ARAMCO WORLD
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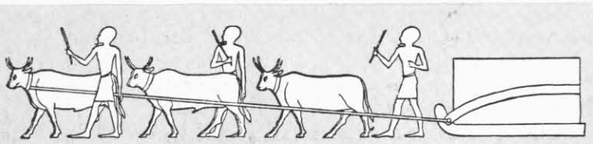


Painting from a temple built in Memphis about 1550 B.C. shows Phoenician workmen moving a large block of stone on a sledge.

THE EARLIEST ENGINEERS

the world would draw much of its technology of building.

A relief from 3,000 B.C. shows a Mesopotamian king, Ur-Nanshe of Lagash, delivering the first basket of bricks for some public work and is remindful of the ground-breaking ceremonies often conducted by political dignitaries today. In this same period, engineers on Crete were building imposing palaces, complete with ceramic drain pipes to carry water away from the baths, and a gigantic mile-long dam — the first of its scope in history — was being completed by kings of the Arabian Peninsula. The dam, said to have been started by a legendary sheikh, Luqman ibn-'Ad, furnished irrigation to a valley near Ma'rib, in the southwestern corner of the Arabian Peninsula, for a thousand years before it broke down.

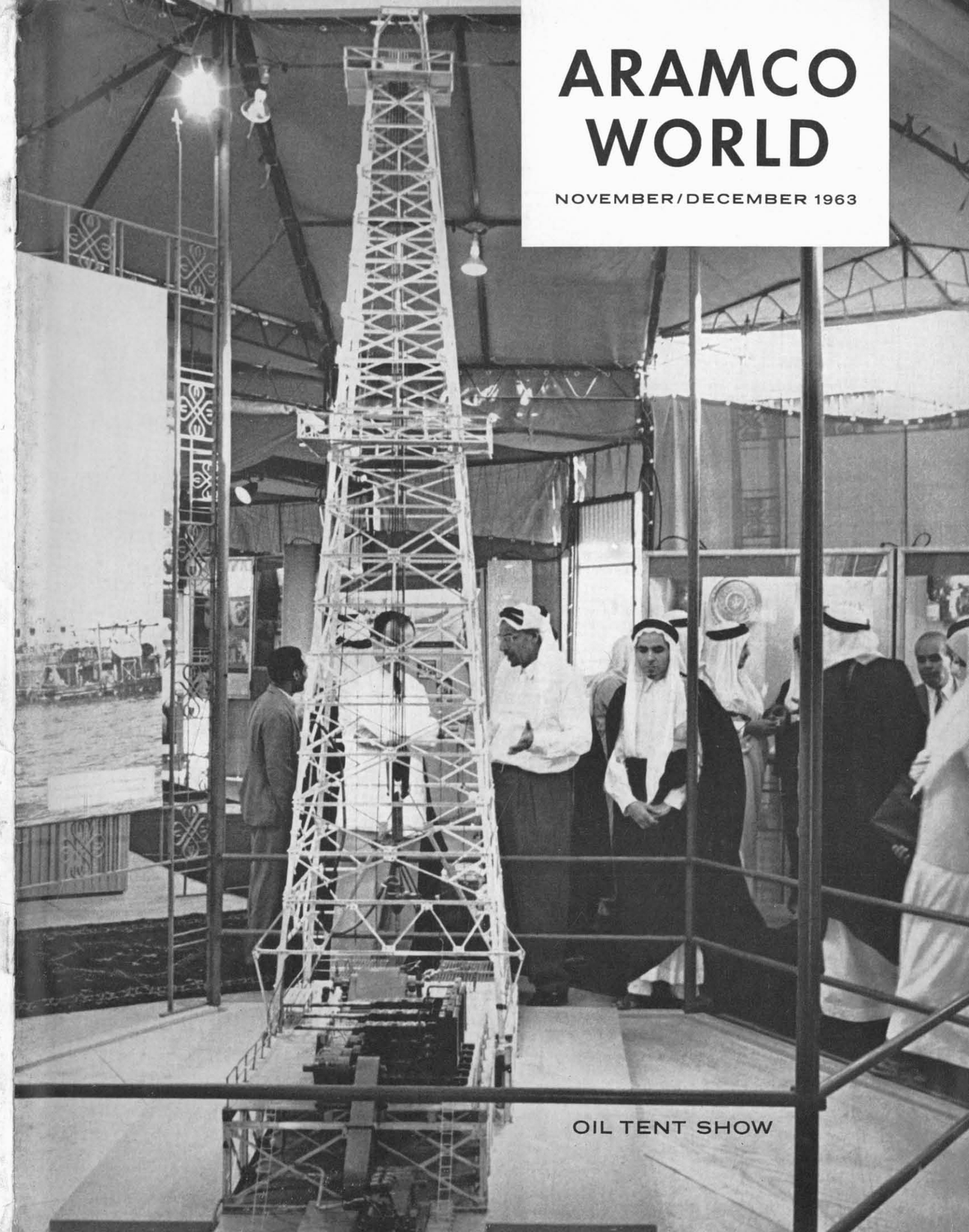
Other imposing accomplishments of early Arab engineers included the raising of 20-story granite and brick apartment houses and the digging of elaborate underground aqueducts called *qanât*, which brought water from foothills to dry plains. The first practical use of the windmill took place in the great age of the Middle East a thousand years ago. Prior to then, millwrights had exploited waterpower by floating barges on the Tigris on which they mounted mills of various kinds, driven by undershot wheels. Arab advances in fortification were numerous, and all were eventually copied by European kings. One of the simpler but most effective of these was the making of a fortress entrance in the shape of a dog-leg. He who would enter had to make a right-angled turn or two, and could not from the outer gateway see or shoot into the inner courtyard.

A Persian relief dating to 500 B.C. portrays King Darius sitting on a throne, the legs and rungs of which reveal that someone had already invented the lathe. In the same century, engineers in the Hittite capital of Hattusas built what might be called the first railroad. Along the city's paved processional way was a pair of grooves tooled to fit the wheels of sacred wagons. Legend had it that it would not do for a god's wagon to get stuck or his statue be jostled, as there was no telling what an angry god might not do!

The rebuilding of Babylon was ordered in 500 B.C. by King Nebuchadnezzar, and architects, designers and contractors from all over the known world were called in to take part. The finished capital featured neatly laid-out and ornately decorated avenues with names such as Shamash Street, Marduk Street, The Street on Which May No Enemy Ever Tread, etc.

The city's famous Hanging Gardens (actually a large garden atop a princely palace) was planted on a roof waterproofed by layers of asphalt and sheet lead. A windlass bar arrangement, involving buckets attached to a chain-work on a wheel, kept water flowing up to the roof night and day from a well in the basement of the building. Nebuchadnezzar's father, Nabopolassar, one of the best-trained builders of his day, had put a bridge across the Euphrates at Babylon which for centuries stood as one of the wonders of the world. Built when most bridges were flimsy affairs of tree trunks, reeds or inflated goatskins, Nabopolassar's marvel had streamlined piers of baked bricked and stone and a timber superstructure 390 feet long!

One of the secrets behind the success of these ancient bridges — as well as dams, pyramids, and public structures — was simply that the builders and their employers had no need of haste. A second secret was the inborn consistency of technology. Great men have built great empires, but these have declined. Tastes and styles constantly soar — and sink — in the arts, in philosophy, in politics. But through all history the technology of building has plodded ahead. While empires blossomed and fell, forms of government went through erratic cycles, science flared up and fizzled out, the engineers went ahead raising walls, edifices, paving, digging, tinkering, improving tools and then building better than ever. Though their names are mostly unknown, their accomplishments often outspanned the reigns of dozens of kings. Some of their structures still stand as testimony to their extraordinary craftsmanship. ■



ARAMCO WORLD
NOVEMBER/DECEMBER 1963

OIL TENT SHOW

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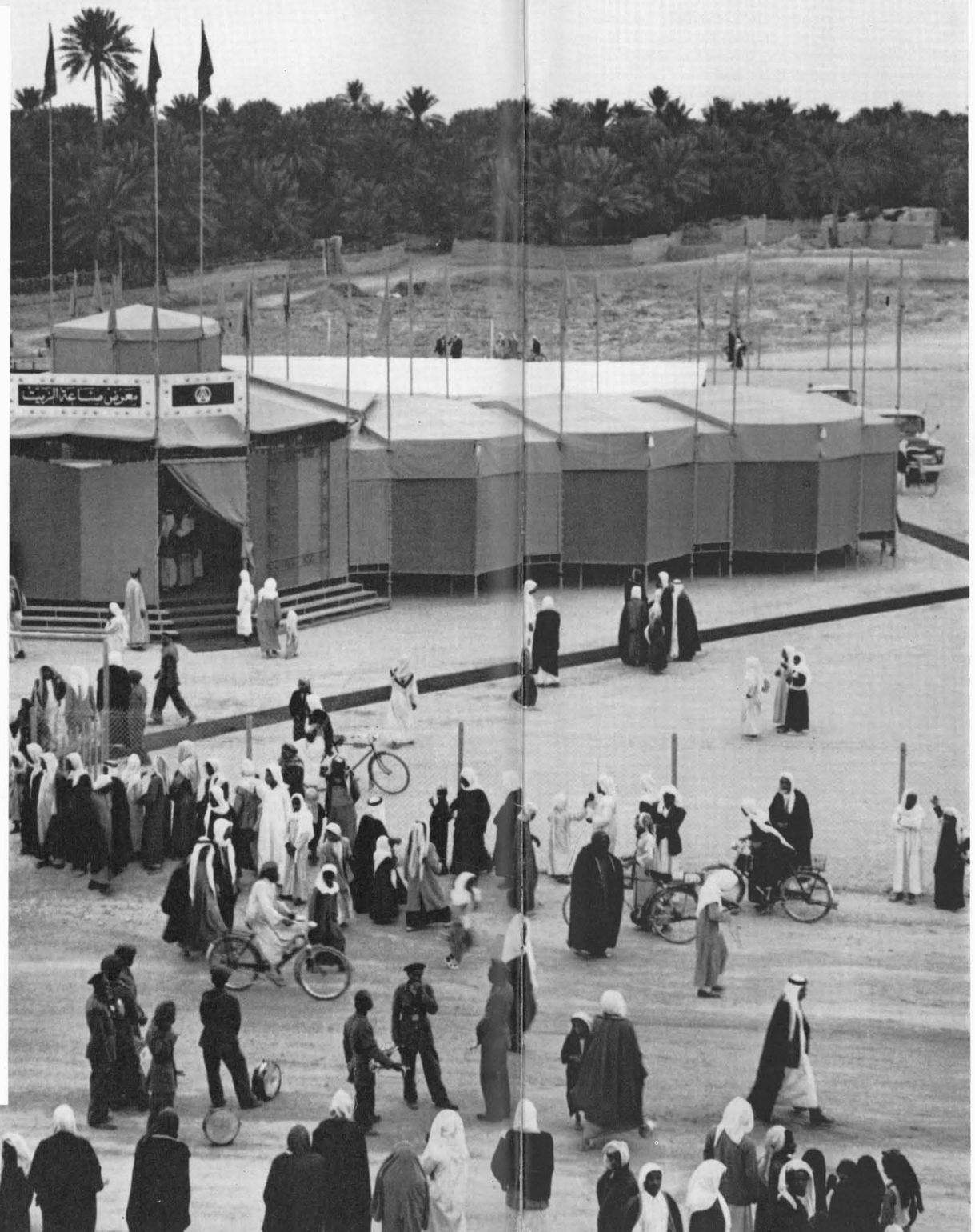


OIL SHOW

The people of Saudi Arabia are learning more about their nation's most important natural resource through Aramco's mobile oil show

ONE SUMMER AFTERNOON a year ago, ten red stake trucks drove along an asphalt highway on the 'Asir plateau in southwest Saudi Arabia. The caravan had left Abha, the capital of the 'Asir region, earlier in the day and had driven nearly 150 miles north. The air was relatively cool; the elevation was still over 3,000 feet, but it had been cooler back in Abha where the crest of the tall coastal range rises to 7,200 feet.

The trucks made good time. Each carried a cargo of odd-sized crates, all painted grey, all numbered. As they neared the town of Qal 'at Bisha, a highway junction, the trucks slowed down — luckily.

Ahead, a group of townspeople stood across the road. They signaled the lead truck to stop. The signal went back from driver to driver. The caravan halted. A spokesman for the town came forward. He knew what the trucks carried. He demanded, courteously, that the trucks turn off the road, put down their cargo, and that the oil industry "tent show" hidden away in the grey crates be put up immediately. The town, he said, had petitioned the Arabian American Oil Company (Aramco) to book the show into Qal 'at Bisha at a future date. However, rumors had come down the road from Abha where the show had just completed a four-week

Citizens of Hofuf, in the Eastern Province of Saudi Arabia, await the opening of the Aramco Mobile Exhibit.

At the entrance of Aramco Mobile Exhibit, huge globe with geographic identifications in Arabic helps depict oil's role in world economics.

OIL SHOW

stand. According to those who had seen it, it was great. The people of the Bisha area wanted to see it *now* – not next season, or the next.

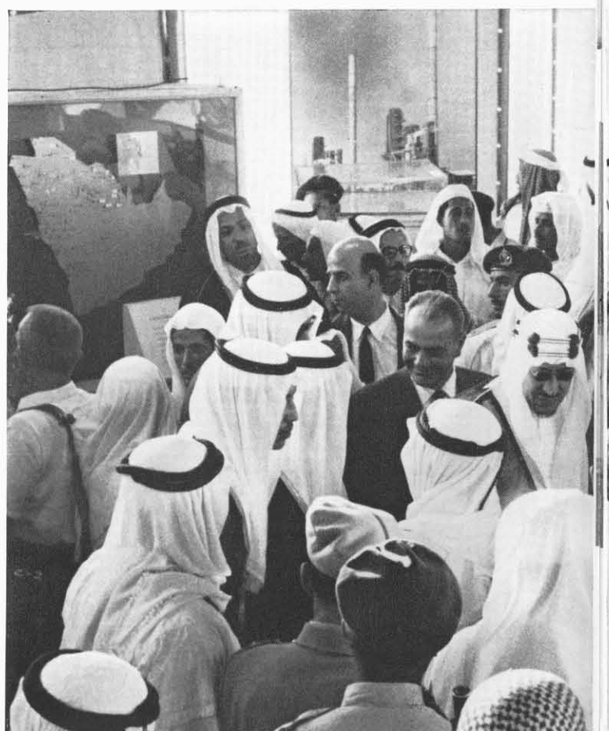
It was a flattering impasse, but Ahmed Lughod, the manager of the Aramco Mobile Exhibit at the time, and a tactful and persuasive man, explained that the show was scheduled to open in Tayif, the "summer capital" of Saudi Arabia, in a couple of days. Besides, he added, it would be a better show when it came back this way again. The trucks started up again and rolled on toward Tayif.

The enthusiasm of the Saudi Arab public for the Aramco Mobile Exhibit does not usually take so dramatic a turn. However, in the six years that it has been "on the road," the show has generated a broad and lively interest among government and local officials, educators, students and the general public. Attendance is nearing the one million mark – this includes "repeaters," people who come back to see the show more than once. They are in the majority. Not long ago in Hayil, one of the old and historic communities in Najd, an elderly man who had come to the tent show several times told Ali Ganadiely, the present manager, "To make three or four visits is like reading a book like this," and he held his palms several inches apart, one above the other, to indicate a work of considerable size and merit.

This desire to see the exhibit more than once is reflected in the mounting number of requests from the Amirs and the education officials of the areas visited to "please come back, every year if possible."

Also, the alert interest in the show from coast to coast in the Kingdom reveals the intense interest of the Saudi Arab public in the country's biggest industry, biggest employer, biggest taxpayer, the biggest source of national revenues. The Aramco exhibit is designed to help fill that interest – to inform Saudi Arabians about their major natural resource.

The exhibit, which occupies a three-tent pavilion covering 7,000 square feet, presents a comprehensive picture of the petroleum industry, a complex world enterprise once characterized as "this fascinating oil business" by a veteran observer. It educates, and through the adroit use of bemusing audio-visual techniques, as well as sophisticated showmanship, it also entertains. It tells its story clearly to both the educated and the uneducated by using handsome scale models, dramatic photo murals, animated maps and diagrams, earphones with question-and-answer messages, motion pictures, charts and graphs, pamphlets, and the personal touch of guided tours. The exhibit not only shows what the oil industry is in Saudi Arabia, and how it works, but also shows where it fits in the larger picture of world oil competition – and, even further, where world oil fits into international economics.



H.M. King Sa'ud of Saudi Arabia (center), escorted by Aramco Senior Vice President R. I. Brougham, inspects display cases when show visited Riyadh in September, 1960.

The eye of the Saudi Arab has been pleased. Wholehearted letters have praised the "charming scenes and elegant designs," "the complicated and excellent working models," the "beautiful arrangement, lighting, and elegance," and the general "good taste" of the exhibit. In turn, the mind has been enriched. Education officials, teachers, and students have given the exhibit their thoughtful endorsement:

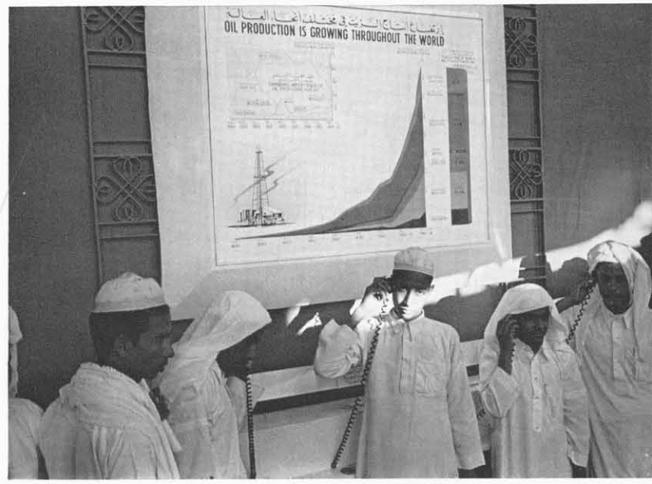
"We saw miracles, great projects and technical models that inspire us" . . . "it is a speaking picture that expresses the development of the oil industry in Saudi Arabia" . . . "Through this exhibition the young men and the intelligentsia of the country will gain knowledge of this important industry which is one of the pillars of world economy" . . . "a practical school where the people can learn much about the country's oil production" . . . "it provides a cultural and theoretical idea" (of world oil) . . . "We admired the tangible progress we saw and acquired very useful knowledge about the operations of the Arabian American Oil Company."

The high opinion the show enjoys has given rise to the world's best advertising, the word-of-mouth praise that goes from town to town, say from Abha to Qal 'at Bisha. As far as the people in the Bisha area were concerned, they had heard enough – they wanted to *see*. But even if they had added their numbers to the attendance total (which they will, in time) they could not have seen an aspect of the show that is hidden from all viewers—the back-stage details. These can be seen only in a low building in Dhahran, the interior of which might, appropriately, pass for a theater scenery loft in New York City. In Dhahran, once a year, the show is stripped down, rebuilt, repainted, rewired, edited, modernized – in short, transformed.

Out of their banged-up crates come the models: a working drilling rig, looking like a spider-web Erector set, its structure bent, its draw works out of kilter; the three-legged "AMDIP" (Aramco Marine Drilling Platform) that stands on the sea bottom and supports an offshore drilling rig on its deck, its tiny railings pushed in now and needing a general touch-up; a silver GOSP (gas-oil separator plant), a tiny replica of the big spheres seen out in the desert reaches; a twin-towered crude oil distillation unit with one tower leaning slightly and looking road-weary; a big tanker; a complete refinery; five types of Aramco Home Ownership Program homes; an employee cafeteria . . . one by one the dramatic scale-models of the oil industry in Saudi Arabia come out of their packing cases for a complete refurbishing.

New pictures may be added as new Aramco facilities are completed. New production figures and records are inserted into the charts as Saudi Arabia's output of crude oil continues to rise. A recent addition to the show is a handsome, new integrated map on which the entire Aramco network of facilities and oil fields can be lighted up by pressing buttons. New Aramco documentary motion pictures are shown to Mobile Exhibit visitors as soon as they are produced. And not long ago the last of the English-language panels disappeared from the show, making the end of an era in which it served to instruct American employees as well as the Saudi Arab public. The "tent show" idea first grew up in the Eastern Province oil communities after Aramco had participated in the Saudi Arabian Government's pavilions at four successive International Fairs in Syria.

Once refurbished and modernized, the Aramco exhibit is ready for "another opening, another show." It has already



Visitors to exhibit at Yanbu' al-Bahr listen to recorded talk on company operations. Exhibit guests who listen through all six banks of earphones obtain a comprehensive picture of Aramco and Saudi Arabia's oil industry.

OIL SHOW

traveled several thousand miles: twice to Jiddah, the cosmopolitan gateway to Mecca, clear across the country on the Red Sea; twice to Riyadh, the nation's capital; to Hayil on the southern margin of the Great Nafud, the vast north desert; to Buraidah in the heart of Najd, almost due west of Dhahran; to Tabuk in the northwest Hijaz, where the sand-burnished rails of the historic Damascus-Medina railroad can still be seen; to Yanbu' al-Bahr and Jaizan, ports on the Red Sea, the one above, the other below Jiddah; to Tayif in the mountains where the Amirs of the Hijaz summered for generations and where much government business is now conducted during the hot months of the year; and to Hofuf in the heart of the al-Hasa Oasis, and Dammam, the country's great Arabian Gulf port, both in the Eastern Province, the "oil country" of the Kingdom.

Besides the ten trucks it normally uses to get around the country, the show also requires the temporary use of a company DC-3 to transport 23 crates by air. The rest of the 83 crates go by truck. Because of the logistics involved, each road tour takes careful planning. And because the show is still such a new idea to many parts of the country, it requires that the manager be a combination impresario, diplomat, promotion man.

The present manager, Ali Ganadiely, only two years out of college, was groomed for the assignment in the Public Activities and Services Division of Aramco Public Relations. Fahmi Basrawi, the general supervisor of the division, is an old hand in dealing with distinguished visitors to Aramco facilities, guiding them on plant tours, dealing with educators, and other responsibilities requiring tact and diplomacy.

Ganadiely has to work well "ahead" of the show. He makes all the arrangements with the Amir of the area to be visited, selects and gets permission to use a central location, arranges for housing, and looks to matters of protocol and local custom. Before the exhibit opens he visits the education officials and all the schools in the area. He arranges a special schedule for school children to visit the show (usually the mornings are reserved for them), charters busses to pick them up from outlying districts, and if the journey will be a long one for the youngsters, he arranges to have a lunch prepared for them. Over 3,000 school children visited the oil show at Yanbu' al-Bahr, some from Mecca, about 80 miles distant.

Opening Day . . . for almost three weeks the community has watched the show grow into a handsome carnival of green and white striped tents. The four Saudi Arab attendants are on duty and waiting. An Aramco plane has arrived with a company delegation. Afternoon prayer has been completed. And now the ceremonies begin:

An honor guard of police escorts the Amir and his guests to the exhibit *majlis* (the traditional Arab receiving place). An Aramco executive (T. C. Barger, the company president recently addressed such a gathering in Arabic) makes a short speech of welcome to the Amir and the people of the area. Arab coffee is served to all and the chief Aramco delegate is introduced to the Amir, who then cuts the traditional green ribbon opening the show. As the impresario, Ali Ganadiely then conducts the Amir as the honored guest through the pavilion — and the show is on. Usually, there is a good bit of excitement in the air, and an opening-day crowd often numbers 5,000.

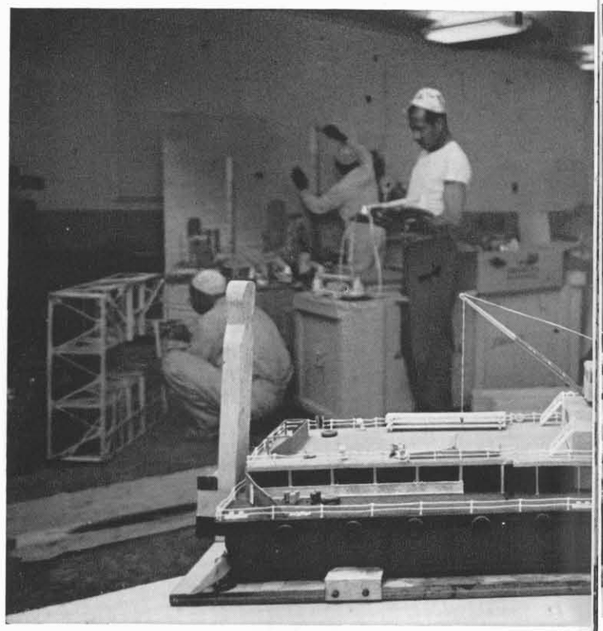
The Saudi attendant-guides have created an enormous amount of good will for the show. Their countrymen frequently comment with pride on their knowledge and their courtesy.

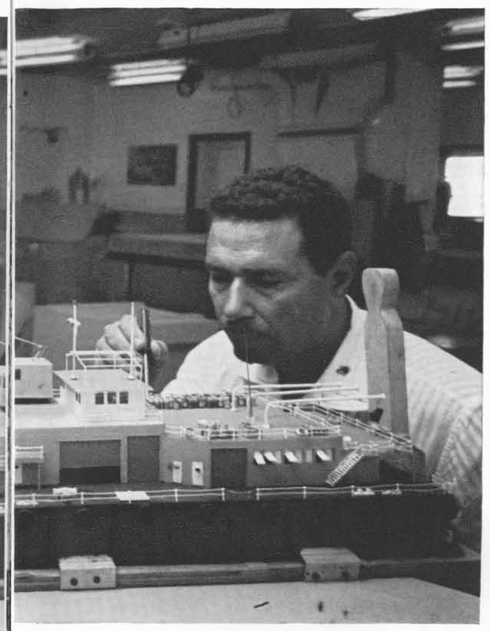
It is a rule of thumb in show business that you have to offer something new or the public soon loses interest. Will Aramco apply the rule, and will the people who stopped the trucks at Qal 'at Bisha *really* see a better show than the people at Abha saw?

"Of course!"

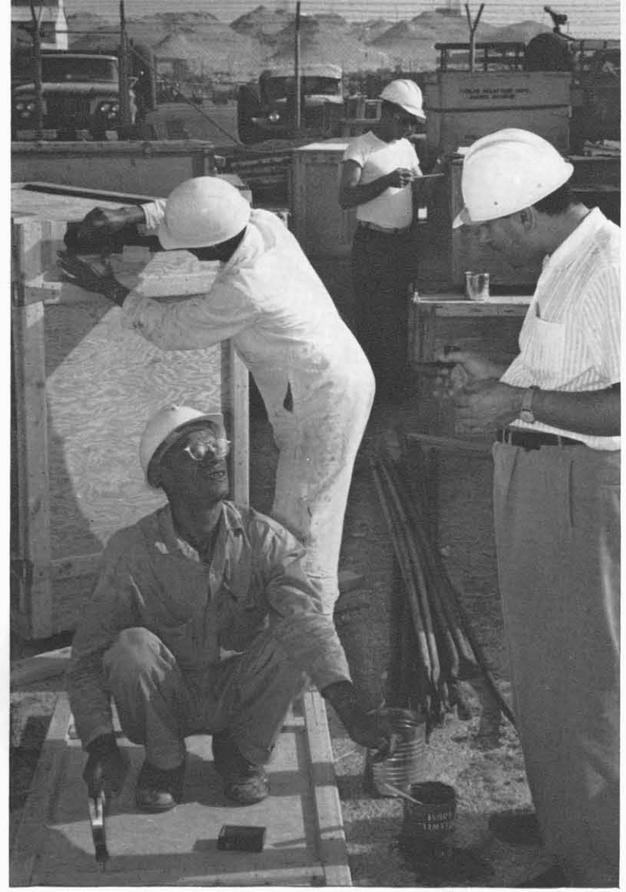
This prediction was made with full confidence last July by Ganadiely. The show had been stripped down for repair, and Ganadiely had just returned from a vacation in Europe where he had visited the World Oil Congress exhibit in Frankfurt, Germany. "What a show!" he said. "They had a working model of a drilling rig on which the drill stem actually went down into the hole and extra lengths of drill pipe were automatically added. You know, maybe next we could. . . ."

There's no business like the oil show business. ■



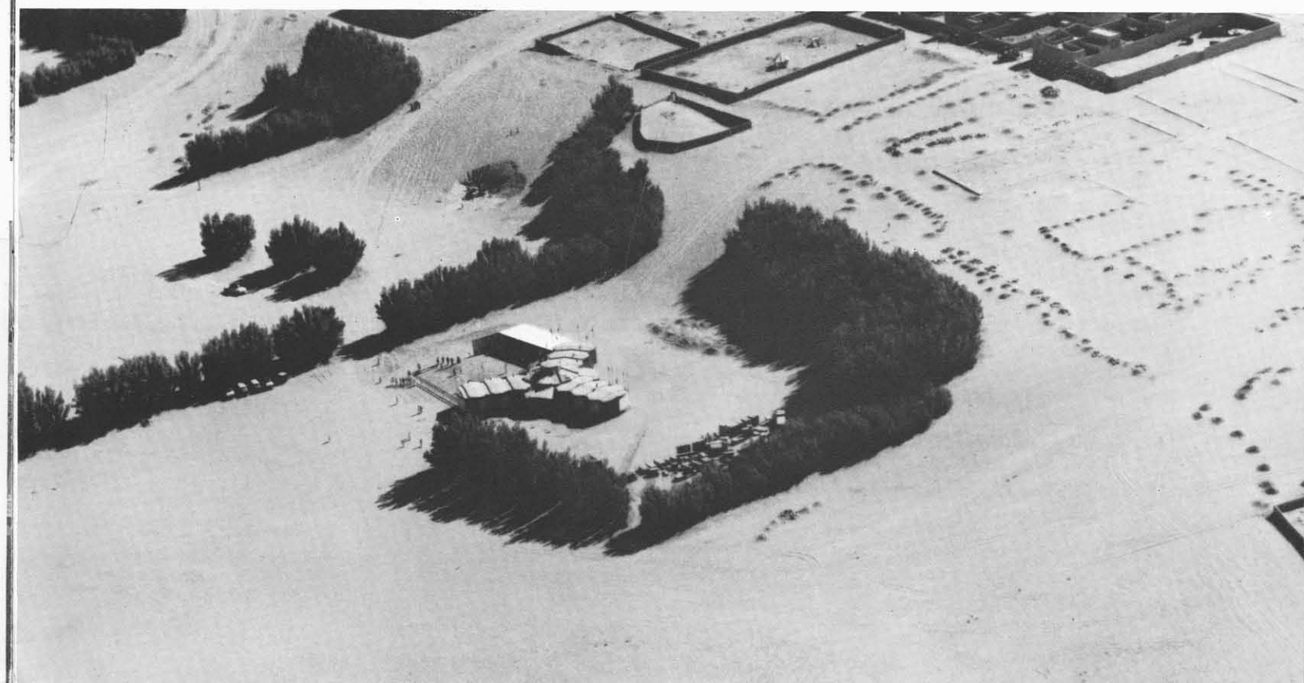


Show returns to Dhahran headquarters each summer for refit. Ahmed Yousef fixes model of drilling barge.

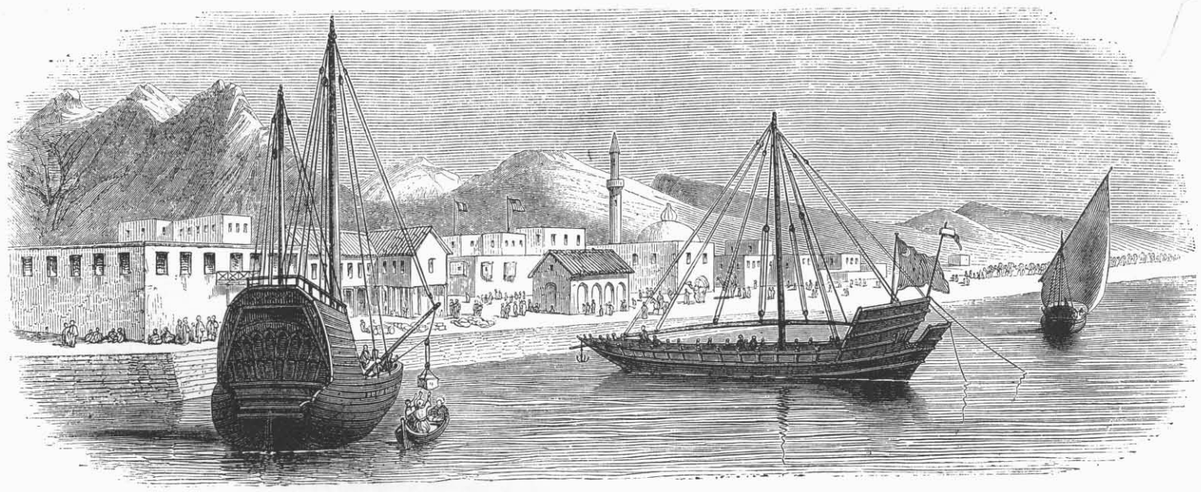


After each display is repaired for the next season, the entire Mobile Exhibit is crated for transfer to towns in Saudi Arabia.

Screen of trees protected tent pavilion from winds blowing off Najd plains when show appeared in Buraidah in north central Saudi Arabia in 1961.



Arabian Sea



All the treasures of the ancient world
were borne across the warm waters
that stretch from the Arabian Peninsula
to the shores of India

Old print depicts coastal town and trading ships on the southern shores of the Arabian Peninsula. Below, 55,000-ton oil tanker, Europe-bound, pushes through same waters.

". . . the narrow strip of rocky shore where we stood was strewn with the wreckage of a thousand gallant ships, while the bones of luckless mariners shone white in the sunshine, and we shuddered to think how soon our own would be added to the heap.

"All around, too, lay vast quantities of the costliest merchandise, and treasures were heaped in every cranny of the rocks . . ."

So Sindbad the Sailor described one of his many adventures on the Arabian Sea.

Modern navigation has made traveling on the monsoon-driven currents of the Arabian Sea less hazardous than in Sindbad's time, but the ancient trade routes along the coasts of Africa, Arabia, and India still hold the same promise of wealth and adventure which lured Sindbad to the sea.

The treasures today are oil, rubber, uranium—raw materials from two continents bordering the Arabian Sea. The ships may be 100,000-ton oil tankers or swift cargo vessels skimming between Mukalla and Bombay faster than Sindbad's wildest dreams. Yet these ships, supplying the industrial needs of a twentieth-century world, are merely continuing a tradition which goes back past Sindbad to the beginning of recorded history.

The Arabian Sea stretches away from the Indian Ocean north of an imaginary line drawn from Cape Comorin, at the southern tip of India, to Cape Guardafui, at the eastern end of the Horn of Africa. Africa, Arabia, Pakistan, and India enclose its warm salty waters in a sprawling shoreline formed like a great cup. The sea leaks over the cup through the Gulf of Aden, which connects the Arabian Sea with the Red Sea, and the Gulf of Oman, which links the sea with the Persian Gulf. At the broadest part of the sea, it is only about 1500 miles from the Arabian Peninsula shores to the Indian coast.

Since the beginning of civilization man has used the Arabian Sea as a trading route to the world's wealth. The first sea-trading route known to man passed through the sea. Shortly after 3000 B.C. ships raced along the coasts to southern Arabia and India, exchanging copper ore from Oman, teakwood from India, and incense from Arabia for wheat, cheese, and barley from northern kingdoms.

The earliest kingdoms of southwest Arabia probably traded by sea, perhaps as far back as the Minaean Kingdom, which dates from about 1200 B.C., and definitely in the Sabaean Kingdom, which existed from about 950 B.C.

As civilization pushed up toward Europe, trade routes linking Europe with the "fabled East" ran through the Persian Gulf and Arabia rather than the Red Sea. Ships landed at Arabian ports, and caravans, occasionally with thousands of camels, fanned out over Arabia heading north. The merchants of seacoast towns in Arabia grew so rich Greek and Roman historians observed that their doors, walls, and even the roofs of their houses were beautifully

inlaid with "ivory, gold, silver, and precious stones."

While civilization spread around the world, the Arabian Sea remained a center of commerce. Chinese vessels plied the sea so regularly that in the tenth century Chinese coins were used as currency as far north as the Persian Gulf ports.

Empires reached its shores and crumbled through the centuries. In the sixteenth century, the Portuguese took over the trade routes and built fortresses on the black onyx rocks overlooking the sea. But their empire also died, leaving their castles like medieval ghosts frozen on the shore.

Vessels using the sea usually sailed close to shore, tempting pirates of all eras. The pirates operated so successfully that early ships carried "cohorts of archers" for defense. The age of piracy ended in the nineteenth century on the Arabian Sea; their coral lairs and sunken ships were abandoned to the relentless sea.

After the Suez Canal opened in 1870, the Arabian Sea experienced another rush of commerce. Since then traffic on the sea has expanded so rapidly that some ports can no longer handle the deeply laden vessels. New shipping lines have been formed to meet the needs, and merchants predict new ports will open to them.

A steady stream of huge tank ships, designed for oil, now cuts past the desert shores of the Arabian Sea. Cargo vessels race at 18 knots on a tight schedule between Europe and the East. They carry rubber, jute, silk, wool, spices, sugar, grain, cotton, carpets, coffee, dates and dozens of other products. Air conditioned liners cruise past some of the warmest and driest seashores on earth (the temperature in some coastal areas hovers at 130° and rain falls only a few days a year).

This year, the sea is sharing in an unparalleled ocean study organized by the International Council of Scientific Unions to determine how the world's weather pattern is affected by the monsoons and to learn new geological facts about the Indian Ocean. Ships of 21 nations, including the United States and Russia, are participating in the study, which began in 1962 and will end in 1964.

The study also is developing the sea's commercial fishing potential. With United Nations help, Karachi recently established a new fish harbor which has increased the value of the annual catch from the Arabian Sea in the West Pakistan port by over $8 million in four years and jumped the earnings of the fishermen up to 400%.

While much remains to be explored and developed in the Arabian Sea, vast knowledge has been uncovered. The greater part of the Arabian Sea is deep, with the deep water reaching close to the bordering lands except in the northeast from Karachi to Bombay.

No islands exist over the sea's center, but the Maldive ridge stretches to the southeast for over 100 miles from north to south, the highest parts forming the Maldive and Laccadive Islands – great coral atolls rising from the blue water. The long plateau island of Socotra points out to the sea 160 miles east of the Horn of Africa. Southeast of Socotra is the submarine Carlsberg ridge, with water less than 1500 fathoms (9000 feet) deep above it, but suddenly dropping to over 2100 fathoms on either side. Mariners often use this ridge to divide the Arabian Sea from the main body of the Indian Ocean.

The regular half-yearly alternation of weather conditions and winds plays a more important role on the Arabian Sea and other northern areas of the Indian Ocean than in any other seas on earth.

From October to May the favorable tradewind, or northeast monsoon, blows across the sea and brings a strong southwesterly current which sends many Arabian dhows south with traditional date harvests. When the strong southwest monsoon blows from June to September, they sail home again to Arabia on the northern current. The southwest monsoon brings rain to all of India and can be so violent that it is dangerous to modern steamship traffic at times. Hurricanes may tear across the sea when the monsoons change, but tidal waves and natural upheavals are rare in the Arabian Sea.

The Arabian Sea has the saltiest surface water in the Indian Ocean. High salinity water flows out from the Red Sea along the bottom of the Strait of Bab el Mandeb. It sinks, mixes with the surrounding water, and spreads at great depths as far as Ceylon and southern Africa. Little fresh water dilutes the salty currents since few large rivers empty into the Arabian Sea – only the Indus, Narbadi, and Tapti rivers, all from India.

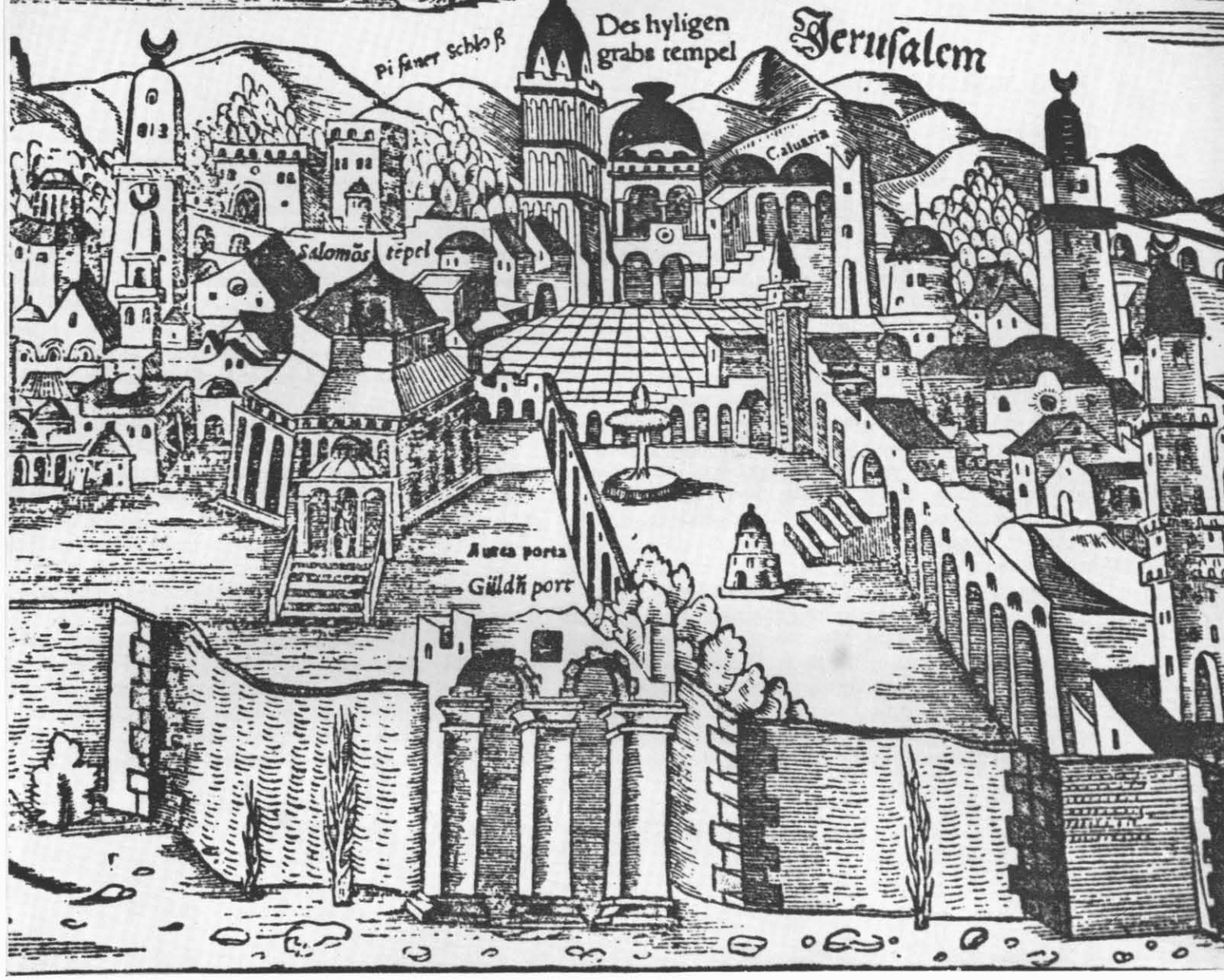
Surface water temperature remains higher than 68°F at all times and goes up to 86°F in the Red Sea and Persian Gulf. Swimmers tempted by the warm water could meet some inhospitable aquatic life: stingrays and sharks haunt the shallows, and poisonous sea snakes and schools of finback whales have menaced divers in the sea.

Not all of the sea's aquatic life terrifies humans. Flying fish spin over the water, and thousands of porpoises leap together like frantic ballet corps. Some of the world's best spiny lobsters bask in pools on the Kuria Muria Islands. Far out on the sea, huge sea turtles sun bathe on the surface, oblivious to the curiosity of human seafarers.

Along much of the coast, dark volcanic knolls plunge into the sea before a shimmering line of dunes. Houses cluster on the slopes in seacoast towns, one home built on the edge of the other, each roof serving as a terrace for the house above. A mosque minaret or an abandoned fortress towers above the whitewashed buildings.

The larger seaports of the Arabian coast carry on vigorous trade with the world. Cosmopolitan populations have been drawn to ports like Masqat and Mukalla from many countries. Muslim pilgrims arrive from Singapore, India, Pakistan, Indonesia, and the Philippine Islands on their way to Mecca by way of the Arabian Sea.

Daily activity on the docks reflects the evolving life on the Arabian Sea. The deep tankers and graceful dhows which sail into the harbors retain some of the flavor of old kingdoms on the Arabian Sea, of Sindbad the Sailor and merchants from antiquity sailing in search of wealth. But they are bringing twentieth-century prosperity to the people who carry on the traditions of an ancient sea. ■



Print made in sixteenth century by Sebastian Münster shows Jerusalem surrounded by wall. The Church of the Holy Sepulchre is at center.

A Church in Jordan

Artists ever have been fascinated by the changing face of Jerusalem's Church of the Holy Sepulchre

THERE ARE MANY PLACES of special interest to Christians in Jerusalem, including no less than nine churches and four convents. But the one building often uppermost in the minds of visitors to the Jordanian metropolis is the Church of the Holy Sepulchre. It rests on perhaps the holiest ground of Christendom.

Beneath the huge domes of this ancient church adorned with gifts of precious jewels, gold and silver, tradition says,

lies the site of Calvary and the place of the crucifixion. Here, too – under the same church's roofs – are the places of the burial and the resurrection.

Ironically, the church, first built in 326 A.D., owes its existence in part to an infamous Roman ruler who was violently anti-Christian. In 135 A.D., the Emperor Hadrian, then 16, was determined to crush the memory of Jesus by remaking Jersusalem into an entire pagan city. One of his acts was to have erected upon Calvary and Jesus' tomb a sprawling temple to Venus. His contemptuous deed, however, served to mark forevermore the sites he was intent on obliterating. Thus, two centuries later, when Empress Helena of Constantinople wanted to finance the building of a basilica over the sites, she had no trouble finding them.

Helena's structure was begun in the year 326 and was finished a decade later under the direction of her son, Constantine. Reports issued from time to time by church and other historians hint that during the excavation workmen found three crosses, a few nails and an inscription such as Pilate ordered to be placed on the cross of Jesus.

Crosses had long been used as gallows and were familiar to the Egyptians, Africans, Macedonians and Greeks centuries before the Romans used them. During Constantine's own rule, crucifixion was the official method of capital punishment. Whether his workmen found the cross of Jesus is something which will probably never be proved. But it is known that at a point during the building of the Jerusalem basilica Constantine suddenly abolished crucifixion and venerated the cross as a symbol on the coin of the realm.

Constantine's church, dedicated in 336, was a magnificent wooden and stone monument. The sepulchre itself had been tediously separated by excavation from the mass of surrounding rock, and the emperor had its walls lined with fine marble. The restored sepulchre was then surmounted by a gilded dome in the center of a rotunda. Lastly, the main structure, the church, was built around the rotunda.

In 614, the Persians under Chrosroes II conquered Jerusalem, and the city and much of Constantine's church were destroyed by fire. In 638, when Abu Bakr's successor, the second Caliph, Omar, entered Jerusalem, he helped clear with his own hands its accumulated refuse. On the site of Moriah, the sacred rock where today stands the splendid Dome of the Rock and Al-Aqsa Mosque, he ordered built a simple wooden mosque. A deeply pious man, Omar also encouraged the Christians living in the city to retain their faith and rebuild their shrines. Under Muslim rule, the church and the precious sites it covers have been preserved to this day.

In 1147, a fire started by lightning caused the main building to burn, but it was soon restored. In 1342, Rome awarded custody of the church to the Franciscan friars, a responsibility they still retain. The keys of The Church of the Holy Sepulchre, however, are traditonally kept in the custody of the Muslim Nuseibeh family. Because of the firmans of Mahmud II (1834) and Abdul Megid (1841), which laid down the principles of the status quo in the sacred places of the Holy Land, the properties, rights and privileges of the respective communions in the church have not appreciably changed.

Today, the church is open daily from 4 a.m. to 11:30 a.m., and from 12:30 p.m. to 7:30 p.m. Although scores of sightseers visit it between these hours every day, on religious holidays their numbers are greatly increased. Literally thousands of visitors will crowd into Jordan to annually commemorate various of the events, sad and joyful, in the life of Jesus.

Among the dates which specifically involve Jerusalem are: the week of His Triumphal Entry into Jerusalem, the week of the Last Supper, the Time of His Agony (in nearby Gethsemane), the day of His Arrest and Trial before Pilate, the hour of His Death and Burial, and finally the week of His Resurrection and Apparition.

The Church of the Holy Sepulchre lies within the Old City of Jerusalem – which in turn is situated in the center of the modern city. Surrounded by an impressive crenelated brown stone wall built in the sixteenth century by Suleiman the Magnificent, the Old City is a five-minute taxi ride from most Jerusalem hotels. Once inside its walls, the tourist proceeds on foot along narrow winding streets, often ascending shallow flights of worn stone steps.

One of these narrow streets is the Via Dolorosa, or Way of Sorrow. This route, which by tradition marks where Jesus trod carrying His cross, begins not far from the site of Pilate's praetorium.

Now, every Friday at 3 p.m., a Franciscan procession including visitors retraces the steps and stops at each of the Way's 14 stations to pray. Of particular interest to them are the three stations where Jesus fell under the heavy weight of the cross, and the second station, at which Pilate is said to have come out, seen "Jesus wearing the crown of thorns and purple robe," and sneered: "Behold the man!"

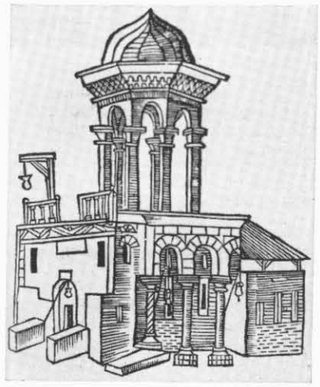
The Via Dolorosa's last station is, of course, "at the place called Calvary," inside the Church of the Holy Sepulchre.

Since the severe earthquake of 1927, which weakened some main structural supports, the church has been partly supported by steel scaffolding. Late in 1962, a repair and restoration plan for the entire building was announced by the Jordan government. The work will be done by a technical company appointed by the various Christian communities represented in Jerusalem.

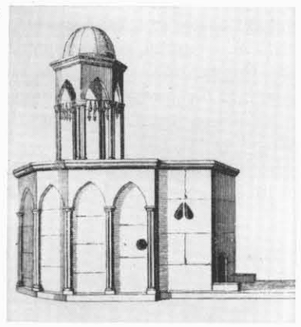
A similar renovation was begun in 1958 on another of Old Jerusalem's religious sites – the ancient Dome of the Rock. Repair operations on this beautiful mosque, which shelters the famed sacrificial rock of Abraham, will be completed in 1964, and the Holy Sepulchre project should be finished by 1967. Then, people from everywhere will come to Jerusalem to witness these two revered structures in all their original splendor. ■

A fourteenth-century Latin codex depicted the Church of the Holy Sepulchre like this.

The earliest-known woodcut representation of the Holy Sepulchre was done by the Franciscan friar Noé Bianco in about 1519.

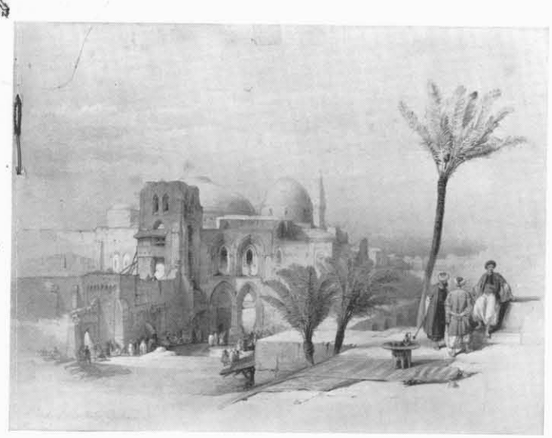


Bernard von Breidenbach depicted the Holy Sepulchre toward end of fifteenth century.



Architectural drawing of the Holy Sepulchre was made in 1651 by M. J. Doubdan.

Jerusalem, with the Holy Sepulchre in center, was painted by the Count of Forbin at start of nineteenth century.



The well-known English artist David Roberts captured the Holy Sepulchre on canvas in 1839.

The Church of the Holy Sepulchre as it stands today, awaiting extensive repair and renovation.

CALIPH AND CONQUEROR

Very early in the history of Islam a Caliph named Omar the Great unified his people with sword and law

Omar, on foot, approaches the walls of Jerusalem at the head of his victorious army. His commanders criticized his simplicity of dress.

THE GUIDE showing a party of tourists around the Old City of Jerusalem ushers them up a flight of steps, under a row of stone arches, and into a vast rectangular courtyard. Beyond the courtyard sprawls the timeless city, the houses crowded together in the impressive confusion of the centuries, separated by a maze of narrow streets and back alleys alive with humanity.

The effect is quite different inside the courtyard. Here there is no confusion. The surface paved with stones extends on every side of the big building in the center, so that it stands isolated in solitary splendor, and all the more impressive for sharing the space with no rival.

"The Mosque of Omar," says the tourist guide with a sweep of his hand. All eyes follow the vaulting lines of the architecture up and up, past columns, arches and cornices to the soaring dome above.

The voice of the tourist guide drones on. "You will notice that the Mosque of Omar has eight symmetrical sides – an octagon within a square courtyard. The arches are semicircular, preserving the geometrical proportions and at the same time breaking the monotony of the straight lines."

He points up at the dominating feature. "The dome completes the pattern of unity and variety, a semi-sphere on a level base. Unlike the walls, which are of solid stone, the dome is made of wood. The builders put a coating of lead on the outside, and, as we shall see when we enter, a coating of plaster on the inside. The decorations beneath the dome are typically Islamic, especially in the use of intricate mosaics, but they are not uniform in style; they show a succession of styles over a long period of time."

He pauses for effect. "This is, after all, an old building. Few examples of Islamic architecture are older than the Mosque of Omar."

"Who," says one tourist, "was Omar?"

The question is a strange one. It is like asking who Alexander was, or Caesar, or Justinian. Omar the Great ranks with them as a world figure. Yet his name is little known in the West except to historians, and even among Islamic peoples he is eclipsed by the greater fame of Haroun al-Rashid and Saladin – to whom he bequeathed the imperial basis of their power.

Before Omar, the Arabs lived mainly within the confines of the Arabian Peninsula. After Omar, they ruled the Middle East from Egypt to Syria, and north through Syria to the frontier of the Byzantine Empire. Omar the Great reigned over more provinces than any man since Alexander the Great. That alone places him in the forefront of the makers of history.

Why is his reputation not commensurate with the grandeur of his achievement?

For one thing, he was not a flamboyant personality. He clung to the simple ways of the Bedouin even after he had become the most powerful man in the world. His generals of the conquest quickly adopted the luxurious manners of the Syrians and the Persians. Their caliph never owned more than one shirt and one mantle at a time, and his meals

at home were as frugal as those he ate on the battlefield.

When Omar first entered Jerusalem after the surrender of the city, he found his military men already dressed in gorgeous robes and glittering jewels, the spoils of plunder. He himself, they told one another privately, looked less like a caliph than like a beggar on a broken-down camel. He summoned them to a conference at which he criticized their departure from the old ways of the desert, and declared emphatically: "It is not fitting that we, to whom so much has been given, should be so eager to take so much."

Omar the Great never took anything for himself. He died as poor as he lived.

Again, he never tried to snatch the military laurels from his fighting men. He was the statesman and the strategist of empire-building but allowed his generals full freedom of action during their campaigns, and he willingly conceded the limelight to them when they returned as victors. He meditated in his tent while they paraded through the streets to the cheers of the crowd.

When he cashiered his foremost tactician, Khalid, this was not from jealousy of a brilliant subordinate, but because he found Khalid guilty of extortion during his Syrian command. "Oh, Khalid," the Caliph lamented, "I would forgive you if you had stolen from me."

Simplicity, poverty, justice – these are three qualities of the brave and energetic man who led the Arabs out of the confines of the Arabian Desert and into the lush lands of the age-old Fertile Crescent.

Omar arrived on the scene at the moment best suited to his genius. Born in 590 A.D., one of the early followers of the Prophet of Islam, he threw his authority behind the selection of Abu Bakr as the first Caliph of Islam. When Abu Bakr died in 634, Omar succeeded him.

Two things needed to be done at once. The Arabs had to be united under a new system that would replace the anarchy of nomadic life in the desert. Omar solved this problem by establishing the Caliphate in its historical form. The attitude of the Arabs to their enemies had to be determined. Omar solved this problem with his sword.

The true meaning of the Caliphate had not emerged under the first Caliph, for Abu Bakr reigned for only two years and was mainly concerned with his religious duties. The second Caliph saw that Islam would be under constant attack without a strong right arm. He added military duties to the Caliphate so that the Islamic peoples might know to whom to look for defense against their enemies.

Omar adopted a title to go with this specific function, a title that rings through history from his time to the present: Commander of the Faithful.

With domestic affairs straightened out, the Caliph turned to foreign affairs. Once more he brought order into events that began before his Caliphate. The Arabs were already fighting around their perimeter. This border skirmishing had revealed the startling fact that the grandiose Byzantine and Persian Empires were far weaker than anyone had suspected. There would be nothing quixotic about the desert warriors mounting a full-scale drive against these once-mighty neighbors.

Omar the Great, Commander of the Faithful, resolved to invade the imperial provinces that faced Islam along the arc of the Fertile Crescent.

Syria came first. Omar sent an army under Khalid toward Damascus. The Byzantine Emperor Heraclius hastened down from Constantinople with a larger force. Khalid outmaneuvered him, lured him into a trap in a canyon of the Jordan Valley, and overwhelmed him in the decisive Battle of Yarmuk (636). Heraclius fled back to Constantinople. Syria fell to the Arabs.

The Patriarch of Jerusalem, Sophronius, realizing the futility of attempting to hold the city, surrendered to the Caliph himself. This was the occasion of Omar's criticism of the luxury of his generals. A more famous anecdote tells of the Patriarch escorting the Caliph around Jerusalem, and inviting him to say a prayer in the Church of the Resurrection. "No," the Caliph replied, "for if I do, my people may appropriate the Church when I am no longer here to protect your rights."

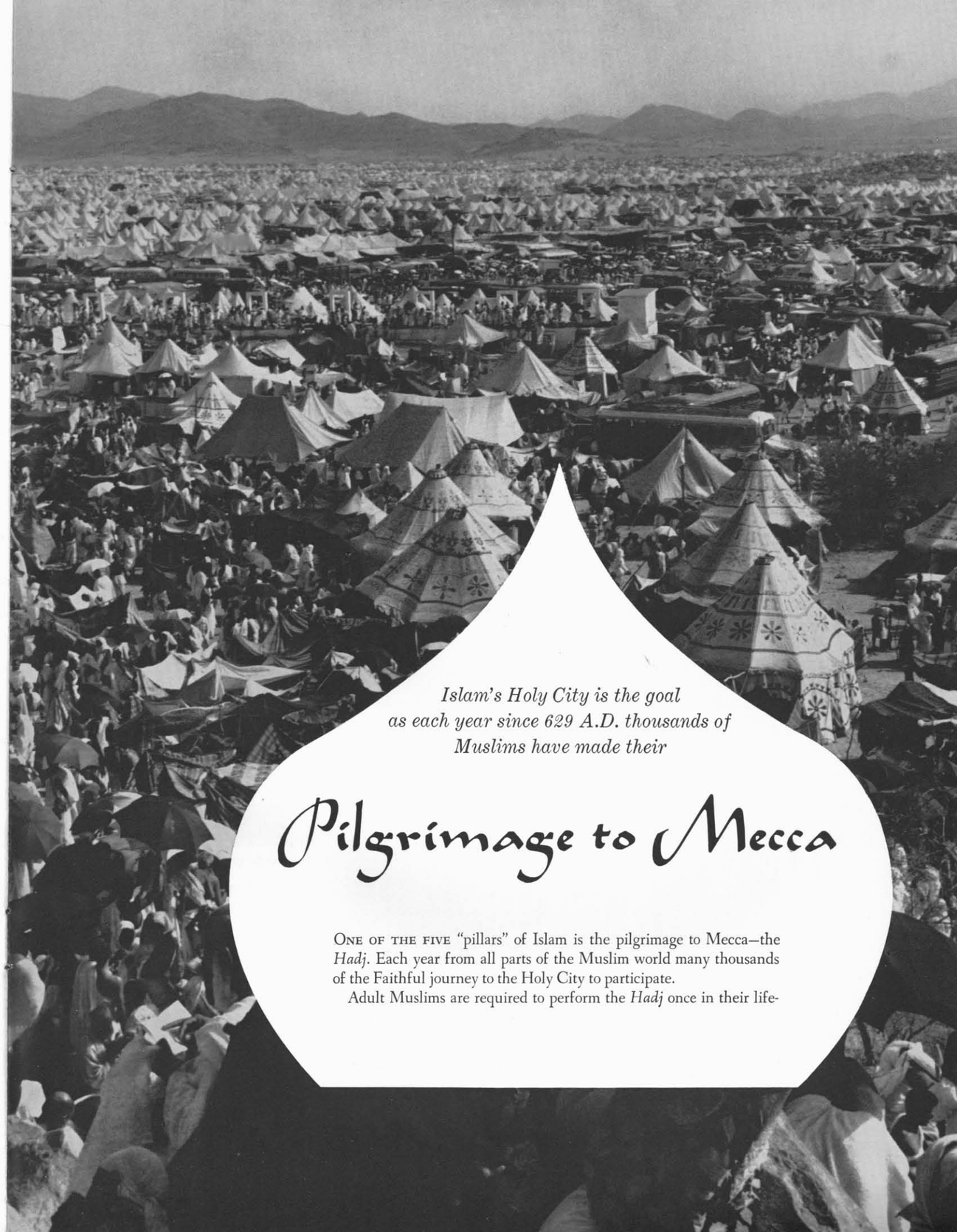
Iraq came next. The Persian Emperor sent the legendary Rustam down the Euphrates to deal with these upstarts from the desert. Instead, they dealt with him at the crushing Battle of Qadisiya (637). The Persians fled back to Persia. Iraq fell to the Arabs.

Egypt was easier because the death of Heraclius left the province in a turmoil. The Arabs were in control of the Land of the Nile by the end of 641. That same year they occupied the headwaters of the Tigris and Euphrates, and penetrated into Persia after winning the Battle of Nihawand.

Omar had, within the space of some five years, transformed the Fertile Crescent from a threat into a bulwark. This incredible feat was distinctly his since he had, with consummate understanding of the epoch in which he lived, chosen where and when to strike on each campaign. His people, reacting spontaneously to the success of his grand strategy, called him Omar the Great.

History endorsed his statesmanship. His death at the hands of an assassin in 644 did not cause his work to crumble. He had given Islamic power the momentum to expand in subsequent centuries as far as Spain and India, and, in 1453, into Constantinople itself. A Western historian offers this summation of his career: "Omar the Great he was to his contemporaries, and Omar the Great he remains to us, the first and foremost Commander of the Faithful."

Much of the history of Islam is his monument. So is the Mosque of Omar in Jerusalem – built fifty years after his death, named in his honor by his grateful people, carefully preserved to this day, thirteen centuries after he molded the wanderers of the desert into a force that brought unity to much of the Middle East. ■



Islam's Holy City is the goal as each year since 629 A.D. thousands of Muslims have made their

Pilgrimage to Mecca

ONE OF THE FIVE "pillars" of Islam is the pilgrimage to Mecca–the *Hadj*. Each year from all parts of the Muslim world many thousands of the Faithful journey to the Holy City to participate.

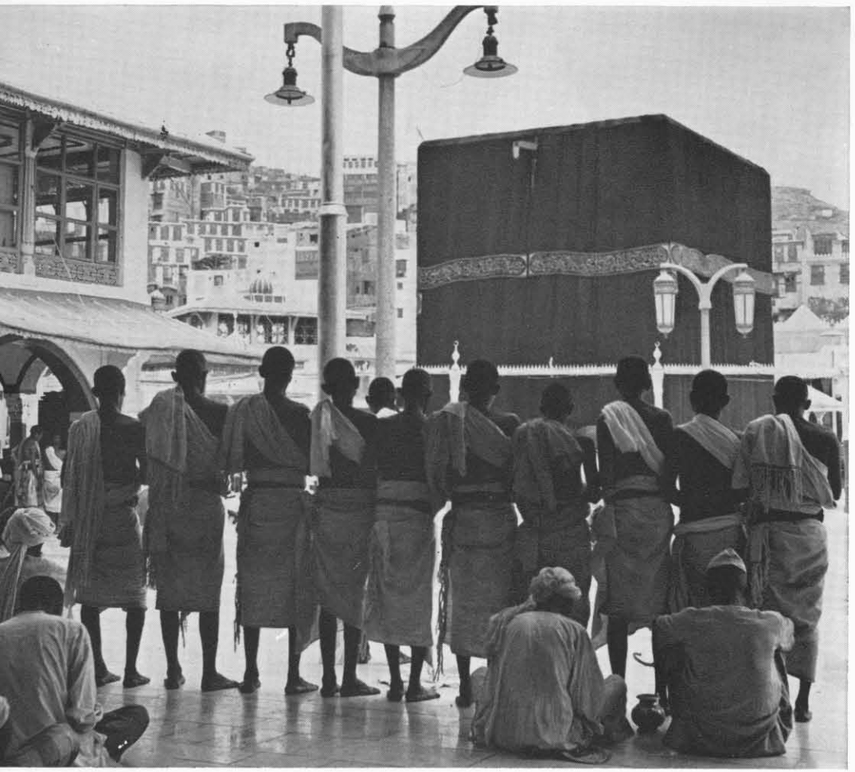
Adult Muslims are required to perform the *Hadj* once in their life-

times if they are physically and financially able to do so.

The Islamic calendar is strictly lunar and hence the *Hadj* runs in time through all seasons of the year. It falls in the second half of the first ten days of the month of Dhu al Hijjah, the twelfth month of the Hijrah Year. During the hot summer months pilgrims must endure hardships which in older times caused many fatalities.

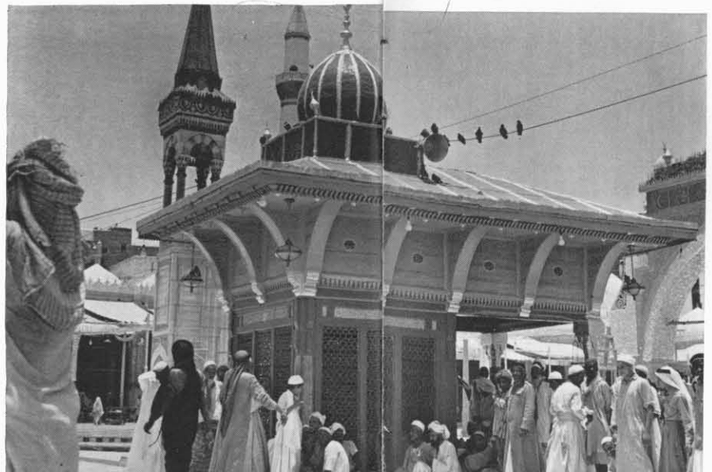
Modern means of transportation and the efforts of the Saudi Arab Government in providing shelter, sanitation and medical care have greatly improved conditions.

Improved also is the appearance of the Mosque of Mecca the *Masjid*



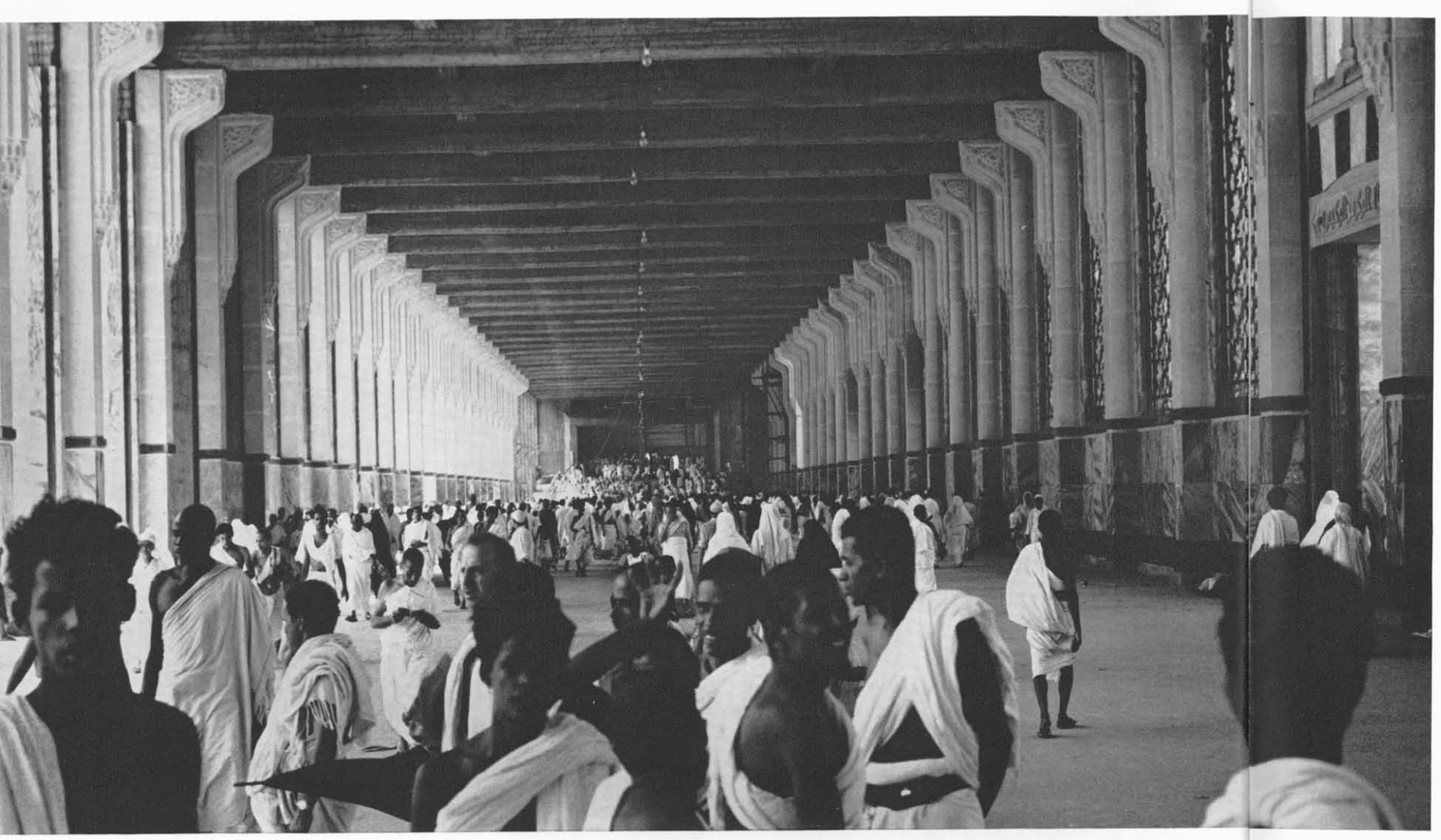
The pilgrims approach Mecca in a sanctified condition, bareheaded, barefooted, and wearing the traditional, two-piece, seamless *ihram*. They make their way to the Haram Mosque, which encloses the holiest structure in all Islam, the Ka'bah. Praying, the pilgrims walk around the shrine seven times.

The Ka'bah is a cube-like building 50 feet tall and covered with brocade curtain called the *Kiswa*. Muslims incline in prayer toward Ka'bah five times a day.



Traditional forerunners of Islam were the patriarch Abraham (Ibrahim) and his son Ishmael, who are said to have built the original Ka'bah. Within courtyard of Haram Mosque is this shrine to Abraham, covering a rock from which he is said to have addressed the people.

Having circled the Ka'bah, pilgrims pause to drink at sacred well of Zamzam. Muslims believe that this well was revealed by the Archangel Gabriel to Hagar, who, with her son Ishmael, was dying of thirst in the wilderness.

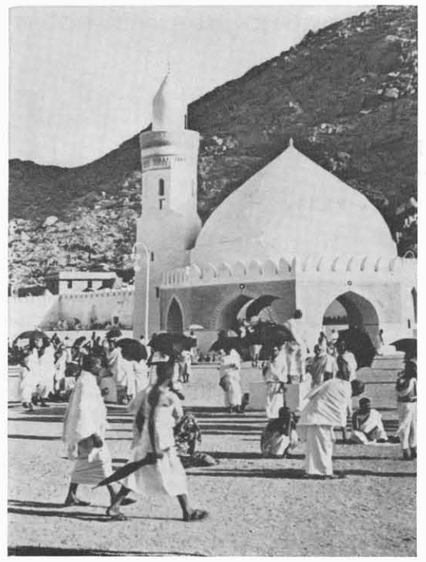


Pilgrimage to Mecca

al-Haram, which had been essentially unchanged since the sixteenth century. Under the present Saudi Arab regime great new wings, faced with marble, have been added.

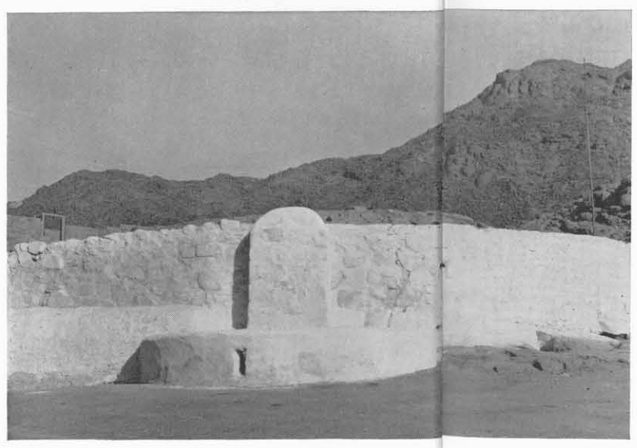
The Pilgrimage was instituted by the Prophet Mohammed in the Hijrah Year 7 (629 A.D.). Its rites and rituals reflect the traditional deeds of Ibrahim (the Biblical Abraham), Hagar and Ishmael, believed by Muslims to have taken place in the vicinity of Mecca.

In conjunction with this annual pilgrimage comes the major Islamic feast of the *'Id al-Adha*. Sheep, camels and cattle are slaughtered throughout the Islamic world and shared by all on the day that the pilgrims sacrifice animals at Mina, near Mecca. Three days of holidays, visiting and gift-giving follow. ■



At Mina each pilgrim slaughters an animal, usually a sheep, to commemorate sacrifice of a sheep by Abraham. On this day Muslim world observes 'Id al-Adha. Mosque of Al Khaif at Mina was built by Saladin.

The Saudi Arab Government has enlarged Haram Mosque, which plays important part in the *Hadj*. This new, high-arched entrance, called Saud Gate, adds much to the impressiveness of the structure.



During afternoon of fourth day pilgrims stand on or near Mount of Mercy. Wide flight of stone steps leads to top of hill. On the sixtieth step, on the afternoon of the *Wakuf*, or "Standing," a sermon is delivered, usually by the Imam of Mecca.

At sunset on the fourth day, pilgrims move from Arafat down the road to Mecca. After an evening's encampment they go to Mina, where each throws seven stones at this pillar. To Muslims pillar represents Satan, who appeared to Abraham on this spot.

After drinking from well of Zamzam, pilgrims re-enact search of Hagar for water for dying Ishmael, rushing seven times between the hills of Al Safa and Al Marwa. Today this path is covered by marble colonnades built by the Saudi Arab Government.

They created magnificent structures with nothing but simple tools and unbounded imagination

THE EARLIEST ENGINEERS

WHEN was the Suez Canal first completed? The world's first system of public street lighting installed? The first NO PARKING sign put up? The answers are respectively: 525 B.C., 350 A.D., and 630 B.C.

Uncanny as it seems, a ship canal to connect the Mediterranean with the Red Sea was begun 2,600 years ago by the engineers who served Egypt's ruler, Nikau II. The unwieldy yet workable waterway was actually finished 74 years after Nikau's death by the armies of Darius I, who had conquered Egypt. In time, the canal was allowed to fill up with sand and it became unnavigable. However, in 640 A.D. another conqueror of Egypt – the Arab soldier, 'Amr ibn-al-'As – had the canal dredged. By 800 A.D., it had again fallen into disrepair, and until the present canal's completion in 1869 communication between the two great seas was closed.

The city of Antioch, in what is now Turkey, was the site of the first municipal street lighting, and the inauguration of restricted parking occurred at Nineveh, ancient capital of Assyria. There, at intervals along a wide paved street, King Sennacherib had posts placed which read ROYAL ROAD. LET NO MAN LESSEN IT. An offender caught parking a chariot or other vehicle along this boulevard didn't get a traffic ticket. The penalty for breaking the law was stiff – death.

While a thoroughfare paved with flat bricks set in lime mortar, sand and asphalt seemed a wonderful innovation to the Assyrian king, the idea was not new even in his time. Engineers in neighboring Mesopotamia had learned how to construct such paving several centuries earlier. And 2,000 years before *them,* still other engineers had invented the bricks necessary to road-building.

Who were these ancient engineers, these men who could undertake projects too large for a single craftsman, projects calling for hundreds, or thousands, of men organized and led toward a common goal? History gives pages, even chapters, to kings, philosophers and artists but very little space to the men who built the stages on which these others performed. Yet the story of the rise of civilization belongs equally to the tiny group whose genius lay in building.

The first engineers lived in the Middle East, probably around 3,500 B.C. No one knows their names, but they conceived and built the elevated irrigation canal. As irrigation systems spread, farmers were able to raise more food with less labor. Thus, an increasing number of people were relieved of agricultural chores and able to gather in cities to practice specialties. Today's city is essentially still a place where specialists live and work.

Eventually, the kings who ruled these primitive, early cities desired houses larger and more comfortable than the huts of reeds and clay they'd been living in. They hired gifted men to build them palaces. Priests, feeling the gods would be offended if their statues weren't housed as splendidly as the kings, insisted on the construction of elaborate temples. Thus, a new class arose, technicians who could discuss with monarchs or priesthood the planning and construction of public works.

To protect the wealth of gods and kings, the early engineers designed military walls and moats to surround the cities. Soon the jewels, fine raiment and food in the temples and palaces required men and means to keep track of them. Arithmetic and writing were invented. By 1,000 B.C., this and other technology had created a high level of civilization which stretched in a broad belt from the Middle East to India, southeast Asia and China. Any new invention originated at one end of this cultural highway eventually traveled to the other end.

Imhotep, the Egyptian who built the world's first pyramid in 2,700 B.C., is the earliest engineer known by name. He is credited with inventing the art of building with hewn stone, and from him a long line of architects descended. One such descendant was Khnumabra, who, a tablet relates, "was Minister of Public Works under King Darius I," (490 B.C.).

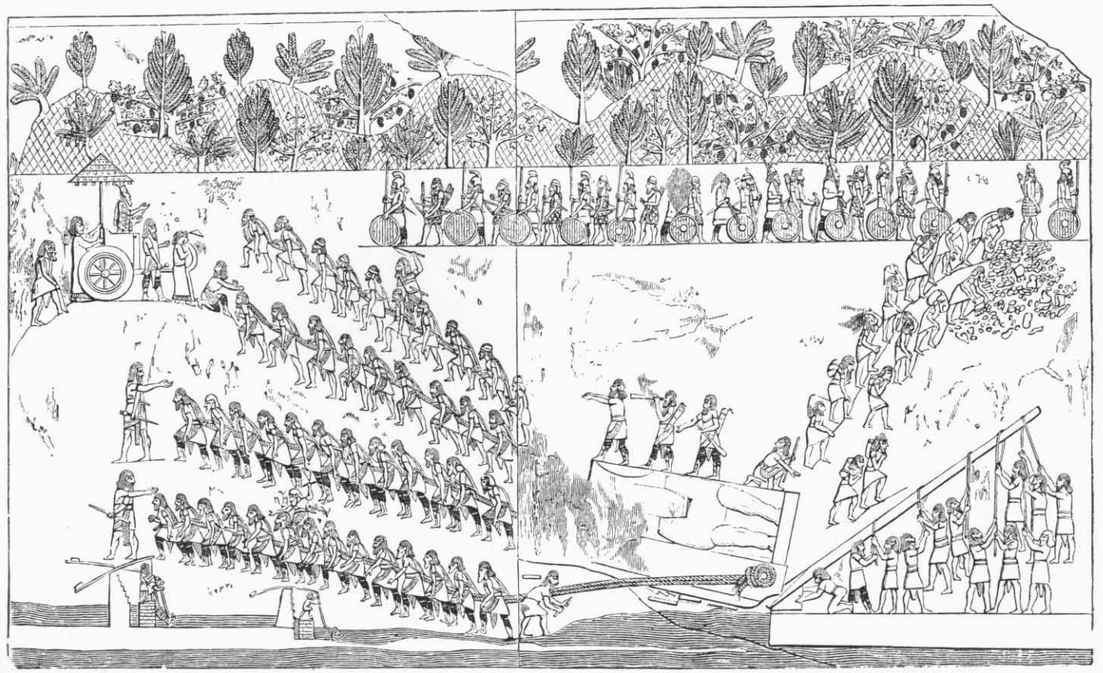
Imhotep's king, Joser, believed that an afterlife could exist only so long as the body was kept intact. Accordingly, he ordered Imhotep to design a burial structure which would befuddle tomb robbers forever. After a lifetime of experiment, Imhotep produced a stone pyramid. It had many corridors branching out to hold the wealth Joser counted on taking with him, and even living quarters for the priests who would perform rites for Joser's welfare in the afterlife.

Imhotep's design inspired many later burial tombs. One of these required 2,300,000 blocks of stone weighing two and a half tons apiece. It was second only to the Wall of China among the largest human constructions of antiquity. This colossus was the Great Pyramid of Gizeh, so large the cathedrals of Milan, Florence, St. Peter's of Rome, St. Paul's and Westminster Abbey of London all could be placed at the same time in an area the size of its base.

After centuries of speculation, current archaeological research has given a new opinion on how the Great Pyramid was built. About 4,000 workmen (soldiers and well-paid civilians, not slaves) were probably involved. These workers, according to recent translations, were organized into high-spirited gangs, such as "Enduring Gang," "Vigorous Gang," etc. With the exception of the simple lever, no machinery – not even wooden rollers – was available to them. They quarried the granite and limestone building blocks with crude copper wedges and chunks of stone for hammers, then drew them to the site on sleds. A tomb painting shows 172 men sledding one of the 50-ton slabs used in roofing the pyramid's chambers. While workers quarried the stones, others were clearing and leveling the building site. The sides of the base were measured off with cords to form a square, and leveling was accomplished with a long, narrow clay trough filled with water. The trough worked just as well as a modern spirit level!

As the pyramid grew, the builders raised an earthen mound on all sides of it. Remains of such mounds have been found around many pyramids. Wooden ramps were placed against the mounds, and with sapling levers the mammoth blocks were hauled upwards. As each course was laid, mound and ramp were raised to another level. When the job was done, the thousands of tons of earth were hauled away in buckets and carts.

When Egyptians were just beginning to learn the fundamentals of stone-construction, the Mesopotamians were already seasoned professionals at building with brick. These ancient Middle East peoples were second to none in engineering. And from them and adjoining cultures, the rest of



Carving from walls of Nineveh shows how stone statue was moved about 660 B.C. Stone rests on sled drawn by four lines of workers. Back of sled is eased off barge by lever and wedges. One of the overseers standing on stone gives directions through a trumpet.