ARAMCO WORLD
505 PARK AVENUE, NEW YORK 22, N. Y.

IN A BAG

of paper. Formerly, the bag paper was so poor that it could stand little or no stress and strain without tearing, and paper made of imported hemp or jute was too costly.

By 1875, members of the Wolle Combine formed a company that today in Savannah, Georgia operates the world's largest bag-making plant. Amid the palmettos of Georgia, the quarter-mile-long machines at the Savannah plant devour about one million cords of long-fibered pine each year. Among the endless belts snakes an automatic, continuous piping system that insures an even flow of the vital starch that seals the bags. Through other pipes flow the 30 million gallons of water that are necessary for each day's operation. Some 35 million bags stream from the plant each day — shopping bags, potato sacks, garbage liners, bags for flour, chemicals, insecticides and machinery parts. There are bags for hauling freshly-picked vegetables from the western farm belt to the markets of New York; insulated bags to carry home ice cream; great sacks that hold 25 to 50 pounds of ice cubes for hours without coming apart and "raincoat" bags to protect newspapers during wet-weather delivery.

One New York paper bag company has a machine that turns out 8,000 bags a day which measure 14 feet in length and six feet around. The mammoths are used to package items such as beach umbrellas, golf bags and fishing poles and are not unlike the paper shipping sack which developed into an enormously successful industry on its own after the common bag was perfected. The giant bag holds up to 100 pounds and is composed of one to six walls of specially-coated paper — the number of walls depending on the degree of strength required. The physical characteristics of the multi-wall sack offer just the right amount of strength and the exact degree of protection needed to package any kind of product from rose bushes to rock salt, from popcorn to potassium chloride.

People have become so used to paper bags that they take them for granted, but bag manufacturers are trying to catch the public eye with more imaginative containers. One company on Long Island is putting out special Trick or Treat bags for Halloween — bright orange and black containers decorated with black cats and fearsome witches astride broomsticks. This same company supplies a fashionable New York millinery store with chic bags in pastel hues ranging from cerise to sky-blue and festooned with garlands of flowers.

Bag manufacturers are trying to get across the message that the sturdy bag has many uses after it is brought home from the store. The commuter who brought home a bag of candy for his youngsters last night is likely to be carrying his lunch to work in that same bag today. The bag used by the housewife to carry the groceries many turn up with a few daubs of paint and a couple of eye-holes punched in it as a play mask for Junior.

Bag sizes originally were gauged by the amount of sugar they held. Thus a five-pound bag, regardless of shape, held five pounds of sugar. This naturally made for many inaccuracies when used as a system of measure. The problem related to bag sizes was finally solved in 1926, when the U.S. Bureau of Standards set up minimum capacities — designated by cubic capacity — for all sizes of grocers' bags.

Bag styles are innumerable and bag uses myriad, but there are only four basic bag shapes. The flat bag is actually a tube sealed off at one end. The square bag has tucks at the side to give it greater space. The satchel-bottom bag has a large bottom section so that it will stand upright when filled. And the automatic bag or "S.O.S." (self-opening square) has a rectangular bottom and tucks in the side. It can be opened with a snap of the hand and fills with air so that it will stand by itself even when empty.

There are also many types of specialty bags. Some have slick linings to prevent snagging fragile items. Others may be grease-proof, moth-proof or heat-sealed. Some are insulated for carrying perishables.

Lately the bag has been moving into new fields.

In Fredericksburg, Virginia, the residents are no longer awakened at dawn by the jangle of metal cans as the garbage trucks make their rounds. They now have their trash removed silently in tough, weather-proof bags of water-repellent paper.

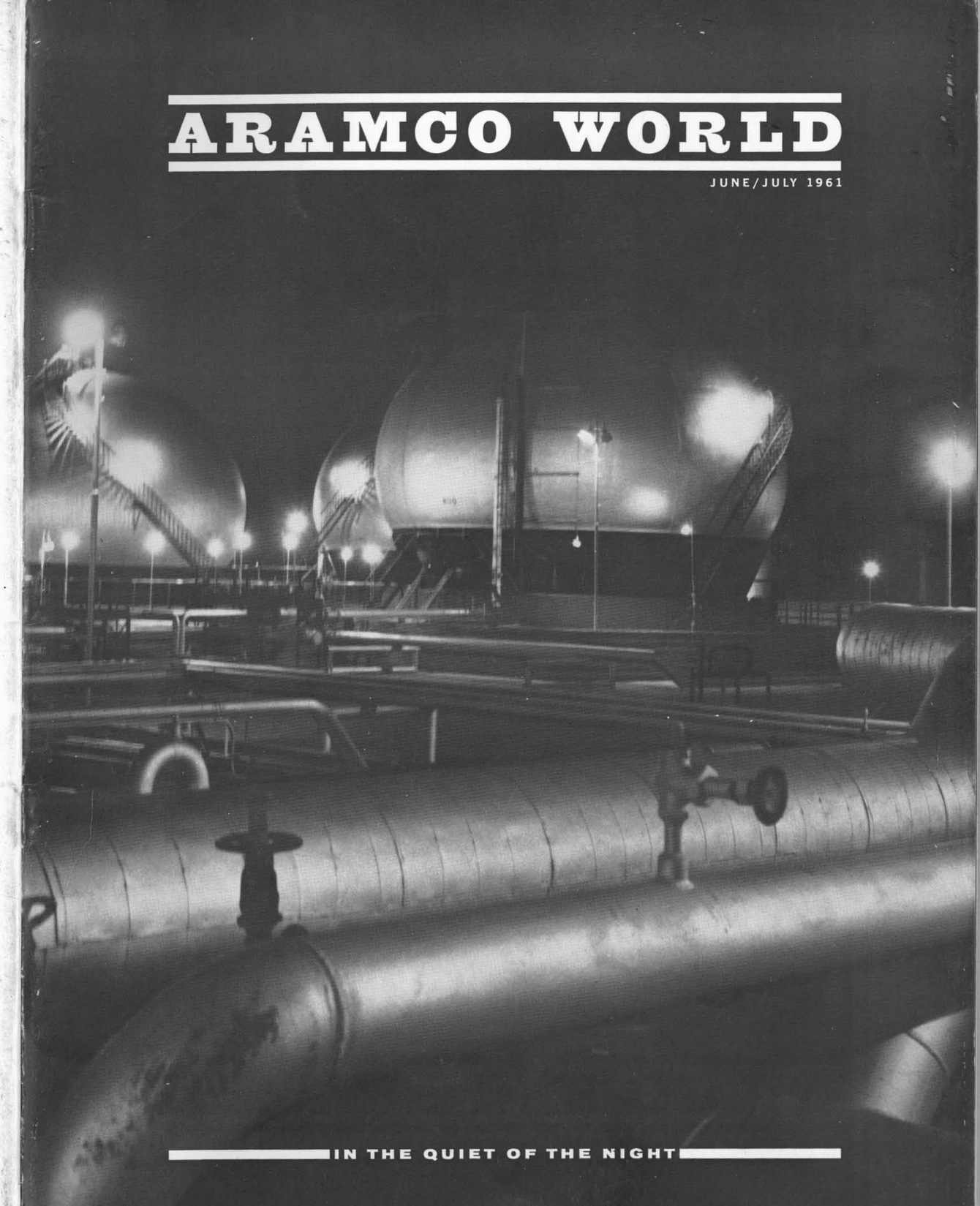
A Midwestern hospital has found that by using king-sized disposable bags as liners for its 30-gallon waste disposal cans it not only saves thousands of dollars in labor costs but has sharply reduced the hazard of contamination.

A New England milk company uses a special twin layer bag with ice in between the folds to keep its bottles cold during the long truck hauls. Throughout the East tourist refreshment stands have begun using a bag with a laminated inner foil to keep barbecued chicken hot and crisp until the customer gets it home.

And in Iowa one enterprising company, discovering that the sugar content of corn rapidly turns to starch in hot weather, created a bag that will ship five dozen ears of corn nestled in 20 pounds of ice a thousand miles away and keep it field-fresh.

A far cry from the precarious containers the grocer's boy used to paste together back in 1850! ■

ARAMCO WORLD
JUNE/JULY 1961



IN THE QUIET OF THE NIGHT

Aramco World

JUNE/JULY 1961 VOLUME 12 NO. 6

FRONT COVER: All night long busy operations at an Aramco gas-oil separator plant (GOSP) near Abqaiq, Saudi Arabia, shed a soft glow over the desert. At the GOSP crude oil is processed to remove volatile gases so that the oil can be safely handled for tanker and pipeline shipment.

PICTURE CREDITS: Front cover, pages 3, 5 (right), 6 (left)—Aramco photos by V. K. Antony. Pages 4, 7, 18 (bottom), 19—Aramco photos by B. H. Moody. Page 6 (right)—Aramco photo by T. F. Walters and V. K. Antony. Pages 8 and 9—Hawaii Visitors Bureau. Page 10 (top)—United Press International. Page 10 (bottom left)—Culver Pictures Inc. Page 11—Black Star. Pages 12, 15—The Bettmann Archive. Page 14—Ice Cream Trade Journal. Pages 16, 17 (top)—Brown Brothers. Pages 17 (bottom), 18 (top), 22—A. Devaney, Inc. Page 23—Union Bag-Camp Paper Corporation.

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A Look At The Past Year

TRAFFIC along the paved highway from Dhahran to al-Khobar is heaviest on Thursdays and Fridays. The trip takes only about fourteen minutes by bus or car — yet, the two cities are worlds apart in many ways.

Dhahran, the largest of the three major oil communities in eastern Saudi Arabia, might be found tucked away outside many American cities. It has a suburban air: trim hedges, neat lawns and low cottage-style houses bordered by flowers and shaded by trees. Blooming oleander and thick false-jasmine hedges lend an exotic touch.

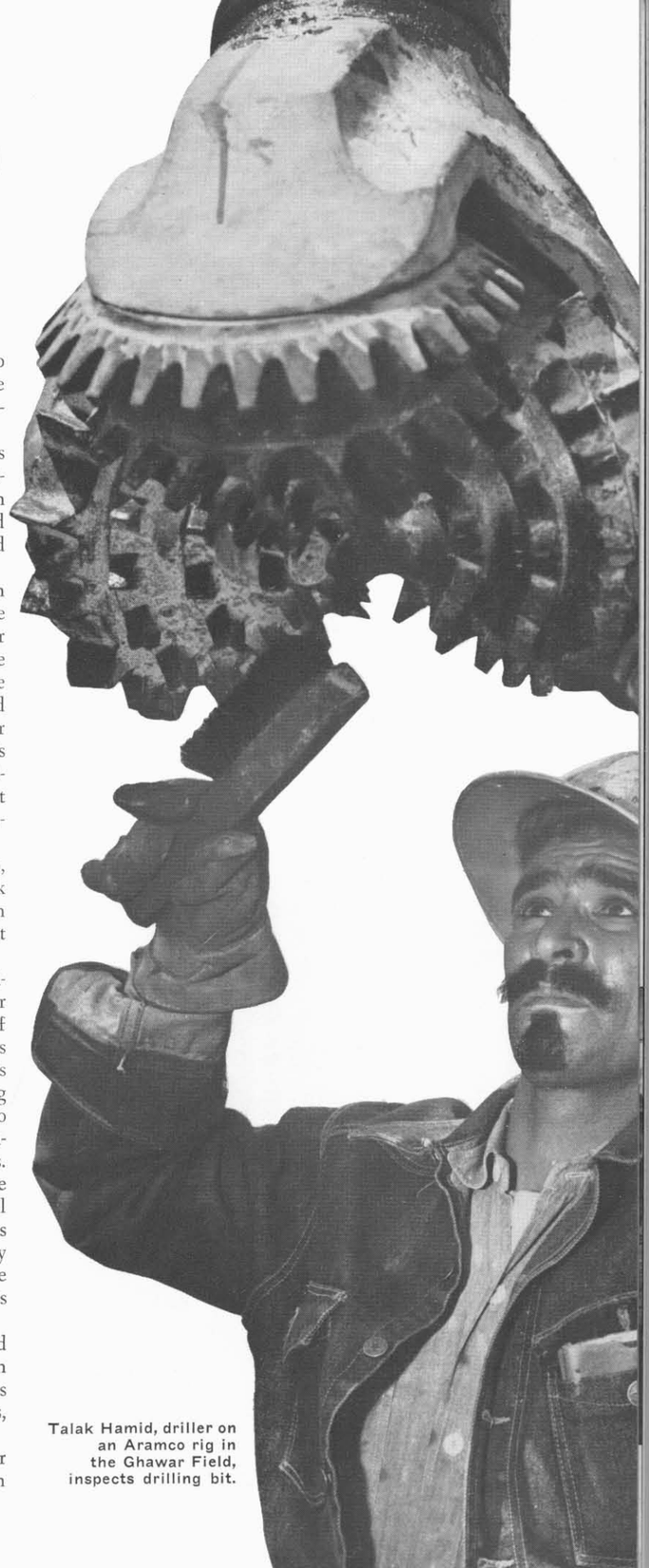
Al-Khobar is resolutely Saudi Arab in the long tradition of the *suq*, the lively, subtle, colorful trading center. While Dhahran is surrounded by barren desert, al-Khobar stretches out along the blue waters traditionally called the Persian Gulf, but now known to the Arab world as the Arabian Gulf. It is a striking city of new buildings and modern shops which look out upon skeletons of still newer buildings which will house still more modern shops. It is marked by the nervous vitality of swift growth and bounding leaps into new enterprises. It lies along the ancient tradeways of *dhow* and camel but has become the "shopping center" of the Eastern Province of Saudi Arabia.

Thursday and Friday are the usual days off for Aramco, the Arabian American Oil Company. This strange "week end" (Americans never quite get used to it) is based upon the facts that Friday is the Muslim sabbath and that three-quarters of Aramco's employees are Saudi Arabs.

In recent years the week-end traffic from Aramco's headquarters at Dhahran to the shopping center at al-Khobar has grown enormously. The intermittent flow of cars of all shapes and sizes is a symbol of a vital change that has been stimulated by the oil company's policy. During its early beginnings in Saudi Arabia, and even more during the era of vast expansion following World War II, Aramco had to act as haberdasher, pharmacist, travel agent, laundryman and hardware man for its American employees. But the company decided long ago to "get back into" the oil business. It took time to promote the growth of small Saudi Arab businesses, service companies and contractors to handle the bulk of the non-oil responsibilities. Little by little, however, American residents in Saudi Arabia have been able to turn to Saudi Arab businessmen for goods and services.

The traffic into al-Khobar is, therefore, an outward measure of the achievement of Saudi Arab merchants in building, stocking and managing a great variety of stores to serve the demands of the Americans and their families, as well as the Saudi Arab people.

Far less noticeable to the casual eye has been another significant development that reflected a new breadth in



Talak Hamid, driller on an Aramco rig in the Ghawar Field, inspects drilling bit.

A LOOK AT THE PAST YEAR

1960. Like the American families, the oil company has come to depend increasingly upon Saudi Arab businessmen for goods and services. Last year Aramco spent more than $18,000,000 with Saudi Arab suppliers and contractors for constructing pipelines, renting autos and transporting gasoline, for imports of auto tires, cement, sugar and canned foods, for locally produced tiles, paper products, soft drinks and fresh vegetables and eggs. During 1960 the company also began buying highly specialized materials – large-diameter pipe, for example – through Saudi Arab suppliers.

Another symbol of growing Saudi Arab enterprise is seen by turning left from the highway just before reaching al-Khobar. A suburban development comes quickly into view. A cluster of new two-story homes of concrete and stucco, built under the oil company's Home Ownership Program, stands in the brilliant sun. Each home reflects the taste of the owner: ground-to-roof panels of bright color, slanted buttress devices, mosaic panels, decorative designs. And each is surrounded by the traditional high wall that marks the Arab's love of privacy for his family.

This is West al-Khobar, something new under the desert sun – an *Arabia Suburbia* to be added to the vocabulary of ancient geography that included *Arabia Felix* and *Arabia Deserta*. Aramco provides the funds through interest-free loans, and the municipality through a Royal grant provides the land for each new home built or purchased by a Saudi Arab employee of Aramco. The employee generally prefers to choose his own design, while local contractors do the building. West al-Khobar was opened up in 1959. By the end of the past year, 100 homes had been built and 30 more were under construction there.

Last year was a record year for home-building under the company program: 722 homes were built or bought in various parts of the Eastern Province. By now, more than 2,800 homes have gone up under the ten-year-old program. The largest developments are in Dammam, Rahimah and Madinat Abqaiq.

Record home-building and record company purchases through Saudi Arab merchants—each was linked intimately to a year of extraordinary activity for Aramco. This spring, when the desert bloomed after a season of better-than-average winter rains, the company made its annual report to the Saudi Arabian Government on the operations of the company during the twenty-seventh full year of its concession.

It was the best year in the history of the company.

The production of crude oil in 1960 increased almost 14 per cent over 1959.

The country's greatest resource – its proved and recoverable crude oil reserves – increased by approximately seven *billion* barrels.

The big refinery at Ras Tanura processed nearly 29½ per cent more crude oil than in the year before.

Aramco's summary of its banner year is filled with facts and figures which demonstrate the continual push upward that has become necessary in the modern world of international competition. As Chairman of the Board Norman Hardy and President Thomas C. Barger reported:

"During the year there was an encouraging rise in world demand for petroleum, largely as a result of mounting industrial activity in countries of Western Europe and the Far East, which are major consumers of oil from Saudi Arabia and other Middle Eastern countries. The company is pleased to report that despite the world-wide surplus in producing capacity and increasing amounts of oil from the Soviet Union entering free world markets, Aramco's exports have succeeded in keeping pace with the increase in world demand."

Aramco is wholly owned by four American corporations: Standard Oil Company of California, 30 per cent; Texaco Inc., 30 per cent; Standard Oil Company (New Jersey), 30 per cent; Socony Mobil Oil Company, 10 per cent. These four companies in turn are owned by a total of more than 1,200,000 individual stockholders – or more than any American corporation with the single exception of the giant American Telephone and Telegraph Company.

Here are some of the highlights of Aramco accomplishments in 1960:

Producing. The company's logbook had some benchmark entries. For instance, Aramco's 196 producing oil wells produced a daily average of 1,247,140 barrels of crude oil in 1960 – an all-time record to date during Aramco's 22 years of commercial production. Aramco's cumulative production passed the four-billion-barrel milestone on June 13. During December the company racked up its best month thus far, with an average daily production of 1,392,-014 barrels. A sixth oil field, Khursaniyah, was placed in production.

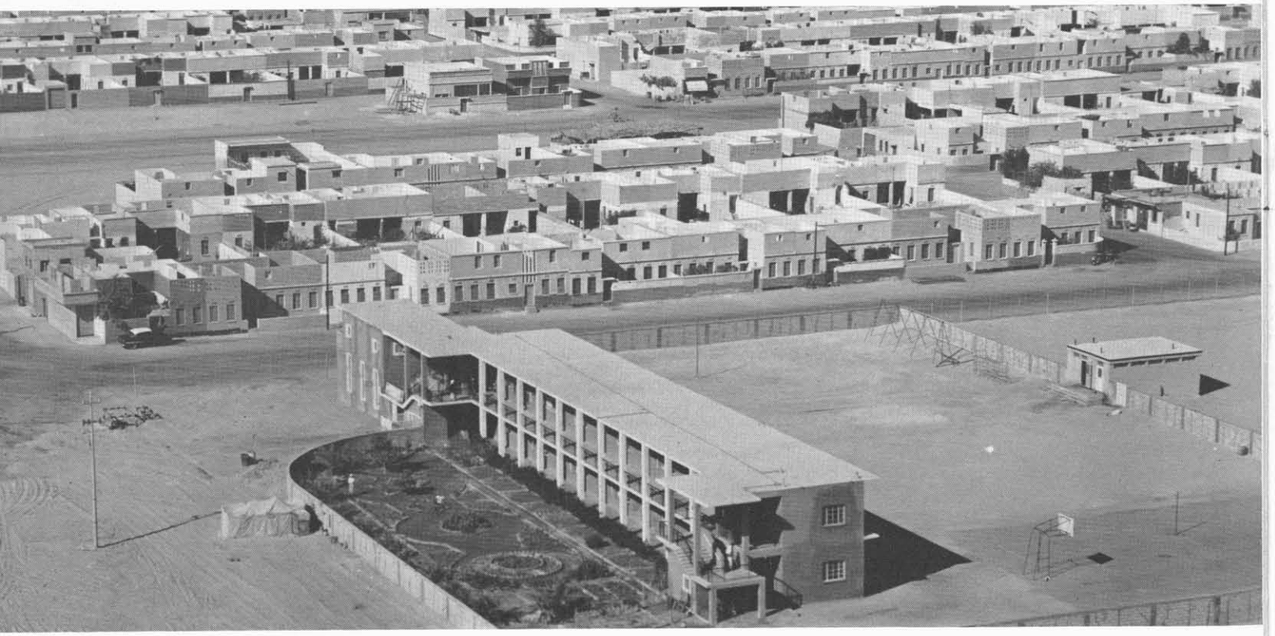
But volume alone is not the biggest concern – volume without waste, that's the heart of the company's conservation program. To keep up the natural pressure in the deep-underground oil reservoirs and to recover every practical drop of crude oil over a long span of years, Aramco injected vast quantities of water and gas – a quarter of a million barrels of water and a quarter of a billion cubic feet of gas every day – into its principal producing fields. In addition, a liquefied petroleum gas (LPG) injection plant was begun at Abqaiq to permit the return of 55,000,000 cubic feet daily of otherwise unusable gas into the crude oil reservoirs in the 'Ain Dar area.

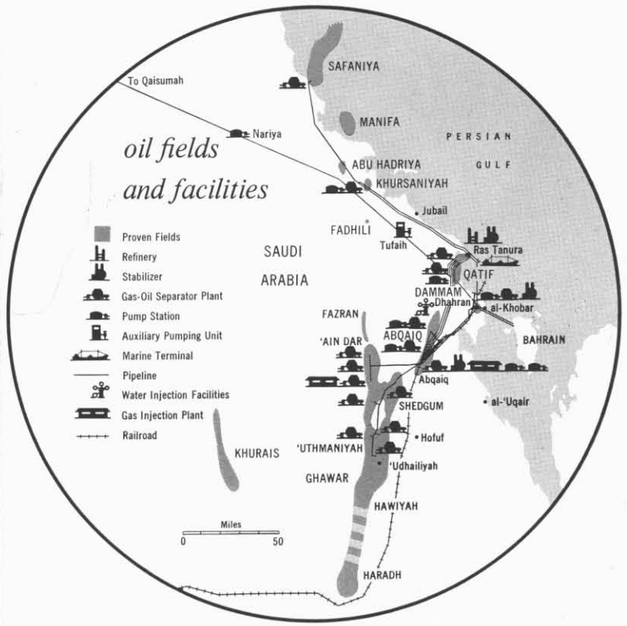
Already Aramco is injecting or burning as fuel 45 per cent of all the gas produced along with crude oil. The LPG injection plant will raise that figure still higher. Its completion will bring Aramco's total investment in conservation to $48,000,000. Although the costs are high, the results are more than worth it.

Drilling. The 17 wells drilled by Aramco in 1960 were designed mainly to define the limits of known oil fields in Saudi Arabia. Such "delineation" wells helped fix the boundaries of the fields with great accuracy. Aramco was thus able to add to the country's proved reserves. At the close of the year Aramco's reserves had been boosted to approximately 45,600,000,000 barrels, or more than in the entire United States. Offshore drilling in the Arabian Gulf doubled the proved area of the Safaniya Field, probably the largest offshore field in the world.

Exploration. The company continued its geological and geophysical exploration in remote sections of the Rub' al-Khali (the Empty Quarter), the world's most extensive sand desert. Special techniques enabled Aramco to carry out seismograph work, based on "echoes" from miniature man-made earthquakes, in the unbelievable terrain of the "sand mountains," towering as much as 1,000 feet high. The mapping of the underground rock formations in the

Modern school for sons of Aramco's Saudi Arab employees who live at this new community in Dammam, near the oil operations.





An expert from Aramco's Health Centers highlights important points in his talk for youngsters at a Saudi Arabian school.

A LOOK AT THE PAST YEAR

Rub' al-Khali was also facilitated by drilling test holes as much as a mile and a half deep. In addition, Aramco and the United States Geological Survey, under the joint sponsorship of the State Department and the Kingdom of Saudi Arabia, were completing their new geological and geographic mapping program of the Arabian Peninsula.

On July 21, Aramco relinquished from its concession area 33,700 square miles in the southwestern Rub' al-Khali. Now that a total of 140,413 square miles had been relinquished in a dozen years under an agreement between Aramco and Saudi Arabia, the company's remaining concession area still was somewhat in excess of 350,000 square miles, or larger than Texas.

Refining and Marine Terminal. A daily average of 224,894 barrels of crude oil — more than ever before — was processed into petroleum products at the big Ras Tanura refinery during 1960. More than half of the refined products consisted of fuel oil for industrial use, followed by diesel oil, motor and aviation gasoline, kerosene and jet fuel. At the nearby marine terminal more than 1,800 tankers — an average of five a day — were loaded with crude oil, refined products and bunker fuel during the year. The first plant in the world designed to produce refrigerated LPG, normally retailed as "bottled gas," for shipment on tankers was nearing completion at the terminal at the year's end.

Marketing. A further stimulus to small business enterprises in Saudi Arabia came from the establishment of 77 new service stations owned and operated by independent Saudi Arab dealers. A total of 302 retail dealers under such independent management now sell Aramco products across the length and breadth of Saudi Arabia — the only country where the Aramco trademark appears at the filling stations.

Aramco, which is primarily engaged in finding, producing and refining oil in Saudi Arabia, does not market outside of Saudi Arabia. Once this oil is exported, it is transported and marketed by one of Aramco's four owner companies or their affiliates. Of Aramco's 1960 production, 42.5 per cent was marketed in Western Europe, 36.7 per cent in Asia and Australia, and comparatively small quantities in North America, South America and Africa.

Safety. A good index of a company's morale, teamwork and skill is its safety record, and Aramco's record-breaking safety record in 1960 was better than the average in the United States. Only 1.8 disabling injuries were incurred for each million hours worked by Aramco employees in 1960. Aramco's previous all-time low of 1.9 in 1959 was honored by the National Safety Council of the United States.

People of Aramco. At the end of the year the company had 14,834 employees in Saudi Arabia, of whom 11,149 were Saudi Arabs, 2,180 were Americans and the rest were of many other nationalities. Thus the proportion of Saudi Arabs in the Aramco family stood at almost three-quarters.

In turn, more than three-quarters of these Saudi Arabs held semi-skilled, skilled, professional or supervisory jobs — twice the proportion of seven years earlier. Looking toward future advancement, more than one-third of the Saudi Arab employees participated in the company's training programs at the Industrial Training Centers during working hours. Nearly the same proportion were voluntary students during evening classes at the training centers.

Aramco agriculturist Sami Labban works closely with local farmers on methods to improve produce quality and quantity.

The exacting skills of the machinist are being taught to trainees Daig ibn Abdullah, left, and Yousif ibn Sulbrookh.

By the end of the year, 366 Saudis had been promoted to *mushrif* (single work group supervisor) or *muraqib* (supervisor of several work groups). Twenty-nine Saudi Arab employees were sent for advanced, specialized training to colleges and universities outside Saudi Arabia at Aramco expense, 17 of them to the United States.

Schools. During the year the company completed its eleventh elementary school for the sons of Muslim and Arab employees. The school was accepted in September by the Saudi Arabian Government's Ministry of Education. Like the other schools given to the country by the company, the new school at Hofuf will be maintained by Aramco, and the company will reimburse the government for operating costs and teachers' salaries. The 11 elementary schools accommodate a total of 3,300 boys.

Two intermediate schools were being completed at Dammam and Hofuf on the same basis. Each will accommodate 150 youngsters.

Benefits. The human side of Aramco's record year was further reflected in the benefit program for Saudi Arab employees, including its savings plan, death and disability payments, and free medical care. During the year a general pay increase for Saudi Arab employees brought their average annual income to the neighborhood of $1,750, or almost twice the level of five years ago. A retirement plan went into effect in July for Saudi Arab employees, with the company assuming all the costs, and 132 employees retired and began receiving annuity payments.

Forty-six per cent of Aramco's Saudi Arab employees have been with the company for at least ten years, and 14 per cent have passed the 15-year mark. The stability of the great number of Saudi Arab workers indicates their general satisfaction with the conditions of employment.

The housewife driving from Dhahran to al-Khobar on a Friday morning with a long shopping list (perhaps made up with the help of the shopping column in the company's weekly newspaper, *Sun and Flare*) is likely to be unaware of the magnitude of oil industry history made along that short stretch of highway.

For one thing, when the concession contract was signed in 1933, there was no such place as Dhahran, and al-Khobar was a fishing hamlet made up of a few palm-frond barastis. Today these two communities, linked by the joint endeavors of American and Saudi Arab in a vast enterprise and its flowering offshoots, share three distinctions which rise from the statistics of Aramco's 1960 report to the Government:

. . . Saudi Arabia ranks as the fifth largest crude-oil producing country in the world (after the United States, the Soviet Union, Venezuela, and the tiny Shaikhdom of Kuwait at the head of the Arabian Gulf).

. . . The country ranks second only to Kuwait as having the greatest proved reserves of crude oil.

. . . Aramco ranks as the second largest crude oil producing organization in the world, next to the Kuwait Oil Company.

Of course, these honors belong to Saudi Arabia at large as well as to Aramco, and not merely to the two communities which symbolize certain aspects of the record year. ■

By means of structure drilling, geologists study the earth strata beneath the Rub' al-Khali desert.

KAMAAINAS (old-timers) tell malihinis (newcomers) that America's only islands-state is more than Honolulu and more than the Royal Hawaiian Hotel, leis and poi, surf-riding, sugar and pineapple. Of course, admits a kamaaina, when a Hawaiian talks about going to town, he means he is going to Honolulu, and the capital city on Oahu is the first place in Hawaii that most malihinis visit.

The Royal Hawaiian Hotel still dominates the beach at Waikiki. It is hard to ignore, for it is so huge that one iconoclastic guest even employed his small British car to motor down the long hallways to his room in a remote wing. Leis still have an importance in Hawaiian life which is as real as the tropical flowers that go into them, and poi remains a dietary staple, although it is more likely to come from a can or bag bought in a supermarket than to be ground at home. There is also no denying that men do ride the long curl of the surf and that sugar and pineapple are the main industries.

Hawaii is still all these things, and it is a summery life beneath the banyan and the monkey-pod. It is the land where in ten years a garden is old with lavish vegetation and if untended becomes a tropical forest within 25 years. Kamaainas point out that Hawaii is much more. It is a hub of international transportation, a defense bastion, a significant mid-Pacific melting pot and a land with a fascinating history. After he has sunned himself on the beach at Waikiki and seen the sights of Honolulu, the malihini does well to quit the busy tourist spots and explore this fiftieth state, this tropical American commonwealth.

Such a trip might begin on Hawaii, biggest of the islands. Roads cut through green walls of sugar cane to towering Mauna Loa where the lava pit simmers and smokes as ominous proof that the islands were built up from the ocean floor by volcanic action. Mauna Loa erupts some 30 times a century, shaking the mid-Pacific with its thunderous earthquakes and spewing its lava down through the forests and the cane fields to the fishing villages on the beach. Neighboring Mauna Kea, the giant of all volcanoes, reaches two and a half miles into the azure sky to make Hawaii the highest island in the world. Winter never comes to the languorous land at its base, and summer never touches its snowy top.

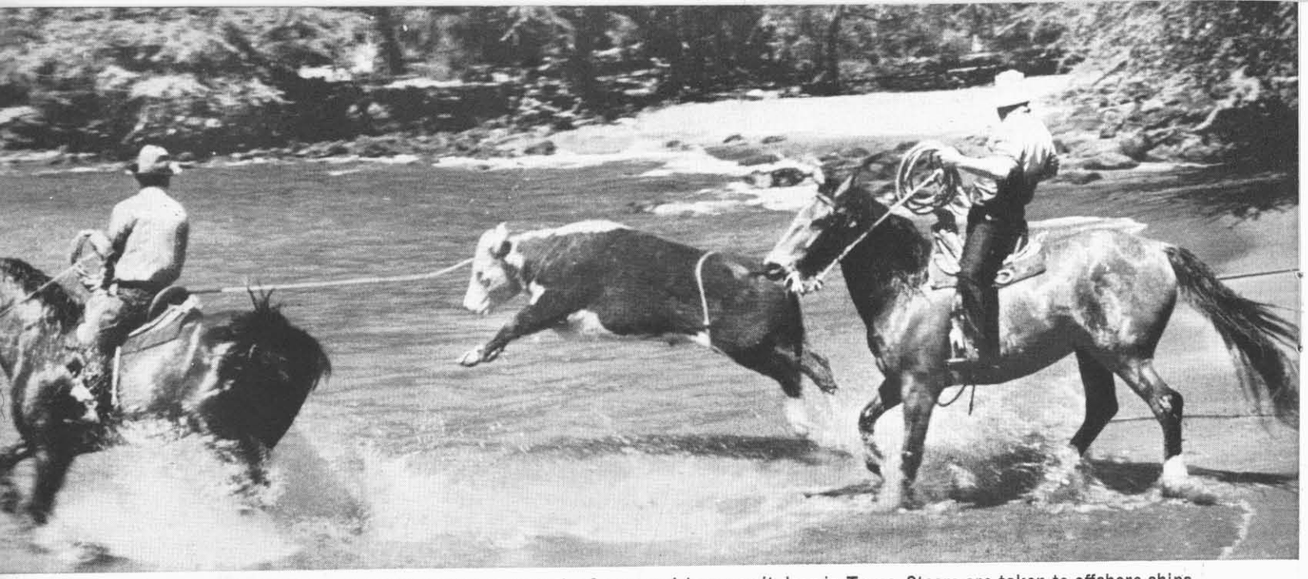
The first adventurous Polynesians to reach the islands came ashore on the big island at about the time the barbarians were sacking Rome. They named it Hawaii, meaning homeland. By the time Columbus discovered America, the last of the Polynesians had arrived. Probably Japanese and certainly Spanish ships reached the islands before the celebrated English navigator Captain James Cook, but he is generally credited with discovering them in 1778. He also first went ashore on Hawaii where the hospitable Polynesians made a god of him. Visitors can still see the spot where Cook was worshipped in an idyllic temple. Dramatically close by is the place where Hawaiians later killed their "god" in a fracas over a boat stolen from his ship.

Hawaii has many other reminders of the past, too. The wild cattle which roam the interior are descendents of stock released on the island by the early British explorer,

Diamond Head mountain, world-wide symbol for Hawaii, towers 1,800 feet above the bathers and outriggers at Waikiki Beach.

That youngster of the Union, Hawaii, is presenting some mighty convincing evidence that she may also be

FAIREST OF THE 50



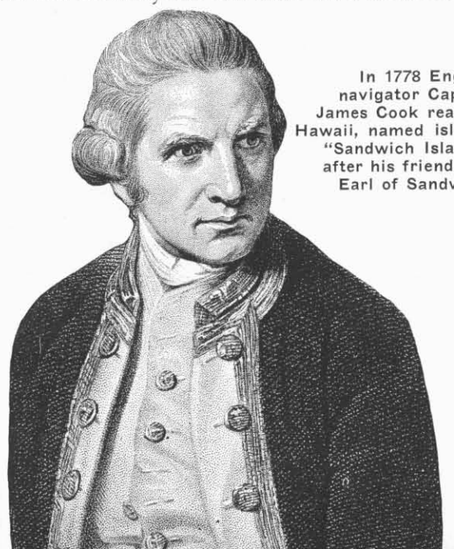
Roping steers in Hawaii requires the same teamwork of man and horse as it does in Texas. Steers are taken to offshore ships.

FAIREST OF THE 50

Vancouver. When botanist David Douglas – after whom the Douglas fir was named – visited Hawaii, he hiked to the summit of Mauna Loa to see the fire pit. On the way down he fell into a trap dug by Hawaiians to capture a wild bull. The trap had already served its purpose, and Douglas was mortally injured by the bull.

John Parker, who deserted an English vessel during the War of 1812, had a happier experience with the wild cattle. He married a Polynesian girl and fled into the interior, where he grew vegetables for the whalers who shortly afterwards began putting into the drowsy town of Hilo for supplies. Over the years he domesticated cattle until he had the nucleus of a herd, which has since grown to be one of the largest in the United States. The Parker Ranch on Hawaii contains 260,000 acres, which make it second in size only to the King Ranch in Texas. Cowboys of Japanese, Polynesian and Caucasian ancestry tuck tropical flowers in their sombreros and ride the Hawaiian range.

On the grounds of the public library in Hilo there is a huge boulder. This is the Naha stone. In the old days it was said that the youth who could lift it would become ruler of the island. One day in the late 1700's a young man tested his strength and, to the astonishment of the crowd, easily lifted the stone. His name was Kamehameha, and in the decades that followed he and his army made the ancient legend come true. Throughout the islands are battlegrounds where this mid-Pacific Napoleon defeated his enemies. Most dramatic of these is the Nuuanu Pali, a precipice rising 1,500 feet above the Oahu plain. There Kamehameha's determined forces hurled Oahu's defenders over the cliff.



In 1778 English navigator Captain James Cook reached Hawaii, named islands "Sandwich Islands" after his friend, the Earl of Sandwich.

More poignant is the site on Hawaii where in November, 1790 a chief marching with his men to attack Kamehameha met an even more dreadful adversary. The main army paused to rest on the crumbling lava slopes of Mauna Loa. The volcano awoke with a shattering roar. When the terrified rear guard came running up to the bivouac, they found the chief and all his men dead. They were scattered about in positions that resembled life, but all had perished in some mysterious fashion, perhaps by poison gas or concussion. Even today when the wind blows the volcanic ash aside, visitors can see the foot prints and toe marks of this lost army.

Kamehameha was the first of four kings who ruled the united islands. They chased away Russian and Spanish marauders and traded bark cloth and dried fish for cotton goods with British and American ships. They welcomed U.S. missionaries, who not only converted the people to Christianity but produced books in the Hawaiian language, founded schools and helped establish a constitution.

There are many mementos in the islands of these early days, such as the only royal palace in the United States. Iolani Palace with its broad stone galleries was built in Honolulu by King Kalakaua and is the center of the new state's government. Probably the most intriguing reminders of the past and best seen from the air are what seem to be giant slides down the volcanic peaks. This is precisely what they are, for Hawaiian royalty maintained slides as much as a mile long. Slopes were covered with pili grass and candlenut oil so that the princes could climb aboard their 11-foot toboggans and go streaking down the slides.

In a few museums there are magnificent cloaks of yellow feathers once worn by the kings. These cloaks explain why the OO bird no longer screams from the treetops. The OO was a blackbird with a single yellow feather in each wing. Hawaiians hunted them to their doom so that they could clothe their rulers in yellow.

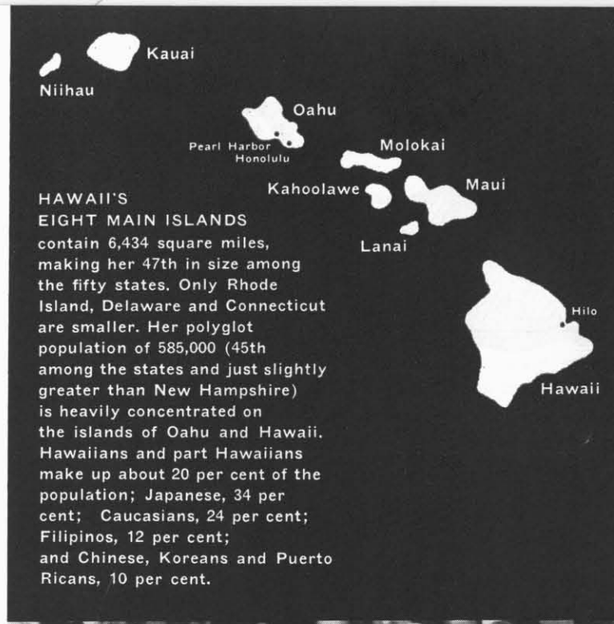
In 1893 the monarchy gave way to a republic, and in July 1898 the Hawaiians' petition to be annexed to the United States was approved by the U. S. Congress. Hawaii joined Texas as the only two independent nations to become a part of the American union. No sooner did Hawaii become American territory than her legislature began a long struggle for the full rights of statehood. Forty-eight statehood bills were introduced in the U. S. Congress until finally in 1959 statehood was approved by both houses and signed by President Eisenhower.

America's newest state entered the union with a booming economy. Sugar, pineapples, bumper crops of tourists, defense spending and some 550 manufacturing companies yearly put better than one billion dollars into the pockets of its close to 585,000 inhabitants. Its eight populated islands are tied together by jet-prop plane service. In early days it took a boat 10 days to beat to windward 200 miles from Honolulu to Hilo, but it is now a few minutes' flight. San Francisco, some 2,100 nautical miles northeast, is only four and a half hours by jet. Tokyo, Sydney and Manila are at the end of other airlanes leading from Honolulu. Fourteen major steamship lines dock regularly within sight of the famed Aloha Tower on the city's waterfront. This same strategic geographic position makes Hawaii America's greatest military bastion in the Pacific.

The people of Hawaii have come to it from all over the Pacific basin and beyond. Chinese, Japanese, Filipinos, Polynesians, Koreans, Puerto Ricans, Indians and Caucasians – they all have blended into a common way of life which makes the most of sunshine and beaches. Hawaiians may enjoy the same TV programs and movies as their fellow citizens on the mainland. They may play the same hit tunes, read the same books and magazines, but their way is different. It is as colorful as the brilliant-hued aloha shirts worn by the men.

There is a Polynesian quality to the tradewind, to the tropical foliage, to the uncommon blue of sky and sea. This is true even on Oahu, to say nothing of remote islands where taro still grows, fish nets dry in the sun and outrigger canoes are drawn up on the beach. May 1, which is Lei Day, sees even traffic cops and truck drivers wearing flowers. The hula dance persists–commercially in Honolulu and in a purer form on the outlying rural islands. Hawaiians still wrap a whole pig in ti leaves and steam it to mouth-watering succulence in pits.

On Maui with its serene valleys recalling yesterday, on the pineapple island of Lanai, on Molokai with its progressive leper county founded long ago by selfless Father Damien, among the waterfalls and gardens of Kauai, on Niihau where pure-bred Polynesians still speak their native tongue and have little contact with the outside world, on huge Hawaii and busy Oahu, the Hawaiian people are together building their new state's future. ■



HAWAII'S EIGHT MAIN ISLANDS contain 6,434 square miles, making her 47th in size among the fifty states. Only Rhode Island, Delaware and Connecticut are smaller. Her polyglot population of 585,000 (45th among the states and just slightly greater than New Hampshire) is heavily concentrated on the islands of Oahu and Hawaii. Hawaiians and part Hawaiians make up about 20 per cent of the population; Japanese, 34 per cent; Caucasians, 24 per cent; Filipinos, 12 per cent; and Chinese, Koreans and Puerto Ricans, 10 per cent.

The night before the Revolution

The same darkness that cloaked British troops hid patriot horsemen who raced to warn the Minutemen

OUTSIDE the door of Boston's Old North Church, three men hid from a full moon's cold light, their whispers lost in the wind that rolled off Boston Bay. Suddenly the three shadowy figures parted. One man, Robert Newman, slipped into the church, while another stood guard. The third man, a 40-year-old silversmith named Paul Revere, disappeared into the darkness of the cobblestone road. It was 10 P.M., April 18, 1775.

At about the same time Revere was getting into a skiff, Newman was arriving in the church belfry. Lighting a lantern, he hung it in an archway that served as a window. Then he lit and hung a second lantern. As Revere set out across the bay, Newman's two lanterns gleamed their message to another group of men across the bay in a section of Boston known as Charleston. The message, as pre-arranged, was clear to the watchers: "One if by land; two if by sea!"

Newman had completed his end of the plan. He had warned Captain William Conant and his Minutemen that a troop of British regulars was on its way to Concord. The anxious watchers already knew that the troop's mission was to confiscate all powder and arms that the troublesome colonists had hidden in Concord – arms that might be used in further rebellious acts. The two lanterns in the Old North Church belfry told Captain Conant even more: the soldiers were crossing directly to the mainland by boat, which was a shorter route to Concord than marching south over the Neck and then west to Concord. With the Minutemen warned, it was up to Revere to carry out his end of the plan.

With muffled oars, Revere's skiff glided silently under the bristling guns of the British man-of-war *Somerset*. His orders were to cross the bay to Charleston and dash twelve miles to Lexington, where he was to warn revolution leaders Sam Adams and John Hancock. Then he was to race another six miles to alert the Concord Minutemen.

At Conant's house in Charleston Revere mounted a horse owned by fellow patriot James Larkin. Artists have turned this obscure animal into a huge, fiery charger, either coal black or pure white in color. More likely it was one of the Narragansett Pacer breed, famous in New England at the time. Usually dun-colored, small, and very fast, the Pacer had a large store of endurance. For this night's journey, Revere's horse would need those qualities. At 11 P.M. Revere swung into the saddle, spurred his horse and galloped off.

This was not his first such ride. Revere was deeply involved in the revolutionary movement that was sweeping Britain's American colonies. He had been one of those who, disguised as Indians, dumped English tea into Boston Harbor, and many times he had "ridden express" for the Committee of Safety – at least twice going as far as Philadelphia. Only four months before, he galloped through snow and ice to Portsmouth to warn of redcoat reinforcements for Fort William and Mary. Now the King's troops were marching again, and he had been picked by the Committee of Safety to spread the alarm. Actually, Revere was not the only rider out that night. The Committee was taking no chances. A young man named Billy Dawes had also been sent to warn the revolutionaries, but he was to take a different, longer route.

After galloping down the moonlit road for about two miles, the constantly wary Revere suddenly spotted trouble. Two horsemen waited under a tree some distance ahead. One of them started toward him while the other rider blocked the road farther on. Revere, who knew that British patrols were out with orders to arrest all suspicious riders, reined in his horse, wheeled about and plunged into the woods beside the road. Thoroughly familiar with all the surrounding country, Revere hoped to lose his pursuers in the tangled, hilly wood and emerge on Mystic Road. There, he could turn west toward Lexington again. Crashing after him came the two riders. No shots were fired, and for long minutes only the plunging of the horses' hooves broke the chill April air. When Revere's mount burst from among the trees and stretched its legs again in a full gallop, no sound followed. Revere had lost the patrol.

At the little village of Medford, Revere clattered up to the house of the local captain of Minutemen and breathlessly told his news. After that, he pulled up noisily at almost every house along the road, bellowed until a light went on and a head poked out a window, and shouted "The Regulars are out!" Then he galloped on. From some of these houses, other riders fanned out over the countryside to rouse, in Longfellow's phrase, "every Middlesex village and farm."

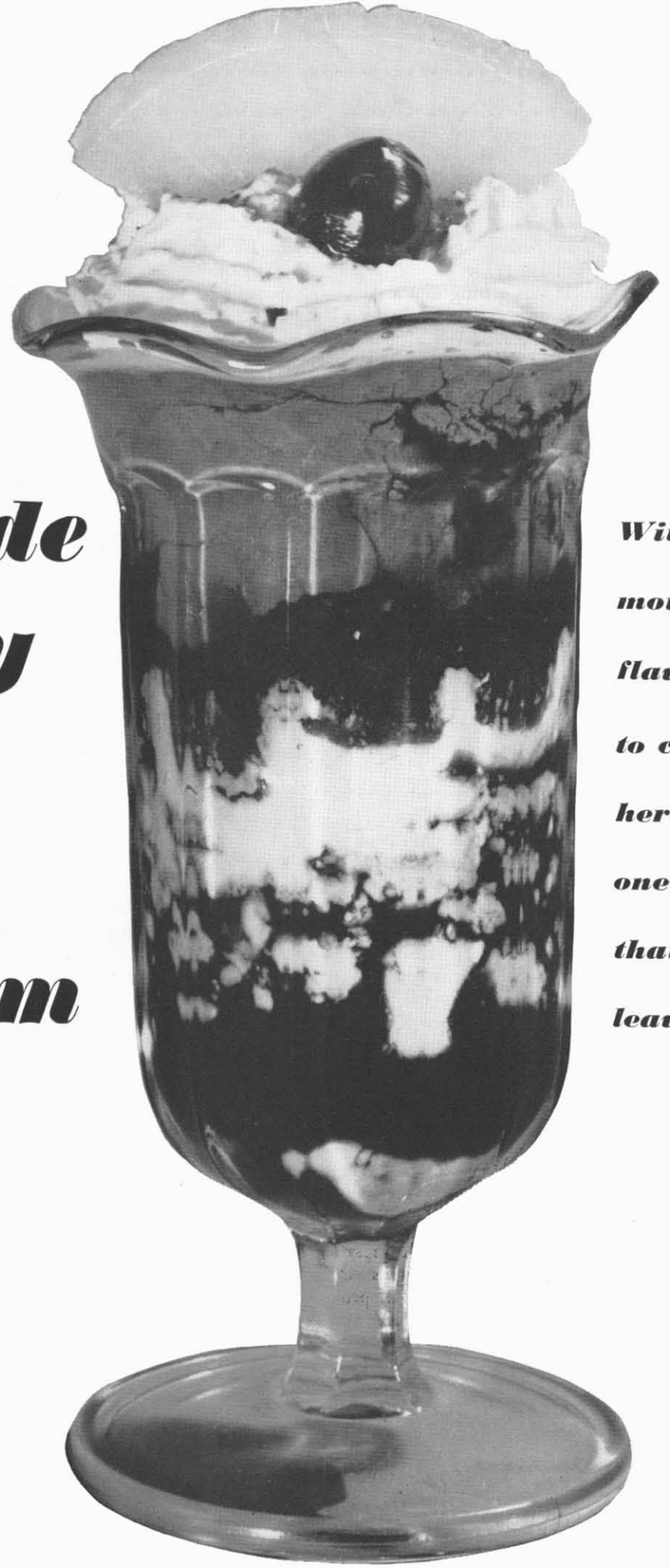
At midnight, Revere reached the Clark house at Lexington, where Adams and Hancock were staying. The two patriots had been alerted previously by Revere to the possibility of a troop movement. Now it was a fact, and they hurriedly packed important documents. Revere delayed awhile to help. When he was about to leave, Billy Dawes rushed in. Together they remounted and set off in the direction of Concord.

Until Longfellow wrote his poem "Paul Revere's Ride," in 1860, Revere's stirring feat was remembered only in Boston and then somewhat vaguely. But, although Longfellow helped to make Revere a national hero, the venerable poet took many liberties with the facts. The last stanza ("It was two by the village clock when he came to the bridge in Concord town . . .") is fiction. Revere never made it to Concord that night.

After leaving Lexington, Revere and Dawes picked up another rider, Dr. Sam Prescott, a Concord resident who was returning home from an evening spent courting a Lexington girl. Prescott, also a revolutionary, sped on with Revere and Dawes.

Then, some two miles beyond Lexington, another British patrol materialized from the shadows, halted the riders and arrested them. Dr. Prescott escaped by jumping his horse over a stone wall and was able to deliver the news to Concord. Revere and Dawes were held in custody for an hour or so and then released – but not before a British trooper had "confiscated" Revere's horse. Presumably the gallant little animal that had carried Revere ended his days in the service of the King. But the King's days in America were already numbered. ■

Inside story of ice cream



With 200 mouthwatering flavors to choose from, here's one frozen treat that leaves no one cold

SOME 325 years ago Charles I of England gave a state banquet. Charles, sometimes a vain and pompous man, was proud of his kitchen. At the end of a sumptuous dinner a unique dessert — ice cream — made its appearance on the banquet table. Charles dug into it with obvious relish. Taking their cue from the King, the guests sampled this strange combination of milk and ice. The Lord Lieutenant of Ireland looked up from his empty dish and nodded his approval to the Marquis of Montrose, who in turn spoke to the Earl of Argyle about the new dessert. Dukes, ministers and ladies of the court all agreed that the King's dessert was a smashing success. Charles beamed, and after his guests departed, he hastily summoned his French cook, commanded him to keep the recipe a royal secret and sealed the bargain by granting the cook a handsome yearly pension.

It proved a poor investment. By the time Charles was beheaded by his political enemies in 1649, the secret was out and every nobleman in England was setting his own table with ice cream.

Today, ice cream is no longer the dish reserved for kings and noblemen. It is enjoyed by nearly everyone in almost every part of the world and comes very close perhaps to being a universal dessert.

In the United States, it is the favorite dessert. Americans last year consumed a record 800 million gallons, more than all other countries combined and an average of about 18 quarts per person. Some 50 million people eat it every day. Where once it came in three flavors only — vanilla, chocolate and strawberry — it now comes in 200 flavors, mixed with soda, topped with nuts and syrup, frozen on a stick, perched on a cone, served in a cup or as a sandwich.

Although King Charles' cook may have hastened the introduction of ice cream to America by so freely divulging the recipe, he cannot be credited as its inventor. Like many other foods, today's ice cream is less a discovery than a process of evolution which began with the chilling of wines and other beverages in Biblical times.

Alexander the Great, in the fourth century B.C., insisted that his drinks be cooled with packed snow. Nero, the Roman Emperor who ruled in the first century A.D., used to send teams of slaves to the mountains for snow, then mixed it with fruit juices, pulp and honey to make a kind of flavored snowball. In 1295, Italian adventurer Marco Polo returned to Venice from the Orient with a recipe for making water ices, apparently known in Asia for thousands of years.

To the Italians goes the credit for presenting fruit and cream ices in solid form. Historians believe the first to develop them was Florentine architect Bernardo Buontalenti, in about 1570. Doctors at first condemned those frozen desserts as harmful to health but changed their minds when they discovered how refreshing they were on hot summer days. By the turn of the century, the vogue for cream ices had spread throughout Italy.

Though the appearance of ice cream at King Charles' banquet in England got into the history books first, French cooks had learned the recipe years earlier from migrant Italian chefs. The first specific reference to ice cream in France, however, does not appear until 1670 in the account of a court dinner given by Louis XIV. Guests were served what "looked like a freshly laid egg, colored like those at Easter, sitting in a silver gilt cup. But before the company had time to recover from their surprise at such a novelty for dessert, they discovered that the supposed eggs were a delicious sweetmeat, cold and compact as marble."

By then, ice cream was also on sale in Paris at confectionery shops run by Neapolitans and Sicilians. At the start of the eighteenth century, it was known to most sections of Europe and was being sold in all seasons.

The first evidence that ice cream had reached America comes from a letter written in 1700 by a guest of Maryland's Governor Bladen. It notes that ". . . we had a dessert no less Curious; among the Rareties of which it was

Nineteenth-century French gentlemen take their ice cream from glass cups; baked cones were not invented until 1904.

Compos'd, was some fine Ice Cream which, with the Strawberries and Milk, eat most Deliciously."

Mrs. Alexander Hamilton, wife of America's first Secretary of the Treasury, served it to George Washington in 1789 at her home in New York. He obviously enjoyed it, for he spent $200 on ice cream during the next summer. Four years later, an item in Washington's expense ledger indicates he bought a "cream machine for ice" so his staff could make ice cream whenever necessary. Historians say Washington also kept two "pewter ice cream pots" on hand at his home in Mt. Vernon.

Other founders of our nation depended upon ice cream to lighten the burdens of state and war. General Anthony Wayne once described a dinner he and his officers enjoyed at Greenville, Ohio after defeating the Indians at the Battle of Fallen Timbers near Toledo in 1794. Wayne said, ". . . and to cap the jubilation, dishes of ice cream, a dainty

which the army had not seen since it left the East."

Dolly Madison, wife of the fourth President, was the first to serve ice cream at a White House reception. It was described as "a large shining dome of pink ice cream." White House servants had to beat it by hand and shake it up and down in a pan of salt and ice.

Ice cream had become a popular treat for the carriage trade by 1840, but it remained beyond the means of average Americans because it was so difficult and expensive to make. Then, in 1846, a woman, Nancy Johnson, took some of the work out of making ice cream by inventing the hand-cranked freezer.

Even so, anyone who grew up in a family where mom made her own ice cream remembers what a chore it was. Ice first had to be crushed in a burlap bag with a mallet or broad side of an ax. The can of ice cream mix was then emptied into a larger wooden tub or bucket, packed with a mixture of ice or snow and salt, and covered. Next came what seemed like interminable cranking of the freezer handle until the liquid mix solidified. Only the reward—liberal portions of ice cream — made this worthwhile.

Although commercial plants stopped using this kind of freezer in 1890, many rural families yearning for a dish of homemade ice cream rely on it still. For those with less ambition and nostalgia, however, ice cream can be made far more simply by freezing the mix — store-bought or made as any cookbook suggests — in the refrigerator.

Father of the ice cream industry was a Baltimore milk dealer, Jacob Fussell. During the summer of 1851, he found that he had more cream and milk than he could sell and began making ice cream to use up the surplus. His low prices put ice cream within everyone's reach and created such a demand for it that Fussell soon was able to open plants in Washington, Boston and New York. Even so, he and his competitors could turn out only a few thousand gallons each year. By 1890, pioneers had introduced ice cream to the West, and U.S. production had jumped to more than a million gallons a year.

With the advent of electricity and mechanical refrigeration, the manufacture of ice cream was made easier and faster. Today it is mass-produced in some 20,000 wholesale and retail plants around the country with still greater ease. An ice cream mix is put in one end of a "continuous process freezer" — invented in 1926 by Clarence Vogt — and seconds later shoots out the other end as semi-frozen ice cream.

Ironically, most of the forms in which we now enjoy ice cream were hit upon by chance rather than design. The ice cream soda is one example. Its origin is credited to Robert Green, a concessioner who was exhibiting a soda fountain at the Franklin Institute Exposition in Philadelphia, October 1874.

At that time, sodas were made with syrup, carbonated water and ordinary sweet cream. Green was making such a soda to demonstrate how the fountain worked when he ran out of sweet cream. He substituted some hastily-purchased vanilla ice cream, and the first ice cream soda was born. Customers mobbed his concession until the exposition closed.

The ice cream sundae has been on the American scene since the late 1890's, when most historians say it first appeared in Evanston, Illinois. Pious city fathers there, resenting the dissipating influence of the soda fountain, passed an ordinance forbidding the sale of ice cream sodas on Sunday. Some ingenious confectioners and drugstore operators, however, got around the law by serving ice cream with syrup — but without the soda.

This soda-less soda, called the Sunday soda, became so popular that orders for "Sundays" began to cross the counters on other days of the week as well. When the town fathers objected to a dish christened after the Sabbath, the spelling was changed to "sundae." Innovators have since added nuts, fruit, whipped cream and cherries until today a deluxe sundae can cost several dollars and satisfy the hunger of two average eaters.

As much an American institution as the soda and sundae is the ice cream cone. The first one appeared in 1904 at the St. Louis World's Fair. There, Ernest Hamwi of Damascus baked crisp, wafer-like pastry on a flat waffle iron and served it with sugar and other sweets. One day the ice cream booth nearby ran out of dishes. Hamwi came quickly to the rescue by rolling one of his thin waffles into the shape of a cornucopia. As it cooled it hardened, and the vendor put ice cream in it. The idea caught on, and within two years the cornucopia had become known simply as a "cone."

The Eskimo pie — a bar of ice cream dipped in chocolate — was dreamed up in 1921 by a man named Nelson in Waukon, Iowa. A year later, Harry Burt of Youngstown, Ohio was experimenting with chocolate coverings of his own when his daughter remarked that the rectangular slabs were too messy to handle. Burt's 21-year-old son at that moment spied some of his dad's candy lollipops nearby — then called Good Humor suckers — and suggested "handles" for the ice cream bars. It worked. When the patent for this ice cream-on-a-stick was delayed, young Burt reportedly took a gallon can of ice cream suckers to Washington and won the approval of officials by letting them sample the product.

Although the method of ice cream manufacture and the form in which it appears have changed in the last half-century, the basic recipe has not. Today, the mix of cream, milk and milk solids — products of some 23-million dairy cows each year — is blended with sweetening, eggs and a stabilizer such as gelatin to prevent the formation of ice crystals. The resulting mix is then pasteurized, homogenized, cooled and finally frozen with fruits, nuts or flavoring.

Vanilla is still the favorite flavor — in the U.S. sales exceed all other flavors combined. Chocolate is second and strawberry third, followed by a blend of vanilla and chocolate fudge, cherry vanilla, butter pecan, peach, maple nut and coffee.

In recent years, America's enthusiasm for ice cream has spilled over to create a demand for other frozen desserts. Newest on the list is soft ice cream. It has the same basic ingredients as ice cream, but the balance is slightly different. The freezing process is skipped in making soft ice cream, and the product is dispensed directly to customers from large machines.

Some 20,000 soft ice cream stands have sprung up across the country since World War II. They boast at least 36 flavors, served in 60 different ways. Many people confuse soft ice cream with the custards they remember at carnivals and beaches. They look alike, but custards have a good deal more egg content.

A familiar scene on the Atlantic seaboard at the turn of this century were the colorful pushcarts where vendors scraped shavings from a cake of ice into a paper cup and then poured on the customer's favorite syrup from a bottle that looked like those on a barber's tonic shelf. Though not directly related to the development of ice cream, the pushcarts undoubtedly played an important role in creating the taste for something cold, flavored and sweet.

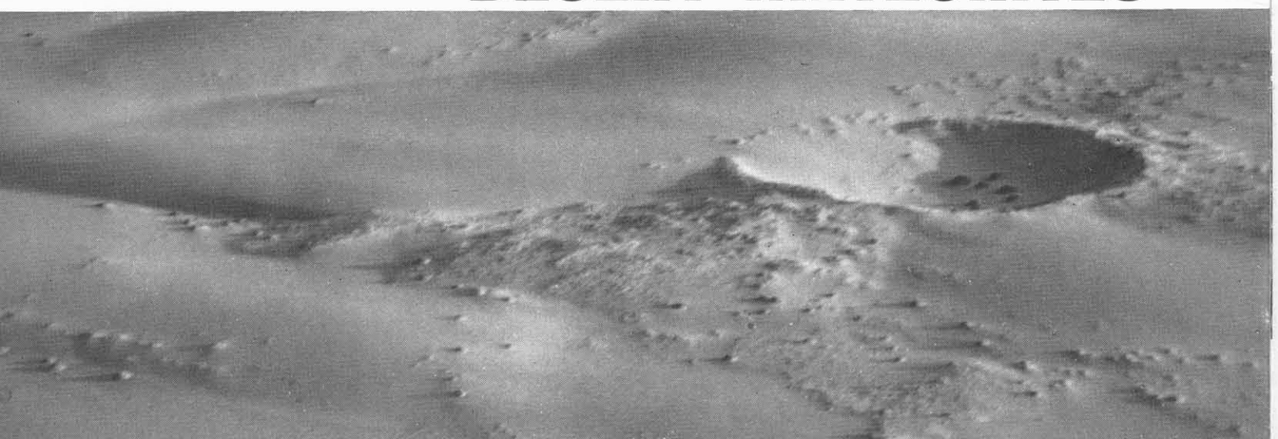
Ice cream and American social life have always been closely linked, but not for the reason mentioned by Ralph Waldo Emerson more than a century ago. "We dare not trust our wit for making our house pleasant to our friend," he observed, "and so we buy ice cream." Closer to reality, perhaps, is the fact that everyone buys ice cream because everyone likes ice cream. ■

Before modern refrigeration, mixing and freezing ice cream by hand was a hard chore but one that was worth the effort.

With its ornate marble fountain and wicker-bottom chairs, the old-fashioned ice cream parlor was a favorite gathering-place.

He probably could eat all three, but two are for friends.

DESERT METEORITES



Desert lore calls the Wabar crater a "buried city," but the crater was gouged out of the Rub' al-Khali at an unknown time by a huge meteorite.

Aramco scientists have found objects from outer space scattered in the vastness of the Rub' al-Khali

IMAGINE yourself standing on the broken crater rim where, in Bedouin lore, the endless shifting sands of the Rub' al-Khali cover the fire-blackened ruins of the legendary city of Wabar. It is a clear night in the immense marches of the great Arabian desert, the mysterious Empty Quarter. The stars wink, crystallize and close.

It is a place touched with awe. Standing there you might scan the vast sky and feel very keenly the implications and excitement of space flight. Your senses might leap to capture some human and reasonable notion of the environment of outer space and its effect upon a flying object.

But would you think to look underfoot? Would it cross your mind to search the sands of Wabar for a clue to space flight? Probably not. And yet, by the light of day you would find buried fragments of meteorites, the only known objects that have hurtled through outer space and come to rest on earth. The meteorite crater at Wabar, long known to the Bedouin of the Empty Quarter and first mapped by H. St. John Philby in 1932, turns the questing mind to ancient times and points the scientific researcher to the future.

The meteorite fragments discovered by Philby at Wabar (near al-Hadidah) are not the only such space objects to be found in the Rub' al-Khali. Nor were they the first to be discovered on the surface of the vast Arabian sub-continent.

A nineteenth-century discovery did precede Philby's al-Hadidah meteorite discovery by almost ninety years. Two masses of meteoric iron weighing 131 and 137 pounds were found in 1863 in the Najd, the mountainous area of east central Saudi Arabia. A "grey bronzite-chondrite" meteorite which fell into the desert in the Hijaz, the western coastal section of Saudi Arabia, was reported in a French scientific journal as having struck the earth on a spring night in 1910. Then in January, 1931 an English explorer, Bertram Thomas, picked up a meteorite fragment from the sands at al-Buh, in the Sawahib dunes of the central Rub' al-Khali.

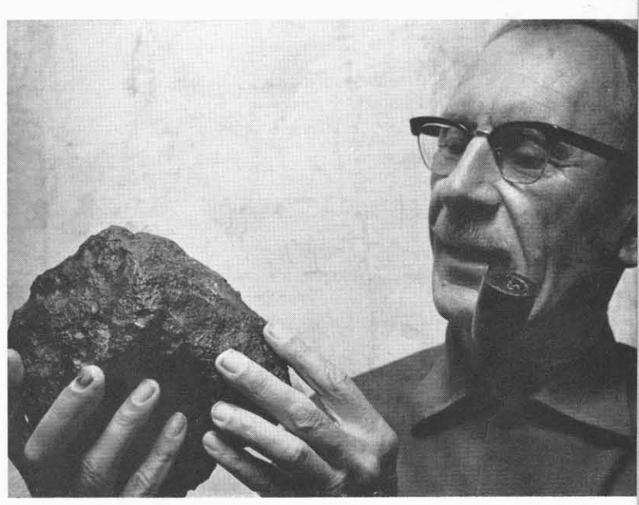
In recent years, the once-remote expanse of the Rub' al-Khali (the name means, literally, the Empty Quarter, a vague and poetic designation of undetermined origin) has been surveyed and mapped by exploration parties of the Arabian American Oil Company. Aramco geologists have made a number of interesting additions to the inventory of Rub' al-Khali meteorites since 1952.

Donald August Holm, an Aramco senior geologist and devoted student of the geomorphology (the changing surface) of the Empty Quarter, recently undertook to survey the specimens of exotic rocks brought into Dhahran, Aramco headquarters, from geological field parties in the past decade. Holm is preparing a scientific paper on the meteorites of the Rub' al-Khali in response to the increasing inquiries that have come to Aramco from scientists who may help pave the way to interstellar flight by way of a second look underfoot.

According to Holm, "There are at least ten localities in the Rub' al-Khali where meteoric materials have been found. Of these, six were found by Aramco personnel, one by Bertram Thomas and three by Philby."

Philby, a well-known British explorer and author, reached the al-Hadidah craters in 1932. He had reason to believe that he might discover the lost ruins of Wabar. But he was destined to disappointment. He wrote:

"And now I was about to draw the veil from the mysteries on which I had pondered so long with all the devotion of a pilgrim . . . I reached the summit and in that moment fathomed the legend of Wabar. . . a city destroyed by fire from heaven for the sins of its king . . . This may indeed be Wabar, of which the Bedouin speak, but it is the work of God, not man."



Don Holm, Aramco senior geologist, studies a stone meteorite found in the Rub' al-Khali by an Aramco exploration party.

Philby at first assumed that the several craters he found at al-Hadidah were of volcanic origin. He then mapped the area indicating the positions, contours and depths of two craters and suggested the positions of several others which had been covered over by sand. (Today only one crater rim remains above the sweep of the sand and, according to Holm, it will disappear beneath the dunes in another decade.) Philby then deduced correctly that he

had discovered meteorite craters and not volcanic craters. Such a find, Holm points out, "is still quite rare in nature."

None of the newer locations, as Holm notes, have yielded any craters. This disappearing al-Hadidah (Wabar) crater is the only evidence left in the great desert of the force and heat generated by the fall of a meteorite.

How recent was the meteorite fall in the Rub' al-Khali? No one can yet be certain, Holm says. Did the fragments fall in a single shower? Not enough data to give a firm answer, according to Holm.

The reluctance of the scientist to speculate doesn't burden the rich trove of oral desert lore handed on by the nomadic Bedouin tribes who have frequented the Rub' al-Khali for generations. One of the most enticing images of desert mystery dangled before explorers by Bedouin guides has been the enduring report of a piece of iron "as big as a camel." No one has ever found this huge meteorite. But not long ago a visitor to a Bedouin tent asked his desert host if he had ever heard tell of this mysterious object.

"Yes," the Bedouin said without pause.

"Have you seen it?" the visitor asked.

"No, but I know where it is."

"Where?"

"At the ruins of the castles of Wabar," the Bedouin replied.

"Can you find Wabar?"

"No, that is buried too."

One by one the mysteries of the 230,000-square-mile Rub' al-Khali have given way to the searching eye of science. But the vast reaches of the world's largest desert still excite the fancy of men in quest of knowledge about the first "space ships" — the meteorites.

A Down-to-Earth Look at Meteors and Meteorites

During his early history, man looked upon "shooting stars" as omens of pestilence and death. More recently, however, the fiery bolts have been viewed with increasing favor, especially by scientists who covet them as the only outer-space material available for direct examination.

Accounts of meteors dot ancient literature. The word "meteor" is of Greek origin and was used to denote "things in the air." But it was not until the nineteenth century that the study of meteors and meteorites took a serious turn. (A meteorite is a meteor fallen to earth.) On November 13, 1833 the sky over North America fairly glowed with a shower of these celestial bodies estimated at 200,000 between dusk and dawn. The brilliance and duration of the aerial display piqued the curiosity of astronomers all over the world. One of the first facts they established is that meteors seem to rain on the earth at about the same time a comet sparkles briefly millions of miles out in space. (Comets are, in a sense, large meteors that maintain regular orbits, like those of the planets, around the sun.) Cross-checking meteor reports in ancient literature, the scientists found that the appearance of meteors and comets had regularly coincided. What their relationship is, is still open to speculation. It may be that meteors are the residue of comets, pulled into the earth's atmosphere when the comet, in its own orbit, speeds past. Or it may be that the comets themselves attract the meteors in outer space and carry them along on their journey toward the earth.

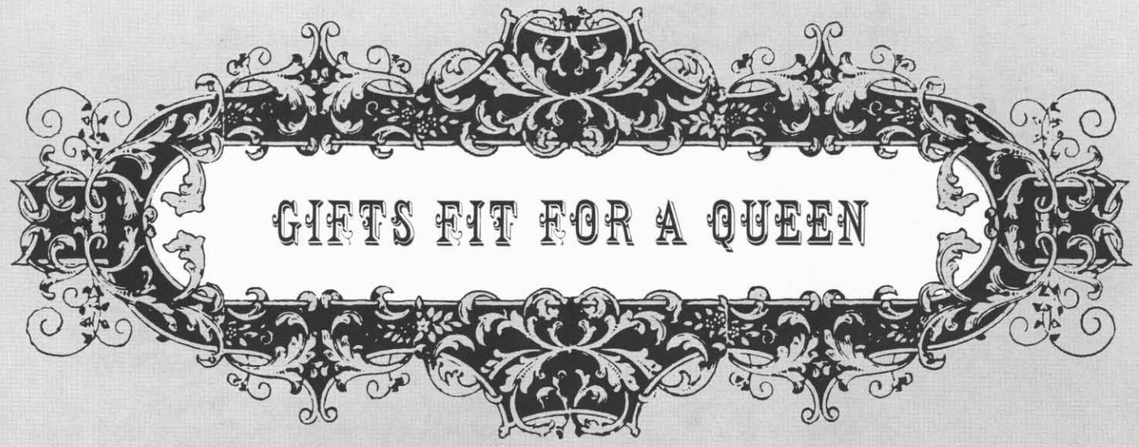
Whatever the means of their arrival, meteors arrive spectacularly. Plummeting through the vacuum of space, they enter the earth's blanket of air at acute angles to this planet. A slow meteor hits the relatively thick atmosphere at 25,000 miles per hour; fast bodies may be traveling at as much as 160,000 miles per hour. Fast or slow, their velocity is great enough to cause the intense friction that eventually vaporizes them. They literally burn up, causing the incandescent arc in the sky. Low-flying meteors hurtle past witnesses with the rumble of an avalanche and may fly to bits with a thunderous roar. It is small wonder that they left the ancients awestruck.

Scientists claim that at least 75,000,000 meteors enter the earth's atmosphere every day and that one or two may last long enough to reach ground-level. Some meteors no larger than one-tenth inch in diameter and weighing a fraction of a gram appear as huge fireballs because of their glow. These small meteors burn up long before they get close to the earth, but those as large as a football when they contact the atmosphere stand a chance of reaching the earth, although they're no bigger than peas when they hit.

Others of frightening bulk have invaded the earth's atmosphere and have retained enough size to considerably dent the earth's crust. One of these, weighing millions of tons, fell long ago in what is now Arizona. It gouged out a crater 600 feet deep and 4,000 feet across. The meteorite itself has never been found, but drilling samples indicate that it may have burrowed down some 1200 feet under the crater. The crater at Wabar, Saudi Arabia, 300 feet wide and 40 feet deep, and 13 large craters in central Australia also prove that the earth occasionally takes a heavyweight punch from a meteorite.

Meteorites recovered by scientists are either stone or metal. The largest stone meteorite, found on Long Island, New York, weighed 1,230 pounds. Metal meteorites, usually iron or nickel, tend to be larger. One weighing 79,000 pounds was found in Greenland, and another of mammoth size found in Africa in 1947 weighed 132,000 pounds!

Scientists have subjected these outer-space visitors to every conceivable test in an effort to learn more about the building blocks of other worlds. Perhaps the most significant result so far is that they have found no element in either stone or metal meteorites that is not also found on earth. And the newest — and perhaps most exciting — revelation came this year from an old meteorite. In May, 1864 a stone meteorite fell near Toulouse, France. French scientists examined it and announced that it had an unusual chemical composition, but almost a hundred years elapsed before better techniques of chemical and physical analyses were applied to it. The analyses yielded carbon compounds akin to those found only in plants and animals. Although some scientists warned against jumping to conclusions, those who examined the French meteorite said that their findings provided "the first physical evidence for the existence of forms of life beyond our planet." ■



What man does not consider his beloved a queen, for whom the best is just barely good enough?

DAZZLING gifts are as much a part of fairy lore and legends as castles, enchanted princesses, and princes riding to the rescue.

Everyone recalls the ship filled with gold figures which Trusty John guarded; the kettle hung with bells, which played "Ach! du lieber Augustin" and which gave anyone who looked inside a sniff of other people's dinners. From Grimm and Andersen to the Arabian Nights, no prince ever offered a princess an ordinary gift.

In real life, lovers' offerings are less magical, but through the centuries, a few men have bestowed gifts equaling those in legends.

In China, centuries ago, Emperor Genso doted on the capricious Yokiki. She leaned from her balcony to admire the gardens, and the emperor replaced the wooden railing with one of rare fragrant woods. Yokiki walked in the gardens and Genso ordered the stepping stones to be covered with lotus blossoms, so that her feet need never touch the ground. In time, however, Genso's subjects became displeased with their extravagant emperor and drove him and his favorite from the palace.

Mu'tamid, last of the Spanish-born Moorish kings, was blessed with a gentle and beautiful bride whose name was Rumakiyya. One March morning the king and queen watched snow falling on the hillsides from their palace at Cordova — a rare sight in that part of Spain. Rumakiyya thought the feathery whiteness so beautiful that she burst into tears, and begged to live where she would always see the snow.

Mu'tamid made her a promise — and then ordered the hillsides planted with almond trees. Every spring, when his wife looked out, she saw vistas of snowy hills made by the blossoming almonds.

In thirteenth-century Sweden, Doomsman Bengt made a gift to his lovely bride, Sigrid the Fair. It was not a miraculous gift, but so brave and gallant that the story is still told.

Sigrid was of lesser rank than her betrothed and the marriage was harshly opposed by Bengt's older brother, the powerful Earl Birger. One day a wedding present arrived from the Earl. It was a rich and lovely brocade dress made of the finest material. In the center-front of the dress, however, was a length of coarse, ugly homespun — so ordered by the Earl to make Sigrid conscious of her lowly state of birth. When Bengt saw the dress, he took it and had every stitch of the rough cloth covered with embroidery of pearls and precious stones, making a dazzling panel of jewels where the homespun had been. Sigrid wore the jeweled dress to receive her angry brother-in-law. The Earl was won by her grace and charm, and the brothers were reconciled.

In the Brazilian mountains, some 200 years ago, the richest and most important man in the diamond country was João Fernandes de Oliveira, the Crown diamond merchant. João lost his heart to a captivating slave girl, Chica da Silva. He bought her freedom and made her mistress of a great country house which was surrounded by gardens. But Chica longed to live by the water's edge. She wished to sail in a vessel and to feel the cool breeze on her face. So Senor de Oliveira built a lake in the highest town of Brazil, and he launched a small ship with a crew of ten to be always at Chica's disposal.

And there is the oft-told story of King Nebuchadnezzar's love for his young queen. So strong was his devotion to the Medean bride that he met her longing for the green hills of her former home with the creation of one of the Seven Wonders of the Ancient World — the Hanging Gardens of Babylon.

Not all extravagant gifts belong to the remote past. Heart Island, one of the Thousand Islands in the St. Lawrence River, was bought by hotel baron George Boldt for his wife. The island was carved into the shape of a heart and materials were brought from all over the world to construct an ornate and fanciful place not unlike those on the German Rhine which Boldt had seen as a child.

Have grand gestures, such as these, vanished? Who can say? Perhaps today, somewhere, a man is planning a gift for his lady which will rival those of lovers in fairy tales. ■

THE fragrance of spices blending with the pungent smell of oranges freshly arrived from Florida permeated the air of the otherwise musty smelling general store. Neat mounds of dried prunes, baskets of figs and glass-windowed boxes of cookies and crackers covered the main counter on either side of the great wheel of yellow cheese; and lining the rear shelf were glass crocks of chocolate cigars, licorice strings and colorful jelly beans to tempt the small fry.

Here was everything one could need or want in the year 1850. The storekeeper kept a full stock of widely-assorted goods — everything, except the bags to carry the goods in.

Some of his customers carried market baskets or crocheted bags with bright green and blue patterns. Others tried to stack their groceries so that they could be safely cradled and carried in their arms.

The harried storekeeper made a quick grab for several purchases which fell off the top of one housewife's armful. He missed, and dried prunes rolled all over the floor in front of the counter.

"George," the grocer called to his young helper in the rear room, "bring out some of those paper sacks!"

The grocer's boy was busy cutting big squares of wrapping paper and pasting them together with hastily mixed flour and water paste. He dried several of the makeshift bags over the wood stove and brought them to the counter.

The housewife looked at the bags and shook her head.

"Sorry," she said, "I used one of those paper things last time. Before I got home it fell apart and dumped my groceries on the road. I'll just take what I can carry."

The storekeeper retrieved the prunes, tucked the two fallen packages securely on top of the others which she carried, and shrugged his shoulders in resignation.

With mid-century business booming from the Atlantic Coast to the banks of the Mississippi, thousands of storekeepers shared this same problem. To twirl a penny's worth of candy into a paper cornucopia was one thing. To make a paper sack that would hold five pounds of potatoes or that would carry ten pounds of purchases was another.

The aggravating packaging problem set an idea working in the mind of a 35-year-old German-born schoolmaster named Francis Wolle. The idea crystallized one day in 1850, and Wolle quit his teaching post in Bethlehem, Pennsylvania to try his hand at inventing a machine to make paper bags. Two years later he was granted a patent and began turning out his first product.

But Wolle had only overcome the first hurdle. No one had ever tried to sell paper bags before, and most merchants remembered their own bitter experience with hand-produced bags. They placed little trust in Wolle's new-fangled product, with the result that the inventor nearly went bankrupt.

Years later Wolle recalled: "We found it all hard, uphill business in our efforts to overcome habits and prejudices of consumers in paper bags . . . difficulties were so great that in almost every instance commission or expenses amounted to more than profits — a good deal more."

Other early attempts to develop machines met with little more success than Wolle's first try. These first inventions were crude machines which were operated by a hand lever and a treadle that were synchronized to roll out and paste up the square-shaped and conical paper bags.

The problems encountered by pioneer bag-makers sound amusing today, but they must have been grim at the time. One pioneer "bag factory" received a complaint from a Beloit, Wisconsin firm to the effect that the paste made of flour and water did not hold and the bags kept coming apart at the seams. To offset this, the makers doubled the quantity of paste.

Then came another communique from Beloit: "Consignment of bags received, but can't report on quality of bags until spring. Every one is frozen solid!"

After tedious experimenting, it was discovered that starch would hold as an adhesive without freezing. To this day, starch is a key ingredient in the paste used for bag making.

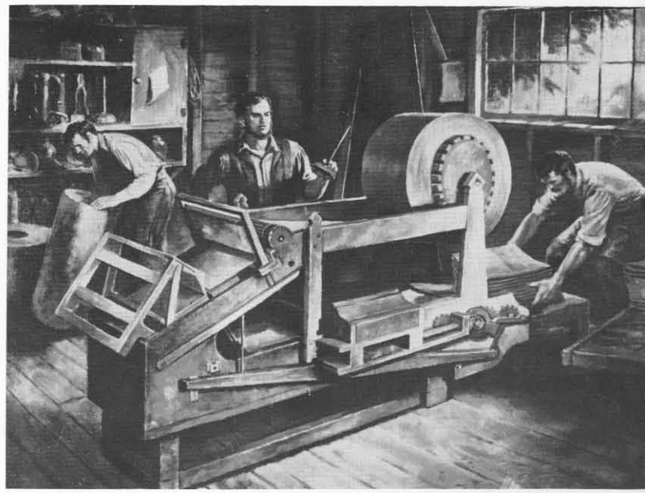
The paper bag industry began to hit its stride in 1869 when Wolle and a group of backers purchased the best features of various automatic bag-makers. The new machine formed bags from a roll of paper in continuous operation. A long paper tube with a single longitudinal seam was first formed by folding the paper around a long cylinder so that one edge of the paper overlapped the other. Paste was applied and the two paper edges were brought together to seal the seam. As the tubular paper moved off the cylinder, the small bag lengths were successively cut from the advancing end. One of the two extremities of the paper tube was closed, and a complete bag moved on to the dryer.

Having devised a bag that worked, Wolle and his colleagues launched an intensive sales drive, sending teams from city to city to demonstrate the product. When merchants realized that here was a bag that did not freeze or fall apart, their orders poured in. By the early 1870's, licensees using the Wolle Combine's machines in New York and New England alone were putting out a million bags a day. Bags were used everywhere to package everything from millinery to manure, until more than 70 billion of all shapes and sizes were coming from American plants each year. Bags became so common that people used them without thinking twice.

Contributing to Wolle's success in the '70's was the discovery of wood pulp destined for use in the manufacture

The bag, with its thousand-and-one practical uses, is equally versatile as an "expression-maker" in our language. Our title, for example, owes its ring of familiarity to its closeness to the expression "It's in the bag," referring to a "sure thing." Literally, the saying means that the point in question is as secure as game in a game-bag. No one likes to "be left holding the bag" because no one likes to be the sole loser while others profit. "Letting the cat out of the bag" is an embarrassing mistake, for when it's done, a secret has been inadvertently disclosed. To "bag" any game, from rabbits to elephants, means to kill or capture the animal. "Sack" likewise has loaned itself to usage beyond its original meaning. When an employee "gets the sack," he's been dismissed from his job. The expression comes from England where workmen once kept their tools in a sack. When they took a job, the tool sack was placed in the care of the boss, who returned it when the employment was over. Not as old as "getting the sack" is the expression "geting into the sack" or "hitting the sack." G.I.'s in World War II used it to describe going to bed, probably an allusion to the sleeping bags they all knew. In the South a bag is often called a "poke." It's always a good idea to avoid "buying a pig in a poke," for whoever acquires merchandise in that fashion, acquires it without checking its merits — or faults.

Flavor of fresh corn from the Middle West is preserved for corn-fanciers everywhere by ice and tough, multi-walled bags.



After Francis Wolle patented the first bag-making machine in 1852, he had trouble convincing others that bags were useful.