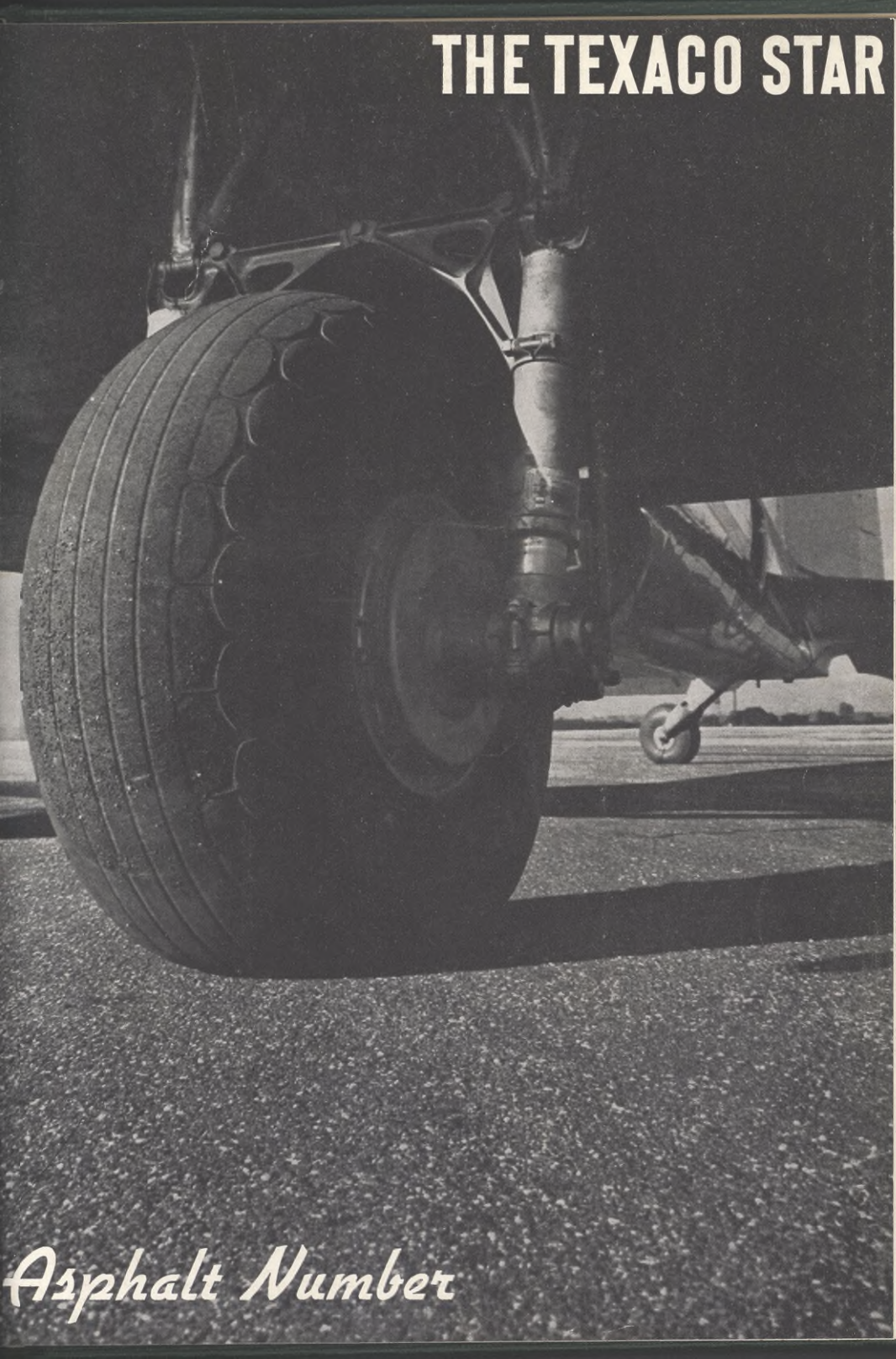
THE TEXACO STAR



Asphalt Number

THE TEXACO STAR

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VOLUME XXVI NUMBER 3

Our front cover illustration shows the landing gear of a modern air liner resting on one of the Texaco Asphalt runways of the recently opened New York Municipal Airport (LaGuardia Field). It was photographed by Robert Yarnall Richie. The photograph at the left is by Frank A. Bauer. On the inside back cover is shown a step in the manufacture of Texaco Asphalt Shingles, while the back cover represents a section of Texaco Square Butt Strip Shingles applied to a roof

A PUBLICATION OF THE TEXAS COMPANY

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MEMBER, THE HOUSE MAGAZINE INSTITUTE

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★ Why an "Asphalt Number" of THE TEXACO STAR? Well, asphalt is probably one of the most versatile of petroleum products, with a career that dates back to prehistoric times. Moreover, The Texas Company is the largest manufacturer of asphalt and asphaltic products in the world.

Brief AND TO THE POINT

★ In Syria the natives regard the odor of hot liquid asphalt as a sure cure for head colds.

★ In 1910 The Texas Company formed the Paving and Roads Division, consisting of a manager, an engineer, a chief clerk, and a salesman. Today the Asphalt Sales Department is divided into five districts, with 10 offices at central points.

★ Texaco started to manufacture asphalt roofing products more than 27 years ago at Port Neches, Texas. Today a complete line of Texaco Asphalt Roofings and Shingles is being supplied from plants in Port Neches, Lockport, Illinois; Edge Moor, Delaware, and Port Wentworth, Georgia.

★ Asphalt is used in a surprising number of manufactured articles. One Texaco customer uses large quantities of asphalt in the manufacture of moisture-proof burial vaults. Another interesting application is the manufacture of protective paper used to line the outer walls of houses, to protect cement structures during the hardening period, and for many other purposes. The petroleum industry itself uses large quantities of asphalt and asphalt-saturated felt paper for coating the outside of oil pipe lines.

★ An old-timer in the Company recalls that one of the early "laboratory tests" for the quality of asphalt was to chew a sample. If it stuck to your teeth it was too soft. If it broke off a tooth, it was too hard.

"A certain mastodon on his morning stroll chanced to step into a pool of asphalt and was slowly engulfed in the sticky mass"

THE GREEKS HAD A WORD—

ἄσφαλτος

EARLY civilizations called it "pitch," "slime," or "bitumen." The Greek word was in the form of an adjective. It meant "firm," "stable," or "secure." It was pronounced "asphaltos."

But our story really begins about 200,000 years before the Greeks appeared on the scene. Back in those days monsters walked the earth, and a certain mastodon on his morning stroll chanced to step into a pool of natural asphalt and was slowly engulfed in the sticky black mass. Today the perfectly preserved bones of that unhappy animal, in company with those of a sabre-tooth tiger and other prehistoric beasts of the jungle form an amazing exhibit at the Museum of Natural History in Los Angeles. Why those perishable bones defied the law of universal decay through countless ages is best explained in the museum's report, which says that the bones "were saturated with this best of all known preservatives," —asphalt.

In the very dawn of creation, the first faint stirrings of organic life were in seaweed and in a one-celled creature called a diatom. The cycle of life and death slowly built up an accumulation of organic remains on the ocean floor. Then came the stupendous uplift and shifting of ocean beds and land areas accompanied by incredible heat and pressure. The sediment was partially changed into petroleum. Held in solution in the petroleum was the non-volatile hydrocarbon we call asphalt.

When petroleum emerged from the sea, some of it came out into the sunlight, though most of it was trapped thousands of feet underground. Most petroleum products, such as gasoline and kerosine, are volatile and these constituents evaporated in air and sunlight. The residue of the petroleum, seemingly immune to change or decay, remained in place. This immunity to change and decay was the quality which preserved the bones of the mastodon and sabre-tooth, and marked asphalt as the greatest preservative ever made in Nature's workshop.

After the mastodon and sabre-tooth, Nature's preparation of the world to adapt it to human needs proceeded in a succession of geologic and organic periods. We take up our story again in Mesopotamia, cradle of civilization. The races which inhabited the valleys of the Euphrates, the Tigris and the Indus soon grasped the possibilities of asphalt, not alone as a preservative, but as an indispensable cementing

medium with which to build their remarkable temples and palaces, the vast irrigation systems and enduring highways which today excite the wonder and admiration of scientists and students.

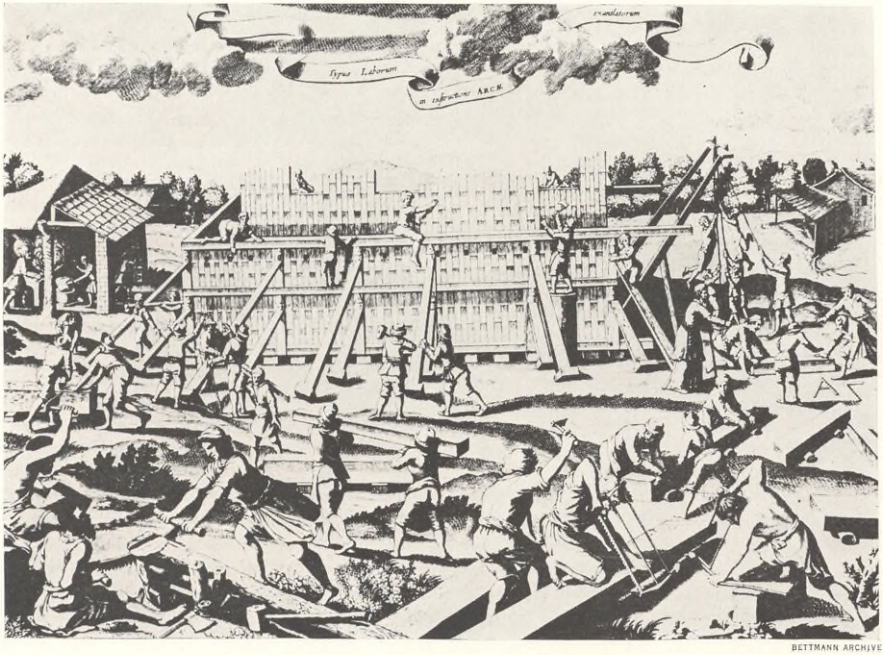
Asphalt was so flexible, so ductile and resilient as well as resistant to acids, alkalis, and water, as to adapt itself to a multitude of uses. As early as 3200 B.C. men made bricks in Mesopotamia and laid them in a mortar made of asphalt. Molded bricks are known to have been used 2500 years before Christ. How tenacious was this form of construction and how enduring throughout the long march of the centuries was attested by the Roman historian, Cassius Dio, who in chronicling the reign of the Emperor Trajan (A.D. 53-117) said, "There in Babylon, Trajan saw the asphalt with which the walls of Babylon had been built (for, together with bricks or gravel, it produces such strength that the walls made of it are stronger than rock and any kind of iron)."

In the colorful period 3250 B.C. to 2750 B.C. men reached the peak of ancient civilization. Recent excavations reveal extensive use of asphalt for waterproofing. A bathing or ritual pool discovered in the valley of the Indus was waterproofed by means of a one-inch layer of asphalt on the walls and a similar thickness laid on the bottom between two layers of brick. Supply and drainage channels were similarly waterproofed.

Gutters of brick laid in asphalt mortar were in common use in Nippur 2800 years B.C. and the substructure of the Enlil temple, built about 2700 B.C., was insulated by a protective coating of asphalt.

Vast irrigation systems were made effective against loss of water and destruction by flood through the use of asphalt and thus anticipated by more than 3,000 years the successful installation of asphalt revetments on the Lower Mississippi and the construction of asphalt jetties in Galveston Harbor. (*See page 9.*)

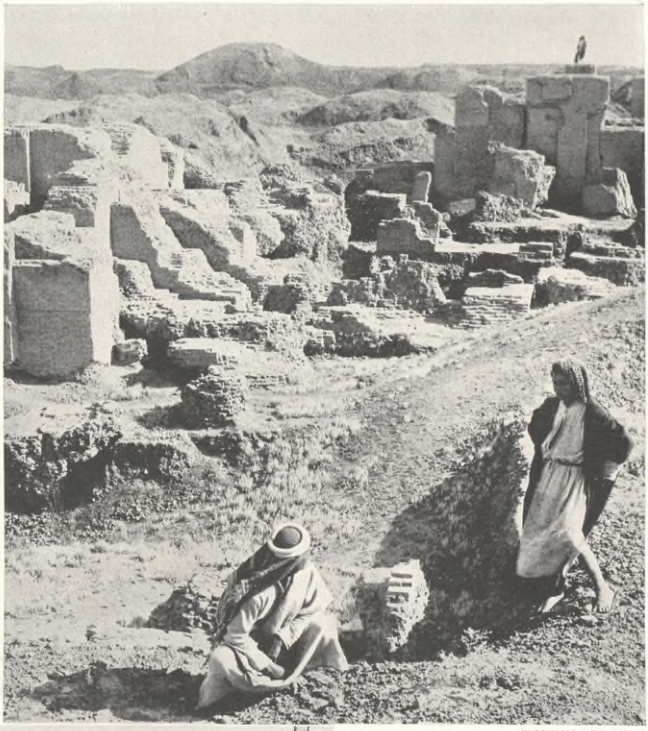
Nebuchadnezzar built large sewers lined with blocks of asphalt made of a mixture of loam, gravel and asphalt moulded into form on a tile. When



BETTMANN ARCHIVE

In a Seventeenth Century account of the building of the Ark, Noah is said to have selected his site near a supply of raw material. His lumber came from Lebanon, while the asphalt he used to make his ship waterproof came from wells in Babylon

(Right) The palace of Nebuchadnezzar as it is today: Asphalt was used as a binder for the bricks and for the waterproof foundations



UNDERWOOD & UNDERWOOD

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(Below) Hannibal is given credit for having used asphalt in compounding the so-called "Greek fire," which was used in ancient warfare

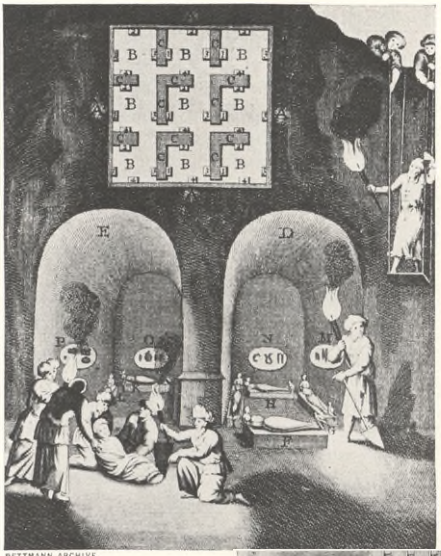
BETTMANN ARCHIVE

placed in position, the tile formed the face of the wall. His father, Nabopolassar, first used asphalt as a mortar for brick pavements. Nebuchadnezzar was so impressed with his own genius as a road builder that he left to posterity this inscription on one of the paving bricks:

"*Nebuchadnezzar, King of Babylon, he who made Esaglia and Ezida glorious, son of Nabopolassar, King of Babylon. The streets of Babylon, the Procession Street of Nabu and Marduk, my lords, which Nabopolassar, King of Babylon, the father who begot me, has made a road glistening with asphalt and burnt brick; I, the wise suppliant who fears their lordships, placed above the bitumen and burnt bricks a mighty superstructure of shining dust, made them strong within with bitumen and bricks as a high-lying road. Nabu and Marduk, when you traverse these streets in joy, may benefits for me rest upon your lips; life for distant days, and well-being for the body. Before you I will advance upon them. May I attain eternal age!*"

The Sumerians, pre-Babylonian inhabitants of the Euphrates, were skilled in carving and decorating stone. One of their statues, now in the Louvre in Paris, is that of a human-headed bull. Made of black steatite (a species of talc), it is inlaid with small yellow shells. Many of these shells are intact, gripped firmly by asphalt through 50 centuries of time and exposure.

Hannibal, who lived in Carthage about 250 B.C.,



BETTMANN ARCHIVE

(Above) An embalmer's underground establishment in Egypt. Asphalt was used as a preservative in the process of mummification

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(Right) Laying an asphalt pavement in New York City in 1869. Asphalt was used for paving in this country as early as 1838

BETTMANN ARCHIVE

is given credit for having used asphalt and possibly mineral oils also, in compounding the so-called "Greek fire." This was used in warfare and was said to burn so fiercely that water could not extinguish it.

The Egyptians made extensive use of asphalt. It was spread upon the bandages they wound around their mummies, and its wonderful preservative properties may be seen in museums today. Pliny the Elder of Rome, in his treatise, "Naturalis Historia," written about 100 A.D., notes that the Romans were in the habit of coating their images with asphalt to protect them from the weather. He describes the use of asphalt for medicinal purposes and recommends it for curing boils, inflammation of the eyes, asthma, blindness and epilepsy. In Roman times, asphalt was sold extensively under the name of "mummy" (Arabic, *mumija*), and was actually scraped from mummies taken from tombs. Its alleged curative properties were explained by the fact that it had preserved the dead for so many centuries!

Asphalt was also used by the Egyptians in the foundations of the Pyramids and for coating the external and internal walls of the ground floors of houses and in constructing silos, cisterns, and in other work where waterproofing was necessary. When the tomb of Tut Ankh Amen was opened a few years ago, the comment was made that only the fabrics and woods coated with asphalt resisted disintegration when exposed to the air.

Had it not been for the virtual eclipse of civilization and culture in the long night of the Dark Ages, asphalt might have entered materially into the early civilization of Europe. Asphalt, on the other hand, occurred only in those countries where petroleum was a natural product, and hence was rarely found in Europe. In fact, petroleum is not mentioned in European chronicles until about 1200 A.D.

It was not until early in the Eighteenth Century that deposits of limestone impregnated with asphalt were found in France, Switzerland and Germany. By 1802 this asphalt-impregnated rock was being used to lay bridge floors, sidewalks, and floors in buildings. In 1838 it was used to pave a sidewalk in the portico of the old Merchants' Exchange in Philadelphia. Paris used it in compressed form for paving streets in 1854, and 15 years later London paved Threadneedle Street with rock asphalt. In America it was laid as an experimental pavement in

Newark, New Jersey, in 1870, and in Washington, D. C., in 1876.

All this while men were losing sight of the important fact that it was the asphalt and not the limestone which mattered. Since limestone could be had cheaply at a thousand places and since the aggregate need not be limestone but could be any good stone, gravel or sand, why haul stone across the Atlantic? Why not obtain the pure asphalt and mix it with stone, sand or gravel where it was to be used?

The remarkable asphalt lake on the Island of Trinidad, although discovered by Sir Walter Raleigh in 1595, had escaped serious attention as a factor in solving this problem, although a small amount of this material was used for paving in England in 1836. By 1876, however, asphalt from Trinidad was used in this new fashion to lay the first pavement of modern type in Washington.

By melting the asphalt and mixing it with heated and dried sand and a fine dust or filler, laying this mixture as a sheet on a suitable foundation and compressing it by a roller, an admirable pavement was produced. This was the first sheet asphalt pavement. Another asphalt lake was found in Bermudez, Venezuela, in 1891, and the source of supply was thus widened.

The petroleum industry, meanwhile, was on the threshold of its great destiny, and its fields of use were constantly broadening. Oil producers had noticed that many of their crude oils had a black, sticky base or residue which was found invariably to be asphalt.

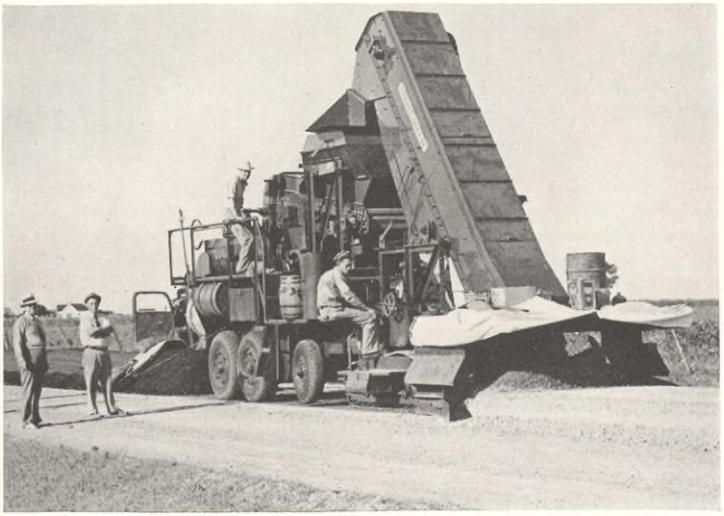
Early oil men didn't know what to do with this sticky residue. Gradually, however, it found its way into the paving field, but for years asphalt was looked upon as a stepchild of the oil industry—a sort of ugly duckling whose brilliant destiny was not even faintly realized.

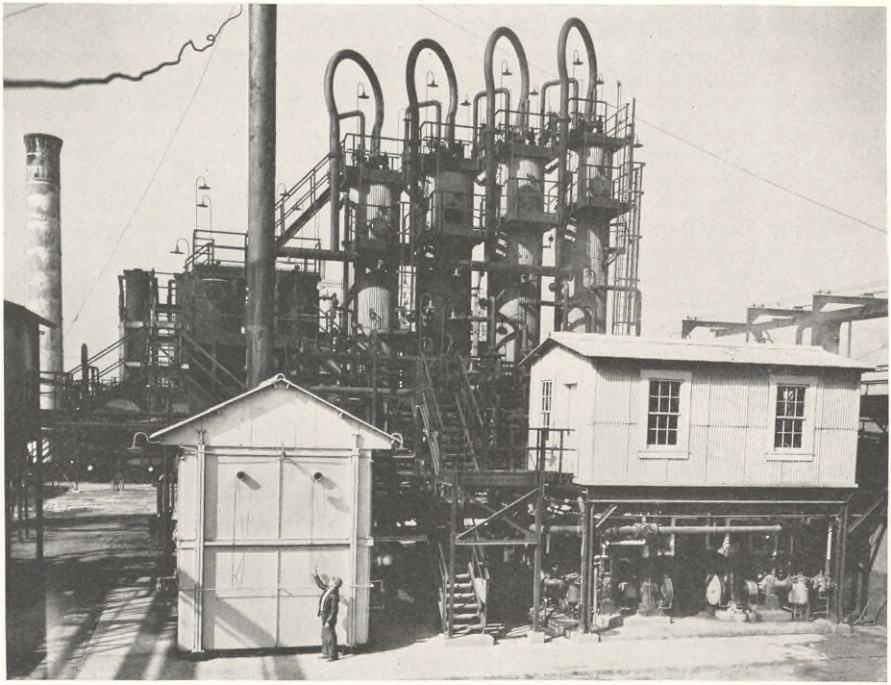
Since 1900 the production of asphalt from petroleum has progressed rapidly. Originally, petroleum asphalt was looked upon as strictly a paving material —and for city pavements at that. With the inauguration of the great Federal highway program in 1916, asphalt proved so adaptable to the requirements of lower-cost types of pavement that it soon dominated the field wherever a mudless, dustless macadam or gravel surface was desired. Today 80 per cent of city streets and 40 per cent of modern-type state highways in the United States are of asphalt.

Asphalt provides a non-skid, durable and attractive surface for airport runways, sidewalks, tennis courts, swimming pools, parking spaces, and floors. In addition, it has hundreds of industrial uses, some of which will be described elsewhere in this issue of THE TEXACO STAR.

Adapted from "Asphalt, Nature's Most Versatile Product," by J. E. Pennybacker, Managing Director, The Asphalt Institute. Other sources: "Asphalts and Allied Substances," by Herbert Abraham, and "Asphalts, Their Sources and Utilization," by T. Hugh Boorman.

This modern road-building plant (below) picks up earth, gravel or other aggregate at one end, mixes it with asphalt, and deposits the mixture at the other end of the machine at the rate of 200 tons of "mix" per hour





(Above) A battery of oxidizing units used in the manufacture of Texaco Asphalt at The Texas Company's Port Neches, Texas, Refinery. Here air is blown through the asphalt to produce a wide variety of industrial products

The Manufacture of Texaco Asphalt

By R. R. THURSTON

Supervisor, Technical Service (Asphalt & Roofing), The Texas Company

ASPHALTIC products play a large part in providing the luxuries of the Twentieth Century—fast and dustless automobile roads; attractively colored, serviceable and inexpensive roofing, and an infinite variety of everyday articles, such as auto tires, fuel briquettes, waterproof paper bags, cartons, paints and cements, protective coatings, battery boxes, garden hose and insulating compounds.

Asphalt is the oldest waterproofing material known to man. In ancient days, outcroppings of asphalt were found which had been refined by the processes of nature to usable consistencies and were used as preservatives and binders. Similar deposits are known today, but the tremendous tonnage that is annually used in America has been made available only by the refining of crude petroleum in modern, scientifically controlled refineries.

There are relatively few crude oils in the United States that are suitable for the manufacture of asphalt. Samples of new crude oils are evaluated for this purpose in the laboratory. Those that show promise of making products with suitable physical characteristics are then evaluated on a semi-plant scale, and products that can be made by varying the re-

fining technique are further studied for their quality and suitability for different specific purposes. Only those crude oils of outstanding suitability are selected for use at asphalt refineries, where they are run to the type of products for which they are naturally best adapted, either paving, roofing, or industrial. Many laboratory tests are used to establish the quality of asphaltic products for particular purposes. One such test is the "accelerated weathering test" for roofing asphalts, which reproduces all the destructive forces of Nature but breaks down products much faster than Nature. Many other tests, such as oxidation, stability, staining, adhesion and aging tests are employed to make sure that each grade is suited to the purpose for which it is sold.

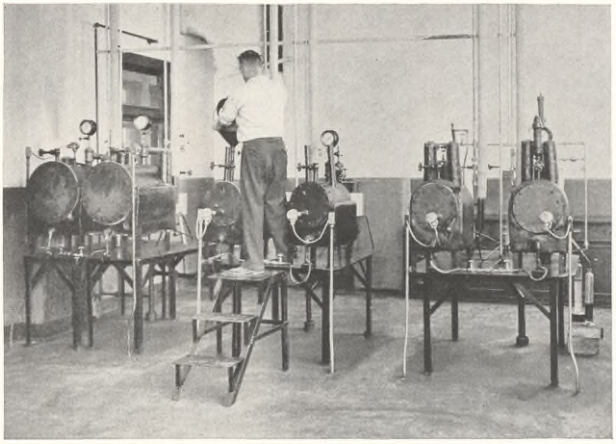
To supplement American sources, foreign crudes are also imported to this country for use in asphalt manufacture. Mexican crudes were formerly used, but in recent years considerable quantities of South American and Venezuelan crude oils have been imported. These crudes, in common with the best domestic grades, have been found particularly suited to the manufacture of paving asphalts.

Crude oils destined to be used in the manufacture of asphalt arrive at the refinery either by pipe line or tanker, and are stored in steel tanks, which hold up to 80,000 barrels each. From these tanks the crude is run to the latest type of continuous vacuum tube still unit, where the gasoline, kerosine and oil fractions are distilled off and sent to refining operations suitable for each. The remaining portion is then used to make different grades of asphalt by two distinct methods: Either it is further distilled under vacuum to relatively hard asphalts (suitable in consistency for paving grades), or it is oxidized by blowing air through it to produce a wide variety of roofing and industrial grades. Oxidation always increases the melting point of the material and makes it less susceptible to extremes of temperature.

Products having melting points varying from 100 to 350 degrees Fahrenheit are made in this manner. Those which soften at less than 200 degrees Fahrenheit are frequently shipped to the consumer in insulated, steam-coiled tank cars.

All grades are also drawn into 450-pound steel drums or barrels for smaller users. Grades used for mopping on flat roofs are also shipped in 100-pound paper bags, which are exceptionally easy to handle and use.

In addition to a wide variety of grades of asphalt as such, there are millions of gallons of "cut-back" asphalts used in surfacing roads. These are asphalts which are dissolved in light petroleum solvents so that they may be used without heating. Several grades are made which vary in consistency and rate of curing, which is accomplished by evaporation of the solvent. Other grades of asphalt are emulsified with water to produce a smooth liquid form of binder which is used for surfacing roads in the same manner as "cut-backs."



(Above) Five- and ten-gallon stills and converters in the laboratory at the Port Neches plant. This small-scale equipment is used to evaluate various crude oils in order to determine whether they will yield satisfactory asphalt products

Asphalt for Harbor Protection

(Left) The jetty in its original state except for asphalt blocks which have been erected to support a runway for the trucks

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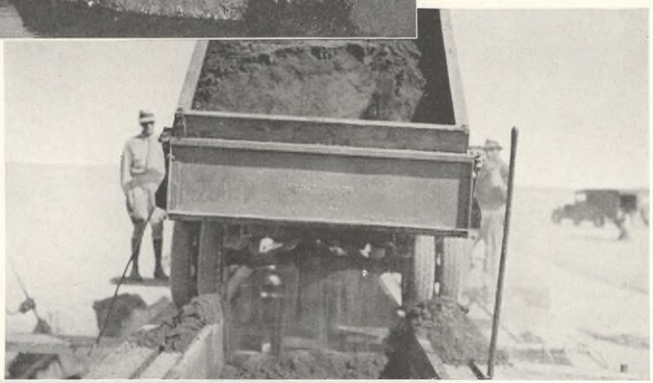
(Below) A truck moves out on the jetty and dumps a load of hot asphalt mix down between the stones



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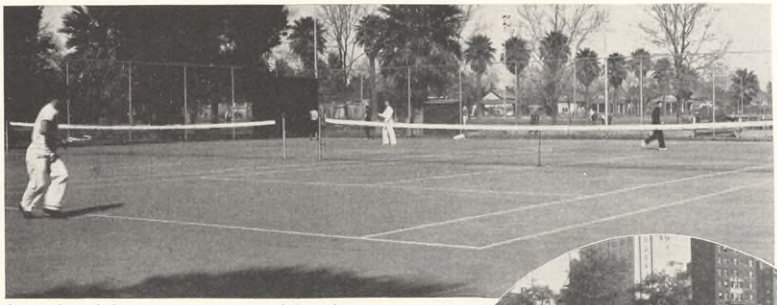
(Below) Workmen with steam vibrators work the hot mix and cause it to bond under its own weight and form an impenetrable asphalt mass

(Below) The jetty completed except for the removal of guide timbers atop the asphalt

SUCCESSFUL mending of harbor jetties with hot asphaltic concrete to make the jetty impervious to water and sand is a notable development in the use of asphalt. The photographs on this page show the first use of this method by United States Army Engineers to repair the jetties at Galveston, Texas

Asphalt is Versatile

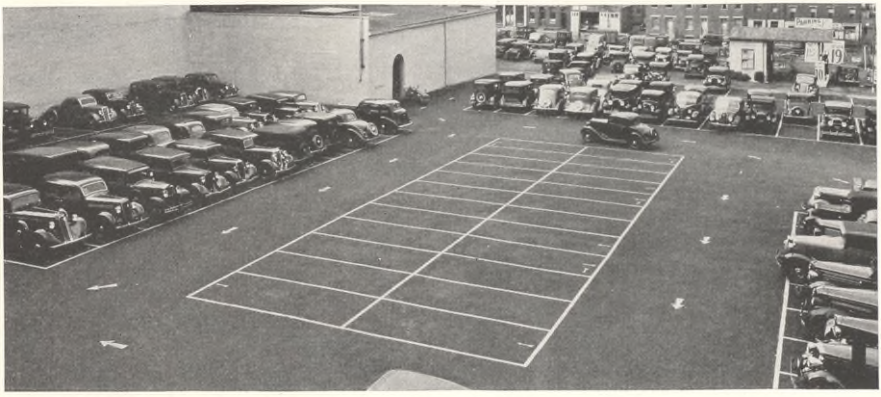


(Above) Asphalt tennis courts are non-skid, resilient

Felt-base floor coverings are made in part from asphalt-saturated felt

(Above) A New York City playground is surfaced with asphaltic concrete

(Below) An asphalt-surfaced automobile parking lot



(Right) Asphalt furnishes a durable, dustless surface for this auto track

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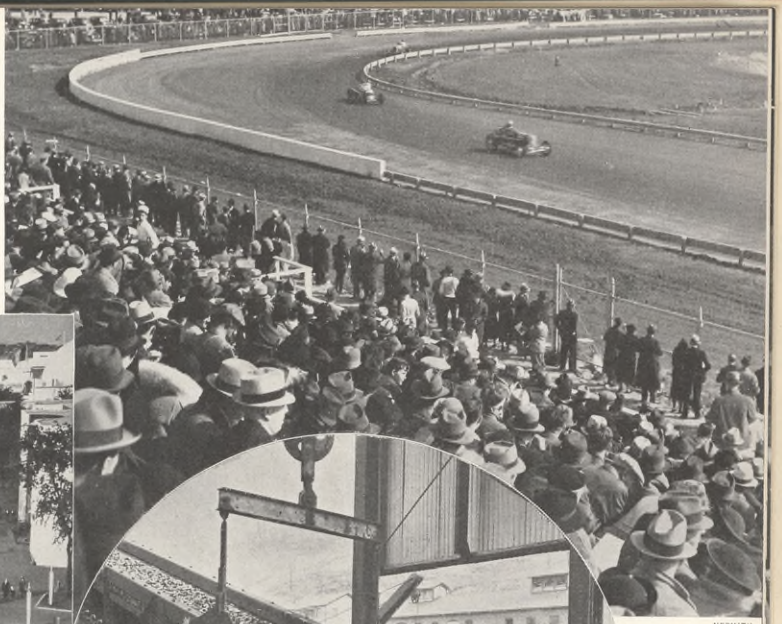
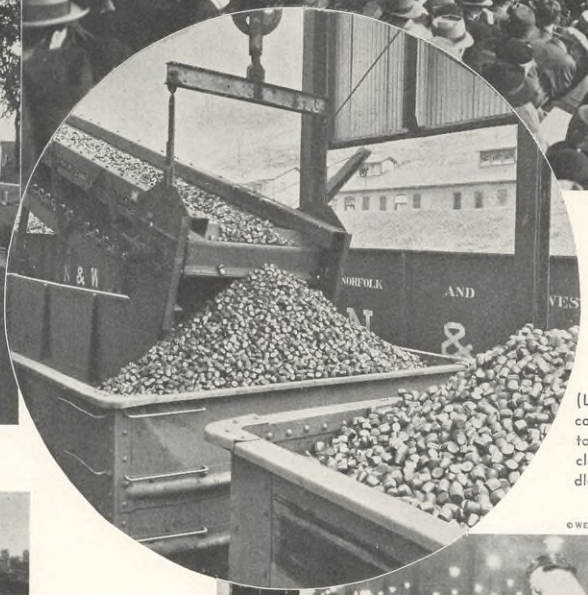


NESMITH

BUCHER

Asphalt sidewalks at the New York World's Fair are easy on tired feet



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(Left) Asphalt and coal dust, pressed together, provide clean, easily handled fuel briquettes

©WESTERN ELECTRIC CO., INC

Asphalt-surfaced revetments (left) prevent erosion of river banks

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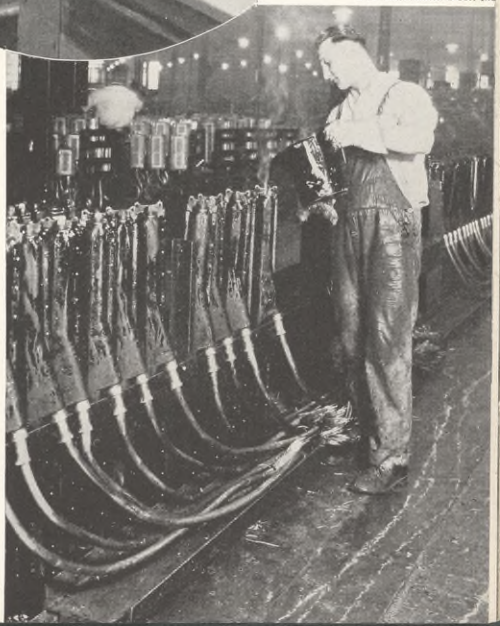
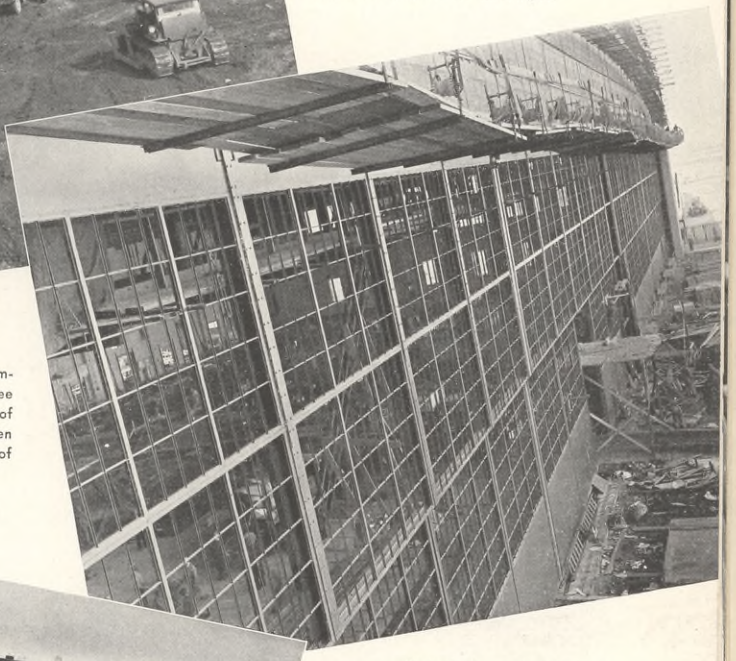
(Right) Asphalt has many industrial uses: In the manufacture of telephone cable terminals it keeps moisture from the wires



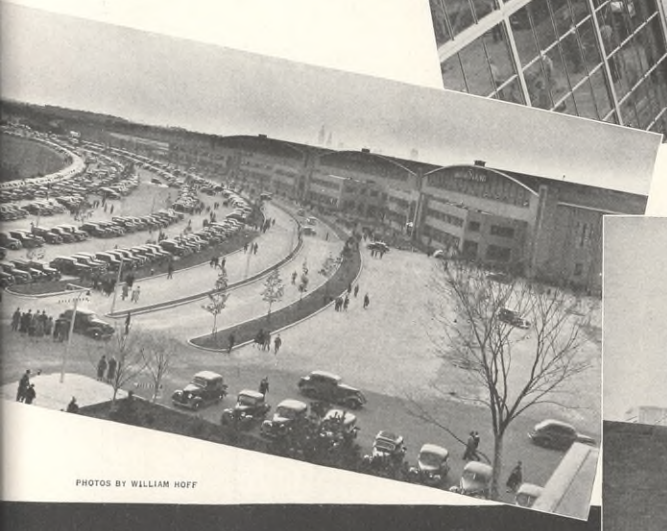
Aerial view of the dedication of the airport. In the backgound is the Bronx-Whitestone Bridge

LAST year more people entered and left New York City by air than by sea. New York Municipal Airport (LaGuardia Field) comprises 558 acres. There are four runways, one of them 6,000 feet long and 200 feet wide, a veritable pilot's dream. Each of the six hangars is larger than Madison Square Garden. At the peak of construction 23,000 workers were employed. Ground was broken by Mayor LaGuardia on September 9, 1937, and the field was dedicated October 15, 1939. More than 3,000,000 gallons of Texaco Asphalt were used in constructing the runways, parking areas, and some of the hangar aprons.

Material from Rikers Island was used to fill part of Flushing Bay and Rikers Island Channel for the Airport



(Right) Closeup of one of the mammoth hangars under construction. Three of the hangars (below) and part of the automobile parking space, seen from the Administration Building's roof



PHOTOS BY WILLIAM HOFF

(Below) The control tower, and a TWA plane taking off

(Left) It is 5 p.m., and the big Skysleepers line up to take on passengers for the long hop through the night to California

Building the Nation's Roads

BLACK STAR

(Left) A worn cement pavement being recovered with asphalt. This type of paving is called "hot mix," as it is applied to the surface while heated, is spread with rakes and then compressed with a heavy road roller

★

(Right) In 1919 many of our national "highways" looked like this stretch of road near historic Dumfries, Virginia. Now look at the picture below

(Left) Here is the same stretch of Virginia highway as it looks today after being widened and surfaced with asphalt, built to take the punishment of heavy motor traffic

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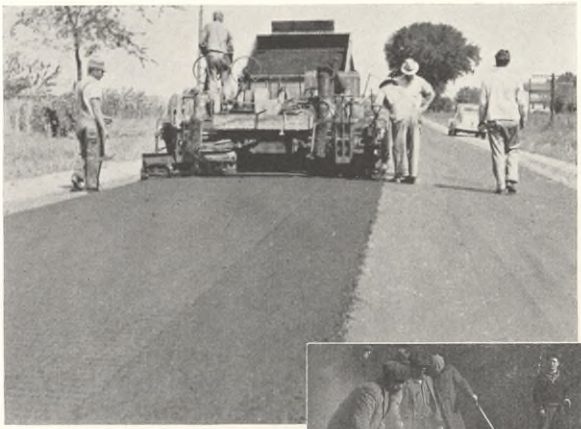
This operation (right) is known as "road mix," which means that the liquid or "cut-back" asphalt is mixed with gravel, sand, or other aggregate directly on the road by these grading machines. It is then spread and compressed



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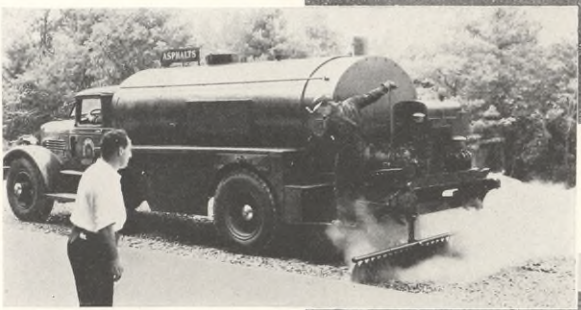
(Left) Here is a "plant mix" pavement being laid. This material has been mixed in a central plant and is of such nature that it may be laid when cold rather than heated

The process shown at the right consists of forcing the liquid asphalt under high pressure into the bed of stone which forms the road base

BLACK STAR

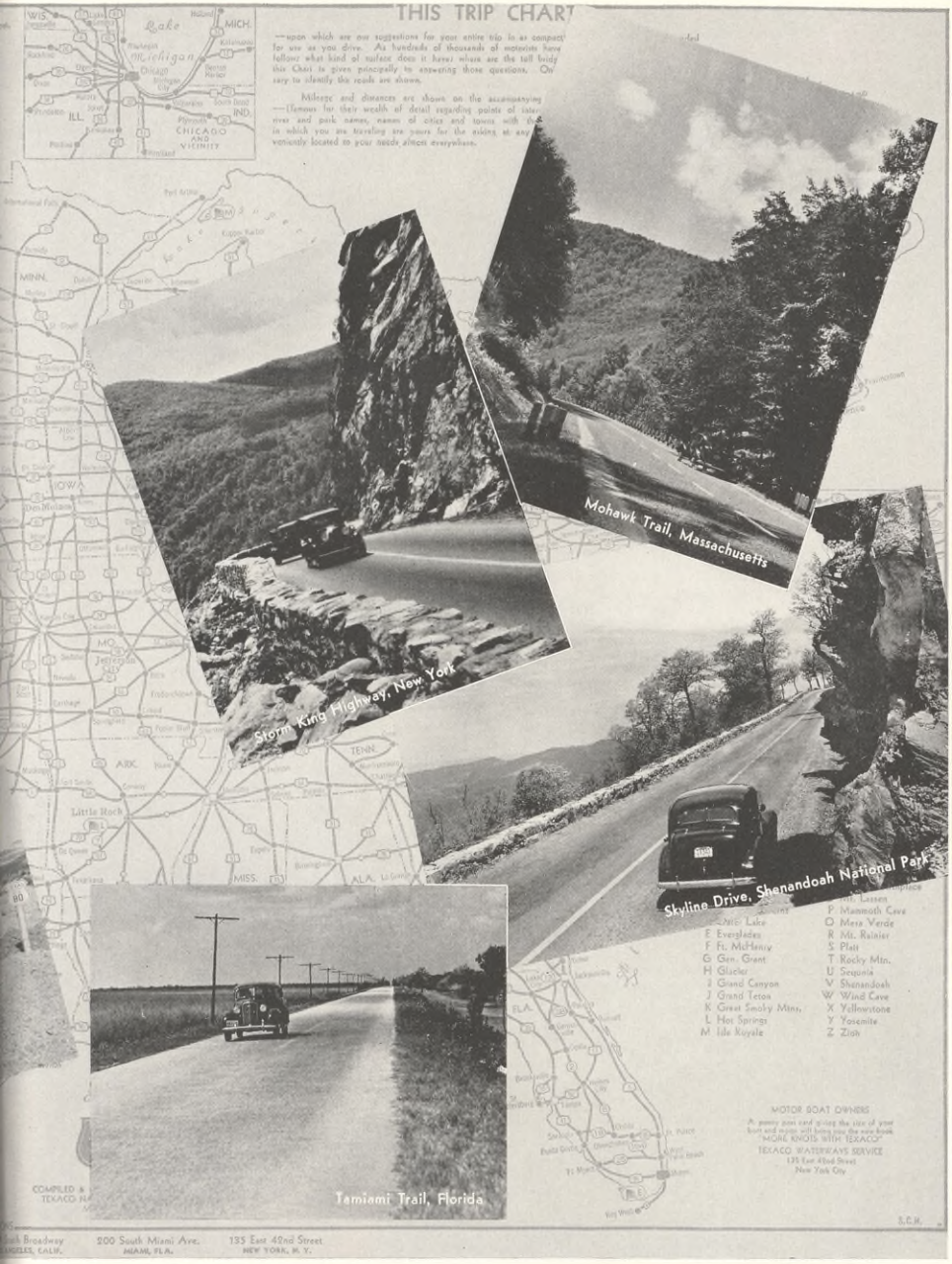


Usually the asphalt is sprayed by machine (left) rather than as shown above. This machine method is used on higher-type highways

(Right) Asphalt, applied to this brick pavement, seals the joints between the bricks, providing a continuous waterproof surface

(Left) Thousands of miles of low-cost, farm-to-market roads are being improved by this simple process of spraying "cut-back" asphalt on a gravel base and covering it with sand


Redwoods, north of San Francisco
Gila Bend, Arizon
Yosemite National Park
U. S. 80, near Dallas
MILES OF ASPHALT ON MOTOR HIGHWAYS
Superimposed on a Texaco Trip Chart are photographs of some of our country's famous motor highways. On all of them there are substantial mileages of all-weather, dustless, non-skid asphalt surfaces, contributing to your comfort and safety
PHOTOS FROM H. W. FECHNER, PHILIP D. GENDREAU, WILLIAM SCHOEB AND R. J. NESMITH AND ASSOCIATES
NOT DRAWN TO SCALE
Albuquerque
Baltimore
Birmingham
Boise
Calgary
Cleveland
Cincinnati
Detroit
Dallas
Indianapolis
Jacksonville
Kansas City
Minneapolis
Montreal
Omaha
Philadelphia
Phoenix
St. Louis
Salt Lake City
Washington
332 South Michigan Ave. CHICAGO, ILL.
210—14th Street DENVER, COLO.


THIS TRIP CHART
Storm King Highway, New York
Mohawk Trail, Massachusetts
Skyline Drive, Shenandoah National Park
Tamiami Trail, Florida
Lake Michigan
CHICAGO AND VICINITY
WIS.
MICH.
ILL.
IND.
MINN.
IOWA
MO.
ARK.
TENN.
MISS.
ALA.
Little Rock
D Lassen
P Mammoth Cave
Q Mesa Verde
R Mt. Rainier
S Platt
T Rocky Mtn.
U Sequoia
V Shenandoah
W Wind Cave
X Yellowstone
Y Yosemite
Z Zion
MOTOR BOAT OWNERS
MORE KNOTS WITH "TEXACO"
TEXACO WATERWAYS SERVICE
135 East 42nd Street
New York City
COMPILED &
TEXACO
200 South Miami Ave.
MIAMI, FLA.
135 East 42nd Street
NEW YORK, N. Y.

"More than a Million Square Yards"

GENDREAU

GENDREAU

ROBERT DUDLEY SMITH

EWING GALLOWAY

Each of the cities illustrated here has more than a million square yards of Texaco Asphalt on its streets. The oldest Texaco pavement still in use was laid 30 years ago in Newark, New Jersey, and is still giving satisfactory service. Four out of every five cities east of the Rockies with a population of more than 25,000 have Texaco asphalt pavements

TAR

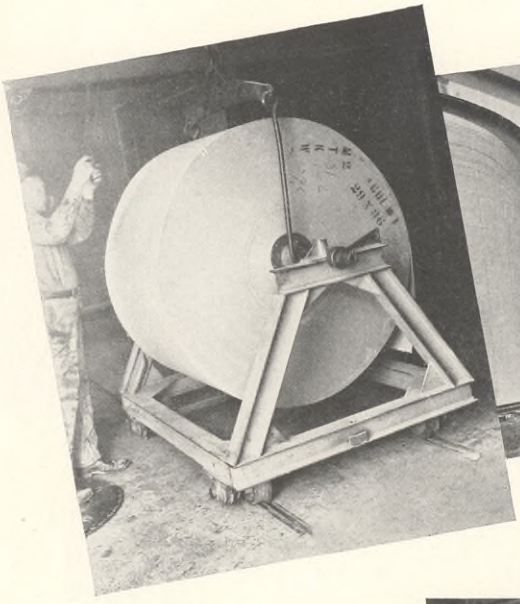
BLACK STAR

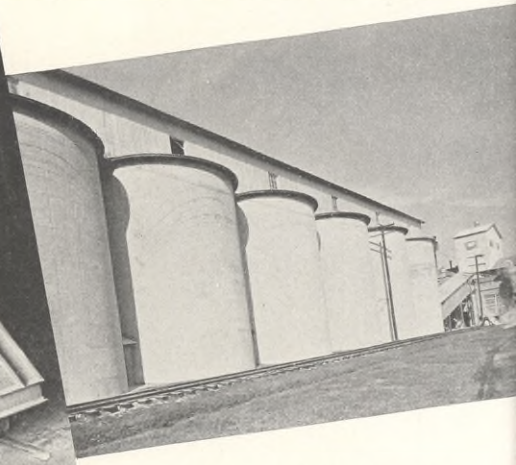
BLACK STAR

EWING GALLOWAY

EWING GALLOWAY

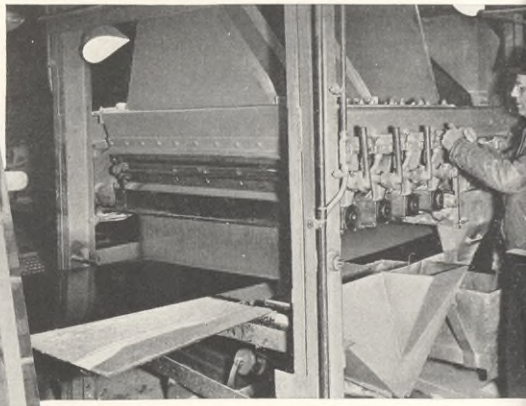
Texaco Asphalt Roofing and Shingles





2. (Above) Crushed slate and other materials used for coating the surface of Texaco Shingles are stored in these huge, silo-like structures

1. (Above) A roll of dry felt, destined to be made into roll roofing, is being placed in position for the initial step in the process



3. (Left) After being saturated with hot asphalt, the felt passes over a series of drums and "loopers" until it is cooled to the proper temperature for further handling

4. (Above) Here the saturated felt receives a surface coating of asphalt, followed by crushed slate, mica or talc, depending upon the type of roofing material being made

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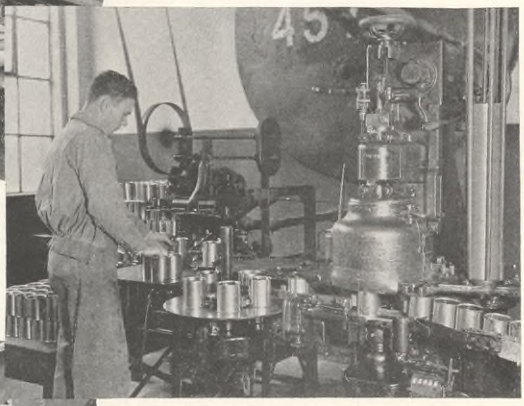
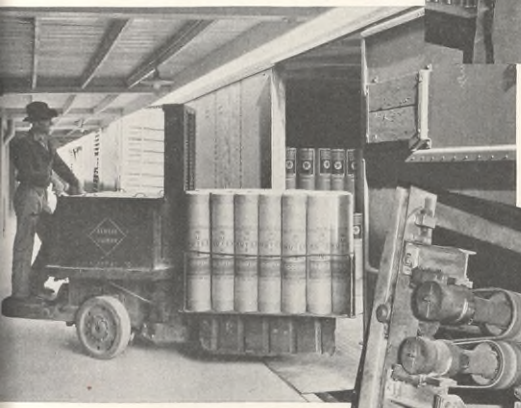
5. (Below) A good asphaltic cement is very important in applying roll roofing. This operator is filling cans with Texaco Roofing Cement



6. (Above) The finished roll roofing is being taken from the end of the machine and prepared for shipment



7. (Left) A load of finished roofing goes aboard a box car at our Port Neches, Texas, plant

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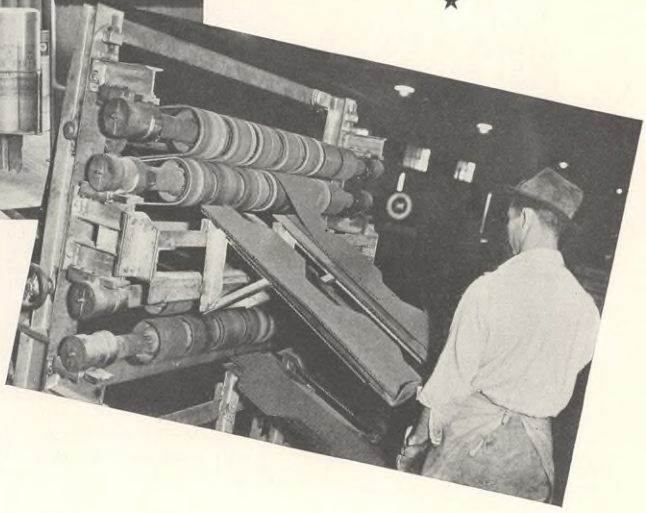

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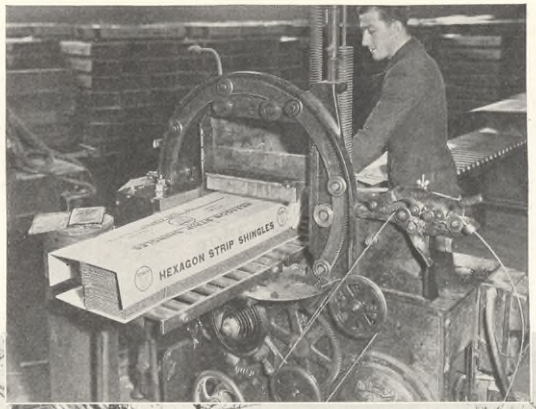
8. (Right) Texaco Asphalt Shingles are made in a variety of colors and styles. Here the shingles are being cut and stacked ready for packaging

9. Swiftly and neatly the shingles are wrapped in a carton and bound with wire

★



Texaco Shingles are sturdily packaged for ease in storage, shipment and handling

★

The finished job—a colorful, attractive, durable roof. Texaco Roofing Products have been widely accepted by the trade and the general public

ROBERT YARNALL RICHIE

What Oil Means to Texas

EDITOR'S NOTE: The oil industry's annual contribution to the national income in the form of wages, dividends, royalty payments and taxes amounts to more than four billion dollars. What this means in terms of a single state is illustrated in the following article, which appeared recently in *The Texas Weekly* and is here reprinted in condensed form with the permission of its publisher.

MEMBERS and guests of the Civic Federation of Dallas met recently to hear George C. Gibbons, Executive Vice-President of the Mid-Continent Oil and Gas Association, discuss "What the Oil Industry Means to Texas." It is probable that many of those in the audience had some knowledge of the importance of the petroleum industry to Texas. But few Texans appreciate how widely distributed are the economic benefits generated by the oil industry and how profoundly they influence the welfare of Texans in every walk of life.

Most Texans know, for example, that their state is the nation's leading producer of petroleum, although they may not actually know that Texas produced in 1939 about 460,000,000 barrels of petroleum—approximately 38 per cent of the nation's total—from 88,000 wells. But most of them would be surprised to know that oil or gas is being produced today in 147 of the state's 254 counties, while exploration is under way in 98 other counties.

The most accurate estimates available indicate that 215,000 persons in Texas were employed in 1938 by the petroleum industry and its allied branches. Since each of these persons supports an average family, nearly a million Texans are directly dependent upon this industry for their livelihood.

What the industry means to a small Texas town in an area which produces a great deal of oil, and to a

large Texas city in an area which produces no oil at all, can be illustrated by Longview and Dallas.

Longview is situated in the famous East Texas oil field. Its population has increased since 1930 from 5,000 to 26,000. Dallas is located in one of the nine counties of the state in which there is no actual production or exploration under way. Yet it has been reliably estimated that there are 23,278 persons in Dallas County who are working for the oil industry—and who, incidentally, are collecting and spending in salaries and wages nearly $28,000,000 annually.

In other words, the number of those working for the industry in a county which produces no oil at all is nearly equal to the entire population of another city which is located in the world's greatest producing area.

Consider the case of Houston, reputed to be the nation's fastest growing city. Its population has increased from 292,000 to more than 400,000 during the past nine years. It has been estimated that six persons out of every ten in Houston are directly dependent upon oil for their living.

It is true that the sea-going commerce emanating from Houston is an important factor in its economic life, but it is also true that 92 per cent of that commerce consists of petroleum and its products.

Perhaps one of the reasons why the average Texan does not fully appreciate just how important the petroleum industry is to him is that its importance came about too quickly to be detected. It came about just at the time that the cotton industry, upon which the state's economy had rested principally for decades, began to collapse, and the substitution of the oil industry for the cotton industry took place so subtly that the average Texan was unaware of the profound change that had occurred.

During the 'twenties, the cotton production of Texas was valued at an average of approximately $393,000,000 a year. But during the 'thirties the cotton crop of the state was valued at less than $169,000,000 a year. During the 'twenties Texas produced an average of 186,000,000 barrels of oil a year, but during the 'thirties Texas produced 404,000,000 barrels a year.

Thus at the end of the 1920's agriculture was providing a fourth of the state's total cash income, while minerals (principally oil and gas) were producing only a fifth. But at the end of the 1930's the farms and ranches of Texas were yielding less than a fifth of the state's income, including government subsidies, while minerals were supplying a third.

In their relation to the economic welfare of the state, then, these two industries reversed their positions. It can easily be imagined how seriously Texas would have suffered when its annual cotton income declined if some other great industry had not taken up the slack.

That is precisely what the oil industry did, and at a critical time. Nothing else explains the circumstance that Texas' annual income today is approximately what it was in 1929, despite the fact that the time-honored pre-eminence of the cotton industry is no more.

Because its ramifications extend into every section of the state, the petroleum industry can be said to pulsate the mighty economic heart of Texas.

It does so not only as a big employer, but also as a big taxpayer. It is the state's biggest taxpayer. Texas oil paid $44,090,808 in state and local taxes in 1938, *or an average of 9.3 cents on every barrel produced. In Louisiana, for example, the tax amounts to 8.7 cents a barrel, and in Oklahoma 8.4 cents a barrel.*

Perhaps the most significant contribution of the petroleum industry has been its stimulation of industrial development. For many years, citizens of Texas who sought to look forward, sensed to a high degree the acute need for developing a diversified business structure. They observed that added values and increased employment could be created in the processing of raw materials produced in Texas.

And so they sought to attract capital and enterprise, so that Texas labor might be profitably employed, Texas markets might be cheaply supplied, Texas power might be used, and Texas capital earned for reinvestment for further development of their state.

The oil industry has responded in a manner which has not even been approached by any other industrial enterprise. Today, 153 oil refineries all over the state manufacture into products 80 per cent of the state's oil production.

Texas refineries employ 25,000 Texans, with a $40,000,000 annual payroll. These plants represent an investment of many millions of dollars, and it is virtually all capital that has been created by the Texas oil industry, and reinvested in these facilities for the manufacture of petroleum products. It is by far the largest manufacturing enterprise in Texas.

Although Texas processes only three per cent of its cotton production, and none of its extensive wool and mohair production, the state is converting 80 per cent of its petroleum into products. Moreover, the petroleum industry is attracting other capital into Texas to be invested in other enterprises.

Consequently, as far as Texas is concerned, oil *is* as oil *does*. Oil is to Texas what oil does for Texas —and because it is the state's number one economic asset, it is the state's most impressive augury for future progress.

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