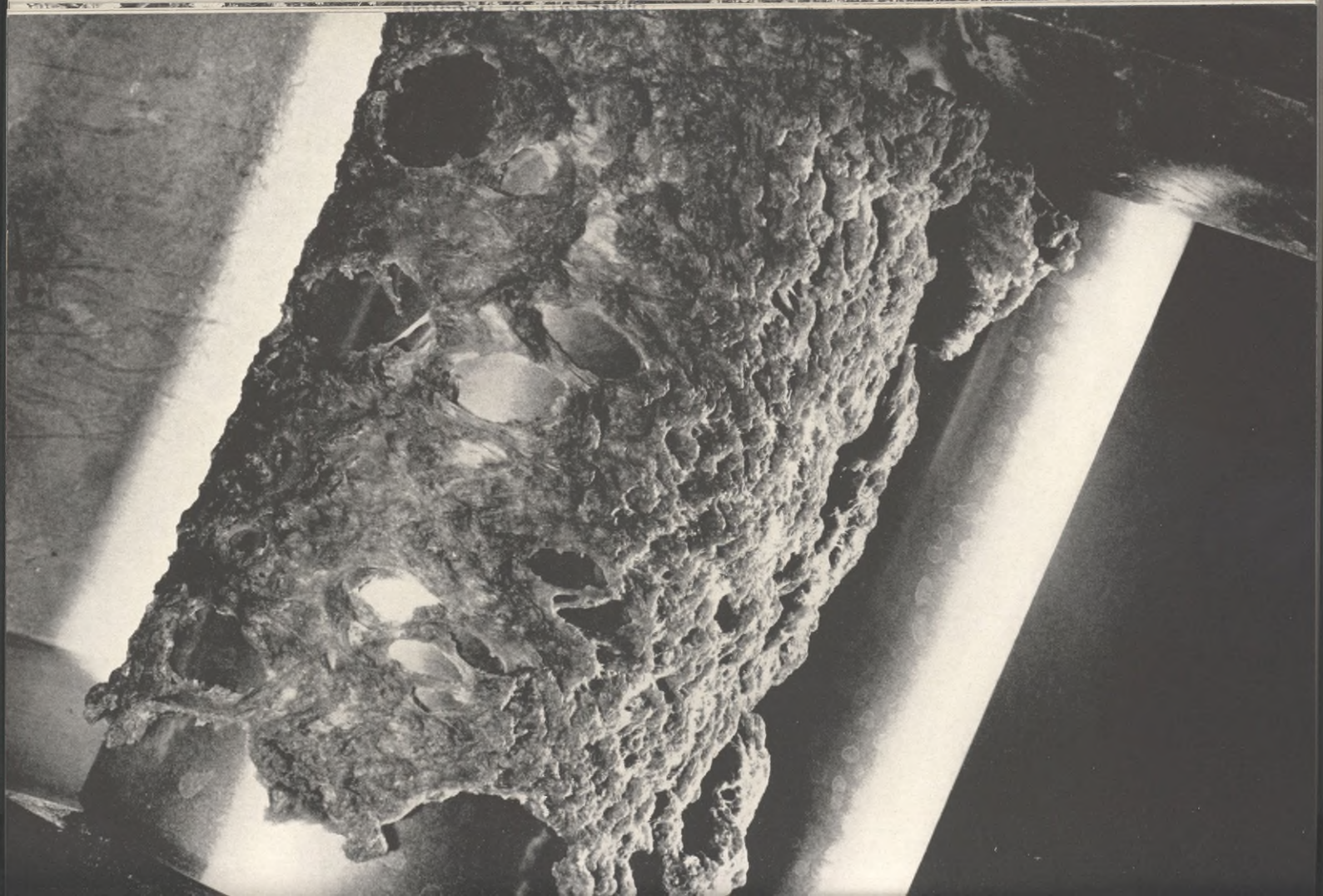
THE TEXACO STAR

RUBBER INDUSTRY NUMBER



THE TEXACO STAR

Rubber Industry Number

VOLUME XXV NUMBER 3

Our front cover, representing a rubber worker tapping a tree, was designed and modeled by Carl Burger and Phyllis Bothwell. Inside front cover, showing processing of crude rubber, photographed by Robert Yarnall Richie and reproduced by courtesy of the Pioneer Asphalt Company

A PUBLICATION OF THE TEXAS COMPANY

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DIRECT ALL COMMUNICATIONS TO THE EDITOR OF THE TEXACO STAR
135 EAST 42ND STREET, NEW YORK CITY

★ Eighty per cent of the products of the rubber industry are used in automobiles. More than 200 rubber parts, in addition to tires and tubes, are used in the present-day motor car.

★ Last year a single textile plant produced about 18,000,000 miles of cotton cord for automobile tires.

Brief AND TO THE POINT

★ Thirty years ago the average motorist had an annual tire bill of $176. Today the average car owner spends less than one tenth that amount for seven times the tire mileage.

★ The principle of the pneumatic tire was patented by an Englishman, Robert William Thomson, in 1845. An early set of air-filled tires lasted 1,200 miles when placed on a brougham.

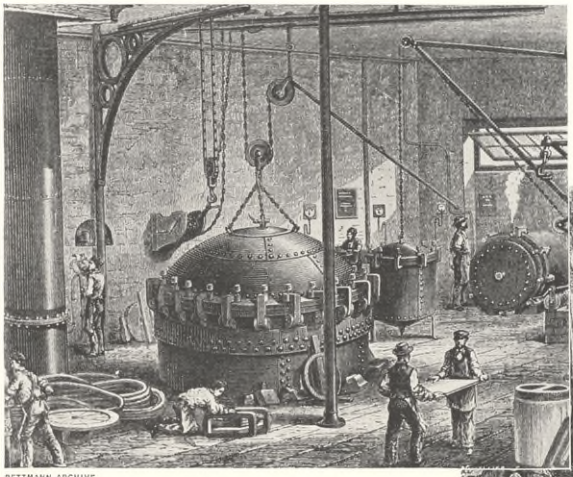
★ Pneumatic tires were first applied to motor vehicles by the French firm of Michelin and Company.

★ The seed-bearing pods of the rubber tree contain a gas which causes them to explode when ripe, throwing the seeds from 75 to 100 feet away from the parent tree.

★ Early in the 19th Century, Charles Mackintosh, a Scotch manufacturer, discovered a method of waterproofing cloth by means of rubber. Garments made from this cloth were called "mackintoshes."

★ Among the more unusual products of rubber is putty. Ordinary putty, used to hold glass in metal frames, often hardens and breaks loose. The rubber putty clings tightly to metal and glass and does not become brittle.

★ By covering the leading edges of wings, tail surfaces, radio masts, and other affected surfaces of an airplane with rubber, and pulsating it by means of compressed air, pilots are able to break the ice off as rapidly as it forms.



BETTMANN ARCHIVE

(Left) Vulcanizing rubber by means of steam in a factory in France—late 19th Century

BETTMANN ARCHIVE

(Right) Natives gathering rubber near the banks of the Amazon River, Brazil

★

THE STORY OF THE "WEEPING TREE"

A HUNGRY South American Indian was probably the first human being to notice rubber. No doubt he wondered whether he could eat the milky fluid, now called "latex," which he saw oozing from a tree deep in the Brazilian jungle. Discovering that he couldn't, he gave no further thought to it, except to note that it congealed to a sticky mass in his hands.

Later he might have returned to the tree, or perhaps to several trees, until he had enough of the sticky stuff to shape into a small, spherical mass. After playing with it for a while, he probably threw it to the ground, and was amazed when it rebounded.

We know that the Indians named this plaything "batos," meaning ball, and that they called the sap from which it was made "cahuchu" or "caucho," which means "weeping tree."

The first white man to see rubber was Christopher Columbus who, on his second visit to America, noticed the Indians playing with these queer bouncing balls. But it was nearly three centuries later that the scientist Priestley, while experimenting with some of the stuff, discovered that it would erase lead pencil marks. He cut it into small pieces, which he called "rubbers."

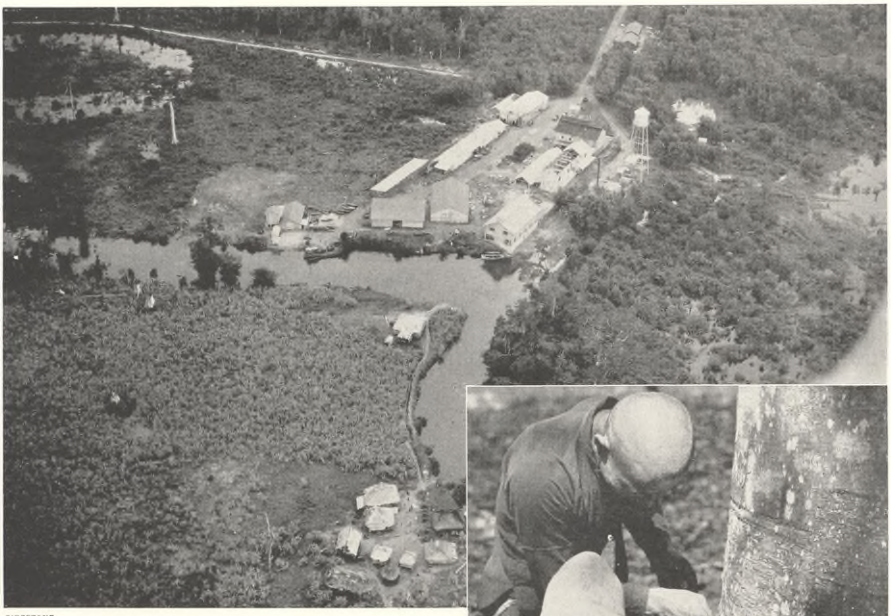
For many years, the uses of rubber were limited because, while soft and sticky under Summer heat, it became hard and brittle in cold weather. In 1839, Charles Goodyear discovered that when rubber was heated with sulphur, it became stronger, more elastic, and less affected by temperature. This process, known as "vulcanization," was of tremendous importance to the future of the rubber industry. By 1845 the principle of the pneumatic tire was patented, and as time went on thousands of other uses for rubber were discovered.

Many varieties of plants, including the familiar

milkweed, contain latex, but the best grade is produced by the tree called *Hevea Brasiliensis*, originally found in the Amazon Valley of South America. In 1873, seeds from these trees were successfully grown in England and transplanted to Ceylon. When it became apparent that there was a large demand for rubber from trees planted and cared for systematically, large areas throughout the Far East were rapidly planted. Today the largest quantities of rubber come from Malaya, the Dutch East Indies and Ceylon. Smaller amounts are produced in India, Sarawak, Borneo, French Indo-China, Siam, and Africa. There are now, it is estimated, about eight million acres of rubber plantations in the world.

At the juncture of the wood and bark of the Hevea tree there is a layer of cells about the thickness of a sheet of paper. This layer is the seat of the tree's growth. Next to this, in the soft portion of the bark, are found the latex tubes. The latex itself is a liquid resembling rich milk. Latex from the Hevea tree contains about one-third its weight of rubber.

Most plantation trees yield about four pounds of rubber annually, although some trees yield as high as 30 pounds a year. Trees are ready for tapping when five years old. Tapping consists of removing a quarter-inch strip of bark with a sharp knife. The first cut is usually made about four feet above the ground, diagonally downward one-third around the tree. The latex which oozes from the tree along the cut flows through a metal spout at the lower end into



FIRESTONE

(Above) Deep in the jungles of Liberia, this Firestone factory is one of the shipping points for rubber from plantations located in West Africa

EWING GALLOWAY

★

(Right) Tapping consists of removing a thin strip of bark from the tree with a sharp knife. The latex flows along the cut into a porcelain cup

a small porcelain cup about the size of a tea cup.

About an hour after the cut is made, the latex stops flowing. Subsequent tapping is carried out on alternate days, lowering the production channel about one inch a month. Nature starts replacing the bark where cuts have been made, and by the time the tapping cuts are close to the ground, the first cuts are covered with new bark suitable for tapping again. This cycle may be carried on indefinitely. Some trees still yield latex after 30 years of tapping.

This latex does not flow from the cut in a stream, but at the rate of about two drops a second from a fresh cut, diminishing in an hour to about one drop a minute. It requires a whole year's output from two trees to supply the rubber for a pneumatic tire weighing 20 pounds.

The process used for coagulating the rubber from the latex is similar to the curdling of warm milk by the addition of vinegar. Usually the day's production of latex is poured into tile or earthenware tanks. After an equal volume of water is mixed with the latex, a half pound of acetic acid diluted with water is added to each hundred pounds of rubber. Immediately the latex begins to thicken. After two hours the rubber is coagulated.

The rubber may now be processed into two forms, the grade known as "pale crepe," or that called "ribbed smoked sheet." To make the former, the coagulated latex is first squeezed and washed between iron rollers revolving at unequal speeds. A non-rubber serum is squeezed out and a strong, elastic sheet of rubber is obtained. This sheet is squeezed and washed again between a second set of rollers set closely together. It emerges as a thin, pale yellow sheet with a crepe-like surface. The water still remaining is dried out by hanging the crepe on poles

EWING GALLOWAY

(Above) When the latex is mixed with an acid, the rubber is coagulated

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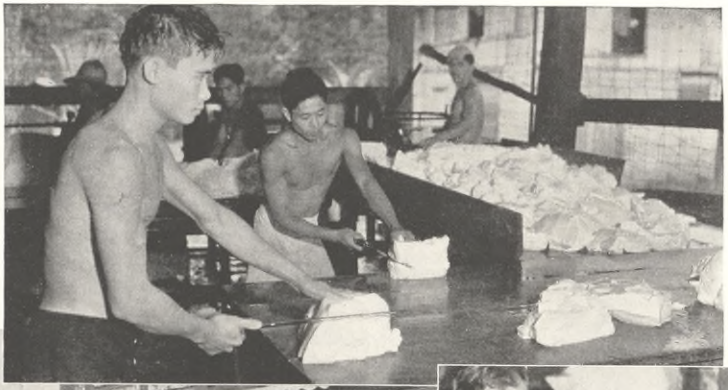
(Left) Natives, carrying latex, ford the Rewa River, Fiji Islands



(Left) The raw rubber is sliced preparatory to being rolled into sheets

★

PHOTOS ON THIS PAGE FROM BLACK STAR

(Left) Sheets of crude rubber are baled and begin the long journey to American factories

(Above) Squeezing between heavy rollers produces what is known as "pale crepe" rubber

in large, airy rooms for approximately three weeks.

Ribbed smoked sheet is produced by an initial washing between smooth iron rollers revolving at equal speeds. A second set of corrugated rollers leaves a crossed ribbing on the surface of the rubber sheet. This form of rubber contains impurities which facilitate the growth of mould. To avoid this, the sheets are hung and dried in the smoke of a wood fire.

The most important development in the rubber industry was the discovery of vulcanization. Next came the art of compounding—blending the rubber with powders, oils, waxes, tars, asphalts, fibers, and the like. Later, rubber was combined with other materials such as fabrics, metals, concrete, wood, glass, and asbestos. Modern rubber products even contain age resistors.

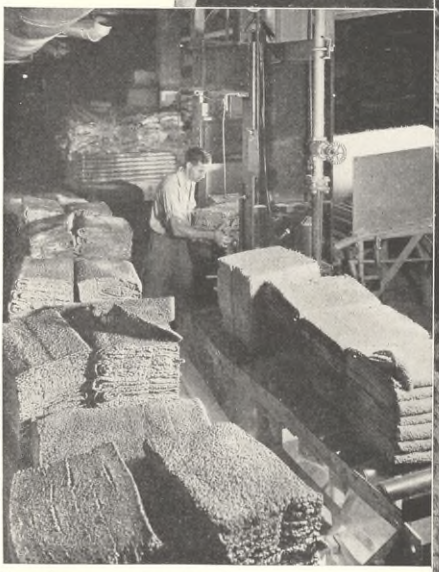
Last year, the estimated value of rubber goods manufactured in the United States was approximately 830 million dollars. In 1937 the industry employed about 125,000 wage earners and 17,000 salaried employes.

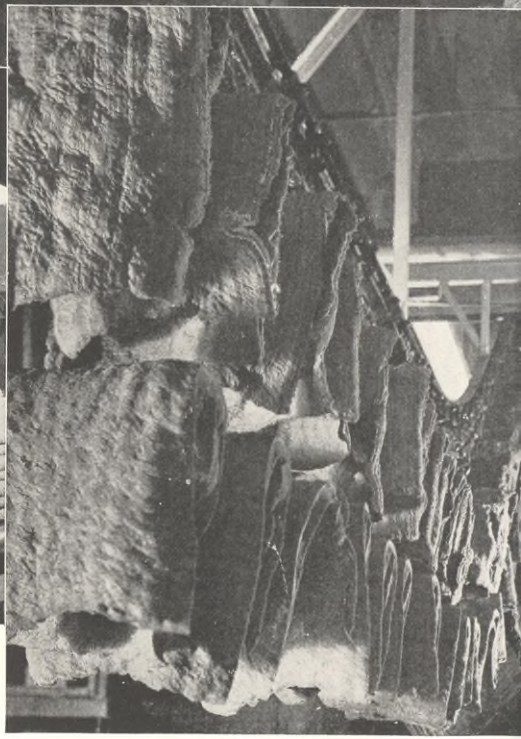
Much of the material in this article was taken from "A Wonder Book of Rubber," published by the B. F. Goodrich Company, Akron, Ohio, Copyright, 1937

BUILDING AN AUTOMOBILE TIRE

The outstanding use of rubber in America is in the manufacture of automobile tires. Each of the bales shown at the right weighs 250 pounds. The raw rubber is stored in heated rooms to attain the proper temperature before the processing begins

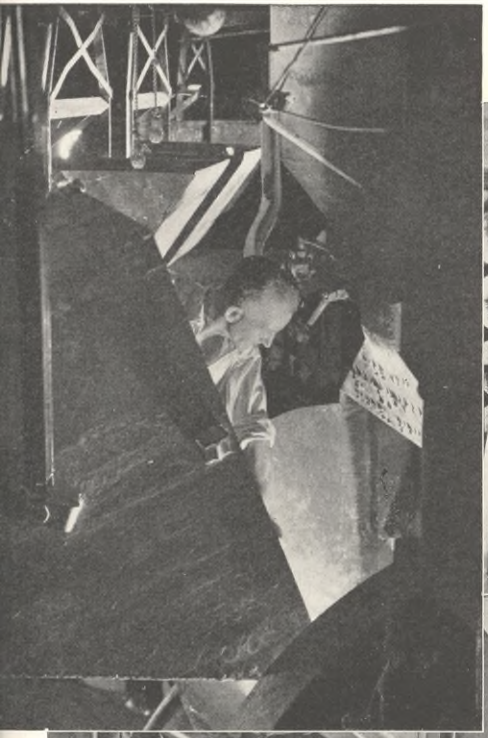
★





The bales are cut into sections (above) and made ready for the plasticating machine (right) which macerates the rubber and extrudes it in sheets

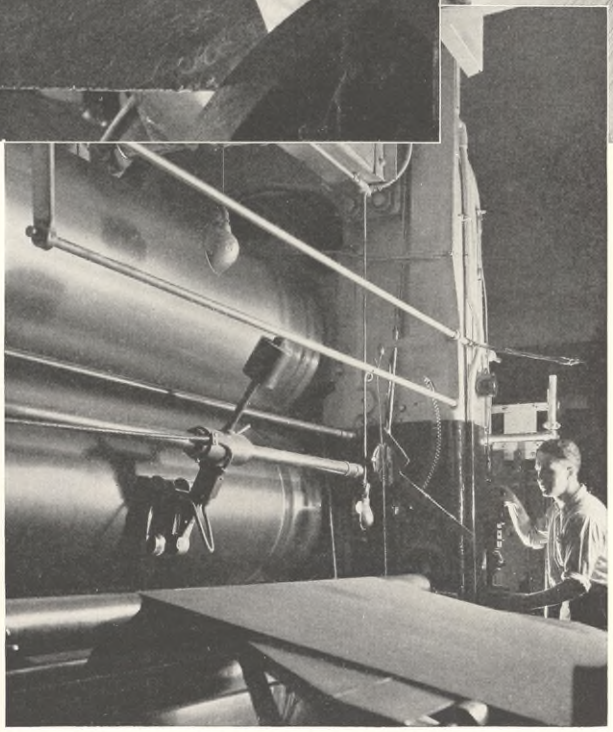
PHOTOS NOT OTHERWISE CREDITED ARE FROM FIRESTONE TIRE & RUBBER CO.



Chemistry plays a large part in the manufacture of rubber products: Crude rubber, pigments and other chemicals are mixed in this machine (left)

GOODRICH

Next to rubber itself, the most important material used in an automobile tire is cotton. Shown above is tire cord, made from cotton, being assembled for the weftless calender. This is the first step in the preparation of the body of the tire



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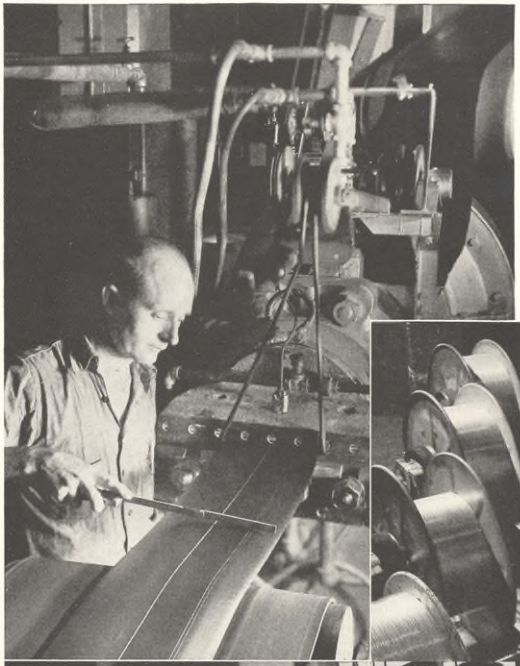
(Left) The cord fabric, after being dipped in pure liquid rubber, passes between rolls on huge machines known as calenders. Here the cords are coated on both sides with the rubber stock—a process which protects the plies against friction and increases the strength of the tire body



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(Left) In this machine the tread stock is forced through a die of given dimensions, is extruded to the proper size, and is then cut to the required length

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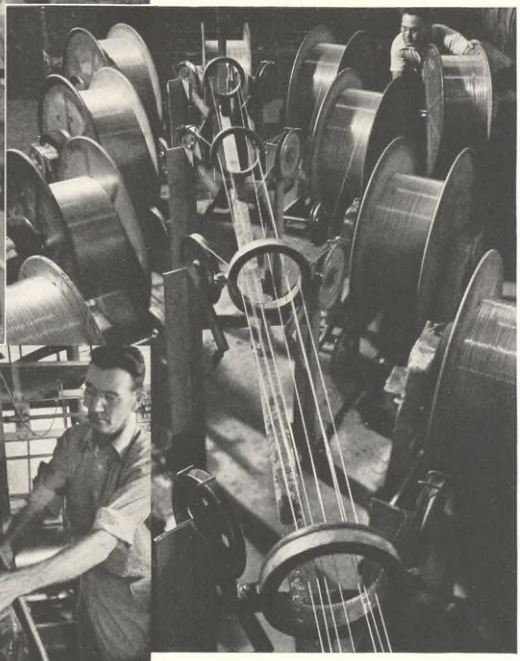
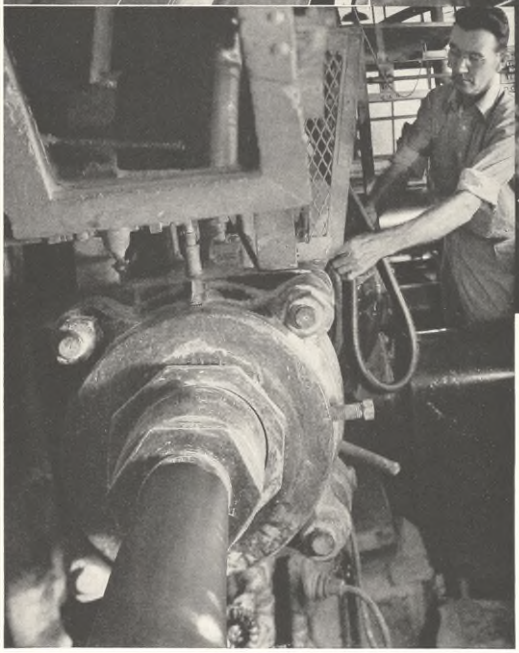


(Above) The "bead," that part of the tire which holds it to the rim, is made from steel wires, shown here being fed to the building machine. The average tire contains 137 feet of wire

★



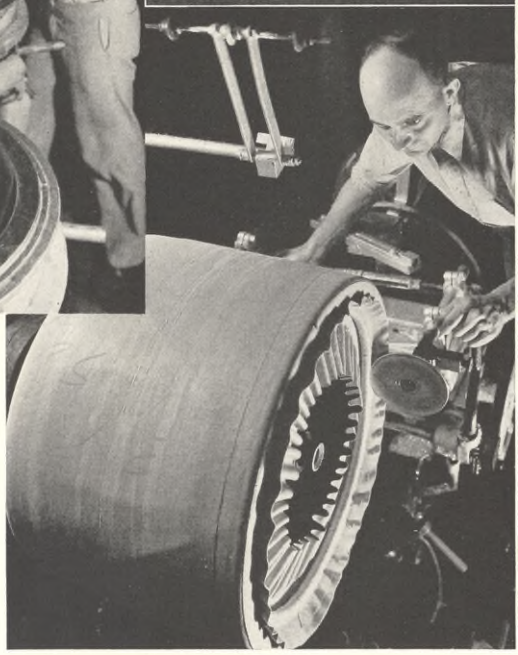
(Left) Inner tubes for automobile tires are made by feeding specially compounded rubber stock to this machine, which extrudes a continuous, seamless tube

★

(Right) After the cord fabric for the body of the tire has come from the calendering machine, it is cut on the bias and fed to the tire-building machines

★

(Above) Inner tubes are being placed in rows of jacket presses for curing



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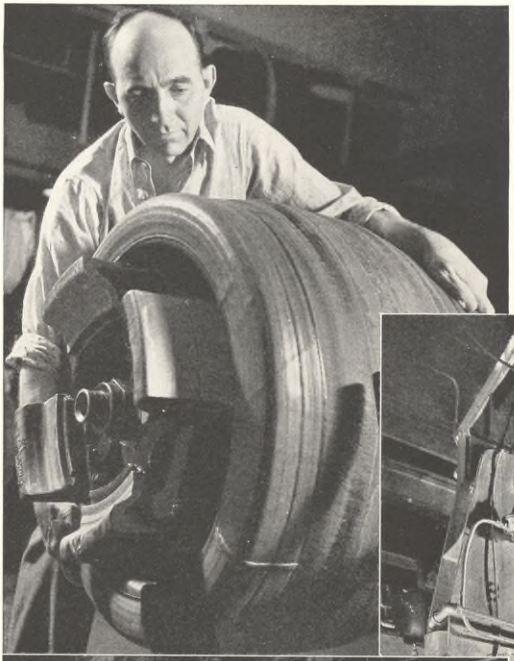
(Right) Firestones are built on a drum by what is known as the "flat band" process. The various plies of the tire are built up, one on top of another. Here the operator is stitching or rolling down the reinforced bead after the plies have been put in place



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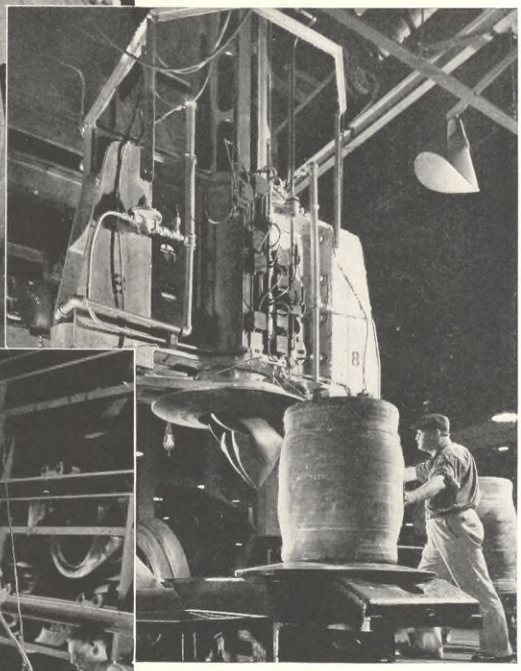
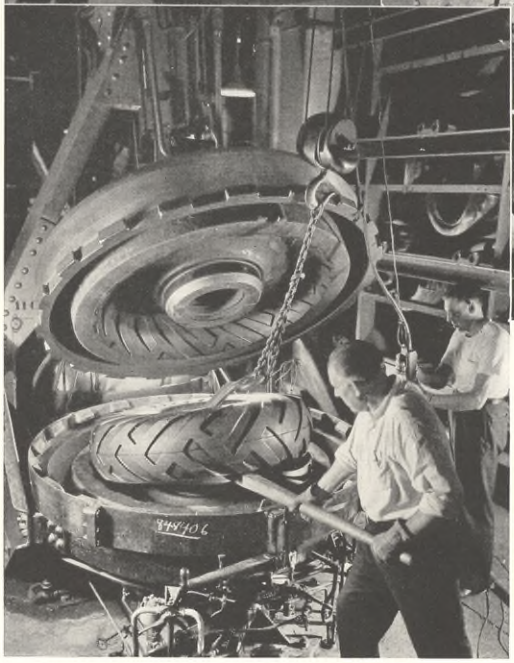
(Left) The body, tread, beads and side walls of this nine-inch bus-truck tire have been assembled into a unit and the tire is ready for expanding and shaping

★



(Above) The air bag which will go inside the tire can be seen hanging from the top of the press. During the vulcanizing process, this air bag will force the smooth tread and side walls into the non-skid pattern of the mould

★



(Left) The completed tire is removed. Vulcanization occurs when heat, provided by steam, is applied to the rubber which has been mixed with certain chemicals, and the tire is transformed into a tough and long-wearing product

(Left) The rubber stamp. (Below, left) The first practical use of rubber was for erasing pencil marks. (Below) Rubber bands keep things neat in their sturdy embrace

(Above) This fountain pen has a hard rubber body and a soft rubber ink sac. (Above, right) Rubber cement is a clean, convenient adhesive. (Right) This moistened rubber sponge takes the place of the old-fashioned tongue in licking envelopes

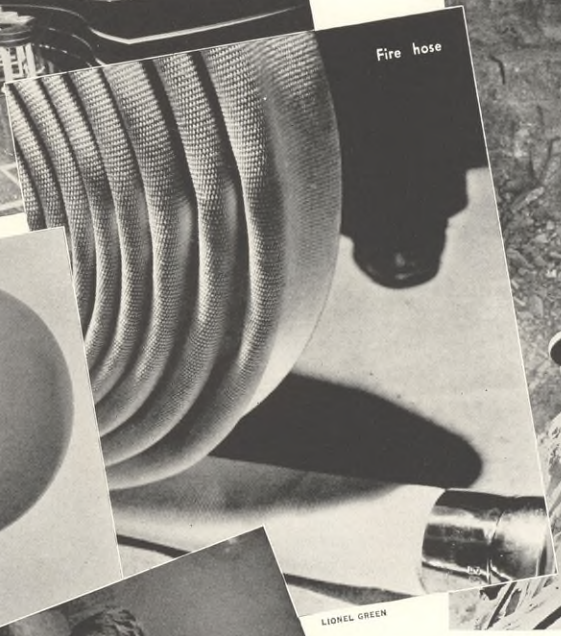
RUBBER IN THE OFFICE

PHOTOGRAPHS BY ODIE MONAHAN

RUBBER IN

An "all-rubber" cocktail lounge in an Akron hotel

ME



Fire hose

LIONEL GREEN

Compressed air flows through ru

ENDREAU

(Above) Rubber pilot balloons are used at airports for studying wind currents

Rubber protects this chemical worker from the strong acid he is handling

EWING GALLOWAY

Miles of rubber tubi

R. J. NESMITH & ASSOCIATES

INDUSTRY

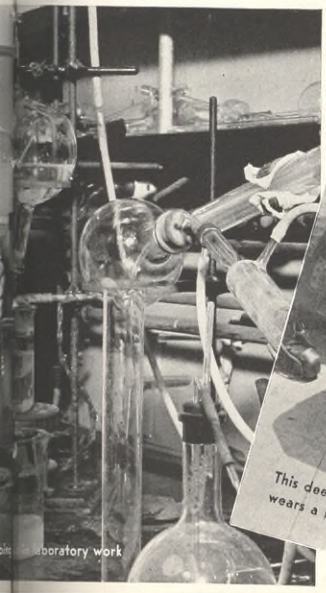
GENDREAU

These workers are utilizing another of rubber's properties: its resistance against electricity

SMITH FROM NESMITH

Rubber in many forms is widely used in the communications industries

NESMITH



laboratory work

This deep-sea diver wears a rubber suit

TRIANGLE

Rubber "silencers" under the rails of New York's subway mean quieter rides

MAC-MEE STUDIOS

THE OIL INDUSTRY AND RUBBER

Oil and rubber are strongly interrelated industries: Rubber companies, by virtue of their need for efficient lubrication in their plants, are among the oil industry's best customers. On the other hand, the oil companies use large quantities of rubber in the production, transportation, manufacture and sale of petroleum and its products

★

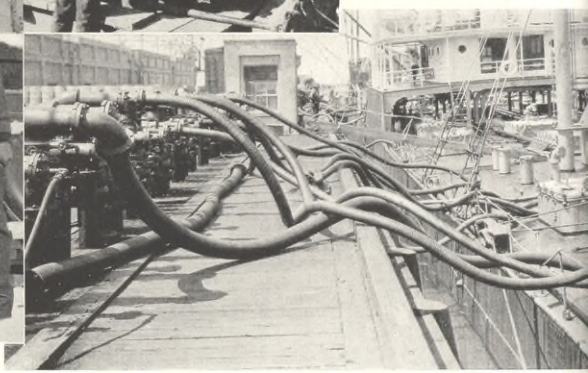
Rubber is widely used in Texaco refineries (left) and in the oil fields (below)

ROBERT YARNALL RICHIE

ROBERT YARNALL RICHIE

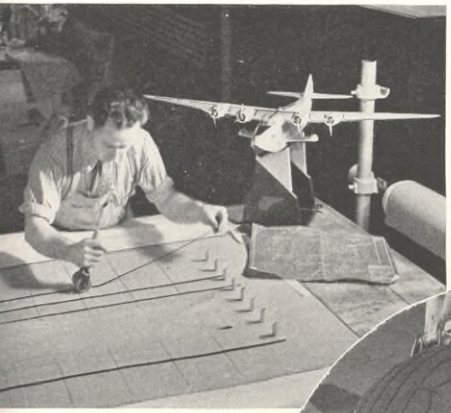
(Above) Rubber tubing in a Texaco research laboratory

Oil and rubber meet again at your neighborhood Texaco station when you drive in for gas



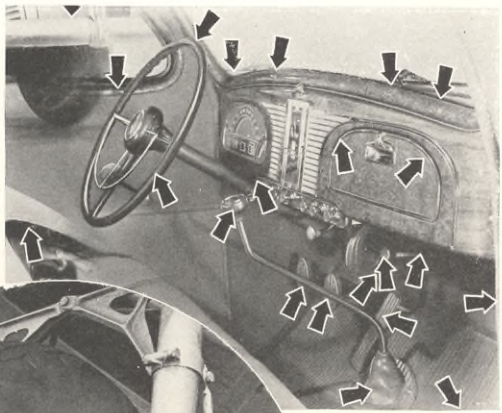
Through strongly reinforced rubber hose, thousands of gallons of Texaco gasoline are being pumped aboard this tanker at a Texaco terminal

RUBBER IN TRANSPORTATION



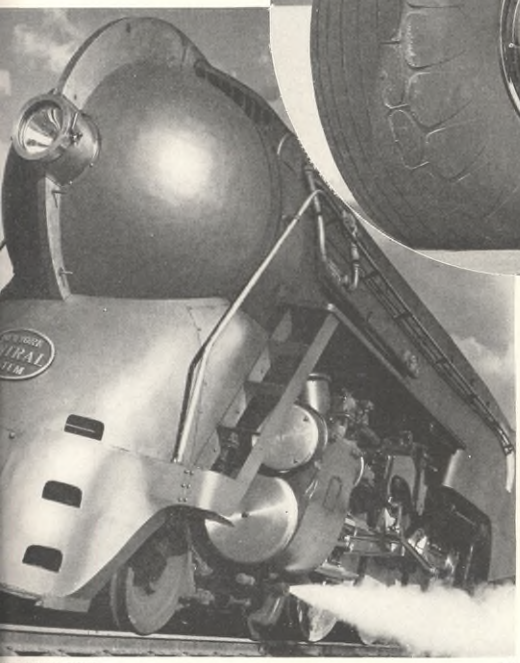
DRICH

(Above) Making rubber de-icers for the wings of a new flying boat



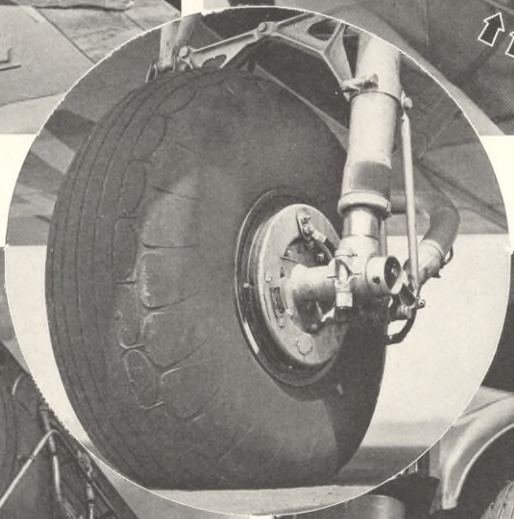
DE SOTO

(Above) 20 of the 272 places where rubber is used in an automobile



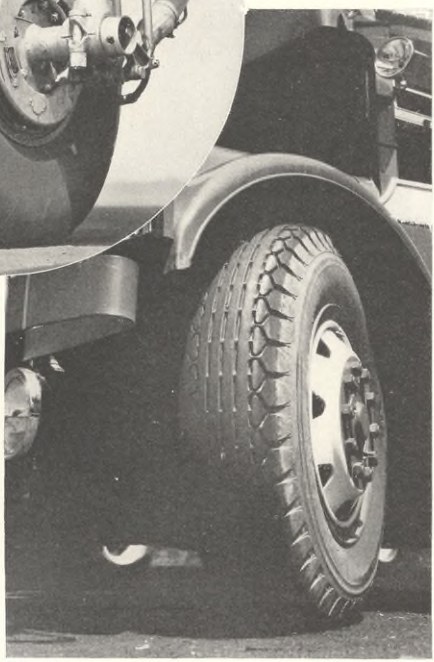
BERT YARNALL RICHIE

(Above) American railroads are large users of rubber products on rolling stock and equipment



BROWN BROS.

(Circle) It takes plenty of rubber to manufacture the tires for one of our modern air transports



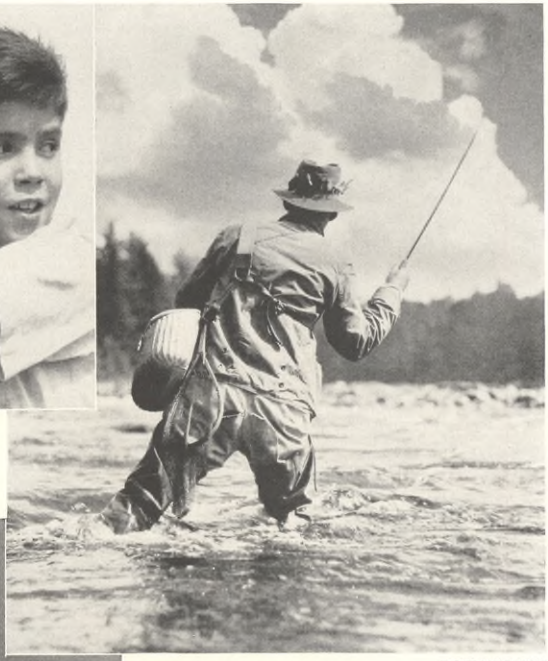
NESMITH

(Above) Truck and bus tires must be able to take heavy punishment from mile after mile of highway

RUBBER IN THE WORLD OF SPORT

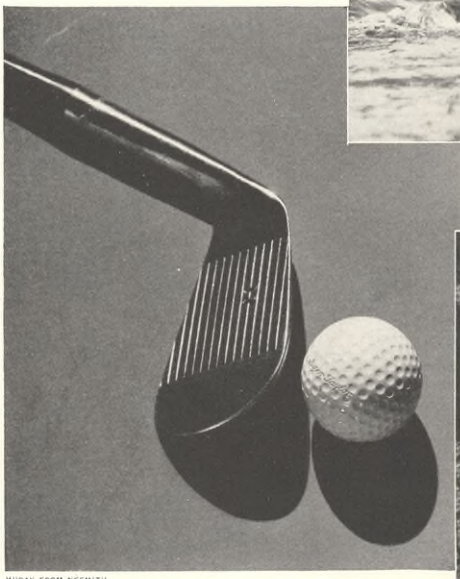
DORIS DAY

Like its big brother, the football, the basketball contains an air-filled rubber bladder



ROBERT DUDLEY SMITH

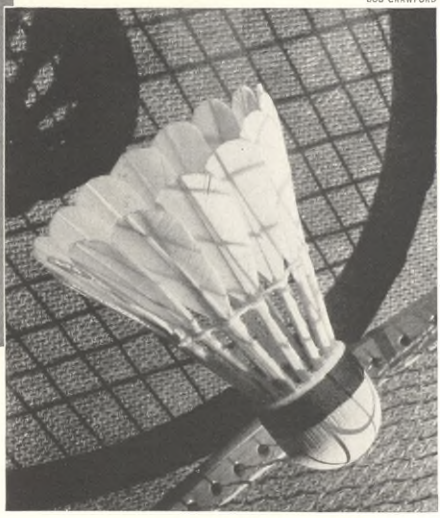
(Above) Even trout fishing wouldn't be much sport without rubber waders



MURAY FROM NESMITH

Under its shiny white coat, the golf ball holds many yards of rubber cord

BOB CRAWFORD



(Right) Rubber and feathers combined go to make up the lively shuttlecock

SNIDER FROM TRIANGLE

With renewed popular interest in bicycling, considerable rubber is being used in the manufacture of tires for the two-wheelers

★

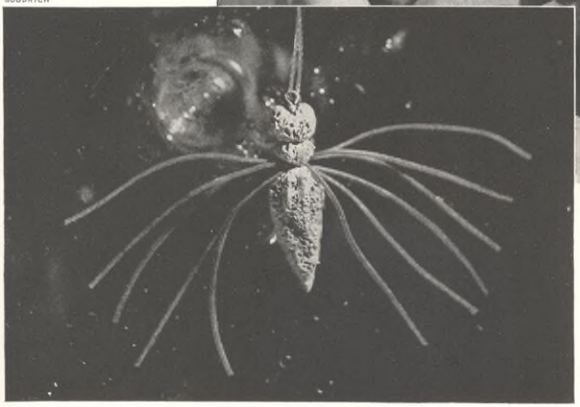
GOODRICH

BOYER FROM GENDREAU

A forked stick and a piece of old inner tube make an ideal slingshot

EWING GALLOWAY

(Above) A beach ball adds to the enjoyment of water sports



(Left) This trout "fly" has a body of sponge rubber and "feelers" of rubber thread; it has been very successful

RUBBER IN THE HOME

(Below) Every housewife knows the value of rubber jar rings in "putting down" fruits and vegetables for Winter

DORIS DAY, LODER

LODER

(Top, right) Sterilized rubber nipples protect baby's food from germs

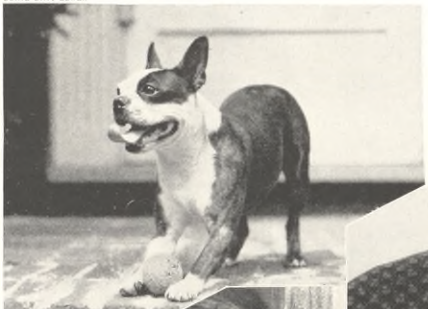
DORIS DAY, LODER

FIRESTONE

(Above, right) Garden hose is made up of alternate plies of rubber and cotton

(Left) A new rubber product called latex whip is being used for mattresses

DORIS DAY, LODER



R. I. NESMITH

(Top, left) Ready for a romp with his favorite toy — a rubber ball

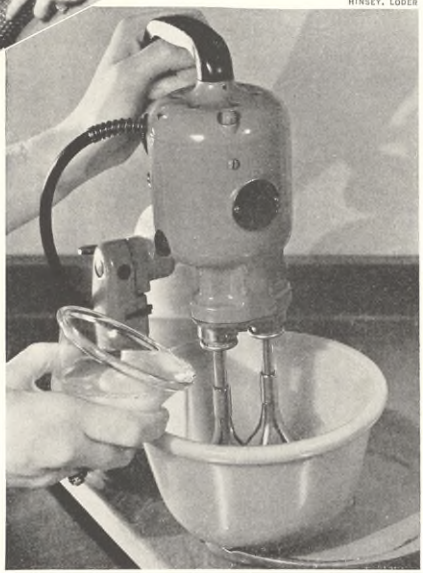
(Above, left) Household aprons of rubber are both attractive and economical

(Right) Hundreds of household electrical appliances are made in part of rubber

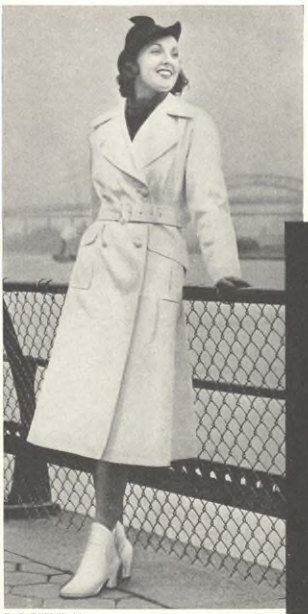
(Below) The hose and many other vacuum cleaner parts are of rubber

LODER

HINSEY, LODER



THINGS TO WEAR IN RUBBER



U. S. RUBBER CO.

(Left) A new, smartly tailored rubber raincoat, with overshoes to match

DORIS DAY, LODER

(Above) Nasty weather has no terrors for this Down East fisherman; his stout rubber raincoat keeps him dry, warm and comfortable

BROWN BROS.

(Left) Bathing outfits of rubber are now made in a wide variety of colors, styles and textures

BROWN BROS.

GOODRICH

(Above) Bathing caps protect your wave from the waves.
(Left) This young lady is trying on her new "sneakers"

RUBBER DOWN ON THE FARM

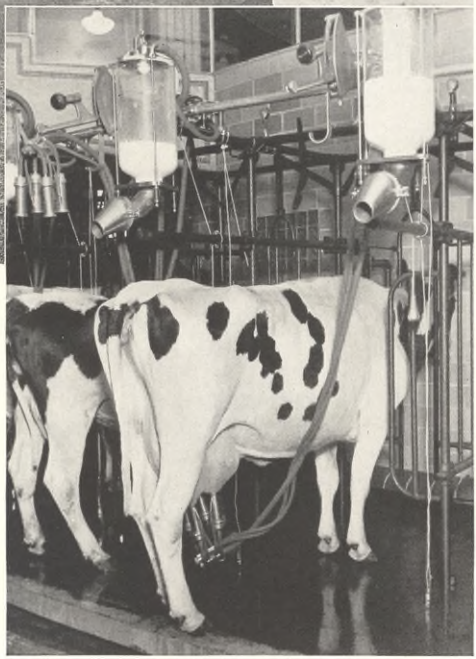
ACME

Heavy-duty tractor tires are partially inflated with water in addition to the air. According to engineers, the added weight checks the bouncing of the wheels on rough surfaces, thus assuring a steadier pull and making for better traction

★

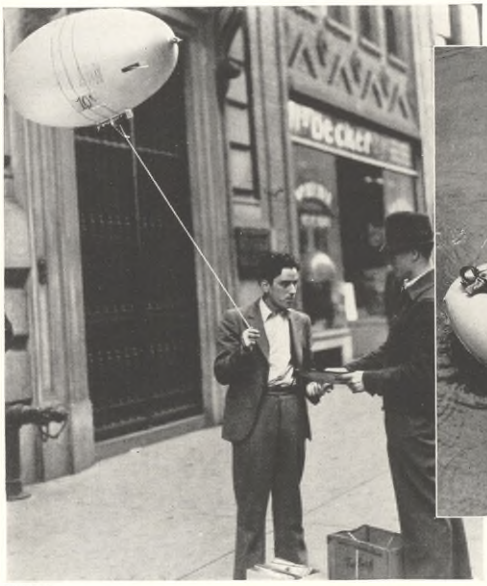
GOODRICH

(Above) This power-driven manure spreader is equipped with heavy-duty pneumatic tires—rubber tired wheels have proved quite efficient on many types of agricultural machinery



(Right) The famous Walker-Gordon "rotolactor:" The milk flows through sterilized rubber into glass receptacles, with no possibility of contamination

A FEW OF RUBBER'S ODD JOBS



TRIANGLE

(Above) On the sidewalks of New York rubber novelties enjoy a brisk sale

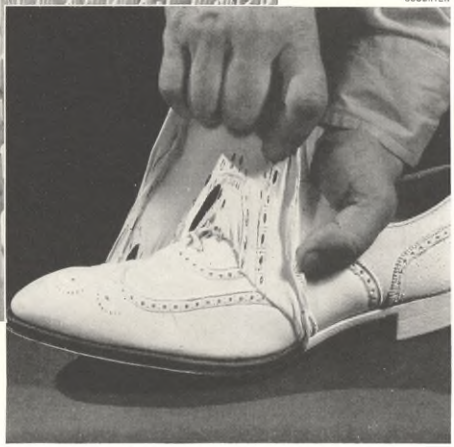
© WILLIAM LAVARRE, GENDREAU

The collapsible rubber raft is a boon to explorers and trans-oceanic flyers

GOODRICH

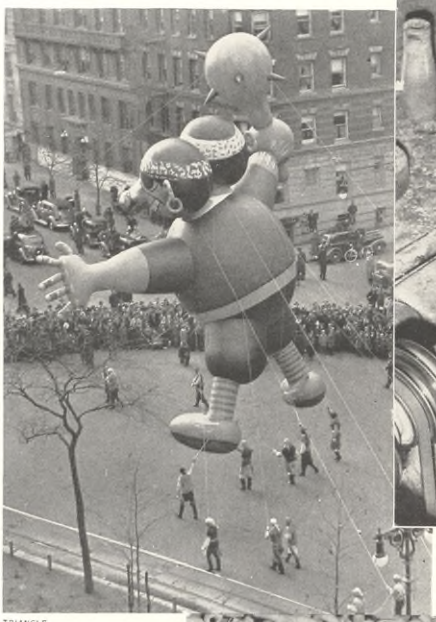
(Left) Making surgical rubber gloves by what is known as the "anode" process

GOODRICH



(Right) A protective coating of rubber protects this white shoe until it is ready to be displayed for sale

(Below) One of the colossal rubber figures created by Tony Sarg for the Macy Thanksgiving Parade in New York



TRIANGLE

R. I. NESMITH

(Above) A skilled worker fashioning a pipe mouth-piece from hard rubber

★

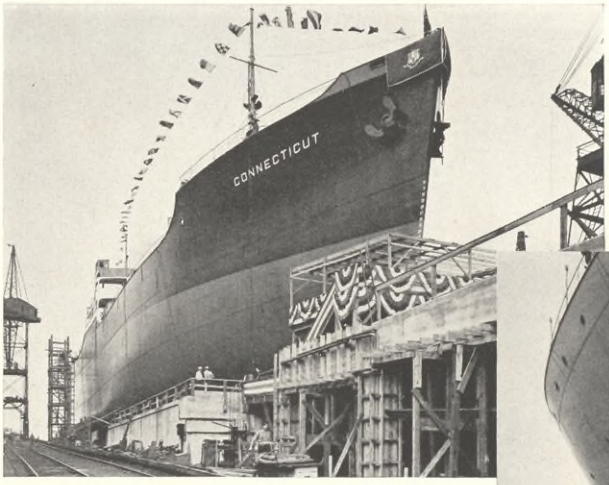
(Below) A new pair of rubber heels, and the old comfortable brogans are even better than new

NESMITH

GOODRICH

(Above) A mountain of legs, arms and torsos to be made into life-like dolls

New Texaco Tanker Takes to the Water



With Mrs. Wilbur L. Cross, Jr., daughter-in-law of Connecticut's Governor, as a sponsor, Texaco's newest tank ship slid down the ways at the Maryland Plant of the Bethlehem Steel Company on September first. The new ship was christened the *Connecticut*

(Above and right) The *Connecticut* rests on the ways and awaits the christening party

BETHLEHEM STEEL CO.

Left to right: T. Rieber, Chairman of the Board, The Texas Company; W. S. S. Rodgers, President of The Texas Company; Governor Wilbur L. Cross; Eugene G. Grace, President of Bethlehem Steel Company; Mrs. Avery Cross, matron of honor; and the sponsor, Mrs. Wilbur L. Cross, Jr. (Right) Mrs. Cross takes a lusty swing at the new ship's bow under the guidance of Bethlehem's A. B. Homer

BETHLEHEM STEEL CO.

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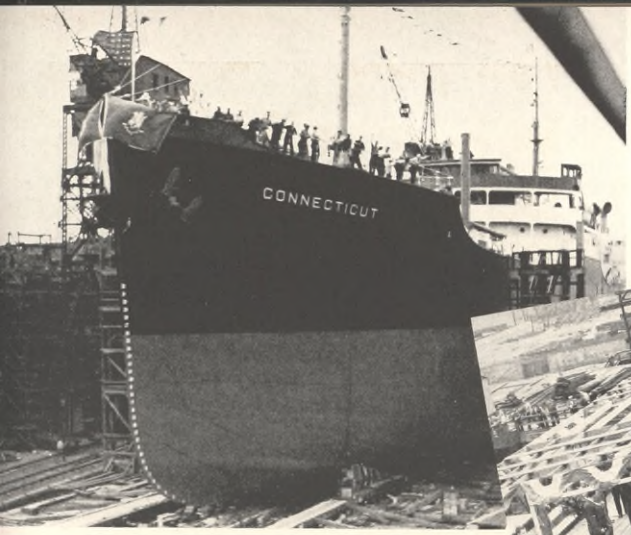
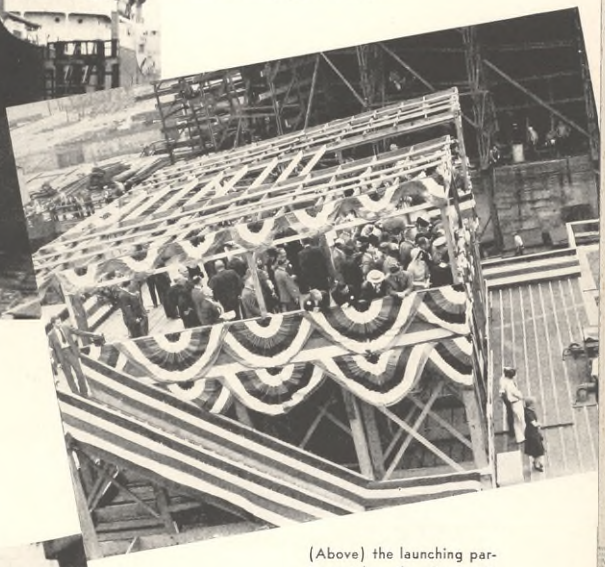
THE CONDÉ NAST PRESS, GREENWICH, CONNECTICUT



(Left) The *Connecticut's* 12,600-ton bulk gathers speed as she slides down the heavily greased ways

The new ship is 490 feet long, with a moulded beam of 65 feet and a moulded depth of 34 feet, three inches. Powered by high-pressure steam turbines, she has a cargo capacity of 4,300,000 gallons. Her keel was laid January 10, 1938



(Above) the launching party watches the *Connecticut* as she hits the water

★

(Above) Mr. Rieber confides in Vice-President T. J. Donoghue, oldest Texaco employe in point of service. (At right) Tugs pick up the *Connecticut* and return her to the fitting-out dock

PHOTOS, UNLESS OTHERWISE CREDITED, BY WENDELL MACRAE

Detroit said, "*They'll be Hot!*"

SO TEXACO ENGINEERS INSULATED THESE TWO GREAT OILS AGAINST ENGINE HEAT

MONTHS AGO the engineering staffs of the great motor car companies sounded this warning:

The engines of tomorrow will be quieter, more powerful, more economical of fuel and oil.

That means they will turn over faster, fit tighter and run much hotter than ever before.

We knew that called for a new, more heat-resistant type of oil.

When the word came our Research Engineers were ready. For years they had been working on this problem. They evolved a revolutionary new process for insulating oil against the effect of the intense heat of the higher-speed, hotter-running engines of tomorrow. At the same time they made a better oil for the conventional engines of today.

This new INSULATION process has now been applied to two great oils—Havoline and Texaco Motor Oil. Henceforth both are protected from the adverse effects of higher heats.

We have demonstrated they will stand up under greater heat than will ever be generated in even the hottest of the new engines.

And we have proved they will flow quickly and lubricate perfectly in zero weather.

These oils now ignore both heat and cold.

Next time you need oil, tell the Texaco Dealer to put in the *Insulated* Havoline, if you use a premium grade—or *Insulated* Texaco Motor Oil, if you use the 25¢ grade.

Both will give you the peace-of-mind that comes with the knowledge of full protection—against heat and cold. Copyright 1938, The Texas Company.

Stop where you see this Texaco sign, for one of these two great insulated oils, for Fire Chief Gasoline, for Marfak Lubricating Service—or just to freshen up at one of the Registered Rest Rooms

TEXACO DEALERS INVITE YOU to tune in THE TEXACO STAR THEATRE: A full hour of all-star entertainment every Wednesday night, Columbia Network: 9:30 E. S. T. 8:30 C. S. T. 7:30 M. S. T. 6:30 P. S. T.