BANBURY
THE MASTER MIXER

By D. H. Killeffer

A Biography of
Fernley H. Banbury

Fernley H. Banbury

New York  Palmerton  1962
A biography of Fernley H. Banbury has been long overdue. The word "Banbury" is one of the first to be learned in the vocabulary of the modern rubber industry. And the man who made it so can be credited with one of the most significant advances—the Banbury Mixer—ever made in rubber technology.

In 1916, the year Banbury invented his internal mixer, the rubber industry was on the threshold of the growth that brought it to its present position in the American economy. The automobile was pushing the horse to the back roads, and the truck was beginning its rise to prime carrier of the nation's commodities. For tires on these vehicles, and in many other forms, rubber was needed in steadily increasing volume.

But the time-consuming, laborious operation involved in mixing the rubber with the various compounds to fit it for its applications was badly out of step with the times. It took approximately 25 minutes to feed chunks of rubber onto two-roll mills, add the compounds, break down the mixture and sheet out the compounded rubber. In addition, the mills with their rolls of up to eight feet long, took up a lot of room that could have been used to better advantage.

Thus, the birth of the first Banbury Mixer in 1916 was both welcome and vital to the rubber industry.

It has been a great source of pride for The Goodyear Tire & Rubber Company that the first Banbury Mixer devised by the young engineer on the staff of the Birmingham Iron Foundry in Connecticut was taken to Goodyear Plant No. 1 in Akron for its tryout.

The tests went on day and night, for months. Banbury, in his coveralls and with a "red bandana" tied around his neck,
Foreword

covered with carbon black from head to foot, became a familiar sight as he nursed his machine and its rotating blades through those early trials. His sleep was a matter of short naps on a cot in the first-aid room.

While the first Banbury Mixer could handle only 250 pounds of stock at a time, as compared to 1,000 pounds in the largest of the old mills, it wasn't long until a 750-pound batch could be mixed in two minutes.

Today's modern rubber plants, with their efficiency and ability to handle the materials flow, simply would not have been possible without the Banbury Mixer.

The industry and the nation owe a great debt to Fernley H. Banbury. This excellent book by D. H. Killeffer provides a splendid recognition of that debt.

E. J. Thomas
Chairman of the Board and
Chief Executive Officer
The Goodyear Tire & Rubber Company

Akron, Ohio
June, 1962

Preface

This book has been for me an adventure in friendship. Just as people throughout the chemical process industries have known about the Banbury Mixer, so had I; just as members of The Chemists' Club have long known and passed the time of day with Fernley H. Banbury, so had I. But when I found in 1958 that Ban had preceded me to my chosen spot for retirement,—Clearwater, Florida—our casual relationship ripened into a warm and close friendship. With that, too, my superficial knowledge of the Banbury Mixer required to be broadened and deepened. And so, when our mutual good friend, Mel Lerner of Rubber Age, suggested that Ban and I work together to write this book, it seemed to me an opportunity to be seized.

We have worked together on this enterprise for many months and this has afforded me a welcome association with an important contributor to our age. It has also provided many, many stories of the great and near great who have also had part in the profound changes wrought in American ways of life by the automotive age and its wheels cushioned by rubber tires. Many of these stories form the material of this book. I have endeavored, so far as possible, to preserve in this written text the salty style of Banbury's story telling.

This has not been at all difficult. Not only have I delighted in his style, but I have had the hearty and close cooperation of Ban himself whenever it has been needed. This has had two effects: it has provided a vast store of information ready at hand, but it has also limited flights of imagination that constantly bump into facts.

Instrument makers and tool makers are accustomed to think of their occupations in terms of Paul Revere's horse. This an-
Preface

mal was of course completely indispensible to the patriot's thrilling ride, just as toolmakers are in industry, but neither the horse nor the maker of tools ever gets public credit for his part in the important enterprises of Revere or of the industries that build on tools.

Perhaps this book can do something toward correcting that impression in this field of tool-industry relations. I hope so. Throughout this account of my friend and his activities and his machine runs the golden thread of indispensibility to rubber production. Every part of the industry, but especially the fabrication of tires, is shown here in its close dependence on him. Surely if this case resembles Paul Revere's horse, it does so only in the fundamental service it renders to the main enterprise.

Many people have helped in a variety of ways with the task of writing this book. Friends in England have supplied data and photographs, especially Misses Irene and Ida Banbury (sisters to F.H.B.), William Banbury (a nephew), and S. Lloyd Jones (town clerk of Plymouth). My former associates at Columbian Carbon Company, Messrs. Braendle, Stipak and Daly especially, have supplied data and photographs that have helped tell the story. Friends and associates of Dr. Banbury have supplied information, confirmation and pictures, especially Messrs. Farrel, Strahan, Comes and Ahlefeld of Farrel-Birmingham Company.

Finally, we must acknowledge the valuable help of Mrs. Banbury, who supplied many interesting details, of Mrs. Carol Cox who patiently typed and retyped the manuscript, of Miss Lorna Tuck for typing help, and of Walter Ellis, who read and commented helpfully on the result. To all of them my best thanks, in which I am sure Dr. Banbury joins me.

D.H.K.

Clearwater, Florida
June, 1962

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FERNLEY HOPE BANBURY

Born: Trelidon Farm, St. Germans, Cornwall, England, December 22, 1881. Came to United States, 1904.

Naturalized: First papers, 1905; final, 1922.

Colleges: Lewis Institute of Technology (Chicago), 1903.
Purdue University, B.S., 1906.
Purdue University, D.Eng., 1948.

Honors: Modern Pioneer Scroll of Achievement by the National Association of Manufacturers, 1940.
Charles Goodyear Medal of the Division of Rubber Chemistry, American Chemical Society, 1959.
Honorary Life Member, Los Angeles Rubber Group, 1961.


Sargent & Lundy, Chicago, 1904-1908; Commonwealth Edison Co., Chicago;
Acheson Oildag Co., Niagara Falls and Europe, 1908-1913;
Werner & Pfeiderer, Saginaw, Michigan, 1913-1916;
Birmingham Iron Foundry, Derby, Conn., 1916-1927;
Farrel-Birmingham Co., Ansonia, Conn., 1927 to date. Director, 1927 to end of 1951; retained as consultant.

Banbury:
The Man and His Machine

This is the story of a man and his machine. It is also the story of a great industry during the period of its great internal revolution. It is the story of how this man (Banbury) and this machine (the Banbury Mixer) played an important, if not a spectacular, role in that revolution. But above all this is the story of the day-to-day actions of people in the midst of revolutionary industrial events. If the man turns out to be intensely human, if his machine does a useful task well and economically, if the people sharing in the revolution are not only big names to conjure with, but at the same time human beings like ourselves, if the revolution proves to be the creation of today's automotive transportation in which all of these people shared, so much the better for our story.

To appreciate—even perhaps to understand—this story of industry in the midst of change, we must look first at the broad outline into which our story fits. For the part that our man and his machine performed in the play of great events is not at all evident to most observers. Rather their function was to the rubber industry as its gear train is to a fine watch—utterly essential to its proper operation but hidden from all but the skilled watchmaker who alone ever sees the intimate parts of a fine timepiece.
It is true, of course, that the work of our man and his machine might have been done by others. But it is also true that this did not happen and that our story thus becomes one of success, of how these two were and are the implements employed by the rubber industry to solve its vital problem of dispersion of pigments, particularly carbon black and zinc oxide, in rubber and thus of perfection and uniformity of the industry's products.

In the early years of this century several developments reached their climax in the sudden, almost explosive growth of the automotive industry. World War I replaced army mules with motor trucks, and the years following nurtured the automobile as the public vehicle. The growth of this idea reflected itself in a great and growing demand for rubber tires.

In these same early years experience had piled up a mountain of evidence which finally proved overwhelming—that a special synergy operates when carbon black, the industrial pigment with the finest particle size, is perfectly dispersed in semi-solid gum rubber. A smoke-like dispersion, Twiss has called it. This effect, accentuating the desirable properties of rubber, still remains somewhat a mystery in spite of the fact that a major share of manufacturers of natural rubber, and especially of synthetic rubbers, employ it to advantage and have done so for nearly half a century.

For our present purposes it is not at all necessary to involve ourselves in the uncertain theory behind this extraordinary fact. But it is clearly germane to our story to point out that perfect intimacy of mixing gum and pigment is essential to realize the benefits of their union.

Thus it is that machines and methods for incorporating dry pigment—either carbon black or its white competitor, zinc oxide—into semi-solid gum became especially important to the rubber manufacturer. The standard way to do this in the pre-carbon black era was to employ open two-roll mills, and they are still used for this purpose to a minor extent today. These machines consist essentially of two smooth horizontal rolls set side by side to revolve toward each other at slightly different speeds. They are adjustable so that the space between them can be varied. In use, the ingredients of the rubber compound are introduced (gum first) into the bite of the revolving rolls and the mixture is cut off and repeatedly returned to the rolls until the compound achieves the necessary uniformity.

Two important objections to this technique appeared during the rubber revolution we are discussing. First, carbon black (and zinc oxide as well) by its very fineness and lightness can blow about the plant on the slightest provocation, thus escaping from the open mill to become highly objectionable flying dirt. And second, because the rubber mix on such a mill requires a certain amount of manipulation by hand, workmen suffered adverse effects from some of the chemicals then being added experimentally to rubber on the mill to improve its properties and accelerate its vulcanization.

These objections pointed up the special need for a machine and method that could keep the ingredients of the compound completely enclosed during a mixing cycle which would be carried out without contact with the workmen. In other words, the need was for a totally enclosed, automatic, internal mixer. Several ways of enclosing roll mills were devised and tried, and a number of different kinds of mixers were built for the purpose. But each for one reason or another failed to solve the problem completely.

Fernley H. Banbury overcame objections to these by devising a mixer in which the mixing arms or rotors "smeared" the mixture under substantial pressure against the casing of the mixer and at the same time parted the mass and brought the parts together again in a kind of reverse of the quartering that a chemist employs in taking a small, representative sample from a large amount of material.
The Master Mixer

The device itself is described briefly in Banbury's first patent, U.S. Patent No. 1,200,070 of October 3, 1916:

This invention relates to that class of machines in which revolving blades act in conjunction with stationary surfaces adapted to treat plastic materials and mix other substances therewith.

The object of this invention is to increase the efficiency of machines of this class for preparing rubber, etc., for industrial purposes. To this end the active or working faces of the blades are so formed as to be at acute angles to the stationary surfaces so that as they revolve around or over the same they, by wedging action, press the rubber or other material being treated with considerable force against said surfaces and at the same time by their pushing action of rotation impart to the rubber rolling, kneading and squeezing actions under considerable pressure, thus insuring a thorough working by changes of position of all parts of the mass being treated. The sliding action of the inclined blade tends to impart a smearing action on the rubber.

Another feature of this invention is that the angular direction of the blades relative to the axis of the rotors is such that the leading ends of the blades are adjacent to the ends of the cylindrical chambers with their other ends at or near the centers of the rotors and when two or more blades are used the inner ends of said active surfaces extend from the two ends of the rotor and preferably overlap. By this arrangement, the material being treated is caused to flow or move from the ends toward the center and as the portion of the material in front of a blade passes over its inner end, which it does under a dragging or drawing out action, it is taken up by a blade extending from the other end of the device to be similarly treated and passed again to central position and discharged from the inner end of this blade on to the first mentioned blade. The lines of the active surfaces extending from the hub or base to the peripheries of the blades may be right lines to impart the desired acuteness of the angle between the active surfaces and the stationary surfaces, or such lines may be curved to any desired extent to cause squeezing action on the rubber, etc. by an increase in the acuteness of the angle as the apex of the angularly arranged surfaces is approached.

In practice it is preferred to make the machines of a duplex character, that is, with two cylindrical chambers communicating between them, into which the material to be treated is fed, each being provided with a rotor having the inclined blades of this invention. The material carried over by the two rotors into the communicating chamber will intermingle therein, portions of it will interchange between the rotors and their enclosing cylindrical beds and thus insure a thorough and rapid admixture of, and efficient action on, the materials being treated. A weight fitted to slide freely in the upper part of the communicating chamber may be used to press on the rubber to insure proper feeding action of the blades thereon.

And a claim:

"6. A machine for treating rubber, and other heavy plastic materials, comprising a cylindrical bed having its surface partly or wholly serrated, a rotor having a blade whose active face is transversely curved so as to be inclined at an acute angle to the cylindrical co-acting bed and longitudinally inclined relatively to the axis of the rotor and having its forward or leading edge at one end of the rotor and with its inner or discharge edge located some distance from the other end of the rotor, whereby the material being treated is caused to move or flow toward the center of the rotor.”

The action of the Banbury in mixing a dough of butadiene-styrene rubber (SBR) with carbon black to attain its “smoke-like” dispersion (to use Twiss' word) in rubber has been described by Braendle thus:

"Let's follow such a Banbury mixing cycle: Styrene-butadiene rubber (LTP, e.g.) is dropped into the mixer; the ram is down just long enough to push the rubber through the throat of the mixer; the ram is brought up; black is added, and, say, some oil. The ram is brought down again. There is a large amount of horsepower exerted on the mix by virtue of the combination of higher-than-normal ram pressures and higher-than-normal rotor speeds. Picture the rubber folding and refolding and engulfing handfuls of carbon black and squeezing it with terrific pressure, compacting it with a force it has never before experienced and then shearing it apart again and pushing it and shearing it into the rubber. It has been supercompacted and then subjected to super-shear to undo the damage of the supercompacting."

The special advantages of the Banbury automatic enclosed
mixer, as compared with the previous two-roll open mill, are:

1. Safer, cleaner, more healthy working conditions.
2. Great saving in factory floor space.
3. Great saving in power and labor.
4. Smaller investment in machinery for a given tonnage to be mixed per day.
5. A better and more uniformly mixed stock.
6. Saving in formula cost (raw material) for some stocks.
7. Control of temperature of the mix.

If the right size Banbury is properly installed in the customer's factory, and then works 20 to 24 hours a day for 250 days a year, it commonly pays for itself within a year by savings in labor and power.

The importance of this machine in and its acceptance by the industry will become clear from what follows in this book. Here it seems appropriate to quote from one of many letters to Dr. Banbury by leaders in the rubber industry at the time he received the Charles Goodyear Medal of the Division of Rubber Chemistry of the American Chemical Society (1959).

H. A. Braendle said, "Our friend Banbury's Goodyear lecture was the highlight of the whole affair. He broke with tradition and gave us a warm human story. The character of the man shone through the whole thing. He choked up a couple of times and so did hundreds of us who listened. Probably the only exceptions were some of the young cynics who think a day's work is beneath them and believe that a soft life is their right and is to be handed to them without either the hard work or gratitude to fellow men that has made our industry and country what it is today."

If this account dwells unduly on the functioning of this remarkable machine in the rubber industry, the reason is apparent in its universal adoption in rubber plants. Yet its value is by no means confined to rubber. All kinds of heavy mixing jobs it does economically and well. In plastics, particularly, it can greatly improve the uniformity of mixing that is often essential. For instance, in an important factory that was molding musical records, the use of the Banbury to compound shellac-based plastic so increased the uniformity of the material that rejected records dropped from 16 to 3 per cent and that is equivalent to adding 15.5 per cent to the output of the factory. Clearly a significant improvement.

It remains to look at the man himself. Here we have tabulated the cold facts about him, a factual framework for this story, but . . .

Fernley H. Banbury is "a man renowned in rubber circles the world over for his achievements, his notable service, his high ideals, his integrity and his dedication. He is our good friend and a real gentleman."—A. H. Frederico in bestowing upon Dr. Banbury honorary life membership in the Los Angeles Rubber Group, October 3, 1961.

"Living things," Fernley Banbury once said to me, "are possessed of a mighty power and desire to live that practically controls our actions and our accomplishments. Without this overwhelming power, all our efforts fail."

And in those few words he summed up himself, for surely no one could possess a mightier power to live than he.

His friend, Martin Uhrich, recently characterized him by writing, "Your preference to emphasize 'People and the Banbury Mixer' shows the same instinctive generosity that has been evident in all your contacts throughout the rubber industry."

In the pages that follow appears a gradually developing picture of the personality of this sturdy Cornishman-become-American. Evidence scattered throughout this account attests the keen sense of humor that prompts the sparkling twinkle in his blue eyes. So, too, one cannot miss the inveterate storyteller whose ready smile and easy laughter brighten his ruddy face in appreciation of the humor of others.
Less apparent is his hearty interest in a succession of sports fitted to the several stages of his career: cricket, soccer football and tennis in preparatory school, walking and horse-back riding from his earliest years onward, and now an eager interest in golf on Florida links where the white mane of his hair can be seen any Thursday of the year leading his foursome vigorously around the course.

But it is better to get to his story for here surely is the man himself: Fernley Hope Banbury.

Some of his friends have said that most of the important events of Fernley Banbury's life happened because he once missed the boat. Not figuratively as the modern slang has it, but literally, a ship bound for India that was to take him off to a career in mining gold, as we shall see later.

That was surely the work of what Shakespeare called "a Divinity that shapes our ends, rough-hew them as we may." A powerful factor in his life, but hardly, as I think of it, dominant. Rather, I prefer to believe that men—and this one particularly—can mold circumstances too, just as incidents may affect men. Some very wise man—I cannot remember his name—once said, "When one door shuts, another opens to a better road." That happened to Fernley, often, but it could not have profited him if he had not been prepared to follow that "better road." Circumstances and coincidences exert a great influence on our lives.

But what is far more important than any single incident is the rich background of family, friends and schooling that filled Banbury's youth in Cornwall. All of these supplied elements that shaped and directed him after sturdy Cornish-Devon stock had endowed him with the priceless heritage of a sound and inquiring mind in a healthy body.
He was born the sixth of ten children just eight days before the beginning of 1882, on Trelidon Farm in the parish of St. Germans, County Cornwall, in southwestern England. St. Germans is about 10 miles from the seaport of Plymouth, from which the Pilgrim Fathers long ago sailed on the Mayflower.

This southwestern part of England enjoys a most equable climate because the wondrous Gulf Stream warms the waters around this projecting tongue of land. Even though the British Isles lie about as far north as does frozen Labrador, farmers around where he lived as a boy could turn a furrow with a plow and a pair of horses practically any day, even in winter. His mother, Susan Lord (Coad) Banbury, as a girl was fond of outdoor life including horse-back riding on the lady-like side saddle of that day. She was a good mother and the capable manager of her not-small household. In those days there seemed to be plenty of happy help in the home and outdoors on the farm. Mrs. Banbury loved a garden with plenty of flowers, fruits and vegetables. Some of her fruit was grown on trees splayed over the sunny surface of a long masonry wall.

She, and soon his sisters, knew the botanical, as well as the common, names of the wild flowers that grew profusely in the turf hedges along west of England roads: primroses, campions, meadowsweet, sweetbriar, fox gloves, blue bells, honeysuckle, and many others.

Fernley is a name from our Fernley’s mother's family. The most famous one who bore the name before was a Dr. Fernley who had achieved eminence as a missionary in Canada. Later, toward the turn of the century, the people of West England honored him by an annual series of lectures bearing his name. Banbury recalls that when he was leaving for the United States, Plymouth was placarded with notices of the Fernley lectures. There is also a town of the name in Nevada, near Reno, believed to have been founded by the missionary’s descendants.

The Banburys’ was a good home. They were neither rich nor poor. They were practical, industrious, healthy, religiously inclined, and educated fully up to the common standard of that day, interested in all current happenings—local, national and international. Perhaps they can best be described as comfortably middle class, to use the parlance of that time and place—Cornish folk with a dash of Devon blood. A good background for any young man or woman.

The youngsters had an occasional pet lamb, and nearly always young calves to be admired and talked to, and an occasional young colt. Their dogs and cats were not only pets but were also supposed to be useful in killing the rats and mice that were pests in the farm buildings wherever there was grain.

When the Banbury children grew older they built and fenced in a tennis court, not of course of tournament quality but good enough to give youngsters lots of fun and exercise. Fernley remembers especially the glorious view from that tennis court of the English Channel in the near distance, and to the far left and seaward, the Eddystone lighthouse, well known to travelers headed in for Plymouth or for Southampton. Occasionally they would thrill to see a full-size Atlantic liner on the horizon heading up from the west; or sometimes an excursion boat from Plymouth and often in the late afternoon the sailing of the fishing fleet. They thought they could foretell the weather by whether the Eddystone light looked large (for rain) or small (for fine weather).

All this left wonderful pictures in the memory. As his wife, Christine, more poetic than he, has lately put it:

"Strong in our west country folk is a spirit of adventure, a wideness of outlook, a heritage of the open moorland, the granite tors and the cliffs that held back the sea from us.

"The tremendous Atlantic breakers at the base of sheer rock headlands, the spray, the flying gulls, the keen and salty wind, brought a kind of super-vitality to our spirits—never forgotten, never absent from our consciousness even today after many
decades of absence.

"Stark, grey stone circles, cromlechs, and sacrificial altars older than Stonehenge were an everyday part of our life. Not far away, Tintagel and royal Arthur's court stood on these precipitous cliffs."

Fernley's father, Richard Banbury, was a well known and respected farmer. Perhaps it would be better to call him an agriculturist for he operated four farms, two of average size and two much smaller. Two of these were about 30 miles north of St. Germans near the border between Devon and Cornwall. Richard had been born in this vicinity and raised on one of the farms. So he had in his veins some of the sterling Devon blood that spurred Sir Francis Drake and other Elizabethan navigators and discoverers long ago to adventure around the world.

Richard Banbury somehow managed to have the best men available working for him. Here is a story that fitted his view and that may account for his (and his son's) success with people.

A 10-year-old farm apprentice became dissatisfied with his employer and applied to another farmer for a job. Naturally he was queried quite closely about why he wanted to make the change.

"Does not your employer give you enough to eat?" "Oh, the food is all right," the boy said. "Is your room (lodging) too small or too cold?" "No, that is all right." "Does he work you too many hours?" "No, I like my work and don't get too tired." "Then why do you want to make the change and come to work for me?"

The boy looked up into the second farmer's face and said, "Because he never puts his hand on my shoulder and says, 'Well done—you have done a good job.'"

Richard Banbury's contacts with his men reflected this boy's point of view, which meant good relations between a worker and his boss.

For several decades Richard Banbury was a District Councillor. As such he supervised highways, sanitation, care of the poor and the infirm, and other public matters in the district in which he lived. In his late sixties he became a County Councillor and a Justice of the Peace. These titles and duties indicated that he was rated highly in that part of the country.

The big, roaming, self-propelled threshing outfits came to Cornwall when Fernley was about 12 years old and made a strong impression on him. They were much better than the previous threshing machines pulled by horses. The boy would give up any family meal to see them arrive, prepare for threshing, and then the next, or second day, pack up to leave with great dignity. Painted attractively and so powerful, they gave him the feeling that machinery was great stuff. And anyone could easily see that it led to more efficiency and a more desirable way of life! He loved the smell of the oil and the steam from these powerful engines when they were at work threshing or moving from farm to farm.

Fernley's father was always on the lookout for improvements in his farming operations. When he imported the first of a new type of harvesting machine (a self-raker, that was to replace men with scythes, to cut and cradle the ripe grain), there was much local interest. His son was a proud boy when he was given the chance to operate this machine for a while and to drive the three horses that pulled it.

Perhaps a decade later this machine gave way to another harvesting marvel—the "self-binder," that cut the standing wheat, oats or barley and bound it with twine into sheaves. The workmen had chatted quietly among themselves about what the self-raker might do to their jobs and when they saw what the self-binder did they became seriously worried. But one of the more enlightened ones said: "There should be plenty of easier jobs for us when this machine does the hard work." And so it turned out.
Richard Banbury had training and some practical experience in pharmaceutical chemistry—chemistry as it related to medicine. The accidental drowning of his brother had forced him to give up a city career and to return to operate the family farm. But here, too, his technical training served him well in developing it and the other farms that later came under his care. At first this was useful when chemical fertilizers were used to grow bigger crops, but later it helped in other ways too.

Richard would treat many of the ordinary illnesses that plague a family of growing children by following what was called the "homeopathic bible" with its various related pills. The nearest physician was several miles away, and they had no telephone in those days in Cornwall to call him and only horses to bring him. So it was natural to turn to a father's prescriptions that more often than not did the job with the help of the natural health, strength and immunities of his children and household. The Banbury veterinarian was even farther away than their physician, and so, too, Richard occasionally had to treat the farm animals as well.

Both the physician and the veterinarian came to the farm occasionally for general consultations and in emergencies when expert advice and help were needed. On these occasions there would be long and leisurely talks, sometimes dropping into what was to Fernley an unknown tongue as the topics and words got more technical. Soon the father was to specify his favorite, Latin, as the first foreign language for his son to learn. At one time his parents had the idea of making a medical doctor out of Fernley, but he could not easily stand the sight of human blood and turned in a different direction.

Richard Banbury had great determination and an ability in his treatment of his farm animals that was quite remarkable, as this little story shows:

He was returning home from his distant farm, "Whately," driving an unusually fine young horse. On the way the horse took suddenly sick in a hotel livery stable. After some hours' treatment by a local vet (not his regular man), Mr. Banbury was told the animal's condition was very serious, and a little later was told again that there was no chance for the horse to recover. Then Mr. Banbury himself took charge and every half hour gave the horse a dose of a different and favorite homeopathic medicine of his own (aconite, probably) as he had prescribed it many, many times before.

Next morning the vet sent his man around to ask what time the horse had died, only to learn that the horse was on his feet again and would soon be trotting quietly along on the remainder of the journey home.

A year or so later this same horse was sold to a well-placed man in Plymouth who loved horses, and a couple of years after that the horse took first prize in a class open to all of England.

This was probably the finest horse Fernley has ever ridden. So gentle, with such manners, so good-looking, a chestnut with a white star in his forehead—he handled his feet and his head well and proudly. Many years later, Fernley was surprised and delighted to see a photograph of this horse on the desk of the town clerk of Plymouth when he called there on an entirely unrelated matter.

Horses were always a prime interest of Fernley's, whether they were good farm horses or good for riding and driving. When later he became involved in the business of the Banbury Mixer nothing pleased him better than a few days of horse-back riding out in the Arizona country en route to or from California. Occasionally he has been able to take a couple of hours riding nearer home. But as his years accumulated he came to feel that hitting a golf ball with friends on a good golf course was a pleasing and more practical form of exercise and relaxation.

Now something about his early schooling. The local day school was a mile and a half away from the Banbury home across
fields and a valley with a pleasant stream in it. After finishing
there, when he was just over twelve years old, Fernley's father
sent him to Shebbear College near the Lorna Doone country
in north Devonshire. (He pronounced that name, Sheb-be-ar.)
The headmaster, a Mr. Ruddle, naturally liked all the boys to
play athletic games. Fernley chose cricket and tennis and en-
joyed both, as well as the school life there. Next he went to
Harleigh House in Bodmin, the capital town of County Corn-
wall. There he played soccer football and the boys were drilled
once or twice a week by an ex-army sergeant. The headmaster, a
Mr. Stranger, often told his pupils he came from Cincinnati, in
the United States. He imposed strict discipline and required
hard study. Mrs. Stranger was responsible for the dining room
and was much liked by the students; now and then she provided
special Sunday dinners for them.

About this time a decision had to be made whether young
Banbury should stay on the land as the family men usually
had done, or whether he should select some other field for his
life's work. He chose mechanical engineering.

The Banburys had considerable machinery on their farms,
and two small factories within three miles of their home made
farm machinery. One of these belonged to Davey Sleep, a
friend of Richard Banbury and father of Mrs. Fred Sargent who
appears in our next chapter.

After considerable investigating, the senior Banbury selected
Bickle and Company of Plymouth as the place where his son
should train, since it was larger and made a more varied line of
machinery than the others. The Bickle operations included the
building of mining machinery, much of it for Mexico and
Africa and some for quarries nearer home, as well as a consider-
able amount of repair work, some on ocean-going ships.

Richard Banbury signed up his son for a two-year apprentice-
ship with this company and paid his tuition, as apprentices
were supposed never to be able to work their own way. The
company agreed to give Fernley working experience in its
machine shop and in its drawing office, supplemented by occa-
sional periods in the pattern shop, foundry and blacksmith
shop where he could observe what was done and chat freely
with the foremen. These foremen were capable men and the
general supervision of the company was excellent. Work started
at six in the morning and the workers were allowed half an
hour for breakfast at eight.

Toward the end of this agreement, Fernley was in the draw-
ing office under J. T. Bickle (who later made a name for him-
self in mining engineering in the United States and in Mexico)
when the top talent there was taken away to open another
drawing office elsewhere in Plymouth to work on a new type
of drive for an automobile. That suddenly left the young ap-
prentice as senior draftsman, doing jobs that were a bit over his
head, but he was fortunate to be able to depend for help on
the two most experienced foremen (Anstey and Ivey) whose
good will he had fortunately attracted. A clever young office
boy, too, helped in locating the drawings from prior jobs that
were just the right thing to help with the new orders. Mr.
Jebus Bickle, general manager and a good engineer, undoubt-
edly assisted also by looking over Banbury's finished drawings
and instructions before they went to the production department.
And so the jobs were built and performed as expected.

Here we must interrupt this narrative of training and school-
ing to introduce Mr. Bickle's daughter, Christine, a student in
a school of art near her father's consulting office. For it was
at this time that Fernley Banbury met the slight, bright, viva-
cious young lady who was later to become his life partner. Such
first meetings are commonly supposed to be clothed in an aura
of romance, moonlight and stardust. But this one was not of
that sort. As nearly as the principals can recall now, this is what
happened.

One morning Fernley was alone in Mr. Bickle's consulting
office in Princess Square, Plymouth. He was diligently working over some drawings when a stranger, a young lady, appeared at the door. The dialogue, hardly soul-stirring, went something like this:

She (in the doorway): I'm looking for my father.
His (intent on his work): He's not here now.
She: May I come in and wait for him?
His: If you like.
She (coming into the room): I don't see any chair.
His: This will do.

And with that he picked her up bodily and set her on a high draftsman's stool. Then he went back to his work. Soon she tired of sitting on a stool with her feet dangling, and in a room with a young man absorbed in something else.

So she returned to her class work. The school was in a fine classical-type building situated in Princess Square Gardens, one of those small, leafy, beloved retreats so general in English towns.

These schools throughout the country were always well staffed and were subject to central control, being branches of the South Kensington Institute of Arts and Sciences in London. Examinations were given and diplomas awarded by the London Board of Governors. The curriculum was widely inclusive: plane and solid geometry, free-hand drawing from the antique, design, applied art, flowers and still-life painting, clay modelling, portrait and figure work.

Christine received scholarships and certificates in most subjects and eventually was teaching as well as studying there. She continued there until her family moved to Cornwall, when she entered the Camborne School of Art.

Before leaving for the United States in April, 1904, Fernley had twice taken Christine and her sister to spend a day with his family in the lovely countryside. On one occasion they were harvesting. Once they had been with friends at a picnic on Lord Mount Edgecombe’s beautiful estate, open that day to the public. Her brother came down to the farm several times for the shooting. Once Fernley stayed a night at her parents' home in Plymouth when torrential rains made it undesirable for him to cycle the twelve miles from Mr. Bickle's office to his home in Cornwall. No engagement was ever thought of then, although it is true that they took pleasure in each others' company.

This was the girl who, about seven years later, in January, 1910, became Mrs. Banbury, after only a two months' engagement. Fernley was then on a business trip which involved seeing her father again. Staying the night at their home (in the autumn of 1909), and without any correspondence in the meantime since he had left for America, Christine and Fernley both realized that they belonged together. So they promptly decided to get married.

In that day of long engagements, this one was notably short, but Christine continues to this day to manage her husband with gentle humor that can become surprisingly firm at need. Christine's family background was crowded with adventure. Her maternal grandfather, John Treenery, and his five brothers were wild seafaring men, skippers and mates of schooners who sailed around the world and on the seven seas.

All lost their lives in far-off places except Captain John, who came back to build a pleasant house, to grow roses and to become a deeply religious man under the influence of his friend, General William Booth of the Salvation Army.

On her father's side were inventors and engineers, quiet and home-loving men whose adventures were chiefly in the realm of thought, where they were daring and original, in advance of their era. Science, the arts and literature, together with a great love of nature in all its aspects, comprised their life.

Of this marriage, two sons were born: Richard Hope on July
5, 1913, in Purley, Surrey, England, at the time his father was connected with the Acheson company, and later christened in Peterborough Cathedral; and David, on May 18, 1918, in Ansonia, Connecticut. Both boys contracted diphtheria during an epidemic in 1926; only Richard recovered.

Richard was a stalwart youngster and devoted to his younger brother, whom he twice rescued from serious danger, once from drowning in a half frozen canal, and once by dragging his sled from the path of a skidding car on an icy hill. Richard later attended and graduated from Choate School and Yale University to become a solid citizen of his community. In 1937 he married Miss Geraldine M. Foley, daughter of Mr. and Mrs. Frank F. Foley of Hartford, where they now make their home. Their only son, Richard Fernley, is a promising student in Yale Law School as this is written.

During his apprenticeship Fernley was expected to study in the evening at the Plymouth Technical School.

"I remember especially," he says, "the course in Fundamental Engineering with the emphasis on 'fundamental,' which covered the basic formulae of engineering and allied sciences. A wonderful teacher, a martinet connected with the British Navy, taught this course and boasted at the very start that this was the hardest course in the school and that he expected no more than 50 per cent of the class to pass. But I passed it and later it proved invaluable in my career."

Next came a summer course in mine assaying at Penzance School of Mines and a similar summer course in mine surveying loosely connected with the Camborne School of Mines. In each case Fernley had a special full time personal instructor from each school. His father, acting on advice, evidently believed in concentrating on one subject at a time until you got such a knowledge of it that you could easily pass the required examinations.

At Penzance School of Mines, Fernley assayed many mineral ores, particularly for tin, lead, gold, silver, zinc and copper. One of the incidents that stays in his memory from this course at Penzance was some assays of silver ore. His results consistently showed a higher content of the precious metal than a class who had assayed it before, and so his tutor advised him to go to Mexico where, as he said, "everybody is looking for a higher percentage of silver."

All of this schooling and training gave young Banbury a far better grounding in the fundamentals than most boys were able to get in the England of that day and it also provided him with a number of treasured diplomas and certificates.

Now he wanted a job, and with this kind of training it looked as if he would have to go overseas, as many young Cornishmen then did. And that is why Fernley Hope Banbury decided to embark upon the ship that, with important consequences to himself, he missed!
An acquaintance of Richard Banbury held a responsible position with a well-known, large gold mining company that had an office in London and mines in India and other countries. His duties required him to be in India much of the time but occasionally he came back to his old home in Liskeard which was near the Banbury home. He offered to take young Fernley in charge if the young man would join him when the boat left Southampton for India. The mines, he said, were at an elevation of about a mile and that made living conditions better than in most of India.

Realizing that saying farewell to home and mother before starting out for far-off India might be rather painful, Fernley planned with his parents that he should take leave of them about ten days ahead of his ultimate sailing and then take a trip to say his farewells to relatives and friends in the surrounding countryside. He planned to return a day or so before the boat sailed for a final quickie good-bye to his home. But somehow his horse and carriage brought him home only two hours before the boat sailed—and Southampton was some 150 miles away!

"So," he says, "I missed that boat. I never was able to account for just where that missing day got lost."
Richard and Susan Banbury, Fernley's parents

Christine and Fernley Banbury on their Golden Wedding voyage
Then shortly afterward the hand of Providence showed itself. A Mr. Fred Sargent from Chicago, with his attractive young daughter, called at the Banbury home one afternoon. When Sargent was young he had lived with his parents in Liskeard about 8 miles from Mrs. Banbury's family on Trelidon Farm and she knew him while they were happy young people. Mr. Sargent by the time of this fateful visit had become the head of Sargent & Lundy, consulting engineers in Chicago. He had, among other clients, Samuel Insull and the Commonwealth Edison Company, Chicago public utility firm of which Insull was president, and for them he had gone to Europe two or three times seeking the most efficient steam turbine to replace the reciprocating steam engines used to drive electric generators in those days.

Mr. Sargent had stopped on a trip to see the Banburys. One of his first questions was, "Has Fernley finished his schooling?", and this led quite easily and quickly to a proposal that the young man travel with the Sargents to the United States.

Fernley had been thinking about going abroad. His father confided that he himself had at one time been anxious to go to the United States. However, the drowning of his brother had put Richard in responsible charge of the family's affairs and thus kept him on the farm where he had to forget his dream of America.

So it was arranged that Fernley would travel on the same boat as the Sargents for New York. He planned to get employment with Allis-Chalmers Company of Milwaukee and carried with him a letter of introduction to the president from their London manager. On the boat, Mr. Sargent and his young protégé had several chats together over the rail between his first class and the lad's second class. Later Banbury was invited to travel from New York to Chicago with the Sargents and to stay at their home a couple of weeks to rub off some idiosyncrasies before going on to Milwaukee.
After a few days, Mr. Sargent said to Fernley, "Why don't you come down to our office for a few days and see how we do things. It would be good experience for you." He introduced the young man to his staff and took him out for lunch a couple of times. He also set the young man to work on a drawing board next to an experienced draftsman. Then one day he said, "I know the president of Allis-Chalmers quite well, and if you'd like me to do so, I will tell him you have decided to stay here in Chicago."

But Fernley said that all his training had been along the Allis-Chalmers lines and that he knew practically nothing about electricity. This, he thought, would place him under a handicap with an organization catering principally to companies generating electricity in a big way.

Mr. Sargent said, "In that case, it might be a very smart move for you to go to an American university to get a degree in electrical engineering."

Fernley did not jump at the idea, for he wanted to be done with schooling and at work doing things. A few days later, Mr. Sargent mentioned again this idea of going back to school. This prompted the young man to ask, "If I do go back to school, which school do you suggest for me?"

He replied, "Of course, M.I.T. is tops, but we will also be satisfied if you go to either Cornell or Michigan and there is a young school called Purdue down in Indiana. We would also be very glad if you go there because we like the type of professors they are getting and some of us out here in the Midwest plan to see it eventually the equal of any school—including M.I.T."

Obviously this was much more than a passing notion of Mr. Sargent's, and so the young man began to do some serious thinking. The next evening he mailed to each of the schools a letter telling where he had come from, something about his schooling and training, naming the engineering certificates and diplomas he had received, and adding that he was in the drafting room of Sargent & Lundy and on the fringes of the Commonwealth Edison Company. He added that he wanted a degree in electrical engineering, but was frankly afraid to take an entrance examination because of differences of meaning between many words and expressions here and in England. He asked each school to state if it would omit an entrance examination in view of his previous schooling. The letter to each school was precisely the same. He mailed all four at the same moment in the same mailbox and as he did so, he said to himself, "The first school that says 'yes' to me, I will say 'yes' to it." He did not realize the distances between places here in the United States.

Almost at once word from Purdue said "We will take you without entrance examinations. Report the day after Labor Day." Then Michigan replied in the same vein a few hours later, and Cornell a little later still. Then good old M.I.T., one or two days later, said "Yes, but subject to a personal interview."

He kept his promise to himself and took Purdue, because frankly he had not expected any school to say "yes" so easily and so quickly.

Of his decision, Banbury says, "I am glad I went to Purdue. It was with me 'love at first sight.' I worked hard with a full schedule and, with the help of several credits they gave me after my arrival, I got through in two years (instead of the usual four) with a B.Sc. in Electrical Engineering in June, 1906. My thanks for this went to some very excellent and kind professors at Purdue. I had spent the summer of 1905 at the Lewis Institute of Technology in Chicago taking a special short course in Physics. I do not recommend such a rush college course, but I wanted to get back to productive work."

Strangely, the local district manager of American Express, a Mr. Lancaster, had talked to the Registrar at the University on the morning of the day Fernley arrived at Purdue. The Registrar
was Professor Ted Davis, who years later lived near the Banbury's in Connecticut and who was long connected with Scoville Manufacturing Co., of Waterbury.

Mr. Lancaster said, "I live in a big house, as you know, down on the bluff less than a mile from the campus center and overlooking the Wabash River Valley. We serve a wonderful table and there are only four of us, my wife and I and my son and his wife. We have never taken any students and would like you to send us one—not a local boy but preferably one from a long distance away."

So the young Cornishman in his first year in this country was given the chance to live in a good American home with an interesting group of four people and a maid to wait on them. For his second year he roomed at the Y.M.C.A., in order to get more university contacts on the campus.

After graduation from Purdue came a few weeks of happy vacation at Mr. Sargent's lovely home on the shores of Lake Michigan. Later, after he had started to work, the Sargents invited him to spend most of the long week-ends and national holidays in their home.

Banbury spent the next two years or so at the Fisk Street Station of Commonwealth Edison under the over-all guidance of Mr. Sargent. First he was inspector of piling and concrete construction work for some extensions of the station, then the most talked of public utility job in the country for its size and its use of steam turbines instead of reciprocating engines to drive its electric generators. Then came a series of free-lance jobs at the same plant.

One of the free-lance assignments concerned the 1,800 tons of coal burned each day to produce steam for the turbines. One day Mr. Sargent said, "Dr. Chauvezz is leaving us shortly to take his internment in a local hospital. He has done a fine job for us and we're anxious that you team up with him for a few hours each day until he leaves. He has told us that he will be very willing to pass on to you, as far as he can, his experiences with us."

Each morning Dr. Chauvezz (or someone he would assign) would walk over each of the 40 or so cars of coal unloaded per day to make a rough check to see if the coal was up to the sellers' description.

Bushel samples would be ordered from several cars for later analysis. The skeptical men in the boiler room used to say that the amount of clay that stuck to the inspector's shoes as he walked over the cars was a better indication of the burnability than was any laboratory test for B.T.U., etc.

Right from the start Banbury was intrigued by the "quartering" that produced a representative sample for the chemist in the laboratory. This quartering reduced a bushel or so from the car to a final sample about the size of a duck's egg. The coal bought was "slack," of small but variable sized pieces. The first large sample would be taken to a place free from draft and the largest lumps broken up to a small, uniform size. Then the total amount well mixed would be heaped up into a cone. Then opposite quarters were discarded and the two remaining opposite quarters well mixed were heaped into a smaller cone. Then again opposite quarters would be discarded from that cone. Grinding reduced the coal to powder during the quartering. This would continue until the sample got down to about egg-sized. This roughly describes the "quartering" process.

"It did intrigue me," Banbury says, "as being sensible and accurate. In later years I often thought about quartering in another connection. I liked to imagine the reversal of this quartering. To my mind there is a similarity between what we tried to do in the Banbury Mixer and the reverse of this quartering process to get the thorough interchange inside the mixer. This supplements the smearing action of our rotor blades. So, I remember those samplings that we did back in Chicago, because they spurred my imagination along the right lines."
Another special assignment was as the youngest of four men detailed as a team to study many aspects of steam boiler efficiency and the smoke that sometimes belched into the atmosphere.

He told Mr. Sargent that he felt a "babe" compared to the other three experienced men of this group.

The chief replied, "I know it. Listen with both your ears for the first few weeks. Say little if anything. Then ask questions. You are more recently out of school than they, and the theory of things should be fresh in your mind. Perhaps you may be able to advance some new points of view and to offer some suggestions of real value. Don't belittle the training you have had. We are spending a substantial sum of money on this investigation and we are purposely using people of different backgrounds. We have selected you to be on that little team. In due course there will be an important written report to be made by all four of you as a team or as individuals. We anticipate some interesting results."

Two of the men were from Babcock & Wilcox, the boiler manufacturers, and the other two represented Sargent & Lundy, the consulting engineers, and their principals, the Commonwealth Edison Co.

This was a new and very interesting period for the young man. It gave him chances to listen to what each man would like to investigate, and to work out detailed plans. This often involved changes and much running of tests (each test was eight hours long for better accuracy). Then followed talks about what the tests proved, subjects of many arguments and repetitions of tests. And what long hours they worked happily!

And when time came to write up the report, the investigators split into two groups, not agreeing. Banbury was the junior, and agreed with Boyd Bryden, one of Sargent & Lundy's top men. Bryden delivered to Mr. Sargent the report that the two had written giving a tremendous lot of figures and facts. After inspecting the report, Mr. Sargent said, "This is the best report ever received by this office."

One morning, a few months before Banbury left Sargent & Lundy, Mr. Sargent had said to him in a friendly, fatherly way, "You have already taken one step up the ladder of success. You are going to have to put up with a lot of jealousy. I don't know that I can tell you how to bear it, but try to get along with it as well as you can."

Mr. Sargent was a vital part of the young engineer's life—indeed he was a kind of engineering godfather to the younger man. His name will come up again and again in this book.

A few weeks later, Mr. Sargent suggested it was time for Banbury to take a vacation—why not join the Sargents down on the shores on the Gulf of Mexico. But Fernley had become deeply interested in these tests and persuaded the older man to let him do a little more work on his own. Banbury was a hound for work, and wanted to get better established in his new country. That might have been a wonderful vacation!

The further testing Banbury did gave him a better standing as a youngster, and soon a special trip of several weeks' duration was arranged for him to see much in power engineering in the United States and Canada, and to meet some top men in public utility companies and their staffs. This trip was to be partly a reward for work already done and partly a training for the future.

This special and wonderful trip led quite unexpectedly to a change in the pattern of his life and to his joining with Dr. Edward Goodrich Acheson, famous as the creator of Carborundum and artificial graphite, to do an important job for him.
The Master Mixer

Acheson, in America and Europe

"I first met Dr. Acheson in his office in Niagara Falls in the early summer of 1908," Mr. Banbury recalls. "He was already famous, the inventor of Carborundum, silicon carbide, which possessed extremely useful properties as an abrasive, and of a method of making graphite synthetically in the electric furnace, and I was a young engineer on a journey of exploration and training for Commonwealth Edison.

"Our broad problem at Commonwealth Edison was to improve efficiency and economy in generating electric power. The steam turbines we had installed gained economy as steam temperatures and pressures were raised and this in turn called for better refractory brick for furnace linings. I was looking for this better refractory when I went to see Dr. Acheson. I had spent the day before in Schenectady with the well known Mr. Emmet of General Electric on other phases of our problem and he had given me a letter of introduction to Dr. Acheson. Both Mr. Sargent and Mr. Insull (of Commonwealth Edison) thought this would put me on a better footing with the doctor than a similar letter from either of them."

Banbury tried to get the Doctor to talk that morning about his Siloxicon, a low grade Carborundum for fire brick. But he insisted instead on telling the story of his new lubricants, Aqua-

dag and Oildag, believing that Banbury might be able to help him get these products started in Commonwealth Edison.

"When I asked him for more and still more substantiating data to convince me before I attempted to convince my people," Banbury says, "he became slightly irritated. Perhaps I was a bit tactless. He said, 'You should be prepared to take my word for what I say. I assure you that you young fellows just out of college have a great deal to learn.'

"Seeing that I had really offended him, I said quietly to myself via a little German phrase I often used then, 'Ich habe nicht been doing very smartly here today.' To try to correct this I explained that back in Chicago we regarded him most highly as a man who had done really big things and I was sorry to have offended him.

"'You, Dr. Acheson, have done things, whereas I am only a youngster trying to get started.' I further explained that at one period in Plymouth, I was nicknamed 'What-Is-That-For' by some of my younger associates.

"That put us back on a good basis again and soon he interrupted our normal, easy conversation to ask, 'How many languages do you know?'

"I told him three—French, Latin and German—but only book knowledge, for I certainly did not wish to give him the impression I was a linguist.

"After some minutes I brought him back to my subject by asking again where I could get some real, first hand information about Siloxicon. He sent me a few blocks away up the street to see Mr. Frank Tone, president of the Carborundum Company, who told me what I wanted to know."

A few weeks later Dr. Acheson came to Banbury's office in Chicago, quite unannounced, and smilingly said, "I suppose you are surprised to see me here."

"Yes," was the response, "but I am glad to see you. What can I do for you?"
Then the Doctor said, "I am here to ask you to leave this company and come with me. Within a few months I want you to go to Europe for me to look after my patents and my business affairs there. I want to start several factories there. I will make it very attractive to you, financially and in other ways, too, I hope."

Banbury's reply was, "Thank you for the offer, but the answer is 'No'."

"Tell me why."

"My people here in Chicago have been mighty good to me. They have openly appreciated the things I have done for them. I would be ungrateful to leave them."

About five months before, Mr. Sargent had told the young engineer that he and Mr. Insull had conferred on how to recompense him for the special things he had done. They had decided that a substantial raise in pay, or a better position or title was not in order because either would create jealousy. So they recommended that he take, as both a reward and an education, a good long trip at their expense. He must stay within the confines of the U.S.A. and Canada, and remember that he belonged to the Edison Company, but otherwise he was to have plenty of freedom to go much as he pleased.

"We want you to visit the plants and the top operating people in several of the best public utility organizations in this country," they said, "and we'll arrange it. The Babcock and Wilcox people (from whom we buy our big boilers) will take you in charge and show you around Pittsburgh with its big steel mills and around New York City. They will take you to some of the companies making the best firebricks in the country. You will also visit the excellent ceramics department at Ohio State."

"Moreover," Mr. Sargent had added, "take some time out for some real relaxation." For Banbury to leave his connection with such people lightly would have been unappreciative and foolish.

When Banbury explained all this, the Doctor asked, "May I see your superiors and talk this over with them?"

"Only if you start by saying I have turned down your offer and that I do not want to leave."

Dr. Acheson and Samuel Insull had been together with Thomas Edison years before and Mr. Sargent was close to Insull. So their conference about the young man's future was surely friendly but it was also confidential.

Some hours later the Doctor returned to Banbury's office just before quitting time. He evidently had had a strenuous interview and seemed tired. With a friendly, "They are going to talk with you tomorrow," he left the young man.

Next morning, Mr. Sargent told Banbury, "There are several aspects to this question. We in this public utility business have to be very careful and conservative in engineering, to staff, and to operate a company like the Commonwealth Edison safely, for the lights must never fail, not even for a single second. But an inventor—and Dr. Acheson is certainly a good one—is by temperament a gambler. He can and does take chances that we never could. He makes changes quickly and often. Our equipment is very expensive and takes time to procure. But an inventor can often dream up a thing while he is shaving in the morning and try it out by ten o'clock and frequently do it at very little expense.

"You would, therefore, be in an entirely different mental atmosphere with Dr. Acheson. He is very eager to have you. He apparently wants you principally to do a job for him in Europe, and I know you can do it and do it well. You would be on your own there and removed from some of his quick changes. I think you and the Doctor should state to each other: (a) that he will adequately support you in this undertaking; and (b) that you will stay with him at least four or five years to see the job through. We will be sorry to see you go and will be glad to have you return when you have done the job. When
you come back you will be a much more experienced and competent man, and probably you will command more money and have more in your bank account than if you had stayed with us, taking your normal increases."

So Banbury went with Dr. Acheson in Niagara Falls. That was just after Labor Day, 1908. Promptly the Doctor began teaching him the art of making Aquadag and Oildag in preparation for his going to Europe. But the Doctor soon decided to delay this European trip to see if he could inspire and direct the younger man to help improve his processes. This field was quite new to Banbury and so he worked right along under the Doctor's direction and oversight, operating plants in Dunkirk, N. Y., and in East Boston, Mass., each for some months. In them he tried many, many variations, including the use of natural waters from the greatest variety of sources because the Doctor was convinced that minute differences in the composition of the water used could profoundly affect the products.

Several times in those earliest days in Niagara Falls, the Doctor told his young protégé, "I am nearly sixty years old. I have the money to finance these developments, so you need not be too afraid to spend it. I hired you from Chicago because I was told you were a hustler who could get results. I am extremely anxious to see this thing put over to become a big worth-while development during my lifetime."

In spite of this interest in developing new methods, Banbury made a preliminary trip to Europe in the fall of 1909, operating a little portable plant in Genoa, Italy, in Antwerp, Belgium, and in Calais, France. The purpose of this was partly experimental and partly to meet requirements in the several countries requiring patents to be worked.

Later commercial size plants were installed and operated to make Aquadag and Oildag in Epinal, France; in Novara, Italy; in Verviere, Belgium; in Fiume, Hungary; in Cantrida, Austria; and in Plymouth, England. Earlier a smaller plant had been quickly installed and put into operation in Camborne, England, when Acheson's patent lawyers thought this necessary to maintain British patent protection under the compulsory working law. Banbury's early responsibility was this working requirement of patents in Europe, and this also brought him in close contact with the company's American patent lawyers.

After a conference with their New York patent counsel one morning, the Doctor and Banbury sauntered to a good place he knew for lunch. A second after they had passed through the front door of the restaurant, several tons of glass from the skyscraper's windows above came crashing down on the spot they had just passed. After a few minutes the Doctor said, "It looks as if we are spared to do something worth while together." That was the moment of the famous Black Tom munitions explosion out in New Jersey that broke so many windows in New York miles away.

On an early trip to Europe Banbury took along a nicely tabulated sheet prepared by one of Acheson's patent men to give him the salient facts on protecting, working and paying taxes on patents in the several European countries. But this information differed in many cases from what he learned directly from patent correspondents in Europe. One of them in Brussels explained the discrepancies by saying, "Remember patent law is an art and not a science."

The Doctor's plan of action for Europe was something like this: He, his American patent attorneys, and Banbury, would decide in conference which countries should have Oildag and Aquadag factories. Then Banbury would select the town most suitable in each country, the best water being a major consideration. Banbury would procure the factory, install the equipment, see that a proper local company was formed, and start up the operation. The Doctor would send over someone from the U. S. for Banbury to install to operate the factory, and Banbury would
look for a man (a native), or an organization, to sell the product.

Dr. Acheson in those days feared ill will and possible obstruction from certain big companies. One of the things he often asked Banbury to do in Europe was to delay naming his principal, the Acheson company. So Banbury operated under his own name until the factory was erected and about ready to start up, telling the local people concerned that a substantial American company behind him would be named at the proper time. As soon as the factory was ready to operate and the local company had been formed, its name appeared over the front door.

Despite his great achievements in other directions, the Doctor was not always a good judge of men and this sometimes caused him trouble. Once, around 1910, he cabled Banbury, in effect, "If you can leave Europe for a while without damage to our interests there, I wish you would come home as soon as convenient. Something here is worrying me. I am going to Florida in a few days but will leave a letter telling you my misgivings, and hope you can correct whatever is wrong."

Banbury hurried back to Niagara Falls, found the difficulty, and soon put it to rights.

The patent attorney-correspondents in the various countries of Europe had been selected by the company’s American patent people and all proved to be excellent in their fields. The people that Banbury met in the various European countries and who helped him to start factories there invariably did good jobs. He met not a single case of crooked dealing but many cases of real cooperation and business friendship. Altogether the operation enjoyed outstandingly good international cooperation.

From the time of his first meeting with Banbury, the Doctor perhaps exaggerated the younger man’s knowledge of foreign languages. In those days English was not so much spoken on the Continent as it is today. His wife, Christine (they had been married in January, 1910) brushed up on her French and soon became a real help with this language. She also became fairly good with Italian. She was not tied down with household chores so her husband procured for her a second-hand typewriter and she became a great help to the project as a part-time secretary and interpreter (without salary!).

Occasionally they hired an interpreter. The outstanding one was Signor Stuparish in Fiume, who could handle several languages well, and to a certain extent, eleven or twelve others, some of them probably dialects, of which southern Europe has a great abundance.

To the Banburys, Italian was the easiest language they had ever tried to learn. Of course their grammar may have been atrocious but people were extremely tolerant. This tolerance was helped along, undoubtedly, by the fact that the Americans represented a rich American company that was likely to spend some real money.

Good past associations can greatly help a man. Just before starting up the Novara plant, Banbury contacted the Edison Company in Milan to arrange for a supply of power. Banbury started off with his halting Italian, when the Italian manager interrupted in perfect English: "We'll get along faster in your language."

Upon hearing that Banbury had been connected with the Edison Company in Chicago, the manager at once rattled off the names of several of the important men there that both knew, including their first names and some of their nicknames. With such a favorable start the American asked for a contract containing a minimum of small print (with an English translation of the Italian), and also for his very best rate (price) for power, reminding him that the load was steady twenty-four hours a day and seven days a week. How well he treated these requests and what a good rate he gave!

That evening Banbury wrote to Mr. Sargent back in Chicago,
telling of his meeting with the Italian engineer who knew so
many people in the Edison Company.

Mr. Sargent replied, "Certainly we know him and rate him
very highly. At this moment we have two men on the high seas
bound for Milan to study his new, apparently excellent, under-
ground conduit system for electric cables."

Banbury's several years with Dr. Acheson and the Oliday
Company included much intense and very interesting work.
They also included pleasantly remembered social activities,
among them weekends spent at Dr. Acheson's home in Niagara
Falls and many pleasant contacts abroad.

The Doctor could be a perfect host. The day after Banbury
had located and arranged for the Verriere plant, the Doctor
and members of his family were at the Palais Hotel in Brussels.
In the evening he said, "Let's celebrate tomorrow, hire a car,
a guide, and all of us go out to see the battlefield of Waterloo
and the surrounding country."

Once he wired that he and Mrs. Acheson were arriving in
Naples on a certain day and for Banbury to come down and
spend a few days with them, bringing Mrs. Banbury with him.
They were then in Novara. The Doctor made the first day light-
hearted with a little sightseeing and with jokes about the local
arrangements to keep the mosquitoes from eating the hotel
guests. The next day or two they discussed business problems.

Then there was a tea that Mrs. Acheson once gave at her
hotel on Northumberland Avenue, London, for Banbury's sis-
ter, then living in near-by Bexhill-on-Sea. On this occasion, the
hostess, with her usual graciousness, spoke about what she called
"the fine support your brother is giving the Doctor."

Many years have passed since these events took place and on
March 9, 1960, the fiftieth anniversary of the Acheson opera-
tion in Plymouth, England, was celebrated there. Howard A.
Acheson, president of the Acheson organization, was a principal
speaker and he recalled the important part Banbury had played
in the early development of the company in Plymouth:

"After two years of encouraging development (of his col-
loidal graphite lubricants, Aquadag and Oliday) in the United
States, Dr. Acheson was convinced he had created something
of worldwide importance and for that reason turned his eyes
toward Europe for broadened manufacture and marketing of
this new product. His European patents he rightly considered
very important and to protect these he felt he should, in certain
of the countries, establish actual small production units. For
that purpose, however, he needed a capable engineer to select
proper locations and to set up initial production equipment.

"He was very fortunate indeed to find available for such an
assignment a young engineer, then employed in Chicago but
interestingly enough, a native of Plymouth, England. This was
Fenley H. Banbury, who, a number of years later, after having
served Dr. Acheson most capably, returned to the United States
to achieve considerable fame in his own right by inventing and
developing the famous Banbury Mixer used widely by the rub-
ber and plastics industries.

"When Dr. Banbury was reminded that we would today be
celebrating the Fiftieth Anniversary of the operation which he
personally established for Dr. Acheson here in Plymouth, he
evidenced considerable interest and set down the following
comments primarily directed toward The Lord Mayor.

TO THE LORD MAYOR OF PLYMOUTH:

The writer is very happy because my home town of Plymouth,
England, is celebrating today a birthday of Dr. E. G. Acheson.
The present day industrial world has been much benefited by
the many products which he invented and then produced in
large quantities. For instance: Carborundum, then the several
Acheson graphite products (which like Carborundum have their
genesis in a big, special, electric furnaces), and his colloidal graph-
ite products, Aquadag and Oliday.

Dr. Acheson knew what he wanted and how to get it. Within
a few weeks after I first met him in Niagara Falls he unex-
pectedly arrived at the office of my employer in Chicago, saying
he wanted me to join his company and soon go to Europe to open up his Aquadag and Oildag business there. Five or six factories to make these products would have to be spotted around Europe and one factory in England. My job would be to find the best location for the factory in each country, then procure and equip a suitable factory in each case and then put the factories into operation. There would also be sundry patent and other business matters requiring attention over there. A sort of leave of absence was arranged with my Chicago employers.

The right location for the factories involved: (a) A town that had a good, soft water supply, (b) An agreeable place in which to live, and (c) A suitable place to carry on our business.

Hence, for England, I chose Plymouth, after investigating one or two other places. (Our early little plant in Camborne in 1910 had been only a hurried "stop-gap" for special reasons then existing.)

It is now many years since I ceased to be formally connected with the Acheson interests. Sentimentally, I'm still attached to them. The products they made were scientifically unique and definitely useful. I remember in sincere friendship some of the persons I met there, and this includes some of the Acheson family.

To Mr. Howard Acheson, who is with you today, to his organization, and to the City of Plymouth, may I bespeak many happy and profitable years of living and working together!

(Signed) Feroley H. Banbury

"So you see that what our company is today really stems from initial spade work done by one of Plymouth's own sons, who—I can say it from close personal acquaintance—retains tremendous loyalty to the city of his youth, as well as to this Acheson organization."

About a year before Banbury left Acheson, his good friend, Mr. Sargent, met him in France and said, "It's about time for you to come back to Chicago with us. That's our definite opinion. We have been watching things. You have done the job you started out to do."

In a few weeks, a letter brought him a very attractive offer, but he was emotionally too much involved with the Oildag job to leave the Acheson Company just then. Also, had not both the Doctor and he said several times lately that it was to be a life job?
With Werner & Pfleiderer

BANBURy'S INTERLUDE WITH Werner & Pfleiderer was crucial in his career and it developed quite naturally out of his work for Dr. Acheson. The original Werner & Pfleiderer was a German enterprise located in Stuttgart and it has undergone many changes since those times before World War I. Its English associate company was Werner, Pfleiderer & Perkins of Peterborough. The British and the German companies jointly owned the American company, Werner & Pfleiderer of Saginaw, Michigan. During World War I the British company merged with the Baker Company becoming Baker & Perkins, Limited, and subsequent to the close of the First World War, the American company became Baker-Perkins Company. It will be easier to keep these companies straight by referring to their geographical locations than to use their changing proper names.

These companies made machinery, especially mixing and kneading machines for bakeries and for other industrial uses, among them the production of the Acheson graphite dispersions for lubricants, Oilag and Aquadag. Banbury's background of deep interest in things mechanical naturally led him to a close study of these machines and their operating characteristics.

Saginaw had supplied machines to Acheson in the United States before Banbury came into the picture and continued to do so. When it was time to buy another machine, Banbury asked the builders to make certain improvements—the simplest of these would save floor space. Banbury himself made some changes to the inside of their machines then operating at Niagara Falls. Dr. Acheson had turned him loose to see if he could develop machines better than those of Saginaw for this special work. They spent time and money on this project as we have noted in the preceding chapter, trying to get something more efficient for this special deflocculating job. So Banbury became very machine-conscious while he was with Dr. Acheson.

When Banbury went to Europe, he took a used Saginaw machine from Niagara Falls and shipped it to England to be erected in a little plant near Camborne. A local trucking man was to transport it from the dock at Hayle to the plant. But it was raining heavily, and the trucker had trouble getting the machine up the hill from Hayle to Camborne. In the emergency he had to park his lorry with the machine by the roadside for the night. Then, as a coincidence of one in millions, Kurt Pfleiderer of Peterborough happened to be passing late in the evening in his car, en route to an appointment next morning with a customer, the Bickford Smith Company of Camborne, maker of fuses.

Seeing this contraption parked by the roadside, with adequate lights, of course, he asked the watchman what was wrong because he thought he saw one of his big Peterborough machines being transported. Somehow he got hold of Banbury's address and appeared there that night about 10 o'clock. It was still raining very hard, and Kurt was dressed in a completely rain-proof costume. His first words were somewhat serious, somewhat joking.

He said, "You are a smuggler. You have no right to be importing that machine into my territory."

Banbury's reply was, "Don't be silly. We paid for that machine a couple of years ago, and have the right, as far as I
know, to transport it to any place. Let’s have breakfast together tomorrow morning, because it may be that I can become your biggest customer. Bring your credentials with you.”

Next morning at breakfast an understanding developed between the two that lasted for as long as they had business contacts together.

Several years later, when Banbury was about to leave the Acheson people, Kurt Pfieiderer became very active in trying to get him to join Saginaw. He thought the young engineer should be connected with their American company for an important position that he should eventually fill. But Banbury had an understanding with Mr. Sargent that a suitable position would be open for him back in Chicago.

So he had a real problem: whether to go back to Chicago with Commonwealth Edison or to join Saginaw, as Kurt Pfieiderer wanted him to do. In this Kurt was apparently joined by top men in the German company and by Mr. Ihlee, the managing director in England as well. These men were personal friends of Banbury’s and that made the decision harder to reach. He had been away from the Chicago work for a long time, and might well have forgotten much of what he had learned there. But the Chicago people involved in his life were about “tops,” and he hated to dissociate himself permanently from them. Also it might be interpreted as lack of gratitude to Mr. Sargent, himself a kind of godfather to Banbury. On the other hand he knew, or thought he knew, the top W & P men in England and in Germany.

Kurt had several times spoken about his enthusiasm for the then small but explosively developing rubber industry, and hoped that some time his company would get a machine to perform some important function in that industry. But they did not have it yet. Their rubber cement making machines had only a very limited appeal and their tank rubber washer was

about all they had besides. This machine was useful in washing trash out of wild rubber, then much used, but the machine was likely to become obsolete as plantations produced more and more of the world’s rubber.

After the exchange of several telegrams between London and Chicago, including a 72-word one from Mr. Sargent outlining several jobs he thought Banbury could handle for them at that time, the young engineer still believed that industrial machines might likely prove his strong point rather than those extremely big, expensive, high-pressure turbines and boilers of the power industry. And he had a feeling that some of his Chicago friends by this time would have become much more advanced in that art than he after four and a half years’ absence.

Kurt Pfieiderer was the key person at this juncture in Banbury’s career and so we must interrupt our narrative here to comment at some length on him and his part in our story.

Banbury saw him and his company every few months during his sojourn in Europe. When Banbury was about to leave Acheson and return to his previous associates in Chicago, Kurt became very hopeful that he would join their American organization. Kurt was quite frank in saying he hoped that Banbury would soon become experienced enough with their line to take the top job. But naturally this was highly confidential and not talked about at that time except between the two of them. But Kurt’s poor health and his early death, and World War I changed things very radically.

“Although Kurt looked healthy,” Banbury recalls, “and jolly, too, I noticed he studiously preferred to talk at a slight distance from me and that he washed his hands much more often than I did.

“Then, one day he said, ‘My doctor insists that I take a long ocean voyage, to start at once. I think I’ll take a boat to those remote places where rubber is grown and where we send our rubber washers.’ Presumably he went. And I went back to
The next thing I heard was that he had died of galloping consumption (in December, 1915).

"Kurt had always been very prompt and careful to see that his machinery customers were happy and content with the machinery he sold them. Once or twice I later wondered what he would have said and felt if he had been mixed up with all the trouble I found in the United States, just where he was anxious that I should be.

"When I left Peterborough," he continues, "I felt that I was leaving behind three good friends: Kurt, his brother, B.J., who perished in the battle of Jutland, and Ihlee. Besides these there were, naturally, several casual acquaintances, all of a normal friendly nature as far as I recollect. But for some reason, John Poynton, the chief engineer, and I seem to have had little contact."

It was a tough decision to make. But as time went on, he saw the hand of Providence leading or pushing him into this opportunity with the rubber industry that later developed into what is known round the world as the Banbury Mixer.

Finally he agreed to join Saginaw. Staehle, their general manager in the United States, was then in Germany on a visit. Although he witnessed the agreement, he did not originate it. Nor did he know Kurt’s plan for Banbury which was apparently shared by some of his associates. Staehle was already being criticized for some of his actions in the United States.

Banbury was to spend some time in Peterborough to become acquainted with their products and also with their business methods before going to the United States.

Certain tests were being made at Peterborough to develop a suitable masticator or mixer for rubber, but Banbury came to the conclusion that the results being obtained there (and also in Germany as far as he knew then) were by no means hitting a bull’s eye. More than once he told Ihlee what he thought on this.

He was never assigned to work on these tests at Peterborough or in Stuttgart. He saw them at Peterborough as he roamed over the factory and office from day to day to pick up information. The tests were run only spasmodically, and he thought their "improvements" were along wrong lines. Vaughn, whom he saw at these tests, was an affable man with whom he had several chats about selling the Peterborough bakery line in Canada. Vaughn was a very busy man and the tests were being run only occasionally. Soon Banbury found himself, by his own choice, the main man on these tests.

One Friday morning he entered Ihlee’s office and said that he was due to sail for America in eight days, and that he was disappointed that they had not yet made and tried out that special rotor that he had a couple of times suggested would undoubtedly do the job.

Then Banbury said to Ihlee, "When I get back to America I think I shall have authority to make this rotor there. If I am mistaken in this, I shall undoubtedly make the rotor myself with my own money because I am sure it will work."

Ihlee rang for his chief engineer, John Poynton, and said to him, "John, Banbury is still talking about that rotor, and says that if the company will not make it, he will himself, as soon as he gets to America, using his own money if necessary. He is sailing tomorrow week. Can you make a rotor of his type and have it installed and ready to perform by next Wednesday?"

Poynton said, "If I work through every hour between now and then we can have it." And so it was agreed.

By the following Wednesday noon, Banbury had personally mixed three very satisfactory batches with the new rotor, and had asked Ihlee to come out to the test room to see the second and third batches. Ihlee was quite impressed, and said, "If you will come to my office right after lunch we will jointly write a telegram to send to Staehle." Staehle was the manager in the United States.
The telegram said approximately, "We have struck oil with an important improvement in the masticator. Banbury is about to leave here for the United States but it seems wise for him to stay another few weeks to follow up with further tests to see if the thing is really as good as it seems to be. Please wire your agreement."

Next day a wire from the United States agreed that Banbury should stay for those further tests, but also asked that he take that opportunity to go over to Germany again (he had been there once before) to look into a new process for lithographing tin cans that might be helpful in satisfying an important inquiry just received by Staeble from Baltimore.

Naturally this big improvement in the rubber masticator caused quite a bit of discussion around the Peterborough office, and when Banbury was looking for Ihlee a couple of days afterward he was told the boss was "out of town." The grapevine said that he was with his chief engineer in the office of a patent attorney!

What was the young man to do under these conditions? After all, he was there in Peterborough only as a guest of the Peterborough organization and he did not then fully understand the British law on patents which differs from ours. But he understood that Germany owned about two thirds of the American company, and England about the other third. So after all the American company, with which he intended to work, would benefit from his improvement. And he did not see, moreover, how anyone except himself could lay claim to this improvement, and therefore be legally entitled to claim a right to the patent. He had only recently joined W & P and had no plans except to stay with their American company.

After Banbury got back to America he heard that Staeble was talking in his office favorably concerning this new rotor, although actually he knew very little about its actual shape or design.

"I always thought," says Banbury, "that Staeble was miscast as the administrative head of the Saginaw company. He had had an accounting rather than an engineering background and he and I were often at odds. In my innocence and optimism, I began, soon after I joined the company, to ask Staeble to do something to improve customer relations. Several of my requests were quite detailed concerning little things that could help bad situations. It never seemed that these made much of an impression, but I do recall that Staeble once said to me, 'I have always known that Germans were sticklers for accuracy and detail, but now I think you are more thorough than any German that I've ever known.'"

One of the first things Staeble asked Banbury to do was to try to collect payment from a company at Canonsburg near Pittsburgh. This was a new rubber department connected with the Continental Can Co. that had bought this so-called "rubber mixer" many months before. He was also to try to collect from American Metal Cap Co. of Brooklyn. Both companies had had the mixers for many, many months, and both had refused to pay, saying the machines did not begin to do the rubber compounding job that had been promised.

Upon visiting the factory near Pittsburgh, Banbury found that they had had arguments with Saginaw and had removed the machine from the factory. It was then out in the factory yard. The manager and his chief engineer seemed reasonable and capable people and they immediately agreed to protect the machine against the elements. But no more "Saginaw" for them! They were adamant about this. They had put the machine in the yard and had told Saginaw to come and get it. Later Banbury told Staeble that in his opinion the machine was totally wrong for the job, and if he were in the customer's position he would not have paid for it either.

The head of the company that had the second mixer also absolutely refused to pay. But he said if Banbury could make it
work he certainly would then be glad to accept and pay for it. So Banbury set himself to make the machine satisfactory. This he did mostly on his own time, some of it evenings and some of it at weekends, in the cheapest and quickest way possible.

Mainly he changed the working face of the rotor to give the desired smearing action. This he did first by threading some studs into the face of the rotor and then pouring babbitt metal around the studs. Then he changed the neck or upper part of the mixing chamber by inserting hard wood pieces for the first batches, and also adding a wood and metal floating weight. With these simple changes the machine performed satisfactorily and the president, a Mr. Werner (no relative to W & P), became the happiest man in the vicinity. He could operate this on an upper floor where a roll mill was objectionable. Mr. Werner became a warm personal friend of Banbury’s.

Later Saginaw worked with Banbury and supplied permanent metal parts that completed the customer’s mixer with duplicates of the cheaply made temporary ones that convinced the user.

American Metal Cap’s formula was approximately 18 per cent to 20 per cent plantation rubber. For the first few batches they naturally masticated the rubber pretty thoroughly first, and then added the powdery ingredients and reinforcing pigments (whiting and sulfur) to complete the mix. After a few weeks the powders were added first, and this helped to lower the peak of horsepower at the beginning of each batch. This seemed to please the customer and proved that the mixer could do real compounding. Years later this was known as “upside down” mixing.

“I remember,” Banbury says, “and my carefully preserved records show, that I wrote Staeble promptly after the machine at the American Metal Cap Co. proved to be a good operating mixer. I told him our company should take prompt steps to obtain patent protection on this machine. After about three weeks I received a noncommittal reply. My records also show that during the following twelve months I asked them verbally several times to take out the patent. Then, finally, as the situation had deteriorated quite badly both inside the company and in its standing with the trades we catered to, I consulted a mature lawyer in whom I had confidence.

“He advised from the ethical as well as legal point of view. He found for me a first rate patent attorney and said to me, ‘I’ll defend you if you get into trouble.’ So I patented the mixer in my own name, a course I had been urging on the company without success.’”

In due course the first patent was granted to Banbury (U.S. Pat. 1,200,070, October 3, 1916). By this time he had resigned from Saginaw (or was he pushed out? ). He had had a tough time with that company, including a very bad situation with their rubber washer at Miller Rubber Co., at Goodyear Tire & Rubber Co., and at the St. Mungo Golf Ball factory in New Jersey. Real trouble at the latter plant was prevented by a quickly organized gang of men whom Banbury superintended all through one Thanksgiving Day to correct a main drive detail which the customer was angry about with reason. This, in addition to the mixer troubles at Canonsburg and Brooklyn! But Banbury had learned a lot and made many long-time friends.

"After the American Metal Cap mixer became well liked and talked about far and near by my new friend, Mr. Werner, president of that company," Banbury recalls, "a duplicate mixer was installed in a little basement room under a machine shop in Brooklyn. This I called our demonstration room. I had set up my office in New York, perhaps 15 minutes away. I hired a slightly lame but quite intelligent young man as typist and assistant. Several encouraging officials of the rubber industry began calling on me. Visitors and people in Akron were saying, 'Get with a better company, and we will give you lots of busi-
ness." However, I took no steps to get a new business connection until after I became free of Saginaw.

One of the first visitors to this demonstration room was a chemist for Goodyear Tire and Rubber. After the tests were completed, he left in a hurry to go back to his hotel in New York. But so black was he that the hotel doorman would not let him in, despite his protest that he had a room there and that his appearance was only the temporary result of a business visit to a factory in the vicinity! A little crowd quickly gathered as crowds do in the metropolis and so the chemist walked away. Next he tried a back door of the hotel but he was again stopped. Because he was now off the street, he protested until the hotel detective came to straighten matters out and let him get in to a much needed bath. Later, strangely enough, this man became a sales-service man for a leading producer of carbon black.

Banbury did not leave Saginaw immediately after his success with the mixer at American Metal Cap. Far from it. He still had high hopes of straightening out the company's relationships with the trade, at least as far as his part of their customers were concerned. He knew there was some well-founded discontent with their treatment of at least one of their bakery customers. This trouble was voiced around the office and the staff thought Staehle took a strange attitude toward it. Banbury also hoped to straighten out his personal relationship with Staehle, but that appeared to be increasingly impossible. He had had no contact with Peterborough in England for a long time, possibly not since he left them to come to America. Of course Ihlee and Peterborough were immediately very much affected by the outbreak of World War I.

Right before, or at the time of his resignation, Banbury had two very frank sessions with Staehle in the old Belmont Hotel (then at the southwest corner of 42nd Street and Park Avenue, New York). He asked Mr. A. J. Vollrath (then vice-president of the company) to accompany him to these meetings. Vollrath was a good friend of Banbury's even after Banbury left Saginaw. Mr. and Mrs. Banbury had been his house guests and also had been present during the marriage of one of the Vollrath children. Vollrath had also arranged two luncheon dates perhaps a year later for a chat between Mr. Elmer Baker who had recently joined the Saginaw company and Banbury, Vollrath being present also. These luncheons were pleasant and informative, but Banbury then had to say, "It's too late now. I'm happily located with the Birmingham Iron Foundry, but I'd like to remain your friend."

After Banbury joined B.I.F., he began to hear by the grapevine some nasty things that were being said about him by some important, but perhaps second-string, men in the company he had just left. He sent word by a friend that he had informed B.I.F. that he would fight, if necessary, for his mixer, but that he did not intend to raid Saginaw's regular line of machinery, despite a very definite request that he do so.

Banbury has in his safekeeping several important papers. One is an affidavit from Walter G. Travis, a man of some standing formerly connected with Saginaw, who would have had good reason to know whereof he wrote and swore. He felt Banbury had a lot of constructive ideas regarding the Saginaw machinery, and that he was the man who got Saginaw out of their trouble (previously referred to) at American Metal Cap in Brooklyn. He (the affiant) considered that Saginaw prior to then had no machine to do this sort of work; that Banbury redesigned and "made-over" their machine to do this very successfully. That he considered Banbury did not have proper cooperation from Saginaw and when he (Banbury) finally left, "Saginaw lost one of the best men they ever had."

About these days, after he had been at Birmingham Iron Foundry for some years, Banbury tells this story:

"With my hat on, ready to go to lunch one day, I felt compelled to stay in the office for perhaps 10 or 15 minutes without
any apparent reason, just walking in and out of my office and the adjacent one. Then our telephone operator, seeing me, excitedly said, 'Mr. Banbury, where have you been? I've been trying to get you for 10 minutes. Someone is on the telephone and very anxious to talk to you.'

'To my great surprise, it was Mr. Ihlee who wanted to speak to me. His first words were, 'Can you have lunch with me today?'

'I said, 'Where are you? I didn't know you were in this country.'

'He said, 'I'm in Ansonia.'

'I said, 'I'll join you.'

'Then Ihlee said, 'I wish to warn you that there will be several in that dining room whose interests are competitive to yours. I'm with the Farrel people, but I will arrange that you and I sit at a table alone where our conversation will not be overheard.'

'When I entered the dining room and had gotten seated with Ihlee, I noted the tense expression on the faces of some of my competitive neighbors. Ihlee's first words after we'd looked at each other for 30 seconds were, 'Why did you not offer that mixer of yours to Staehle?' I replied, 'I did.'

'He said, 'Say that again—and slowly.' Which I did.

'Then I said, 'I can show you the letter.'

'His reply was, 'I don't need to see the letter, because when you speak to me in that definite manner, I accept your word.'

'From that moment and after I had reminded him of a couple of other happenings, I knew there would be no lawsuit between us, and we had a very happy lunch together, chatting over old times and old business associations.

'Franklin Farrel, Jr., who was one of the other diners on that occasion, has several times asked me, 'What did you tell that man, Ihlee, to turn him so quickly from a definite opponent to such a good friend?'
"I've always replied, 'I told him the simple truth.'"

Franklin Farrel, Jr. was a policy maker in his company for most of his business life. This included the offices of vice-president and board member from 1912 until 1930, and chairman of the board from 1930 to 1945.

So here again was demonstrated the tremendous power of truth. Both Mr. Ihlee and his American associate, Mr. Elmer Baker, were absolutely fair in allowing this whole matter to be straightened out without a law suit of any kind, because they realized the strength of Banbury's case. All of this in spite of their strong desire to have the mixer for their own companies.

"Soon after the above happy progress with our dispute," Banbury recalls, "Mr. Ihlee had another chat with me, wherein he volunteered that he would like, and be quite willing, to help me in any legal attack from a third party regarding my improvements. He thought, and I agreed, the tests he suggested should convince any judge and jury that a real improvement had been made. This is additional evidence of the fundamental honesty of my friend Ihlee and the company of which he was then head."
Birmingham Iron Foundry and The Wannings

Throughout the development of the Banbury Mixer it had the interest and the confidence of forward-looking top men in the rubber industry. Two such men in separate companies early became active in "selling" the Birmingham Iron Foundry of Derby, Conn., to Banbury and he to it. Because of their past experiences with Birmingham, which manufactured heavy machinery for the rubber industry, they thought Banbury's temperament would blend well with the B.I.F. way of doing business.

An interview was arranged by these men to introduce the young engineer to H. F. Wanning (then about 70), the president of Birmingham, and his son, F. D. Wanning, general manager, a few weeks after Banbury had left Saginaw. Together these two men and their family controlled Birmingham. The Birmingham Iron Foundry had started in 1836, i.e., in Charles Goodyear's day and geographically close to him in Connecticut.

Their first interview at B.I.F., as Banbury recalls it, covered the patent situation and the prior art. B.I.F. would be willing to aim for only a fair, reasonable, percentage of profit (a definite percentage was mentioned) and the inventor would be satisfied with the lowest of the three royalty percentages that F.D. suggested. They all agreed on this. Thus they hoped to sell many machines—not just a few.

They also agreed that they would want a strong machine that would operate day and night, month after month, and year after year without being often shut down for repairs due to breakage. This was basic. This new enclosed mixer of Banbury's was to mix the stiff rubber doughs then being mixed on open 2-roll mills, such as B.I.F. manufactured.

Finally the younger man said to his father, "If we go ahead, I suggest that the machine be called the Banbury Enclosed Rubber Mixer." And that, of course, did not displease Banbury.

Banbury told B.I.F. at this first interview with them that he would fight if necessary to maintain his right to the new rubber mixer but that he did not want to be a party to any pirating of the Saginaw standard line of machinery.

Early in April, 1916, a few weeks thereafter, he was invited back to Derby. By that time another company had become interested and had made him a fair offer. He was still not quite sure if F. D. Wanning wanted to take the gamble.

So he found himself saying to F.D. and his father: "Our proposed machine must be sold on the basis of proved performance. We should have a testing room at Derby with a mixer so that prospective customers can bring their materials and see them being mixed. We should plan to have, as soon as we can, a serviceman to call on the trade."

In the early days Banbury became a serviceman himself for he was trying to really learn this art of mixing and at the same time to get first hand information to help him with the many, many improvements to the mixer over the years.

After the talks that day, H. F. Wanning said, "I very much like what you have said. That is the way to sell machinery. We need you, and if you will see your way to join us, I will do my best to see that you never, never regret your decision." He walked away several yards, returned again to where Banbury stood observing in the machine shop and repeated his words.
with very definite emotion. Banbury could easily see that he was deeply earnest. During the many years that followed the older man never assumed a less cordial attitude. So together they went to F.D.'s office and signed a simple mutual agreement that formalized the relationship.

F.D. and Banbury would occasionally, afterwards, in a calm and unemotional manner, discuss the Banbury Mixer patent situation, principally, of course, as it concerned Werner and Pfeiderer in those early days. Banbury had told F.D. that he thought the position was strong, even if a little complicated, and that he had in his safe deposit box some vitally important legal papers. These he preferred not to show at that time, because word of them might quite unintentionally get out.

"If it comes to a real fight, I will show them to you instantly," Banbury said. "In the meantime we are not being hurt."

Banbury had good success in expanding the sales of the Saginaw chemical division. Some wits called it the Comical Division. After Banbury left Saginaw one party solicited him three times to help them establish competition. If he would not give full time to it, would he give one day or even one evening per week as general consultant? But the answer was irrevocably "No," as he told F.D. without giving names. And right after his Banbury Mixer had been approved by a few people in Akron someone in the rubber industry, thinking World War I might compel them to use more wild rubber, tried to get him interested in taking a group order for 20 Saginaw-type tank washers which were to be modified a bit by B.I.F.

But here again the answer was "No, Saginaw can make those washers for you and I will advise with them on this if they ask me to do so."

It was better that he give his attention to making the mixer a real success—mechanically reliable and capable of handling all of the many stocks to be mixed.

H. F. Wanning became a good friend and at times a wise counsellor, particularly during the latter part of their contacts in the Derby office. He had by then become more and more concerned about the health of his son, F.D., who as Banbury's sponsor, was a careful, prudent manager, intent on his job and fair-minded.

The first two weeks Banbury was at Derby, he worked in and from F.D.'s office. The purpose was for the two to get to know each other better. Always F.D. had problems and projects that kept Banbury so busy that there was no chance for him to get ahead with his own pet project, the internal rubber mixer.

As this continued, Banbury said to F.D. one day, "This is all very fine and I like it, but unless I get this mixer of mine under way, I'll explode. It has been in my mind so long that I must get it started."

F.D.: "Why don't you lock yourself in your office downstairs—even cut off your telephone—and get to work?"

"That wouldn't work. I've already become too involved in details of this plant and the company's operations. All of this is interesting and absorbing, but I need to get away to concentrate on my problem for a while. When I get that under way, I'll make up to you whatever time I put on my mixer. What I would like to do is to take several days, maybe a week, in Akron concentrating on mixing rubber and reminded of nothing else."

"Go ahead. I see your point."

And so it was done.

At Akron the number one problem at the beginning was what size mixer should be built first. It had to be big enough so that the big rubber people would not laugh at it as a laboratory toy because of its small size. But it must also be small enough so that changes that would no doubt be necessary would not cost too much.

Consultation ultimately fixed upon a capacity of 80 to 100 pounds of crude rubber as about the best compromise. Then
followed days in the Goodyear mill room where young Banbury again watched the behavior of mixes being compounded on the roll mills there, how the mixes improved at each successive pass through the bite of the rolls, and how changes of clearance altered the action.

Finally, satisfied, Banbury shut himself in his hotel room at the Portage, begged some wrapping paper from the hotel's tailor to use for drawing paper, had the hotel set up a salesman's sample table for him to use as a drawing board, purchased a small box of thumb tacks and went to work with pencils and some compasses he had brought with him.

By 7:30 or so next morning (after working all night), Banbury called his friend Earl Davies to look at half a dozen outline drawings he had produced. Davies was to choose the ones he thought best of the batch "as if he were czar" of the Goodyear company. Furthermore, he was to reach his decision while Banbury had a hurried breakfast. The two friends agreed on the first choice design but not on the other choices. At once Banbury rushed with his sketch back to Derby and got the drafting room crew there at work turning the sketch into working drawings. For some days (or weeks) he worked right along with the draftsmen.

And that was the beginning of the Banbury Mixer as a continuing entity.

It was evident right after Banbury joined Birmingham that F.D. had other ideas in addition to the mixer for him. Soon he found himself, due to sickness in the staff, temporarily in charge of the works, and then a few months later, F.D. asked, even finally insisted, that he take the title and responsibility of Factory Manager.

F.D. Wanning said, "You will still have plenty of freedom to travel about the Banbury Mixer, after you have made the two personnel changes that you have in mind for the factory." Banbury became very happy in his relationship with the factory. B.I.F. had a remarkably good group of men, and this included the supervisory force. Alec Urquhart, Steve Sill, Francis Hall, and Ollie Hooker (of engineering) were excellent in their several spheres. Alec Gordon, the very helpful gear expert who later designed the Gordon Plasticator, had back in April, 1916, urged F.D. to sponsor Banbury's Mixer.

Banbury's promise to himself when he was first put in charge of the Banbury department at Derby was assiduously kept. He was constantly on the alert to improve the mixer and he'd keep after that diligently but also with due care. He would never try to sell a mere change as an improvement unless it really was so. He would always act as an honest consulting engineer and recommend only what he thought best for the customer. He would never let himself become simply an eager salesman hungry for orders and mostly concerned with building up big sales. The more careful and energetic he was in this way, the more good would come to his customers and to his own company from his efforts. This meant constant checking and re-checking. He was constantly on the job himself, out with customers much of the time, seeing and learning, teaching and improving his machine as he learned more of what was needed.

F.D.'s high opinion of Banbury was expressed in an affidavit F.D. made to the Bridgeport draft board in October, 1918. These two paragraphs are pertinent:

Registrant has been in the employ of the Birmingham Iron Foundry since April, 1916 and came with this company primarily to develop a labor saving machine for working rubber, which he had before invented and he has successfully developed this machine since April, 1916 so that it has an active market at present on war work. The machine is still, however, being improved from time to time and some of his time is given to this development. Registrant after April, 1916, proved his capacity, judgment and energy so completely that on November 7, 1917, he was appointed Works Manager for the Birmingham Iron Foundry. Since that time he has brought about marked changes
and improvements in the factory conditions, is in daily, active
touch with all foremen and all factory operations, and has in
fact made a remarkable showing in this brief period. It will
be absolutely impossible to replace said Registrant with any man
who could in any way take his place in the organization of the
Birmingham Iron Foundry and if said Registrant was drafted
into military service, the output of said Birmingham Iron
Foundry would certainly register an important and irredeem-
able slump.

Said Registrant is always on the job, night or day, and is pos-
sessed of untiring vigilance for the good of said company,
abundant energy and vitality, great ability, and all capacity for
constructive work. He is of the highest type of citizenship in all
respects, and affiant is most thoroughly convinced that if your
honorable board saw fit to place said Registrant in deferred clas-
sification as above that it would be for the best interest in the
emergency for the United States of America.

F.D., then general manager, suggested that Banbury branch
out further in the B.I.F., and early in 1919, F.D. and his father
had four meetings in the young man’s office.

To Banbury, F.D. said, “Your engineering viewpoint and
your money viewpoint are important and helpful. We would
like you to move upstairs into an office we will prepare next to
mine, and do this within a few months. Then we would like
you to be preparing to take over the presidency of the company
in about four years. I hope then to take things much easier.”
F.D. added that the mixer could now take care of itself as the
other general products did, “without any specialist.”

Banbury could not agree to this detail so finally this offer
was turned down (somewhat regretfully, he assured F.D.) to
preserve his freedom of movement and action.

Under conditions then existing, Banbury thought this deci-
sion was best for the Birmingham Iron Foundry with its 500
employees and also, of course, best for the Banbury Mixer,
which was then only about three years old. It was necessary
for someone, like himself or better, to spend lots of time out in
the field with customers, learning and helping, and improving
the mixer as he learned.

Of course, F.D. was always pleased that B.I.F. had the Ban-
bury Mixer, but his enthusiasm in the early days was rather mild
compared to what it was after the Size 27 came along, a mixer
weighing about 125 tons and driven by a 500 to 1,500 horse-
power motor. Then F.D. became almost more enthusiastic and
confident than Banbury himself.

With this Size 27 added to the sales sheet, F.D. quickly
became willing to hire Andy Hale to open an office in Akron;
also to have Don Comes move into the little Banbury Depart-
ment and to help take care of mixer sales in the eastern part of
the U.S.A. This was in the Spring of 1923. They had by
then sold about 150 mixers, mostly Sizes 3 and 9. Until then
the Banbury sales had been pretty much, but not entirely, a one-
man affair. So how Banbury appreciated the help of Andy and
Don! Both became personal friends of his and wonderful co-
workers for a number of years.

But even in this friendly atmosphere, disagreements could
arise.

A second agreement of about 1917 between the company and
Banbury later was the occasion of several little arguments about
how much one clause was intended to cover. It affected Ban-
bury’s commissions and whether they should apply to piping,
timing device, temperature device, and driving gears of mixers.
So F.D. and Banbury agreed between themselves that F.D.
would give Banbury the names and addresses of three good
lawyers in New Haven. Not a person in the Naugatuck Valley,
because neither wanted anyone locally to know that there was a
dispute, even though it was friendly.

Each of the three lawyers suggested was totally unknown to
Banbury, but he took a gamble on the first one on the list.
When he entered the lawyer’s office he introduced himself and
gave his business connection.

Then he said something like this, “Please don’t think this
case will involve a lawsuit because I can pretty well guarantee
it won't. We are having a little argument about the interpretation of our agreement and what is included in it. What we would like is an unbiased opinion from a good lawyer.'

Then the lawyer said he knew F.D., having been at Yale with him, but that would make no difference in making what he thought a good unbiased interpretation.

There were three items of dispute, and his new lawyer friend agreed with Banbury on all three, after looking carefully over the agreement and at a photo of the mixer as they were then making it. He would not accept any fee for this few minutes of advice saying, "I am glad to see two sensible business men settling a matter like this by consultation rather than letting it develop into a lawsuit. Good luck to both of you!"

A week or so afterwards F.D. asked Banbury, "What have you done about seeing an independent lawyer?" And then he said in a very agreeable way, "We ought to get this thing straightened out."

Upon learning that Banbury had seen a lawyer a few days before that and that he was somewhat embarrassed because the lawyer had agreed with him on all three points, F.D. said, "I have been thinking this thing over, and I had about come to the same conclusion myself—that I was not being quite fair in the matter. I really agree with what the lawyer has said. It will become effective immediately and also cover the recent past." Then he added, "Thank you for the very gentlemanly way you have handled it."

Once in the early days, a rather small rubber company had bought a Size 9 Banbury and had gone bankrupt before it had put this machine into operation. The purchaser had seen the mixer perform on his stock in the B.I.F. test room and was very pleased. He had paid about a third of the full price with the order, but that was the only payment the company received. Therefore Banbury was rather surprised when he was credited on the full sale price. He called it to F.D.'s attention and his reply was, "It was my fault and not yours. As you know, I saw that test which you ran for the customer, and I, like he, was impressed by the performance. I thought I knew this customer, and I personally take the blame for what happened."

Of course any machine like that was quickly rebought by another rubber company.

F.D. wasn't always a wise angel. Who is? Disputes arose from time to time as one might expect with a relationship as close as this one with business problems confronting the two men every day. An early buyer of Banbury Mixers said to Banbury once with much feeling, "If you will get that sponsor of yours to smash his typewriters, he and I will get along a lot better." The customer and F.D. had exchanged some rather outspoken letters of a kind neither of them liked to receive. F.D. changed upon being told it was hurting B.I.F.'s business and might get worse. Moreover Banbury pointed out to F.D. that a good machinery competitor of his nearby wrote excellent letters concerning adjustments, judging by reports coming from some business friends. Banbury never found F.D. arrogant or arbitrary in his dealings. Other friends, too, had the same feelings about him.

He and Banbury once were having quite an argument about how to conduct themselves toward a certain big rubber company. Apparently F.D. and the top man in that company had clashed before the younger man came with B.I.F. As a result of a trip Banbury had taken, and a good deal of thought on the matter, he decided upon a pretty definite course of action as being best, and felt that it should be adopted immediately. What he was recommending would cost practically nothing and it would heal the mess and should probably mean big business in the future in Banbury Mixers.

But he was making no headway.

This seemed a bit unusual because F.D. was in those days giving Banbury almost a free hand. F.D. had promised him much
freedom of action and had renewed the promise a number of times in a very friendly way and without pressure. This had made Banbury say to himself more than once that he would reciprocate by going out of his way to keep F.D. fully informed of his actions and of his thinking regarding the future. This paid both well, and created a good working atmosphere.

F.D.'s brother-in-law, Julius Day, came to the Derby office occasionally to discuss price and quality of castings that B.I.F. supplied to his local factory which made printing presses. So F.D. agreed to ask Julius Day if he would give a third party opinion on this argument between F.D. and his protégé. F.D. gave a wonderful two minute presentation of the case, including his thinking and Banbury's thinking, altogether a very clear and fair statement. He ended by saying, "Now, Julius, what would you recommend?"

The reply was about as follows: "I will not go into any discussion of the details, but, Frank, I will say that as a general policy I am inclined to give a lot of leeway and discretion to anyone who habitually does a good job and makes money for my company. In line with this it seems to me that I would go along with Banbury in this case, and do as he suggests."

In less than a minute F.D. took Banbury by the arm and led him back to the former's office saying, "We will dictate a letter right now along the lines you want." He did this with extremely good grace and friendliness. Incidentally this was the turning point of a very important, and later money-making situation between B.I.F. and that big customer.

The financial depression that hit the United States during 1920-21 caused many a company trouble. B.I.F. had a bad time but came through all right, but F.D. had been terribly worried. That worry may have been one of the things which led to his unfortunately premature death. He once said, "Much of my family fortune is in this company, and I am the responsible man."

When the depression had passed and B.I.F. was sailing again on smooth seas, F.D. said one day, "Let's go up to Boston together and see one or two of my old friends, particularly Hugh Bullock, president of Converse Rubber Shoe Company. He is a very long-time friend of mine, who comes from this Connecticut Valley. He has been a good customer and one of my best personal friends."

Banbury could see then no real reason why F.D. was asking him to take this trip, but after they had been in Mr. Bullock's office for an hour the reason became clear.

With a good deal of sincerity F.D. turned to his friend and said, "Now I want to tell you about this man Banbury who saved me from bankruptcy in our recent depression."

F.D. could be a very generous friend. He must also have told Ed Anderson, president of the Rubber Reclaiming Company, Naugatuck, a similar story judging by what Ed said later. F.D. was perhaps overgenerous in such talk. The advent of the Size 27 had meant a great deal to F.D. who liked its massiveness, and the weights of its many parts. Producing and having it ready at the right moment (for it proved finally to be exactly the right moment) was a great tonic to F.D.

So far, we have considered almost entirely the "generous" aspects of F.D.'s dealings. But someone may say, "What about those periods when some of us heard him say some rather ungenerous things, remarks bordering on the harsh and dissatisfied?"

Banbury's reply might be, "Many a man likes to think of a manager as tough and firm, and F.D. might have talked that way to some people at times. But to me our private dealings were mostly very friendly."

Some of his expressions of good will were wonderful. The only period when he was otherwise was just before, and for a few weeks after, the amalgamation of Birmingham with Farrel in August, 1927, when he had many problems on his mind. One
can readily understand some of his wishes and feelings of that period, but within a few weeks he was the same confiding friend with Banbury as of previous years. They had many different problems on their hands then, some of them quite unexpected.

As a prudent manager F.D. had become conscious within a year or two that the cost and selling price of rubber mill room equipment for a given daily production tonnage based on the Banbury Mixer was only about one half what it would be if the mixing were done on a 2-roll open mill. (Here is a good place to note that about 1920, B.I.F. sold a Size 9 Banbury with its drive and attachments for about $15,000. Ready to run in the customer's plant with freight, foundations, motors, etc., the total cost was about double that of the mixer alone.)

What would this do to make his own Derby factory obsolete in time? Banbury Mixers were already making obsolete some of the roll mixing equipment bought by rubber factories not long before. Perhaps he secretly hoped he could keep some part (perhaps a major part) of the business in mixing machines for the big 2-roll open mills he liked so much. But this was not to be the line of progress. With the passage of a little time, he eased up on this, Banbury remembers.

Meanwhile Banbury was collecting favorable data from Banbury Mixers already running. The little Norwalk Tire and Rubber Company, under the guidance of Dr. David Spence, was collecting records from an early date on tire stock mixed in their Banbury.

F.D. could not see how the Banbury Mixer could mix cheap low grade stocks, like battery boxes, if it also mixed high grade stocks, like inner tubes and some of the high grade tire stocks. But finally he agreed on this also.

Then came a period when Banbury saw a need for a laboratory size Mixer. Rather than bull this idea through he chose to wait and listen for a while.

He heard: "Who would want to buy it?" and, "Don't you know that a laboratory size 2-roll mill is not a true guide as to what can be done on an 84-inch roll mill in commercial practice? It might even spoil the sale of larger Banburies."

And so on and on. F.D. had had some bad local advice on this but one morning after the regular reading of the incoming mail in the office next to F.D.'s and after quite a session on this matter, Henry Brewster, B.I.F.'s chief engineer, said to F.D. as he passed through his office, "Frank, I think 'the boy' is right. We should have a laboratory size Banbury as soon as we can get it."

Next day F.D. said to Fernley, "If you still want it, we can start on the laboratory mixer tomorrow morning. Can you have your main dimensions with rough sketches ready by that time?" They were ready, and F.D. was happy.

As time went on it was interesting to note that you could duplicate in a big commercial Size 11 or 27 Banbury the results obtained on the laboratory size.

Henry Gordon Brewster was for many years the chief engineer of B.I.F. and later an engineer with the amalgamated Farrel-Birmingham Co. At one of the first morning mail-reading sessions soon after Banbury joined B.I.F. in April, 1916, F.D. read aloud with much pleasure a letter from the Winchester Arms Co. of New Haven, thanking F.D. for the excellent brass-rolling job Henry had designed for them. It was an exceedingly complimentary letter, and at the end F.D. said with much feeling and sincerity, "Thank you, Henry. We are proud to have you with us."

Henry worked for B.I.F. and its successor, the F-B Company, all his life, except for one year when he worked in a tire factory at Hartford, Conn.

"He was always open to consider any question I asked of him," Banbury recalls, "and he was one of those engineers who
did not feel hurt if I failed to follow his advice. That was real cooperation on his part. He kept endless records and clippings of things he had seen or heard. Once when Henry was in charge of our testing laboratory these gave me supporting evidence for a couple of rubber reclaiming patents. He had followed rather closely the rubber reclaiming art or practice over the years, and one of his brothers had been in charge of a reclaiming plant in Buffalo."

When B.I.F. was getting its Size 27 launched, F.D. and Banbury had a difference. "I believe," Banbury recalls, "there was only one time when I spoke firmly about his obligations and that was about the actual building of our Size 27. My temperament and my best business judgment say the best way usually to get things done is to work well with the situation where I find myself. To suggest, perhaps to suggest many times, perhaps to argue, rather than to demand or to give anything like an ultimatum. Personally I do not like the idea of giving or receiving ultimatums. To me 'cooperation' is the big important word in our language.

"But here we had this situation: The customer (Miller Rubber Co.) wanted the big mixer; he had given us a firm order, but F.D. for several days was unwilling to make the mixer because of the bad times then existing. After several short chats between F.D. and me on different days, some Akron friends got into the picture on my behalf.

"But F.D. still said 'no'.

"Then I quietly said, when we were alone in my office, 'You know I have a contract with you and if you do not wish to have B.I.F. make it you must please allow me to have it made elsewhere. I feel sure that I can get an outside machinery company to make it. But we right here in Derby should make it. It will give many of our men some badly needed work and with no appreciable gamble on your part.'

"After a few minutes talking about the big sizes of many of the parts and the size of the rotor castings, his face began to shine a bit and he said, 'Let's tackle it. How soon can the drawings be in the works?'"

It was not that F.D. was afraid of the mixer, Banbury recalls, but he was terribly afraid of doing it at that time of depression. In a few days F.D. appeared very pleased, even proud, to be making the machine, and he seemed secretly glad Banbury had talked him into it. Then later how proud he became of it! He liked Size 27 much more than the smaller Sizes 3 and 9, the only ones made at Derby till then. Similarly he had always admired an 84 inch mill more than a 48 inch mill.

Shortly after the Banbury Mixer was launched and was beginning to sell (about 1922), Banbury received offers from friends in the rubber industry. The first came from a well known, good tire company away from Akron and was made with much sincerity by two staff men whom he knew. They emphasized that the manager of the company and its directors favored the offer being made. His immediate reply was that on no account could he leave F.D. who had sponsored him so heartily.

Two or three offers from other excellent companies he had also to turn down because he was so much involved in the Banbury Mixer, and he definitely wished to remain with it. He knew very well that F.D. wanted to keep him.

Once when Banbury went away on a short vacation, F.D. wrote him saying that somehow, someone had got a report started to the effect that the younger man was not going to return to Derby. Naturally F.D. was rather disturbed, but later he informed Banbury how he thought this unkind report got started and the malicious source of it.

Banbury also was disturbed by the report, especially when a top man in a big company said it had also come to him. This customer was disturbed because he had just bought through Banbury another big Size 27 and he said, "I presume you are
staying with the picture. We rely on you about these mixers."
The reply was, "I am surely staying with the picture."

One day F.D. and Banbury were discussing a rather important extension to the main bay of the machine shop. This was not a large extension but it would provide much better facilities for loading and shipping finished machines, because with it railroad cars would enter the far end of the machine shop. Thus big cranes could do the lifting and loading, easily and safely, and replace the primitive and inefficient loading facilities that had been used for decades. It would also give more erecting space and that would help reduce costs.

With a forced smile F.D. said, "There is a fundamental difference between your viewpoint and mine. I am not ambitious whereas you are ambitious, very ambitious."

This conversation was around 1924 or 1925 and it was becoming increasingly evident that F.D.'s poor health at the time required a sale or amalgamation of B.I.F., and that it was just around the corner. So Banbury persuaded him next day to come out and see the proposed extension as it was laid out on the ground by brand new, good-looking 2 by 4 inch stakes. Stakes also showed the location for the railroad line to run into and through this proposed new end of the shop. Again F.D. said he was not as ambitious as the younger man.

After a few minutes he said, "If I grant this extension now, will you promise never to ask for another?"

He was told never is an awfully long time. But Banbury agreed not to ask again for anything like this inside of three years if he would grant this one now. A big help in persuading F.D. was that he would be able to present a better factory to a company that was then actively interested in merging with B.I.F. He approved the extension.

Of course, H. F. Wanning, his father, was always aware of major plans—for a few new lathes, or for extensions like this one, not the first since 1916. Once H.F. sought a chance to say to Banbury, "I would give anything to be 10 years younger so I could work more energetically on these things with you."

As time progressed H.F. said it was time for Banbury to do some more "playing."

"Take up golf and get Frank to do the same. It will do both of you good." But F.D. did not want to spend time on the golf course; boats seemed to attract him much more.

"Looking back upon my association with F.D.," Banbury recalls, "I appreciate deeply the confidence he had in me, and the many times he expressed great pleasure in what I was doing for him and his company. He often said that he hoped I would make it my life job as, in fact, I did. It pleased F.D. very much that the Banbury Mixer venture paid for itself so well—this even during the first year, which is rather unusual for the starting-up of a thing so big and so important. This, of course, was largely due to the support people in the rubber industry gave to us at Derby, when we were trying to do something worthwhile and a little bit unusual.

"I like to think of F.D. as Dr. E. H. Jenkins said of himself when he was retiring as head of the Connecticut Agricultural Experiment Station, 'If I have done anything worthwhile, it has been to keep the Station a comfortable place where able men could work productively.' Certainly F.D. did that."

But others, too, had important parts in this Banbury story—

Bill State, for one.
A Goodyear Cinderella Story

IT WAS A MONDAY MORNING in the Fall of 1916. Banbury had been with Birmingham Iron Foundry only 6 or 8 months. His office opened onto the main entrance and reception hall. Without any ceremony or prior notice, in walked William State, chief engineer of Goodyear Tire and Rubber Company. Frank Seiberling was president of Goodyear in those days.

This Mr. State was well known as extremely forceful and very outspoken. A hustler and a very hard worker himself, he was said to be tough on anyone he considered to be lazy or not absolutely trustworthy, but a good friend to those he judged to be producers and who could be relied on to do the right and proper thing.

Banbury's first interview with Mr. State back in 1914 had been short and rough, State doing 99 per cent of the talking. Goodyear had bought a tank rubber washing machine which, they said, "had disintegrated." Banbury had sent in his card but that day he never got further than the reception room. This was late in the afternoon of the first day of Banbury's first visit to Akron.

At 7:30 next morning Mr. State received from him, by special messenger, a letter saying, "I was totally unaware of

the 'trouble' you referred to in our brief time together late yesterday. Possibly I have authority to try to straighten it out and plan to call upon you again at 9 A.M. today, hoping for the normal interview to which I am entitled."

Fortunately this 9 A.M. interview started an understanding between the two of them that increased during the six or seven later times that Banbury met him in Akron.

He merited respect and cooperation, and he could, and did, give B.I.F. many orders for machinery. His so-called "trouble" in that first meeting in no wise concerned B.I.F. nor any other Connecticut corporation, but it helps to give proper background for what follows. But to get back to our story.

After closing the door behind him, State's first words were, "When are you going to give us that rubber mixer of yours to replace those damned two-roll mills you machinery people have been selling now for two generations?"

The reply was, "Here is a bundle of twenty drawings. From them we are now making two duplicate mixers."

After State had looked at each of the drawings he said, "But no rubber was ever mixed by drawings. Show me what you have in iron and steel."

So the two went to the machine shop and located some of the main parts. State looked at them carefully and asked questions about each of them. The rotors interested him most, and he asked lots of questions about them. The young engineer explained his theory of their design, and said that he felt sure the plant could follow through and make a much larger mixer as soon as they had proved a machine of this size, designed for a 100 to 150 pound batch of 1.5 gravity stock.

After a couple of minutes of quiet thinking he said, "Take me back to your office." Neither said a word on the way back and Banbury sensed he was thinking seriously as he walked.

As soon as he reached the office State said, "Give me your phone." Then to the express office at the Derby railroad station,
he said, "I am William State, chief engineer of Goodyear Tire and Rubber Company, Akron, Ohio. I want you to have an express car on the siding of Birmingham Iron Foundry by Thursday of this week to transport a 10-ton machine to Akron."

Banbury interrupted with, "Wait a minute! Wait a minute!" "And don't let anyone cancel this order. I am talking from Mr. Banbury's office over at the Birmingham Iron Foundry."

When he hung up, Banbury said, "Now what have you done? That machine is not scheduled to be shipped for months yet!"

State's slowly spoken reply was, "If you will get that machine finished and in that express car by Thursday night and spend the necessary time with us in Akron to demonstrate it, I will make you!"

Banbury's reply was, "When I saw you last some months ago in Akron, I was a freelance engineer without too many routine duties. But since then, Mr. Wanning has asked that I take the job of works manager here. I must play the game fair. I cannot now push my own hobby ahead of all the other business the company is trying desperately to get through the shop."

His reply was prompt: "If you will do what I ask you, I will make your company, too!"

After looking at each other for a while, Banbury said: "Well, what is your proposition?"

State answered, "Get that machine on that car by Thursday. Goodyear will trace it through to Akron. A foundation, built by your drawing, will be ready to receive it. We will attach a D.C. motor to drive it at various speeds. We will telegraph you two days before we are ready to start mixing. That will give you time to organize and clean up your necessary affairs here in Derby. Then you will come to Akron to stay for several weeks, and really take charge of these mixing demonstrations and the actual running of the machine. Goodyear has many hundred formulas and you will have to show us what your mixer will do on each class of stock. Then, if you are successful, you must stay till we mix tons and tons. We (Goodyear) will pay all the expenses of these tests and production runs, including the occasional use of maintenance mechanics, if needed, and the Goodyear machine shop will be available if you want it.

"Goodyear will supply enough men to run the tests without undue delay. One shift per day at first, then two and three shifts when good stock is produced. You will receive promptly a copy of all the data accumulated, together with all tables, charts, and so on compiled from the data. Also, comments regarding quality of stock mixed, and how it behaved in the subsequent tubing and calendering operations. You will be invited to our staff meetings that will be called to discuss the tests."

The younger man asked, "How should this information (obtained at Goodyear) be used by me later in trying to sell the mixer to Goodyear's competitors? Firestone, for instance?"

His reply was, "Let your own good judgment govern that, but avoid direct quotes and never quote a Goodyear formula. After the weeks you spend with us, you will have had valuable experience and education that, after all, will be your biggest assets in selling machines to others."

"Would Goodyear want any special favor from B.I.F. for giving their time and expense to these tests?"

State's reply was, "No, except possibly quick delivery on any mixers Goodyear might buy right after, and as a direct result of these tests."

"Why is Goodyear offering to do all this for us?"

To this he replied, "Goodyear and the rubber industry in general have been looking for an enclosed automatic rubber mixer, and this machine of yours seems to be IT. Goodyear may get some prestige out of having started this mixer on its commercial future. We can afford to help."

Then Banbury asked, "What about patents? I hope our first patent will prove to be pretty good. What about any patentable
developments that may arise as a result of the tests in your plant?"

To this State said, "Goodyear Tire & Rubber Company will never steal that mixer from you. We recognize it as your baby, and our organization would likely be a bit tough should anyone try to double-cross you on this. But your main protection is for you to be right on the job yourself, all the time, and take the lead in all future developments of the machine and the patents that may result."

State was, as can be seen, extremely fair in all this. Sensing that Banbury or others might think these tests in Akron would in some way tie the machine into the Goodyear orbit, he said, "And why don't you, for demonstration purposes with other rubber companies, install as soon as you can right here in Derby the twin of the machine I am asking you to send to Akron? Then you will also get experience directly in your own factory." (This B.I.F. did, and it paid off handsomely for their customers, and for them.)

When Banbury suggested to Mr. State that they go to see Mr. Wanning, he refused, saying, "No, I have made my deal with you. It is up to you to handle all the details."

So he left the office as unceremoniously as he had arrived.

Now the young man's problem was, what would F.D. say to all this, including the agreement to be away from Derby for several weeks? But he knew it was a mighty good thing for the company. He further relied upon F.D.'s previous agreement to give him freedom of judgment and action in his job.

"So I phoned upstairs and told him what had happened, and added that I thought it was a good thing for the company," Banbury says. "F.D.'s quiet reply was simply, 'I suppose you know what you are about.'"

"Within an hour we had: cleared a space for the erection of the mixer; selected a little day crew of four or five men who would hustle; told them what it might mean for the company, and promised the men a bonus if the job were finished on time. "We put a similar small night force on the job. I slept close by in the first aid room during the next few nights, to be right there if the men ran into any snag. The men did an excellent job and we had the machine out on schedule."

Goodyear did a quick job of installation and Banbury soon had a wire to come to Akron. They had organized the program nicely and immediately mixing was started.

The machine behaved beautifully from the very start. Banbury soon found out, however, that he had to sell a new process, as well as the new machine. Fortunately the dispersion of pigment was good from the start, but there were lots of discussions about getting the stock harder or softer, and so on. They also tried a wide range of speeds and many other variations. Soon they were running two shifts, then three shifts; and when they began to run nights, Banbury occasionally slept in the Goodyear emergency room upstairs to be on hand during the change of shifts, and when a new formula would be started.

Goodyear provided a crew of excellent men, and in addition, Banbury had a liaison man of some authority and considerable experience as a trouble shooting chemist, Earl Davies. Sometimes at the start there were about 20 men per shift, including chemists and their assistants, testers, follow-up men, engineers, time study men, weighers, truckers, operators, inspectors, laborers, etc. Later the number per shift was reduced.

Goodyear fulfilled Mr. State's promises completely. For instance, one morning at 2:30 A.M., Banbury called for a mechanic. Soon he saw a foreman-type man (Jess Phillips) striding towards him followed by a mechanic and his helper.

The foreman's first words were, "Who the hell are you? And what are you doing? We have standing instructions to give you a mechanic any time you ask for one, night or day. But right now we are in a terrible jam trying to get a calender
repaired so that the big 7 o'clock shift will be able to go to work when they arrive in the morning." Banbury explained his situation and the mechanic was released in a few minutes.

One Friday afternoon Banbury said to Mr. State, "These tests seem to be going well and everyone appears satisfied except some of the practical men who say the stock is somewhat tough for tubing and calendering. I plan to go home tonight and make a new set of rotors that will rectify that complaint."

State's immediate reply was: "Stay right here with us. Goodyear will make those rotors for you. Right now I'll order every patternmaker we have to stay on the job and work through the night till the patterns are made. I have ten draftsmen in the next room, and five of them can be at your disposal in five minutes to prepare something for the patternmakers to work from."

But from his briefcase Banbury took a B.I.F. drawing of the rotors they had been using, made some red pencil changes on it and gave this to the patternmakers.

And here Elmer Clark, State's right hand man, went into action. He coached the men on how to make the pattern the quickest possible way, alerted the steel foundry in Sandusky to get ready for a rush job that had to be cast on Monday morning sure. He rushed the casting back to Goodyear's machine shop, and had the Banbury in operation again Wednesday night. They started mixing again Thursday morning. This new rotor gave the desired results and became standard design on the Size 3 Banbury for the next several years.

At one of the early crucial conferences at Goodyear, Banbury and six or eight Goodyear men were in State's office to decide for, or against, placing with the B.I.F. a sizeable order of Banbury Mixers. State was polling each man. The chemists, the time study men, and others had voted, "yes."

But the last man to be polled (except Banbury himself) said: "I hate to stand out against all you fellows. But I cannot conscioniously vote 'yes.' I am the man in the plant who is responsible for production and quality. My job is not to mix a few one-pound batches a day and then bury the result if it is not satisfactory. I have to turn out many tons of stock each day. And it has to be a good stock. Remember that our raw material varies widely from day to day and sometimes from batch to batch. There is very little real uniformity to the material we start with. You all know that. Therefore, do not ask me to O.K. a mixing method or mixing machine unless each of my men can look at, see, and feel, if he wishes, each batch just before unloading. Remember, all our past and present success in the mill room has been based upon this easy inspection on the roll mills."

State looked at the young engineer and said, "Banbury, what have you to say? It seems the next move is up to you."

Banbury took from his briefcase a drawing showing the vertical cross sections of the mixer. The feeding neck did seem long, but it had been made long to meet the demand for quick, instantaneous, one-shot loading. With a red pencil he sketched out a hinged front door for the feed hopper. It would, theoretically at least, give the same quick loading and allow the operator, if he wished, to inspect the batch by sight and feel before unloading, particularly if there were not too much carbon black around.

State, as usual, asked a few questions to be fully informed. Then he turned to the objector and said, "Tom, what do you say to that modification?"

In a couple of minutes, and after asking a few questions, Tom said, "With that modified construction, and if the engineering department O.K.'s it, I will go along with you fellows and vote 'yes.'"

Banbury had told State this construction might cost a little more and that it called for careful machining and erection. Also it would give a little less height to the mixer. (The lower height
applied to him.) Thus started the hinged hopper construction that was a big help in the early days of the Banbury.

"Were we foolish to work such long hours on this project?" Banbury asked himself. "No. I think we acted wisely in so doing. Goodyear had offered us a unique opportunity and we wanted to make the most of it. It was an opportunity to demonstrate quickly what the mixer would do. Also, it was an opportunity to improve the machine mechanically, to collect a lot of useful data, and to educate ourselves in this new art of mixing. Also, some people were skeptical and others were sure the mixer would not succeed. Our job was to make sure that it would. It's success would mean much to us at Derby and I had thrown in my lot with Derby. Also, we could not let Goodyear down after they had put such confidence in us. And these were hectic days. Some of us had friends involved in the war in France. Akron was a very busy place then and often lumber, structural steel, cement, etc., were being carted through the streets on Sundays as on any other day to meet war needs."

In a few months this country was in the war and the call was for more, and still more production. Early in the game Banbury and F.D. sensed that if this machine succeeded, it would much improve working conditions for the men in the mill rooms from coast to coast and in other lands as well.

Eventually these tests and the experimental production runs came to an end. Goodyear wrote an order for twelve Size 3 Banburys. The Banbury Mixer used in these Goodyear tests seemed to give an output per hour about equal to that of three 60-inch mills. (With softer stocks, a little more; with stiffer stocks a little less.) So it was called Size 3. The next size was to be about three times larger, thus Size 9. The Size 27 was to be three times larger than Size 9.

Because the B.I.F. Derby plant was at the time overloaded with other work, they had these twelve mixers, together with about 40 other Size 3 mixers, made during the next few months by Murray Iron Works of Burlington, Iowa. Murray did a fine job—good materials, good workmanship and good supervision. Banbury occasionally spent a day with them. They worked to B.I.F. drawings and specifications.

Soon B.I.F. began to receive orders in considerable quantity and from a number of companies. This machine was soon to become an aid in the war effort and a number of orders came with Washington priority rating attached.

When Banbury came to leave Goodyear for home he felt he was leaving a hard-working, square-shooting, and friendly group. Afterward, he often felt the Goodyear "human touch."

In 1926, State phoned F. D. Wanning saying, "I want to have lunch with you and Banbury in New York City some time next week. Arrive about 11:30 and be prepared to stay until about 2:30. Among other things I have a new roll design to talk about. We will also talk about anything else that comes to mind."

Talk of the new roll was soon disposed of. Mrs. State joined the group for luncheon.

The burden of State's conversation was, "A few days ago I realized that over the years I had been pushing, pushing, pushing you all the time and how well you people have responded. Your cooperation has meant much to me and to Goodyear. The purpose of this luncheon is to say 'thank you.' Perhaps our contacts in the future will be a little less hurried and a little more human."

One winter, en route to Los Angeles, Banbury was taking a few days rest horseback riding on Goodyear's ranch in Arizona. Parkerton, B.I.F.'s Los Angeles representative at that time, phoned one day begging him to drop everything and come over to Los Angeles to help get a badly needed order. (This was back in the depressed Thirties.) Parkerton felt that he was losing this valuable order. So Banbury cut short his stay and was in Los Angeles in the morning.
Paul Litchfield, Goodyear's president at that time, was staying in the same vicinity and heard of Banbury's sudden leaving. He asked Mrs. Litchfield to drive in to deliver this little heart-warming personal message: "I feel very happy that you should care to spend your spare time with us after all the hard work we have done together."

Years later, another Goodyear officer wrote, in part, as follows:

**Dear Mr. Banbury:**

I well remember your early work in Akron at Goodyear in connection with your Banbury Mixer and your close association with Mr. Litchfield, Bill State and Bill Stephens and all the others. The picture that comes to me of you at that time is a fellow in a jumper with a handkerchief tied around your neck and covered with black from head to foot. You really did a job.

Your development has to be marked as one of the real steps forward in our industry over the period in which we have been in the business. I just don't see how we would proceed with our work today if we didn't have Banbury Mixers—and without you this would never have been accomplished.

With all of this came the very great personal associations of the members of our organization with you and the development of complete confidence and trust which you never at any time let down.

It must be a great source of satisfaction to you to have made such a great contribution, and we shall forever appreciate this association and what it has done for our company and industry.

(Signed) E. J. Thomas,
Chairman of the Board
December 8, 1939

And so the Banbury Mixer was well launched in the rubber industry with the powerful help of interested friends. But this was only a beginning as we shall see.

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**Dick Griffith and Miller Rubber**

Banbury's first meeting with Dick Griffith, general manager of Miller Rubber Co., was memorable. Banbury was then on his first trip to Akron soon after his return from Europe in the early spring of 1914. He had only recently joined Saginaw. The purpose of his visit was naturally to lay the foundation for future business, but it was also to try to straighten out a tangle.

A well-known rubber machinery manufacturer had supplied to Miller Rubber a machine, a tank washer, copied from a special machine Saginaw made and apparently infringing one of its patents. Banbury's job was selling this infringed machine. So naturally the first few minutes of the interview were a bit strained, but he soon saw that he could get along with Dick Griffith. Then when cordial relations were established Banbury said he would everlastingly appreciate any help anyone could give him in getting a proper insight into the problems of running a rubber plant. If Miller had any mechanical problems he would like to hear about them as his company might be able to help out.

Griffith took Banbury on a leisurely trip through the factory, and this started a business friendship that lasted through the years.
Thus, Dick Griffith was one of the first people to whom Banbury confided his hope to be able to mix or compound rubber in an enclosed automatic mixer, as superior to the older method using an open roll mill. Griffith's attitude was helpful and encouraging and he was one of the first to have samples of his stock mixed in the new machine. Later when Banbury called again at his office in Akron, he said, "That stock you mixed gave me treads the like of which for quality I've never seen before. I'll be busy for several hours in this labor conference, but I'll be glad to have dinner with you at the Portage Hotel tonight. Then we can talk about this very interesting development of yours."

When Dick Griffith first learned that Banbury had signed up with Birmingham Iron Foundry and the Wannings, he was much concerned. He said to the younger man, "Let's think that over. You and I are going to be doing a lot of business together and we'll have to work together."

In those very early days, Dick Griffith hoped that Banbury would tie up with some company in the Akron vicinity to make this new mixer, rather than go to Derby as he did in April, 1916. In fact, sometime Griffith proposed forming a machinery company in Akron in which Banbury was to have a good managerial position at the start, and later the top place in the company if things worked out well. He was the only rubber man who expressed regret that Banbury had joined the Wanning organization, and explained why—this story of the 13th bolt.

Griffith had bought a machine from Derby for the Miller Rubber Company, a 60-inch, two-roll mill. When the mill came it needed one more foundation bolt than the advance plan had called for. But the foundation was already in place and all the necessary bolt holes had been cored into the concrete. The discrepancy aggravated Dick and he at once got on the telephone with Derby to enter his complaint and find out why the difference. Just who spoke to him, Banbury has never found out, but the response to Griffith was, "No one should be blamed for supplying more than was specified!"

That may be good philosophy but it certainly didn't fit in this case, particularly as the contractor broke off a big chunk of the concrete foundation when he drilled the hole for the 13th bolt. Repairing that damage was expensive and the chain of circumstances led to decidedly uncomfortable feelings between Dick Griffith and B.I.F. and especially with F.D. Wanning.

All this had happened some time before and should have been forgotten—but it wasn't. Dick told Banbury that he would like to heal the breach, especially on his friend's account, but he couldn't think of a way to do it without the risk of making himself look foolish or of having his overtures spurned by F.D.

He said, "Should I have him come to see me here in Akron, or would it be better for me to go to Derby? Both Mr. Wanning and I are busy men and we could hardly afford to spend time to get together unless it seemed likely that doing so would heal the breach between us. How would it be if you and I team up on this thing and you invite me to Derby to witness a test run in your mixer with material I shall supply to you? I'll drop a line to Mr. Wanning telling him that I would like him to witness these tests in your demonstration room with me. He can hardly afford not to meet with me under such circumstances. You be sure that there are at least two comfortable chairs near the mixer and I am certain that we can get over our friction through a little talk under those circumstances. Of course, I'll see that the samples I send you have no carbon black in them to disturb our meeting! If that works, and I'm sure it will if we take our time about it, it will make an opportunity for me to tell him what a good thing I think he has in the Banbury Mixer and how wise I think he was to sew you up. That ought to do it, and help you, too."
So that is just what was done. Those comfortable chairs did exactly as expected. F.D. relaxed and enjoyed himself. There was no telephone in the demonstration room to interrupt their talk and Banbury saw to it that enough batches were run, each for a long enough time, to keep the two talking until it was apparent that all their differences had vanished. So was peace and friendship established. No questions ever arose after that about the past.

Later, in 1917 Griffith bought one Size 3 Banbury, and then another, and then still later a Size 9 in 1919. This Size 9 was the second machine of this size B.I.F. ever made. Later he bought the first Size 27, and then later still he also bought the second of this large size.

Dick Griffith showed unusual and personal confidence in Banbury when he ordered that first Size 27. He had heard a little about a probable mixer three times bigger than the Size 9. One day he wired Banbury saying, "If you are still thinking about that mammoth mixer, come to Akron at your early convenience."

But 1920-21 were depression years, and Derby had been hit badly, as were many other industrial companies throughout the country. B.I.F. had received a tremendous number of cancellations of orders for rubber machinery other than Banbury Mixers. At this time even Goodyear was having financial trouble that caused them to cancel a large amount of machinery including the first Size 27 which they had recently ordered. So F.D. and Banbury discussed for several days what to do about the Miller Rubber telegram. They finally agreed that the younger man should go to Akron and tell Dick Griffith that B.I.F. definitely could not go ahead in this new venture at this time.

Next morning in Dick's office, Banbury had what seemed to him a memorable experience of a lifetime. As he describes it:

"I told him my company definitely felt that it could not go ahead and build this machine at this time, and why we reached this decision. He asked me to repeat the story. Then after pacing his office a couple of minutes he said, 'Do you really think and feel that this machine will work? Are you talking as the same man Banbury that I have known for several years?'

'I replied, 'Naturally I think and feel that it will work; otherwise I would not be talking with you about it.'

'Then he said, 'If you have that definite feeling then I will give you the order without any guarantee from your company as to whether or not it performs as expected. I will only ask the customary assurance of your standard quality of workmanship and material.'

'Then he added, 'This will also relieve you personally of any financial or moral obligation in case it does not perform properly, provided you promise me that you will give the whole design your personal, careful attention, and that the machine will be built according to your ideas completely.'

'So we shook hands and he started to have the order written up including these special conditions. But then when he learned the purchase price, we had an argument. The price seemed terribly high to him, but in a couple of minutes, he said, 'You are right—if this machine does what we expect it to do, it will be a big money maker.' So the order was signed.

'When I got back to Derby I had a real selling job on my hands. In this I was soon helped by Tumble Crisp, one of Griffith's men in Akron. Finally we started to make the machine and all of us at Derby agreed later that it was a very good move for all concerned. Shortly after this first Size 27 was put into operation Miller Rubber decided to buy a second Size 27. That is, they bought the first two Size 27's we ever built."

Tumble Crisp was a comparatively young and new man with Miller Rubber when Dick Griffith told him to see what he could do to put their Size 9 into more effective production. Tumble telephoned asking that Banbury come to Akron to help him get started on this assignment. That started a very
helpful association and for the next few years Banbury spent considerable time with Tumble. Banbury says it would fill a book to tell of the help he was in connection with Banbury Mixer matters in Miller Rubber Company, and later at Firestone Tire and Rubber Company. And Banbury likes to think that the Banbury Mixer gave Tumble a chance to show his great ability, his industry, and good judgment.

The first Size 27 Mixer installed at Miller Rubber attracted much attention. Banbury had told Dick Griffith that the machine would break down (masticate) a 600-pound batch of raw rubber without any preliminary cutting of the 200-pound bales. But the mill operator didn’t believe the machine would stand this strain, so the first bale was loaded gingerly with an ice tongs. Such was the excitement of the moment that the operator inadvertently dropped the tongs in with the rubber. Before those watching could stop the Banbury, the machine had ground the tongs into small pieces.

Other rubber people in Akron were curious to see this great mixer operate and Dick Griffith was willing to show it off. But he was reluctant to show it mixing even though he was proud to demonstrate the way it masticated rubber. Consequently, rather than give away all he knew, he arranged a bell system that would warn his mill operator when a visitor might be coming. When the bell rang, the operator was expected to dump any charge he might be mixing at the moment and put in rubber to be masticated for the visitor’s benefit. (Perhaps we should here explain that both the Banbury Mixers and the 2-roll mills they replaced were employed for these purposes and either type might be mixing part of the day and masticating the rest.)

With this system set up, Mr. Griffith thought he was able to control everything. And so he was until one day Sam Robinson, later president of B. F. Goodrich, dropped in for a visit and asked to see the big Banbury at work.

Dick punched his signal bell to warn the operator and all the way down through the plant explained to his guest that the machine was breaking down rubber, not mixing. This went on until the two men reached the machine and saw what was perfectly obvious, that it was mixing and not masticating! The signal system had broken down. The visitor surely got his money’s worth from that visit; the mixer was turning out a 9- to 12-hundred pound batch, thoroughly mixed, every few minutes! But the story of Dick Griffith’s signal that broke down went the rounds of the industry!
Pennsylvania Rubber Company

Every little while people have asked Banbury, "How did you have the guts to stick to your mixer long enough to get it over the first hump into production and then to make it a world-wide success?"

Of course, there are many factors involved in this, but an important one he hesitates to tell about lest it reflect unfairly against the rubber industry back half a century ago. Certainly the rubber industry has proved itself often, particularly during its heroic efforts in the two world wars. Surely if the industry had shortcomings in one of its periods of swift growth, these have been forgotten in the light of its achievements since.

Banbury always prefaces his answer to this question by reviewing the background of the event he describes.

The rubber industry was undergoing a basic revolution in the second decade of this century, a revolution that grew out of the vastly expanding number of automobiles (and hence of tires) in use, the discovery of the powerful reinforcing action of carbon black in rubber, and the hardening of vulcanization of rubber by the inclusion of certain types of organic chemicals (accelerators) in the mix.

All of these factors contributed to make an automatic internal mixer a vital implement for the processing of rubber. Only through the use of such a machine could the intimate and thorough incorporation of carbon black and chemicals into rubber be accomplished efficiently without allowing the material to come in contact with the workmen's skin.

Here is the story as Banbury told it in the office of the Gutta Percha & Rubber Company in Toronto in 1930. The two people present were the president, who asked the question, and a Mr. Stuart, the company's factory manager.

"The story begins," said Banbury, "with the visit of a Mr. Deming, then manager of the Pennsylvania Rubber Company, to me at Derby. I well remember he came quite unannounced one Monday afternoon toward the end of 1916. I was just getting away to catch the train for Akron to keep an important engagement the next morning. I couldn't spend time with him because the train was already coming into the station a couple of hundred yards away from my office. I hurried off, promising my visitor that I would call on him at his plant on my way back from Akron on the following Thursday or Friday and assuring him that I would telephone him later to confirm.

"So it was that in keeping with that appointment, I was driven up to the plant the following Friday in a taxicab with an obviously Irish driver. As we drove inside the main factory gate en route to the main office, the driver slammed on his brakes, jumped out of the cab and pointed to three of the very dirtiest men I had ever laid eyes on, lying on a grass plot beside our roadway just outside the factory mill room. They were quite evidently sick as well as dirty, for when we stopped by them, we saw that not only were they covered with carbon black, but they were choking out blue-colored froth from their mouths.

"'A cryin' shame it is that such a thing should ever happen to honest workin' men! Why don't the bosses do somethin' about it?', said my Irish driver with some heat—so much heat in fact that I was a bit put back and refrained from expressing my own concern.

"'Something is being done about it,' I said to him, 'and just
this morning I had breakfast with a young man who is going to cure this trouble for good.' That was true, of course, but I didn't add that I had breakfasted alone and that I was that young man. As I looked at the three sorry looking specimens laid out there, I seemed to hear my father (then dead several years) say to me, 'Son, that's something you can do!'

"Almost at once three clanging ambulances drove up and we returned to our cab and drove on to the main office. I was so much moved by what I had seen that I said to the cabbie, 'When you are in church Sunday, Pat, be sure to say a prayer for that young man who will try to correct this bad condition.'

'That I will, governor, sir,' he replied.

"That was one of the important spurs that kept me eager to perfect my Banbury Mixer. I had intended that my mixer would be important to me, but then I decided it would be the biggest thing in my career.

"When I told that story in Toronto," Banbury says, "I noticed Mr. Stuart was becoming more and more interested. When I had finished, he leaned over his desk and said:

'The men's sputum was green, not blue. It is strange that you should be telling me that story. I was the young chief chemist of that plant at that time and we were having trouble with poisoning of our men by some new chemicals that we were trying out. I can add this to your story: I was the one who discovered the plight of the men and had them taken out into the fresh air. Then I told my secretary to get an ambulance, but I was so worked up that I also told my assistant to do the same thing, and later I myself called for another. That is the reason that three ambulances showed up!"

"When I think back now to those days," Banbury generally concludes, "I am proud that my mixer helped to prevent such troubles and to make the rubber industry comparatively clean and healthful. Of course, the resourceful rubber chemists get credit too because they uncovered better chemical accelerators."

In 1917 THE BANBURY MIXER was making its debut to the rubber industry. Several had been sold quickly to well-known companies but the conservative B.I.F. management wished to sell no more machines until those already sold had proved themselves. But Washington and several customers were pushing for machines because the war was on and demand for rubber goods was tremendous.

The Hood Rubber Company at about this time telephoned to buy a mixer as a result of what they had heard from a mutual friend. This friend was either Charley Boggs of Simplex Wire and Cable or John Bierer of Boston Woven Hose. Banbury cannot now be sure which, since these two were close friends and companions. Anyway one of them (both were there) had bought a mixer the day before as a result of seeing a demonstration at Derby.

The Hood people were told by Banbury that the only condition under which B.I.F. would sell would be for Hood to send down a responsible man, preferably their chief engineer (rated a rather outstanding man of those days), and that he personally inspect a mixer which was then being shipped. Next day, as this chief engineer was walking out to see the machine on the railroad car, he said to Banbury, "Who are you?"
Banbury started by saying, "When I first came to the United States, I worked for Sargent and Lundy, consulting engineers of Chicago, and Mr. Sargent—"

His companion interrupted, "Stop right there. I know that company and have employed them on two occasions to do work that I thought was too big and risky for my company to tackle. I have a tremendous confidence in, and respect for, their engineers. Also I have met their Mr. Sargent and consider him not only a mighty good engineer but also the squarest and most reliable man I have ever known in my business career." Surely here was more and powerful help from Banbury's good godfather, Fred Sargent.

Then the Hood engineer continued, "With that background I am not going even to presume to know anything about the machine. Let's go back to your office."

But Banbury replied, "No. You get up on that railroad car and inspect that machine, for you have got to take half the responsibility for the purchase and help me make good when you have it installed. I will assume the other half of the responsibility."

The next morning after the chief engineer reported what he had seen and heard at Derby, the Hood people telephoned to ask for four mixers instead of the one they had originally wanted. F.D. took the call and replied, "Not by a damn sight." And hung up.

Hardly a minute later, Hood was on the phone to Banbury asking him to persuade F.D. to change his mind. Banbury told the inquirer: "We all know a war is on, and there is a certain gamble involved in buying this mixer since we have only short experience yet with our machines in operation. Why don't you call F.D. again in a little while after I have had a chance to talk to him. Tell him that you are working on war orders, that you realize there is a certain gamble in using our machines but that you are willing to take it to forward the jobs you are doing.

And tell him, too, that you will work with us to insure the success of the machines, if B.I.F. will accept the order." Then followed a hurried conference with F.D. and when the call came through again from Hood, F.D. finally agreed, after Hood had said, "Yes, we know it is a new type machine. We will assume part of the risk."

The superintendent of production at Fisk Rubber Company phoned Banbury one day, about midsummer, 1917, to say that their first Banbury Mixer (a Size 3) was doing a good job and that they wanted to buy a duplicate at once. He would send through an order by mail, but their treasurer insisted that Banbury visit Chicopee to meet him personally and to tell him what happens inside the mixer during the mixing operations. So it was agreed that the young engineer would meet the treasurer at ten next morning, right at the mixer in their mill room. He arrived well ahead of time, and watched the mixer discharge several batches punctually every ten minutes according to their schedule. The batches looked well mixed and they had that glossy black shine indicating a well mixed batch. On the stroke of ten o'clock the treasurer appeared. The two introduced themselves. At a glance it was obvious, as a mutual friend had said, that the treasurer was the best-dressed man anyone would likely see in the rubber industry.

The operator was given the signal to load the mixer. The treasurer and Banbury stood on the floor right in front of it where they expected to see a properly processed batch drop out in a few minutes. As they chatted, the mixer sounded a little different from normal, and when the operator unloaded, what a mess fell at their feet! Nothing but carbon black—loose, fluffy carbon black, nothing else. In a few seconds, the two of them were completely enveloped in carbon black—from their shoes up. Someone gave out a loud curse and in seconds the treasurer left the mill room by the same door he had entered a few min-
utes earlier as a best-dressed man!

Banbury went up on to the charging platform and said to the friendly old operator, "What happened? That was terrible."

He replied, "I never saw anything like that happen before. I am sorry. Apparently I forgot to add the rubber for there it is, on the floor. Probably I got rattled by seeing so much office brass around."

Banbury at once set himself to do something to his mixer, so that such a thing need never happen again. Within a few hours he had made in the Fisk machine shop, and installed on their Banbury, what has since always been called the tell-tale device. This is a simple rod, or pipe, attached to the floating weight on the inside of the feeding hopper. Its top end extends through the top of the feed hopper, so that the operator can always easily see what the floating weight is doing—how it is rising and falling, and its height at all times—thus indicating what is happening inside the mixer. Some chemists used to call it the "Brains of the Banbury" and some have called it the "softness indicator."

Fisk mailed to B.I.F. next day the order for that other Size 3 Banbury!

Toward the end of 1924, Banbury was invited to Chicopee when the Fisk directors would meet there. "Come early that day to check with us on the installation of 3 more Banbury Mixers. Then have lunch with the directors and be prepared to discuss the merits of this proposed extension."

Upon arrival he learned they wanted to purchase another Size 27, which could be easily placed alongside an additional Size 27 that was to be shipped in about eight weeks. They also would like to install two Size 9's on the fifth floor of a building that had never been built for such heavy loads. Their architect was there with his drawing of the building so they all studied the problem right on that fifth floor. Eventually Banbury agreed to installing the machines on that floor provided they would throw a well-reinforced steel-concrete slab over the area and tie it into the adjacent vertical columns of the building. They would also do some diagonal and vertical reinforcing now, and more later if necessary. They were told by Banbury that the gearing on the mixer would be a little off-standard to help minimize vibration in this unusual setting. They agreed.

These two Size 9's were to warm up and plasticize cold mixed tread stock ahead of a tubing machine or tread calender. So underneath each Banbury was built in, or placed right under the bedplate of the mixer, a separate pair of sheeting rolls, driven by a separate motor. This sheeter motor usually had a device to speed it up or slow it down to keep it in step with the next machine.

Here is where something unusual came into things from the business angle. With Banbury's conservative nature he found himself thinking and hinting that what was being planned that day was for their next expansion to follow after the Size 27 now being built had been installed and proved. Chicopee had never yet operated a Size 27. So after a pleasant luncheon together and a chat with some of the directors, Banbury left the Fisk premises and went over to see American Steel & Wire Co., good customers in Worcester, Mass., some 25 miles away. He had thought B.I.F. would likely get the Fisk order in about ten weeks if all went well as expected. But later that day Fisk reached him in Worcester saying, "Come back today or tomorrow first thing. We want to place that order now."

Next morning in the office of the Fisk manager at Chicopee Banbury expressed his surprise. But after they asked some more questions about his education, business background, etc., they told him, "Here is the order. Keep in touch with us for the next few years and if we here at Chicopee cannot operate your big mixers we will have to find out the 'Why.' Other companies are doing it so why can't we?"

This is an illustration of Banbury's (and B.I.F.'s) policy of
always playing absolutely fair with customers, and never trying to sell where he would not be willing to buy if he were sitting on the other side of the table. That policy was recognized and appreciated as he heard more than once from fair-minded customers.

Early in 1917, William O'Neill, later president of General Tire and Rubber Company, sent a message to Banbury at the Portage Hotel, Akron, asking that he come to see him. His greeting was, "I've been hearing through the grapevine something about what you are doing at Goodyear with that new mixer of yours. I did not ask you to come out here to my office to give me any information prematurely, but I asked you to come out so that I could size you up as an individual."

He queried the young engineer about his industrial experience, schooling, and finally his boyhood days when he played some cricket and soccer. Later he said, "Put me down for the first mixer you make after Goodyear has bought all they intend to at this time." He became a strong believer in the Banbury Mixer and many orders came from his company.

He suggested that Banbury keep in touch with him and said that he might be able to give him some advice, from a business and commercial angle, during the period ahead. More than once he gave the young engineer brotherly advice that was highly valuable.

Before the 1920 crash, he sent messages warning Banbury on three different occasions, "See that your company keeps its inventory low—there is business trouble ahead."

A few years ago Banbury reminded O'Neill that the two had once, perhaps about 1920, together attended an afternoon meeting of the Rubber Association which was then held the first week in January, in New York, and how on this particular occasion they woke up to the fact that they two were the only people left sitting in that big assembly room. The meeting was over and all the other people had gone. They were sitting geographically right in the center of the big room, with perhaps a couple of thousand empty chairs all around them, talking quite earnestly about something. When Banbury looked around and saw all those empty chairs he said, "Perhaps we had better go. This looks funny and someone might make a cartoon from it."

With a twinkle O'Neill replied, "Don't worry. It will never hurt you to be seen talking to me."

Banbury met his friend Bill O'Neill several times when the two were in California on separate missions.

As Banbury was registering in at the Biltmore Hotel in Los Angeles, with his wife on his first, much anticipated trip to California, O'Neill spotted him and said, "You are the man I most wish to see right now. We are holding a sales conference here in this hotel and tomorrow morning I am featuring what that big Size 27 Banbury is doing to help our quality and uniformity. We will speak of this as showing we spare no expense to give our men high quality tires to sell. A large screen will show your big mixer and there will be a good, well prepared description of what is being accomplished and by this machine. I would very much like to have you present on the platform, to be introduced to the meeting."

Banbury's prompt reply was that it would appear unwise for him to be on General Tire's platform because he should not boost one company's tires over another's. He had to be neutral on such a matter. In a couple of days he would be at Goodyear's plant and if they heard about it they might well mention the matter.

O'Neill at once said, "You are right. You should not be on my platform helping my company sell its tires."

But naturally Banbury was interested in the talk about the mixer and they agreed it would be quite proper and discrete to have someone bring Banbury into the meeting just as the talk
on the mixer was about to begin and seat him in the audience. At the end Banbury would rise and take a bow just before leaving the gathering; at the time he felt the talk was an intelligent and accurate presentation of what the mixer should continue to do for General Tire.

Although the B. F. Goodrich Co. had used an early Size 3 Banbury, it was years later before they ordered any more. They did some not-too-successful fliriting with some of the competition. Some people in Goodrich complained that B.I.F. prices in terms of cents-per-pound-of-metal were unreasonably high.

Then Banbury was invited to a couple of conferences with B. G. Work, president of Goodrich; Dr. William Geer, Goodrich chief chemist, sat in on the first of these. These conferences were pleasant and soon progress was being made. Banbury’s selling theme was, as usual, “Forget the price-per-pound of the mixer. Remember that the Size 27 mixer should pay for itself, including installation, driving motor and concrete foundation, in one year’s operation. Also B.I.F.’s definite policy was ‘same price to all customers.’”

At the second conference, Work was shown a typed page giving his then-current approximate costs in labor and power per pound of mixed stock and comparative figures if the mixing were done on a Size 27, thus proving Banbury’s statement that Size 27 would pay for itself in a year. Work asked to retain this cost estimate for his files. As a result Goodrich soon bought one Size 27 and then later several more over the years.
B. F. Goodrich showed the advantage of a friendly atmosphere where one could observe, confer, check up, think, and then make a decision. Banbury made more than one important mechanical improvement to his mixer and an important change in sales policy as a direct result of this.

Apparently Mr. Work did some friendly boosting for the mixer with several businesses, including Continental Rubber Company and the Krupp Company, both of Germany. His several conversations with Banbury were friendly, helpful and right to the point.

One day during the mid-twenties, Work spoke to Banbury as follows, "Something important from the long range point of view has been on my mind regarding you and your mixer and your company. I'll agree you have done a first rate job developing and presenting your mixer to the trade. It is also pleasing to see that you are building up a supporting organization. I understand that you at your Birmingham Iron Foundry have done a good job in the actual building and installing of these mixers. There must be a fine lot of mechanics and foremen back East in your Derby factory."

"Yes, Mr. Work, we have an excellent group of workers, loyal and capable."

Mr. Work continued, "You must also realize that the rubber industry has been good to you personally. They have allowed you and your mixer to acquire quite a big proportion of the rubber mill room mixing business. And apparently that mixer of yours may eventually get most, or even all, of this mill room mixing business. This is an important consideration because your Birmingham Iron Foundry is too small to be a sufficiently adequate source of supply for something that is so fundamental and so important to our rubber industry. There are two ways to rectify this:

"One, double the size of the present Birmingham Iron Foundry. But this, at best, would take considerable time and

maybe the principal stockholders might not want such an enlarged factory even though outside capital might be easily forthcoming, if wanted.

"Or, two, consider an amalgamation between Birmingham Iron Foundry and some suitable company. This might be the better way. It might be brought about in a reasonable time and be to the benefit of all concerned."

Then, in confidence, he mentioned a company that he thought would be very helpful because, (a) it was a well established and a well known manufacturer of machinery of the same general type and weight; (b) one of its factories was located in Ohio near Akron; (c) it had good management and its company-customer relationships were believed to be good; and (d), there was reason to believe that this company might be interested in such a merger.

"This is primarily in Mr. Wanning's field, rather than in mine," Banbury said, "but thank you for your interest and for your friendly frankness in talking to me about it."

Work's reply was, "When this does come to your attention through Derby, I hope you will not buck it but that you will feel to go along with the idea. It is a logical development, and probably it is wise."

Naturally, F.D. and Banbury were accustomed to exchanging views on all kinds of company problems. They trusted each other. During the first five or six years of the 1920's, more than one amalgamation proposal of this kind had been discussed confidentially.

The important outcome was the amalgamation in August, 1927, of the Farrel Foundry and Machine Company and the Birmingham Iron Foundry, to become the Farrel-Birmingham Company of Ansonia, Connecticut (the F.B. Co. of this story). Thus for the Banbury Mixer and the other Derby specialties much more foundry and machine shop capacity was immediately available, more sales offices and more service men, plus a
larger group of engineers, and eventually, a much improved and much used testing room (or laboratory) adjacent to the Ansonia office. Banbury became one of the directors of the Farrel-Birmingham Company and manager of its Banbury Mixer department.

Banbury's last chat with Mr. Work was on the early evening train out of Akron, bound for New York. Seeing Banbury studying some blueprints in his open Pullman berth, Work said, "What improvement are you trying to dope out now? It is time to put away those drawings for today. Come into my stateroom and let's have a chat. I don't want to go to bed for an hour or two yet."

That evening Work seemed at his best, jolly but thoughtful. He talked of many things and of some people of mutual interest. One important man in the rubber industry in the limelight at that time he thought was being criticized too severely. Banbury knew the man; Mr. Work naturally knew him well, and said some interesting and kindly things about this man from first hand knowledge.

Work was then en route for Europe where he died. Of him Banbury says, "In the normal course of events we did not meet very often. He led a busy life, far removed most of the time from my own sphere of activities. But real and friendly emotion stirs within me whenever I remember my friendly contacts with B. G. Work."

One day Banbury was invited to visit a rubber company near Milwaukee by the plant engineer and led to expect an order for the first three Size 11 Banbury Mixers to be made. He knew his host to be a live thinker. After Banbury's arrival at ten, the engineer spent two hours showing him through the plant and pointing out the most interesting things there.

In the afternoon Banbury tried to steer the conversation toward the promised purchase of the three machines. But the engineer had been allowed by his management to hire a Wisconsin University professor as a consultant. His problems included transfer of heat and thus cooling. The professor's report had arrived a week earlier and the engineer wanted Banbury to spend much of the afternoon to help evaluate the report, saying he believed his visitor knew more theory than he did and that he would really appreciate help to size up the report. The report had several interesting things that later helped Banbury.

Then the engineer wanted to show Banbury what a local man was beginning to do to make rolls (for the rubber industry, he hoped) by a very interesting and quite novel method. Finally came dinner and then a date for breakfast at 8 A.M. to talk about the new Size 11 mixers. After a good breakfast the engineer laughingly said that all details of the mixer were up to Banbury and that his own responsibility was only to arrange for driving them and being sure they would fit into the place assigned to them.

When Banbury got to Chicago, he phoned back to Milwaukee to say, "Give me 10 or 12 weeks longer than the delivery date promised you yesterday and I'll get a special appropriation as soon as I get back to Derby. Then I'll run some scientific calorimeter heat transfer tests and embody the improvements, if any, into your three Banbury Mixers." The plant engineer agreed, but said the delay must not be as long as 12 weeks.

By the time Derby was reached, these calorimeter tests were matured in Banbury's mind. Each was to be eight hours long to be more sure of results. They were actually run by a Johnny Lenihan who had just graduated from college and was all set to follow the program easily. Various thicknesses and surfaces of various metals were tried, and various rates of flow of the cooling water. But the big difference came with spray cooling under certain prescribed conditions. They carefully tested details of this.
F.D. was so impressed with this that he asked a couple of Yale engineering professors to come to check over methods and results. They were complimentary and F.D. pleased. He agreed that previously cooling data for B.I.F. machinery had involved too many variables. In contrast these tests were fundamentally sound and the results indisputably definite and accurate.

Some trouble developed in getting properly started in two or three important rubber companies. Hence Banbury's slogan: "We wish to sell you not simply a good machine, but a moneymaking installation as well. Please let us cooperate on the general layout."

The first two Banbury installations at Firestone failed to satisfy. An early Size 3 was rather small, and had been installed too far away from the sheeting mill. Later, two Size 27s gave batches too big and too infrequent to fit into the Firestone continuous operation. But the machine builders learned a lot from all this.

Later when Banbury was designing the Size 11, he had Firestone particularly in mind. But only when this Size 11 machine had performed well in other rubber factories, and after Tumble Crisp (whom he had met before at Miller Rubber) had joined Firestone, was this machine introduced into the Firestone operation. After that, and with Tumble Crisp's prior experience, the Size 11 really went to town at Firestone. In 1929 they ordered thirteenSize 11's.

"The grapevine told me," Banbury recalls, "that for years Mr. Firestone had been personally interested in our mixer. One day when I was about to leave their big Akron office, he came over with his president, John Thomas, and putting his hand on my shoulder, said 'Good work, my boy, good work. Keep it up.'"

"On a later occasion," Banbury recalls, "when Firestone's company owned more than a million dollars worth of our Banbury Mixers, I was again in conference with his Akron engineers and he came over to me to offer some more very significant and kind words."

Later still, at the time Banbury received the Charles Goodyear Medal, he received the following letter:

DEAR MR. BANBURY:

It was certainly thoughtful of you to send me an autographed copy of your acceptance address at the time you were awarded the Goodyear Medal by the American Chemical Society. I wish to add my congratulations and best wishes to those of your many friends and associates.

The Banbury Mixer has been a most important contribution to our industry and I am sure that your name on this major piece of equipment is known throughout the world wherever rubber products are manufactured.

It is given to few men to see the fruits of their effort so richly rewarded and widely used.

(Signed) Harvey S. Firestone, Jr.,
Chairman
The Firestone Tire & Rubber Company
February 10, 1960

Once in 1929, when Bill State was told Banbury was going to California on a bit of vacation, he said, "You must definitely call at Goodyear's Los Angeles plant where a young man, Eddie Thomas (watch him—he is going places! a fine fellow!) has recently gone as factory manager. I'll tell him you are coming."

This young man gave Banbury a very complete trip around the factory. As they were shaking hands just as he was leaving, Banbury said, "If I were not on vacation I'd be trying to sell you at least one or perhaps two mixers, because it looks as if they would pay for themselves completely in one year's service."

"Repeat that statement," which Banbury did carefully.

Then Thomas said, "If you feel like that, let's go through the plant again right now, and you show me where you would locate those machines."
Half an hour later, as the two were walking back to Thomas’ office, Banbury remembers saying, “For the protection of both of us, let me dictate to your secretary a memo covering what we have said here this morning.”

This memo was along the following lines: “You have told me how many tons of Class A stock you have to mix per week; your output per 84-inch mill, using one man per mill; your rate of pay for these men; the power consumed per mill per hour, and the rate you pay per KWH. You have also given me figures for other classes of stock.

“Now I tell you the power consumed by my Size 11 Banbury plus its sheeting mill; that each mixer and each sheeting mill will require one man (two men per unit); and the output per hour per unit of mixer and sheeting mill operating on each of several stocks.

“With these data and the cost of the Size 11 Banbury with its drive, F.O.B. Derby, plus freight and installation cost, we can easily figure the first may take eleven months to pay for itself and the second thirteen months, assuming, of course, that they work full time.”

Both of them initialed both copies and then each took a copy for possible future reference.

As Banbury was leaving, Thomas casually said, “When will you be arriving back in your office in Connecticut?” The reply was April 2nd.

Sequels were: (a) The order for two Banbury Mixers was put on Banbury’s desk at 2 P.M., April 2nd. (b) When, about a year later, Banbury was next in Los Angeles, he was greeted with the cheery words, “It’s a little early to say definitely, because we’ve been operating only about six weeks, but the figures look 10 or 20 per cent better than you estimated.”

In Banbury’s early days at Derby, and soon after the surge of initial orders, F.D. and he had a chat on how to stir up additional orders for the Banbury Mixer. Banbury proposed (and F.D. agreed) to draft a circular letter mentioning the hourly output that might be expected from the Size 3, giving some idea of the dollar savings in power and labor. The first letter as drafted was directed to manufacturers of stock for rubber insulated wire. Early orders showed that several of the new mixers had been sold to mix this class of stock, a service they performed excellently with good saving to the customer.

One morning Banbury noticed at mail-reading time that Phillips Wire Co., of Pawtucket, had ordered roll mills for this purpose. On the previous day one of B.I.F.’s senior engineers had been at this customer’s plant. He could not learn that any attempt had been made to sell a Banbury; indeed he was not sure the customer knew about this new mixer.

F.D. and he went into a huddle. This was the first of several similar huddles about taking orders for roll mixing mills without properly presenting the superior merits of the Banbury Mixer. They had previously agreed on the use of the circular letter, and it might seem inconsistent to delay sending the letter to Phillips Wire to tell them they could probably afford to scrap their roll mills in favor of Banbury Mixers. So they sent the letter to Mr. Phillips that day.

Upon receipt of the letter next morning Mr. Phillips was on the phone, talking to his friend, F.D., asking that Banbury be in his office the following day to explain the situation.

Banbury spent most of that day with Mr. Phillips. All morning they were in the Phillips office talking about the mixer and casually about other things. Then Mr. Phillips and his treasurer took their visitor to lunch with several of their business friends. By 3 o’clock they were back in the plant office, and apparently the verdict of Mr. Phillips and his friends was that Banbury could be trusted, for they ordered a Banbury Mixer. Naturally, the mixer made good in this plant, and Mr. Phillips was much interested in its performance.
A few years later Phillips wanted to buy another Banbury, this time the bigger Size 9. Banbury had showed them one of these mixers in operation in another rubber factory and they were pleased with what they saw. This resulted in the placing of an order for a Size 9, after they had checked comparative performance figures of a competitive mixer.

At Rome Wire Co., three early Size 3 Banbury Mixers gave a good account of themselves. One was bought early in 1917, another later in the same year, and a third in 1920. Everyone was pleased, and Banbury used the place once to show Good-year Tire and Rubber Co. what good work other rubber companies were doing with his mixer.

Then without any prior warning Rome Wire bought an internal mixer that was intended to compete with Banbury's and may have been infringing one of his main patents. This surprised B.I.F. and was a temporary disappointment.

But a couple of years later, the president of Rome Wire telephoned one day asking Banbury to take the earliest opportunity to be in his office again. Banbury was in Rome next morning.

The president told his visitor, "Your mixers have been doing an excellent job for us and everybody here likes the way you do business. I have tried one competitive machine and found it not equal to your machine. This is being returned to the maker, so I am now in the market to buy again from you—today."

When Banbury left for home he took along not only an order for a Size 9 Banbury, plus its drive, but also an order for a special mechanically operated roll adjustment device and a roll scraper—both new adjuncts that would help the man on the sheeting mill get a better quality finished stock. The president was so pleased about what this scraper and the roll adjustment device would do that he wrote the order for them on basis of cost plus 10 per cent.

Here again Banbury was to find that an hour or two spent in a customer's mill room suggested an improvement to the art of rubber processing and at the same time gave the customer a better Banbury Mixer installation. Also it sold some additional machinery to be made at the Derby factory.

Word came to Derby one day early in the mixer's history that Endicott Johnson, the big shoe manufacturer, was likely to begin making its own rubber soles and heels. Mr. Johnson, their factory manager, said he would like to talk with Banbury at Binghamton about what Banbury Mixers would do for him.

Upon Banbury's arrival he found Mr. Johnson not in his office but out in the building which had been set aside for this new rubber department. A water pipe had burst and the big floor was covered with half an inch of water. Mr. Johnson and his right-hand man were walking around on their heels.

Banbury soon found himself in conversation with Mr. Johnson, both of them standing on an 8-foot plank perhaps an inch thick.

On this little wooden island they had a chat that started a mutually satisfying relationship for Derby, and for Endicott Johnson. Johnson wanted to stay on the little wooden island so that he could supervise one of his staff who was taking steps to do something about the flood. It was only a small pipe that was causing the trouble.

As a starter for the Endicott Johnson rubber department, they had recently bought a second-hand, 60-inch rubber mill with separate motor drive. The motor was in a pit, and at that moment was immersed in 20 inches of water. So, both Johnson and Banbury quickly realized the wisdom of keeping the electric motor above floor level, rather than in any pit. Banbury told him Derby had such a design and could show it operating in a rubber factory not far away. In prior years there had been some reasons for having many motors in pits.

Then, still on this little wooden island, the two began talking
about rubber machinery in general and its manufacturers. Banbury said, "If I were buying, I'd be inclined to investigate the two or three main manufacturers and then stick to one of them, because it's a very competitive business, and there would probably not be too much difference in price even if you bought the best. Also, if you stick to one make, it will probably help you with your future problems of spare parts and maintenance. This holds good for mills and calenders, but for the internal mixer, we at Derby are miles ahead with our Banbury Mixer."

Still on the island Johnson asked the names of some of the most important users of Banbury Mixers. So he was told that many, or even most of the best known rubber companies were using it. When Banbury said that X-Y-Z had bought four or five of them, he interrupted, "Don't tell me they paid you full price?"

He made quite a point of this, so Banbury said, "Yes. Let me show you the order some day to prove it."

Over the years that followed B.I.F. had excellent business relations with, and orders from, the Endicott Johnson Company, but only after a rather dramatic show-down, related in detail here lest anyone get the impression that this machinery business is, or ever was, an easy snap.

A principal competitor was determined to get this sizable Endicott order. It was to consist of a Size 9 Banbury (or a competing machine), a 60-inch sheeting mill and a 60-inch rubber calender. Each of these machines was to have its own separate drive.

This competitor put one of his best engineers and salesmen on this inquiry, and he spent much time trying to get the order. F.D. was quite disturbed about the situation, and talked to Banbury about it more than once. Then one day the latter received a long-distance telephone call from the customer saying that he had decided to give the order to Derby (as Banbury had expected all the time they would do eventually).

They said, "Be here tomorrow morning and we will tie up all details so that you can start work on the order immediately."

But even at that last minute that competitive "best engineer and salesman" showed up unexpectedly. Next morning at the customer's main office he arrived at practically the same moment as Banbury did. The competitor brought an unusual letter from the president of his company insisting on a further delay before the placing of the order, and requesting that the customer take another trip to see the competing internal mixer.

The customer was naturally embarrassed. He confidentially asked Banbury's advice on how to act that morning, remembering that Banbury was there at his request to take home the order. Because of that unusual letter, and because neither wanted to build up any unnecessary ill will or trouble for the future, Banbury advised that the customer make that additional trip to see that other internal mixer, and expressed his own willingness to wait a couple of days. While waiting, Derby would get ready for a quick start. In a few days the order came in by mail to B.I.F.

This Mr. Johnson (there were two by that name active in the business at that time) and Banbury saw a good deal of each other after this. One day Johnson said, "You may be surprised to hear that there is some local opposition to my mixing or incorporating carbon black into rubber in our Binghamton factory. Someone is very keen on my continuing to buy carbon black in the form of a masterbatch from a source about 200 miles away. Therefore, please be extra sure that your Banbury Mixer will operate with the minimum of escaping carbon black."

Banbury acted upon his request and used it as the occasion to introduce a few improvements. Much of the dust could be caused by the empty carbon black bags. Therefore he asked Endicott Johnson to provide something that he had designed to overcome this.
To help give practically dustless loading, Banbury increased the size of the motor of the ventilating fan, and asked the Banbury operator to load his carbon black with the door of the feed hopper half closed and locked there—with the mouth of the bag well down into the throat of the machine. This improvement was later shown in the Banbury Mixer Bulletin.

Banbury personally loaded 80 to 90 per cent of the bags of carbon black that were used that day, with the Endicott operator at his elbow to see exactly how he did it.

Mr. Johnson paid two or three visits to this part of the factory that same day and a couple of times he asked Banbury to go to the roof with him to observe the amount of carbon black coming from the ventilating fan. He was pleased with what he saw, and finally at about 4 o'clock he said, "This is fine. The locomotive of the Erie Railroad passing my office makes more dirt and dust than you are making."

Banbury remembers that day very distinctly in nearly all the details. About 5 P.M., Bill Matthei, the very cooperative and resourceful superintendent of this rubber department, said, "It is time for you to go and eat with me."

Then Banbury went to a big mirror to see whether or not he would be clean enough to go to any restaurant. Although his hands and arms up to his elbows were horribly dirty with carbon black, and apparently he had stroked his face once during the day with a dirty finger, it was really astonishing how clean his shirt was. It was a white shirt with the sleeves rolled up nearly to his arm pits.

This was an unusual exhibition of what could be done if real care were exercised with an installation properly made.

Next day Banbury had to be down in Trenton, New Jersey, to see a former Akron man who was then beginning to operate a rubber plant there. Naturally Banbury told his friend with a good deal of detail and glee what had happened the previous day in Binghamton. His comment was, "I have always thought of you as a strictly truthful man, but I can't swallow that."

So Banbury insisted on taking his host right back to the Trenton club where he was his guest. Banbury insisted that he see that white shirt which he had worn the previous day.

This little bit of history is not representative of what is commonly done by any means, but rather it represents what was done without too much extra care and expense that day in Binghamton.

Mr. Johnson once said that he reckoned the best bonus he paid anywhere in the plant was to the operator who wrote the best recording thermometer charts on their Banbury Mixers. He paid a bonus on the best-per-day basis. When he had perhaps four or five mixers running two or three shifts a day the competition became intense, he told Banbury.

Moreover, he stacked these charts through their center holes on vertical poles three or four feet high, spaced along aisles in a room he specially set aside for storing them. The charts were kept for a year or more, to be referred to if any stock showed up badly in the finished merchandise. Some other companies used to do the same sort of thing to help safeguard uniformity and quality, and they probably still do.

Banbury recalls early contacts with Dunlop Rubber Company in England that were important in many ways in the development of the Banbury Mixer. "My early contacts were with H. C. Young in Manchester and with Harry Willshaw in Birmingham and elsewhere. Young had Size 9's in the well-known Mackinlop plant where they did fine service, and Willshaw had a pair of Size 27's in Birmingham. The experience, helpfulness, and personal friendship of these two men were especially valuable to me and helped get acceptable early installations."

"Dunlop's Toronto, Canada, plant was the first anywhere to install a Banbury Mixer (in this case a Size 9) on a mezzanine
floor located directly over the sheeting mill. George Harlow was then chief engineer at that plant and he and I made the original sketches for this installation. Later he joined the Dominion Engineering Co. of Canada as sales engineer, and in that capacity actively pushed the Banbury Mixers with excellent results. This way of installing our mixers on mezzanine floors over 'sheeters' has since become general practice, in part through the initial enthusiasm of George for that first installation."

Quite aside from the importance of Dunlop itself in the Banbury story, contacts made then and in that company later had significant importance elsewhere. John Collyer, then in a top Dunlop position, first came into Banbury's horizon through that company. Later he was to occupy the chief position at B. F. Goodrich in Akron and through that he became a world figure of great power in the rubber industry.

Dr. Harry L. Fisher, a B. F. Goodrich man early in his career, made important contributions to the rubber industry and attained outstanding eminence. Dr. Fisher numbered presidency of the American Chemical Society among his many honors and his most important work was probably his contribution to the synthetic rubber program before and during World War II.

"In his last years," Banbury recalls, "he returned to teaching at the University of Southern California, Los Angeles. He was always a close personal friend and a wise and understanding counsellor, particularly during his years at U. of S. C. Many close and warm incidents characterized this friendship, among them a well-remembered Christmas dinner of the two families in Santa Barbara at a time when the Fishers felt somewhat lonely."

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The Mixer Overseas

One day in 1918, F. D. Wanning and Banbury fell to discussing the future of their joint endeavors with the Banbury Mixer. F.D. said how pleased he and his father were with the success of the Banbury Mixer venture in the United States. The basic question was whether Birmingham Iron Foundry should attempt to manufacture in Derby for export and also to service foreign customers from this side of the Atlantic, or whether it would be better to deal with overseas machinery makers who would manufacture, sell and service the Banbury abroad. These companies would represent Derby and use its know-how and drawings in building the machines, selling them and servicing them.

So Banbury said, "Our Size 3 mixer is definitely building up good will and acceptance in the trade here. Our larger Size 9 mixer (then being introduced to the trade) should build up still more good will, and more sales for us. But we must not forget that we have several competitive, or would-be competitive, enclosed mixing devices to reckon with. Our patent protection should help. We have every reason to believe that we are ahead of any competitor. We have the best basic design and have sold more mixers than any competitor, and probably more than all competitors added together. We should continue to do pretty well in this country."
"But we also know that there are important rubber factories in Great Britain and on the Continent. A good machinery company in England and one in Germany are striving to get a satisfactory rubber mixer. They naturally will try first to sell their mixer to their local market and then with that experience try to sell in this country. Thus they will add to the already long list of competing machines. Hence we should start selling abroad as soon as possible."

So the two agreed that they should establish a relationship at once with a good rubber machinery manufacturer in England to manufacture, sell and service the Banbury Mixer under a license and royalty agreement. This could have meant a fight with competitors and an early testing of the patent structure. Banbury was prepared to take that risk if B.I.F. was. Looking at it from a legal as well as an ethical viewpoint, both thought they should win out. This move did stir up some tough problems about patents but the eventual outcome was excellent and represented a decided strengthening of the patent structure.

It was also a commercial victory. F.D. suggested that if B.I.F. manufactured overseas they should deal through David Bridge Company of Manchester, England. A few years before one of its owners was in the United States on a trip regarding machines to be erected in Pennsylvania. He called upon B.I.F. before sailing back to England, and made a favorable impression on F.D. Banbury seemed to remember that a few years before he had visited their plant briefly with a business friend who seemed to be on a favorable working basis with the Bridge Company.

At that time, the company was operated by the five sons of the original David Bridge. It had been started and had grown from the original production of a heavy, industrial coupling, or a clutch as we would think of it today. The original David Bridge had made these units under a railway arch in Manchester. From that small beginning, the company had grown tremendously by continuous servicing of the excellent products it manufactured. That was what the Banbury Mixer most needed, local service, and that necessarily meant local manufacture as well to make the whole operation coherent and profitable. This was just what David Bridge’s five sons had to offer and so it was not difficult to reach a happy arrangement with the David Bridge Company.

Here it seems necessary to detail some aspects of Banbury’s relations with Birmingham Iron Foundry. Banbury’s principal compensation was through royalties paid him by B.I.F. on Banbury Mixers built and sold. The rate of royalty was set intentionally low because all agreed that a low rate of royalty, accompanied by low factory profit and selling price, might yield more in the long run than high ones that could affect sales and encourage competition. It was a wise decision that none regretted: that same policy was carried over into the arrangement with Bridge, a low rate of royalty on the patents to encourage activity on its part.

As soon as F.D. and Banbury had reached their agreement they there and then made a draft of a letter to be sent to Bridge. The letter called attention to what they hoped were the possibilities of the mixer in the rubber industry, and to some aspects that might give Bridge trouble. In case of trouble the Americans would, of course, help. They would also apply for patents in such other countries as might seem desirable.

Bridge liked the proposal and both parties promptly started action toward manufacturing, selling and servicing the Banbury Mixer in England.

F.D. and Robert Bridge, then chairman of the Bridge Company, shortly became close, letter-writing friends. Their letters often contained much beyond simply business matters. Banbury recalls that some of F.D.’s letters would contain one or two long paragraphs about general business and national problems of the day, and then in a short paragraph, or a postscript, F.D. might
add, "Mr. Banbury and I have read and discussed your letter of ten months ago and we agree that your suggestion is good. So we will consider it to be effective as of now."

F.D. and Banbury regularly consulted with each other before making any policy decision affecting this three-party Bridge agreement up to the time of the 1927 amalgamation of B.I.F. with Ansonia.

In addition to carrying on considerable European correspondence of his own, Banbury soon began making trips (probably six or seven round trips in all) across the Atlantic. He spent much time at Bridge’s main office and factory in Castleton, Manchester, on manufacturing and sales problems. He took trips to canvass the rubber trade over there, always accompanied by a Bridge representative, except in rare instances.

Eventually the business was built up, capturing much of the trade, but in spots it was tough going for a while, partly because of local national pride and some natural tendency to favor a local competing machine.

Two of Bridge’s sales representatives of the earliest years were Leslie Radcliffe and Paul Vanderlene.

"Leslie Radcliffe was manager of Bridge’s London office," Banbury recalls. "We had several pleasant trips together visiting rubber and linoleum factories in the southeast of England. He was a good sales engineer, a well-read man and an excellent companion. Paul Vanderlene worked out of his native Brussels home, a tireless worker, a great enthusiast for our mixer, and an invaluable linguist. Together we visited many European factories, most of them more than once, including Continental Rubber in Germany and Pirelli in Italy."

About 1936, Jonathan Bridge (managing director) and Banbury made a most interesting "good-will" trip together, calling on their principal European customers, most of whom at this time had several Banbury Mixers. Joseph Brown, who

the trip he and I took together to Germany late in 1938, shortly before the start of World War II," Banbury relates.

"Krupp was then making the Banbury Mixer in Germany, and their engineer and salesman, Ellerman, conducted us on a memorable visit to Krupp’s factory in Magdeburg, to Continental Rubber Company in Hannover, and to the Berlin factory of Kuebler, where we inspected the first Banbury (a Size 3A) to be made with anti-friction bearings to carry the rotors.

"I had specially requested Ellerman to make at least one Banbury with these anti-friction bearings in view of the fact that in the United States we had been unable to get any user to agree to be the first to try them. Even Ford, in that big order around 1935 (that we shall tell of later) had shied away from anti-friction bearings in view of our good record with the sleeve-type bearing. Ford too was not satisfied with the guarantee the bearing manufacturer was willing to give. I believe Krupp made four 3A’s with anti-friction bearings. The Banbury which we saw in Berlin seemed to be operating beautifully."

After Robert Bridge died in 1927, Jonathan Bridge took top place in the company. Then later Joseph Brown began to come into his own.

The mixer thus gained outstanding men and friendly cooperation. Together Banbury and Bridge’s men happily visited most of the main British and European rubber factories. Several of these were branches of, or connected with, rubber companies in the United States.

Joseph Brown came into Banbury’s orbit first in connection with a ten months’ trip Brown took to Russia around 1930. There apparently he did an outstanding job. His assignment was to demonstrate two Size 9 Banbury Mixers already erected in Russia and to superintend the erection and starting up of some new Size 11’s. Later he was to become top man at Bridge and a great Banbury Mixer booster.

"But to me," said Banbury, "no list of the Bridge organiza-
tion men who helped us would be complete without mentioning Bradbury, the sales representative in Glasgow, Scotland. Versatile and reliable, he was a good and interesting man to have known.”

Jonathan Bridge more than once stated that the Banbury Mixer had been a great help to his company because through it, several Americans who came to England to erect rubber factories went almost automatically to Bridge for some of its other machinery.

Men at Bridge worked hard—at times, very hard—but they all enjoyed it, partly because their efforts succeeded, bringing profit and prestige to all concerned, including their customers. Apparently they were pushing the best machine and it usually won.

B.I.F. supported Bridge from Connecticut by sending drawings of all latest changes in machine design, and innumerable communications about the latest methods of installing a Banbury and of mixing the many different types of stocks in it. Ideas, methods and designs were being improved constantly over the years.

Although Bridge’s headquarters at Castleton was the clearing house for new information sent from Derby, Bridge was very cooperative and agreed that Banbury might at times write to his agents directly about their occasional troubles in mixing, and even occasionally write directly to important customers whom Banbury knew personally. Of course, copies of all such letters went to Castleton and this informal handling greatly helped the Banbury to get started in Europe and also relieved Bridge of some details.

Early in this cooperation all agreed that it was necessary to be flexible when, on occasion, a customer would insist that their first and sometimes later Banbury Mixers be made in United States (as did Continental Rubber Company, for instance). Manufacturers soon learn that the customer is boss, and have to adjust themselves to his thinking. Nonetheless the idea of local service more often controlled the customer’s decision.

In the late 1930’s, Banbury began to hear from an occasional Australian rubber man visiting the United States, who wanted facilities “down under” for servicing and repairing the mixers properly. Then during the early 1940’s two Australian companies sent representatives to see him, saying explicitly that the Americans should arrange to manufacture and service mixers in Australia.

They stressed three things: (1) The long geographical distance from Australia to either the United States or England, (2) the vital part that the Banbury played in the production of rubber goods in Australia, and (3) the war effort that made it especially desirable to have facilities in Australia rather than to trust such vital matters to long ocean voyages. They inferred that the Australian government informally agreed with them and hoped the arrangements would be made.

After considerable checking, Banbury (then in Ansonia) contacted Jonathan Bridge, saying he felt something should be done. Bridge had been selling a full line of rubber machinery in Australia and knew conditions there better than they who were in Connecticut. The result was that Goninan, Ltd., of Newcastle, N.S.W., now manufactures and services Banbury Mixers in Australia.
Ed Anderson and
The Reclaim Problem

In the earliest days of the Banbury Mixer, it became evident that one of the easiest ways to show its advantages in compounding rubber stocks over the then-standard 2-roll mill was with a formula containing a considerable percentage of reclaim rubber. Ed Anderson, president of the Rubber Reclaiming Company, was quick to recognize this and to use the fact as a means to help him sell his reclaim. On four or five separate Saturday mornings in those early days he would telephone Banbury to say he had just returned from another trip out among his trade and had sold another Banbury Mixer.

"Come on up and I will give you the name." So Banbury would quickly drive the twenty miles to see him and get more details: usually that Mr. Blank of XYZ Rubber Company would likely give him an order if Banbury followed up the matter promptly. Thus did he receive several orders.

To one of these prospects, Banbury once said, "Mr. Anderson was very kind to help me sell my mixers."

To which the reply was, "Don't say 'kind,' say 'clever.' For he knows your mixer provides the only way some of the damn reclaims he sells to us can be mixed properly."

Banbury spent many a Saturday morning in Anderson's office. Anderson had become a real friend and believed that the Banbury Mixer offered the best means of "massing" reclaim rubber for the alkali process prior to refining. He took Banbury to the refineries to illustrate his contention and bought several Banburys for this massing job at Naugatuck and at his Indiana factory.

As the years went by he said, "I believe some day someone is going to do a devulcanizing job right in that mixer of yours. I believe it has the right action. Get busy."

This was about 1925. The two of them tried several times in the demonstration room at Derby but without any real success then. Years later and under different conditions of temperature, pressure, speed of rotors and horsepower, material was obtained that might—or might not—have interested Ed Anderson for certain classes of stock, had he lived.

He used to try to give Banbury a swelled head by saying that F. D. Wanning had definitely told him that his mixer had saved the company from bankruptcy back in 1920-21. He and F.D. had been long-time good business friends.

U.S. Rubber Company's glove and shoe plant at Naugatuck are associated with Banbury memories of much friendly, fruitful cooperation. Two cases stand out: John Alm in 1917 mixing twenty batches per hour of shoe stocks (using pre-masticated rubber) in a Size 3 Banbury; later Alm's record-breaking performance, starting about 1919, with an early model of Size 9. And again, some years later when Bill Biddle and Harry Anderson made and operated two trail-blazing, money-making installations.

President Saeffer, of U.S. Rubber's glove and shoe plants, was a close friend of F.D. and was much interested in the Banbury Mixer. In 1917, he brought a small group of his factory people to Derby to witness and help in mixing tests on their stocks in the B.I.F. demonstration room. The tests went well and later, Banbury recalls, they all went to the Clark Hotel for lunch. Afterward as they were sitting around a big
round dining table over coffee, Mr. Shaeffer was saying how interesting the tests had been when someone remarked that there were thirteen people at the table—look out! So Banbury moved his chair back behind F.D.'s, leaving only twelve at the table and thus silencing the joking objector. Then the discussion went ahead in an entirely friendly light hearted atmosphere. After the week or so it took to evaluate the stock mixed that day at Derby, they sent in an order for a Size 3 mixer.

At first this seemed not to perform satisfactorily. Banbury and his assistant, Dave Ducharme, would go up to Naugatuck and make test runs that came out very well. On two or three visits to the plant, they showed the foreman that he could mix a good batch every three minutes. But as soon as they left the plant the machine would be shut down for some reason. Clearly that foreman was not aggressively interested in having it work and later he included a very strange statement in his report explaining why he didn't like the machine.

It seemed very foolish of him to say, and especially to write, "The thing takes too many men to carry stock to it and carry it away again."

Banbury was never sure how far that report circulated but soon afterward a new millroom superintendent, John Alm, took charge of that mixer.

John Alm was one of the thirteen who had been at the table that day. A big, tall, bony Swede, John could think on his feet and even though his knowledge of the English language was not too good in those early days he got his ideas across. He was a good worker and he had a keen mind in his blond head. Naturally, he and Banbury became good friends and mutually helpful.

First thing that was done when he was given charge of the mixer was to move it to a more convenient location, and then he operated it for all it was worth. Before the rest of the plant quite knew what he was up to, he had this same mixer turning out 20 batches an hour of shoe stock from pre-masticated rubber plus reclaim. That was quite a stunt for a mixer that Derby had been requested to remove by his predecessor!

A couple of years later his company's management bought for John a new Size 9, the third of that size to be built, and he really made history with it: good tonnage, good quality, all curatives added in the mixer, and turning out a wide range of colors including both black and white stocks for the shoe department and also for the druggists' sundries department across the street. In the course of a few months, it was doing the work that some brand new 60-inch mills had been bought to do a couple of years before. That Size 9 and what it was doing day after day, and year after year were much talked of, and the indirect cause of many other orders from other factories around the country.

"After ten years' operation," Banbury recalls, "the factory management ordered the machine dismantled for careful inspection during the plant's July shut down. This was a precautionary measure because of the great importance of this machine in the daily operation of the factory. It was then they telephoned me saying that I must come up to see that the original tool marks were still visible in the four brass bushings carrying the rotors."

Much later, about 1930, Banbury had other happy pioneering dealings with U.S. Rubber at Naugatuck. Among the developments they had been cooperating on was a Size 11 Banbury as the central unit in an installation that embodied many novel ideas.

This mixer was driven by a two-speed motor suggested as a way to increase production and to give greater flexibility in operation. Another new feature in this installation was extra cooling of the sheeter rolls, accomplished by drilling special holes for the cooling water into the rolls near their surfaces. The installation also had a special cooled, tilted mill pan to catch
the batch as it came through and cool it somewhat before it was returned to the rolls. Also developed and incorporated was a long cooler that would take the stock in a ribbon from the sheeter and cool it down to near room temperature. As the stock left the cooler, the flying shear automatically cut it into pieces or slabs that were stacked for the next operation.

Mr. Davis, then president of U.S. Rubber, one day watched all this in good operation and turned to Harry Anderson, then plant engineer, and said, "Harry, this is fine. Excellent. That is just the way I like to see our money spent. Where shall we put in another installation like this one?"

That was one of two trail-blazing developments by F.-B. Co. with Harry Anderson and Bill Biddle of Naugatuck. The other concerned reclaiming factory scrap rubber.

Earlier in this chapter you have read about Ed Anderson and his ideas on reclaiming rubber. The development to be described now in detail was a quite different problem and had another Anderson (Harry) in it as plant engineer and production manager, and Bill Biddle as factory manager.

The whole thing started one Saturday afternoon when these two were playing golf with Banbury (as then they planned to do once a summer) on the Race Brook course near New Haven. They usually talked very little about business during the game, but as they were walking together up the tenth fairway, Banbury casually said to Harry, "What are you buying these days in the way of equipment?"

He at once replied, "Probably an incinerator, and how I hate to do it." Upon being asked, "Why do you want to buy an incinerator?" he said, "To burn up our factory scrap rubber, trimmings, overflow, half-cured waste stock and the like that is usually found in a rubber shoe plant like ours; and our dumps are full."

Banbury's reply was, "Let's finish the game and then as we eat our lobsters I'll tell you and Bill about some work we have been doing in our Derby lab to take care of scrap like yours and at the same time make quite a profit for you, we hope and believe."

Don Comes, who usually played with the three of them but had not played that day because of a recent hospital operation, joined them at dinner, and they all talked out their ideas on reclaiming factory scrap. Finally, Banbury suggested that his Derby laboratory run some tests on the scrap of the Naugatuck shoe factory in its test room.

Bill asked Banbury to repeat exactly what he expected to do with this scrap and what the value was of the processed scrap in the Naugatuck plant. It was agreed that a Naugatuck chemist, Valois, would spend the necessary time in Derby and then take charge of using the product in the factory formula.

Even though the story now sounds simple, the Derby group had put a lot of hard work into doing this sort of processing before this, so now for Naugatuck they quickly had results that pleased all concerned.

When Bill and Harry saw what their chemists could do with that product from the Derby test room they were delighted, particularly when they figured out the big savings possible.

They ordered the Banbury Mixer of the size and specifications recommended.

While their mixer was being built they were to rent a Naugatuck parking lot and fence it in to store their scrap instead of burning it.

Soon the process was put into operation at Naugatuck and it worked from the first, after some matters of bearing clearances and of ventilation were corrected.

"Better than we dreamed," Bill told Banbury soon afterward. "What you said about the product of this process was just too conservative," and soon this Banbury devulcanizer was paying for itself.

Bill Biddle's figures and his enthusiasm caused his friends
at U.S. Rubber Co.'s Mishawaka plant to buy a Banbury Mixer that reclaimed their factory scrap—also profitably.

On the subject of shoe stock, Banbury recalls that a rubber shoe factory takes a totally different view of the snow and slush of winter and spring than the rest of us. Charley Haynes, an important man in U.S. Rubber's shoe division, was visiting in Derby one day in December, 1918 when a heavy snow began to fall about noon. All the rest were naturally thinking about the trouble of driving their cars home that evening, for that part of Connecticut is hilly. But not Charley!

"Oh, what a wonderful snow," he said, thinking only of the overshoe market and not of getting home himself. "Worth a million dollars to our factory! A snow storm in December makes people buy new rubber overshoes and do so promptly, whereas when a snow storm comes in March they continue to use their old overshoes."

Banbury's first contact with the Ford Motor Co. was about 1923. They mailed Birmingham Iron Foundry an order for four or five Size 9's, but Banbury felt compelled to send it back because the order read "2% for cash in 10 days" whereas the quotation called for "30 days net." B.I.F. had informally agreed with the trade to maintain the same price to all customers on the same specifications. So, would Ford correct the order accordingly and return it? How F.D. hated to have this done, but nevertheless! The corrected order came by return mail without comment. F.D. breathed more easily.

Banbury was never too pleased with that installation because he could not convince the customer to install conveyors to and from the mixers as then seemed necessary for efficiency. Toward the end of this first job, he had friendly personal chats with Mr. Ford that greatly helped their future business relationship.

The next Banbury job for Ford was another Size 9 about 1928. Here again a little argument arose about a detail of the installation concerning compressed air. When Banbury offered to visit Detroit again to clear up the matter, Mr. Ford sent word, "Go ahead. You know more about this sort of thing than I do."

The biggest and the most memorable Banbury Mixer job for
Ford was in 1935. Banbury's office telephone rang early one Thursday afternoon and a voice said, "This is H. B. Hanson of Ford Motor talking from Detroit. Our company is likely to build a new plant to manufacture auto tires."

H. B. Hanson had operated the Acheson Company's Camborne and Plymouth factories in England, and later had joined Ford as a protégé of the well-known Mr. Sorenson.

He was asked, "How big a plant?" The reply was, "The size is not settled yet but it may be 5,000 tires a day or 10,000 or even as big as 30,000 to 40,000."

"That is a big plant."

The voice said, "It's not big for the Ford Motor Co. When can you be here? Tomorrow?"

Banbury replied, "No, but I'll be there Monday or Tuesday, depending upon when I can reach and talk with our Akron man."

This was Andy Hale who had that morning started on a fishing trip with some friends. When Banbury reached Andy and told him of this Ford inquiry, he quickly agreed to come to Detroit to help tackle the biggest inquiry ever.

The two arrived at the Ford office and were ushered at once into a group of perhaps a dozen interested staff men. Mr. Ford was there. After a few minutes Mr. Sorenson said aside to Banbury, "Mr. Ford would like me to bring you into the adjoining office so that he, you and I alone can have a chat before we go into conference with the larger group."

As soon as the three were alone together Mr. Ford said, "Of course, we like your mixer and we have already a few of them doing a good job for us. But what we are now proposing involves so many more of your mixers, and other machinery of yours too, that we want to learn your personal attitude on a question. If we should want to do with your mixer what we have done with some other machinery that we have purchased, namely make suggestions about the design, what would be your reaction?"

Banbury's prompt reply was, "Gentlemen, I feel honored that two men of your importance should be willing to give your time to help us improve our machines, particularly the Banbury Mixer. You can be sure of my personal cooperation. I will carefully check into your suggestions, discussing the pro's and the con's with you honestly as we see them. But if you should ask us to incorporate any features that we can't fully approve, we would like your approval in advance that we write you saying that that particular feature is incorporated at your request and at your risk."

Mr. Ford turned to Sorenson and said, "That is quite fair and proper. That is real cooperation. We can work with people having that attitude of mind."

Banbury said, "Gentlemen, would you like to tell me now what improvements you have in mind?"

Sorenson replied: "First, we would take all the gears off the Banbury, put them in a separate gear case, and then couple up with wobblers (strong, simple universal joints) to the rotors."

Banbury's reaction was, "You mean a steel rolling-mill drive. We have considered it in the past, but we believe it will cost 20 or 25 per cent more than our standard and we believe the rubber trade is not ready to accept that increase in price."

Mr. Ford at once said, "I'd be willing to pay this extra. Certainly for the plant we are now considering, because I am hoping to make it a show place and not simply an ordinary production unit. Perhaps you might call it a forecast of the future."

So they worked up detailed drawings in Ansonia that Ford finally adopted and bought. The gears of the sheeting mill were also put in the same big gear case.

Other suggestions were also considered, but Mr. Sorenson agreed to drop them when he saw the scaled drawings and the complications involved.
This Ford inquiry naturally stimulated and interested everyone at Ansonia very much. Banbury went to Detroit for five 3-day visits, each time with ten days between for preparation for the next interview.

Mr. Sorenson was the day-to-day contact but Banbury also had frequent chats with Mr. Ford. Right from the start Ford encouraged Banbury to talk of what the F.-B. Company had actually done in the recent past, and also about some of his own "dreams."

He said, "Tell me about some of the ideas you have presented to other companies unsuccessfully. I think I might back you on some of these." So they talked of standard products and methods that had been done again and again, then parts of these that could be reshuffled to make an installation probably better than anything now operating; and finally pure dreams.

Mr. Ford had said, "Let us talk mainly of dreams."

After one or two of these exploratory visits Banbury said to Ford and Sorenson as he was leaving one day, "Perhaps you would like me to bring along next time one or two of our other experienced engineers."

But Ford said, "No. We are doing pretty well as things are now organized. Later we may like to see others from your company, but not yet."

After the third three-day visit of Andy Hale and Banbury, they brought in more engineering talent from Ansonia, Carl Schnuck, then chief engineer of F.-B. Co.

The last day that Banbury was at Ford for these conferences, Mr. Ford came in the morning with a legal size page marked with a double line down the center. On the left side he had written twelve reasons why they should not go ahead with this plant, and on the right side, a list of fifteen reasons why they should. As he sat down, he said, "Mr. Banbury, sit down here by me and let us evaluate the pro's and con's." One could see that a very wise head had directed that pencil when the pro's and con's were tabulated.

It interested Banbury how thoroughly at ease he was with Mr. Ford during all these talks. Of course, he had heard stories about how arbitrary Ford had acted at times with some people, but the utmost confidence seemed to prevail between the two of them. Yes, and frankness, too. One day he said: "Mr. Banbury, you do not seem to be very keen about my going ahead on this thing."

Banbury at once said, "Mr. Ford, if you do go in for this thing I hope you will give us the order and you can rely on us as individuals and as a company to do a high grade job. But I can't help think what a terrible kick in the pants it will be to some of the tire making companies that have, by their orders and goodwill, kept us in business for many, many years."

Ford replied that he appreciated the good work the tire companies had done for the auto companies and for the consuming public, "but maybe the time has come for me to do something myself."

In the early days of these discussions, Banbury asked Mr. Ford just how secret he wanted to keep his inquiry. F.-B. Co. was, of course, accustomed to keeping secrets, and this seemed a special case where precautions should be taken. Mr. Ford told him, "Keep it as secret as you can easily, but don't strain yourself."

Soon after, Bill Miles of Firestone came to Ansonia to buy some more mixers. Firestone insisted in those days on the use of a special alloy in their mixers that reduced their first cost somewhat, and so any mixer built for that company was always, to an extent, special. F.-B. Co. quoted and Firestone bought.

Believing that Firestone was the largest supplier of tires to his friend, Ford, Banbury took precautions to incur no immediate expense with respect to this order so that they could readily accept cancellation should Firestone wish it when the Ford plans became public knowledge. When the news was out
a few days later, Banbury offered to accept cancellation at "no charge," but in a couple of days Firestone sent word, "Go ahead full steam, anyway."

One day Mr. Ford overheard someone say that Banbury was in a position to give him the names of some of the best technical men in rubber in the country in case Ford did go ahead. Would Banbury give a few of these names? His prompt reply was, "I cannot help you steal men now employed and doing good jobs. But I might be able to tell you of some good men now out of a job." (This was in the mid-Thirties.)

Mr. Ford at once commented, "A wise answer to an unfair question."

On another day he said, "Mr. Banbury, don't you think all tire factories are terribly dirty?"

Banbury replied, "Mr. Ford, that is hardly a fair question for they are all good business friends of ours."

His reply was, "You know they are terribly dirty. I don't like my things being made in a dirty factory."

Banbury told him that the machinery would require much less repairs if the mill rooms were kept cleaner, as they can be if time, thought and money are devoted to this end.

One day Ford asked, "How clean will our mill room be? Can visitors with white dresses go through it?"

Banbury said, "Yes, Mr. Ford, if you will do all we ask you to do."

"And with white shoes too?"

"Yes, Mr. Ford, if you will do all we ask and make the installation as per plans."

This factory was built in 1938 and operated for five years. Many visitors commented that it really was a very clean place, even the mill room, but cleanliness was characteristic of Ford plants, even his steel mill.

Finally in 1943 this tire plant was shipped by our government to Russia to help their war effort since the enemy had destroyed much of the Russian rubber manufacturing potential.

A development such as Banbury's mixer is never accomplished without trouble. Indeed sweat and tears went into Banbury's efforts for the rubber industry. The Banbury Mixer was at least 75 per cent perspiration with maybe 25 per cent inspiration. Here are some of the troubles. Each of them led to improvements.

The first mechanical trouble was with the dust stops located at the four points where the two horizontal mixing rotors pass through the ends of the mixing trough. In dealing with this over a period of years from 1917 to 1921 Banbury soon learned that carbon black is very, very fine.

Recent electron microscope measurements show it would take about a million of its particles lying side by side to measure one inch. Some people declared it would go through, or escape from, a sealed tin can unless it was crimped and well soldered. It is really only condensed or collected smoke but it does remarkable things to rubber and so the rubber companies wanted to mix it in. This superfine material had to be held inside any mixer that was intended to incorporate it into semisolid rubber.

The first attempts to keep the black inside employed almost every type and make of packing available on the market. Then the rubber companies began some special packings of their
own. Then customers got into the act. Among others, John Gammeter of Goodrich (Akron), who had many patents in his name, tried to solve this problem.

These early packings would hold carbon black to a certain degree but neither Banbury nor his customers were satisfied with the amount of black in the mill rooms. More than once Banbury admitted to a customer that dust stops were the weak points of the mixer design. Some of them realized that quite readily. But this detail was being improved, and customers could get by quite well if they followed instructions carefully. Banbury tells how he reached the solution:

"One afternoon I got my very loyal service man, Dave Ducharme, into my office, and said, 'Let's shut the doors and tell the phone operator not to disturb us unless for emergency. Then you and I will concentrate on this dust stop problem, and not go home till we come up with a better design.'"

"I had previously suggested to Dave that he have a really good lunch because we had a big date for the latter part of the afternoon and we must not be disturbed by routine matters. Dave's face shone, for he liked those occasional important conferences. He soon agreed that we were apparently tackling the holding on the wrong line. The horizontal line was obviously not right, nor was a packing wrapped around the shaft as used for reciprocating shafts like piston rods going in and out of a steam cylinder. Ours was a rotating shaft, therefore we would try to hold it on a vertical instead of a horizontal plane, i.e. in a plane at right angles to the center line of the shaft.

"Then we sketched up a ring arrangement that proved to be a real turning point in our success in holding carbon black as well as other materials that had never been quite as hard to hold. We tried the new design at once. Soon it proved to be on the right lines and just what we wanted. Details and improvements naturally followed—particularly its lubrication, an important item."

On that, the following is a true and typical story:—

Bill Runals, chief engineer of Firestone Tire and Rubber Co., one day phoned asking Banbury to come to Akron to go with him personally inside each of their twenty Size 11 Banburys to make absolutely sure the rubber compound had no chance to be exposed to the harmful effect of copper. There was a theory that the smallest exposure to copper during mixing was harmful to the tire. Banbury agreed to come if Bill personally would inspect with him the outside of each of those mixers when they were working.

They had made this inspection when Banbury said, "Bill, you people are doing a fine job in looking after your Banburys. I was particularly interested to see how well the dust stops are holding in the carbon black."

Bill's complimentary reply was that he thought it was a pretty good design. When Banbury told him that the design relied upon proper lubrication for its functioning, as a bearing does, the two agreed on a test to prove that point there and then. The lubricating pump was temporarily disconnected from one dust stop that was performing perfectly. Within about 30 seconds, carbon black began to leak out a little, and by the end of a minute it leaked badly. Then they started up the lubricating pump and the leaking stopped completely. This was repeated two or three times and Bill said, "That's surely a good illustration of your point. Also of where buyer and supplier can work together to the advantage of both."

The day following these tests was a holiday. Everything was shut down. Bill and Banbury climbed into and through the bottom discharge door of each of those 20 mixers. It was terribly hot and they stripped off all clothing except overalls, shoes, socks and caps. In each case double safety precautions were taken. Not only was each electric switch opened but the fuses were also removed from the main line to the driving motors.

Frank Miller with a helper was also around to pull them
out if trouble developed from the heat. After this inspection and a good shower, Bill decided a few moments in the adjacent swimming pool would be a good thing. But after a while the two men noticed the door behind them had closed and could not be opened from the pool side!

How they got back to the dressing room is another story—even their towels were on the other side of that glass door. But it was a holiday and despite the thought of both that someone else might be at work, they made it dashing stark naked past the section where the secretaries did their typing on business days.

Some companies had more trouble with their dust stops and other phases of mixing than did others working under similar conditions. Firestone had appointed an experienced man, Frank Miller, to keep their many Banburys in good working condition in their several plants. He became a clearing point for frequent bits of information from the builders on how to keep the mixers in tiptop working condition; and do this with minimum expense. Frank also passed along useful observations to Banbury. With some companies, not thus organized, much information from Banbury’s people never got to the man who could have used it effectively.

Abrasion on the inside of the mixing trough seemed likely to be a problem. As soon as Banbury saw that he had a good mixing machine, he dismantled it while it was new and put the rotors in a lathe to reduce their diameters to give as much clearance as might be caused by the wear of years of actual working in a rubber factory. Then another batch of the same formula was mixed in this artificially-worn mixer. Although this gave a reassuring result, Banbury soon found out that in actual practice the mixers often had to handle stocks that were really badly abrasive.

That started a systematic hunt for metals that would withstand this abrasion. Some metals were found to act better with some stocks than with others. A mixer with steel on one side of the mixing chamber and chilled semi-steel on the other side showed directly contradictory “best results” depending on the stock. When a machine was being used in Boston to mix a chemically inert stock like jar rings, its performance contradicted that of one in Akron mixing a masterbatch of carbon black and rubber with the usual stearic acid wetting agent.

Some mixers over a year’s period might mix for many more hours than some others. There appeared to be no way to average up the testing situation. So Birmingham Iron Foundry inserted into several mixers a number of 6- by 6-inch test pieces of different metals to give a real comparison of the behavior of these metals on different classes of stocks run for the same length of time.

A year or more of testing with various metals and metal coatings in the same mixer produced valuable information. Some, from California, were special metals used at the business end of oil well drills. These taught them something, but the big discovery was a special metal much better than any of the others. They settled on this in spite of its cost ($3 per pound) as the best commercial solution because it showed up best on all classes of stock. “Ken Keniston,” says Banbury, “did an unusually careful and thorough job in this metal testing and made intelligent records.”

The job of properly welding this expensive, wear-resisting metal to comparatively large metal surfaces came next. The salesman had warned Banbury that this had never been done before on such large areas and that it would likely take a long period of trial and error. He would not guarantee results. At Derby a very good blacksmith, George Martin (originally from Hungary), was always anxious to tackle difficult tasks and he had been trying out the then-new welding outfits.

He said to Banbury, “I’d like to try that myself, particularly if we can do it in the evening when there are only a few people
around. I hope you yourself will put on a welder’s helmet and watch what is happening at the tip of that welding nozzle.”

What a job he did that evening, a big step forward in the science and practice of building a better Banbury Mixer! Later he used to say to Banbury, when they passed in the shop or on the street, “That was some evening you and I spent together on that job they told us could not be done.”

That was many years ago. Lots has happened in the metallurgical world since then. And Farrel-Birmingham Co. now has in Ansonia an excellent metallurgical department constantly on the lookout for new metals and metal compounds. And they are doing their own part in producing new things and new methods. Therefore, the present knowledge and facilities are a long, long way ahead of the beginnings just referred to. But even now in 1962 the same metal Banbury and Martin first applied is still in favor and constant use.

In the early days of the Banbury Mixers, the art of making steel castings was not nearly as well developed as it is today. B.I.F. had trouble procuring satisfactory castings for the rotors of the Size 3 despite the attempts of several well established steel foundries, but eventually one or two foundries did a satisfactory job. Evidently it was a casting difficult to mold to the high standards that were set, including a steel with an above average tensile strength.

Then when B.I.F. later tried to buy similar castings for the new and larger Size 9 mixer troubles multiplied. Finally they did cull out enough good rotor castings for three mixers, enough to show the value in practice of the Size 9 machine. But many of these later showed small cracks (although none broke in service), apparently due not so much to the work and strain put upon them in daily service as to casting or cooling cracks started in the foundry mold. Some cracks leaked water into the rubber being mixed, and this required special precautions.

F.D. was told about the troubles, naturally. One day he came to Banbury’s office, shut the door, and asked if the younger man would be willing to drop making the new Size 9 because of these troubles with rotor steel castings. F.D. even suggested an interesting line of alternative activity in the company.

But Banbury said, “Definitely no. Look at the drawing as we have been asking the foundry to make it and compare it with this one in red pencil. I am now willing not only to accept this change but I think it will give a stronger rotor.”

Banbury regularly had in a drawer of his desk a drawing of any mixer part that he felt needed prompt attention. F.D. agreed and suggested also a few cooling fins that would be chipped off after the casting cooled.

“So I did not get that better job F.D. had proposed,” says Banbury, “but we all, including the rubber industry, got a better Banbury Mixer!”

B.I.F. began to call the Size 9 “The Money Maker” for what it did for them and for their customers. The regularity of incoming orders enabled Banbury to organize the factory for definite production on a weekly or monthly schedule.

And that is how machinery manufacturers can keep the profit per machine down but at same time make a nice total profit on quantity. And of course that is the way to make money to pay weekly pay rolls and periodic bills for local and national taxes. At the same time, by careful planning, they managed to incorporate later improvements right along into the machine.

To provide sufficient cooling to the stock being mixed was always something of a problem—at least after the first two or three years when more and more production was wanted. All sorts of odd things were tried—in addition to passing cooling water through the rotors and other jacketed parts. Sometimes the cooling water was dirty and gave a deposit in the water chambers. Sometimes it was clean water from the refrigeration unit,
or from the deep well, or at times just regular city water. Occasionally the stock was cooled by adding a little water directly upon the stock itself. Sometimes this was a random addition and sometimes a calculated quantity, such that the water absorbed the B.T.U. equivalent to the kwh input of the driving motor.

Responsible engineers for many years have discussed the relative merits of the anti-friction bearings (both roller and ball types) versus the time-honored sleeve bushings 10 to 20 inches in diameter or larger. This question was discussed and debated as it related to the bearings of calenders, crackers and other heavy machinery used in rubber factories. Banbury’s interest was which to use for the four main bearings that carried the two heavy rotors.

Customers’ master mechanics generally, in the earlier period, preferred the larger, reliable sleeve bushings with excellent automatic lubricating pumps to serve them. They said the sleeve bushings of the mixer normally last for many, many years and give notice of any impending trouble, but anti-friction bearings usually fail without notice. Banburys must operate continually day and night for weeks, sometimes for months on end without stopping. In a number of cases during World War II, for instance, Size 11’s operated three months without being shut down at all. Mechanical reliability was thus fundamental and vital.

It may sound reactionary that F.B. Co. did not use anti-friction bearings earlier in the Banbury Mixer, but the explanation is quite logical. The important action of the Banbury Mixer is to apply concentrated work in relatively huge amounts to the ingredients of the rubber mix to bring them together into a uniform and useful compound. Unlike most machines, the friction of good sleeve bearings in the mixer is so small in comparison with the amounts of energy delivered to the dough that even if all of it were saved the overall economy thus effected would be trifling. Rather than install any kind of bearing that might conceivably cause trouble, the chief engineer felt strongly that it was far better to use sleeve bearings of generous size for the loads involved and then be able to count that they would last through long periods of service with only the usual amount of lubrication.

One of the jokes of the 1930’s concerned a sales engineer who had tried on several visits to sell Ansonia’s chief engineer, Carl Schnuck, and others on the idea of using anti-friction bearings for the two mixing rotors of the Size 11 Banbury. The engineers listened carefully to the story but did not buy for this special application although they did buy for other applications. Then a few years later the ex-sales engineer became plant engineer of the big U.S. Rubber factory in Detroit. Then he phoned Banbury to say his new company was in the market for two more Size 11’s. Banbury suggested he try one mixer, at least, with the anti-friction bearings he had tried to sell. He said he would investigate and then decide. In ten days he phoned saying he couldn’t in his present position conscientiously recommend a change to anti-friction bearings because of the long and reliable service given by the usual big sleeve bushings on this job in this factory.

Krupp, who was making the Banbury Mixer in Germany, was the first to install anti-friction roller bearings on two or three Size 3A mixers. One of them was in successful operation in Berlin not long before World War II.

Actually, Banbury Mixers habitually have such long lives, when properly lubricated and serviced with the latest renewable spare parts, that some have been in use for 40 years or more and are still doing well. Some users expect their machines to last for the average life of a human being. Of course, the constantly improving large anti-friction bearings should now be much more attractive to the practical master mechanic than they were.
years ago.

Although the mixer should give uniform results (and usually did), yet, after a while, Banbury began to hear that uniformity was not as good as it had been previously from the same machine. So he made a special point of checking to find out the cause.

The temperature at which the stock was mixed was very important. Originally the mixer was built without a thermometer attached. (The roll mixing mills it was designed to supersede had no thermometers either, as a rule.)

One day in 1916 or 1917, at Goodyear in Akron, the mixer was turning out batches with great regularity and acceptable uniformity. All at once just before 5 o'clock in the afternoon a batch was discharged that had not been compounded at all. They turned off the cooling water and put the batch back into the mixer and in a few minutes had an acceptable batch. (But how terribly dirty the workmen became trying to get all that carbon black back into the mixer! A rubber man of those days will understand! And this was with unpelletized carbon black!) Then everything went well until about the same time the next afternoon, when the same thing occurred.

So Banbury sat on a barrel and tried to dope out just what had happened or changed at just before 5 o'clock on two succeeding days. He naturally thought about the water-cooling towers up on the roof of the building, through which the cooling water from the Banbury was passed to be recooled for use again. It was winter with almost freezing temperature outside the factory. Therefore, just about sundown the cooling towers would become that much more efficient! After this, he was never to forget that there is a minimum temperature below which the rubber does not like to receive the reinforcing powders; rubber compounding is highly affected by the temperature!

This stirred him to attach a thermometer to each mixer. But this was not done in five minutes, because he had to find or develop a unit that would be sufficiently and quickly sensitive to temperature changes of the batch and at the same time strong and rugged enough to withstand the stresses imposed by the stiff, hard rubber dough as it was being churned around on the inside of the mixing trough. But he succeeded, first with a simple indicating instrument, and then, about a year later, with an instrument that would not only indicate but also record the temperature.

When he first showed this to Mr. State, then chief engineer at Goodyear, this good friend said, "I have been hearing about what you are doing, and I want to tell you that if you succeed, the instrument will be worth its weight in gold to us and to the industry in general. We are very conscious about the importance of temperature. Both of us realize that it has been quite a problem."

Many well-known rubber companies established a procedure whereby the temperature charts, written the day before in the mill room, appeared next morning on the desk of the supervising chemist via the foreman's desk. This was a valuable check on uniformity of product. These charts usually carried the date, the name or number of the stock being mixed, the number of the Banbury and the operator's name. Some companies began to keep these records for six months or longer before discarding them, so that they could turn to their files and perhaps learn something, if there happened to be any complaint.

Later on the round temperature charts which were first used were abandoned by some and, instead, temperature instruments that gave the record on a long paper ribbon were installed. This ribbon could be made to travel at a speed that enabled the chemist to check the operation much more precisely than the round charts usually had done. But, after some years, some of the less exacting people returned to the round charts, saying they were easier to investigate and file.

These charts showed not only the temperature but also the
length of time taken for each batch, plus the regularity with which the operator loaded his second and third ingredients, if there were such.

One day in 1917, Banbury was asked to visit a factory making insulated wire stock. The manager said, "How is it that we used to get such good uniformity, but we don't now?"

The two walked from his office to the operating mixer, but on the way the manager had to take a long distance telephone call, which tied him up for perhaps 15 minutes. During that time from a platform above the mill room where the Banbury Mixer operated, Banbury timed a number of batches, and found that one batch would be unloaded in three minutes, and another might take five or six minutes.

When the manager and he finally got to the mixer, Banbury noticed that the timing was done by a cheap alarm clock, perhaps six or eight inches in diameter, without any glass face, and with the minute hand bent so badly that at its end it was probably an inch or more from the face of the clock.

The first thing he did was to straighten the hand of the clock. Then he drew a chalk circle on the charging platform and instructed the operator to stand within that circle when he was reading the clock that had been fastened down. These two things helped. However, Banbury then noticed that the operator started a batch, at seventeen minutes on the clock, that was to be run for four minutes. But the operator had no means of remembering just when he started that batch, nor did he seem able to add four minutes to the seventeen minutes, as Banbury laughingly asked him to do afterwards.

Banbury promised the customer to let him have, as quickly as possible, a simple timing device with a face 16 inches or so in diameter, with digits on it and an indicating hand, driven by a friction drive that the operator could easily turn to zero at the beginning of every batch. This little device was mechanically connected to one of the mixing rotors of the Banbury.

No more complaints about lack of uniformity came from that customer, and the manager was greatly pleased.

Several disturbing experiences taught Banbury that a factor of prime importance in any mixer installation is the quick-sheetsing to cool it promptly, because the material as it is discharged from the mixer is in lump form. In the early years he was so concerned with the prime importance of mixing the stock satisfactorily that it took a little time to realize this and to request, yes, even to insist in a friendly way, that the mixer be so installed that the stock could be sheeted immediately.

In one case the sheeting mill was almost a block away, and the stock had to be transported through the yard for a part of that distance. In other cases the mixer was so installed that the stock had to be transported by hand-carts to an elevator (when you could find one available) and then to a sheeting mill on a floor above (when you could find a mill available).

These installations were shut down after a time of unsatisfactory performance and one of these Banbury Mixers was quickly installed in another plant of the same big company, where it at once went into satisfactory operation.

These were extreme cases, but in each it was shown that the mixer could disperse the pigment into the rubber in an acceptable manner.

In one or two installations in the early days, Banbury found that the stock was weighed and put into containers on the floor above by a man who never saw the Banbury. His function was to empty the ingredients down a chute into the mouth of the Banbury, he being directed by the man on the floor below, who was standing on the charging platform signaling to him. All of these experiences led to the principle that Banbury soon began to use most energetically:

To sell not only a good mixing machine but also a good money-making installation.
Getting the stock promptly from the Banbury to the sheeting machine was so important that the development of the technique went through the following steps as experience showed the way:

(a) The mixed stock was first carried in a little buggy and lifted from it onto the sheeting mill.

(b) The next improvement was a conveyor to transport the stock from the Banbury to the sheeter. Two or three types were tried. They did the job, but, being motor driven, they were under control of the operators, and therefore, the stock might wait on the conveyor as long as a minute or two at times. Also, conveyors sometimes caused contamination when the Banbury went from one formula, or stock, to another.

(c) In some cases skip hoists took the stock to the sheeter, but here again uniformity sometimes suffered. The stock, nine times out of ten, would be taken promptly to the sheeting mill, yet at other times it might be held in the skip for minutes, or even over a brief lunch period.

Therefore they came finally to:

(d) Placing the Banbury on a mezzanine floor directly above the sheeting mill or over a large screw extruder (much enlarged and improved over recent years) to insure that gravity immediately moved the stock to where it was sheeted and cooled.

During this evolution Banbury and his people had designed a Banbury Mixer with sheeting rolls incorporated into the bed plate immediately under the discharging door. After a few installations they decided this was often not safe enough for the men on the job.

The two-roll mixing mill the Banbury replaced was never too safe despite many improvements.

A few people, including even members of Banbury's own company, thought some of the policies in this regard were too dictatorial. This was not intentional but Banbury was convinced that unless they made the machine fit properly into the operation of the customer's factory, it would not be accepted in the long run by the industry. This truth should be self-evident, because a customer buys a machine like this only with the thought that it will be a good machine in his factory, giving good uniform results, and that it will operate profitably.

Surprisingly enough, the last step was at the time the hardest to put over. Some said, "Let well enough alone, we're doing all right." But in Akron one day Banbury noticed in some records he was shown confidentially, that the conveyor to the sheeting mill sometimes caused more hours of shutdown per year than did its Banbury.

In the early days of the Banbury Mixer, particularly around 1918 and 1919, F. D. Wanning said to Banbury, "If you finally get this mixing business centering around your enclosed automatic mixer, it will be because of your good engineering sense, combined with a good money sense, and because that machine would certainly make the finished product much more uniform than do the open-roll mixing mills now universally used."
Personal Reminiscences

This account of Fernley Banbury and his work would fail in its purpose if it did not include some, at least, of the many stories he is fond of telling. Those following have been selected from several parts of his experiences to round out the picture of the man and to supplement the greater number that you have read in the preceding chapters.

There is no particular pattern to these incidents except in the way they cast interesting sidelights on our principal character. They are put together here as something of an addendum to the principal story that has occupied this book.

Because their purpose here is primarily to reveal facets of the Banbury personality, they follow as he himself has often told them. Many, many more are omitted lest this book overspread its reasonable limits, but these will surely entertain and enlighten those who here seek keys to Banbury’s success.

A well-known local character during my childhood was Squire Hawker, Rector of Morwenstow Church, Cornwall, on that very rugged coastline a few miles north of Bude, and about 15 miles from where my father was born. This story refers to conditions of a couple of centuries or more ago and not as they are now. Also remember that in the days of our story, boats carried freight around to the little coastal towns of the country and travelled without the benefit of the lighthouses and navigation aids as we know them today. This meant there were frequent wrecks.

The feeling then was that after the local people had done all they could to save human lives aboard wrecked boats, they could then take the spoils as their own. Sometimes wrecks occurred at church time on a Sunday. In that case a watcher might tell some one in the rear seat of the church, and this could easily lead several stalwarts to leave the church promptly. A quiet thumping of the rear door or some other local signal passed the word around.

Thus one stormy Sunday morning, Squire Hawker saw one or two of his congregation leaving their pews. So he at once said in a commanding voice, “Don’t let any one leave until we have closed this service. This we will do at once, so that everyone can leave at the same time and thus have equal opportunity to reach the beach.”

This may be a libel on the good squire but it seems somehow to echo the feeling in those days on that rocky, violent coast where ship and cargo were often quickly and totally destroyed unless rescued promptly. Such recovered material was considered community property and even human life was not held as precious as it is held today.

Those same folk were soon to be building lighthouses and establishing and manning life boat stations to safeguard life and property on that rugged coast. Some say that those preachers, John Wesley and his brother, Charles, had a hand in improving things, for these two spoke in a language that was listened to by the people.

Much of the coast line of Cornwall and Devon was rocky, rugged, cliffs often hundreds of feet high, winding, with many indentations and little coves. Some of the coves were connected
to natural caves and occasionally men with a smuggler’s turn of mind would enlarge the caves. Sometimes, I am told, there would be secret tunnels up to the grassland above. Thus a couple hundred years ago this was said to be a smugglers’ paradise. Particularly Cornwall because it was more remote and lonely.

Local revenue men had a full time job on their hands. Farmers would sometimes they find their horses mysteriously tired in the mornings even before work, perhaps through the work they had done in the night for local smugglers’ groups. Maybe a farmer’s son may have cooperated with the smuggler. Smuggled goods would be transported inland and distributed around the adjacent countryside and villages.

I did not see these things with my own eyes, but I have heard my father tell more than once the following story, and when I was in England in 1960 I went around to see the spot where the climax of this little story was supposed to have happened. It was on a little narrow road that passed through the farm where my father was born in rugged North Cornwall. Here is the story:

A strange group of four men occasionally were seen at night travelling on a short cut. The four men were carrying what looked like a coffin, one man at each corner. The coffin was enclosed in a cloth cover, and the men were masked and looked as ghosts are supposed to look. A local man became curious. He thought it funny that so many corpses had to be carried at night. Would it not be quicker and easier to borrow a horse? Funny these people were that poor to have to carry the coffin themselves.

The villager, a bold and hefty man fortified by beer, dressed in dark clothes and hid on several nights in a dark gateway under a spreading tree. In his hand he held a big weighted club. Then one night the coffin bearers came alongside where he stood and he hit the center of the coffin with all his might with that big heavy club, at the same time yelling some unprintable words. The four bearers ran for their lives not wishing to tangle with the law. Inside the coffin was the expected cache of smuggled French brandy, tobacco and silk.

I don’t vouch for the accuracy of this story nor do I claim that either the coffin bearers or the marshal of the law were relatives of mine.

If my father had gone to the United States as he had originally planned he would have travelled with a cousin of his, Thomas Hicks. This cousin and his wife (my cousin Kate), his sister and her husband George Hawke, and my father and mother all through their adult lives were close friends and occasionally had a picnic or a get-together in each other’s homes. They were very congenial with many common interests. Being of about the same ages they died at about the same time while I was far away in the United States. Once when I came back to England, they had all gone to their rewards except my cousin Kate who had been physically the weakest of them all. She had, by doctor’s orders, to take a little rest on a couch downstairs two or three times a day and thus outlived the remainder of the six. She told me this story:

Her husband Tom had a final sickness of some duration. One morning she came into his room at 7:00. He surprised her by saying, “Dick passed away last night.”

“At 5:30 by my bedside clock, I saw him outside my window and he tapped on my window and said ‘Come along Tom. It is no good hanging around here any longer.’”

Cousin Kate said, “What are you talking about? If that is so we will be hearing about it later.”

They had no telephone connections in those days but later that morning a telegram said my father had died at about 5:30 A.M. that morning.

I remembered my father had often used those very words.
I had several times heard them myself when I had joined them on little shooting expeditions which they used to take together. When no birds, pheasant or partridge, could be found in one location, father would say, "Come along, Tom. It is no good hanging around here any longer."

I was always interested in this bit of communication between those two lifetime friends at the time of the death of the first of the pair.

An ocean liner had just left the dock in New York. The customary amount of big rope was lying on the forward deck—ropes (or hawsers) used to tie the ship to the dock. An Irish sailor had the job of untangling the mass and coiling each rope separately on the deck. The weather was hot and the ropes were long and he was sweating profusely. Finally when he came to a particularly difficult tangle he looked up and said to a sympathetic passenger looking on: "My glory! I believe some young rascal has cut off the end of this rope!"

When I got off the boat in New York on one of my return trips in connection with my work for Dr. Acheson, I phoned Edward Acheson, Jr., asking how the new Port Huron plant was going. "Fine," was his reply, "except that occasionally the roof leaks."

My reply was, "I'll be in Port Huron tomorrow morning and we will call in the builder and investigate!"

It was Johns-Manville's best bonded roof and should not leak. Next morning Ed and I in our ordinary office clothes and the builder in his thick outdoor clothes went up on the roof looking for any cause of leakage. The temperature was about 40° and it was a cold, bright morning. As we started to go up to the roof, we were told it was leaking right then. Neither Ed nor I asked ourselves, "How could the roof be leaking on such a dry morning?"

We three had looked over every square foot of the roof (it was not steep). Then we two, half-frozen, and the builder burst out laughing so loud and so uproariously that we could hardly stand up on the sloping roof. It would have made a most wonderful picture.

A few minutes later, when we were inside the factory and had looked around, we could see that the cause of the leakage was condensation on the pipes inside the building.

Before I decided on Epinal, in the Department of Vosges, as the location for our little French Acheson Oildag-Aquadag factory, it made for more than one interesting story. The mayors and councils of each of many towns were determined that theirs should be the town for our plant. They knew we needed special water and showed me with glee their water supply. (Most of which was useless from our viewpoint.) I was entertained at luncheons and the wives of city officials were giving my wife a quick course about the importance of their towns to us. Los Angeles, California, never did a more energetic job to get a factory. I, however, suffered from too much entertainment and decided that a better way to select a plant site would be to get the facts first.

I visited the main library in Paris to get a good picture of where the right water conditions for our process were likely to be. Then I talked with one or two well-informed and friendly government officials about the several towns located in the zone of good water, their approximate size, their friendliness to our establishing a little industry in their town and the living conditions we would meet there.

Early next morning we were on the train from Paris to Epinal in the eastern part of France, and no two people viewed the country en route with more interest than we. Epinal gave me a good first impression but before saying yes I visited one or two other towns in the same vicinity.
In Epinal we were fortunate in promptly contacting, and then using, a mature lawyer who was in close contact with the local town government and also in private practice. He did a good job for us, although his only knowledge of the English language was, “Good Day.” But my wife’s school girl French (plus a little help from me) enabled us to get along without too many embarrassments. Which recalls this incident:

Our little factory was about ready to start up. Everything was in place except the gas and electric meters. I wanted to get the factory going. A suitable location for these meters had been agreed upon and a good concrete floor was in place, but a little dispute arose between two officials as to whether the meters should be put in place before, or after, the enclosing wooden walls and doors were up.

To get things going, I asked my wife and my lawyer friend to accompany me to the factory one morning, saying to my wife, “I will do the thinking and you do the talking in this argument.”

As soon as we were on the job, I said, “Let’s put the meters in place first and then we can build the walls (les mur) afterwards.”

My wife made the translation, but while the proposal was being considered by the Frenchmen I butted in to give additional emphasis, saying, “Yes, the meters in place first then we will ‘fait les mur apres.’”

By the time I had repeated this two or three times (with more emphasis each time), I was apparently saying that we would “fait l’amour apres.” I saw my wife begin to blush and laugh a bit, and heard my lawyer say something in French about my having the two French words for wall and love mixed up in a way never intended. After a good laugh all around my side won and they placed the meters.

In due course after I had operated the plant a week or so, the couple arrived from the United States who were to live there and operate the factory permanently, a Mr. and Mrs. Stevens from Rochester, N. Y., if I remember correctly.

My wife helped Mrs. Stevens (a bride) to set up housekeeping in an apartment she helped to find while I indoctrinated the man of the house on local conditions. Epinal was an agreeable town in which to live—particularly if you knew French well enough to fraternize with local friends. Our vocabulary was good enough to get by with but not adequate for an evening’s chat on all kinds of subjects.

Our factory there was on "Avenue of the Horse Chestnuts." Really a charming street with tall flowering chestnut trees! The lovely Moselle River flowed through the town. Christine reminds me another street was called the "Avenue of the Bon Enfants" (good children). Altogether a pleasant memory.
So we have added an important footnote to the history of the rubber industry. The events we have described belong to that part of the story dealing with the industry’s period of mushrooming growth that happened in the midst of its profound internal revolution.

You can best realize the changes wrought in the period of our story by looking at the statistics. In the first decade of this twentieth century Americans consumed an average of 27,000 long tons of new rubber annually, about 40 per cent of world requirements. That average covers a period when the annual figure rose from 20,000 long tons in 1900, to 42,000 long tons in 1910. This difference is the effect of the beginning demand for automotive tires. By 1920, the figure had increased more than five-fold to 215,000 long tons, a little over 70 per cent of world consumption. That was the period of the discovery and application of the near-miraculous reinforcing power of carbon black. It was also the beginning of the Banbury Mixer. In 1960, American annual consumption of new rubber reached 1.6 million long tons of natural rubber plus 1.01 million long tons of synthetic rubber. Combined, these are 42 per cent of world consumption.

The statistics of carbon black, also important in our picture, are incomplete. U.S. Bureau of Mines data begin only after the rubber revolution was well advanced. In 1923, Americans used 73.2 million pounds of carbon black for all purposes. We do not have a breakdown of this figure by industries, but in 1928 the rubber industry used 141 million pounds out of a total of 202.7 million pounds (nearly 70 per cent). In 1959, rubber production consumed 1,463 million pounds out of a total of 1,532 million pounds or nearly 96 per cent.

No one can now foresee a time when demand for rubber goods, particularly for tires, will stop growing. So we can expect the value and usefulness of Banbury’s efficient mixer also to continue to expand. This will be true also of other industries that depend on extreme intimacy of mixing through powerful smearing.

But above all, our story has emphasized that none of these events, whether everyday or exceptional and revolutionary, can happen without people. Throughout this account we have met many, many men who have molded industry and through it have shaped their times. Compared with the vast multitudes influenced by their actions, these have been few indeed. Yet in spite of the mighty power they have wielded, these men have differed only a little from the common run of people. That difference is made up of a little keener observation, a little better understanding of problems as they have arisen, a little more imagination and persistence in solving them.

Surely as these qualities of people have worked the wonders we have seen, so too will they continue to do so. Never will the doors of opportunity be closed to one who possesses, as Fernley Hope Banbury has, an intimate understanding of industry and its problems, a sound, basic principle for solving them, and the active imagination to bring the two fruitfully to bear on each other.
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