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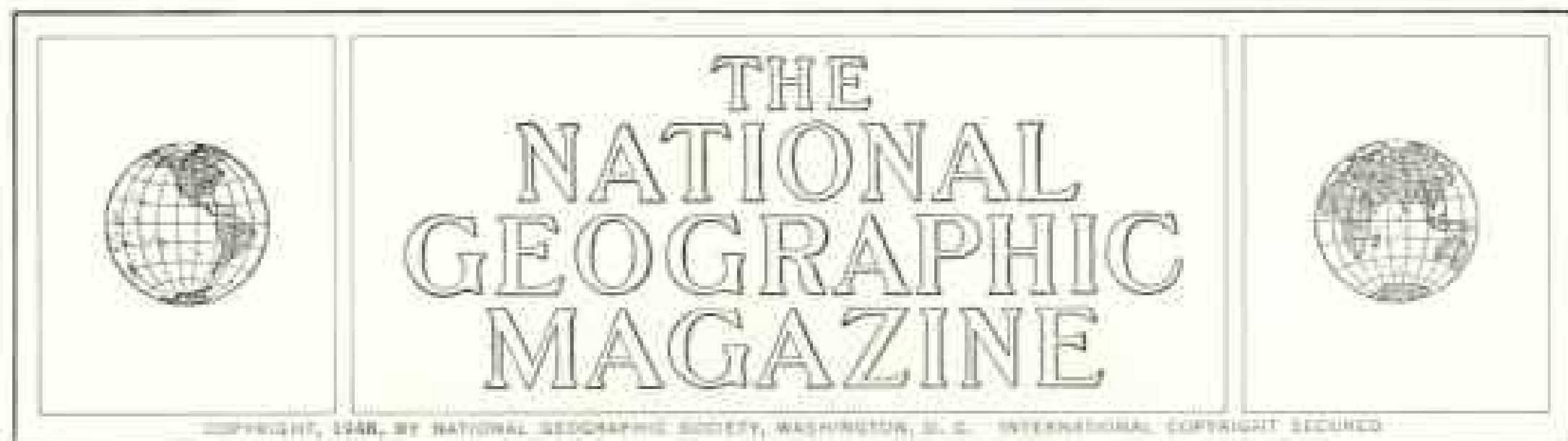
FREDERICK SIMPICH

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Feudal Splendor Lingers in Rajputana

BY VOLKMAR WENTZEL

With Illustrations from Photographs by the Author

IN the oases of the Indian Desert and in the uplands of India's ancient Aravalli Range knighthood still flowers. There the resplendent maharajas of Rajputana, descendants of a lusty warrior race, dwell yet in the Age of Chivalry, surrounded by lavish Oriental pomp and circumstance—which their high-speed planes, air-cooling systems, hydroelectric projects, and foreign educations cannot dim.

I traveled the length and breadth of five of the 23 Indian States, which, together with a Chiefship and a small Estate, made up the former Agency of Rajputana, now a part of the new Dominion of India.

The journey was one phase of my general staff assignment to make a pictorial survey of India for the NATIONAL GEOGRAPHIC MAGAZINE. Most of the trip was made in a war-surplus United States Army ambulance, purchased and converted into a National Geographic Society mobile headquarters, photographic supply house, and hotel (page 421).

I met people in all walks of life—ruling class, landholding Rajputs; priestly Brahmans; devout and business-minded Jains; Jats and Gujars, humble villagers who tilled the soil; *sadhus*, ascetic holy men—the great majority of them Hindus.

I also met a generous number of Englishmen—diplomats, soldiers, and businessmen—many of whom had been born in India.

My most lasting impressions of Rajputana are of the incomparable pageantry and splendor in the courts and palaces of the maharajas. How long this way of life will continue, now that the Indian States have been fused into the Dominion, is problematical. Already many changes have been made.*

Rajputana, somewhat smaller than Missouri and Oklahoma combined, has a population of nearly 14,000,000.

On the west it borders Sind, part of the new Moslem Dominion of Pakistan. To the north lie the strife-torn Punjab and its States. For 150 miles in the east the Chambal River forms its border. On the south a very irregular boundary line cuts it off from the central region of India (map, page 417).

From southwest to northeast the Aravalli Range intersects Rajputana. The area northwest of the mountains forms part of the Indian (Thar) Desert—sandy, unproductive terrain punctuated with oases. To the southeast lie fertile lands where fuel and fodder abound.

Changes Affect Maharajas

Rajput maharajas reign over their States with inherited authority, although many voluntarily are giving up their autocratic powers. Since my visit most of Rajputana east of the mountains has been merged into a new administrative unit called Rajasthan. Representatives of the maharajas have seats in the Indian Government at New Delhi, just a few miles northeast of their States.†

The new Dominion Government affects a maharaja in three ways: It is responsible for

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "India—Yesterday, Today, and Tomorrow," by Lord Halifax, October, 1943; "In the Realms of the Maharajas," by Lawrence Copley Thaw and Margaret S. Thaw, December, 1940; and "Life with an Indian Prince," by John and Frank Craighead, February, 1947.

† See "Delhi, Capital of a New Dominion," by Phillips Talbot, NATIONAL GEOGRAPHIC MAGAZINE for November, 1947.



A. L. Reed

Slave Girls Once Lolloed Beside the Cooling Fountains of This Udaipur Garden

Now village women, chuddars (Indian shawls) draped over their shoulders, enjoy its beauty. Water for the playing streams, partially obscuring the stone fountain in the center of the pool, comes from a near-by lake.

the defense of his State against external aggression; it conducts the foreign affairs of his State; and it is responsible for the Dominion's system of communications, which link the States. Otherwise, a maharaja remains the arbiter of his subjects' destinies.

An Indian Journey Begins

About a year and a half ago I landed in Bombay in the middle of India's hot, murky monsoon season, to find myself adrift in a strange sea of humanity.

My first problem was to find transportation for myself and my heavy photographic equipment. Ever since my Army days on Okinawa I had felt that a standard U. S. Army ambulance would make an excellent vehicle for a photographer, particularly over a vast sub-continent like India. Front-wheel drive for difficult terrain; rugged engine, spring, and body construction; stretchers for sleeping; solid top to support a man and tripod—all recommended it.

I knew there were ambulances among the United States war surplus material left in India. The United States had sold all surplus equipment to the Indian Government, which was disposing of it in wholesale lots. I was told to go to New Delhi, India's capital.

So I acquired a bearer, Akbar Ali, a Mohammedan lad who insisted on wearing a heavy Angora cap on the hottest days, but who otherwise was most efficient.

With his aid I loaded my 14 cases of equipment into two dilapidated victorias and we galloped off to the station to catch the Frontier Mail. The heat was intense, and I was delighted to find that Ali had reserved for me an air-conditioned compartment which I was to share with a pleasant-faced Indian Government official.

The next evening we completed the 1,000-mile trip to Delhi, which turned out to be hotter and more uncomfortable than Bombay. I found rooms in the Cecil Hotel. Its home-like atmosphere, good meals, and swimming pool made it a haven for me to return to throughout my travels in India.

I didn't get an ambulance in Delhi. They all had been sold. By good luck I learned some still were available in Calcutta. I boarded an airplane for Calcutta; Ali and my equipment stayed behind.

The plane was a converted C-47, flown by an Indian pilot and staffed by lovely Indian air hostesses. Instead of the chewing gum which airline hostesses in the United States bestow upon passengers, they passed out from time to time cloves, nuts, and spices from south India.

After hours of weary search for an ambulance in Calcutta, I was about to give up in despair. The huge Government supply yard there covered acre after acre. Through it I wandered all day in the oppressive heat, but I could find only wrecked ambulances. The next morning, none too hopeful, I returned to the hunt and by chance came upon Capt. R. S. Ram, a young Indian officer in charge of one section of the yard. I told him my oft-repeated story. His face brightened.

"My father is a member of the National Geographic Society," he said. "How can I become a member?"

"Get me an ambulance and you are as good as in," I told him quickly.

Captain Ram has been a member of our Society now for more than a year.

Overland Drive to Delhi

My ambulance was a good one. The speedometer showed only 18,000 miles, most of it acquired in wartime service along the Stilwell Road in Assam. I had it overhauled and obtained gasoline ration coupons, driver's permit, and registration card. Then I left Calcutta for Delhi, which I reached in four days.

In Delhi, aided by mechanics, carpenters, and a sign painter, I altered the ambulance to suit my purposes. Then I made my first photographic trip, to the northern State of Kashmir,* unaware of the exciting adventures in store for me in Rajputana. On my return to Delhi I made friends with James Billman, then United States vice consul, and Frederick Vock, representative of a Swiss firm.

As Christmas Day neared we attended a round of parties. At one of these I met His Highness the Maharao Raja of Bundi, who invited me to spend Christmas as his guest, and the Maharaja of Jaipur suggested that I stop off to see him at his palace, en route through Jaipur to Bundi. I accepted both invitations with alacrity.

Jaipur, capital of the Indian State of that name, is a fabulous rose-pink city southwest of Delhi. Thus far the State has not been absorbed in any new political alignment.

Its Maharaja's unusual attainments embrace more than his great wealth, social position, and English education. He is one of the world's best polo players. His stables house more than 200 superb ponies. Electric fans and shower baths keep his mounts cool. He also pilots his own converted C-47.

The State of Jaipur lies on a barren, sandy plain northeast of the Aravalli Range. It is a little larger than Massachusetts, Rhode Island,

* See, in the NATIONAL GEOGRAPHIC, "The Idyllic Vale of Kashmir," by Volkmar Wentzel, April, 1948.



Indians, Young and Old, Thrill to the Notes of a Street Musician's Sitar

They halt outside a gaily decorated bazaar in Bundi to hear a performance on this popular Indian stringed instrument. The modern mural at left shows how Rajputana has accepted the airplane without discarding the elephant.

and Connecticut combined, and has a population of 3,040,000. Jaipur city, built on an oasis, is about 180 miles southwest of Delhi.

Jim, Fred, and I set out on our journey in the ambulance on the afternoon of December 22 and drove without incident for about three hours. The road, through the sandy cactus-clad waste, was virtually deserted. Then, about dusk, the ambulance suddenly shook and stopped. We tried vainly for several hours to find the cause of the trouble. Night settled down.

Panther Stares in the Dark

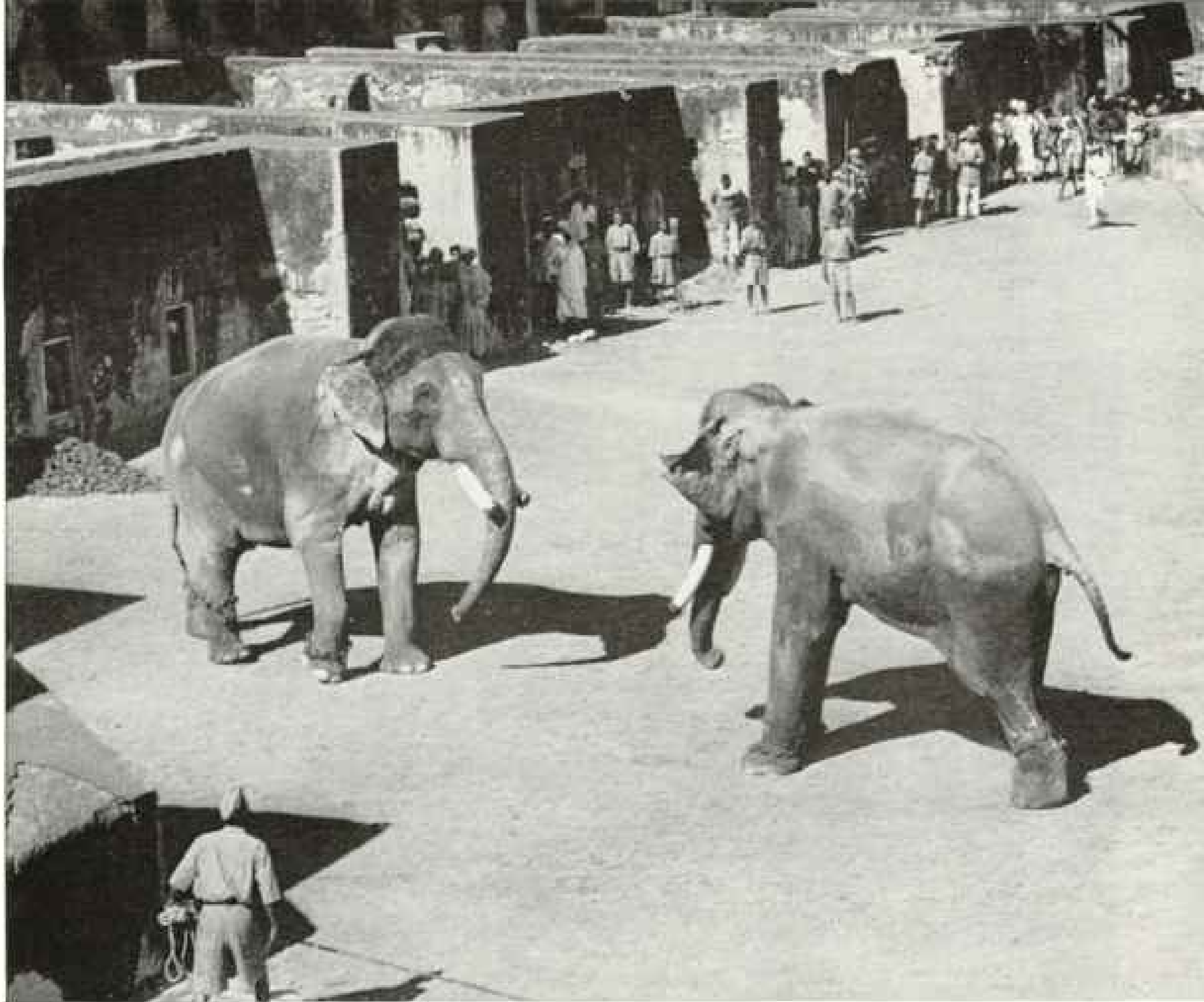
Finally we saw a car's headlights in the distance. As it drew near we hailed the driver. By sheer luck he turned out to be a wealthy Jaipur polo player with whom Fred was acquainted. As soon as he heard we were guests of the State, he gave a quiet command to his servant. The man disappeared and, almost instantly, reappeared beside us with a tray bearing cool refreshments.

I rubbed my eyes at this genielike performance.

Even as we were thanking him, we received another and not so pleasant surprise. A panther (leopard) appeared at the roadside, not 50 yards from us, eyes aglow in the gathering dusk. The servant produced a gun even more quickly than he had fetched the drinks. The polo player shot and missed, and the panther vanished.

Eventually we were able to start the car. We thanked our friend and drove on 100 miles. Then the motor again conked out.

Now we were stalled in a piece of Jaipur's best tiger country. Jim's active imagination conjured up tales of man-eaters, and when we heard something prowling in a near-by thicket it did not improve our nerves. One of us kept watch with a flashlight while the other two worked. But no tiger put in an appearance. We finally located our difficulty in the ignition system, repaired it, and by midnight limped up to the gates of Jaipur.



"Why Should We Fight, Jumbo? Let's Be Friends"

This staged elephant duel in a Jaipur courtyard fizzled out when the two beasts refused to become combative. Attendants prodded them with sticks and set off firecrackers to arouse them, but the only result was a mild butting match which ended in a few moments with no injury to either participant (page 429).

But Jaipur is a completely walled city. All the inhabitants seemed to have gone to bed, and all the gates—large and cumbersome, with anti-elephant spikes sticking through them—were locked.

We reconnoitered and found a small passageway, the gate to which was ajar. We pushed through and then, from inside, unbolted the medieval gates and, using all our strength, pushed them open.

We drove down the dark street, marveling at its width. We later learned that Jaipur, one of the finest of Indian capitals, is also one of the few Oriental cities built on a regular plan, its broad streets bisecting each other at right angles.

After we had gone a few blocks, we could see an illuminated fountain and we headed for that. Sure enough, this striking work in Lalique glass stood at the entrance to Rambagh Palace grounds, our destination.

There on the marble steps of the palace, an aide-de-camp of the Maharaja, who re-

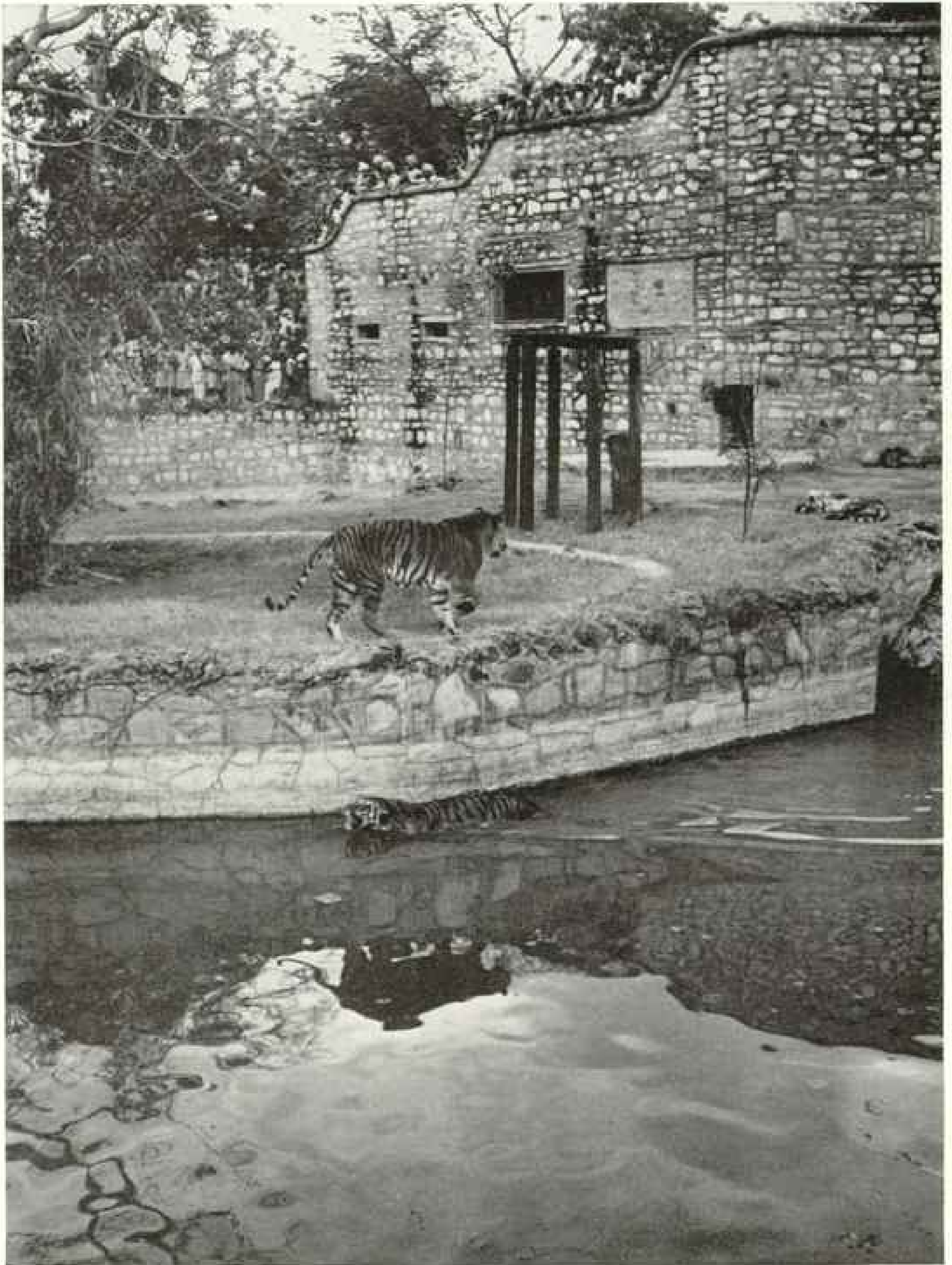
sponded to the nickname of "Rabbit," welcomed us like long-lost friends despite the lateness of the hour. Overlooking our bedraggled appearance—we resembled three automobile mechanics at the end of a busy day in the shop—he ushered us into the palace. Grimy and unkempt, we stepped right into a page from the *Arabian Nights*.

The Maharani Receives Us

The room which we entered was brilliantly lighted and lavishly decorated with Oriental rugs, Chinese tapestries, and other rich and exotic furnishings. In the center of the room on a couch sat Her Highness, Shri Maharani Sahiba, beautifully gowned, and surrounded by sari-clad feminine friends and attendants seated on hassocks (page 445).

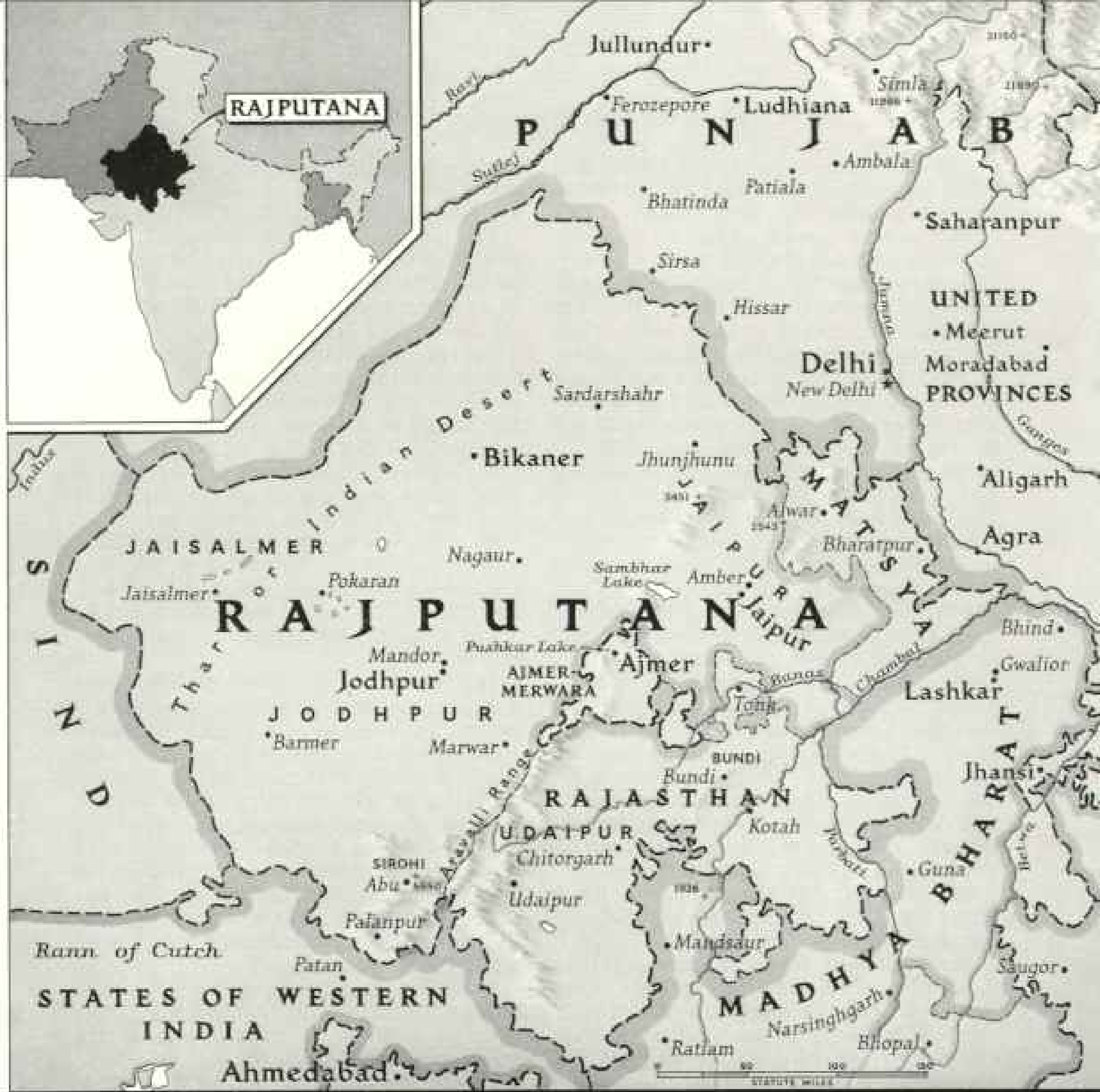
They were amusing themselves by playing records on a small portable phonograph.

The Maharani saw us and motioned to one of the turbaned servants in the background. As quickly as the contractor's servant in the



Death Awaits the Tiger in the Moat when He Emerges to Meet His Antagonist

Spectators line the walls in Jaipur's zoo. When the newly captured man-eater, now pacing along the edge of the moat, was released in the enclosure, the other captive tiger jumped into the water. A few moments later he climbed out to do battle and was killed (page 429).



Drawn by Theodora Price

Rajputana's 23 Indian States Spread over Desert, Mountain, and Jungle

Total area is smaller than that of Oklahoma and Missouri combined. In the desert oases and on fertile uplands dwell some 14,000,000 people. Although its summers are exceedingly hot, Rajputana is one of the most healthful sections in the new Dominion of India. Today many of the Rajput States are being absorbed in new administrative units of the Dominion. Light gray of inset shows India; dark gray, Pakistan.

desert, he vanished and reappeared with a tray filled with refreshments. Graciously the Maharani received us and showed deep interest in the story of our misadventures en route to Jaipur. At length we were escorted to our quarters.

My room was huge and appointed with Western furnishings, including an ultra-modern electric fireplace. I noticed an assortment of familiar-looking gear in one corner of the room and walked over to investigate. A light dawned on me. "Rabbit" had ordered the servants to "bring in all the things." They had taken him literally, had removed every-

thing from the ambulance that was not nailed down, and had faithfully deposited it in my room—down to and including the spare tire.

The next morning after breakfast we met Ram Gopal, Leela, and other members of a famous Indian dancing troupe on one of the palace verandas. The air was balmy and conversation lively. All too soon I had to take my departure for Bundi, leaving my friends Jim and Fred behind. But His Highness invited me to return after New Year to attend the annual Gangor Festival and also a subsequent round of entertainment he had planned for his festival guests.

The ambulance behaved well on the first leg of my journey southward and there was time to observe my surroundings. Gaily dressed women passed along the roadside, gracefully carrying colorful water jugs atop their heads (page 421). High-wheeled camel- and ox-carts moved slowly along. Here and there farmers worked in their fields, which bobbed up between stretches of sandy waste.

Alas, at sundown the ignition coil burned out, and I found myself stalled in a small mud village, about 85 miles from Bundi and 35 out of Jaipur. I was surrounded by scores of curious villagers, but could talk with none. They were most friendly and offered me food. Not to be outdone, I presented them with Army K rations, which they enjoyed immensely, although the little wooden spoons and the chewing gum puzzled them.

After dark they built a small fire and prepared to stand guard for me during the night, for I could not repair the ambulance. Not a single car had passed in either direction.

Just as I was preparing to sleep on my stretcher, a car did arrive on the way to Jaipur. In it were a Jaipur jewelry merchant and his three sons. They offered me a lift and, leaving the villagers to watch the car, I rode back to Jaipur, making a rather undramatic return to my friends at Rambagh Palace, where I again passed the night.

The next day, with the aid of some Jaipur State mechanics, we replaced the defective part and I renewed my journey.

The road into Bundi became more and more hilly. This small Indian State, 1,500 feet above sea level, is about the size of Delaware and has a population of about 250,000. Its capital rests in a steeply walled valley (page 452).

Bundi Agleam on Christmas Eve

As the ambulance slowly gained the crest of a hill, I saw before me in the valley hundreds of twinkling lights—an unforgettable scene in the dusk of that Christmas Eve.

The illumination was from the Diwali (Festival of Lights) lamps of the Hindus, especially brought out and lighted upon orders of the thoughtful Maharaja to give a Christmas Eve welcome to his Christian guests, chief of whom was Field Marshal Sir Claude Auchinleck.

I stopped the ambulance and began to make a time exposure of this impressive scene. While I was counting off the seconds of the exposure, the Maharaja, showing some of his guests the sights of Bundi, pulled up beside me in an automobile. He recognized the National Geographic Society truck and told

me to lose no time in getting to the palace, which lay in the hills several miles beyond the capital, and where dinner awaited us.

The ambulance finally limped into the palace grounds and I was joined by the other guests. Phoolsagar (Lake of Flowers) Palace is a comparatively small building and very old, but it had been stunningly redecorated within during World War II with brilliant murals depicting ancient scenes of knighthood in Rajputana. The artists were German and Italian prisoners of war who had been interned near Bundi during the war.

My sleeping quarters were at the modern State Hotel just outside of the city, so I drove my ambulance back there alone.

On Christmas Day cars came for the Maharaja's guests, and we were taken 40 miles into the jungle to an ancient and abandoned fort, now used as a hunting lodge. The highlight of our holiday entertainment—a tiger hunt—was scheduled.

In a big clearing in front of the lodge stood a tent encampment for the Maharaja and his guests. Each tent was comfortably furnished, and the printed cloth finish on the inside walls gave it a luxurious Oriental effect. About 200 yards distant was the camp of the beaters, mahouts, elephants, and horses.

Just as we had finished luncheon, the chief *shikari*, or head beater, excitedly entered the huge dining tent and said that two tigers had been sighted about an hour before. Quickly the guests, who numbered about twenty, were divided into two groups.

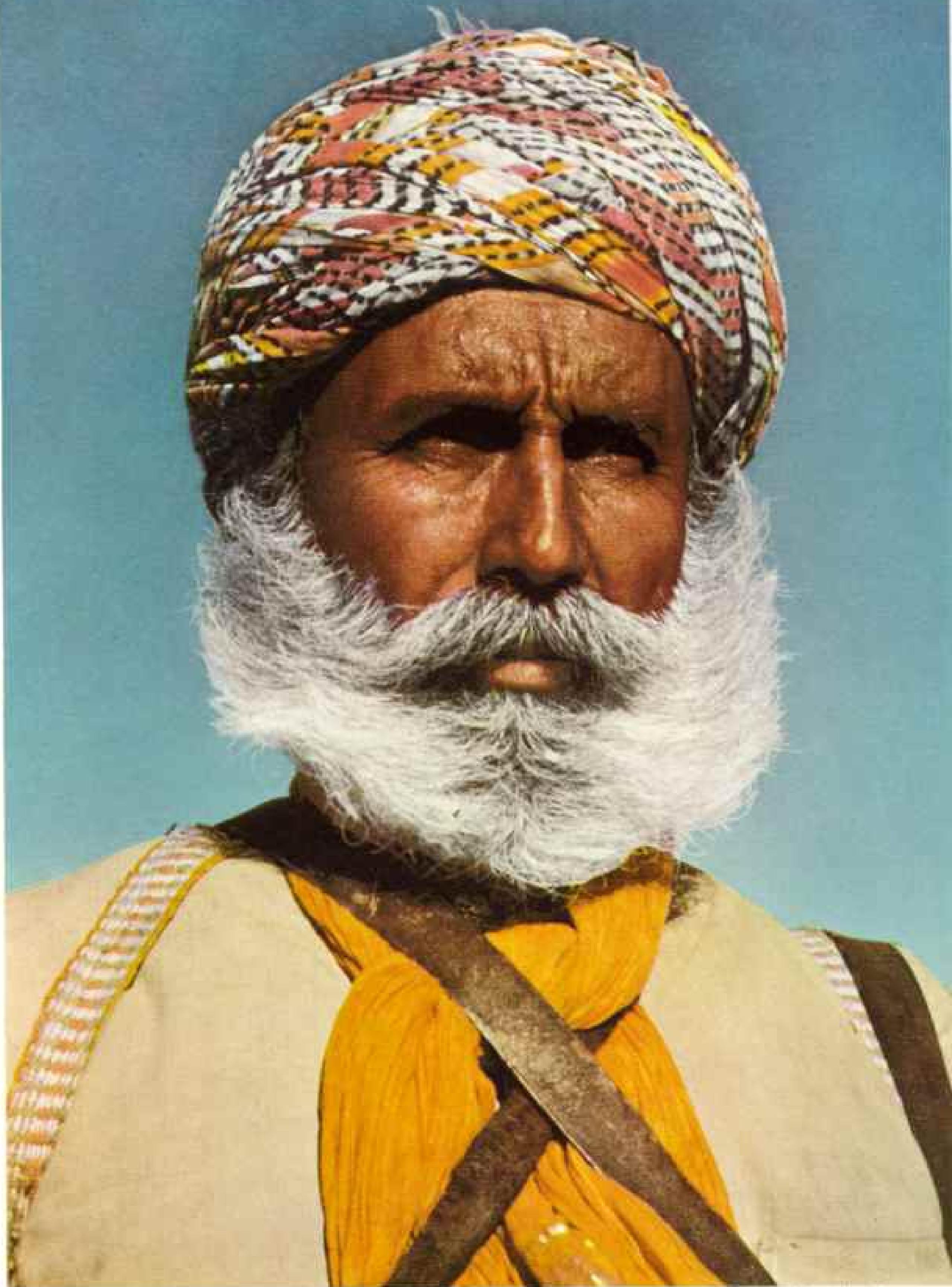
Some, including the Maharaja, his younger brother, Maharaj Kesri Singh, and other Rajputs, ascended to the howdahs of the hunting elephants (page 428).

Others, including myself, were assigned to the *machans*, wooden platforms erected in trees. Here we found guns ready-loaded for us, and a *shikari* who was to render us any necessary assistance. We were told to be absolutely silent.

Soon in the distance we could hear shouting, whistling, and drumming, which grew louder and louder as the beaters approached us. Suddenly from a *machan* about 500 yards from us came a shot, followed by a ferocious growl. The tiger had been wounded.

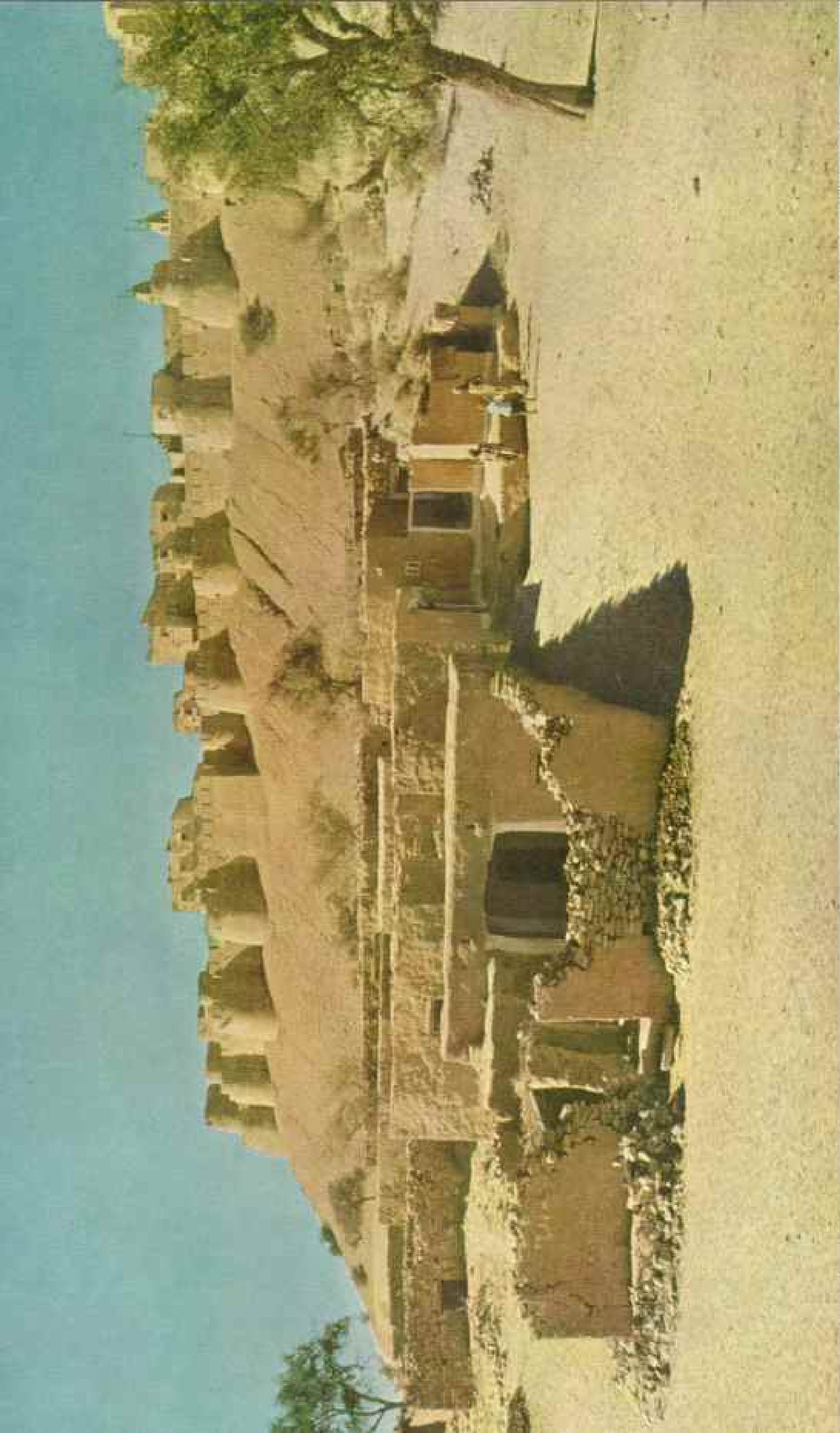
Now the hunt assumed its most dangerous aspect, for it was necessary to finish off the wounded beast, and this was up to the hunters on the elephants.

At a signal from the head *shikari* the elephants began to surround the piece of jungle where the wounded tiger had taken refuge. The Maharaja's younger brother pressed into the jungle on his beast.



A Rajput Bard, Beard Brushed and Parted, Recites Noble Deeds Like a Viking Skald

From his father, this court poet has learned the genealogy of the royal house of Jaisalmer, one of the States of Rajputana. His sagas glorify the knightly chivalry of the Rajputs, India's aristocratic warrior caste.



Jaisalmer's City Wall Is Besieged by the Implacable Indian Desert. Decaying Homes Reflect Drought's Advances

This bastioned fort, stronghold of ancient Rajputs, guards a templed city known to few travelers.

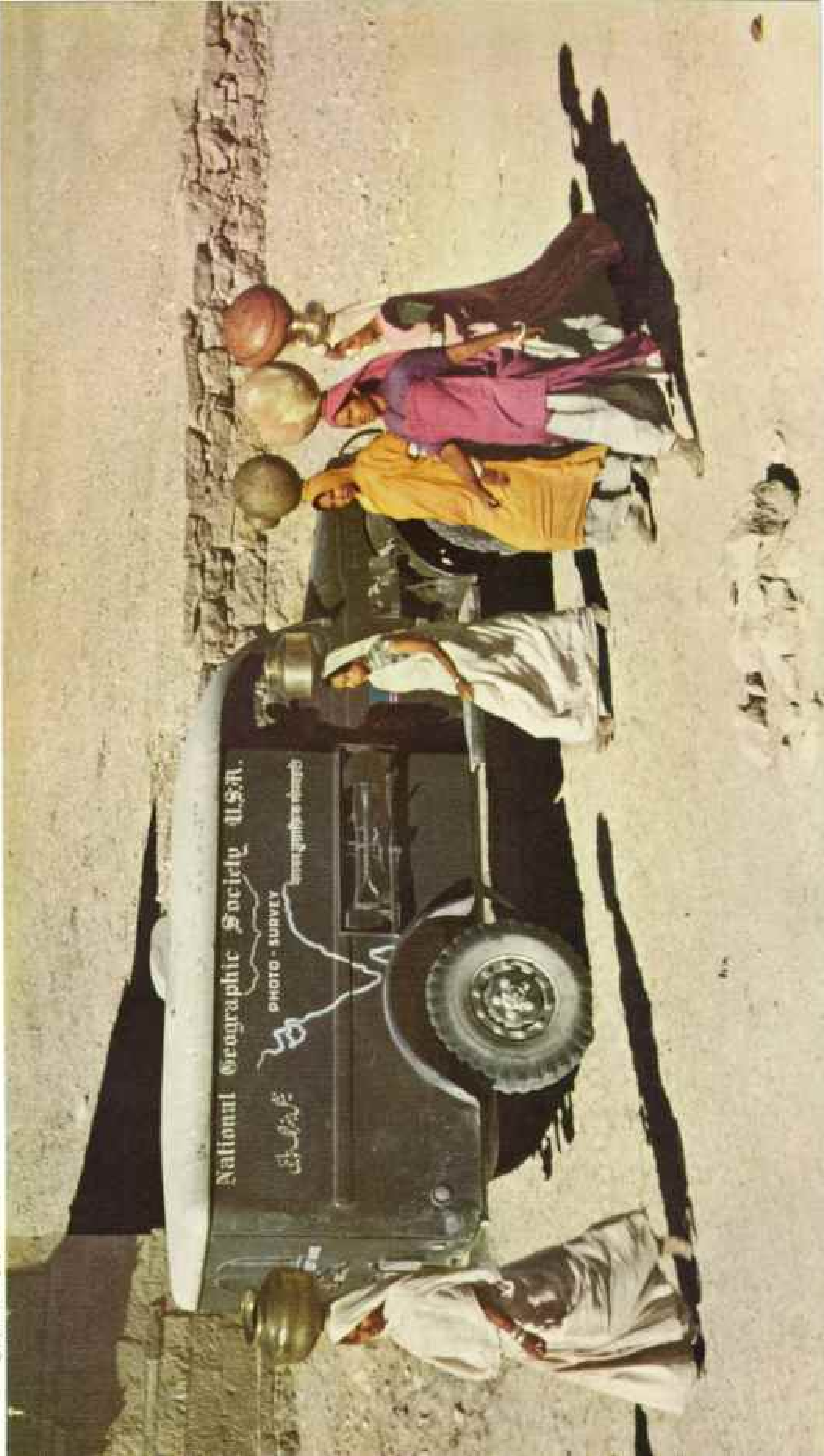
So Scarce Is Water that Housewives March a Mile and Back with Vessels of Brass or Clay on Their Heads

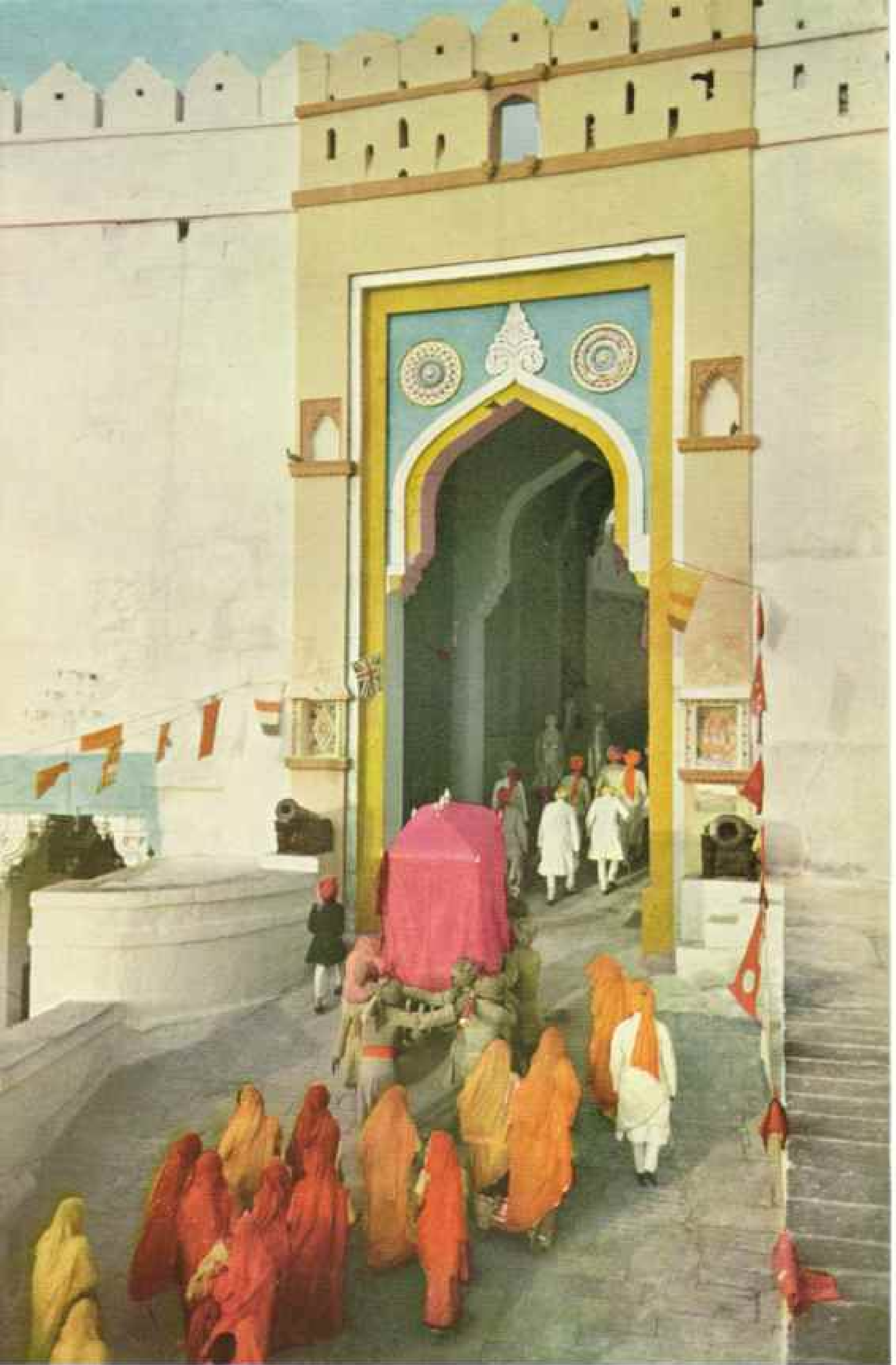
Bound for a lake outside Jaipur, these women pass the National Geographic Society's photographic-survey car. Originally a United States Army ambulance, the car was bought by The Society from the Indian Government at a surplus war material storage yard in Calcutta. Mr. Wentzel converted it into a combination mobile headquarters, photographic supply house, and hotel! In it he has been traveling extensively for The Society across the length and breadth of India and Pakistan.

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Photographs by Vishnu Wenzel





A Bride Princess Is Borne by Palanquin into Jodhpur Fort After Her Wedding



© National Geographic Society

Kolachanassee by Volkmar Westzell

★ **A Special Train Awaits the Bridal Couple and Their Guests at Jodhpur Station**

Garlanded with flowers and tinsel, the second coach is reserved for the happy pair to take them on their honeymoon. For 80 miles beyond rail's end they will go by horse and camel over sandy, barren desert.

✦ **Jaisalmer Rejoices. Bridal Attendants March Singing in the Wedding Procession**

Lancers, fire dancers, sword players, Army tanks, dancing girls, gaily bedecked elephants, and an Indian bagpipe band precoded them. Dense crowds packed the narrow streets.





Behold the Bridegroom! Prince of Jodhpur, Richly Jeweled, Rides a White Horse into Jaisalmer

On this occasion he alone is entitled to the dignity of a mount. All others, even the maharajas, follow on foot.

Arrayed in Medals, Swords, and Jeweled Turbans, the Nobles of Rajputana Parade in the Wedding March

These princes dwell in feudal splendor. As Rajputs (literally, king's sons), they inherit a knightly tradition. As they marched through the streets, they tossed silver and gold pieces to the cheering spectators. Many of the ruling houses of Rajputana are closely linked by marriage.

© National Geographic Society

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Illustration by Koffman Westcott





Lancers and Riflemen Guard the Palace, Where the Bride Is in Purdah

Watching closely from my machan, I saw the tiger, which apparently had leaped out of nowhere, on the flank of the young man's elephant, clawing its way upward behind the frightened beast's ear. Quicker than it takes to tell, the rider shot the ferocious animal at close range. It dropped to the ground. Examination later showed it was a female about to give birth to five cubs.

Later I had time to wander about the famous pink city of Jaipur. Rambagh Palace is not far from the north gate, but in the heart of the capital stands the ancient City Palace (page 446), surrounded by other State buildings.

Women Observe Purdah

Highest of these is the pink nine-story Hall of the Winds, with a confusing façade of countless small latticed windows, all curving outward from carved stone frames. Here, in days past, women of the Maharaja's *zenana*, without being seen, could peer down upon the crowds in the streets and view festivals and parades.

All women in the *zenana* were held in strict purdah, screened and secluded from the eyes of the public. The present Maharani usually observes purdah when she is at the City Palace, in contrast to her freer movements at Rambagh.

All the buildings in the palace grounds are connected by courtyards, passages, and gateways.

Also within the walls is an elephant corral, more than an acre in extent, where in the past several hundred elephants were kept. Now it confines only a few. At one point atop its massive stone wall is a tower from which the maharajas and their guests sit to watch elephant fights below.

Also within the palace grounds stands the largest of the five observatories built by Jai Singh II, philosopher and astronomer of the 18th century and founder of the city.

Like the palace buildings, houses throughout the city are painted rose pink. The wide main street is flanked by scores of these colorful homes, all with balconies and latticed windows. Side streets are crowded with the shops of artisans—workers in gold, silver, stone, brass, and ivory.

In contrast to these ancient surroundings are the modern sewage system, electric lights, and water supply, to a large extent the work of British engineers.

As the time for the Gangor Festival approached, an air of expectancy permeated Jaipur. This ancient rite is held in honor of Gauri, the goddess of abundance.

In accordance with the wishes of the Maharaja, tradition is strictly observed in the Gangor Festival. His only concession to modern ways is in his attire. He wore his military uniform for the occasion.

While the elaborate parade was forming in a rear courtyard, I made close-ups of some of the Camel Corps members, the painted and richly caparisoned elephants, the drummers and the floats (pages 438 and 443), from the rear of an open touring car.

The Maharaja drove "backstage" in his own costly custom-built car to see that everything was proceeding according to schedule. I inquired whether he could suggest a vantage point from which I could photograph the parade.

"Follow me," he said, and drove rapidly through a special gate reserved only for the use of His Highness. My driver followed in his wake, shattering all protocol, but orders were orders. The Maharaja found a spot for me in the market place close to his reviewing stand.

Like many festivals in India, this one began about 6 p.m. when the heat of the day had somewhat abated.

The main street of Jaipur was thronged with onlookers; housetops were covered with additional hundreds of spectators. Youngsters shouted, danced, and waved paper streamers and images of the goddess. Vendors sold *burfi*, an Indian sweet.

From atop the palace wall came a trumpet flourish (page 443). The panoplied elephants led the way, followed by the Camel Corps. Highlight in the colorful procession was the statue of the goddess, borne on a float by a score of men and preceded by a drummer on horseback. Red robes predominated in the long procession.

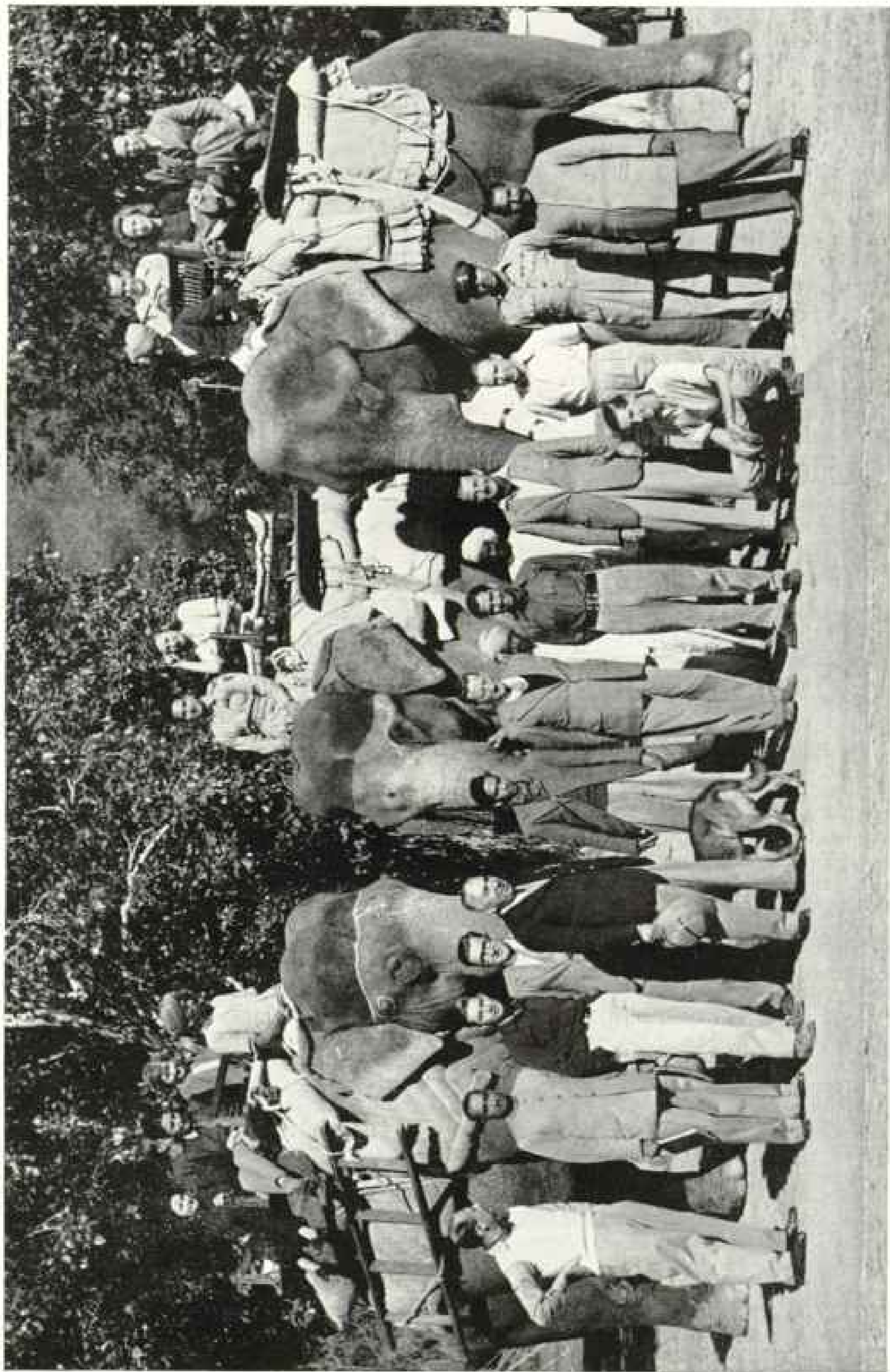
Dancing Girls of Amber

Backdrop for the procession was the deserted capital of Amber, five miles away, with its spectacular ruins standing boldly in the light of the setting sun.

This ancient city was known to Ptolemy. In 1037 the Rajputs captured it and made it their citadel for seven centuries, until it was supplanted by Jaipur.

When I visited the ancient ruins things were somewhat in a state of confusion, with workers busy among them, for today the old capital is being restored by the Jaipur Archeological Department.

After the procession, as night was falling, I was among those invited to the palace gardens. A huge carpet had been unrolled on the lawn and servants brought out chairs.



Returning from a Tiger Hunt, the Maharaja of Bundi, British Field Marshal Sir Claude Auchinleck, and Party Pose with Their Elephants
Furniture members of the party remain in their reserved howdah seats from which they watched the hunt. A wounded tiger was shot as it clawed its way up the flank
of one of the elephants (page 418). The author is third from left; the Maharaja, right center, and Field Marshal Auchinleck to his right.

Only men were present because of strict observance of *purdah* at City Palace.

The dancing girls, spectacularly clad in saris of brilliant hues, emerged to entertain us. An Indian orchestra, with ancient sitars, *tumbas*, and other native instruments, furnished weird music.

Each girl wore a *tika*, a spot of powder, on her forehead. In bygone days the *tika* stood for caste or subcaste. Today it is a decorative formality. The *tika* usually is made from a mixture of powders and spices, and the customary color is red. However, its color often is changed to match the wearer's sari—to black, or orange, or perhaps to a small piece of gold or silver tinsel.

Palms of the dancers' hands and soles of their feet were dyed red. For mascara they used a black paste called *kajal*, with an herb-like scent. Their perfume was attar of roses.

The morning after the festival the Maharaja arranged an elephant fight and a tiger fight for his guests.

The former was held in the elephant corral within the palace grounds. From our seat in the tower we could see an angry elephant chained at the far end of the corral. Just below us was another. But when they were released they refused to fight, despite prodding and the setting off of firecrackers.

Finally the mahouts, bearing an effigy of a man, advanced towards one elephant. The beast charged and they fled, leaving the dummy behind. The elephant seized it, tossed it high into the air with his trunk, then trampled it when it fell, giving a rough idea of what would happen to a man who got in its way. This infuriated the beast sufficiently to attack the other elephant, and they butted each other for a few moments and entwined their trunks. However, their ardor soon cooled (page 415).

More spectacular was the tiger fight, held in the Jaipur menagerie on a man-made island surrounded by a moat.

We lined up in safety along the outer edge of the moat as a man-eater, captured in the jungle the night before, was released in the arena. Then another tiger, which had been in captivity for a few weeks, also was released. When he spotted the newcomer he promptly jumped into the moat and swam around vigorously (page 416).

Finally, tiring of this, he emerged and was immediately attacked by the man-eater. A furious and bloody fight ensued, but it was over in a few moments as the newcomer found the neck of his opponent and killed him.

Then a small Indian sloth bear was released in the arena. The man-eater had

tasted blood and rushed at once to the attack.

But to my amazement, the little bear rose on his hind legs, growled ferociously, and slapped out with his small paws. The tiger pulled up in surprise.

Four times the tiger returned to the attack; four times the little bear engaged in his desperate bluff, and he won. The tiger, after its last attempt, turned tail, climbed high into a plane tree, and refused to descend. The little bear was unharmed.

Before dinner we were guests at an international polo match (pages 444 and 445).

One of the polo guests was the Jam Sahib, Maharaja of Navanagar, one of the world's foremost gem experts. In his honor the State jewels of Jaipur later were to be displayed for his inspection at a luncheon.

To my delight, I was invited to attend. Arriving at the palace with a companion a few moments before the appointed time, we were escorted to an ornate building, open on all four sides, formerly a council chamber. We entered a large room with a raised platform at one end.

On the platform stood a big table, at least 40 feet long, with rich coverings. I immediately assumed that this was the luncheon table and that the function to which we had been invited was a large and formal affair. A turbaned servant armed with a sword stood at the head of the table.

The Author Sees a King's Ransom

As other guests, including the Jam Sahib, arrived, we crossed the room and ascended several steps to the platform. As the top of the table came within eye level I gasped with astonishment. Definitely no luncheon was to be served here. For arranged on the table in dazzling array lay the rarest jewels of the State of Jaipur—literally a king's ransom of some 150 pieces.

The rare sight beggars adequate description. There were several superb *katars*, or Rajput daggers, with finest steel blades and handles inlaid with gold and precious stones; several curved Rajput swords, jewel-encrusted from top to bottom, one a present from the Mogul Emperor Akbar; an 18th-century cane, concealing a sword, which was decorated in famous Jaipur enamel and goldwork with miniature scenes of tiger and leopard hunts.

Half a dozen pearl necklaces, each with from six to eight ropes of matched pearls, were on display, together with flashing diamond necklaces in which the stones were the size of a robin's eggs. Near them lay several diamond-studded clasps for turbans, embellished with long egret feathers.



Baggage-laden Indian Travelers Jam into a Coach to Swelter in 110° Heat

First-class passengers are more fortunate, for their compartments are cooled with blocks of ice. But for overnight journeys all must supply their own bed linen. Rajputana railroads, largely State-owned, are incredibly crowded.

The Jam Sahib picked up one gorgeous diamond necklace and fingered the stones.

"Twenty-three carats," he would say of one to the court jeweler, and then, "twenty-five carats" of another. So expert was he that he came very close to the actual weight as officially recorded.

The Jam Sahib pointed out to me the old Mogul style of cutting diamonds. Each stone had scores of tiny facets. The diamonds also had a yellowish cast.

Tiaras and bracelets, encrusted with diamonds, emeralds, rubies, sapphires, and other precious stones added their brilliance.

Only here, and in a few places in the palace grounds devoted to religious uses, was I forbidden to bring my camera.

During the luncheon, my host asked me if I was aware that within a few days the son of the Maharaja of Jodhpur was to marry a princess of Jaisalmer. He told me that I should not miss such an event while I was in

Rajputana and that if I would like to attend, he would fly me to Jodhpur in his plane.

Of course I agreed, and we made arrangements to depart the next day. He assigned a State driver to take my ambulance as far as Jodhpur.

Princess "Mickey" Accompanies Us

The next morning I arrived early at the modern Jaipur airport, ready to board the private plane of His Highness—a C-47 beautifully furnished inside in tones of red and tan. It was equipped with a small bar and kitchen, and sleeping quarters.

The Maharaja soon arrived, and a few moments later the Maharani drove up, garbed in chic slacks. She was accompanied by one of the princesses, known to everyone as Princess "Mickey"—a charming lass about 15 years old. The princess was to make the trip with us, and so was our old friend "Rabbit," the aide-de-camp.

Sketch from *Three Linn*

Barefoot Chuddar-draped Water Bearers Trudge Homeward in a Burning Sun

Water is scarce here in Jodhpur on the fringe of the Indian Desert. It comes usually from a public well. On a platform around its opening, villagers squat at all hours of the day, bathing, gossiping, and washing their clothes, pots, and pans. Before returning home the women fill their containers by lowering them by rope into the well. Then they carry them home with the grace of a movie star. Flowing head shawls, or chuddars, are large square pieces of cloth.

His Highness has an official pilot, a Parsi with a splendid war record in aviation, but he took the controls himself and had me sit beside him in the co-pilot's seat. As we soared over the ancient Rajputana landscape in the lavishly appointed plane, I thought of myself as riding on a magic carpet over romantic lands.

Soon we skirted Sambhar Lake, and the Maharaja pointed out to me the great salt-producing area. As we went on, the land grew hillier, and soon we were crossing the crest of the northern Aravalli Range. On the other side we approached the small, formerly British, Province of Ajmer-Merwara, and the most sacred lake in India, Pushkar, where the Hindu god Brahma is believed to have been reincarnated.

Ajmer itself was an isolated British province in Rajputana, and still is an independent

political entity, with a representative in New Delhi. It has a large Moslem population. The city is about 1,700 feet above sea level and is the seat of big railway shops where thousands of Hindus and Moslems are employed. These are the only shops in India manufacturing locomotives, though additional shops are now being built elsewhere.

A famous old mosque, known as the "Hut of Two-and-a-Half Days" also stands in Ajmer. Tradition tells that it was built in that length of time by supernatural powers.

Fort Looms Up Like Battleship

Even before I had stopped thinking about Ajmer, our plane was well beyond it and flying westward over the barren Indian Desert. Soon out of the desert haze rose the huge ancient Jodhpur Fort (pages 437 and 439), and our 200-mile flight was coming to an end.



Teacher Shows Her Intent Pupils How to Count on an Abacus

Ranging in age from four to six years, they are members of the A class in a Bundi girls' school. To operate an abacus, the counters or beads are moved on the wires. One row of counters represents units, another tens, and other rows have increasing values. Contests recently were held between expert abacists and operators of modern calculating machines. In a Tokyo exhibition, a Japanese abacist won; in a New York contest, two Chinese abacists were defeated.

The fort resembled a battleship in a sea of sandy waste. On another prominent elevation near by stood the new palace of the Maharaja, an enormous and ornate building of monumental architecture.

We landed at one of the most modern airports in India, one which was a busy way station during the war for overseas planes from Karachi to Delhi (page 436).

Waiting to meet us was His Highness, Maharaja Sahib Bahadur. He was garbed in a flowing robe of geranium red. He greeted his Indian guests Hindu fashion, by putting the palms of his hands together, fingers pointing upward. This greeting expresses all the warmth of our handclasp. However, since I was a Westerner, he shook hands with me.

The Maharaja of Jodhpur was the first of the Indian princes to become a skilled airplane pilot. In addition to his enthusiasm for flying, he also was an accomplished polo player and big-game hunter. I have since learned of his untimely death.

In a big maroon touring car I was taken to

the State Hotel and there, in the afternoon, I received from a messenger a huge gold-bordered and embossed invitation to attend the pre-wedding ceremonies to speed the bridegroom on his way to Jaisalmer, and an invitation to attend the wedding itself. My friend, the Maharaja of Jaipur, had graciously made my attendance at both possible.

The bridegroom was the third son of the Maharaja, Maharaj Kumar Shri Hari Singh Ji Sahib. He was to be honored at festivities in the ancient fort. A few inquiries at the hotel soon revealed to me that white tie and tails were prescribed dress. I had my dinner jacket, and knew I would have to make that do. But I also discovered that I was expected to wear a hat. The son of the hotel manager hustled about and produced a little pork-pie hat which he lent me for the occasion!

Just before dusk I started for the palace, along with other guests. Walking up the palace ramp, I felt a little ridiculous in the hat and short jacket, but the shadows were falling and I was not conspicuous.



They Carve Stone Elephants for the Tomb of Bundi's Late Maharaja

A boy apprentice watches his master's expert hand guide the cutting tool. When Bundi's ruler died in April, 1945, the heir apparent, Lt. Bahadur Singh, was with his regiment, the 5th Probyn's Horse, fighting for the liberation of Burma. He had just been decorated for heroism in action. Regretfully he left the front to take up his duties as ruler of his tiny Indian State in Rajputana.

At the palace a long procession gathered to escort the bridegroom to the fort. Rajput royalty led the way in a gay and festive parade, followed by the court ladies carried in richly covered palanquins closely screened to keep the occupants in strict purdah (page 422). Across the big fort was a huge electric sign reading, "Long Live the Bridegroom and Bride."

As we gathered on a balcony at one edge of the fort, where we had a view of the entire city, the festivities began with a display of fireworks.

At this point His Highness entered. He was dressed in full princely regalia, with a bright orange *pagri* (turban) and a decorated sword. He was accompanied by the Maharaja of Jaipur, who had brought me to Jodhpur. Because of the hurried trip, he had no change of clothes. His open shirt and sleeveless khaki sweater contrasted strangely with the

rich dress of the other Rajputs and the formal attire of British guests.

A troop of nautch girls and an Indian band enlivened the scene. Huge trays of refreshments and special Indian sweets prepared only for wedding festivities were passed. Each guest also received a garland of flowers.

After dark the party broke up, to depart in small groups for the temple of Tija Maji, in the heart of the city, where a religious ceremony was to take place. The streets were crowded and the people were in festive mood. Everywhere were special decorations and lighting effects. We were conducted to seats in front of the temple.

Bridegroom Rides White Horse

Soon the ceremonial procession came into sight. The Jodhpur lancers led the way, followed by five dancers, sword players, the Jodhpur Infantry of Africa fame, dancing

girls, gaily caparisoned elephants, and an Indian bagpipe band.

At the end came the bridegroom, astride a spirited white horse and garbed in finest brocades covered with golden tinsel. He proceeded into the temple and the public festivities came to an end.

The next day the wedding party went on to Pokaran, about halfway to Jaisalmer, by special train (page 423). Here the narrow-gauge track came to an end; so the last stage of the journey, about 80 miles, was made across the desert by camel and horseback.

The rulers of Jodhpur and Jaisalmer, had they wished, could have transported the entire party of about 75 in automobiles or by air. But wedding ceremonies must be carried out in accordance with tradition.

State weddings are old in Jodhpur history. The House of Jodhpur is connected by marriage with the Indian States of Udaipur, Jaipur, Jaisalmer, Rewa, Bundi, Sirohi, Narsingharh, and Navanagar.

I drove across the desert, accompanied by a State driver. The first 100 miles to Pokaran were covered in three and one-half hours.

The rest of the trip was rough and slow, over sandy, barren desert. At infrequent intervals we came upon small villages with conical straw huts, or others with houses made of stones loosely piled upon one another. These desert people were unkempt in appearance, and their animals—camels, cattle, goats, and dogs—seemed scrawny.

Some of the communities apparently had seen better days, for they were enclosed by stone walls. One was bastioned.

As we continued, the road grew worse. The ambulance plowed through deep sand pits, and I was thankful for the powerful front-wheel drive which enabled us to get through.

Then, about 4 o'clock in the afternoon, we sighted Jaisalmer Fort (page 420).

On the plain outside the ancient desert citadel stood a huge tent city erected for the wedding ceremonies. It made a gay appearance. Flags flew from each tent and bunting festooned them. In the city the hospital and some of the office buildings also were decorated with flags, lights, and streamers.

The camp was a center of much activity. Tremendous quantities of rice and curry were being cooked in big caldrons in the kitchen tents. Some of the caldrons were 6 feet in diameter. I hurried to the assembly hall, where all the maharajas had gathered.

At the end of the hall sat the bridegroom, flanked by his father and by other relatives and dignitaries. All were seated on chairs of solid silver. Bearers passed refreshments.

Soon word was given to form the procession. The bridegroom left the hall and mounted a white, richly panoplied horse (page 424). Behind him the maharajas, dressed in their rich Oriental costumes, took their places to follow on foot (page 425).

A score of beautiful dancing girls (page 423) gathered around the groom. The maharajas held silver and gold pieces, which they pointed toward the bridegroom, signifying a blessing, and then tossed to the dancing girls.

The band struck up the Jodhpur and Jaisalmer national anthems, and the parade started toward the fort. Camels, horses, elephants, gaily decorated carts, and a rejoicing mob of people followed.

The rays of the setting sun silhouetted all the people who were perched on balconies, rooftops, and other vantage points to see the spectacle (page 435).

A spectacular display of fireworks greeted the arrival of the bridegroom. Rockets, peacocks, sputtering cobras, images of men and women, and revolving trees were flashingly outlined in the pyrotechnic display. People shouted, bands played.

At one end of the courtyard were the zenana quarters. There, at the entrance, and dressed in a long golden robe, stood the Maharaja of Jaisalmer. The bridegroom, amid cheers, was led to the entrance, dismounted, and was greeted by his future father-in-law.

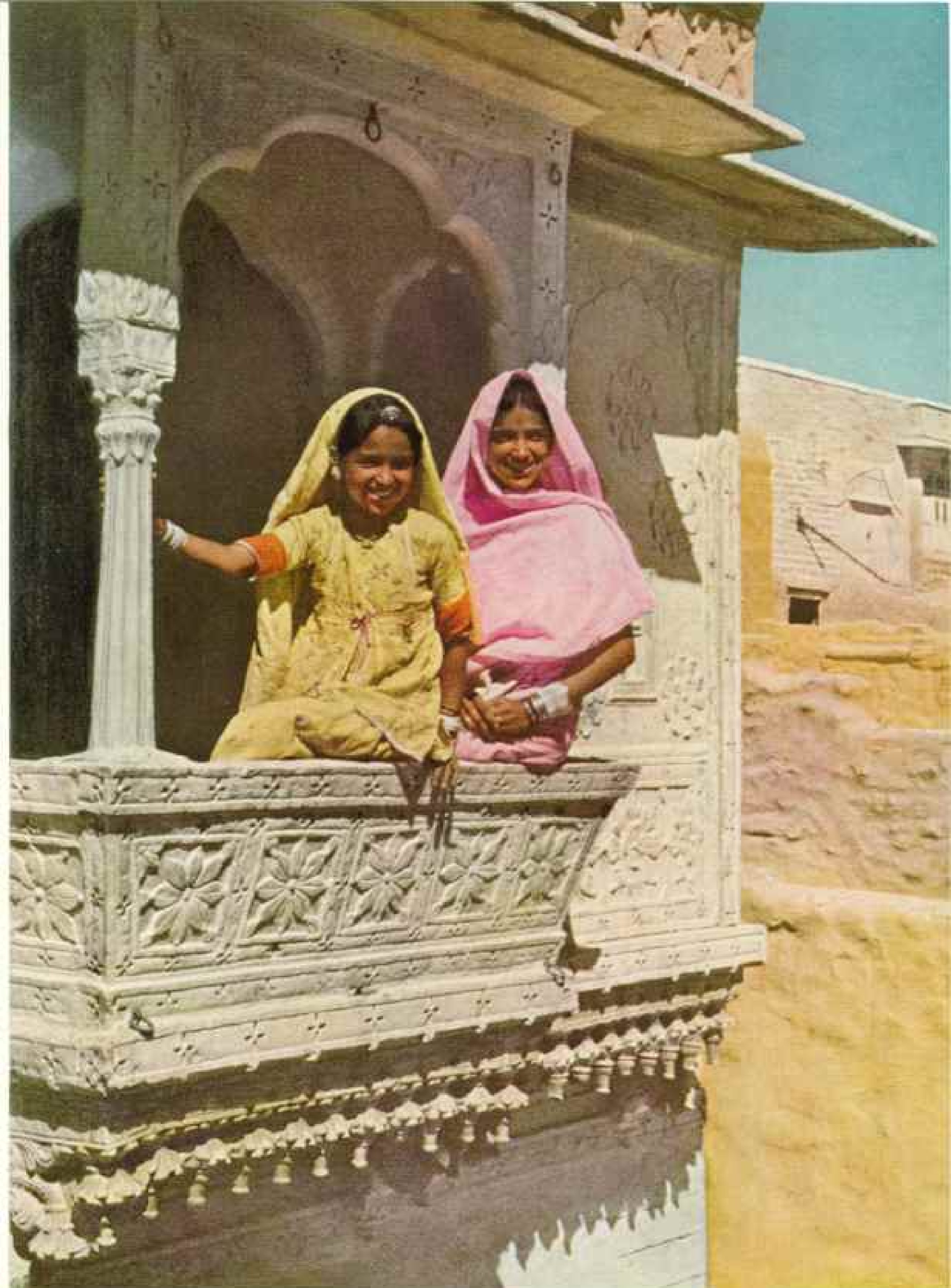
The parade had reached its destination and, so far as the public was concerned, the ceremonies were at an end. Only relatives, women, the bridegroom, and the Maharaja of Jaisalmer were admitted to the zenana quarters (page 426).

Along with the other guests, I passed into a large room where visiting maharajas were being entertained.

As I entered, the Maharaja of Dhrangadhra, with a regal gesture, ordered a bearer to supply me with refreshments. This was most welcome, since I had had nothing to eat or drink since K rations at noon.

After a pleasant chat, I retired to my quarters. Tired as I was, I could not sleep soundly. Through my head passed a kaleidoscopic vision of princes and princesses, elephants, dancing girls, parties, camels, deserts, poverty-stricken villages, diamonds and emeralds, caldrons of food, fireworks, a sea of turbans, jeweled swords, golden robes, airplanes, oxcarts. Rajputana's feudal splendor left my head in a whirl.

For many other articles and photographs of India see the NATIONAL GEOGRAPHIC MAGAZINE Cumulative Index, 1899-1947.



Smiling Sisters Watch the Pageant of India Pass By Their Balcony

In this desert city of Jaisalmer most buildings are carved from base to top. Its stoneworkers find employment all over India. Owing to a population decline, many homes are silent and shuttered.



JODHPUR

DG518

A Fanciful Caravan and Facets of Hindu Mythology Divert the Eyes of Travelers at a Gate to Jodhpur Fort

An airplane flies without wings (left); an elephant bears candleabra on his tusks; dwarf cattle pull a gun carriage. Approached from the air, the ancient fort resembles a battleship riding high in a sea of sandy waste (page 439). It contrasts strangely with the new, huge, and ornate palace of the Maharaja near by.

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Illustrations by Yokoyama Wenzel





Royal Elephants Wear Fancifully Painted Faces at the Festival of the Goddess Gauri in Jaipur.

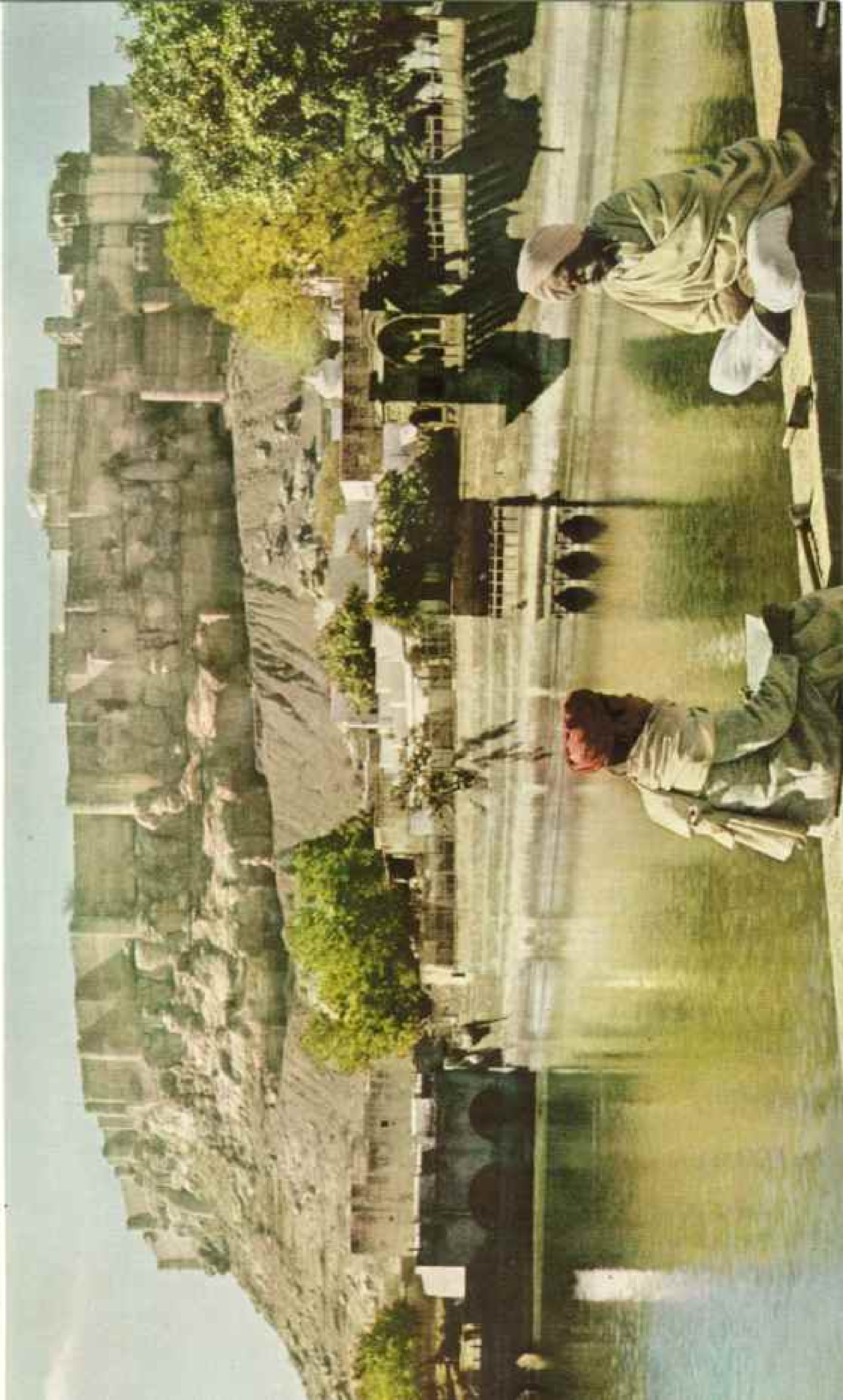
The Maharaja's pampered beasts receive better care than many babies. Lesser elephants do taxi duty for his subjects at the celebration.

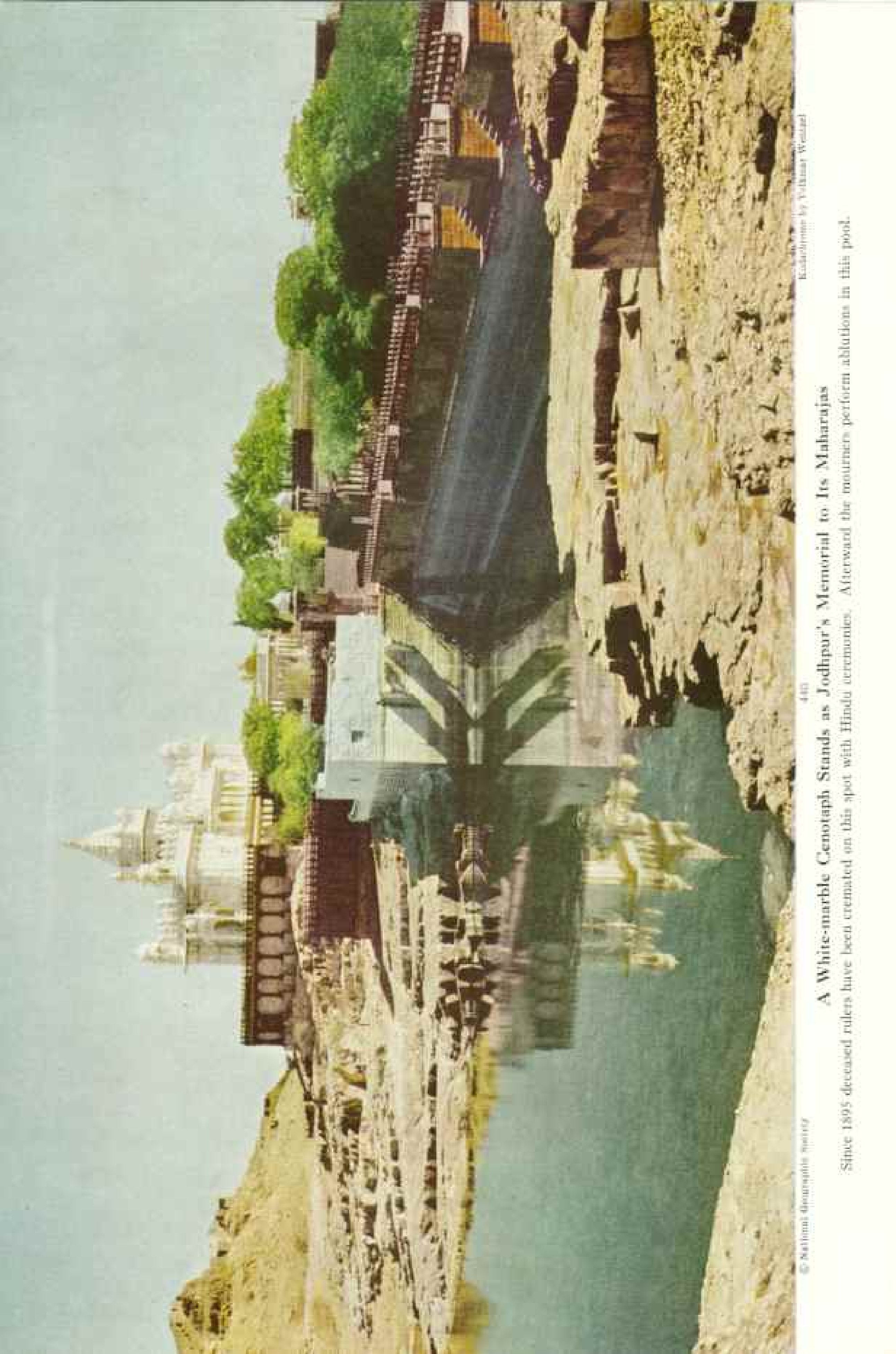
Jodhpur Fort, Crowning a 400-foot Hill, Has Yielded Once to Starvation, Never to Assault, in Its Five Centuries

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Illustration by Vishnu Varma





A White-marble Cenotaph Stands as Jodhpur's Memorial to Its Maharajas

Since 1895 deceased rulers have been cremated on this spot with Hindu ceremonies. Afterward the mourners perform ablutions in this pool.

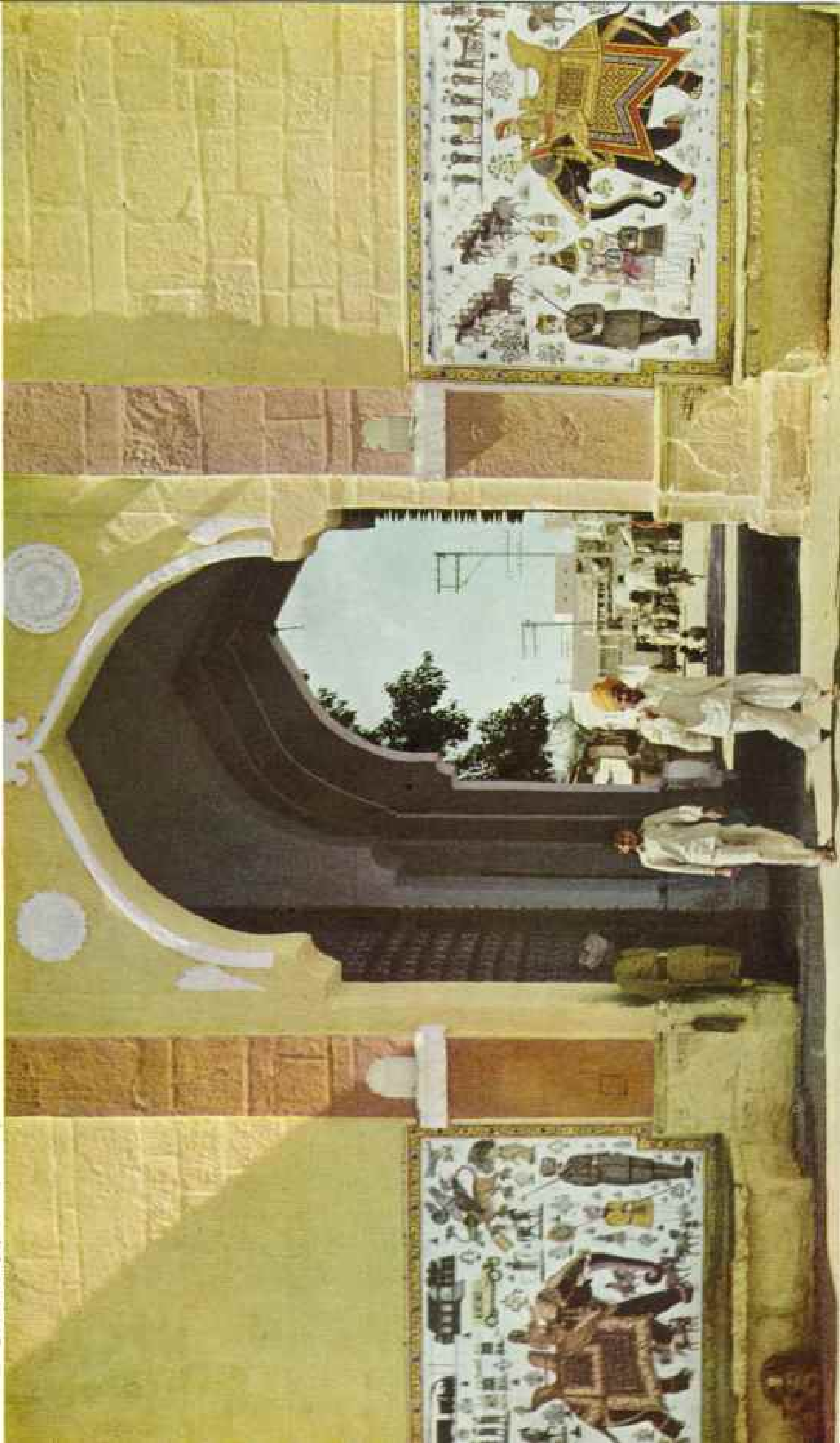
Jodhpur Proudly Decorates Its Gates, Though the Old City Wall Is Falling into Ruins

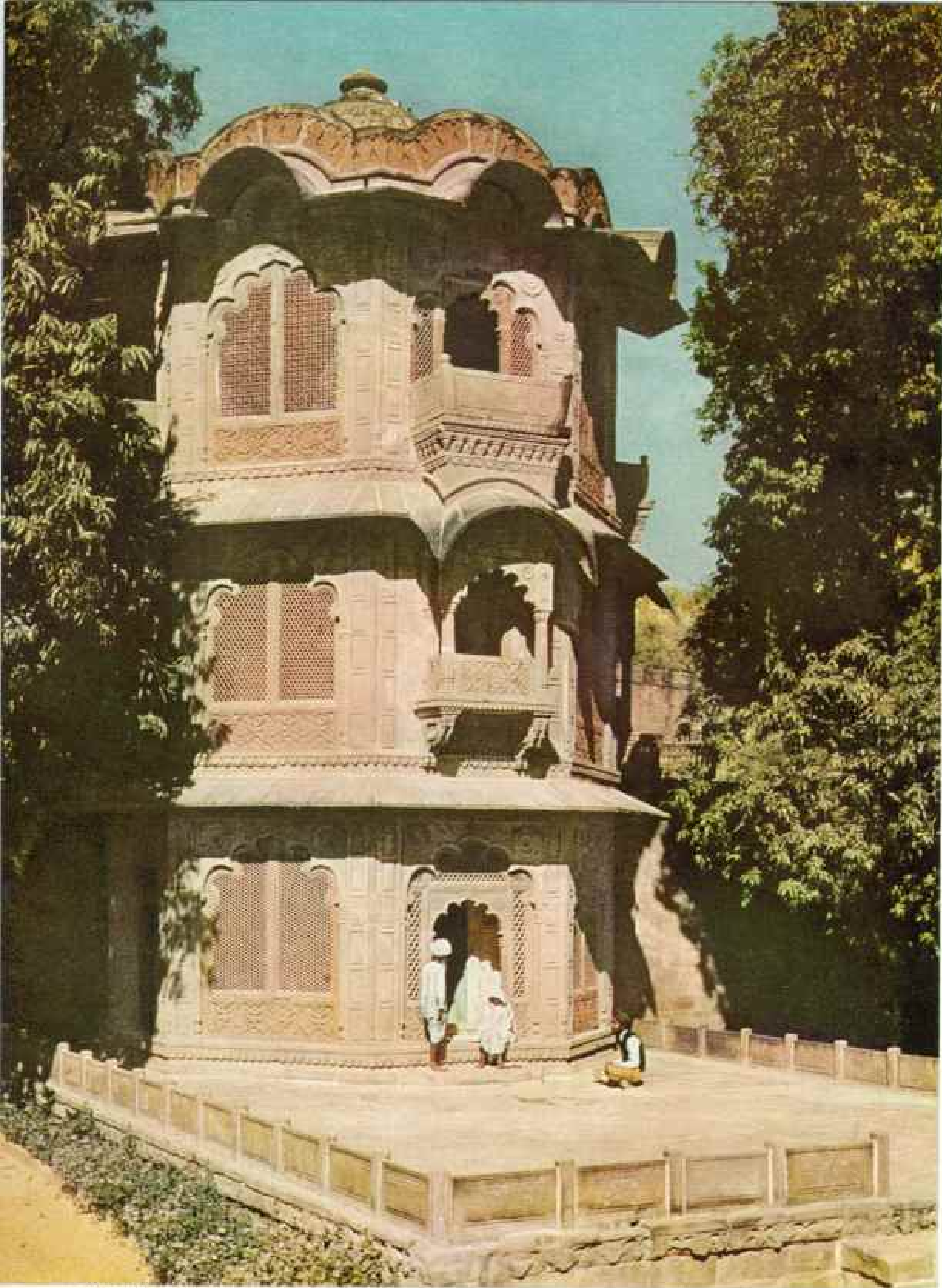
Protruding from each gate, swung back inside the tower, is an array of spikes intended to discourage running by war elephants. The doorway opens into a bazaar street.

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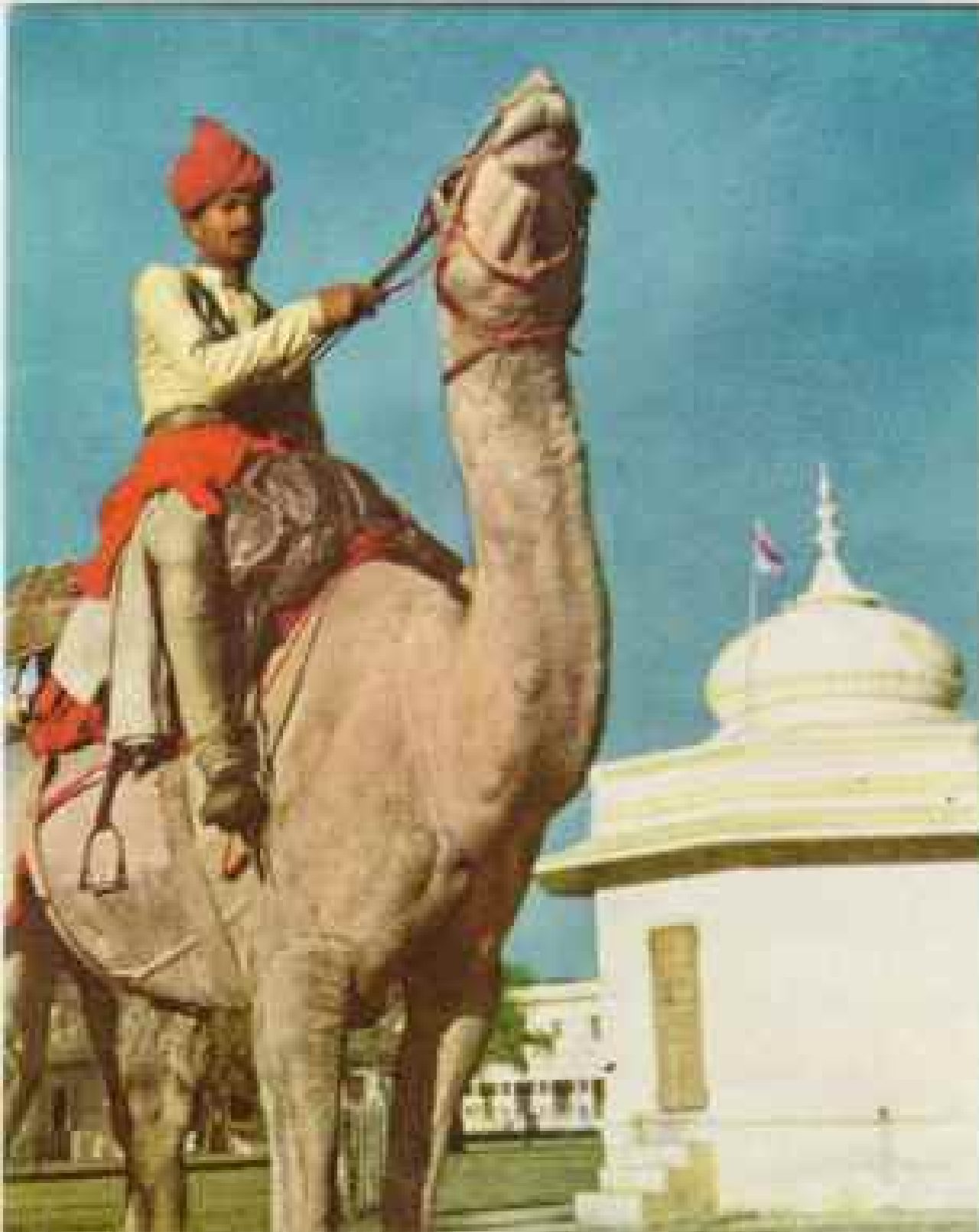
441

Illustration by Voltaire Werrant





In Abandoned Mandor Stands the Pagodalike Hawa Mahal, a Monument to Antiquity
"Palace of the Winds" is aptly named because window screens of carved stone give good ventilation. This dead city, five miles from Jodhpur, was the capital of the Parihar princes until the Rathor Rajputs captured it about 1395.



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Kodachromes by Volkmar Wenzel

A Trumpet Flourish Calls Jaipur, Rose-pink City, to the Gangor Festival

Centuries-old tradition is observed in the annual rite, held in honor of Gauri, the goddess of abundance. Crack Camel Carpenters have a place of honor in the elaborate procession which will pass along paved streets 111 feet wide (below). The city's main avenues, laid out with mathematical precision, are flanked by palaces of Oriental fantasy. Houses, towers, and temples all are of one color—rose.





The Maharaja (Seated, Center) and Maharani (in Blue Sari) of Jaipur Entertain Members of an Australian Polo Team

Like other parts of City Palace, the veranda is lavishly decorated in the style of the Mogul (Mongol) conquerors of India (page 446).

One of India's Loveliest Queens

The Maharani is modern-minded. She often dons slacks (opposite page).

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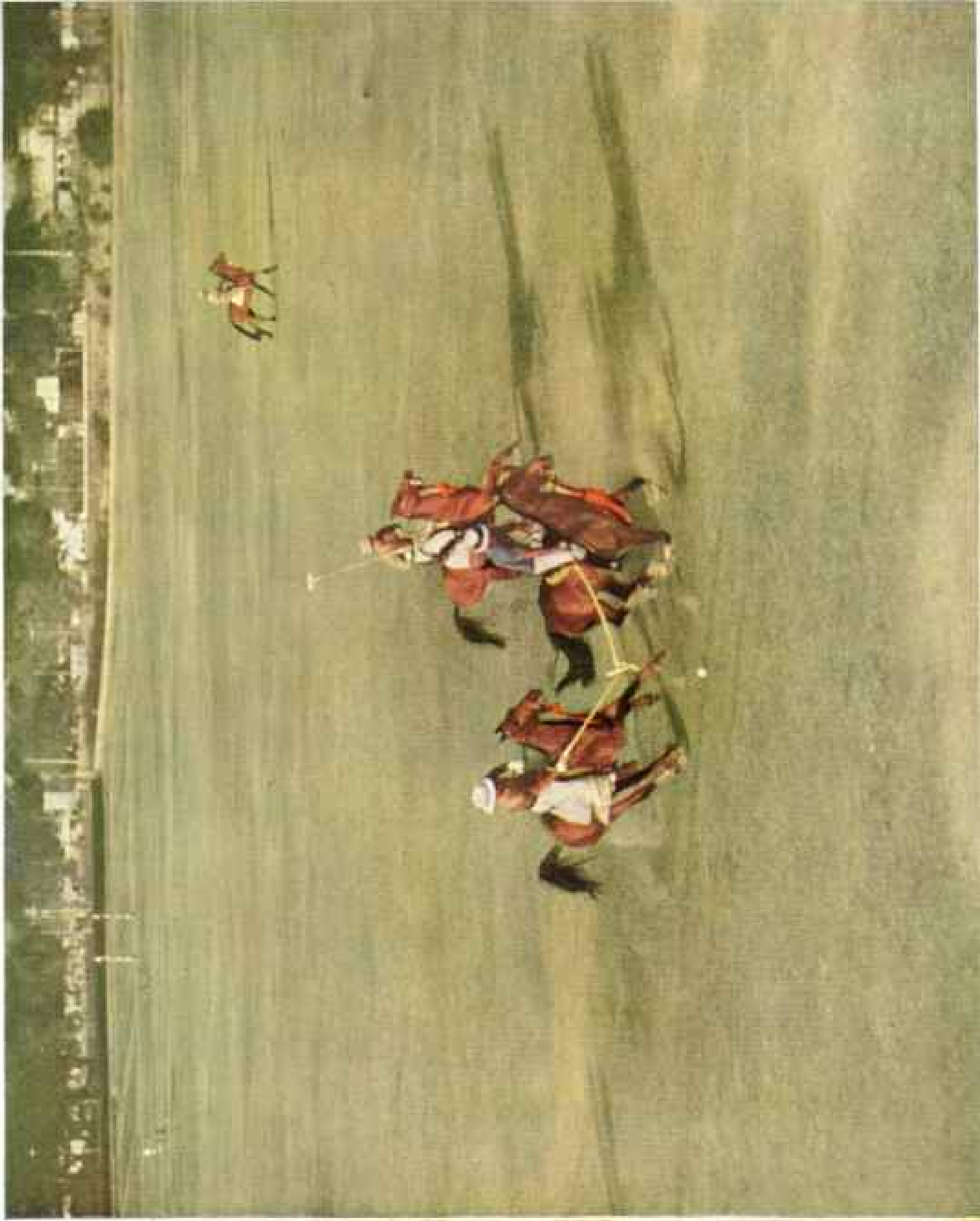


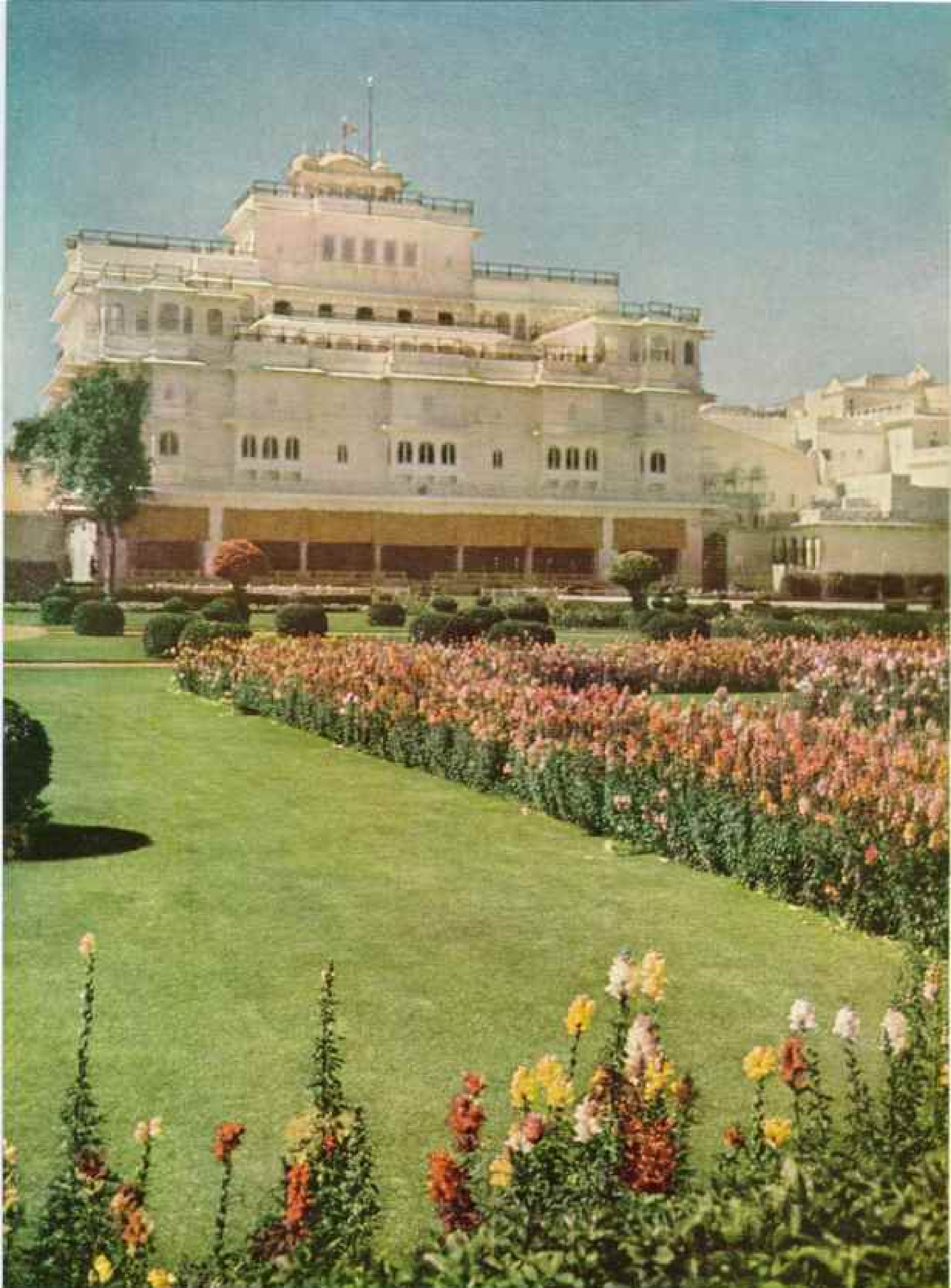
Jaipur's All-Rajput Team Engages Australia on the Polo Field

Their mallet-swinging Maharaja (left) is one of the world's leading players. Complete with ponies and equipment, the all-star Australian team was brought to India by the Maharaja as his guests. The Rajput team won the match.

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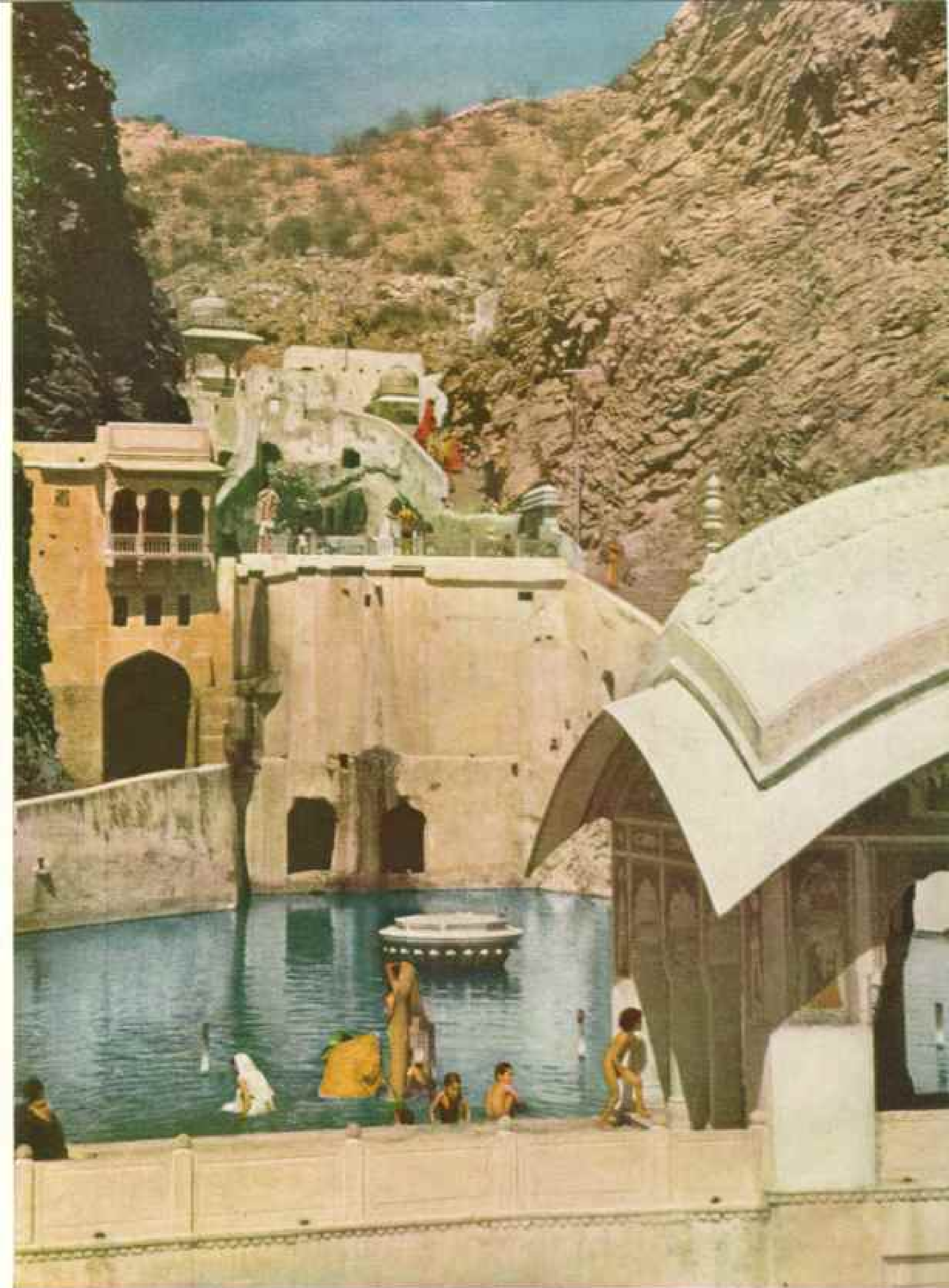
Robertson of Villmar, Austria





Luxurious City Palace and Its Pleasure Grounds Cover a Seventh of Jaipur's Area

As a guest of the Maharaja, the photographer saw sari-clad girls dancing barefoot on the palace lawn by night. Performers, flowers, and illuminated fountains created a fairyland atmosphere.



Hindu Pilgrims Gain Religious Merit by Bathing in the Sacred Tanks at Galtaji

In this temple-lined gorge, high above Jaipur, spring water flows through a series of terraced pools. Fifteen centuries ago a saint performed penances here. Now the spot is almost as sacred as the Ganges.



Cattle, Monotonously Treading a Ramp, Raise Well Water to Irrigate the Parched Fields of Ajmer-Merwara Province

This primitive system satisfies the country's needs; efficient motor pumps might drain the underground reserves.

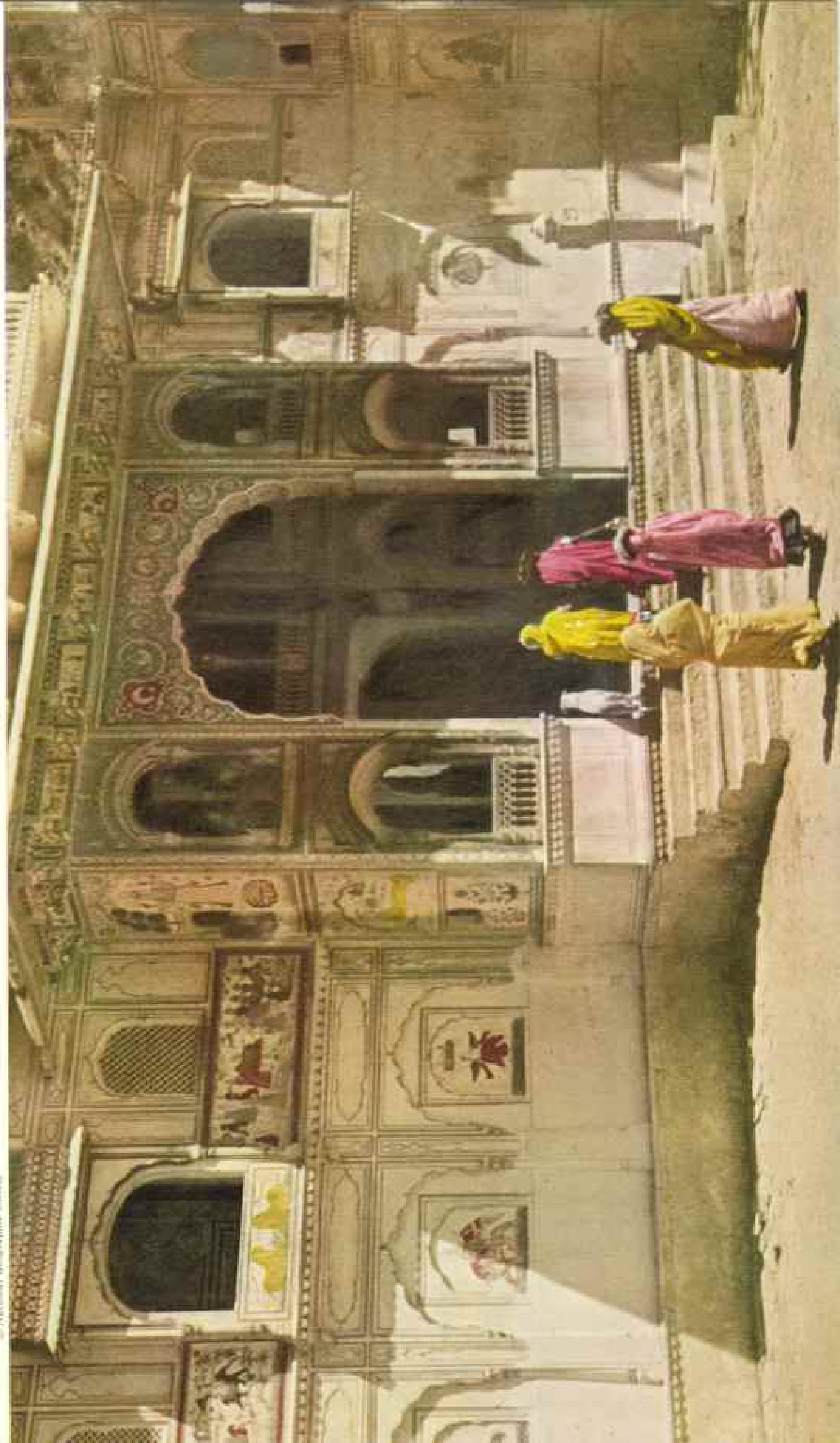
Galta Temple Is a Shrine to the Sun-god, a Deity of the Rajputs, the "Fire-born Race"

The ornate building stands on a hill overlooking the valley of Galta, a pass in the hills east of Jaipur. Balcony and windows usually swarm with langurs (black-faced, long-tailed monkeys). They willingly accept grain from the extended hands of pilgrims.

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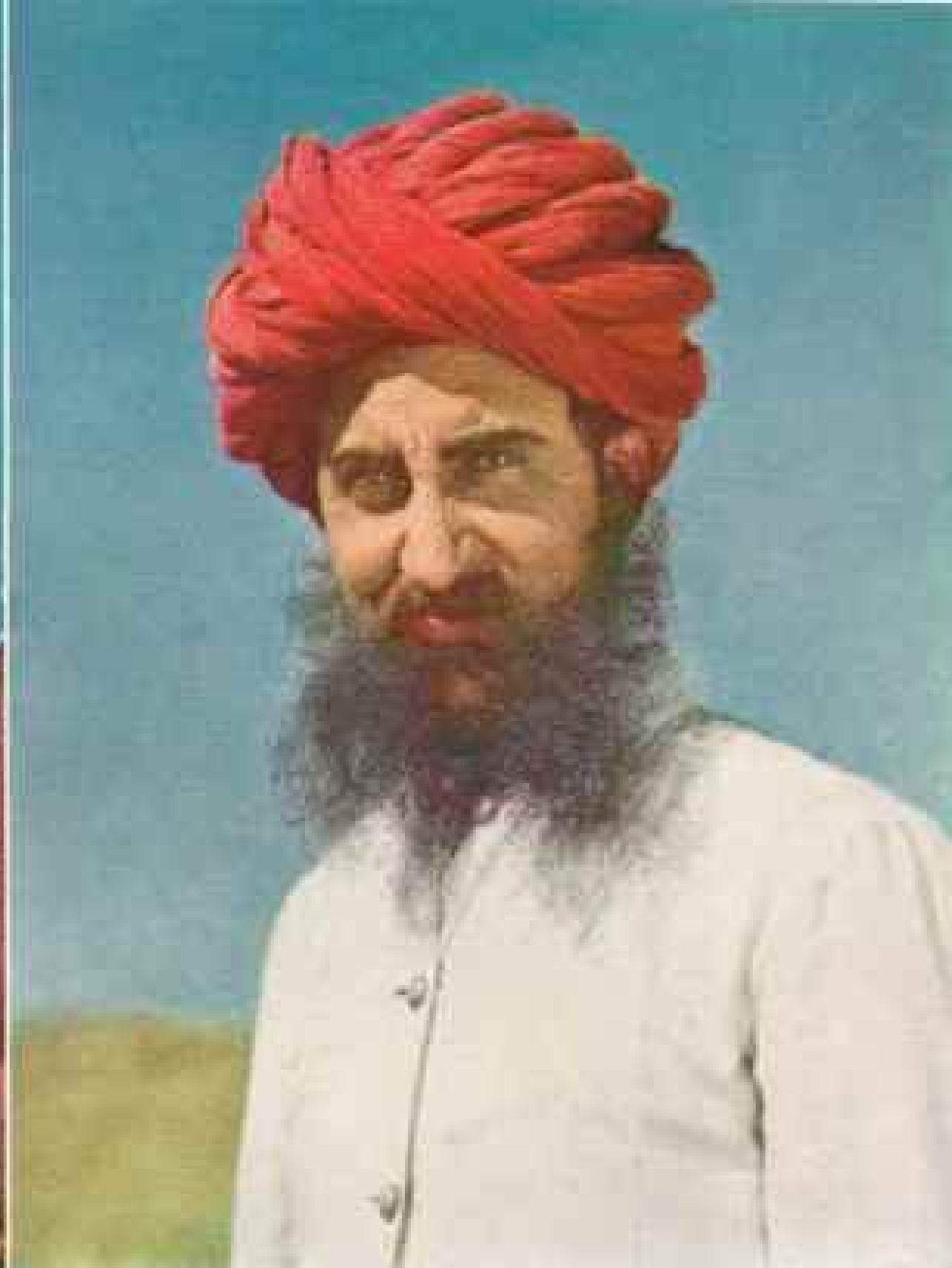
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Kodakrome by Volkmann Westcott





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Kachchwan by Yollmar Weitzel

Jodhpur Girls Spin So Men Can Wear Fanciful Turbans

The Camel Corpsman, upper left, is proud of his position and his carefully set mustache. The worker at right wraps his red turban in peasant style. Below, the girl at left is a shy apprentice, learning her craft from an experienced spinner as they sit alongside the curb to advertise their master's wares. Jodhpurs, close-fitting riding breeches, which originated in this Indian city, were brought to the world's attention by British Army officers.





A Walking Museum of Antique Weapons Is This Guardian of the Palace in Bundi

Scimitar, lance, dagger, canteen, bow and arrows outfit the bearded servitor in the Maharaja's armory. He stands among the fortifications of this Rajput citadel. City walls rise in the background.



Tigers and Elephants Brighten the Community House of the City Sweepers, Who Dwell as a Caste Apart

At the noon hour women gather on the balcony, men swap stories (right), and pigs glean the yard (left). In modern Bundi, outside the old walls, broad avenues are flanked with Government office buildings, a public park, the big State Hotel, a hospital, and a new motion-picture theater.

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Illustration by Vladimir Wainreb









Progress Invades Feudal Bundi. College and Soccer Games Are Signs of the Times

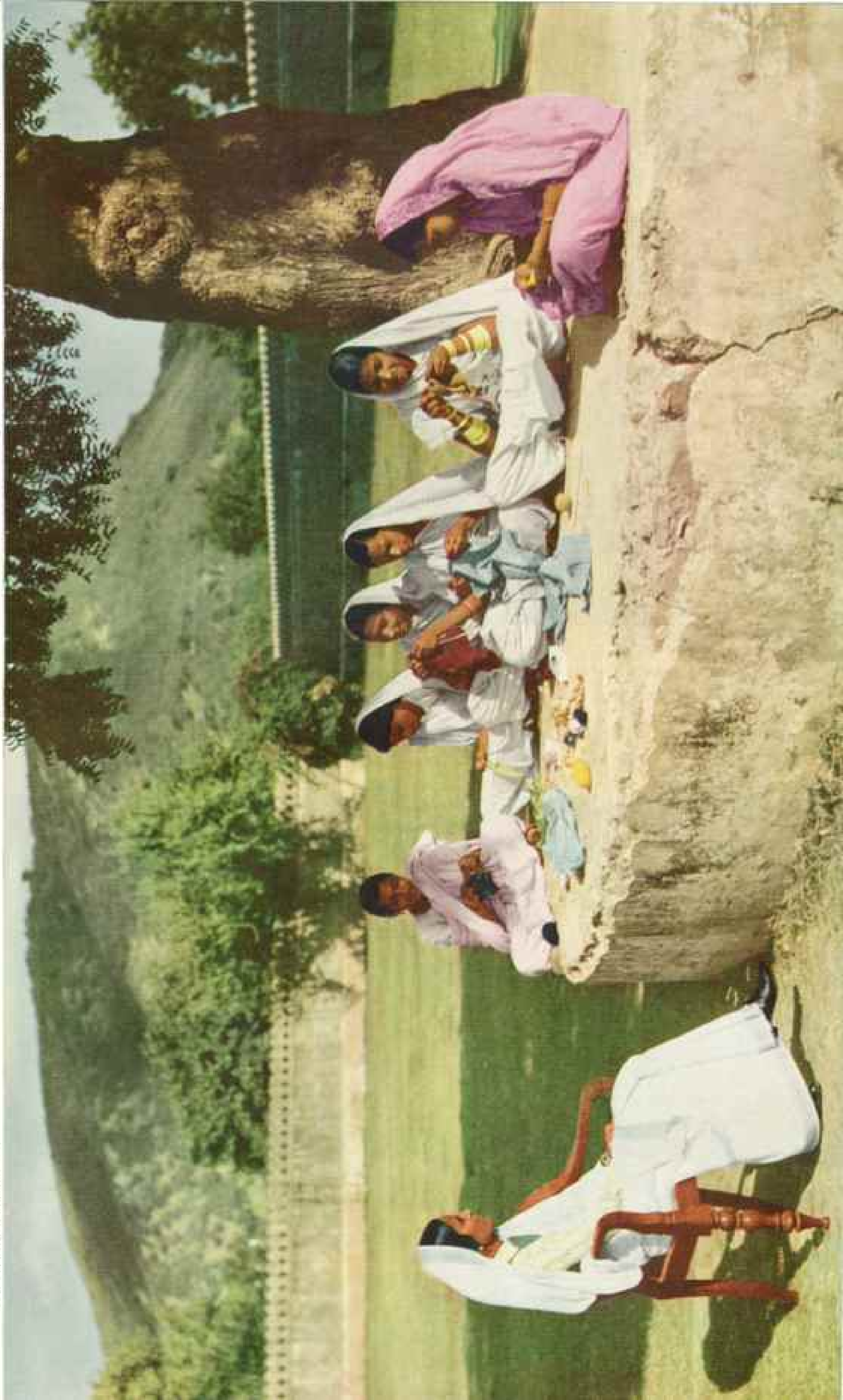
At recreation hour, students and teachers line the playing field, porch, balcony, and roof of Habendra Intermediate College.

A Secluded Sewing Class Moves Outdoors for Its Portrait. "Why, I've Never Seen This," Said the Bondi Maharaja on Viewing the Picture

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Illustration by Volkmur Westphal





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Kodachromes by Volkmann Westcott

✦ **A Holy Man Quits His Jungle Hermitage to Squat Outside a Bundi Temple**

In his forest home he spends hours daily in meditation. Berries are his chief food. Here he plays on a guitarlike sitar. His necklace is made of nuts.

✦ **Dyed Cloths, Dripping Colors, Hang in the Bazaar Like Monday's Wash**

Seated beside his dye vats on the sidewalk, a merchant haggles with a prospective customer, perhaps over the seven yards of material needed for a turban.



Aroostook County, Maine, Source of Potatoes

BY HOWELL WALKER

With Illustrations from Photographs by the Author

THROUGH a hundred miles of unchanging wilderness I drove toward Maine's northernmost county. An occasional startled deer or a white-throated sparrow's lonely call intensified the forest solitude.

Abruptly I broke out into Aroostook's open fields. Tractors and planters rumbling over furrows killed the stillness I left behind. To me the fresh-turned earth smelled as good as land to a sailor long at sea. Here spread a new and different kingdom, governed by potatoes, worked by sturdy folk even now settling a frontier.

In the Heart of Spud Land

Late spring had just melted snow that covers Aroostook half the year; so farmers sped the planting of their soil. I raced the June sun into the heart of the spud country.

Woodland still grips nearly two-thirds of the county, larger than Connecticut and Rhode Island combined. Yet its tilled strip grows 90 percent of Maine's potatoes. And this one county's yield is more than the entire potato crop of any other State (map, page 463; 464).

In the one-crop realm some 94,000 people live, work, talk, eat, dream, gamble spuds. Yearly yields and changing prices can mean the difference between Cadillacs and worn-out shoes.

Warm days, cool nights, and even rainfall favor the region between June and September. Blessed with these ideal growing conditions, it has never experienced complete crop failure. Remoteness from principal consumers, however, makes transportation a problem.

Aroostook's pay dirt is silt-loam soil of limestone origin. One hundred and twenty miles long and a fourth as wide, the potato empire runs north and south close to New Brunswick's border on the east. The clearing carved from heavy forest reveals ground virtually perfect for its purpose (page 472).

On acreage about one-fourth the area of Rhode Island, Aroostook in 1947 grew a bushel for every two and a half persons in the United States; it produced nearly one-seventh of the Nation's 384,407,000 bushels.

I stopped at a farm near Presque Isle to watch a tractor-drawn planter. In a single operation the machine dribbled sliced tubers and fertilizer along rows which its disk plows covered with soil (page 468).

"The seed," said farmer Kilpatrick, running his hand over cut-up spuds, "is practically disease-free. It was tested in Florida last winter and certified by Government inspectors. This year I'll use about 600 barrels on my 60 acres."

And he hoped to harvest 9,000 barrels or better.

For seed, potatoes were quartered, halved, or left whole, depending on their original size (page 468). Some farms relied on mechanical slicers, but I found Claude Tardif and his wife on the manual job. They sat inside a barn at the end of an inclined trough full of potatoes. With automatic skill each pushed spud after spud against a vertical blade fixed in a block of wood.

The Tardifs didn't raise potatoes; they just cut them up for other farmers. Moving from place to place, they operated as a team on piecework basis. When I saw them, they had knifed their way through 7,700 pecks for a personal slice of \$365.

Farm to Live, but Live to Fish

A brief lull comes to the spud country after planting. Aroostook goes fishing. Brook trout tempt farmers to swirling waters still frigid from winter's ice and snow. In numerous ponds and lakes they troll for fresh-water salmon or fighting togue (lake trout).

About this time I drove to Fort Fairfield to interview a big-scale potato grower. I found his office locked.

"If it's the boss you'd like to see," said a workman, "my bet is that he's gone out fishing."

The telephone waked me early next morning. Sleepily I accepted a potato salesman's invitation to try for salmon the following day. As I dressed, I began to realize that most Aroostookians raise spuds to live, but really live to fish.

The waitress who served my breakfast stared with a faraway look through the window into a raw drizzle.

"Gee, I'd like to go fishing," she sighed against the pane. "Weather's just right for it."

While having a haircut, I learned that Ed had wonderful luck at the lake; Pearley pulled a two-pounder out of the river; Sam planned a trip to the Allagash.

I had to go fishing in self-defense.



Steady, Now! An Aroostook Team, Muscles Straining, Competes in a Horse Pulling Contest

The horses, driven by their owner and eyed critically by rival farmers, drag a heavy sledge loaded with sacks of fertilizer. Such events, along with sulky racing, cattle judging, and a blaring midway, annually attract all Aroostook to the Northern Maine Fair at Presque Isle. (page 465).

Larry, the potato salesman, secured his up-turned canoe to the top of his car. On the rear seat we piled extra clothing and fishing tackle. Ahead lay a whole Sunday and a lake with salmon in it. What more could a man of Aroostook want—unless, perhaps, a bumper crop?

But I remembered Gordon Fraser better than the fish we caught that day. At his camp on the edge of Square Lake we stopped for lunch. I commented on the pleasant spot.

"Sure, this is God's own country," Fraser said, "but He doesn't stay here in winter."

Gordon Fraser, however, did.

During summer, Fraser's camp accommodates about 20 sporting guests. From Boston or New York, Cleveland or the Netherlands West Indies they come principally to fish. After the autumn hunting season, Gordon settles down to cut firewood and shovel snow.

To fish remote lakes and ponds in the deep woods, flying boats transport scores of city

sportsmen and local farmers. Small craft for the purpose are based all over the county. When I was there, the village of Portage had a plane for every ten persons living there. The only alternative to reaching destinations in the trackless wilderness by air requires days on foot (page 478).

Solid forest covered Aroostook when the first pioneers pushed up from Massachusetts. Early in the 19th century a handful of settlers reported the vast timber resources of this north country.

However, even after Maine became a State in 1820, the area remained relatively untouched by white men for another decade.* Mostly Indians moved along the river that ultimately gave the county a name; to them Aroostook meant "smooth water."

Then American settlers and lumbermen grew interested in the territory; so did Canada.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Maine, the Outpost State," by George Otis Smith, May, 1935.



Down the Swift, Brawling Allagash Go an Angler and His Guide

In water too shallow for an outboard motor, the guide poles the canoe. Each year the Allagash canoe cruise lures hundreds of Nature lovers and sportsmen to northwestern Aroostook County. It begins at the northern end of Moosehead Lake and ends at the meeting of the Allagash and St. John Rivers, near St. Francis. The route covers some 150 miles of virtually unspoiled wilderness, with numerous portages and white-water stretches.

Axmen began to filter into Aroostook from north as well as south. Hapless Acadians had long been looking for land to call their own.

War Without Blood, Shot, or Tears

Fog of misunderstanding lay thick on Maine's northern boundary. In fact, none seemed to know just what constituted the international frontier. Lumbermen from New Brunswick and Quebec accused Americans of poaching, and vice versa. Persistent disputes over the vague border brought on the bloodless "Aroostook War" of 1859.

For a time, soldiers glowered at each other across the St. John River, but the Webster-Ashburton Treaty of 1842 eased the tension.

Soldier-woodsmen swapped rifles for axes and went back to work in their rightful forests.

As lumbermen opened up Aroostook County, farmers moved in to seed the soil.

In this remote northeast corner of the United States, the potato—native of South America—found just the land it liked. Potatoes thrived. The land produced more than the people needed. But absence of adequate transportation precluded exports to the "outside."

By 1870 local factories were turning the spud surplus into starch. Spurs of a Canadian railroad rambled into the county to handle shipments for Portland and Boston. Still the roundabout routing to American markets didn't satisfy.

Three Peoples Colonize Aroostook

In the early 1890's the Bangor and Aroostook Railroad finally steamed into the region. This convenient link with the rest of the State put Aroostookians on their feet. They had reason to expand their acreage, for they now had a direct way of supplying big consumers.

From then on, Aroostook's name was spud.

Aroostook's potato fields begin where the wilderness leaves off, but more than woods and "inters" make up the county's character. Different as French, American, and Swedish can be, three distinct colonies settle three separate regions. The potato, however, is common to all.

Despite its name, Presque Isle marks the center of the American section. Here people use Yankee slang glibly and eat apple pie with ice cream.

Outside the city I spent much time at the farm of Lewis Christie. With devotion he tilled the potato fields inherited from his father.

When a boy, Lew hoped to be anything but a slave to spuds; so he worked his way through the University of Maine. Graduating at the top of his class, Christie wore a white collar in several office jobs. Eventually, the old blue shirt and potato dirt won him back to the land.

Near Caribou, Ken Powers managed his fourth-generation family farm. He seemed more familiar with its 521 acres than with the 26-room house. After college and a few years of Wall Street brokerage, potatoes brought Ken home to the business he preferred.

Sweden and France in Maine

Towns called New Sweden, Jemtland, and Stockholm drew me into the Swedish colony. I sat in the home of Agnes Anderson, talking with her through an interpreter. In 1870 she reached New Sweden with the 51 original Swedish colonists of Maine, and outlived them all.

At Stockholm the Tall family and I reminisced on their native country. In 1902 Gustaf's father had worked his passage from Sweden to Maine. He held odd jobs around Portland for a year, then moved north as a lumberjack. Later he saw the light of Aroostook; at 82 he was still an active potato farmer.

For dessert I saved my visit to the French area. Church spires dominating the villages of Lille, St. David, and Notre Dame gave the banks of the St. John a French look. Even in such un-Latin-sounding towns as Fort Kent, Madawaska, and Van Buren one commonly spoke French.

Among my friends in this northernmost part of the county were Bouchard, Michaud, Garceau, and Nadeau; Pelletier, Jalbert, and Paradis. I met Pinkhams, Smiths, and Pages, too; and the prettiest, Frenchiest girl of all went by the name of "Scotty" Scott.

Before Aroostook officially belonged to

Maine or the United States, Acadians settled in the St. John Valley. As their axes ripped apart forest, these French, like most people in the county, took up potato farming.

How were they doing today? Well, one farmer quietly told me he'd just received a refund of some \$30,000 on his income tax.

Aroostook farms vary widely in size; otherwise they all look alike. Two-story frame home, barn, and half-sunk potato house float close together on a sea of regularly rippled fields.

In Aroostook's American domain Don Kilpatrick plants 60 acres; a few miles from him Frank Hussey sows several hundred. Most farms in the Swedish realm have an acreage of 30. French-section properties range from tennis-court size to vast hillsides with alluvial flats thrown in.

By the latest limousines or 15-year-old trucks, thousands of Aroostookians converged on Caribou for the annual potato blossom festival, toward the end of July. A number of towns and villages sent their fairest candidate to compete for potato blossom queen of Aroostook County (page 467).

Veterans Settle in Maine Woods

To see the quieter side of Aroostook, Sam Jalbert, guide, and his canoe took me through the heart of the northwest forest. Aside from the maintenance crew at a logging dam, we met few persons during the four-day trip.

Maynard and Earl, two of Sam's sons, lived with their small families in a one-room cabin on remote Round Pond (page 477). The men felled, barked, and hauled cedar trees for telephone poles, while the women kept house and cared for the children.

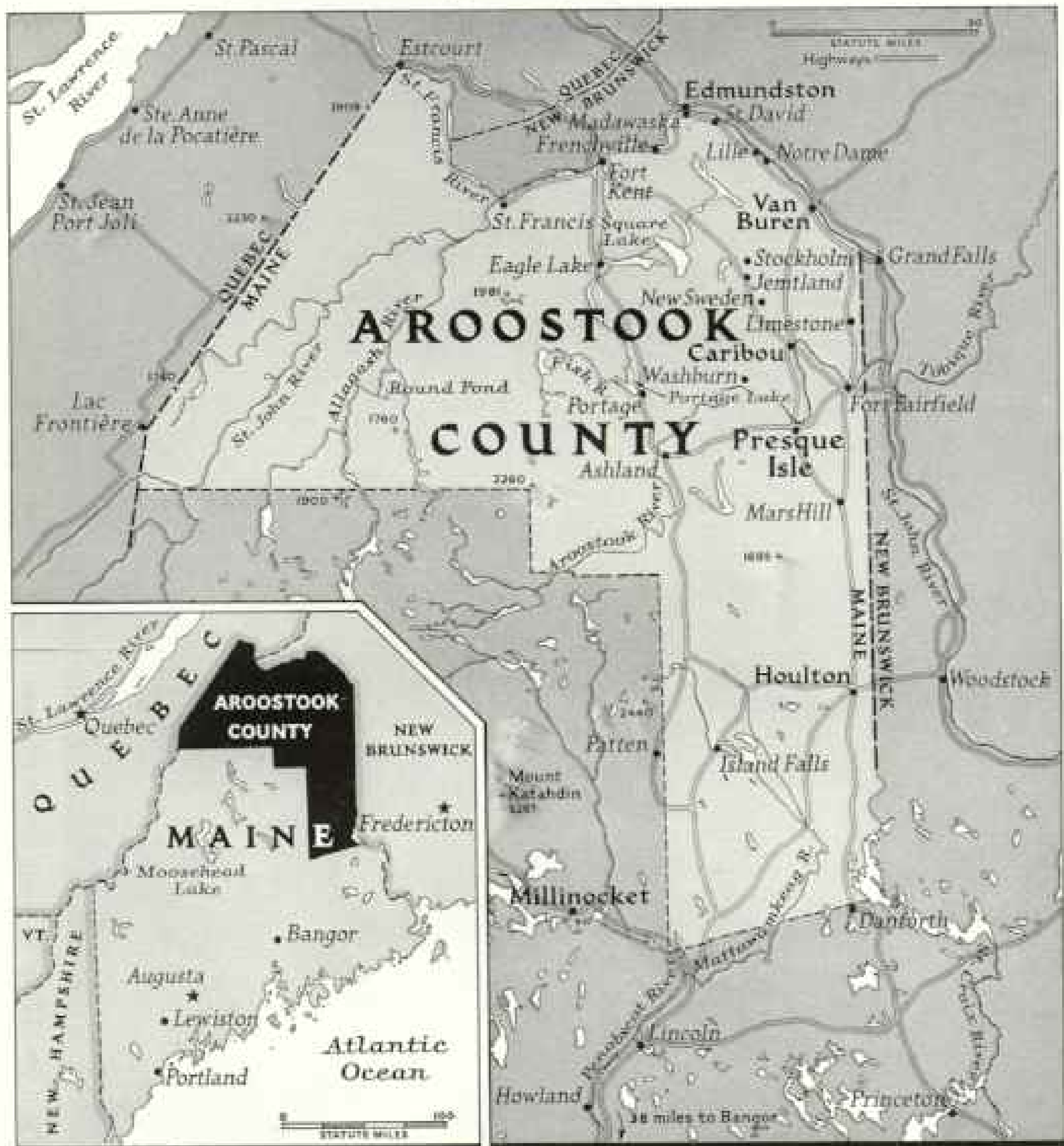
They invited us to share supper at their table, but Sam declined. He knew too well the difficulties of getting supplies to the lonely spot. He wouldn't even accept a cup of coffee.

The brothers had served with the military forces. After the war, they couldn't find a home in civilization; so they took to the woods, each with his wife and two little children. For life in the forest one of the women began with only a picnic background; she was city-born, city-bred.

"This is no picnic," said Earl, who had been wounded at Iwo Jima, "but you gotta make a living somehow."

As a Maine guide, 58-year-old Sam Jalbert knew more tricks of the trade than you could shake a fly rod at. He made pork and beans from a can taste as good as trout we pulled from the river. Our beds of fragrant balsam boughs beat the most luxurious mattresses.

Through rocks and foam of the boiling



Drawn by Theodor Price

The Spud Is King in Eastern Aroostook; Forests Cover Nearly Two Thirds of the County

Presque Isle, Caribou, and Houlton are busy centers of a Maine potato empire about one fourth the size of Rhode Island. The tilled strip has never known a complete crop failure. To the north and west lie vast woodland areas threaded with rivers and dotted with lakes, where hunters and anglers find sport.

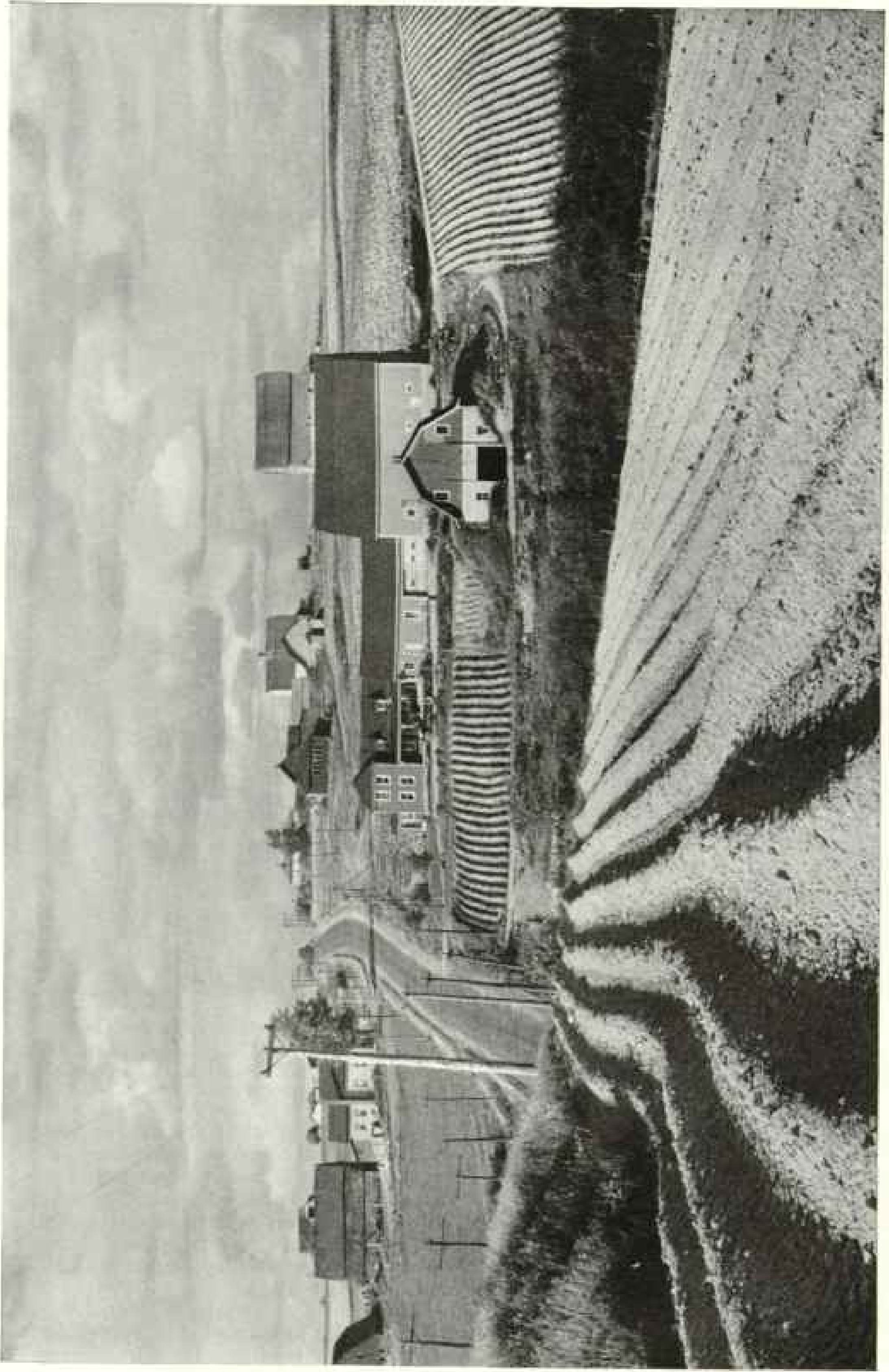
Allagash, Sam handled a canoe with the calm skill that marked everything he did. To prove it was simply a matter of practice, Sam maneuvered the boat over the roughest stretch while standing on his head! (Page 465.)

A "Potato Pickers' Dinner"

But even well-paid Maine guides succumb to the spell of spuds. A couple of months later I ran into Sam at Fort Kent. He invited me to a "real potato pickers' dinner" on a farm employing him for the harvest.

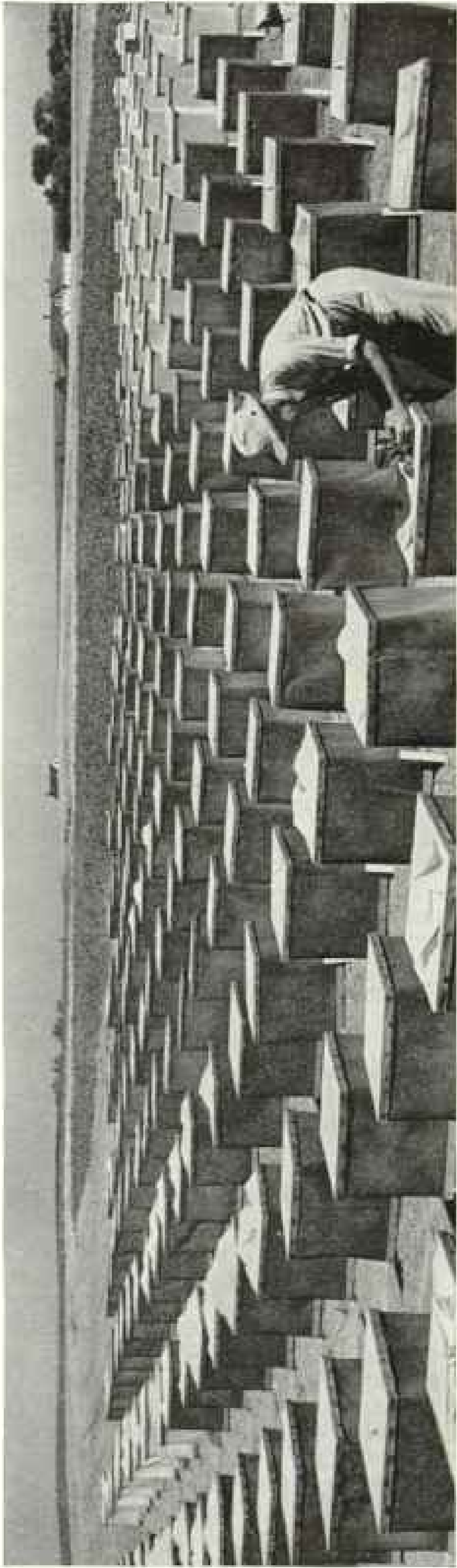
In August the Northern Maine Fair and agricultural Field Day kept me close to Presque Isle. For a week everyone seemed to forsake spuds for Punch and Judy. I joined crowds to watch sulky races, horse pulling contests (page 460), and baby-beef shows and to wander through the blatant midway called "World of Mirth."

Annual Field Day at the Agricultural Experiment Station here brought talk of potatoes in down-to-earth language of the soil. Farmers from all over the county gathered to hear expert



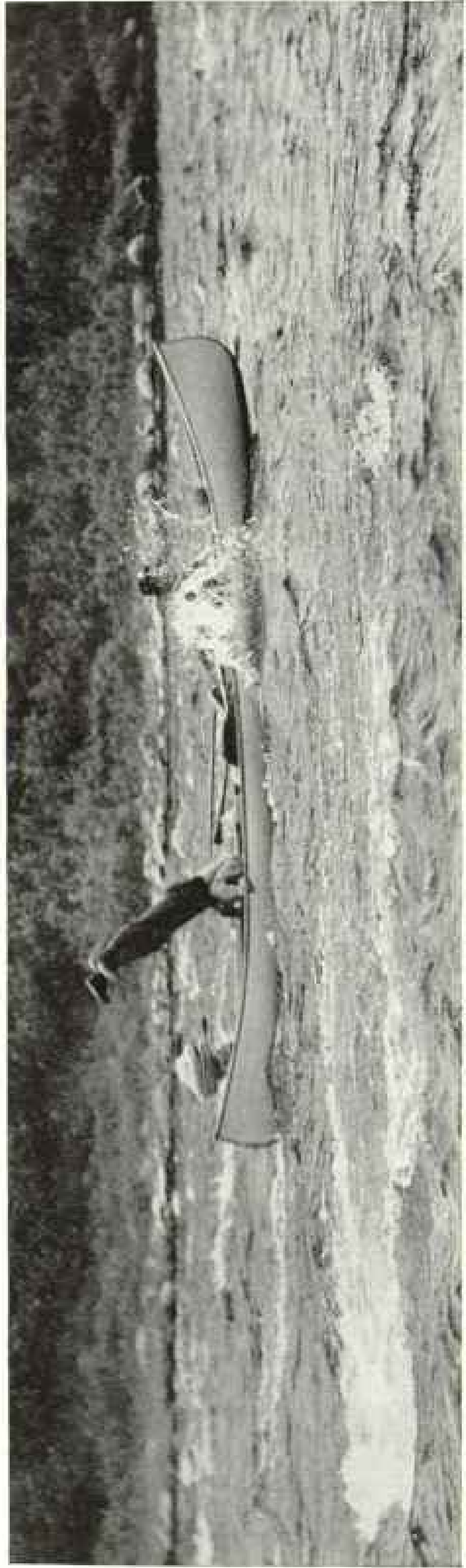
Aroostook's Lime-rich Pay Dirt, Tilled in Long Rows, Produces Nearly a Seventh of the Nation's Potatoes

Silt-loom topsoil of these fields, between Caribou and Van Buren, covers seed planted in June. Harvesting comes in September. The Maine potato empire, a 120-mile strip carved from heavy forest, adjoins the New Brunswick border on the east.



Sheltered by Muslim Tents, "Guinea Pig" Spuds Grow under the Eyes of Watchful Scientists

In these cages at the Agricultural Experiment Station, Presque Isle, potato plants are propagated and tested for reaction to virus diseases.



Guide Sam Jalbert, Almost 60, Knows More Tricks than You Could Shake a Fly Rod at!

Here, to show his contempt for white water, he stands on his head while shooting a rough stretch of the Allagash River (page 462).

advice and to see the latest tractors, planters, plows, and diggers. Like a dragonfly itself, a helicopter dusted plants against insects (page 470). It might replace less maneuverable airplanes as it hovered above local fields for the first time.

Conscientious Aroostook growers comb their foundation stock and certified seed crops for signs of disease. Spraying regularly with Bordeaux mixture-DDT solutions, they beat down bugs, control late blight, and increase yields.

Often I found men, women, and children moving abreast along the potato rows. Each had a bag slung over a shoulder and wielded a long-pronged hand digger. When they discovered an unhealthy plant, they pulled it out, tubers and all; it went into the sack to prevent spread of infection. "Roguing," they called it.

People turned out to rogue as they would to fight a forest fire or to fish. Some even used the term, roguing, to describe an evening of indoor fun. And once when I couldn't find the shoe-shine boy, his boss explained, "Out to rogue . . . but really."

Orchids Grow Wild in Northern Maine

Because Aroostook farmers frequently use between one and two tons per acre, I visited a Caribou fertilizer plant; in a busy year it mixed 40,000 tons of nitrogen, superphosphate, and potash. Byron Hand, a foreman, showed me around. Despite the odor of his work, he lived in a world of flowers.

"Would you be interested in rare orchids?" he asked. "I can find some in a bog seven miles from here."

Byron led over the soggy floor of a forest thick with spruce and black with flies. I stopped frequently to scratch lumpy bites and wonder what I was learning about fertilizer. At last we reached the mossy bed where grew the small round-leaved orchids (*Orchis rotundifolia*). Like tiny narcissus flowers they rose on straight stems, their heads a delicate white flecked with lavender.

I still had more than flowers to find; so I looked into one of Aroostook's 20-odd starch factories. George Washburn, the manager, told me that his plant made a hundred and seventy 200-pound bags of this by-product each day. Examining one of the sacks, I found no mention of potato on the label—just the word "Starch."

"But Presque Isle is printed on the bag," explained the manager. "Everyone knows that means potato."

From Washburn I learned that the adhesive industry uses starch in the manufac-

ture of glues, pastes, and dolls; that it goes into the making of corrugated shipping containers, cushioned wrappers for electric light bulbs, solid fiber cartons, and sizing for paper. One big single use is as a protective sizing for warp threads in the weaving of fine sheetings, shirt materials, lawns, etc.

On the outskirts of Caribou I went through a distillery which in a single day could turn 5,000 barrels of spuds into nearly twice as many gallons of pure alcohol (ethyl). Briefly, the process boils down to washing, cooking, malting, and yeasting, then 52 hours of fermentation prior to distillation.

Potatoes Go into Everyday Articles

This potato by-product goes into the manufacture of such items as antifreeze, cements and disinfectants, paints, varnishes, and their removers, waterproofing compounds, motor fuel, enamels, shoe blacking, and soap. Amazing how many articles in everyday use have original roots in Aroostook soil!

Without hydroelectric power Aroostook factories couldn't keep up with the spuds they receive as raw material. And without Sam Feagles the Maine Public Service Company would be just another local utility.

I first met Feagles in a garage, his hotel on rare visits to Presque Isle. (He much preferred to stay in the country under canvas or at a cabin.) In a long-sleeved undershirt he sat behind a copy of the NATIONAL GEOGRAPHIC MAGAZINE.

"Of course, I don't know how to read," Sam joked, "but I sure like to look at pictures."

Sam Feagles was graduated from Princeton University in 1900. For the next ten years he served on the faculty of his alma mater.

One summer vacation he navigated a Grenfell mission craft to Labrador. Later he went to Aroostook for a fishing and hunting holiday—and never left the county. Sam was, as he put it, "still on that original outing" and, incidentally, area field supervisor for his company.

Feagles and I bounced in a truck over 30 rugged miles toward the town of Limestone. We carried a load of dynamite for crews hooking up a power line to a giant bomber base under construction.

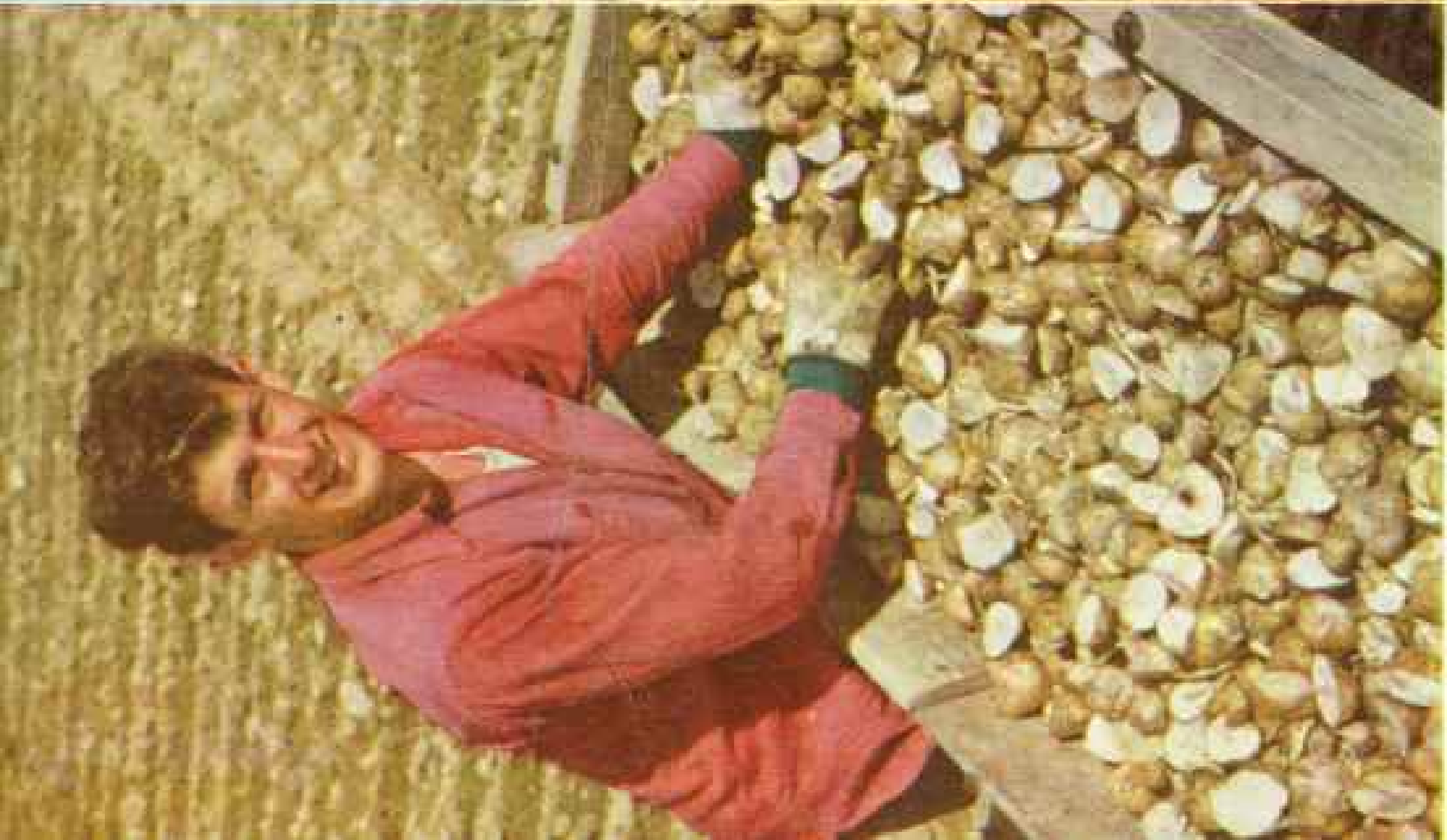
Conversion of potato country to a super-airfield put Aroostook on the Nation's front line of defense. We stopped at headquarters to see Robert E. Lee, resident engineer in charge of all operations. After an hour's search, we still hadn't found him.

By the time we overtook Lee in his jeep, out on the five-miles-square project, we had



Like a Sparkling Smile, Potato Blossoms Light Up the Face of Aroostook County

Northern Maine's principal crop flowers between mid-July and mid-August. Each year at this time Aroostook stages a potato-blossom festival and crowns a local queen for "beauty, poise, and personality."



U. S. National Geographic Society

Sliced Potatoes Dribble from the Hoppers of a Planter while Tilted Disks Cover the Seed with a Few Inches of Soil

At the same time the machine spreads fertilizer on a farm between Caribou and Presque Isle, Aroostook County planting normally is in May.



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Illustrations by Russell Wallcut

Children Wade Waist-deep in Aroostook County Potato Blossoms

The little Smith sisters' home, in the background, resembles many in Aroostook.

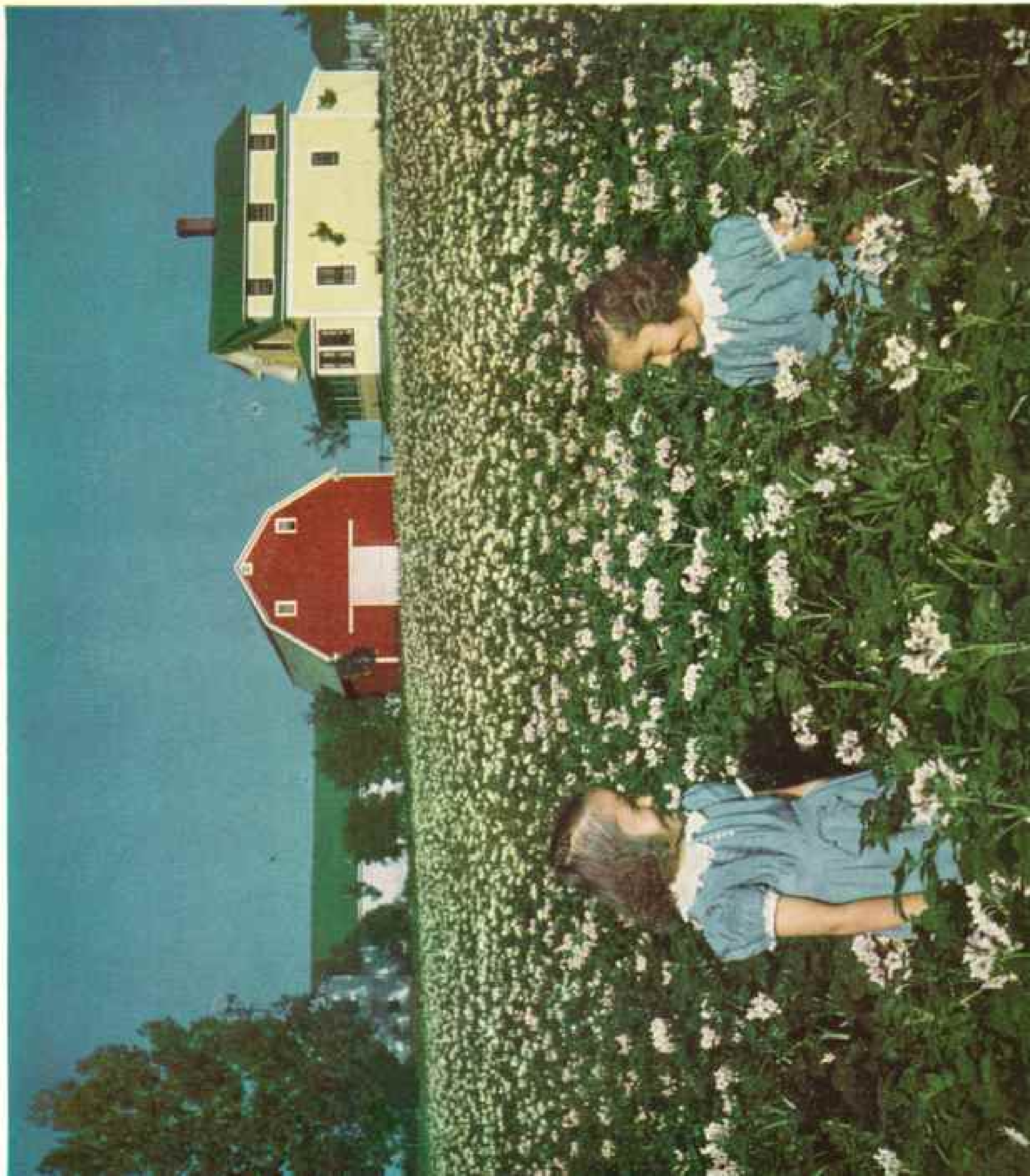
Throughout the "spud" country one sees the pattern repeated—homestead, barn, and potato storage house set close together and surrounded by fields won from dense forest.

Holdings vary from a dozen to several hundred acres, but every one lives, eats, talks, works, dreams, gambles potatoes.

The county produces about 90 percent of the Maine crop, bigger than that of any other State; yet wildness still grips two thirds of Aroostook.

Some Aroostook farmers plant about 10 barrels of cut seed potatoes per acre, and, if the field is well fertilized, may expect a yield of 115-130 barrels per acre.

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Illustration by Harold Weather





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Photograph by Russell Walker

Hovering Close to the Ground, a Helicopter Makes War with Chemical Dust on Blight and Insects Attacking Potato Plants

Formerly, horses pulled spraying equipment through the fields. Tractors later displaced the animals. Now helicopters help do the dusting. During the growing season, farmers spray or dust regularly once a week or every ten days to control fungus, beetles, and aphids (plant lice). Recently, the popular use of DDT (dichloro-diphenyl-trichloroethane) has reduced insect pests and increased crop yields.

Instead of Awaiting the First Freeze, Farmers Kill Potato Vines with a Triple-barreled Flame Thrower Ten Days Before Harvest

Since green tubers skin or bruise easily and rot in storage, they are not dug while still growing. On some small farms men pull up the stalks by hand, leaving the potatoes undisturbed. More commonly, chemical sprays are used for killing, especially if the growing season is prolonged with danger of a hard freeze. The speedier, but costlier, flame thrower appeared here in 1947. It takes 90 gallons of crude oil to burn four or five acres an hour.

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Illustration by Howell Walker



Tractors Roar and Backs Strain in Aroostook's September Potato Harvest

Men, women, and even children turn out to gather tubers at this busiest time of year.

First, mechanical diggers uproot the potatoes and adhering vines. Pickers follow, filling baskets and emptying them into 12-peck barrels, only "11 pecks" full so they can be tipped without spilling.

Trucks haul the harvest to storage houses where it stays in bins until shipment to markets (page 474).

The county in 1947 grew potatoes on an acreage about one-fourth the area of Rhode Island — a barrel for every two and a half persons in the United States.

It's best to begin picking potatoes at an early age; it causes fewer aches then, and in later years allows one to bend more gracefully to the task.

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Excerpted by Russell Wether



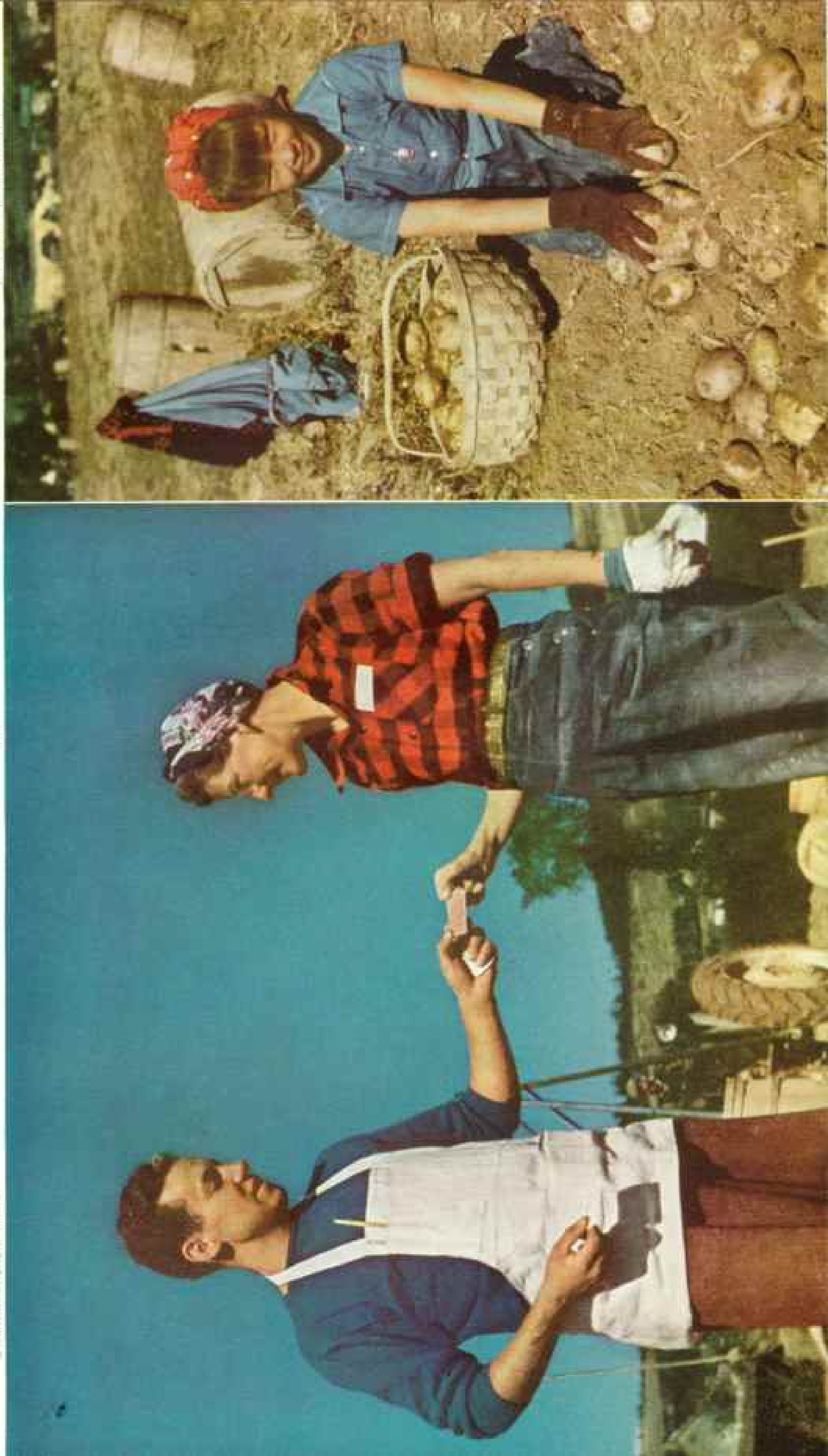
He Distributes Tickets to Potato Pickers for Each Barrel They Fill; on Payday They Exchange Cards for Cash

Diggers generally receive about 10 cents a barrel. An average woman picker earns \$17 a day; a man, about \$20. Children, too, do pretty well. Many county schools close to let students help with the harvest. Even business firms shut down or grant leave to employees for the digging season.

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Illustrations by Howard Walker





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Illustrations by Howell Walker

♣ **In Heated Bins Half Underground, Potatoes
Stay Off Maine's Subzero Weather**

Here a truck takes a load of spuds just harvested to a building that holds 25,000 barrels. Each year Maine ships more than 37,500 carloads to market.

♣ **Pulling Mustard Weed Causes No Weeping
among This Happy Trio**

Twins and younger sister look up laughing from their tough job of ridding a potato field of the persistent nuisance.



acquired working knowledge of the base. He rounded out the picture; and, yes, he came from Virginia.

The \$35,000,000 undertaking involves some 10,000 fairly fog-free acres 700 feet above sea level.

Eighty percent of the area taken over by the Government consisted of waste, bog, or wooded land; it would have required tremendous capital of individual farmers to clear, grade, and drain it for cultivation. Where productive fields lay within the territory, engineers and equipment spared the crops until after harvest.

With 800 workers then on the job, Lee predicted the number would double within a year. We saw frames of large dormitories, mess hall, infirmary, and recreation building; watched colossal caterpillar tractors and gravel gatherers move hills and fill in valleys; shook with monstrous mechanical shovels excavating the route of a supply railway.

In 1949 Lee expects to complete the first runway of our closest "States-side" base to Europe. Other runways will come later as enormous parking aprons and hangars take shape.

Meanwhile, the once-quiet little community of Limestone goes boom! A thundering construction herd bears down on the town; its cost of living rockets up. And farmers paid by the Government to vacate their land look elsewhere in Aroostook to raise potatoes.

Via Canada to Remote Township

I had to leave the United States altogether to reach the remotest settlement in the county. Crossing the St. John River at Fort Kent, I followed a narrow dirt road through New Brunswick into the Province of Quebec. An underpass in a high railroad embankment at Estcourt linked Canada and the United States. By this international thoroughfare I re-entered Maine at Township 20, Ranges 11 and 12.

The tiny American community of a dozen houses has no other name, not even a post office of its own. Mail arrives and leaves by royal arrangement with the Estcourt depot. Everything inward or outward bound, including people, passes through Canada. Goods originating in the States enter duty-free if convoyed by a United States customs officer.

Citizens of the settlement occupied homes partly in Quebec, partly in Maine. One building, for example, stood on Canadian soil; its outhouse in the United States. At another, the International Boundary separated front parlor and kitchen. I did not learn which country taxed whom or for what.

However, I made one startling discovery: an Aroostook township independent of the potato business. Small goods, woodcutting, and timber mills employed most of the men.

Speaking French to declare herself an American, a woman of the community gave me official permission to travel a lumber company's private road.

Twenty miles deep in the wilderness, Roland Bolduc supervised logging operations.

Shortly after I arrived, the cook hit an iron triangle hanging outside the mess hall door. About 45 lumberjacks streamed in for supper. With them I sat down to bean soup, boiled meat, potatoes, and tinned string beans, homemade bread, butter, strong tea with sugar but no milk, several kinds of pie, stacks of doughnuts, cakes, and cookies.

Scarcely anyone spoke during the meal; too hungry, I thought. Then, glancing around, I saw a sign: "Silence a la table s.v.p. Par ordre."

"Why?" I asked the cook.

"Many men to feed," he replied. "When they talk and joke, takes longer to eat and leave."

I caught on and got out.

Lumbering, Like Farming, Now Mechanized

Roland managed three lumber camps in the area. Principally occupied with pulpwood, they aimed to cut 15,000 cords for the 1948 spring drive. Tributaries took logs to the St. John River, which carried them as far as Fredericton, New Brunswick. Here formed into rafts and towed to St. John city, the wood went through mills into magazine paper.

Over a road Bolduc constructed we penetrated a forest that would keep his men busy for the next ten years.

Formerly, axmen had to trudge, sometimes for days, over rough trails to timber camps in the wilderness. They went to work in autumn and didn't see civilization until spring.

Now, with the building of all-year roads through the woods, come tractors and trucks, mail and fresh food. Lumberjacks regularly ride home for week ends. Transportation of timber to mills no longer depends exclusively upon rivers and streams.

Roland walked over to my car as I prepared to leave his camp.

"When you're on the big hill," he said, "just stop and look back. I've seen that view countless times, but it always gives me feelings. Do you know what I mean about the woods?"

I reached the hilltop and looked back at miles of endless forest; but Roland's feelings impressed me more than the view.



The Sign Tells the Story—U. S. Highway 1 Begins with Pines and Ends with Palms

Between the northern and southern termini stretch 2,446 miles of highway spanning 14 States and the District of Columbia. In contrast to Key West, with its heavy Spanish influence, most residents of Fort Kent speak French. The town takes its name from a blockhouse built in 1839, when a boundary dispute almost brought armed conflict between the United States and Canada (page 461).

Leaving Aroostook's wilderness, I returned, of course, to the open spud country; the county held no alternative.

In a field near Frenchville the Paradis brothers had built a unique factory. From a distance it looked like a khaki-clad company of soldiers waiting to use several outdoor telephone booths. Upon closer inspection I saw four separate huts standing in a line and opposite them stacks of finished potato barrels.

Twice fire wiped out the Paradis pair when they occupied one large building. To avoid having their entire plant destroyed a third time by flames, the brothers set up a quartet of smaller units. If one burned, three continued to roll out the barrels.

Two men worked in each hut, equipped with a stove for steaming wood into shape and a wagon-wheel winch to tighten a rope-noose vise. One man fitted tongue-and-groove

staves together, put hoops and bottom piece in place. His partner did the nailing. An average team completed 65 to 75 barrels a day. Operating seven months of the year, all units turned out a total of 55,000.

The Paradis employees could quit to plant or pick spuds as they chose. In no way did the factory interfere with the county's number-one business; in fact, it arranged its working schedule to meet farmers' seasonal demands for barrels or labor.

Potato Picking Takes Priority

At harvest time some 20,000 "outsiders" filtered into Aroostook from all directions. Approximately 5,000 Canadian pickers from Quebec, New Brunswick, and Nova Scotia streamed through customs stations. Along with them crossed a few hundred native Indians whose boundary rights eliminated official clearance at the frontier.



"This Is No Picnic," Says Earl Jalbert, "but It Beats Iwo Jima"

The postwar housing shortage drove the veteran and his brother, Maynard, each with a wife and two children, to this one-room cabin on remote Round Pond. The brothers earn their living by cutting cedar trees for telephone poles. They were among the few people the author met on a four-day canoe trip through northwestern Aroostook County's forests (page 462).

Aroostook schools closed to let children help with the digging, and employment in town industries dwindled for the same reason.

Normally 12 men and 48 women in a Caribou factory prepared 45,000 burlap and 30,000 paper potato bags a day. When I went through the works in September, 40 of the female staff had taken leave to engage in the harvest.

I watched a spool wrapped with 4,000 yards of raw sack material unroll in a few minutes; it fed a machine that cut, stamped, and folded burlap from India. Women stitched the stuff into bags to hold 100 pounds of potatoes; a speedy worker could finish as many as 4,000 sacks in a day. But I didn't see the nimblest fingers; they were picking in the fields.

Harvest of potatoes for next year's seed precedes the gathering of table-stock crops, to get the seed crop safely housed against rain

or frost and to lessen the danger of disease.

Before admitting me to his seed ground, a farmer sprayed my legs and feet with formaldehyde solution. Pickers, including baskets and barrels, were doused all over. And I had to wade through a "duck pond" of disinfectant to enter the building that stored the harvest.

The Growing of Certified Seed

Aroostook County grows most of the certified seed raised in Maine and about 45 percent of all in the United States. In 1947 shipments from Maine went to 32 States, the District of Columbia, Europe, Africa, and South America. They amounted to nearly 9,000 railroad carloads, or more than four million 100-pound sacks.

With whole families of diggers I went early one morning to see table stock harvested. Everything happened on a larger and less



"Let's Go Fishing!" Minutes Away, by Air, Lie Remote, Unspoiled Waters

During the lull after potato planting, Aroostookians angle for trout and salmon. Small airplanes, such as this Seabee on Portage Lake, are based all over the county. The village of Portage, on the lake, has one for every ten residents. In them, visiting and local sportsmen quickly hop to wilderness lakes and ponds formerly days away by trail (page 460).

formal scale than at the cautious collection of the seed crop. I could walk unchecked and unfumigated.

Trucks distributed barrels along the rows. Tractors followed, towing digging machines that uprooted vines and loosely adhering potatoes. In the mechanized wake manual labor went rapidly to work (page 472).

Bushels and Backaches per Acre

While trucks with hydraulic hoists collected heavy loads, a paymaster issued tickets to pickers (page 473).

On payday they exchanged the accumulated cards for cash at the rate of around 20 cents a barrel. Men commonly earned \$20 or more a day; women and children averaged about \$12.

For less than an hour I tried picking potatoes—and oh, my aching back! I marveled at mere girls who filled 60 barrels in ten hours with 30 minutes out for lunch. And farmers spoke of 350 bushels per acre while I measured my stiffness by the foot.

As an excuse from further digging, I followed a truckload to storage.

The potato house is the symbol of an Aroostook farm. Constructed half underground to keep out winter freeze, it looks on the surface somewhat like an airplane hangar (page 474). Its size depends usually on the owner's cultivated acreage. Stove-heated bins hold the contents of several thousand barrels until shipment to widespread markets.

Many dealers store potatoes in large warehouses built for the purpose at railway sidings. Here machines grade spuds and fill bags, which are then conveniently packed into insulated freight cars.

Shipments multiplied as autumn grew colder. I left the county, but not its potatoes. I continued to see bags whose labels meant more to me than to experienced housewives. With grocers in New England or Maryland I discussed relative merits of various brands; without question, down-East "taters" were hard to beat.

Wherever I found Aroostook potatoes, they renewed old acquaintances, refreshed friendly memories. After all, I had watched them grow up and I liked the people who raised them.

Brazil's Land of Minerals

BY W. ROBERT MOORE

With Illustrations from Photographs by the Author

CLOUDS of April autumn hung in thick clusters over the crumpled landscape when I flew from Rio de Janeiro 200 miles north to the city of Beautiful Horizon—Belo Horizonte. The rainy season was nearing its end. Cooler dry months were just ahead.

Belo Horizonte lay in open sunshine. Its tall business district and wide circle of white-walled, red-roofed homes gleaned in precise pattern below us.

Hills gird the city; on the south an iron range rears like a majestic wall. But the city is sufficiently level so that residents can walk, not climb up and down precipitous streets as people have to do in old Ouro Preto, early capital of the State of Minas Gerais.

Coming into the city from the airport, we sped over a new road that threaded raw red cuts in the hills. Red splashes of excavated earth and unfinished buildings attest the capital's rapid expansion.

For sheer youth and exuberant growth this State capital has few equals. And it is completely tailor-made.

Little more than 50 years ago it was only a diagram on a draftsman's table, its site an open space on the plateau. Where bold planners staked out rectangular blocks, wide diagonal avenues, parks, circles, and squares now stands a metropolis of more than 200,000 people.

Its business blocks climb skyward; one is 26 stories high. Its residential and industrial districts expand day by day. Its growth seems not to slacken.

The State of "General Mines"

Interesting, too, is the State that gave it birth.

Minas Gerais means "General Mines." A wealth of minerals is crowded into this mountain-rumpled region, roughly four fifths the size of Texas (map, page 481).

Embedded in its earth are gold, diamonds, an array of semiprecious stones (page 506), and vast quantities of pure quartz crystals.

Here also are rich resources of manganese, mica, bauxite, beryls, and fabulous deposits of iron ore—whole mountains of it—one of the biggest and richest reserves of high-grade ore in the world!

To the "hard" minerals can be added the liquid assets of several spas with radioactive and mineral-laden waters.

From the melodramatic days of gold and diamond discovery until World War II, when Minas contributed richly in crystals, mica, manganese, and other strategic materials, mining has helped foster the State's rise. Yet many of these mining resources have been only scantily developed. Agriculture and stock raising dominate its plateau lands.

Despite its contrasts, Brazilian roots reach deep into the State's red earth.

From the 16th to 18th centuries bold, rugged, Paulista *Bandeirantes*, or Flag-bearers, roamed this interior region. Struggling over rough mountains and probing deep-cut valleys, they won new territory for Portugal.

But they wanted gold. And when they found it, in the early 1690's, here began a frenzied rush, such as was to come much later in California, Australia, and the Klondike.

There was one important difference. Many men herded slaves into the region to pan the streams and sluice the hillsides. Hundreds of officials were sent from Portugal to guard the gold taking. For the king claimed a "royal fifth," plus heavy taxes, imposts, and "voluntary gifts."

Some of the rough mining camps grew into villages and permanent towns. Nestled within the folds of the steep green hills are such old mining centers as Ouro Preto, Mariana, São João del Rei, and Sabará. Time-mellowed museum towns they are now, rich in Portuguese colonial architecture and boasting some of the finest churches in the country.

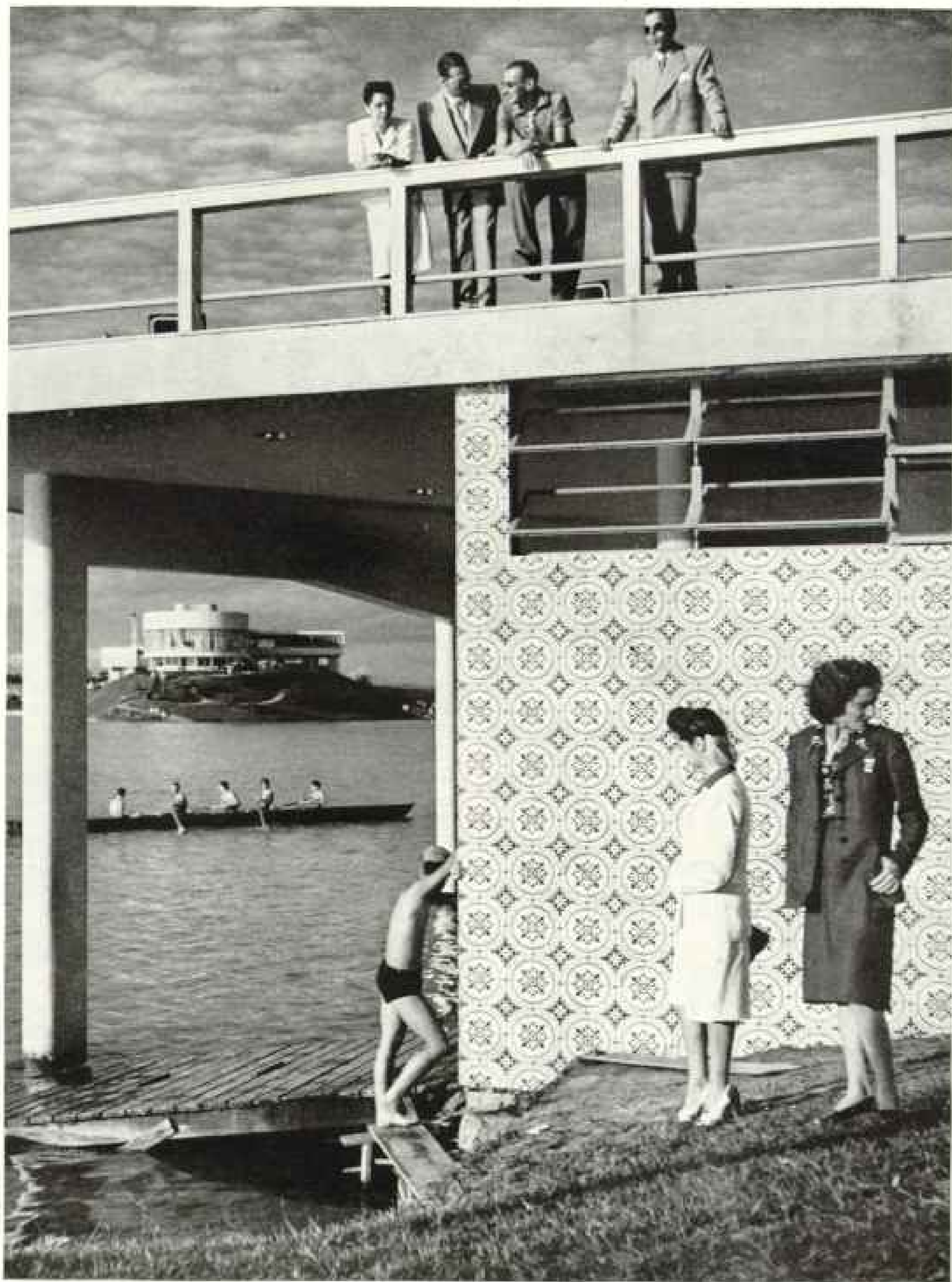
Among the medley of peoples who came with the flush of gold, many stayed to build homes and continue more settled pursuits.

Although not so highly developed or industrialized as São Paulo or the coastal districts about Rio de Janeiro, Minas Gerais has a population of about 7,500,000 persons.

Key centers of Belo are the Praça da Liberdade, about which are located the Governor's Palace and State Buildings, and wide, tree-lined Avenida Afonso Pena. Along this avenue are select shops, towering office buildings, Post Office, and trim City Hall. It is also the concourse for all Belo Horizonte (pp. 491, 502-5).

"Taking Their Footing" on the Avenue

I had arrived in Belo late on a Saturday afternoon. That evening when I went for a walk with an acquaintance I found the avenue surging with thousands of people.



A Modernistic Yacht Club Frames the Casino at Pampulha, near Belo Horizonte

Brazilian architects here have shown the same creative enthusiasm as the city planners who laid out the entirely new capital of Minas Gerais only 50 years ago. From the veranda roof, members watch rowing and sailing races on the man-made lake. Near by is a popular dance pavilion, also built in modernistic style (page 482).



At Itabira Men and Donkeys Tread Streets Paved with Iron

The rocks here are pure hematite, as is Cauê Peak near by, where a company is planning to mine 1,500,000 tons of ore annually. When several such streets were torn up to build a model village for mineworkers, the "paving" was shipped abroad with other ore (pages 484, 495).

captured the national championship nearly every year since the club was opened!

Another entertainment center for Belo Horizonte is Pampulha. Around a sizable artificial lake a few miles north of town architects have gone modernistic in a big way. With glass and concrete they built a circular Casino and night club; a Yacht Club, which many say looks like two slabs of cheese fastened together; and an open dancing pavilion and restaurant. Stairways are passé; you walk up ramps here (page 480).

In Belo I gained a quick picture of many assets of Minas Gerais by walking through the Permanent Fair of Exhibits building at the head of Avenida Monso Pena. There are displayed sample collections of precious and semiprecious stones and the State's amazing wealth of minerals. Portrayed, too, are agricultural and livestock resources.

Cut gems of topaz, tourmaline, aquamarine, amethyst, and beryls are on display. The directors have placed among the exhibits one gigantic crystal of quartz which weighs more than five tons (page 487).

From the top of the tower where weathermen send up their balloons, and atop the new 26-story skyscraper near by, I saw one of the best exhibits of modern Minas. Below spreads all Belo Horizonte (page 491).

When the designers sketched the plan of Cidade de Minas—to use Belo's original name—they looped a Circular Avenue about the town. Now the thoroughfare might be compared to an inner-growth ring of a sturdy tree. Residential areas sprawl many blocks beyond it.

The founding fathers first envisaged this as a stately, cultural town, replete with schools, colleges, libraries.

They have seen its purpose change. Having grown as a distribution center for the State, it is also beginning to industrialize. A new factory suburb has been plotted. High tension lines stride in from an outlying hydroelectric dam to supply power; several large plants already are in operation.

Swinging around the Circular Avenue one day, I noticed a number of gleaming white markets. These State-organized centers were designed to improve the quality of produce and to stabilize prices.

The big central market in the heart of the town, however, has more local color. Stalls, stands, and cages grouped in the block-square area sell anything from a squealing pig to sure-cure snake oil!

Within the pavilions and at open stands throngs of shoppers pick out fruits, vegetables, and other farm produce.

Small shops offer woven baskets, floppy straw hats, heavy bowls carved from soapstone, bean pots, and kitchenware.

Cages hold live chickens, turkeys, quacking ducks, and grunting pigs. You can pick your fowl or porker and, if you wish, have a handy butchery prepare it for the cooking pot.

Hawkers, snake charmers, and spellbinders add the flavor of a fair.

Off to "Old Mountain"

Early one morning I set off for Sabará, Itabira, and beyond.

It is only a short detour from the main Sabará road to the gold-mining town of Morro Velho, the "Old Mountain."

Old, too, are the gold-mining operations going on here, I learned when I talked with the English manager.

"Our company was founded in 1830 to work at São João del Rei. But we came here in 1834 and have operated this mine ever since," he explained.

"More than 100 years! And what have you done?"

"We've dug a hole and got gold!" he retorted, and laughed.

Then for hours I was shown the complicated processes needed to extract gold from the dirty gray ore.

The "hole" is more than 8,000 feet deep. At such depths rock temperatures are high. Huge refrigeration plants and blowers, with an air capacity of 110,000 cubic feet a minute, pump cold air into the shafts.

From its shafts and maze of underground tunnels workmen have hauled up 12 million tons of ore, yielding gold valued at more than \$110,000,000 at the present exchange.

"Is it true that mules used in the tunnels

get dizzy and cannot be used again if taken above ground?" I asked.

"They cavort around when they get in the sunshine, but they don't get dizzy. We bring them up on holidays."

Additional ore comes into Morro Velho plant from the near-by Espírito Santo mine by aerial ropeway. Though each bucket holds more than a ton of mineral, the gold it contains would fill only a small coffee spoon.

As we zigzagged over the hills and dropped down into the valley of the Rio das Velhas, near Sabará, we came upon other goldworkers. Free-lance gold panners, called *garimpeiros*, washed the sand in the river bed (page 508).

Some had built dams and channels to trap the gold-bearing sediment. Others sluiced sand over rickety chutes. Their methods haven't changed a whit since gold was first struck in this river trench.

Several showed us their small finds—perhaps 30 or 40 cents' worth for a day. Small as are the individual pickings, free-lance enterprise nets as much gold as comes from organized mining.

Pioneer Gold Town Turns to Steel

Sabará itself is one of the original gold towns. It has long since gone off the "gold standard." Today it lives on steel.

Many of the crooked streets bear vivid marks of colonial days. Old houses sag wearily against each other. One venerable building, formerly the office of the superintendent of gold production, is now a museum, filled with heavy handmade furniture, old iron-bound gold chests, big balances for weighing the metal, and a press that once stamped coins.

Among the displays I saw one mining account book for 1772-73, listing taxes and operation expenses. Another, dated 1784, showed the royal fifth handed over to the Portuguese king.

Weathered churches stud the village. Some have richly carved doorways and altars credited to Aleijadinho, the malformed Michelangelo of Minas.

Properly, the story of Aleijadinho, the "Little Cripple," belongs to Ouro Preto. For there, in 1730, he was born, Antonio Francisco Lisboa, son of a Portuguese carpenter and a Negro slave (page 490).

Ugly, uneducated, and in later years with hands so wasted with disease that his chisels and mallet had to be strapped to his arms, this twisted and distorted sculptor did outstanding work. The statues of saints he hewed are sturdy and vigorous (page 496).

Outside old Sabará, blast furnaces belch



Daughter and Father Examine a 325-Carat Diamond

One side is worn from ages of rolling; the other flat, as if fractured from a much larger piece. This yellow stone was found in the Paranaíba region of western Minas, in the same general district in which was discovered the famous blue-white "President Vargas," weighing 726.6 carats (pages 488 and 506).

smoke and flames. Since 1922 the Siderurgica Belgo-Mineira has produced iron and steel products here.

Sabará's output is about 120 tons a day. Mainly, however, it serves as a feeder for the newer and bigger steelworks at Monlevade, 60 train miles farther east.

Together, the Sabará and Monlevade plants furnish Brazil with some 150,000 tons of iron annually. Lacking coking coal, these plants reduce the ore with charcoal. As many people are needed to supply charcoal as are employed in the mills.

Traveling down the valley of the Rio Doce later, I saw huge piles of charcoal heaped beside railway stations. Trains of pack mules,

led by a gaily bridled, bell-jangling lead beast, plodded the trails bearing bobbing panniers of fuel. At places on the river I saw dugout canoes hauling other loads of charcoal.

The "Iron Quadrangle"

Iron abounds in a wide region about Belo Horizonte. The earth is as red as a rusty kettle. So plentiful indeed is it that Brazilians refer to the district as the "iron quadrangle."

Caué Peak at Itabira (Presidente Vargas), a big mountain knob visible for miles around, is all iron—almost as pure hematite as Nature can produce. An average sample runs about 67 percent iron (pages 482, 495).

Flanking hills also are virtually solid masses of hematite. Recently a large Brazilian company, the Cia. Vale do Rio Doce, backed by Brazilian capital and loans from the Export-Import Bank, began active exploitation of the iron. American engineers are assisting in the project.

Unlike mines where cuts or diggings are necessary, Itabira's operations will consist mainly of cutting off the whole mountain top.

Work thus far has been mainly by hand; trucks haul the ore down to the railway. Once heavy installations are completed, however, the ore will be fed into a crusher placed at a high level on the hillside and thence it will ride down the slope on a conveyor belt directly to railway cars or into reserve storage bins.

A model village, complete with hospital and other facilities, has been built to house the mine workers.

"Just to chop off the top of Caué Peak down to the level where we're installing the crusher will take at least 30 years if we re-

move it at the planned rate of 1,500,000 tons a year," an engineer told me. "Conceição Peak right here beside it is an even bigger source."

Transport for the ore to the port of Vitória, 300 miles away, has required the building of a new railway spur into Itabira. The meter-gauge main line also had to be rerailed, regraded, and have curves straightened and bridges strengthened—a major construction job in itself.

From Itabira I traveled down the Rio Doce Valley as far as the town of Governador Valadares, a trading center of some 7,000 persons.

During the war I had seen it when business boomed from the production of mica. At that time several American mining experts helped the Brazilians explore the back country for more mica deposits. Crews were busy with picks and shovels digging in veins of pegmatite schists to uncover "books" of the transparent mineral.

In town, girls worked in numerous shops splitting, trimming, and grading the sheets of high-priority mica.

Now that its demand has dropped, Governador Valadares again dozes.

From this rural center I returned by plane to Belo Horizonte, saving long hours on a chugging, winding train.

Airplanes also have simplified the trip to Diamantina and Montes Claros in northern Minas. A railway extends northward, but trains travel slowly.

Site of Eclipse Expedition

Last year, when scientists of the joint Army Air Forces-National Geographic Society Expedition set up camp at Bocaiuva, near



Flamingo Mother from Três Lins

This Hen Contentedly Puts All Her Eggs in One Basket

Woven of split bamboo, the nest hangs on the open bamboo wall of a thatched shed. Frosts seldom come to this plateau land of Minas; poultry and livestock require no winter quarters; simply shelters from rain.

Montes Claros, to study the eclipse of the sun, much of their equipment was flown in by plane.*

To get to the quartz crystal mines between Sete Lagoas (Seven Lakes) and Curvelo, I journeyed by bus.

Chemically, quartz is the same as the sand in Johnny's sandbox—the most common of all solid minerals. But so exclusively are the large pure crystals confined to Brazil that they are often called "Brazilian pebbles" (pages 486-8).†

* See "Eclipse Hunting in Brazil's Ranchland," by F. Barrows Colton, NATIONAL GEOGRAPHIC MAGAZINE, September 1947.

† See "Brazil's Potent Weapons," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, January 1944.



A Shovel Brigade Tosses Out Dirt from This Quartz Mine near Sete Lagoas

Standing on steplike benches, men laboriously pass the waste up the steep slope from the quartz-bearing vein at the bottom. Scattered crystals lie embedded in the alluvial soil. Perfect ones are exported for scientific use (p. 485).

Even here, only a fraction of the quartz dug up is sufficiently free from stains, fractures, and cloudiness to be of value for scientific use.

Quartz is piezoelectric—it generates a measurable electric potential when placed under stress. Because of this property, quartz-plate oscillators serve as the keystone in radio wave control and in numerous detection devices.

During the war huge quantities of quartz were urgently needed. *Mineiros* feverishly gouged the earth to uncover more and more crystals. Some of their mines looked like prehistoric cliff dwellers' building projects or amphitheaters for giants. With war demand for crystals gone, many miners have returned to farming or gold panning.

Home of *Homo brasiliensis*

Prehistoric men once dwelt in this part of Minas. They lived in limestone caves. Near Lagoa Santa on the way to Sete Lagoas, Dr. Peter Wilhelm Lund, a Danish scientist, a century ago found many antediluvian animals and the famous Lagoa Santa man, *Homo brasiliensis*.

In Belo Horizonte Mr. H. V. Walter, the British consul, showed me the skull of the early "Confins" man which he unearthed in this same area.

Among Mr. Walter's pick and spade trophies are jawbones, teeth, and tusks of a mastodon, relics of the saber-toothed tiger, an extinct bear, and a prehistoric horse.

He also has dug up giant sloths, a fossil armadillo, and ax heads, pipes, and arrow points used by primitive man.

Diamantina, 120 miles north of Belo Hori-



This Single Huge Crystal of Quartz Weighs Five Tons!

Yet it has the same characteristic hexagonal sides and pointed end as the smaller crystal held by the girl (right). Even larger ones have been found. It shares space in the Permanent Fair of Exhibits in Belo Horizonte along with samples of the numerous precious and semiprecious stones and wealth of minerals found in the State (page 482).

zonte, is the center of fabulous diamond finds. So many precious stones were taken from this district after their discovery in the early 1700's that they threatened to make the princely jewels just every man's playthings.

The Portuguese clamped on severe restrictions and heavy taxes to control the trade. Between 1740 and 1771, 1,666,000 stones were mined! From then until 1809 the output averaged nearly 20,000 stones a year.

Diamantina still produces diamonds, though not on such a casual or prolific scale as it once did.

Other strikes have been made in Brazil all the way from Amazonas to Paraná. But with



U. S. Navy, Official

"Brazilian Pebbles," Some Miners Call These Crystals of Pure Quartz

Huge deposits are found in Minas Gerais. During the war, quartz crystals had such high priority rating that tons of them were flown to the United States to be cut into plates used as oscillators in radios and other detection devices. Here men sort out those that have stains, fractures, or other defects (page 485).

new placer finds in the western part of the State, Minas still leads in Brazilian production.

During my stay in Belo Horizonte I saw and photographed one yellow stone found in the Rio Paranaíba district. It weighed 325 carats! (Page 484.)

In the same general region the "President Vargas" was discovered in 1938. That prize blue-white stone weighed 726.6 carats. Valued at \$750,000 in New York, it has since been cut into several smaller jewels.

More recently in Minas, in 1943, was found the "Darcy Vargas," 460 carats.

The "Coromandel," weighing 430 carats; the "Estrela do Sul" (Southern Star), 261.88 carats; the "Star of Minas," 179.3 carats; and the "English Dresden Diamond," a stone weighing 119.5 carats, are other famous diamond finds of Minas.

Much of the diamond hunting today is still in the hands of placer miners who roam

these diamond-studded streams. Industrial diamonds are their main finds.

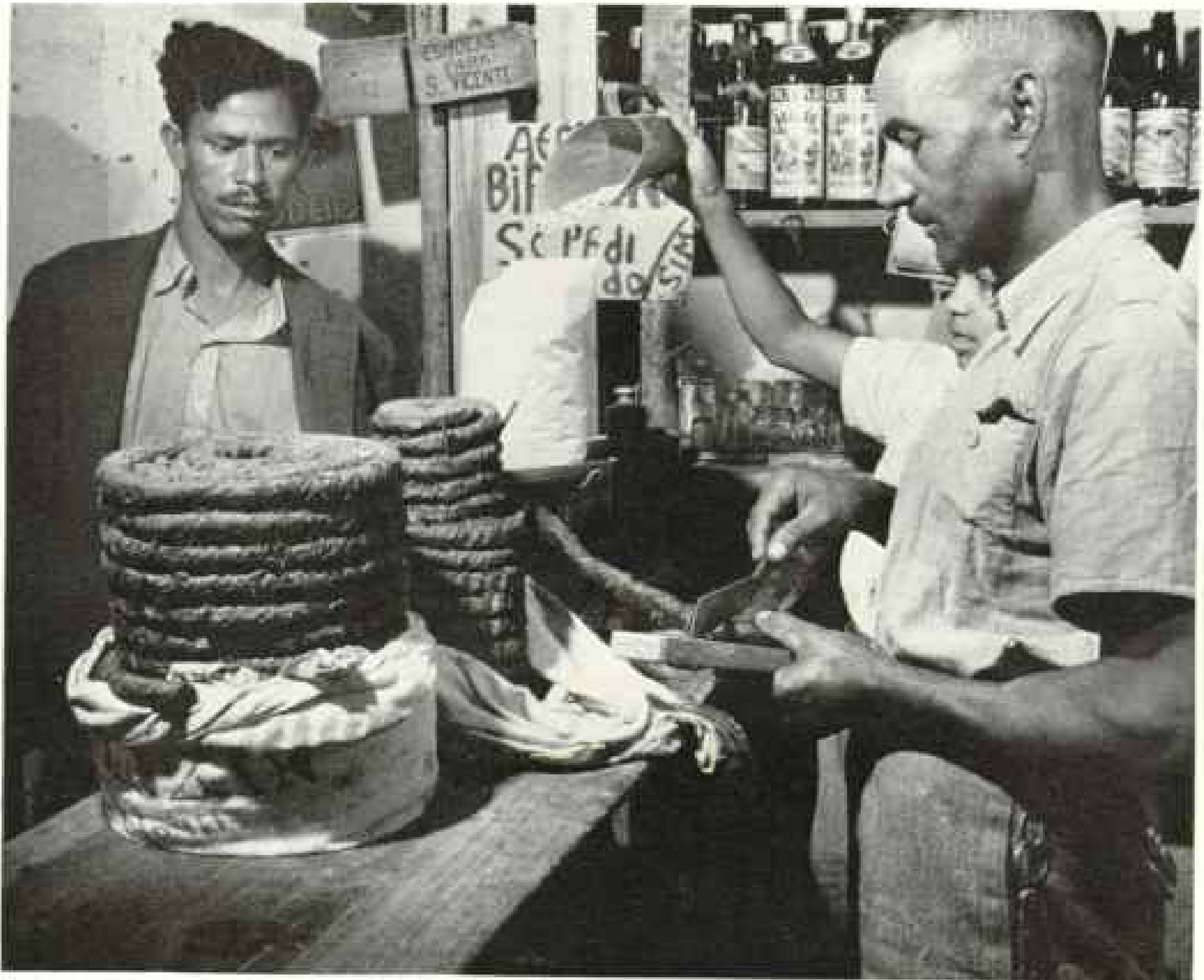
"Wild West" a Cattle Country

This "wild West" of Minas is also rich cattle country. Throughout the region about Uberaba graze hundreds of long-eared, hump-backed Zebus and cross strains of these animals. Pride of many breeders is the big sturdy Indu-Brasil, a stock developed from the Zebu and another Indian breed (page 506). Every year Uberaba holds a big stock fair.

During the war years prices for Indu-Brasil bulls reached absurd figures. A sad-faced, droopy-eared animal of high registry might sell from \$25,000 to \$50,000 or even more!

Before the boom broke, bankers and business men, as well as some cattle owners, were lured by these "banks" parading on four hoofs.

I journeyed out to a fine old *fazenda* (ranch) northwest of Belo Horizonte one day to see its

Florence McGuire from *Three Lions*

"Is That Rope You're Smoking?" Is No Joke in Rural Brazil

Tobacco is made in these long coils; the purchaser can buy a few inches or a yard! While the man cuts off a length of the twisted black leaves, a girl weighs out beans. Such small country stores deal in foods, wines, cloth goods, kerosene, and other commodities.

stock. Hundreds of sleek white beasts grazed its miles of pastures. In addition to breeding their own stock, the owners buy young cattle and fatten them for market.

The fazenda managers have conserved its trees and wildlife. They have even converted an old lake and waterway, once used as a water reservoir for gold mining, into a fish-breeding ground. Fish from muddy Rio São Francisco now leap up a ladder that once was a sluice and spawn in the still, clear waters of the lake. I saw several dourado, one of the finest of fresh-water game fish, breaking the calm surface with their wild leaps and noisy splashes.

The State's Model Farm

Over near Pará de Minas I also visited the State's model farm, the Fazenda Escola Florestal.

Farm lads come here to take short courses in agronomy. Farmers from all over the

State are invited to visit the school and to inspect the farm arrangements. A modest hotel has been built for their convenience, and it doesn't cost them a penny.

Thus, at State expense, they are afforded the opportunity of gaining valuable suggestions which they may apply to their own farms.

In the farm buildings are installed simple machines for making cheese and other milk products, a mill for grinding grains, and a butchery.

Model barns house the livestock. Outlying land is given over to demonstration plots of corn, tobacco, orange groves, and pastures.

In many other places in Minas this same progressive leaven is at work. The advanced State agricultural school at Vicosa and the milk plant at Juiz de Fora, where facilities have been set up for training technicians in making cheeses and butter, are two examples.

It was Holy Week when I left Belo Hori-

zonte to go to Ouro Preto. Traveling by car, we rolled up and down the roller-coaster mountain road and twisted around the sharp kinks of the Rio das Velhas.

On the way I saw several small tea plantations. Later I found some of the packaged tea in Ouro Preto labeled "The Tea of India"!

Just short of Ouro Preto, we came to Saraninha where the Electro-Química Brasileira S. A. built a new industrial plant during the war. Briefly it produced aluminum from the extensive bauxite deposits in the vicinity. Now it manufactures sulphuric acid, copper sulphate, and ferromanganese.

Ouro Preto, City of Cities

From this plant of today you travel backward into yesterday as you ride the last three or four miles into Ouro Preto. Except for a single modern hotel, you step straight into the 18th century.

Here is the city of cities in Minas Gerais. No other spot in the State is crowded with more memories, history, and early colonial architecture.

Ouro Preto (Black Gold) is a museum town in feeling and fact. In the first years of the 1700's it was called Vila Rica—Rich Town. And rich it was from all the gold garnered from the locality. When the golden sands ran out, so did the town's prosperity.

Since then hardly a worn stone in its rough cobbled streets has been changed. People still live here—some 60,000 in the district—but they've done little to alter its colonial appearance. And now, while not yet too late, the Government has declared Ouro Preto a national monument—a living museum (page 492).

Venerable churches stand like beacons on its numerous hills. Thick-walled balconied houses seem to cascade down the steep slopes. Weathered stone bridges still carry traffic over the streams.

At nighttime in the crooked lanes it takes little imagination to picture the crippled sculptor, Aleijadinho (page 483), slinking out of his house to his sedan chair. Borne by slaves to one of these white churches, he worked at night chiseling soapstone doorways, altars, and fountains.

Thus in his later days he labored, avoiding everyone. And thus he was carried to an altar of his own carving to die when a dread disease had mutilated his body.

Ouro Preto's churches are rich shrines. During these Holy Week celebrations several alternately hold elaborate religious rites (pages 496-7-8, 501).

Crowds congregate to watch the ceremony

of washing the feet, to gaze at dramatic scenes of the Passion, and to join in the long street processions.

This week of rites, though less ordered than the Passion plays of Europe, is deeply impressive.

"Tooth Puller," Martyr to Freedom

Tiradentes Day is still another highlight for Ouro Preto, for here lived the first outstanding martyr in the cause for Brazilian freedom.

Back in 1789 one Visconde de Barbacena came as Captain General of the mines. He stirred up much resentment for himself and Portugal by collecting heavy taxes and the full measure of the King's royal fifth.

A small band of influential men and priests started a conspiracy to rid the place of Portuguese authority and form a republic. Among them was a young dentist, Alferes de Cavalaria Joaquim José de Silva Xavier, or, briefly, Tiradentes, the "Tooth Puller."

With zeal as strong as his name was long, Tiradentes shouldered responsibility when the plan failed. His hanging in Rio was like a Roman holiday. Royalists laughed at his execution; the downtrodden wept. Most of Tiradentes's collaborators were exiled to Africa.

But the Brazilians didn't forget.

In the center of the Praça stands a statue of the Tooth Puller. The former penitentiary at one end of the square now has been converted into a museum of the Inconfidência, those "Unfaithfuls" who were the first Brazilian patriots.

The Governor's Palace at the opposite end of the square today houses the School of Mines. I had guides galore all the time I was in town, as the students all wanted to practice their English!

The old colonial Casa dos Contos, once the mint and office of the superintendent of gold production, now is the local post office.

One of Ouro Preto's outlying churches, Santa Ifigenia, recalls the fascinating tale of "Chico Rei."

Chico Rei was an African chieftain who, with his family and members of his tribe, was sent as a slave to dig in the gold mines. Working hard at many odd-time jobs, he managed to save enough money to purchase his freedom. Later he freed his son, and together they progressively bought release for others.

Chico, or Francisco, set himself up as "king" of his little colony and made his son prince.

These people built the church and once each



A Fabulous City of Skyscrapers Soars above the Brazilian Plateau—Belo Horizonte

Within the last four years the population of this capital of Minas Gerais State has risen from 200,000 to nearly 300,000 people. By day the broad Avenida Afonso Pena, the city's Fifth Avenue, is a bustling business center. In the evening thousands, out to "take their footing," jam the sidewalks under the trees (page 505).

A Booming Gold-rush Town in Portuguese Days, Ouro Preto Now Is a Colonial Shrine

Visitors to this former capital of Minas Gerais step backward into the 18th century, when it prospered from the yellow metal dug from its surrounding hills. Ouro Preto's name means "Black Gold"; once it was called Villa Rica, or "Rich Town."

When the gold-bearing sands ran out, so did Ouro Preto's prosperity.

Ironically, Ouro Preto's chief industry today is the mining of iron pyrites, or "fool's gold," a source of sulphur. Near by are large bauxite deposits.

Years after Minas Gerais moved its capital to Belo Horizonte (page 491), the Brazilian Government declared Ouro Preto a national monument.

Steep cobbled streets lead to a wealth of architectural treasures, such as the Church of Our Lady of Carmo (center) and the Museum of the Inconfidencas (left background), once a prison.

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Illustration by W. Astori Moore



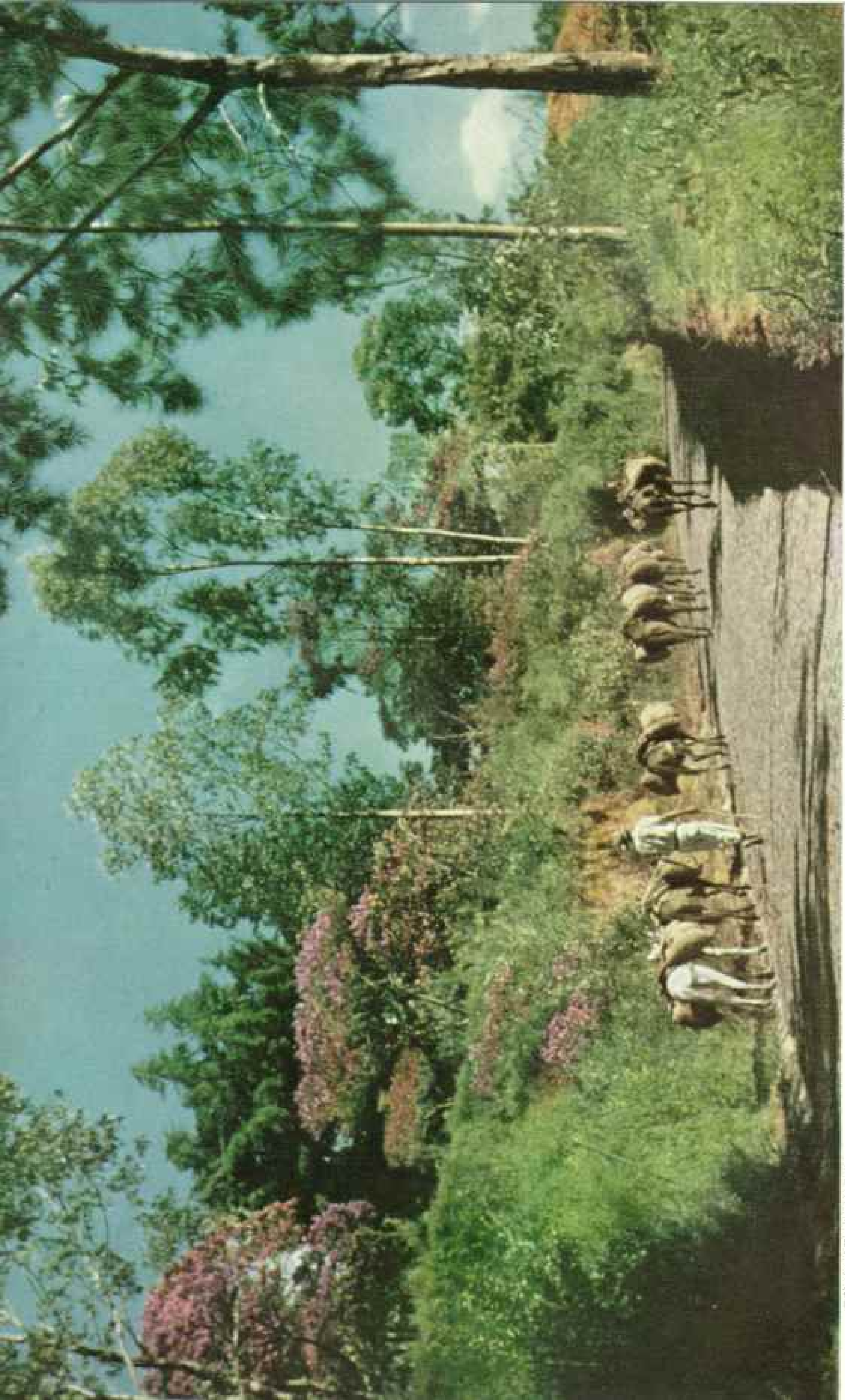
Belo Horizonte's Sports Center, Built with Lottery Funds, Trains Brazilian Swimming Champions
On holidays the capital's young folk flock to the Minas Tennis Club, first of a series of State-sponsored recreation units.

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Illustration by W. Robert Moore





Donkeys Laden with Farm Produce, Instead of Gold as in Colonial Days, Plod Past Purple Lenten Trees near Lafaiete

Slowly, with Picks and Shovels, Road Builders Whittle Away Caucé Peak, a Mountain of Solid Iron Ore Overlooking Itabira

Even the "debris" from their digging goes to smelters. When modern machinery is installed, ore will be removed at the rate of 1,500,000 tons annually.

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Illustration by W. Robert Meade





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Elaborate Doorways, Medallions, and Images, Carved in Soapstone by the Crippled Genius, Adorn Minas Gerais Churches



Illustration by W. Robert Moore

Priests, Acolytes, and "Angels," in Bright Array, March in a Holy Week Procession at Ouro Preto

Pilgrims from all over Brazil and other parts of South America visit the old Minas Gerais capital for the annual church festival.

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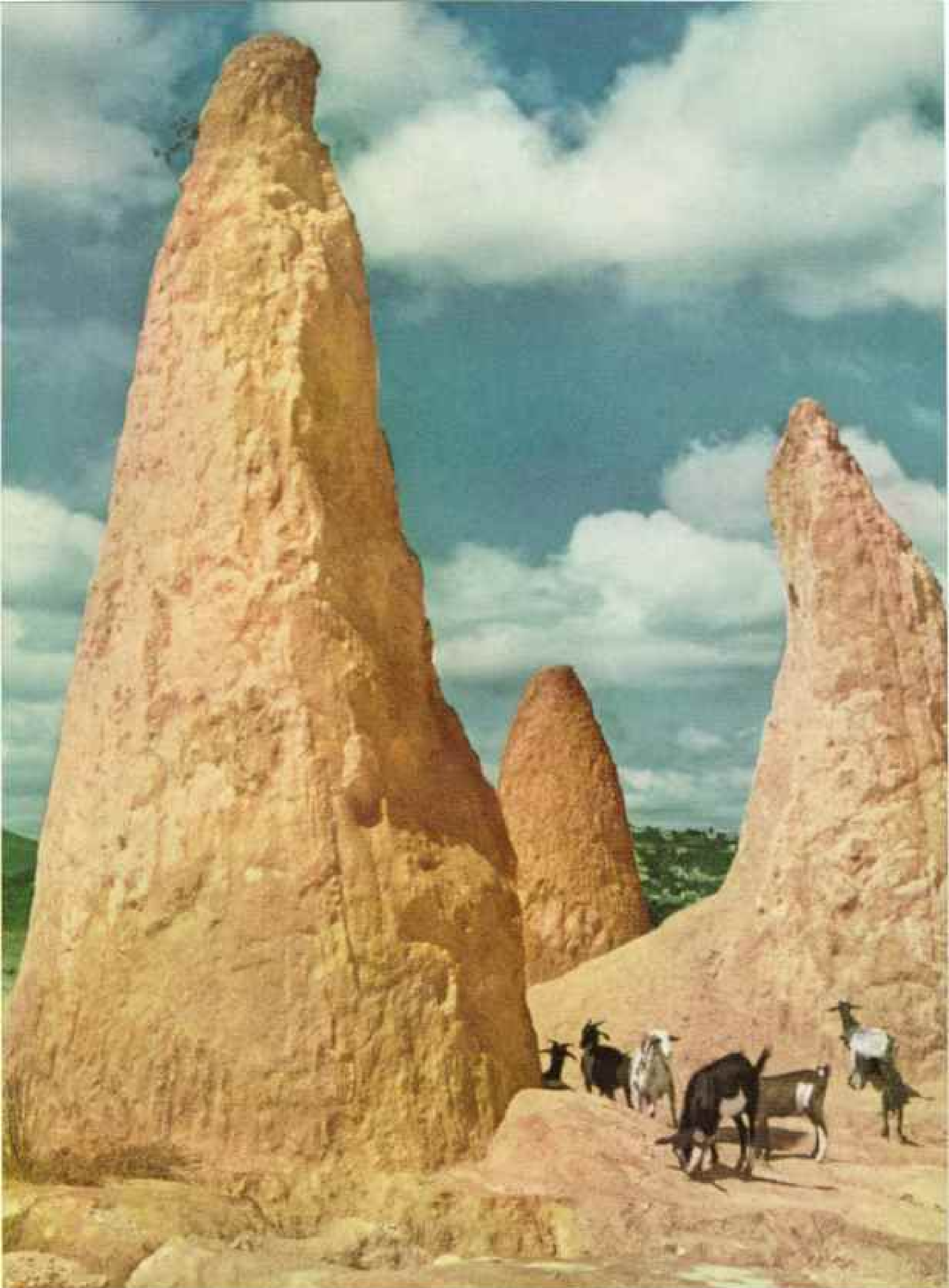
Illustration by W. Robert Miller





They're the Finest Angels in the Easter Parade

Along with wings, rich robes, and starry crowns, these young Mineiros wear seraphic expressions for the Easter Sunday procession in Ouro Preto (page 497). One angel has lost a shoe; it pinched her toes.



A Brazilian Road Project Leaves Man-made Peaks Rearing Skyward Like Giant Anthills

These spires remained when a hill was cut away to provide fill for a new highway between Belo Horizonte and Pampulha. To some travelers they suggest the primitive cone dwellings of Cappadocia, Turkey.



Beside a Lenten Tree in Full Bloom, Trim New Miners' Homes Nestle among Gold-bearing Hills Between Ouro Preto and Mariana

Ouro Preto's Younger Set, Members of El Toro Club, Brighten Holy Week with a Costume Parade

Two mask as bull and bullfighter. Others represent a giraffe-necked freak and a giantess. Marchers in official club uniform bring up the rear.

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Illustrations by W. Robert Murray



Take Away the Palm Trees and This Might Be Central Park in New York, Not in Belo Horizonte!

Mosaic Sidewalks Recall Portuguese Heritage

Builders still favor the broken-stone paving used in colonial days. Dark and light stones, in several color combinations, are laid in fanciful patterns.

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Illustration by W. Robert Moore



A Sedan Chair Is Nice, but She'll Take a Convertible

In this palanquin, with its padded shafts shouldered by two servants, a wealthy colonial aristocrat once rode through the hilly streets of Ouro Preto.

Illustration by W. Robert Moore





Three Times Daily, the Capital's Movie Theaters Spill Chattering Crowds onto the Mosaisé Sidewalks

"Matinees are our flirtation programs," a Mineiro told the author. "So—look out!" American films, with Portuguese subtitles, are popular.

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Kulochrome and Elkhornite for W. Hubert Moore

Old Droopy Ears and a Glittering Array of Gem Stones Represent Two Major Sources of Minas Gerais' Wealth

On a *fazenda* (ranch) near Pedro Leopoldo, a foreman displays a prize Indu-Brasil bull. Such cattle, a hardy crossbreed developed from India stock, thrive on Brazilian ranges. The young lady tries an aquamarine for size. Large uncut crystals are (left to right) aquamarine, blue topaz, and tourmaline. Other stones include morganite, amethyst, citrine, and Brazilian emerald. Diamonds also are mined in Minas Gerais; the blue-white "President Vargas," discovered in 1935, weighed 726.6 carats and was valued at \$750,000.



year held a "royal" procession to attend High Mass. Following this, everyone danced in the streets to the tom-tomming music of African instruments.

As donations, legend has it, the Negresses washed gold dust from their hair into the stone basin at the entrance of the church.

It seems an odd twist of circumstance that Ouro Preto, whose very name and early fortunes were gained from its gold mining, now should have as its chief industry the mining of "fool's gold," iron pyrites.

Just outside town is an extensive 250-foot-thick layer of pyrites. The mine was opened in 1935 and was expanded during the war to furnish sulphur for Government munition plants.

A few miles east of Ouro Preto, on the road to the historic mining town of Mariana, one gold mine still functions.

Mariana, like Ouro Preto, is filled with ornate churches. The town was the seat of the first bishopric and archbishopric of Minas Gerais and still is a strong religious center.

A Souvenir Town of Colonial Days

Among souvenir towns dating from colonial days, few are more striking than the tiny hamlet of Congonhas do Campo, some miles west of Ouro Preto.

It stands on a hill like a light that cannot be hid, with the sanctuary of *Senhor Bom Jesus de Matozinhos* capping its crest. Up toward this shrine the houses straggle in irregular ranks on either side of tortuous rock-paved streets.

In the mid 1700's a Portuguese hermit, Feliciano Mendes, wandered about the countryside carrying a portable altar and an alms box. He had vowed to build a church with the money he collected.

His altar and alms box now hang on one of the church walls—eloquent testimony of the church's humble beginning. To *Aleijadinho* is credited its ultimate in decoration.

Doorways and altars were carved by him or his assistants, and its terrace is surrounded by huge figures of the Prophets carved in locally mined soapstone (page 496).

Small chapels flank either side of the hill approach, housing 66 elaborately carved and painted wooden figures that represent scenes of the Passion. These, too, are said to be the masterly handiwork of *Aleijadinho* and his helpers.

Each year, in September, thousands of persons flock here on pilgrimage and engulf the village.

The whole countryside roundabout is rich in iron and manganese deposits. As you come

by train south from Belo Horizonte you see big piles of iron and manganese ore at sidings.

At Lafaiete, a few miles farther south, the *Cia. Meridional de Mineração*, a subsidiary of United States Steel, has ripped away the whole top of a hill, *Morro da Mina*, to unearth its manganese.

Since operations were first begun here, in 1902, by an earlier company, the old hill has yielded some 5,000,000 tons of ore.

A Land of Spas

Ask for a bottle of mineral water in Brazil and the chances are high that you get another product of this Mineral State. The bottle may bear the label of *Caxambú* or *São Lourenço*.

These are but two of the several spas scattered through southern Minas that are noted for their thermal and mineral waters and health baths.

So popular is the large spa of *Poços de Caldas* (Pools of Hot Springs) that an air service links it with Rio and São Paulo. Brazilians and many other visitors from Latin America come here to benefit by its hot sulphur waters and mud baths.

Surpassing *Poços de Caldas* in the outlay of its buildings is *Araxá*, east of *Uberaba*. For some years this remote interior town was a modest resort. Recently, millions of dollars were spent in building luxurious hotels and baths to exploit its warm sulphur baths and waters.

The Manchester of Brazil

Near the southern edge of Minas on the main line from Belo to Rio de Janeiro is *Juiz de Fora*, a busy industrial center. "Manchester of Brazil" the people like to call it, because of its textile mills and factories.

Twice before in earlier days the Mineiros tried their hand at making textiles. Both times they were successful—too successful.

The first attempt followed the collapse of the early gold-mining boom. On crude looms folk here began producing cotton fabrics and developed a sizable trade with other sections of the country. Portugal quashed that by stringent laws, allowing them to make only coarse sacking for Negroes.

Again, when Brazilian ports were opened to foreign trade, the Mineiros set up their looms. But not for long. A treaty between Britain and Portugal carried a restrictive clause against Brazilian textiles.

The third start was made in 1864 by two *Mascarenhas* brothers.

Perhaps as fascinating as the growth of the Brazilian textile trade since then is the



Generous Nefite from Times Illustrated

As in Early Gold-rush Days in Minas, They Pan Alluvial Sands for Nuggets

These boys may net only a few flakes, worth less than a dollar, for their day's work. Despite small individual pickings, such free-lance enterprise nets as much gold as does organized mining. The lads work near São João del Rei, one of the historic mining centers (page 483).

long story of the Mascarenhas family itself.

The story begins in 1778 when 16-year-old Antonio Gonçalves Mascarenhas arrived in Rio from Portugal. In his pocket he carried a little money gained from the sale of the family farm following the death of his parents.

In Rio he fell in with a *tropeiro*, the owner of a pack train, and joined him in wandering through Minas Gerais, bartering merchandise for rural products.

On one of their trips they came upon an Indian baby whose mother had just perished by the wayside. It was St. Joaquim's Day; so what better than to name her Joaquina Maria da Conceição.

Thus Joaquina was adopted by the *tropeiro* and accompanied them on their journeys. In the fullness of time, Antonio married her.

The old *tropeiro* retired, but Antonio and Joaquina carried on.

Three sons were born on the trail.

When the youngest child, also named An-

tonio, was only nine, the parents were stricken with smallpox. Slaves stole the mules, goods, and money, and abandoned the youngsters.

By rare good fortune another passing pack train found them and took them to the nearest fazenda.

One youth went with the *tropeiros*; the second ran away and died. Little Antonio, however, was made of sturdy stuff.

He lived scantily, grew up, and eventually married the daughter of a wealthy cattleman. To them were born 13 children, all of whom prospered.

Two of these brothers, Bernardo and Caetano, founded the present flourishing textile industry in Minas and laid the foundations for the honored house of Mascarenhas.

It is such human resourcefulness, coupled with rich natural resources, that today is rapidly widening the State's horizons.*

* For additional articles on Brazil, see "NATIONAL GEOGRAPHIC MAGAZINE Cumulative Index, 1899-1947."

Exploring Aleutian Volcanoes

By G. D. ROBINSON *

ON JUNE 6, 1945, when the war against Japan was approaching its climax, a telephone call came for me at my hotel in Anchorage, Alaska, where I was outfitting for a geologic mission in the interior.

There was a note of urgency in the voice of the caller, a colonel on the staff of Lt. Gen. Delos C. Emmons, then Commanding General of the Alaskan Department.

"A volcano is erupting near Fort Glenn, on Umnak Island, one of our big Aleutian bases," he said. "We are afraid it may blow off its top at any time and destroy the base. General Emmons wants a geologist to fly out and see if the base is in real danger."

Fort Glenn was then an important airbase, and in addition a large force of troops was concentrated there for a projected invasion of the Kuril Islands, northeast of Japan proper.

To evacuate so large a force on short notice might result in loss of life. Since there is no harbor near Fort Glenn, it could be done only by ferrying the troops in barges through rough seas out to transports lying offshore.

Geologists, I told the colonel, had been studying volcanoes for many decades, but had not made much progress toward predicting eruptions. There was little chance that I could outguess a volcano which had never been studied, particularly since my knowledge of volcanoes was rather sketchy.

No volcanologist was available for the job, however; so within an hour I was on the way to Umnak by air, armed with a geologic hammer, a camera with one roll of film, a high-temperature thermometer hurriedly wrenched from a B-29 (for taking the temperature of volcanic gases or lava), and a general sinking feeling.

Although this was to be my first encounter with an active volcano, it was not the first such experience for General Emmons.

Mighty Eruption of Mount Katmai

Exactly 33 years earlier—on June 6, 1912—General Emmons, then a young lieutenant, had been on a ship in Shelikof Strait between Kodiak Island and the Alaskan mainland. Suddenly an immense dark cloud had swept in from the west, blotting out the sky, and a rain of still-warm volcanic ash poured down on the ship, threatening to sink it and suffocate its passengers.

This was the eruption of Mount Katmai in which $4\frac{1}{4}$ cubic miles of volcanic ash was belched forth, spreading over thousands of square miles. In this eruption was born the

famous "Valley of Ten Thousand Smokes."[†]

Perhaps, also, General Emmons remembered the frightful eruption of Mount Pelée in Martinique, in 1902, in which 28,000 people perished;[‡] and the explosion of Krakatau, a volcanic island in the Netherlands Indies, in 1883, which caused a tidal wave that snuffed out the lives of 36,000.

Closer to home, though much less destructive, was the eruption in 1944 of Mount Cleveland at Chuginadak Island, less than 100 miles from Fort Glenn. This eruption killed one soldier of a small detachment stationed there and caused the outpost to be abandoned.

Skyscraper Volcano of the Aleutians

As we flew along the Alaska Peninsula and out over the eastern end of the Aleutians, clouds rising to about 9,000 feet hid all but the highest peaks.

Pavlof Volcano on the Peninsula was mildly active, emitting puffs of black ash and steam at about one-minute intervals (page 512). A steam plume rose from Shishaldin, nearly 10,000 feet high, tallest volcano in the Aleutians (page 513).

Umnak Island was shrouded in cloud as we approached.[§] Mingling with the white-and-gray atmospheric clouds but easily distinguished from them was a broad, ragged mass of black ash cloud, attesting to volcanic activity on the ground hidden below.

As our plane ducked into the clouds and began circling for an instrument landing, we lost sight of the ash cloud. When we came down on the Fort Glenn field there was no sign through the fog and oncoming night that a volcano was erupting vigorously only 10 miles away.

Earth tremors accompanying the eruption had been felt only rarely and faintly at this

* Mr. Robinson is a geologist on the staff of the U. S. Geological Survey and is acting in charge of the Survey's volcano investigations. Published by permission of the Director, U. S. Geological Survey.

† See, in the NATIONAL GEOGRAPHIC MAGAZINE, articles on the Valley of Ten Thousand Smokes in the issues for January, 1917; February, 1918; and September, 1921, all by Robert F. Griggs; and April, 1919. Also: "Volcanoes of Alaska," by Capt. R. W. Perry, August, 1912, and "Recent Eruption of Katmai Volcano in Alaska," by George C. Martin, February, 1913.

‡ See, in the NATIONAL GEOGRAPHIC MAGAZINE, by Israel C. Russell: "Recent Volcanic Eruptions in the West Indies," July, 1902, and "Volcanic Eruptions on Martinique and St. Vincent," December, 1902.

§ See "Navy Artist Paints the Aleutians," by Mason Sutherland, NATIONAL GEOGRAPHIC MAGAZINE, August, 1943.



By E. Wilson, U. S. G. N.

Men Crossing Ash-covered Snow Fields Inside Okmok Crater Seem Dwarfed by Eruption

distance, according to Lt. Col. O. J. Mosman, the fort commander, so I began to feel somewhat happier about the situation.

If the volcano had been erupting freely for several days, as reports of flyers seemed to indicate, and the eruption was not accompanied by strong earthquakes, it seemed reasonable to suppose that the volcanic forces were being released about as fast as they were accumulating and that a major outburst was not to be expected.

Next morning a small party in two "weasels" set out for the volcano.

The excellent topographic maps of the Army Corps of Engineers indicated that the northeast end of Umnak Island was essentially a single volcano about 25 miles in diameter at sea level, and that the summit was occupied by a huge, steep-walled, flat-floored crater almost circular and as much as seven miles across, with its rim 2,900 to 3,500 feet above sea level. Craters of this type are called calderas by geologists.

This huge volcano is known by its native name—Okmok. Rising on the southeast flank of Okmok Volcano is Mount Tulik, a long-dormant parasitic cone, 4,111 feet high and the tallest peak on northeastern Umnak.

The maps showed about 10 large and many small volcanic cones on the caldera floor, 1,500 to 2,500 feet below the rim. Since flyers' reports indicated that one of the cones in the southwest sector of the caldera was erupting, we headed in that direction.

Fog Hides Eruption

We climbed in blinding snow and fog to the rim, but could see nothing inside (nor anywhere else), although we could hear a steady booming roar broken by surging and splashing noises. So we returned to the fort.

Next day we approached the caldera by jeep and on foot from the northeast, where the rim is broken by the canyon of Crater Creek, only outlet for the water which falls into the caldera (page 517).

The waters of the creek were clear and barely above freezing, indicating that lava was not flowing or ash being deposited in the northeastern sector.

A herd of caribou, which usually winter in the caldera until July or August, were wandering about on the tundra near Crater Creek, apparently having been frightened out of their winter home by the eruption. The caldera was still nearly filled with fog and low clouds, but from the rim we could dimly make out eruption clouds rising several miles away.

That night I discovered that the Army, without knowing it, had a well-qualified vol-

canologist on the ground at Fort Glenn! He was Lt. Ray E. Wilcox, who was at the fort installing special signal equipment. Before the war he had specialized in volcano research.

Wilcox had heard only that a near-by volcano was erupting and therefore had not come forward to offer his services. I was glad to find a geologist with a more thorough knowledge of volcanoes, and we joined forces.

On the morning of June 10 the fog and clouds at last lifted. From the fort a column of white steam, at times darkened by ash, could be seen rising above the caldera. Our weasel caravan was reassembled, and we retraced our route of three days earlier.

When we left the weasels and walked toward the rim, our feet sank through two inches of newly fallen black volcanic ash and left white prints in the snow beneath (page 516).

As we stood on the rim we were treated to an awesome spectacle. Billowing black and white clouds, rolling majestically upward from the summit crater of a cone less than a mile away and about 500 feet below us, extended far over our heads. As the clouds rose above the rim, a strong north wind swept them to the south, showering the outer slopes and us with fine ash.

A steady roar, like that of a railroad locomotive at the far end of a long tunnel, was punctuated every 10 to 15 seconds by a violent explosion which threw red-hot blobs of lava more than a thousand feet above the cone. The larger lava masses, or volcanic bombs, so named because they resemble projectiles, fell back into the vent or rolled down the slopes of the cone; the smaller fragments were thrown farther and fell on the caldera floor.

About once a minute there was a particularly violent explosion in which bombs, some several feet long, were thrown far out on the caldera floor.

On the topographic map the active cone was shown as about 400 feet high, rather sharp-topped, and nearly 100 feet lower than one joining it to the northwest; now, after a few days' eruption, it had built itself higher than its dormant neighbor and had developed a broad, shallow crater.

A Glowing Red Lava Fall

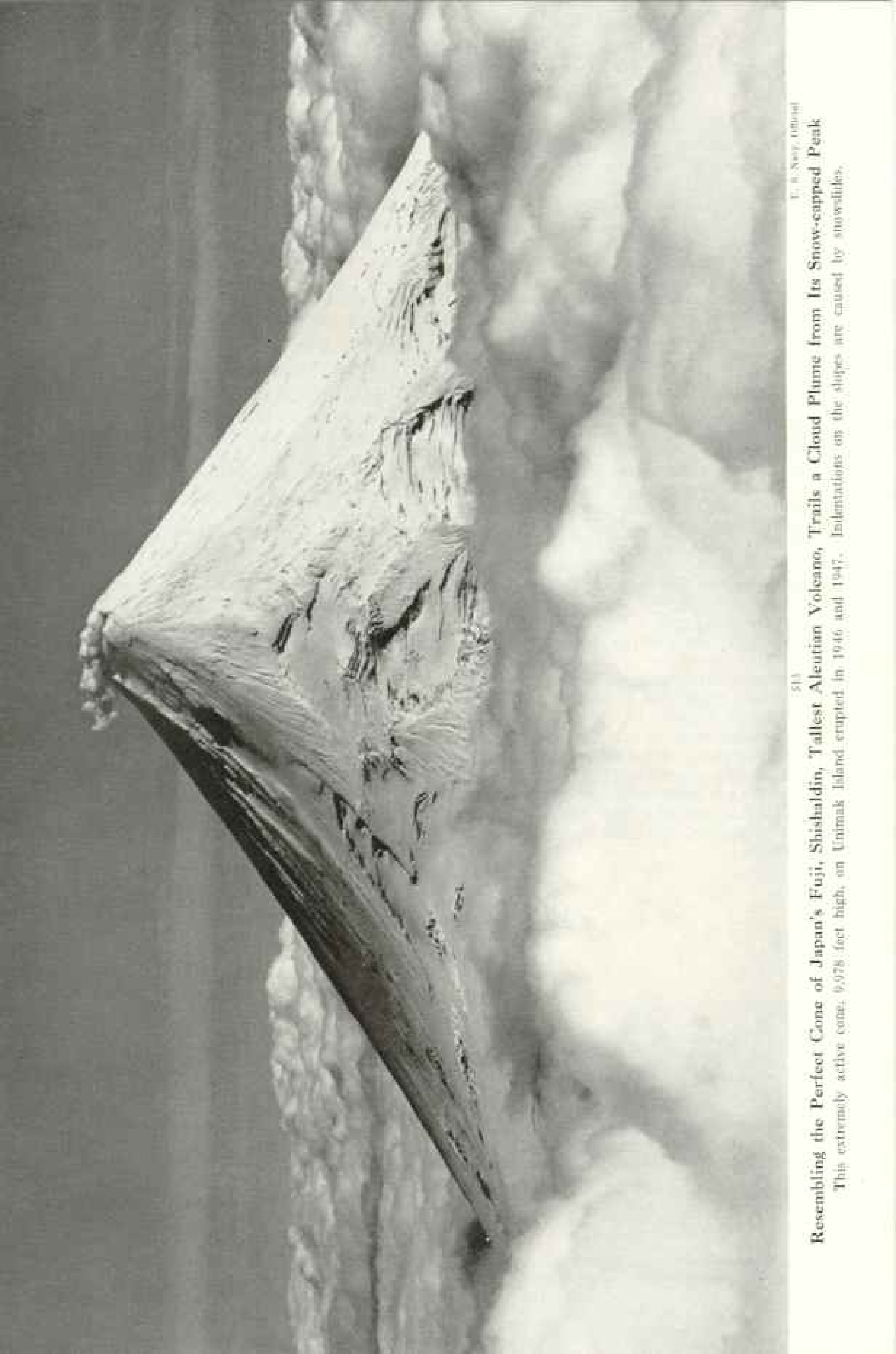
A stream of lava, glowing red even in the bright sunlight, issued from a fissure in the southwest base of the cone, poured over a cliff as a "lava fall," and turned down a depression to the northeast toward the center of the caldera. The flow was then about three-fourths of a mile long.

Another smaller ribbon of lava was moving



Pavlof, 8,900 Feet, Emitting Steam, and Pavlof Sister, 7,000, Are Famous Landmarks of the Aleutian Volcano System

Located on the Alaska Peninsula, they have erupted often. Both have small summit craters. Clean snow on Sister shows it is now quiet.



Resembling the Perfect Cone of Japan's Fuji, Shishaldin, Tallest Aleutian Volcano, Trails a Cloud Plume from Its Snow-capped Peak

This extremely active cone, 9,978 feet high, on Unimak Island erupted in 1946 and 1947. Indentations on the slopes are caused by snowslides.

west into a shallow depression. Dense clouds of steam marked the edges of the flowing lava as it melted the ice of the little glacier which occupied this part of the caldera floor. Its ability to melt ice was considerable, as its temperature was nearly 2,000° F.!

Climbing and sliding down into the caldera, we found the lava stream was flowing 30 to 40 feet a minute. Its surface was partly crusted over, and the floating chunks of crust jostled each other with a peculiar rattling noise. We amused ourselves by throwing heavy lava bombs into the flowing lava and watching them float away like corks.

Near the lava vent were three miniature volcanoes only a few feet high, throwing innumerable blobs of bright orange-hot lava into the air like many-armed jugglers and giving off, with a high-pitched hiss, large volumes of faintly bluish gases. The sides of the tiny volcanoes were spectacularly colored with white, yellow, orange, and red deposits made by the rising gases.

All this indicated that dangerous pressures were probably not being built up inside the volcano, and we reported to General Enmons that there was little risk of a disastrous eruption. Our conclusion was bolstered by the fact that the crater of Okmok Volcano is a caldera, for most calderas are formed in such a way as to provide natural "safety valves" and lessen danger of catastrophic eruptions.

Calderas, such as that of Okmok, usually come into being when vast amounts of molten rock, mostly transformed by internal gas pressure into ash and pumice, are erupted through the central vent of a large volcanic cone, removing support from the upper part of the volcano.

Part of the volcano's top is perhaps blown away in the eruption, but most of it collapses in a jumble of broken blocks, as the upper crust of a pie might do if the filling were suddenly removed.

Later, lava and fragmental material erupt through the cracks between the blocks of the fallen "roof," building small volcanoes on part of the floor and leveling off the rest of it. Crater Lake in Oregon is a well-known caldera formed in this manner and later filled in with rain water and snow.*

Calderas in the Aleutian Arc

Calderas, rather rare elsewhere, are remarkably numerous in the Aleutian Arc.

The chain contains no fewer than 10 calderas a mile or more across, and at least five with diameters of five miles or more. Others probably will be discovered as exploration proceeds.

There are more calderas in the Aleutian Arc than in any other known volcanic chain, with the possible exception of the southern islands of Japan.

Best known of Aleutian calderas is Aniakchak, 5½ to 6¾ miles across and 1,200 to 3,000 feet deep, on the Alaska Peninsula, discovered by W. R. Smith and R. H. Sargent of the Geological Survey in 1922.

The crater of Mount Katmai, enlarged by the great eruption of 1912 to a width of nearly three miles and a depth of 2,700 to 3,700 feet, is a well-formed caldera though not exceptionally large.

Once a caldera is formed, there is little

* See "Crater Lake and Yosemite Through the Ages," by Wallace W. Atwood, Jr., NATIONAL GEOGRAPHIC MAGAZINE, March, 1937.



chance of another catastrophic explosion, for if a mass of magma (molten rock) should rise up beneath the fallen roof from deep within the volcano, the cracks and fractures in the fallen material would ordinarily provide an easy means of escape for gases that might otherwise accumulate sufficiently to produce a major outburst as the magma cooled.

That was apparently what was happening in the Okmok caldera (page 524). Since the gases were escaping and lava flowing freely, it was not likely that great pressures were being built up.

A few days later Dr. Howel Williams of the University of California, an expert volcanologist, arrived and confirmed our prediction. Fortunately, the volcano also confirmed it, although lava continued to flow until some time in September, the main flow finally reaching a length of nearly five miles. Mildly explosive activity continued intermittently until December. Today the cone is steaming quietly but giving no other sign of activity.

This 1945 eruption of Okmok Volcano might have ended much differently, perhaps taking many lives and interfering with our air attacks on Japan. Because of its nearness

to Fort Glenn, the eruption focused attention on how vulnerable the military and civilian establishments in the Aleutian region are to destructive volcanic activity, and emphasized the deplorable scarcity of geologic information on the entire area.



Bering
Sea

St. Paul
Pribilof Islands
1012 St. George

Alaska Peninsula
Shumagin Islands
Unimak
Unalaska Islands
Fort Glenn
Umnak
Chuginadak
Islands of the Four Mountains

Drawn by Harry S. Oliver and Evelyn E. Alliman

Aleutian Volcanoes Form a Chain 1,600 Miles Long

Extending along the Alaska Peninsula and through the Islands, the system includes about 80 large volcanoes and scores of small cones. This is one of the world's most active volcanic regions.



COL. G. A. POLK

Roped for Safety, Geologists Prepare for a Close-up Look at Okmok Volcano

They are about to start down over the southwest rim of the caldera, or large crater. Clouds of ash and steam rise from the erupting cone, half a mile away on the caldera floor. Opposite rim is 7 miles distant. The men's feet, sinking through newly fallen volcanic ash, leave white prints in the snow beneath (page 511). Left to right, Lieut. R. E. Wilcox, Sgt. C. D. Clawson, and the author. The picture was taken by Col. G. A. Polk, fourth man on the rope, who went in with the others.

With General Emmons's backing, a long-range study of the volcanoes of the Aleutian region was launched in October, 1945, by the U. S. Geological Survey, supported by the Military Intelligence Division, Corps of Engineers of the Army, and later by the Office of Naval Research.

A Long-range Study of Volcanoes

From this study we hope to learn the basic facts about Aleutian volcanoes, as well as much new information about volcanoes in general.

This will be useful in planning the locations of military bases and other settlements where they will be safe from possible eruptions.

In the Aleutians, Nature has provided a tremendous volcanic laboratory, for records show that at least one eruption can be expected somewhere in the chain every year. In

fact, the Aleutian region is one of the most active volcanic belts on earth.

The Aleutian Islands consist of some 60 large and small islands and innumerable islets, trailing westward from the tip of the Alaska Peninsula in a gently curving arc nearly 1,100 miles long (map, pages 514-15).^{*} They are mostly but not entirely of volcanic origin.

However, the chain of volcanoes is not confined to the islands. Beginning with Mount Spurr on the Alaskan mainland, about 80 miles west of Anchorage, it extends 600 miles southwestward along the Alaska Peninsula, and on out through the Aleutians to Buldir Island, almost at the end of the island chain, 110 miles from Attu.

Eventually we expect to explore geologically

^{*} See "Bizarre Battleground—the Lonely Aleutians," by Lonelle Davison, NATIONAL GEOGRAPHIC MAGAZINE, September, 1942.



FRANK M. HARRIS, JR., U. S. G. S.

If Your Muscle, Wind, and Nerve Are Good, You Can Cross "Blister Bridge"!

Members of a field party studying Olmok Volcano rigged this rope across Crater Creek and crossed in this position under their own muscle power. It was the only safe way to cross the stream at this point, since the current is dangerously swift and the temperature of the water close to freezing. In the background are the cliffs of Crater Creek Canyon, near its exit from Olmok caldera.

all the volcanoes of this 1,600-mile chain, which is called the Aleutian Arc.

Records of eruptions of the Aleutian volcanoes date to 1760, shortly after Russian explorers and traders began coming to the region, but many eruptions undoubtedly have not been recorded. A few volcanoes on the mainland have been examined briefly, largely by the Geological Survey, and the Valley of Ten Thousand Smokes has been studied in a series of seven expeditions sponsored by the National Geographic Society.*

Aleutian Arc Peppered with Volcanoes

We now know that the Aleutian Arc contains about 80 large distinct mountains known or believed to be volcanoes, from 1,000 to 10,000 feet high, as well as scores of small volcanic cones, some of which are still being built up by volcanic activity. Others are quiescent and are being eroded away by

streams, rain, glaciers, wind, and ocean waves.

Since 1760 at least 39 different Aleutian volcanoes have been reported active, some many times. About 225 eruptions are recorded, ranging from quiet discharges of steam and "smoke" (really ash-laden steam) and minor explosive eruptions often accompanied by lava flows, to major catastrophic eruptions such as that of Mount Katmai in 1912.

Analysis of the incomplete records indicates that volcanic activity in the Aleutians follows major cycles of roughly 80 years, with minor cycles of about 20. Apparently the chain is now in the inactive part of a cycle. If this interpretation is correct, activity should mount to a climax again in the late 1960's.

Most active of the Aleutian volcanoes, according to the records, are Pavlof Volcano on the Alaska Peninsula, Shishaldin Volcano on

* For list of articles on the Valley of Ten Thousand Smokes, see footnote on page 509.



G. D. Robinson, U. S. G. S.

Trail in New-fallen Volcanic Ash Marks Geologists' Route down into Okmok Caldera

From the rim, hidden in clouds, the tracks lead down the steep caldera wall and out across the ash-covered snow field on its floor, heading toward the active cone. One man stops to photograph those ahead.

Unimak Island, and Makushin Volcano on Unalaska Island, overlooking Dutch Harbor.*

The "Disappearing Island"

Most famous of all Aleutian volcanoes is the "disappearing" island of Bogoslof, which seemingly has risen from and sunk into the sea several times since its first recorded appearance in 1796.†

Bogoslof is apparently the top of a nearly submerged volcano rising 5,000 feet from the ocean floor. It is eight miles in diameter at its base. The strange antics of Bogoslof are caused by eruptions of this volcano, building islands above the water which are promptly attacked by wind and waves and rapidly worn away, or destroyed by later explosive eruptions.

Innumerable sea birds nest there, and between 5,000 and 10,000 sea lions live in the near-by ocean. Its topography has been changed frequently by eruptions since 1796, in 1883, 1906, 1910, and almost continuously from 1923 to 1927.

Many intriguing problems arise as the study of Aleutian volcanoes proceeds. For example, why do some of the large volcanoes have no glaciers on their slopes, while others, no larger, have heavy ice coats? Perhaps eruptions have interfered with the formation of glaciers. Mountain glaciers seem to require basins for their formation; the frequent deposition of ash and lava may keep the slopes smooth and prevent basins from forming.

Still unexplained, too, is why the active volcanic vents of the Aleutians gradually have migrated from the Pacific Ocean side of the island chain to the Bering Sea side.

Absence of Trees a Mystery

Another Aleutian mystery, probably only remotely related to the volcanoes, is the nearly complete absence of trees.

Forests grew on at least part of the islands and on the Alaska Peninsula millions of years ago in the late Tertiary geologic period, as we know from fossil tree trunks that have been unearthed. Except for a few thickets of undersized willow and alder, no trees grow there naturally today, though the climate is comparatively mild with plentiful rain and good soil.

Two small groves of Sitka spruce planted on Amaknak and Expedition Islands in Unalaska Bay more than 100 years ago have survived but not flourished; some trees planted recently by the Army have thrived, but more have failed.

Perhaps the strong and long-continued winds offer an explanation. If so, then the

absence of such winds in the geologic past must be accounted for.

In the inhospitable climate of the Aleutians, with its high winds, frequent fog, sudden storms, and constantly rough seas, geologic field work is practicable only during the three months of summer. Even then, bad weather may at times permit as little as half a day's field work in three weeks, and snow storms or fogs may suddenly shut off visibility on days that start out with clear skies and sunshine.

Most areas are without roads or landing beaches, and foot travel is often difficult and dangerous, though not more so than geologists meet in other places.

Especially on the smaller islands, slopes are steep from the water's edge. On the larger islands and the mainland, broad, swampy tundra separates the volcanoes from the seas and from each other. Treacherous glacial streams—icy, swift, and given to sudden shifts in course and volume—must often be crossed, and at higher altitudes the glaciers themselves contain dangerous crevasses and ice cliffs.

On the Alaska Peninsula and on Unimak, easternmost of the Aleutians, bad weather and difficult terrain are not the only complications, for these areas are inhabited by the great Alaskan brown bear, which sometimes stands 9 feet high erect and weighs 1,500 pounds.‡

But for the geologist there are compensations for the hardships. The few clear, warm days are especially enjoyable because of their rarity. During the summer months there are few uncomfortably cold days and no uncomfortably hot ones.

The amazing profusion of sea birds, including eider ducks, arctic terns, albatrosses, petrels, puffins, and auklets, of animals such as foxes, sea otters, seals, sea lions, whales, dolphins, and porpoises, and of flowering plants§ is a constant source of pleasure.

The absence of trees and underbrush, though giving many areas a forbidding and gloomy appearance, makes for easier travel and plentiful exposures of rocks for the geologist to study (page 527).

In three summers of geologic work our men have made at least preliminary surveys of most

* See "Mapping the Home of the Great Brown Bear (The Society's Pavlof Volcano Expedition)," by T. A. JAGGER, NATIONAL GEOGRAPHIC MAGAZINE, January, 1929.

† See "Jack in the Box: An Account of the Strange Performances of the Most Wonderful Island in the World," NATIONAL GEOGRAPHIC MAGAZINE, February, 1909.

‡ See *Wild Animals of North America*, by E. W. Nelson. Published by National Geographic Society.

§ See "Riddle of the Aleutians," by Isobel Wylie Hutchison, NATIONAL GEOGRAPHIC MAGAZINE, December, 1942.



E. R. AIR PHOTO, OFFICIAL

Clouds of Ash and Steam Rise Two Miles High from Erupting Okmok Volcano

This is how the eruption appeared in June, 1943, when the author was summoned hurriedly from Anchorage to see if there was danger of an explosion that might destroy the near-by Army base, Fort Glenn (page 509). The erupting cone is a small one within the caldera, or large crater, $7\frac{1}{2}$ miles in diameter, on Uniak Island. Steam is emitted around the edge of the cone. Just under the airplane wing more steam rises from snow melted by streams of hot lava. Ordinary clouds are in the background and at lower left.

of the western part of the Alaska Peninsula and of about a third of the Aleutian Islands. Most of our knowledge of the western Aleutians we owe to geologist Robert R. Coats, and of the eastern Aleutians to geologist Frank M. Byers, Jr.

Architecture of Volcanic Islands

Other geologists who have made and are making important contributions include Howard H. Waldron, George C. Kennedy, David M. Hopkins, Frank S. Simons, and Bernard Fisher. From their studies we are well on

the way toward understanding the nature and history of many of the individual volcanoes.

Stimulating ideas about the geologic structure and history of the entire region are also beginning to take shape.

Formerly it was assumed that the Aleutians, like the Hawaiian Islands, are immense, rather simple volcanoes built up directly from the ocean floor, with only their tops above water. Now evidence is growing that most of the Aleutian volcanoes have been built above the present-day sea level on a platform of older rocks formed millions of years ago, so that the



U. S. Navy, Official.

Three-cratered Cerberus Volcano Is Named for the Three-headed Dog That Guarded Hades

Two of the craters, each about a quarter of a mile in diameter, are visible. The third, slightly smaller, is just out of the picture to the right. The triplet craters lie within a large crater, or caldera, 6 miles across, which forms the central part of Semisopochnoi Island. Anvil Peak, 3,850 feet, highest point on the island, is in the background. Last known eruption of Cerberus was in 1875, although it is so remote that more recent activity may have gone unnoticed.

bulk of each present volcano is now above sea level, and has been since its formation.

Some of these older rocks were created by volcanic processes, others were laid down as sediments that eventually hardened into rock, and all of them were folded, fractured, and deeply eroded before the present volcanoes began to form.

On some islands extinct volcanoes of an older generation overlie this platform of deformed rocks, and in turn are partly buried by younger deposits of volcanic material.

Probably the relations of land and sea in

this part of the world were far different a few million years ago.

It is quite possible that not long ago, geologically speaking, before the great Ice Age, the present Aleutian Islands were part of a land mass of continental type that extended far south and east of the present Aleutian coastline. Perhaps it went even beyond what is now the Aleutian Trench, a troughlike depression in the sea floor which in places is nearly five miles deep and roughly parallels the Aleutian Arc for a distance of 2,200 miles.

The Aleutian Arc is one of many curving chains of volcanoes that border the shores of the Pacific Ocean. Such volcanic chains are unmistakable symptoms of instability in the earth's crust. How unstable this Pacific region is can well be judged from the earthquakes that frequently shake Japan,* the East Indies, the Aleutians, California, and the west coast of South America.

These earthquakes for the most part are caused by the shifting of blocks of the earth's crust along deep faults, fractures developed in the crust where stresses or strains have built up until they exceeded the breaking point of the rocks. Once a fault is formed, later accumulations of stresses and strains tend to be relieved by repeated movements of the earth's crust along the fault.

Why Are Pacific Areas Unstable?

Why are the borders of the Pacific unstable?

One romantic hypothesis is that the moon once occupied what is now the Pacific basin and was torn loose early in the earth's history by some cataclysm, such as the gravitational attraction of a large celestial body passing near by, leaving the fractured edges of the hole to readjust their equilibrium gradually.

Another theory, not quite so spectacular but more firmly backed by evidence, is that of continental drift. According to this theory, the continental mass of North and South America once was attached to Europe and Africa. It broke loose and "floated" westward—and still is slowly moving westward. This might help explain the unsettled state of the earth's crust, at least along the western edges of the Americas.

Scientists do not agree, however, which of these theories or some other is the real explanation of the instability.

Whatever the nature of the rupturing forces, we know that these great faults or fractures do exist and that they control the location of volcanic chains. The fractures themselves are not easy to find at the surface because they are mostly covered by the outpourings of lava and fragmental material from the volcanoes.

Just what is the earth's "crust"?

Although geologists and geophysicists are not in complete agreement regarding details, it is almost universally agreed that the internal structure of the earth consists of a number of continuous shells. Each grades rather abruptly into its neighboring shells, and each is composed of denser material than the shell outside it. The outermost shell, variously estimated to have an average thickness of 30

to 60 miles, is essentially solid, crystalline rock; this layer is called the crust.

The material of the earth just below the crust is probably of the same chemical composition as the lowermost part of the crust, but is believed to be glassy, rather than crystalline or liquid, because of the combination of the tremendous pressure of the overlying rocks and the great heat at that depth.

The crust is made up of two main kinds of material. The continents and their roots, extending a few miles or tens of miles downward, are composed of rocks which have an average world-wide chemical composition like that of granite. This material is called sial. A thin layer of sial also underlies at least part of the ocean.

Deep beneath the continents, and forming most of the ocean floors and oceanic islands like Hawaii, is denser rock with an average composition like that of basalt—the sima, on which the sial may be regarded as floating.

If pressure is released locally, as in the development of a deep fault extending down from the surface, the heated rocks of the lowermost parts of the crust and the glasslike material of the subcrust may melt, at least in part, and begin to flow toward the fault or other zone of reduced pressure.

Molten Rocks from Earth's Interior

Volcanoes are points at which these molten rocks, called magma, emerge at the surface, after rising along tubelike channels in the more open parts of a fault.

The magma may pour out quietly as lava flows; or, where locally charged with much gas (mostly water vapor), it may come out explosively, in the form of ash, pumice, or volcanic sand clouds.

Cones form as the erupted material accumulates around the central vent. Sometimes eruption occurs along a fissure and distinct cones do not develop.

Quiet eruptions along a large segment of a fracture may produce immensely broad lava sheets, as in the Columbia Plateau of the northwestern United States and the famed Deccan traps of India.

If fissure eruptions are explosive, they may produce pumice fields covering thousands of square miles, such as those on the North Island of New Zealand or, on a smaller scale, volcanic deserts like the Valley of Ten Thousand Smokes.

Most Aleutian eruptions have been of the central vent type. The volcanoes built in the

* See "Sakurajima, Japan's Greatest Volcanic Eruption," by T. A. Jaggar, NATIONAL GEOGRAPHIC MAGAZINE, April, 1924.



FRANK M. BYERS, JR., U. S. G. S.

Testing Heat of Escaping Steam Is a Clue to What's Happening Inside a Volcano

On the shore of Umnak Island geologist Frank M. Byers, Jr., lowers a thermocouple just below the vent of a fumarole, an opening that emits steam or other gases. The instrument recorded a temperature of 214° F., just above that of boiling water. When repeated, such measurements may indicate whether the underlying rocks that supply the heat are cooling off or whether new masses of molten rock have risen from the earth's interior to increase the temperature inside the volcano (page 526).

last few million years by these eruptions are cone-shaped strato-volcanoes—that is, layered or stratified volcanoes, built up by alternating quiet flows of lava and explosive showers of ash and pumice. About 80 percent of the material is the product of explosions.

Explosive eruptions are of two main types—ash and pumice eruptions, and “glowing clouds.”

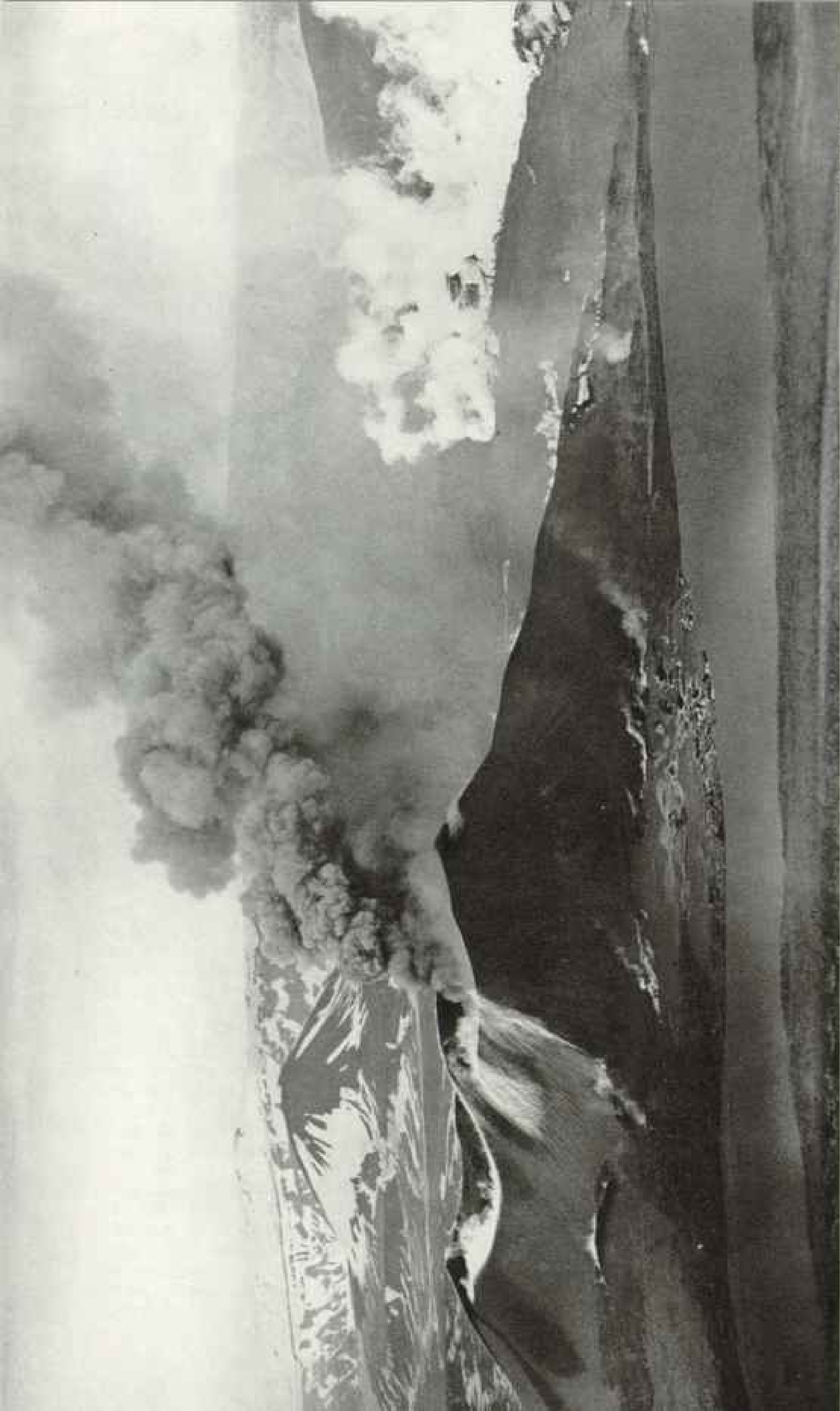
In ash-pumice eruptions, magma charged with water vapor and other gases, derived either from accumulation during crystallization of the magma or by downward percolation of water from the surface, is broken into fine fragments and violently ejected in cauliflower-shaped clouds. Fragments of older rock torn from the throat and top of the volcano make up a large part of the solid material ejected in many explosive eruptions.

In major eruptions these clouds may be

propelled several miles into the air and their load spread over vast areas, as gravity and winds take over when the explosive force is spent. Such eruptions sometimes result in the formation of calderas.

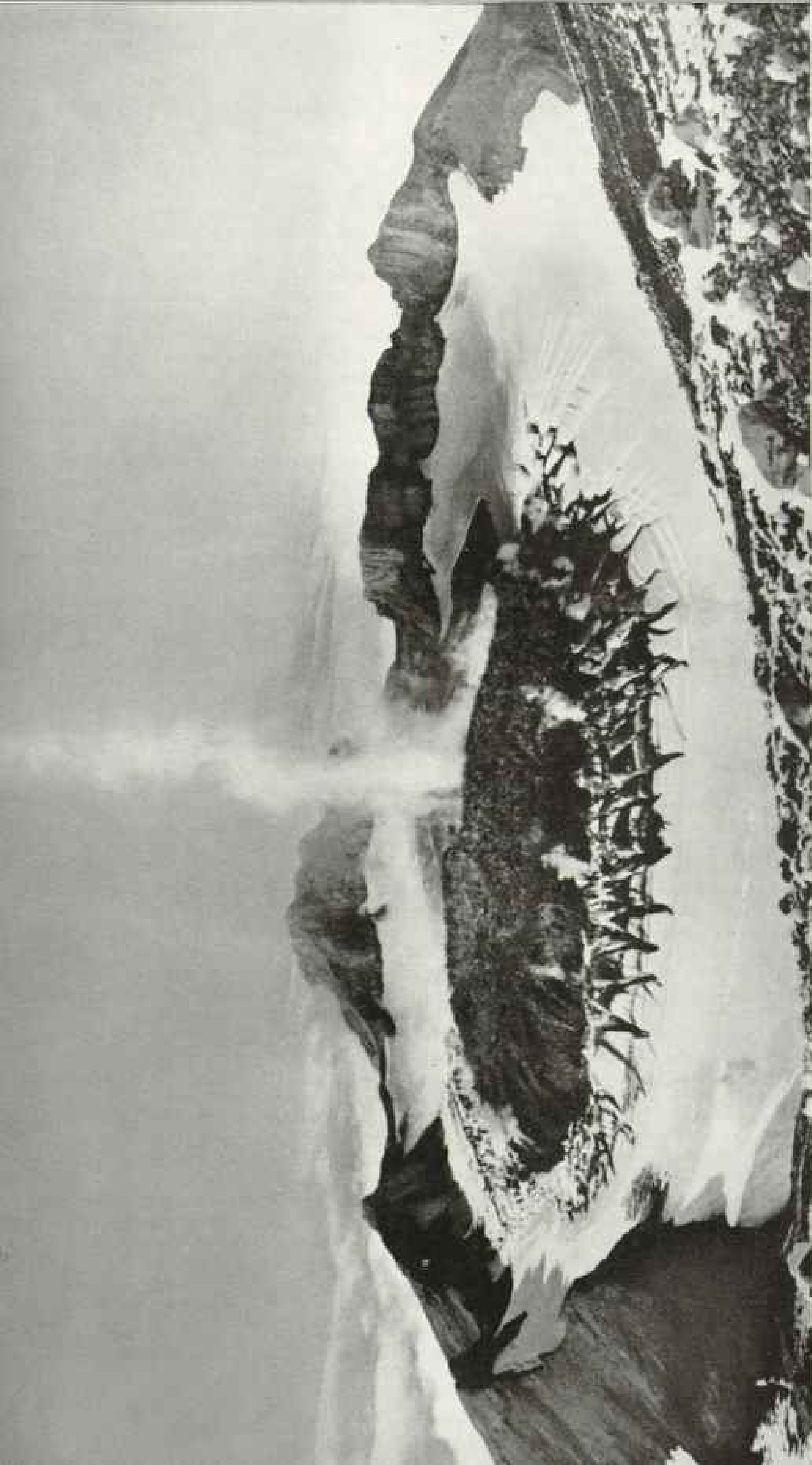
An ash eruption comparable to that of Katmai in 1912, if occurring within 25 miles upwind from the major U. S. military base at Adak, for example, would render the base useless, burying it beneath a heavy suffocating blanket several feet thick; if within 10 miles, the loss of life and property probably would be complete.

Even light falls of volcanic ash can do considerable damage, though they may not destroy buildings and equipment or seriously injure people. The ash can enter and cripple machinery. Chemicals in the ash may dissolve in the water supply of a settlement so as to disturb or prevent the operation of boilers and



Seen from the Rim of Okmok's Huga Crater, or Caldera, the Erupting Cone Belches Ash and Steam Clouds (Not Smoke)

Crater rim is in the immediate foreground. Just below is the ash-covered snow field shown on page 510. Eruption here is dying down.



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Mass of Hot Lava, Pushing Up Through Snow in Great Sitkin Crater, May Menace a Near-by Navy Fueling Station

The dome of molten rock, half a mile in diameter, pushed and melted its way up through the white blanket in March, 1945, cracking the snow around its periphery. Steam rises from snow being melted by the lava. About a dozen lava domes have been observed rising in this way. Several exploded violently, and this one may, too.

Frank S. Williams, U. S. G. I.

even may make the water undrinkable. Such minor ash falls could cripple the engines and armament of planes, trucks, or tanks.

Glowing Clouds Spell Disaster

Glowing clouds, fortunately rare, are perhaps the most spectacular and highly destructive form of eruption. These clouds are a mixture of hot volcanic gas, mostly water vapor, and fragments of hot volcanic rock from which the heated gas is emitted during eruption.

A glowing cloud may froth over the edge of a crater and descend the slope of a volcano merely by the force of gravity; or it may be expelled laterally outward by an explosion from the interior of the volcano. The cloud is generally black, not actually glowing, but is so hot that it will carbonize trees and soften glass.

Glowing clouds have been observed to travel at speeds ranging from 60 to 350 miles per hour, so that a settlement may be destroyed before there is time to escape.

Although millions of tons of fragmental rock may be moved many miles in a few minutes in such eruptions, the clouds travel almost soundlessly, because the gases being given off by the individual cooling rock fragments reduce friction between fragments and with the ground. It was such a cloud that wiped out the population of St. Pierre in the 1902 outburst of Mount Pelée.

The only protection from glowing clouds is distance, or intervening ridges which may stop or divert the progress of the cloud.

Even quiet eruptions—lava flows and volcanic mudflows—can be vastly destructive. Lava sometimes issues from the summit craters of volcanoes, but more often it breaks out through vents on the flanks of the mountain. There is as yet no way of locating in advance the vents from which lava may flow.

Usually the speed of flowing lava is not great, rarely more than a few hundred feet per hour, permitting ample time for those in its path to escape.

For example, when lava from the new volcano, Parícutin, in the State of Michoacán, Mexico, approached the village of Parangaricutiro, its advance was so slow that contents of buildings and even the timbers of which they were constructed could be removed before the arrival of the front of the flow.*

Property caught in the path of a lava flow is completely destroyed, however, and areas covered by recent flows are uninhabitable for many years afterward. Lava in many regions is very fluid and can spread out in thin sheets over large areas, but most flows in the Aleu-

tians have been rather viscous and sluggish; the flows tend to be thick and commonly travel only a few miles from their vents.

Mudflows of volcanic origin are another type of highly destructive eruption. They are caused by eruptions breaking out through lakes, glaciers, or snow fields. The lake waters or melted ice and snow mingle with volcanic ash to form mud, and the mixture runs down the mountainside far faster than lava and with equally disastrous results.

Mudflows in Iceland, resulting from eruptions under glaciers, often carry icebergs of immense size down the mountainsides and deposit them in the valleys below. Mudflows are common in the Aleutians, and in the past have wiped out a number of old Aleut settlements, especially on the island of Unimak.

Predicting Eruptions

When a volcano is about to erupt, many physical and chemical changes take place within it. Some of them can be detected at the surface, where they can be recorded and the records studied. Our best hope for predicting eruptions lies in studying these changes.

It is certain that most volcanoes shake, that they swell and contract, and that their internal temperature varies considerably from time to time. These changes, and perhaps others not yet known, may all be related to eruptions, although in complicated ways.

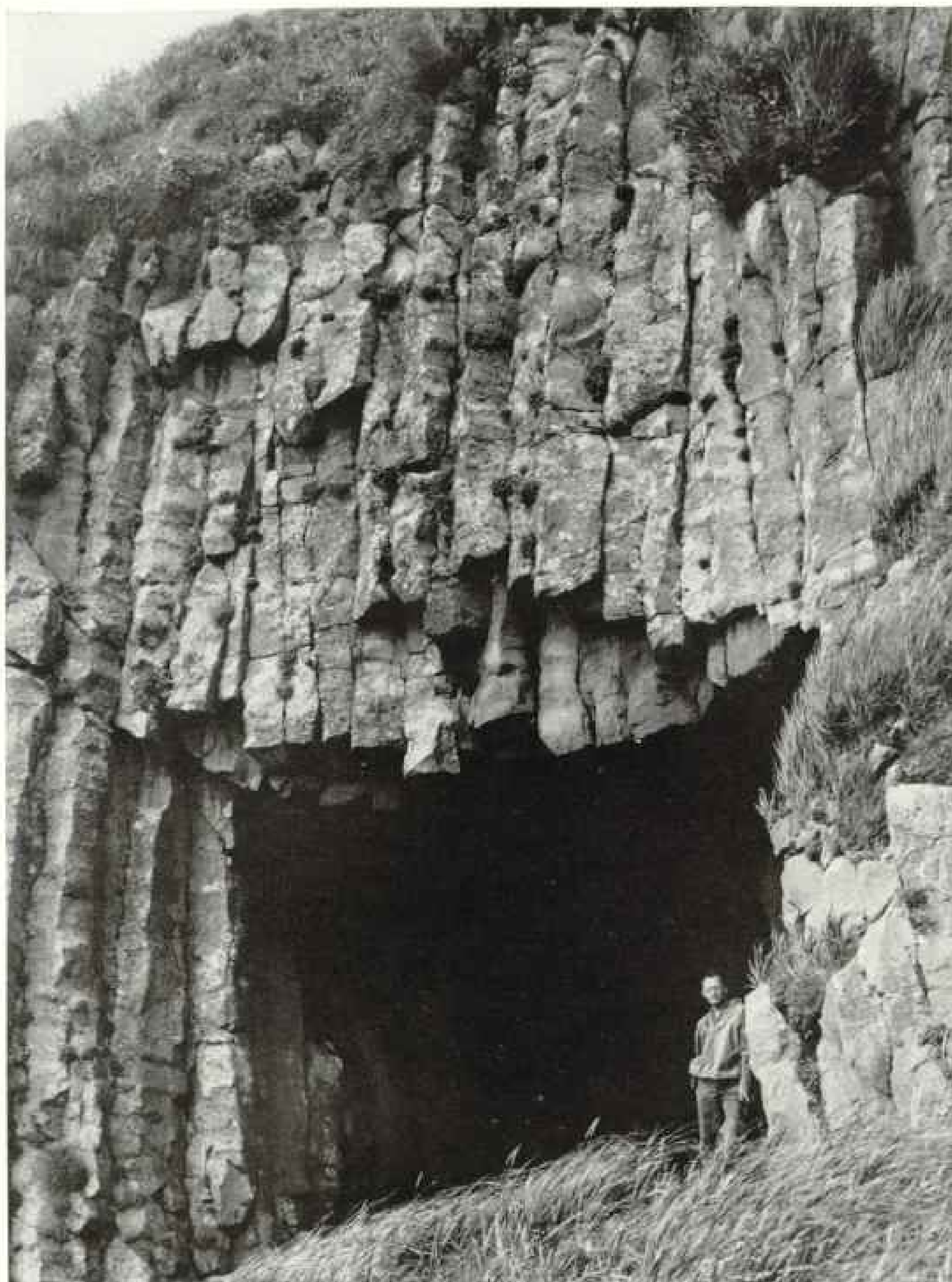
Changes in the earth's magnetism and in its natural electric currents near volcanoes, as well as the temperature and composition of volcanic hot springs and fumaroles (jets of volcanic gas), also may be helpful in predicting eruptions (page 523).

In several observatories to be set up in the Aleutians there will be installed such instruments as seismographs, to measure volcanic earthquakes; tiltmeters, to record ground displacements; magnetometers, to detect changes in earth magnetism; earth-potential recorders, to measure changes in the earth's electrical field; and elaborate temperature-measuring and sampling devices, to study gases and liquids issuing from volcanoes.

Destructive seismic sea waves, or tsunami (commonly but incorrectly called tidal waves, though not related to the tides), often originate from earth displacements in the Aleutian Trench. Seismic sea waves originating in the Trench did severe damage in Hawaii on April 1, 1946; similar waves will surely occur again.

As a by-product of our studies of earthquakes related to volcanoes, we may be able

* See "Parícutin, the Cornfield That Grew a Volcano," by James A. Green, NATIONAL GEOGRAPHIC MAGAZINE, February, 1944.



Robert R. Coats, U. S. G. S.

Sea Waves Battering for Thousands of Years Carved This Cave in an Old Lava Flow

About 70 feet thick, the lava was ejected from a volcano on Tanaga Island, in the Aleutians, during an ancient eruption. As the lava cooled and hardened, shrinkage produced the cracks in the rock structure, called columnar basalt. Geologist Robert R. Coats stands in the entrance to the cave, which extends back about 75 feet.



George C. Kennedy, U. S. G. S.

Driftwood from Far Places Provides Fuel and "Furniture" at This Camp Site

Since no trees grow on most of the Aleutian Islands and near-by parts of the Alaska Peninsula, driftwood brought by ocean currents is the only kindling available. Geological field parties camp in tents and sometimes occupy caves, hunters' cabins, barabaras (native huts), or even abandoned shelters and gun emplacements built during World War II. On the Alaska Peninsula fieldmen encounter giant Alaskan brown bears, from which they have had some narrow escapes.

to aid in developing a system for warning Hawaii and other exposed areas that such waves are on the way.

Possibility of heating buildings and developing power in the Aleutians by using volcanic hot springs or fumaroles, as is widely practiced in Italy and Iceland, or by harnessing the subterranean heat generated around volcanoes, also will be investigated. All fuel now used in the islands must be imported at great effort and expense.

Although there has been space in this article to name only a few of the geologists and others who are or have been associated with Aleutian volcano research, special mention should be made of geologist Bernard Fisher, who lost his life in line of duty.

On June 22, 1946, he and two soldiers set out in a skiff to examine Ship Rock, a small, steep-sided island about half a mile off Umnak near Fort Glenn. The sea was as calm as

Aleutian waters ever are, and the weather fine. They disappeared behind Ship Rock. Later, their overturned boat was found floating in the Bering Sea.

On Unimak Island a newly discovered caldera, perhaps the largest in the Aleutians, has been named for Fisher.

For countless centuries the Aleutian volcanoes erupted their streams of lava and clouds of ash in lonely isolation.

But today great-circle air routes between North America and the western Pacific pass directly through the Aleutian chain, and the region has assumed outstanding strategic importance. Understanding the behavior of Aleutian volcanoes and the geology of the region in general has become essential to intelligent planning and conduct of civilian and military activities there.

The United States Geological Survey is well on its way toward such understanding.

Uncle Sam Bends a Twig in Germany

BY FREDERICK SIMPICH

With Illustrations by National Geographic Photographer J. Baylor Roberts

“AS the twig is bent, the tree's inclin'd.” So Uncle Sam hopes, as his Army in Germany tackles the tough task of training some three million youths for a better way of life.

In Army patter this job is “GYA.” That's short for German Youth Activities. Both Ground and Air Forces work at it.

“Hitler might never have gained such power,” General Omar N. Bradley, Army Chief of Staff, told me, “and World War II might never have been fought, if German boys had been brought up in our more free, democratic way, instead of being regimented and trained as a mass of embryo soldiers.”

In 1933 Hitler outlawed most then existing youth groups; even church work on behalf of youth was hampered. Then came the Reich's Youth Law of 1936. This wiped out all remaining groups and drafted every German boy and girl from 10 to 18 into “Hitler Youth.”

The Hitler Way of Training Youth

Thus 12 to 14 million youngsters began compulsory service with premilitary training under 30,000 leaders.

Both sexes took cultural and athletic courses, and flocked to summer camps. Vocational work was closely tied in with the German Labor Front.

Units of Hitler Youth were set up to study aviation, medical and signal corps work, while others trained for the Navy. Later, hordes of youngsters moved easily from civilian life into the ranks, and the fighting.

Before Germany was whipped, Allied leaders saw that the problem of German youth was to be a big one.

To get the ruined land back on its feet, so it could feed and clothe itself, was civilization's immediate task. And it was the young, in particular, they being more easily reoriented than their Nazi-soaked elders, who were then and still are of first importance.

It is the youth of today, up to 25, says Army, who may soon lead the German nation. If we can train them to lead it along safe paths and make it a sane member in a peaceful family of nations, we may not have to fight it again.

This GYA work involves teaching trades to boys and girls, the better use of leisure time, the problems of waifs, tramps, and

juvenile delinquency, new moral and political concepts—many things.

To this task our Army brings its full facilities, in support of our Military Government, or “MG” in Germany.

Scope of USA Program

To date, Army has aided more than 500,000 boys and girls. Working for GYA are thousands of volunteer men and women, including Army officers, enlisted men, Army women, WAC, Red Cross staffs, American and Allied civilian employees of Military Government, Air Force, and our Department of the Army—and a host of Germans (pages 540, 543).

At first our soldiers made use of gum, candy, soft drinks, baseball gear, jeep rides—and just plain, good-natured American horseplay—and a few new-learned German phrases.* But they were only curtain raisers. We've settled down, now, to hard, earnest work to change German youth's thinking habits and set it new goals in life.

MG controls radio stations in Bremen, Frankfurt, Stuttgart, Munich, and Berlin's RIAS; they give first-hand facts about world conditions. If our President or a British Prime Minister makes a speech about ways the Allies seek to restore Germany, that's discussed without political twists.

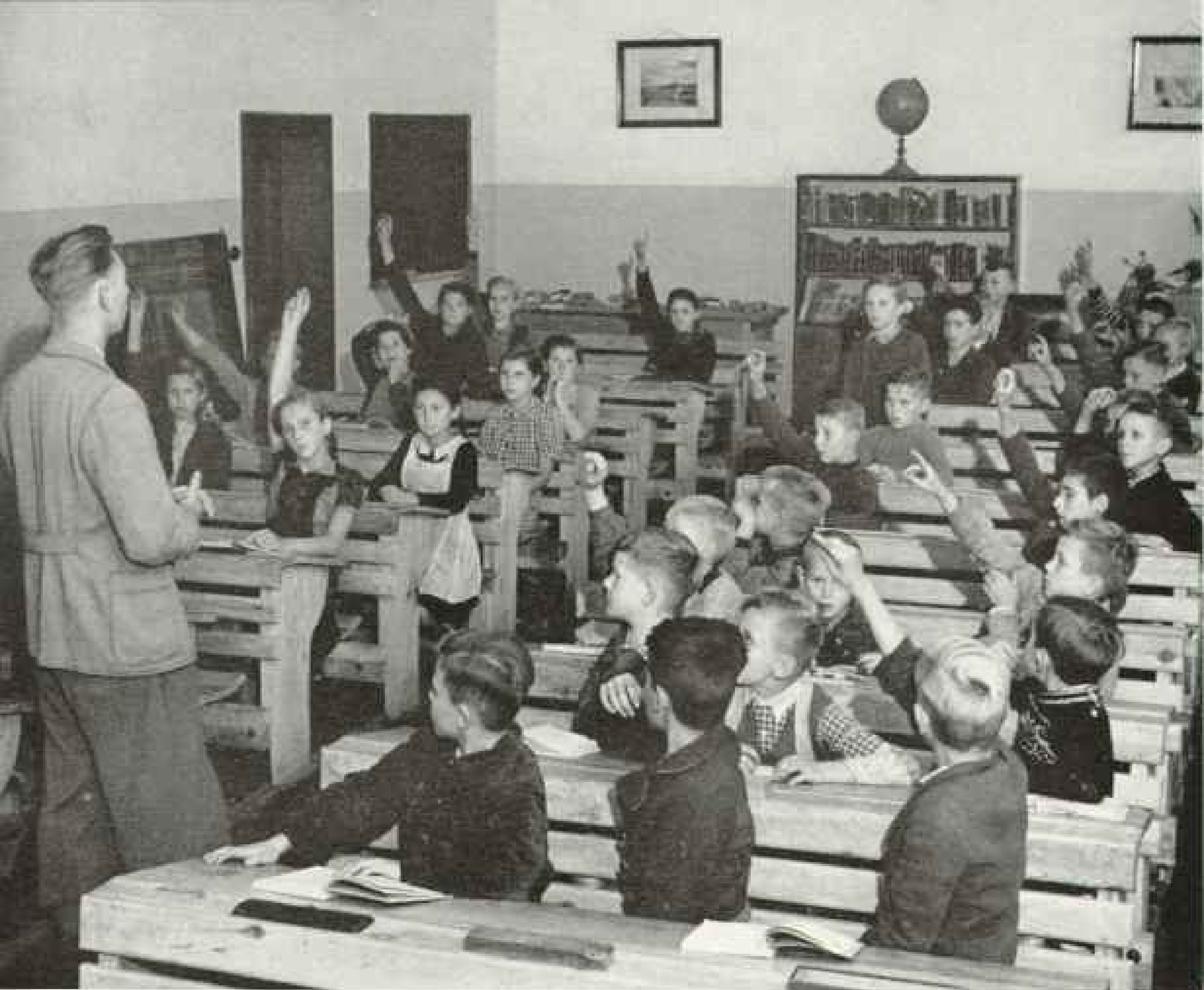
MG makes its own broadcasts, to correct false rumors. Or such talks may range from Germany's need for exports and imports to school problems, public health, civil service, and food.

At 28 different Information Centers MG runs libraries full of American newspapers, magazines, books and maps, shows industrial and educational films, gives lectures, and arranges for debates and discussions and “Town Meeting of the Air,” attended also by thousands of adult Germans.

MG officials lead many of these round tables, whose themes may range from farm life in California to how a German boy trained in a GYA trade school can now find a job.

More than a million youngsters have already seen such MG-sponsored films as *Union Pacific*, *San Francisco*, *The Story of the Lincoln Tunnel*, and *The Adventures of Mark Twain* (page 547).

* See “What I Saw Across the Rhine,” by J. Frank Dobie, NATIONAL GEOGRAPHIC MAGAZINE, JANUARY, 1947.



Propaganda-filled Nazi Schoolbooks Are Replaced Now by Honest Ones Approved by AMG

Books are still scarce. The author visited several country schools, found many children who speak some English, and introduced one delighted group to the old-time American spelling bee. In this country school near Wiesbaden, homemade desks are in use. Not one geography book was on hand. This school is visited weekly by Air Force mobile library trucks (pages 533 and 541).

MG helps young musicians form orchestras and brings over famous American musicians to play for them. It aids German actors to stage such American plays as *Three Men on a Horse*, *Life with Father*, *Boy Meets Girl*, or *Men in White*.

Forums and Debates Encouraged

One of GYA's most useful jobs is the debates and open forums it arranges.

A Frankfurt group asked me to preside at its weekly panel discussion and suggest a theme. I took over, and was joined by Rufus Woods, editor of the *Wenatchee*, Washington, *Daily World*.

We chose a theme, "The Difference Between German and American Newspapers, and the Influence of Journalism on Human Behavior."

Practically all the 60 or more German young men and women present spoke more or less English—certainly their English was better than my German! And lively though friendly

clashes of opinion followed. Now and then the talk got so far from the subject that Woods or I, or Captain Ford in charge of GYA work at Frankfurt, had to bring them back to it. But everybody thoroughly enjoyed the free trade in ideas.

Sound logic, and skill in talking on their feet without preparation or rehearsal on a subject quite new to them, marked this debate.

Especially clever was one girl, Irmgard Hinze, daughter of a streetcar company official. When an American soldier in the crowd made a point she didn't agree with, she was instantly on her feet demanding, "Here, let me answer that GI!"

"I want to go to the States," she told me later, "and study at Black Mountain College in North Carolina, or a place like Antioch."

Another good debater was a boy, Dieter Onneken, staff writer for *Das Reissende Wasser*, a monthly popular with this youth group.



Boy Scouts March to Camp on the Banks of the Historic Neckar; Heidelberg in Background

German Scouts have never been incorporated into the international body. But now, having been reorganized in line with rules laid down by American Military Government, they are recognized and aided by GYA leaders. They may not wear uniforms, play with model planes, or take part in rifle target practice.

"We sell about 5,000 copies a month," he said, "and could sell a lot more, if we could get paper."

"So could I, out in Wenatchee," agreed Woods.

It was a fine party, showing GYA spirit at its best.

When you see with what hearty purpose German youth shares in these GYA meetings, you feel the power history has given Uncle Sam over the destiny of these millions.

Mass Thinking Hard to Combat

The "Heil," the goose step, and Nazi nonsense about Germans being the "master race" are gone; but the old, inborn habit of mass thinking—a survival of military indoctrination—is stubborn and hard to eradicate.

My young son's playmates, when we lived in Berlin after World War I, frolicked knee-deep in toy cannon, tanks, battleships, helmets, sabers, and regiments of cast-iron cavalry horses; instead of playing baseball or

tag, or wrestling, or going rabbit hunting, most of them preferred to beat a drum, march, carry wooden guns, and make mock warfare.

For generations this worship of force, military caste, and power has been drilled into German children; this war theme runs through their music, history, and folklore.

This is what General Bradley has in mind when he says Army's hard job now is to train German youth to think more of boy-to-boy fair play, of individual and not regimented effort, and of how to earn a living in worthy civilian jobs and help rebuild their ruined country industrially, not just how to rebuild an army.

What makes MG's job even tougher is the fact that German youth has no heritage, such as British and American boys have, on which to build a democracy.

It has had no Fourth of July or Magna Carta, no jury system such as ours, no real revolutions against tyranny, no nation-wide "Town Meeting of the Air," no Lincoln-

The Berlin "Corridor" Begins at Frankfurt

Over this 20-mile-wide lane day and night the United States Air Force has flown fuel and food to Berlin. In July alone it made 6,482 flights, covering 4,000,000 miles and lifting more than 32,000 tons of cargo. Frankfurt is military headquarters for the U. S. Zone.





Rothenburg, Exquisite Example of a Medieval City, Is a Favorite with GI Sight-seers

For centuries this now serene picture city figured in some of the great events of Teutonic history. One of the most dramatic was during the Thirty Years' War, when Tilly, commander of the Catholic forces, agreed to spare Rothenburg* provided any councilman could empty a three-and-a-half quart goblet of wine at one gulp. Burgomaster Nusch won the bet! To honor this feat, mechanical figures appear each day at noon high up on the gabled wall of the city's "Drinking Hall," and in pantomime re-enact the stunt.

Douglas debates, no traditions of Pilgrim Fathers, Puritans, or Quakers.

In plain Yankee slang, they've had too much *Hoch der Kaiser* or *Heil Hitler*, and not enough hurrah for Hoover, Roosevelt, Truman, or Dewey, or hurrah for any other candidate who can take defeat at the polls with a smile and then buckle down to help his victorious opponent run the nation's affairs.

After three years of Army's hard GYA work some Germans still say we have failed. They're sick of the word "democracy." At heart some still are Nazis.

Others who now try to help in our youth-training programs say that if we should pull out, Russia will come in, and every German who has worked with the Americans will be shot.

But over and over, in addressing schools, girls' and boys' clubs, or in talking with adult

Germans, when I asked, "Do you want the Americans to get out?" there arose a loud, alarmed chorus of "No's."

Air Force's Work with German Youth

"How many of you can speak some English?" I asked at a country school near Königstein. Of the 34 pupils, 24 held up their hands.

Just then an American Air Force mobile library truck drove up, and all the youngsters who had borrowed books on the truck's previous delivery ran out with them to exchange for others.

Air Force, commanded by Lt. Gen. Curtis E. LeMay, runs six such book trucks, and up to the day photographer Joe Roberts and I were in Wiesbaden, its headquarters, it had

* See "Rothenburg, the City Time Forgot," by Charles W. Beck, Jr., NATIONAL GEOGRAPHIC MAGAZINE, February, 1926.



A New Generation, Facing a New Life, Turns Its Back on the Wreckage of War

War was on when millions of such German girls were infants. In early youth, to them, war was the normal way of life. They knew nothing else! Now here at Frankfurt a group of American Military Police work with German kindergarten teachers to reorient young girls and boys. An American girl, Lydia Irene Briggs of Greenville, North Carolina, instructs a sewing class, and an Army captain runs a trade school.

lent out some 350,000 books—and lost only 296! (Page 541.)

Last Christmas, Air Force entertained 150,000 youngsters. Its GYA sponsors ten newspapers written and printed by young Germans, and more than 50 youth centers flourish at airbases in the U. S. Zone and at Berlin. It builds playgrounds, turns old airfields into gardens, sets up summer camps, and now and then it helps youth to take over and run for a day the affairs of an Air Force city, in the democratic way.

Wives of Air Force officers and men, by writing letters to the States, receive hundreds of boxes of shoes and clothing for German children. These American women, working with their husbands, aid orphanages, welfare agencies, parents' advisory councils, and parent-teacher associations by instilling in both German parents and youth a larger degree of civic responsibility.

Nobody is enticed any more with candy or

chocolate bats; and no attempt is made to ram democracy down German throats. Instead, Air Force works on a well-rounded program of educational, cultural, and avocational activities.

"Operation Boys Town"

One outstanding job is "Boys Town," near Munich. This was set up by the Oberpfaffenhofen Airport, which lent tents, field kitchens, cots, and bedding. Then the airport renovated a 3-story villa, once a Nazi home, and put the boys in it.

Each new boy is given shoes, a dyed and made-over suit and overcoat; he gets sprayed with DDT; and he's fed by leftover food from the airport, supplemented by 1,000 calories a day from German relief agencies.

Now Boys Town, aided by Air Force GYA, elects its own assembly and lives under a self-imposed government. Boys are taught athletic games, trades, and English.



This Stuttgart Street Scene Is Re-enacted in Every City from Essen to Munich

Shabby, worn-out tramcars are packed. Many people walk to save carfare. Throngs halt to peer eagerly into shop windows, where for the first time in years many new goods are displayed, from shoes and radios to dinner sets and bicycle tires. Currency reform, with a mark pegged at 30 cents (U. S.), brings out hidden merchandise. Stuttgart is one of the few cities where much rebuilding is under way after war's ruin.

There's no more goose-stepping, no stiff-armed salutes or shouts of "Sieg Heil!" Instead, boys are busy chopping wood, digging potatoes, playing baseball, or helping the cook.

Here again you see MG's policy at work—which is, "Let the Germans help themselves."

Salvage of delinquent boys is also shown at Vilbel. Here the Evangelical Church operates another Boys Town, with the aid of Uncle Sam's Military Police. I talked with these boys, who showed me through their "town," which they are building themselves from surplus Army cement and scrap lumber. They, too, police themselves.

Many of these kids are waifs from the Soviet Zone. One I met isn't even sure of his own name, and has no idea what became of his parents, sister, or brothers. But they're no longer bums and beggars, the flotsam and jetsam of war. Under wise leadership they are making useful men of themselves.

Theirs is one of the most hopeful aspects of

youth training I saw anywhere. As somebody said, this too "can be written with words that burn holes in the paper."

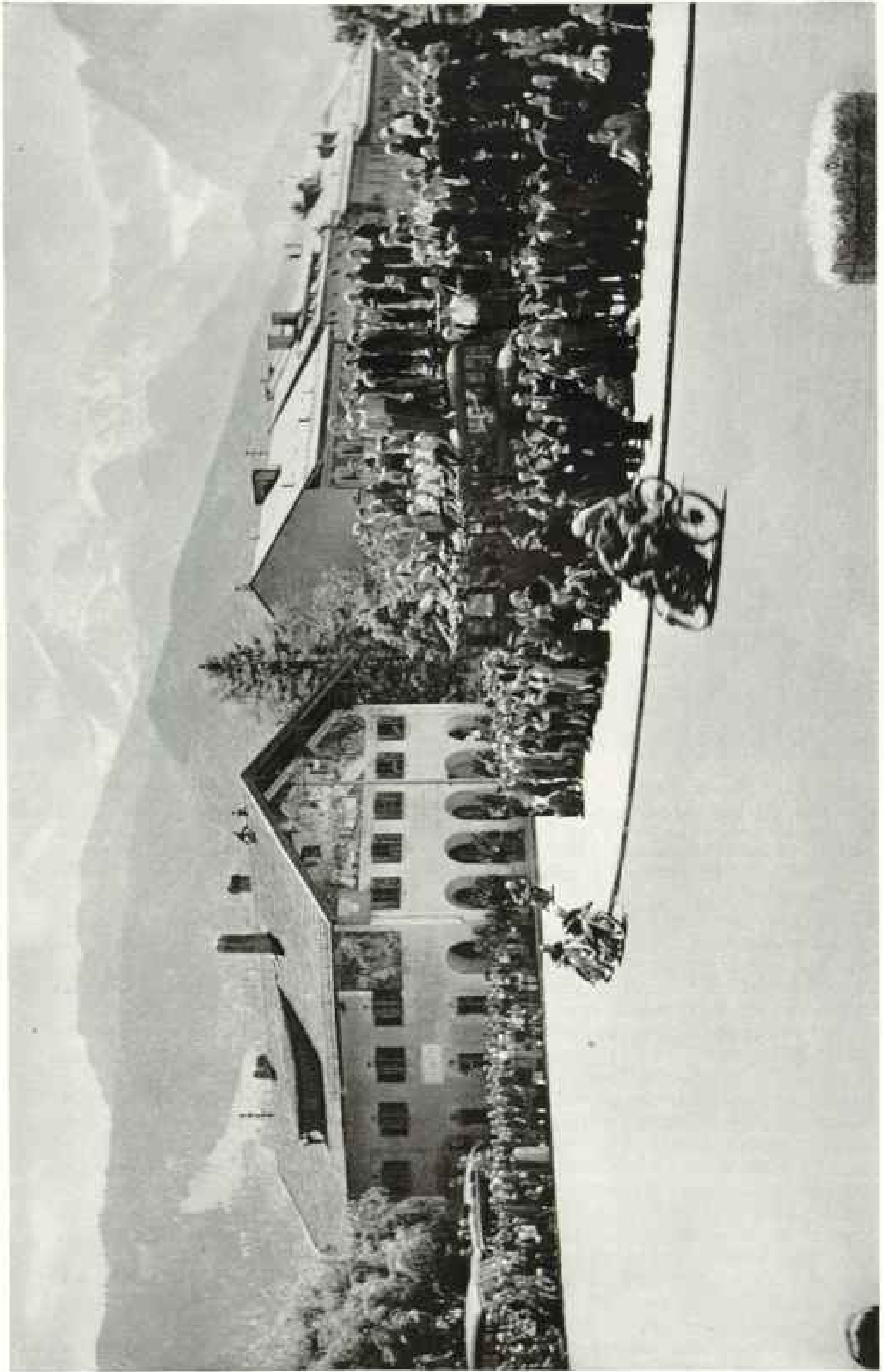
But indifference to GYA work by Germans is not uncommon. Many are so busy trying to find food and clothes that they have no time to think of re-education of a new generation.

Says one Army GYA study: "Germans expect more than Americans can give." They have a notion of unlimited abundance of American supplies, and they are surprised if they do not get everything they ask for.

In one youth center, youngsters were willing to accept the benefits of GYA, but unwilling to work at the youth center.

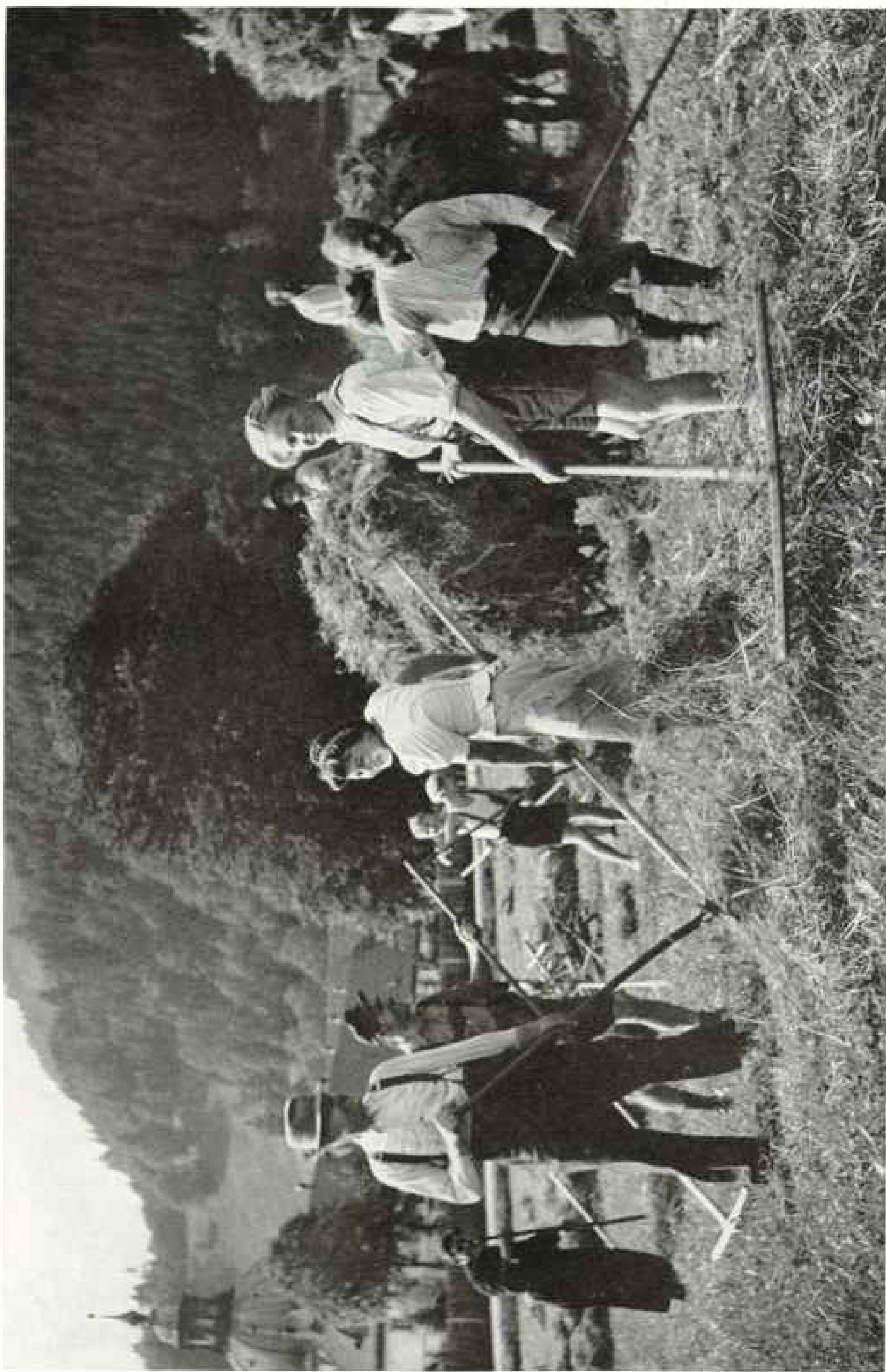
Some politicians, who are powerful as leaders in certain youth groups, display jealousy of GYA's growing popularity, lest it undermine their own influence.

Caste enters in, too, and cliquishness. Some Heidelberg students object to meeting under



Fourth of July Motorcycle Races Thrill Thousands of GIs and Germans in the Garmisch Foothills of the Bavarian Alps

Staged by GYA officials working with the German Motorcycle Speed Club, these races lured the finest street cyclists in the American Zone. Events were run off on a 2-kilometer course, covering from 15 to 30 laps. Despite nine sharp curves, riders averaged 60 m.p.h. Other events at this meet included boat races, ski jumping, tennis, and golf matches. GIs from all over the American Zone take turns at furloughs at this famous Alpine resort.



A Bavarian Maud Muller, on a Summer Day, Rakes a Meadow Sweet with Hay near Oberammergau, Home of the Passion Play

Abundant rainfall in the summer of 1948 brought heavy crops to German farms. Farmers usually live in barnlets and go to and from the fields for the day's work. One sees loads of hay drawn by teams composed of one horse and one cow. When a cow gets too old to work or give milk, she's eaten. But the horse?



Busy Fingers Are Taught to Knit Once-used Material into Items of Clothing

The handsome stockings, worn by these Bavarian girls in the Air Force youth center near Munich, were fashioned of nylon salvaged from the shroud lines of American Army parachutes. Note the GYA poster with its dramatic message, directed to Army personnel: "After You're Gone They Will Run the Show."

the same roof with members of working-class youth groups, and often rival religious or political groups object to working together.

One of GYA's chief aims is to save German youth from becoming the dupe of political bosses.

Some critics of GYA say democracy is a luxury only rich nations can afford. They say the Allies should first work to rebuild German business, then worry about turning bad Nazis into good citizens.

This is not without some justification, says Fred M. Hechinger, writing in the *Military Government Journal*. "Certainly, it is difficult to talk democracy to a hungry man" . . . (but) "if we wait for German solvency before we attempt to orient the German people, the fight will have been lost. Military Government will have been party, by default, to the resurrection of Fascism."

GYA is our dam against the Red tide.

Besides Army and Air Force, much work of

a GYA nature is done by other groups. Cultural materials have come from the Smithsonian Institution, American Library Association, the Association for Childhood Education, the States of North Carolina and Connecticut, individuals, colleges, and other institutions.

One particularly useful task is done by the American Friends Service Committee, the same group with which Herbert Hoover worked to feed and clothe so many children after World War I.

For its fiscal year 1947-1948, this committee spent two million dollars.

It employs about 50 American and British representatives in Germany and gets additional help from German individuals and welfare groups. Seven neighborhood centers are maintained, through which direct relief work is done, including, in some places, laundries and libraries. The Friends set-up at Freiburg University is operated entirely for the benefit of students.



"Max," Cushioned and Comfortable, Rides Regally in New Version of Bicycle Built for Two

This young student is on her way to a show at one of the American Houses, or Information Centers, in Germany where recreation and books are available. Each such Center holds some 10,000 English and German books and receives more than 300 American magazines as well as foreign-language periodicals.

Switzerland has sent many books. MG set aside paper enough, for the first quarter of 1948, to print 5,000,000 textbooks and to sustain school journals. At least 20,000,000 textbooks are wanted, to fill minimum needs of German seats of learning. The Lorenz factory at Hanover (British Zone) is making 5,000 radio sets for use of schools in our Zone.

In the United States, the National Association of Broadcasters appealed to American listeners, in a series of "Silver Shower for German Schools" broadcasts, to contribute \$250,000 with which radios could be purchased for school auditoriums and classrooms in the U. S. Zone.

Under MG's auspices, the first new world atlas for German schools in the U. S. Zone has been printed at Munich. It is planned to run off 1,800,000 copies. "But what we want to know," German boys and girls told me, "is what the German map may look like when the Russians in our East and you

Allies in our West finally agree on our new frontiers."

Nazi Textbooks Destroyed

In the meantime, poisonous Nazi school-books are pulped, and fresh ones, sometimes translated from English, are in use.

Former junior arithmetics were full of problems like this:

"If a Jewish shopkeeper asks 4.50 marks for a vase worth only 3.75 marks, by how much has he swindled his customer?" Other textbooks said: "Examples in the use of English weights and measures have been abridged, in view of the little value they may have after the war."

A history of 1815 to 1918, printed in 1942, closed with these words: "Towards the end of 1918 the German Army came home after more than four years of fighting, victorious on all battlefields of Europe and Asia, but still not as victor."



Sgt. Pat Moriarty Inspects a Water Wheel Built by Garmisch Boys

Moriarty is one of the best-known Yankee soldiers in the American Zone, especially among young Germans. In off-duty hours, at his own expense, he has pioneered in GYA work. He knows almost every playground, summer camp, youth center, Army and Air Force library, and manual-art training school from Bremen to Munich. Under orders, the first sergeant served as guide, philosopher, and friend to National Geographic cameraman Roberts, who made the pictorial coverage for this article on the GYA project.

To save today's youth from such warped ideas, GYA, through MG, works for a free press and accuracy in writing. While MG licenses some 50 papers now printed in the American Zone, with a circulation of close to four and a half million, it insists only that they tell the Germans exactly what the German civil servants are doing. They're not asked to color or slant the news. They may even criticize MG and its GYA work, provided only they stick to facts.

MG wants Germans to have access to worldwide news. It lets native writers go abroad and aids foreign writers who seek news in our Zone. MG licenses book publishers, too. Since war's end more than 6,500 titles have been printed in our Zone. They range from the biographies of Carl Schurz and Mr. Justice Holmes to Louisa May Alcott's *Little Women*.

But Germans still prefer to read Mark Twain, Jack London, and Walt Whitman.

A glance at periodicals published here shows many articles aimed at helping reorient the German people. Some such point out how freely Germans in our Zone may write and talk, compared with the suppression of public opinion in a Zone to the East.

GYA Works Through Youth Groups

MG urges Germans themselves to help GYA achieve its aims. It wants more youth groups, led by trained Germans, and issues a book with a sample constitution and bylaws, showing how to form a club.

Today, in our Zone, more than 10,000 such clubs and groups exist, with some 1,200,000 members. Those with religious aims predominate. Fastest growing is the trade union youth



"Have You Got a Good Book on How They Make Movies in Hollywood?"

Extremely popular is the fleet of mobile libraries run by our Air Force as part of its GYA work. From Wiesbaden headquarters book-laden trucks make weekly trips to youth centers and country schools. Other books, together with technical and popular American weeklies and monthlies, are distributed by carloads to Information Centers and American Reading Rooms. Fully 30,000 Germans a week, including scientists and professional men, visit these libraries, especially to read journals from which war cut them off (page 543).

group, which had a long history before Hitler. German labor leaders promote it.

YMCA's and YWCA's are increasing. Americans who have helped include John R. Mott, Nobel prize winner and long active in world-wide YMCA work.

Sport clubs are strong, and politically active. MG rules permit youth groups to be aided financially by political parties, but not dominated by them. Instruction in good citizenship is encouraged, but not narrow indoctrination. It insists such groups choose their own leaders, free of coercion by political bosses.

Several young men told me they appreciate this sign of MG's faith in their political integrity.

In each *Land* (State) and *Kreis* (county) in our Zone are youth committees, whose job

it is to form groups and clubs. But trained leaders, free from Nazi taint, are scarce.

In their Zone the British have a school for training leaders. In our Zone the YMCA, YWCA, and trade unions are training leaders, but it will take years to meet the demand.

Our Military Government needs more funds earmarked for training more leaders, unless we want to fight Germany a third time.

From what I saw and heard, GYA's fastest progress, so far, is made through the sport clubs. On a single Sunday in Württemberg-Baden, 341 baseball and soccer games were played. One American colonel told me his children played against German softball teams every week.

At a track meet held by our Military Police in Frankfurt last August, both boys and girls participated. Here Col. Carl F. Duffner,



This Young Boy Is Learning to Make Cameras

He's an apprentice, in the Leica factory at Wetzlar, and is being told about lenses by a foreman. Training lasts four years. Many sons here learn the trade their fathers followed.



An Oberammergau Wood-carving Student Manicures a Wooden Lady

Once every decade, for the past three centuries, his home town has staged the Passion Play. Since 1906 that bearded old wood carver instructing the boy has acted in the sacred play. See "Where Bible Characters Live Again: Oberammergau," by Anton Lang, Jr., NATIONAL GEOGRAPHIC, December, 1935.



Pigtails and Feet Fly as Bouncing Girls Elude Their Jumping Rope

Many of Army's 1,200 Wacs on duty here give generously of their free time to train girls in arts, crafts, and athletics. At this same youth center, near Frankfurt, Capt. Michael Leihuaa Bray, of Honolulu, works with boys' classes, teaching mechanics, radio and other repair work, woodworking, painting, photography, and greeting-card design, as well as boxing and other sports.

active in GYA, distributed prizes ranging from cameras and zippered windbreakers to fountain pens, shoes, shirts, and 50 other items.

"GYA arouses increasing interest among American children back in the States," says Lt. Col. Robert C. Hall, of European Command's Education Branch. "This comes through our 'Youth Helps Youth' Plan."

On Hall's desk I saw many letters from members of Midwest 4-H Clubs, addressed to the editor of the *Prairie Farmer* at Chicago, inspired by an article it printed on GYA's "Youth Helps Youth" Plan.

As such letters reach Hall, he pairs them off, for exchange of letters, with similar age groups here in our Zone. Replies from the German youngsters are not begging letters; they simply explain what the German clubs are like, their purpose, size, etc. (page 548).

With each German club letter goes a covering note from Hall, explaining to the American clubs that, while the Germans are not begging, any American old clothes or other supplies will be welcome.

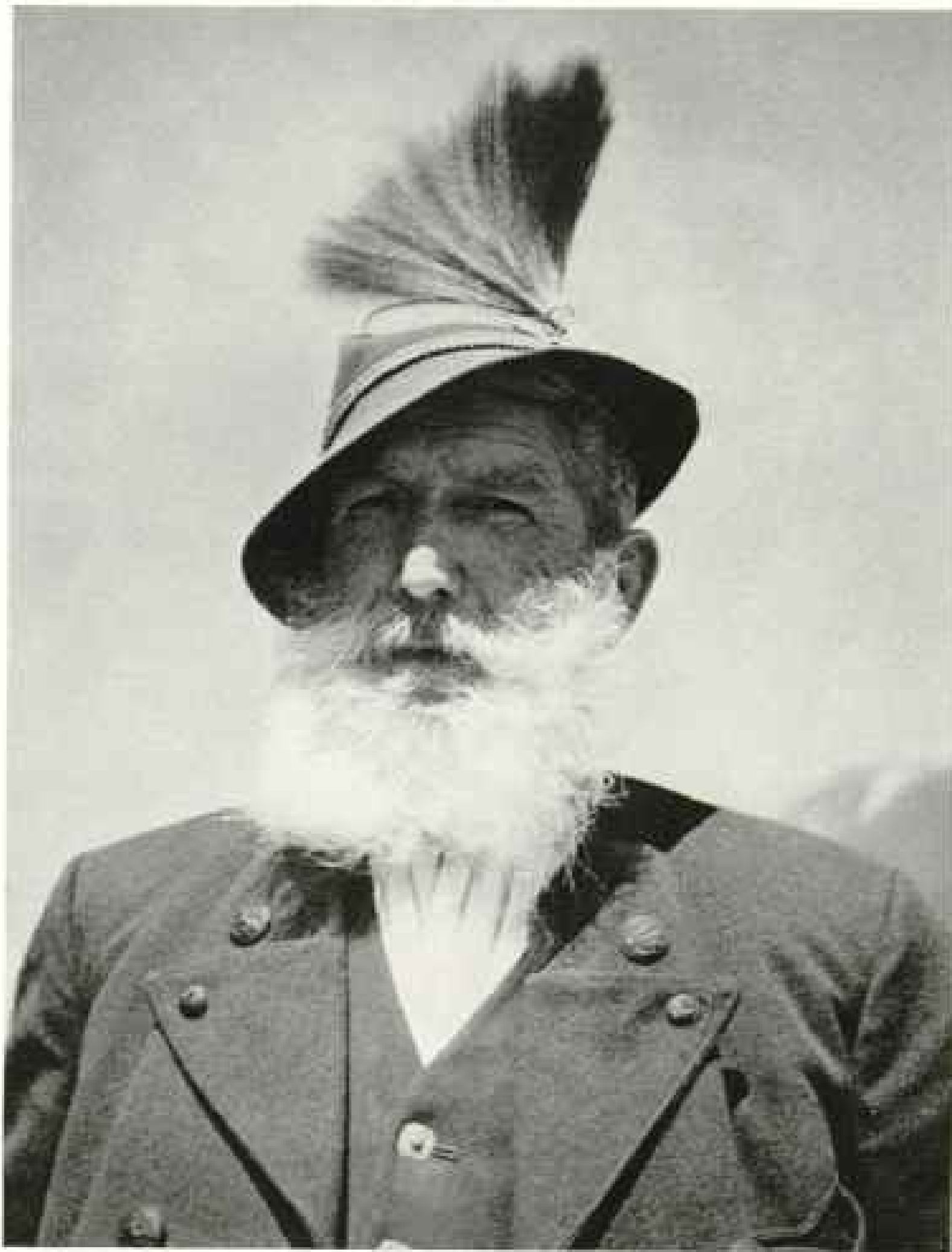
"It's not our job," says Colonel Hall, "to

make raving converts to American democracy of German youth. Instead, we hope to build a reservoir of good will which can last through several generations.

"That's why we want 'Youth Helps Youth' to speed up interchange of ideas. German children are starved for news of the outside world. Older people are, too; you see that in the 28 Information Centers, or 'American Houses,' whose rich libraries of American and British technical and scientific journals are eagerly read by doctors, lawyers, engineers, and others who for years have been shut off from the sound thinking of the outside world.

"But it's younger people, up to 25, we seek to influence. Their questions at our debates about American ways, machines, schools, and labor problems are deep and searching. These Youth-to-Youth letters are a stout link. If German and American children bury the hatchet, we can lay a basis for good relations between the countries that may keep us out of another war when we have quit Germany and these young folks are running it."

I talked with one German superintendent of



Not an Emperor, or a Baron on a Boar Hunt—but a Hack Driver!

His white beard, and that shaving brush and green hat, draw many wisecracks from GIs vacationing around Garmisch. For years a winter sports area and all-year Bavarian Alps resort, it's the happy holiday ground now for constant streams of American soldiers. They ride its horse-drawn hacks, hold *fräuleins'* hands, learn German, and "improve international relations." But if a GI marries a *fräulein*, he must start for the States with her within 30 days.

schools. He said too there's a sad shortage of trained teachers. Too many were confirmed Nazis and hence are not allowed now by MG to resume teaching. He wishes teachers might be sent over from America, and feels that a wider exchange of college students between Germany and the United States would work mightily for better international understanding and be a barrier against the spread of communism.*

German mothers, I found, are grateful to both British and American women who have helped obtain medicines, clothing, and other needed things from England and the States.

I talked with the wives of several officers active in this work. One wrote to American wholesale drug houses for needed medicines, cod-liver oil, etc. One firm sent \$3,000 worth of vitamins. Another American woman wrote for baby talcum powder and received a shipment of 37 *tons*, for distribution among hospitals.

"I'm a former member of the University of Minnesota Faculty Women's Club," said one American woman. "I wrote to old friends in it, and now get about three boxes a week of thread, needles, buttons, clothing, toothbrushes, etc. In one child clinic I found only 10 combs in use among 350 patients."

The writer himself found out how scarce buttons are. He lost one off his pants, asked the German housekeeper at Frankfurt's Park Hotel to sew it on. But he had to make an hour's trip to an Army PX to buy both thread and button, for the housekeeper had none.

In both the British and American Zones Army women also raise

money by putting on shows, giving dances, bingo parties, etc.

One group in Munich put on a cake sale, cut the cake into four parts, and sold each at auction. Then the buyer would put it up and sell it again, till that one cake brought in more than \$100.

In Heidelberg the Army women, WAC, and wives of American civilian employees retrieve all empty flour sacks from the post bakery and make underwear for German children.

* Since the above was written, the author has been informed by the Department of the Army that this program has been vastly accelerated.

Elizabeth Brown, Boston born, started Heidelberg GYA girls' center a year ago, with a membership of 35. Now she has 1,158 girls enrolled.

Though most GYA workers despair of changing the thinking habits of German adults or former Nazis, more than 400 German mothers visited this center in one month, took tea, and watched their daughters at work and play. Some of its discussion groups are students at Heidelberg University.

I heard choral groups sing "Swanee River" and "My Old Kentucky Home." I heard some of these girls sing at American church services. These maidens make blouses, suits, skirts, and dresses from old uniforms, blankets, parachutes, and other materials collected by GYA from our armed forces.

Besides dressmaking, pattern cutting, and sewing, there are classes in music, English, photography, etc.

Many of the Wacs work in spare hours with these girls. "To talk English with fine American women is a source of excitement and joy to our girls," said Mrs. Brown. "It brings them new ways of self-expression and confidence.

"While we try, at these centers, to *live democracy* without specifically mentioning it, at our talks with older girls we do embrace the chance to tell about the form of government in the States . . . and let them reflect on what kind of government might be best for the Germany of tomorrow, which they must inherit."

MG aims at no "thought control." It wants Germans to think for themselves; to draw on their own rich, historic cultural resources in



Amateur (German) Artillery, Inc.

Counting His Chickens *After* They're Hatched

He's Bobby, young son of Col. Walter S. Lee of Washington, D. C., Commander of Rhein-Main Airbase. Hatched at Frankfurt from top-grade Leghorn eggs flown from America, these chicks will help improve German poultry stock. They belong to farmer Erich Notzon, who served three years in prison camp for listening to American news broadcasts.

getting re-educated, yet conform to "certain universally valid principles of justice," such as toleration, respect for human dignity, and the free exchange of right ideas among all men and nations.

Some 200 German students have already been sent to the States. Their expenses are paid by private sponsors, by universities and religious bodies.

Education for Our Own Soldiers in Germany

German youth learns another useful lesson, from seeing how well Uncle Sam treats and trains his own soldiers. General Bradley told me of his keen personal interest in this



Girl Workers from Frankfurt Factories Frolic at Summer Camp in the Taunus Mountains

They dance to accordion music at a former Hitler Youth hostel. Winter sports are also held here. Army's GYA helps run the camp. The author and photographer Roberts ate lunch with this lively party of 100 girls—a lunch of “soup” (without a meat stock of any kind), boiled potatoes without salt or pepper, and a nondescript fish chowder. But the vivacious young ladies did not appear underfed.

phase of the U. S. Army's giant German job.

The day a new soldier lands from the States this work starts. He's told why the American Army of Occupation is here, and what part he must play. He's told how to behave toward Germans, what pitfalls to avoid, and he's also grounded in the history of Germany and the folkways of its people.

Haughty Prussian military men treated enlisted men very differently. I once saw an Uhlan officer whack a trooper over the back with the flat of his saber for not currying a mount properly. While riding around Germany lately with an American colonel and a

sergeant, the latter took his meals with us and was freely consulted by his superior. Caste-bound Germans marvel at such signs of the new American way.

German youth, hungry for knowledge, marvels too at the schooling our soldiers get. This is partly carried on by the Troop Information and Education Service, or “I & E” of the European Command. It runs the well-known *Stars and Stripes* newspaper, the armed forces radio network, and brings the troops their weekly *I & E Bulletin* for use in debates.

It also conducts Armed Forces Institute (USAFI) courses, supplies textbooks, and



What a Study in Facial Expressions as Youth Is Gripped by a Mickey Mouse Movie!

At a small town near Heidelberg the mayor helped American soldiers arrange this program. First there was a short talk on some aspects of life in the United States; then boys and girls asked questions about American skyscrapers, wild animals, Indians, plantations, food in California, schools, colleges. At night the show was repeated for adult Germans.

makes surveys of soldiers' opinions and attitudes.

At each military post is an Education Center, with a civilian educator in charge. Today more than 11,000 soldiers take courses in science, literature, languages, photography, etc.

Those who missed early schooling back in the States take work in elementary grades.

Most schoolwork is done in off-duty time, though boys taking stenography may do so during duty hours.

USAFI gives some 300 different courses at high school and first-year college levels, either

by self-teaching or correspondence. Thus a soldier can earn high school or college credits.

USAFI is a clearinghouse for 59 American colleges and universities. It pays for lessons, but the soldier pays for his books. Its headquarters are at Madison, Wisconsin, where more than 2,000,000 soldiers' academic courses have been graded for study done in the Army.

Schools for American Children

More than 12,000 American Army and civilian children now also attend schools Army runs in our Zone, a new lesson in the American way that astonishes German youth.



"Look! A 4-H Club in Minnesota Sent Me These Fine American Farm Pictures!"

In its "Youth Helps Youth" project GYA helps German children start correspondence with youngsters in the United States. Seeds collected by American youth and flown overseas by our Air Force now grow food in German gardens, tended by German children. Helped by American soldiers on duty at Mannheim, these youngsters cultivate their own vegetable gardens (page 543).

Our soldiers like this German tour of duty. Besides good pay and allowances, social life is gay with plays, sports, movies, and dancing with the blond *fräuleins*. Fraternization is no longer "verboten," but if you marry a German girl, as thousands have already done, you must start for the States in 30 days!

Besides easy trips to historical spots in Germany where old Romans used to romp, Army sponsors minimum-cost trips to Switzerland, Paris, London, and Ireland (pages 533, 536).

Deer and wild boar shooting lures hundreds. The young daughter of one American officer at Munich went out, bareheaded, and shot a big boar.

"I wish more Americans would kill more of these hungry wild pigs," complained one German farmer. "Your Army won't let us Germans have guns; yet pigs ruin my crops. Last night 30 or 40 trotted down from the hills and started rooting up my potatoes. All

night long four of us threw rocks and sticks, and yelled, to save our potato field from utter ruin. It's too bad."

German Youth Watches Signs of Recovery

German boys can't take Greeley's advice—"Go West, young man." They have no Texas, no Oregon, or Montana; unlike their English cousins, they no longer have colonies, no young lands of opportunity such as Canada, Australia, New Zealand, South Africa. They have to stick it out in Germany, the grim, gloomy land their elders wrecked.

So youth intently watches our work—and that of the French and British—to rebuild Western Germany. They know their land can't be stabilized politically till more factories are running and exports rise, so they can import more food.

Many told me they understand why Krupp must make no more guns; that chemical plants must quit making explosives.



Author Simpich Asks, "What Breed of Dog?" The Question Stumps Young Heidelberg

A quarter-century's editorial duties with the *NATIONAL GEOGRAPHIC MAGAZINE* have not diminished Frederick Simpich's Huck Finn qualities. He remains a Missouri farm boy ever ready to go fishing or play a prank. Children, at home or abroad, recognize the affinity. These kids had no difficulty understanding this reporter's German. "Wer spricht englisch hier?" he asked. Only one, the boy on the left, answered. "My name is Ryan," said he.

But they feel dismay when, failing to understand the Allies' reparations policy, they see us tear down "surplus" factories, dismantle and export others for reparations, and break up giant cartels which dominated the steel, dye, mining, and other industries.

They say American industry is based on giants that manufacture long lines of different vehicles, farm implements, business machines, chemicals, foods, and electrical accessories. "Why, then," many asked me, "destroy the big German combines? Is it that the Allies fear future competition?"

On the other hand, when they see us help them import raw materials, improve their banking, railway, postal and telegraph systems, and help their labor leaders confer with ours on social insurance, pensions, and other workmen's problems, they hail the Economic Cooperation Administration as a basis for revival of business and the hope of peace.

News items about how many million parcel-post packages come to Germany, how many hides are being imported, how many tons of scrap iron and coal Germany is exporting, are all interesting reading to young Germans who watch for signs of real business recovery.

The British-American JEIA, or Joint Export-Import Agency, is closely studied. When it says tire production is now highest since the war, young Germany knows that means more cars and trucks can run.

JEIA helps bring in raw cotton and rubber, more leather for more shoes, and more pulp for needed paper, and millions of dollars' worth of fertilizer. It keeps an eye on timber for mine props, on powder for coal-mine blasting, and the import of field and garden seeds, as well, of course, as the import of flour, grain, sugar, fats, dried fruits, and other foods.

Housing, highways, improved river and

canal barge transport, all aimed at the Zone's more rapid business recovery, are involved in Military Government's task and affect the progress of GYA work. In all this, through bizonal action, the British and Americans work closely together.

British Occupy Industrial Area

The British occupy the Ruhr, center of coal mines and heavy industries. They hold Germany's business district. Uncle Sam gets the scenery, with the yodelers and accordion players of Bavaria.

But the British were among the first to bring food and start re-educating youth.

At Darmstadt's Institute of Technology we met British engineering students from Cambridge, there to study German.

Dr. Richard Vieweg, then the head of this excellent seat of learning, showed us about. He lectures to shivering, hungry young men in bombed-out classrooms; all rooms are without doors or windows, and many have big holes in their roofs.

Vieweg's students must work so many hours a day, with shovels and wheelbarrows, to clear away rubble. They have few books or scientific instruments, almost no paper, and scant food that's poor and tasteless. But they plod grimly on.

We rode day after day through the American, French, and British Zones. Save Heidelberg, every big city we saw from Essen to Cologne, Koblenz, Mainz, Frankfurt, Würzburg, Nürnberg, and so on south is in ruins.

It may take from 30 to 50 years to rebuild them; some may never be rebuilt, because the need for them has passed.

In some cities, broken brick and stone and twisted steel are being hauled out into the country on specially laid tramways; in many others, no effort at all has been made to clear away ruins. Dead people still lie beneath fallen walls, with wooden crosses stuck here and there bearing names of those who lived in that particular house.

This is the new "dark continent" in which bewildered youth faces its uncertain future.

Ride out of any blasted city's apocalyptic ruins into serene countrysides where smug farm folk, untouched by war, own a few fat geese, a cow or two, gardens and fruit trees, and everybody looks better fed (page 537). But farmers keep their few pigs locked, hidden, so nobody may see how many!

You meet hungry townspeople riding out into the country on bicycles, looking for food. Farmers bring produce to town, but would rather trade than sell—everybody would rather have things than cash.

A piece of pork will pay for dry goods, or a pail of butter buy some hardware the farmer needs, quicker than money will. At some villages you see bulletin boards with swap and barter offers posted.

Our Zone is a miniature America. Army's gas stations, road patrols, grim-faced menacing military police, speed limits, parking rules, and constabulary, and its PX stores full of Yankee corner-drugstore goods, its ball games, movies, Army family life, and schools for American children give our occupation here an air of permanence despite its setting in this picturesque medieval land of southern Germany. It's just as if whole scenes from American life had been piped over here.

Yet, to us, this is alien soil. Boys from Kansas seem out of place among the Bavarians. Kansans don't wear green Alpine hats stuck with a shaving brush, green knee pants, or velvet vests and rucksacks, and they don't paint landscape scenes on their barns, or yodel to their cows, or play accordions and sing folk songs in beer halls.

But in such towns as Garmisch you may see American soldiers from Kansas, or any other State, with all the self-confidence of early Roman conquerors, riding about in carriages and holding *fräuleins'* hands, learning the German language, and spreading the gospel of private enterprise, individualism, and the streamlined American way.

Our soldiers like this country. Many want to re-enlist and stay longer.

All our top-hole fighting men in Germany heartily back up GYA work. "Tangible results are great," I was assured by Lt. Gen. C. R. Huebner, Deputy Commander in Chief, European Command. "The whole GYA job shows the initiative, generosity, and loyalty to American ideals which are the outstanding characteristics of the American soldier and of those who work with him at this important task.

"There are sergeants who have started boys' clubs at their own expense; Wacs who give steadily of their time to aid and teach German girls; and there are civilian men and women working just as officers and soldiers do. The contributions of my staff, which made it possible for every German schoolchild in Frankfurt to have a really worth-while Christmas gift, was a rare and inspiring thing."

Courtly Gen. Lucius D. Clay, Commander in Chief of United States Forces in Europe (and U. S. Military Governor of Germany) is a brown-eyed Georgian with a will of steel. His Berlin task is tough. He told me *how* tough! But he takes time out, even in the midst of crises, to encourage GYA workers.

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Associate Editor of the National
Geographic Magazine

J. R. HILDEBRAND
Assistant Editor, National
Geographic Magazine

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded sixty years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, the Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, the Society's researches solved secrets that had puzzled historians for three hundred years.

In Mexico, the Society and the Smithsonian Institution, January 16, 1926, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 297 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,302 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Army Air Forces Expedition, from a camp in southern Brazil, photographed and observed the solar eclipse of 1947. This was the seventh expedition of The Society to observe a total eclipse of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted \$25,000, and in addition \$75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration, 1938.



Who plays the leading role in your life?

Is he that distinguished gentleman known as Dad, who has worked so hard to give you all the advantages he never enjoyed? Give him America's most distinguished watch—a fine Hamilton like the **GORDON** (below).

Is she that attractive lady who is not only your mother but your most understanding friend? She deserves an enduringly beautiful Hamilton like the **A-6** (below).

Is she that lovely girl who married you—even though you then had nothing except ambition? Let her know how lost you'd be without her—with a lovely Hamilton like the **LANA** (below).

Is he that handsome guy you fell in love with, the very moment you saw him? Tell him how proud you are to be his wife with a handsome, dependable Hamilton like the **ASLBY** (below).

ONLY IN AMERICA could you expect to find the amazing device invented by Hamilton scientists to help them predict how accurately a watch will run even before it's put together. It's another example of how American research and craftsmanship plus precision machinery work together to produce that miracle of accurate timekeeping—a jeweled Hamilton watch.



A TRIUMPH OF
AMERICAN GENIUS

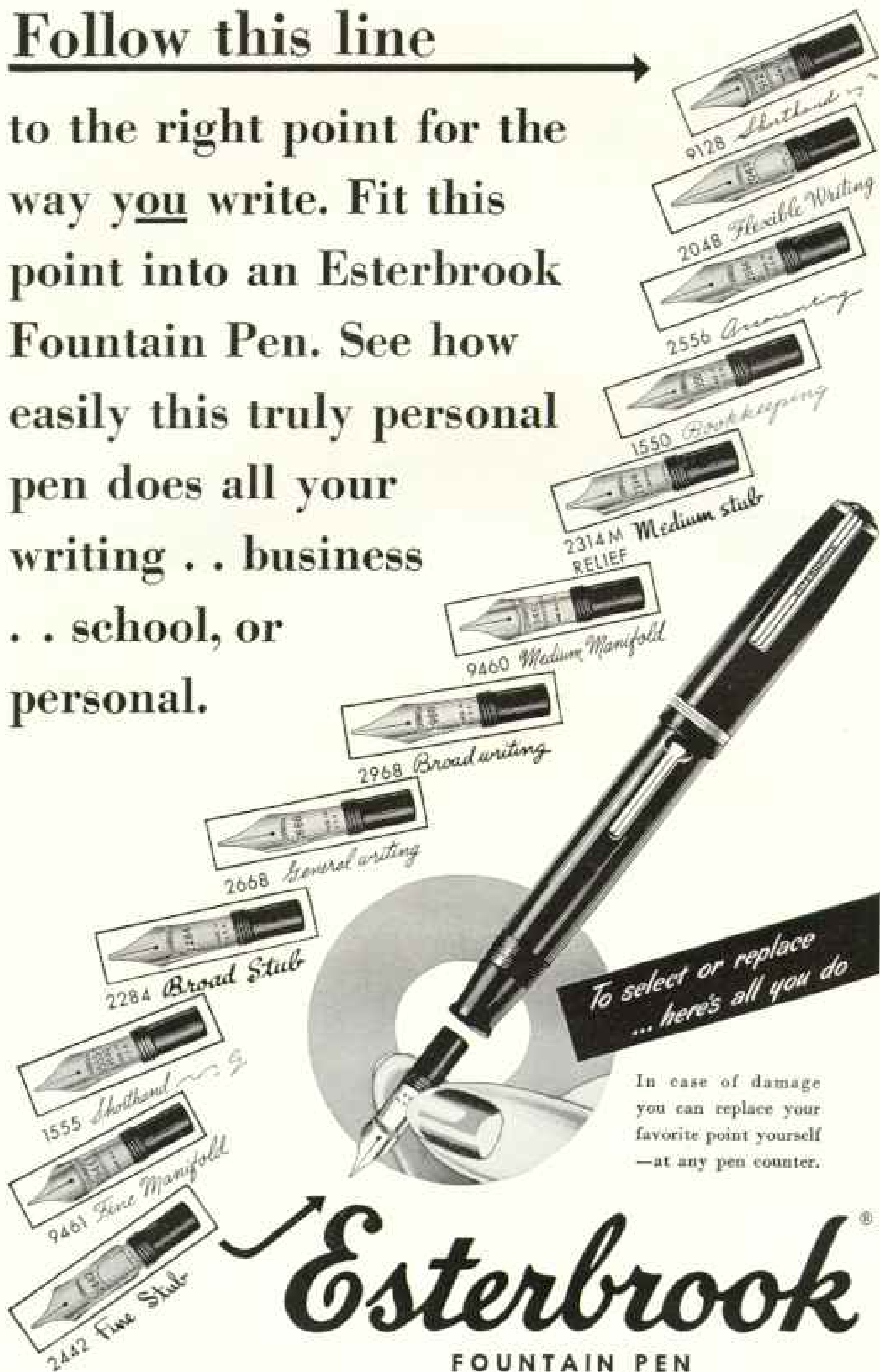
LEFT TO RIGHT: **GORDON**—18K natural gold case, *Medallion** movement, \$210.00; **JUVENS**—14K gold-filled case, \$60.50; **A-6**—5 diamonds set in 14K natural or white gold case, \$150.00 (other diamond-set watches in gold and platinum); **NETI**—14K gold-filled case, \$60.50; **LANA**—14K natural or white gold case, \$71.50; **AGNES**—10K natural or white gold-filled case, \$55.00; **ASLBY**—14K gold-filled case, \$71.50. At better jewelers everywhere. *Provs. inst. Fed. Tax.* All prices subject to change without notice. Since 1892 Hamilton has made fine, fully jeweled watches exclusively. Hamilton's experience making railroad watches assures greatest accuracy in every grade. Send for FREE folder and revealing booklet "What Makes a Fine Watch Fine?" Hamilton Watch Company, Dept. U-6, Lancaster, Penna.

*The "Medallion" is the finest movement created by Hamilton's skilled watchmakers.

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to the right point for the way you write. Fit this point into an Esterbrook Fountain Pen. See how easily this truly personal pen does all your writing . . . business . . . school, or personal.



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you can replace your
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The General Electric Two-Door Refrigerator - Home Freezer Combination

Now . . . a new 10-cubic-foot model of today's outstanding refrigerator!



Home Freezer Compartment. Full 2 cubic feet. Separately refrigerated, separately insulated, with its own separate outside door.

Freezes foods and ice cubes quickly. **AND LOOK** at all the frozen food it will keep under long-time storage at zero temperature.



Refrigerator Compartment. Separately refrigerated, separately insulated, with its own separate outside door.

AND LOOK at all the fresh food it holds under refrigeration—as much as the ordinary 9-cubic-foot refrigerator! Moisture-conditioned cold keeps humidity just right. No need to cover dishes. *Never needs defrosting.*



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WHEN YOU BUY a refrigerator like this great, new Two-door Refrigerator-Home Freezer Combination, you're making a major investment in better living for yourself and your family.

You have every right to expect years and years of dependable, efficient, and economical refrigeration . . . 24 hours a day, day in, day out.

And you'll get it—in this refrigerator. For it's equipped with the famous General Electric sealed-in refrigerating system that has set an unexcelled record for years and years of reliable performance.

See this most advanced of all refrigerators at your retailer's, General Electric Company, Bridgeport 2, Connecticut.

More than 1,700,000 in service 10 years or longer.

GENERAL  ELECTRIC



Fun-packed recreation! All part of life at T.C.M.A. approved trailer parks



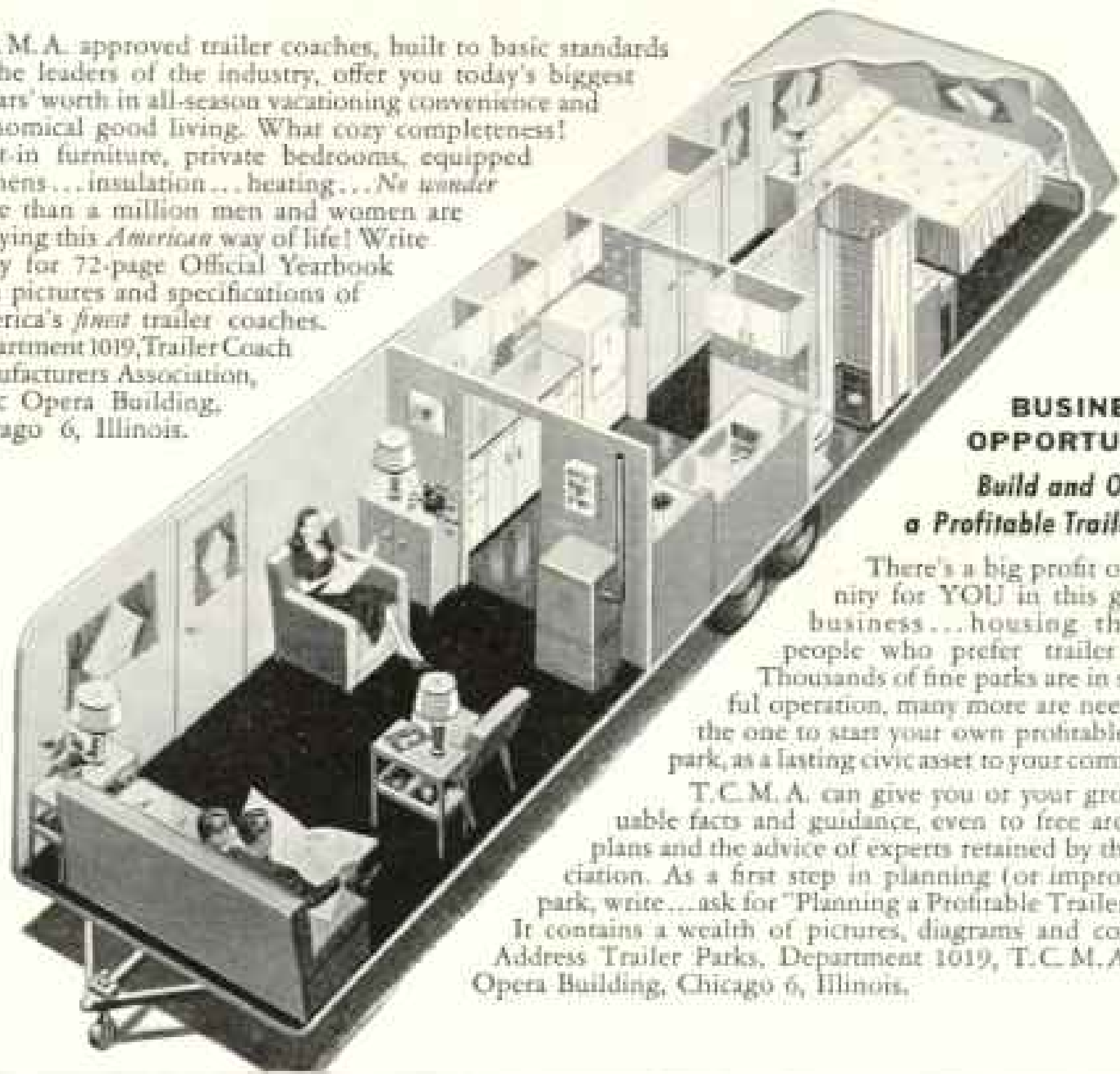
Mr. E. K. Dodge, Navy Dept., and Mrs. Dodge; typical of nice people you meet



Family fun! Trailer Coach economy puts lake, woods, shore at your door

EVERYTHING YOU NEED FOR *Wonderful Vacationing..* AND GOOD LIVING!

T.C.M.A. approved trailer coaches, built to basic standards by the leaders of the industry, offer you today's biggest dollars' worth in all-season vacationing convenience and economical good living. What cozy completeness! Built-in furniture, private bedrooms, equipped kitchens...insulation...heating...*No wonder* more than a million men and women are enjoying this *American* way of life! Write today for 72-page Official Yearbook with pictures and specifications of America's *finest* trailer coaches. Department 1019, Trailer Coach Manufacturers Association, Civic Opera Building, Chicago 6, Illinois.



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T.C.M.A. can give you or your group valuable facts and guidance, even to free architect's plans and the advice of experts retained by the Association. As a first step in planning (or improving) a park, write...ask for "Planning a Profitable Trailer Park." It contains a wealth of pictures, diagrams and cost data. Address Trailer Parks, Department 1019, T.C.M.A. Civic Opera Building, Chicago 6, Illinois.

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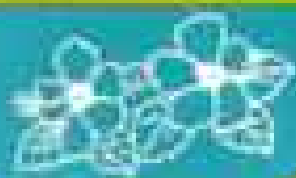
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Please send me now, free, 48-page, full-color booklet:
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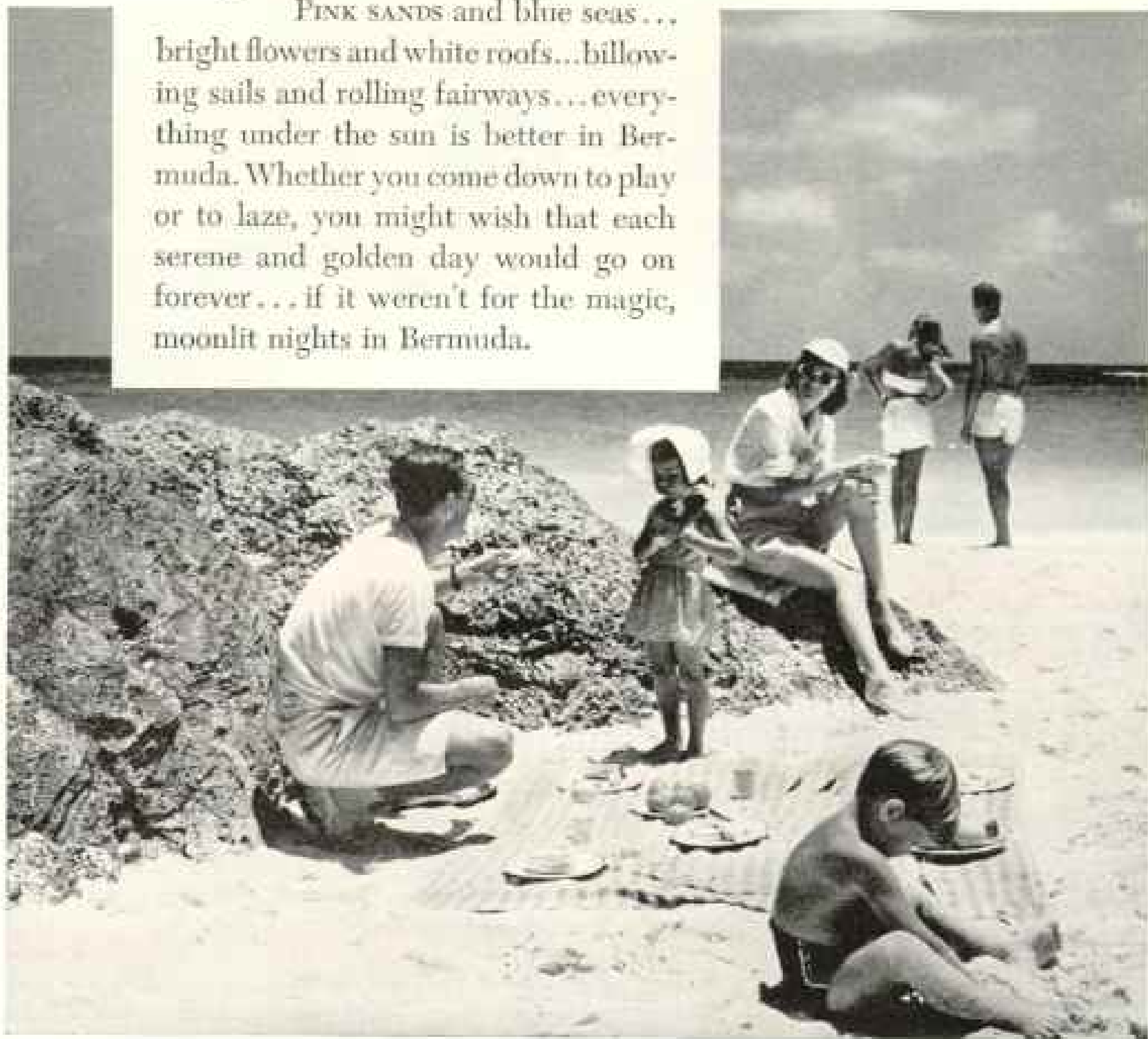
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PINK SANDS and blue seas... bright flowers and white roofs... billowing sails and rolling fairways... everything under the sun is better in Bermuda. Whether you come down to play or to laze, you might wish that each serene and golden day would go on forever... if it weren't for the magic, moonlit nights in Bermuda.



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For this is the time to which everyone who's young looks forward, a time when it's such fun to mark the precious moment of growing up with the most perfect gift of all.

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No matter what the make of your watch, it can be repaired economically and promptly, thanks to the efficiency of the modern jeweler.

For the gifts you'll give with pride—let your jeweler be your guide

The WATCHMAKERS OF



SWITZERLAND

See "The 1948 Watch Parade" at your jeweler's—October 10th to 24th.

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For travel to and from the West—at its very best—
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Road of the Daily Streamliners

It takes **\$20,265**

to keep a man working on the railroad



Yes, that's what it costs the railroads to provide each and every one of their 1,350,000 workers with the "tools" of his trade.

Behind the engineers and stenographers, the purchasing agents and ticket agents, the track walkers and tower men . . . everybody who works on the railroads . . . is an investment of more than 27 billion dollars.

These dollars . . . about \$20,265 for each employee . . . have provided the tracks, the cars and engines, the repair shops and all the other "tools" which make it possible for American railroad workers to move the greatest volume of traffic the world has ever known . . . with maximum safety, efficiency and economy . . . and to earn the world's highest railroad wages.

Railroads are being continually improved. More powerful locomotives, freight cars of increased capacity, luxurious streamlined passenger trains, heavier rail, reduction of curves and grades; new signals that increase safety and efficiency—all are being added as fast as materials become available.

To continue to improve America's greatest mass transportation system, the railroads should be allowed to earn enough to supply their workers with even more productive "tools." Only in this way—combining the resources created by the pooled and invested savings of millions of persons with the skill of railroad men and management . . . will the railroads be able to keep on furnishing the lowest transportation that is essential to the life of the nation.



**Apple Pie,
fresh-baked
in October...**

***Still fresh
in March!***



WHEN the baking mood is on, prepare enough for weeks ahead, and store it in your Philco Freezer. Finished pies and muffins, or just the dough and other ingredients. You have no idea how a Philco Freezer will lighten the chores of home-keeping until you have one and use it every day. It's an auxiliary to your refrigerator, keeping foods at sub-zero temperatures for months, and keeping them *freezer-fresh* and vitamin-rich. Get the story from your Philco dealer.



Says Mrs. Clara Tradnock
of Atlanta, Georgia

"The Philco freezer saves time and money, I always say. I buy meats and poultry in quantity once a week, then store them in the freezer. It really saves my shopping time, and money, too."

Keep Foods FREEZER-FRESH*

* FRESH AS THE DAY THEY WERE
PICKED, CAUGHT, OR BOUGHT.



PHILCO MODEL AV-75. Deluxe Upright, large 7 1/2 cu. ft. capacity holds up to 300 lbs. of frozen foods. 3 compartments, one for sharp freezing. Patented sloping shelves and 2 position drop doors conserve cold. Temperatures as low as 15° below zero. Built-in Thermometer, Outer Door Lock and Temperature Control. Battery-operated Guardian Bell. Hermetically Sealed Power-System. Philco quality throughout.

**PHILCO
FREEZER**

Famous for Quality the World Over



WISH WE HAD A MAID TO DO THESE DARNED DISHES !

THEY'D DO THEMSELVES IF WE HAD A GENERAL ELECTRIC DISHWASHER !

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1. A day's dishes done like magic! The G-E Dishwasher will wash a whole day's dishes at one time for a family of four. Convenient racks hold china, glassware, silver safely. Dishwasher cleans pots and pans, too!



2. No more rough, red hands! You never touch dishwater. Just turn the switch and the Dishwasher takes over—automatically washing and rinsing dishes in water hotter than hands can stand.




3. Gives you new hours of freedom! You're no longer a slave to a dishpan. The Dishwasher thoroughly cleans and rinses each piece cleaner than by hand. Safely, too—only the water moves.



4. No dishes to wipe—ever again! After dishes are washed and rinsed, the cover opens automatically, and both dishes and Dishwasher dry in their own heat. Gleaming, sparkling clean dishes are ready to be put away.

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NOTE: The Dishwasher is available either in a complete sink, or as a separate individual appliance for installation in your new or present kitchen. General Electric Company, Bridgeport 2, Conn.



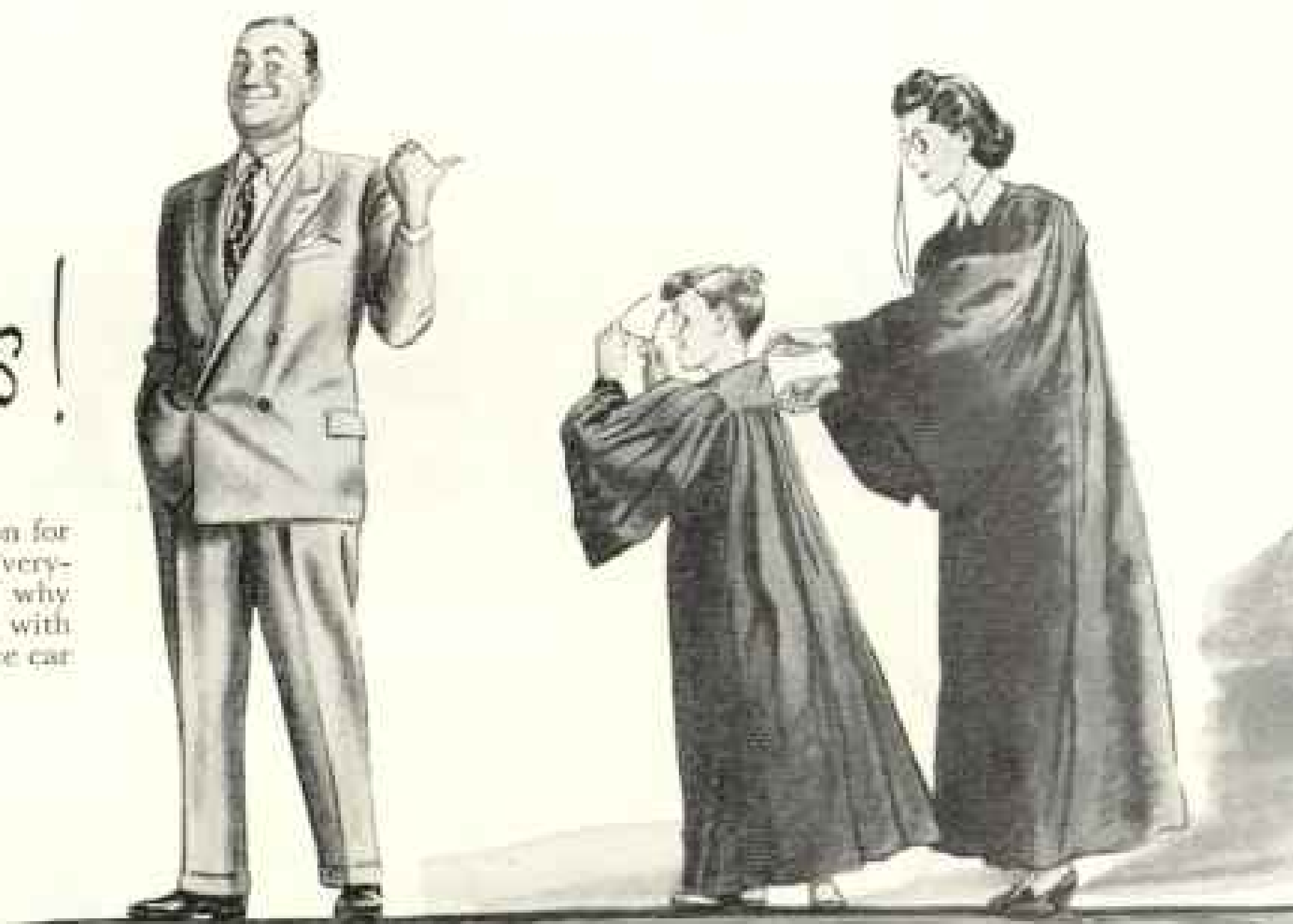
**AUTOMATIC
DISHWASHER**

DOES THE DISHES BY ITSELF

GENERAL  ELECTRIC

Let them be the Judges!

"Buying a new car is a big decision for a family. And, in my little family, everybody has an equal voice. That's why Mother and Johnnie went along with me as we started out to find the one car that would be the best car for us.



"We stopped first at the Plymouth dealer. That's because we know people who have Plymouths and they tell us this is the greatest value car of them all. We saw the new Plymouth Quality Chart and got the facts and figures for accurate comparisons. Then we took a ride.



"Johnnie went for the new Air Pillow Ride. 'Boy, are those Airfoam Cushions soft!' I could see the seats were worth the slight extra cost. But all of this comfort couldn't come from cushions alone. Those big Super-Cushion Tires must help, too—and they're standard equipment.



"Mother just sat back . . . kept saying, 'I feel so safe and secure.' But when we stopped, she got real practical. She inspected the big luggage compartment. 'Why the lid opens with a finger-touch,' she exclaimed. 'And it's so balanced that it can't fall down and crack your head.'



the Verdict

"Since I do most of the driving in our family, I didn't say anything until I got behind the wheel. Then I got excited too. Why, this Plymouth was the easiest-handling car I ever drove. The longer I drove it, the better I liked it. After the ride, I looked at Mother and I looked at Johnnie and I knew we had arrived at a verdict."



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Plymouth Builds Great Cars . . . Good Service Keeps Them Great. Your nearby Plymouth dealer will provide the service and factory-engineered parts to keep your present car in good condition while you're waiting for your new Plymouth. PLYMOUTH Division of CHRYSLER CORPORATION, Detroit 21, Michigan.





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It's in the perfect blending of the charm and achievement of the Old with the excitement and promise of the New...

It's in the rising hum of busy factories... the warm smiles of friendly hard-working people... the gentle climate... the bountiful resources of Nature... the expanding markets...

It's in the breath-taking "magic" of

new industries springing up almost overnight... all along the 8,000-mile Southern Railway System...

It's in the certainty, here in the South, that the historic Past and the dynamic Present are but stepping stones to an even brighter, more prosperous Future.

"Look Ahead—Look South!"

Ernest E. Harris

President



SOUTHERN RAILWAY SYSTEM

The Southern Serves the South



Machines in RCA's Lancaster Tube Plant are designed for mass production of Kinescopes—television picture tubes—at lowest possible cost.

Behind the magic of a Television Tube

Every morning, 14 tons of glass "bulbs" go down to the production lines at the RCA Tube Plant in Lancaster, Pa.

By evening, the bulbs are television picture tubes, their luminescent faces ready to glow—in television homes everywhere—with news, sports, entertainment, education, politics.

Born of glass, metals, chemicals, the picture tube comes to life through flame and heat. Its face

is coated with fluorescent material—forming a screen on which an electron gun "paints" moving images.

Each step is so delicately handled that, although RCA craftsmen are working with fragile glass, breakage is less than 1%.

Water, twice-distilled, floats the fluorescent material into place on the face of the tube, where it clings by molecular attraction—as

a uniform and perfect coating.

Every phase of manufacture conforms to scientific specifications established by RCA Laboratories. Result: Television tubes of highest perfection—assuring sharp, clear pictures on the screens of RCA Victor home television receivers.

When in Radio City, New York, be sure to see the radio, television and electronic wonders at RCA Exhibition Hall, 36 West 48th Street. Free admission. Radio Corporation of America, RCA Building, Radio City, New York 30.



RADIO CORPORATION of AMERICA

Why is going Pullman like...

...a visit with friends?



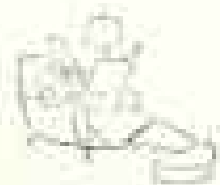
1. Because you're *always* a welcome guest when you go Pullman. No matter what your accommodations, the friendly Pullman conductor and porter are at your service.

...a night out?



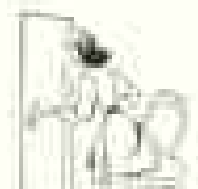
2. Because you can meet new people, make new friends, see new places—as you relax and enjoy yourself in the luxurious lounge car reserved for Pullman passengers.

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3. Because you have almost all of the comforts of home when you go Pullman. A big, soft bed. Clean, modern toilet facilities. And—on longer trips—delicious meals.

...a lock on your door?



4. Because going Pullman gives you that *safe* feeling. Fact is, you're safer crossing the country by Pullman than you are crossing the street in your home town.

...a happy ending?



5. Because your Pullman trip ends happily. You arrive as fresh as you left... on dependable railroad schedules... right in the heart of town... convenient to everything.

Go Pullman

THE SAFEST, MOST COMFORTABLE WAY
TO GET THERE!

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Admiral Triple Thrill!

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Complete Home Entertainment all in One



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Costs little more than an FM-AM radio alone! Plays up to 12 records automatically with Miracle tone arm. Mahogany.

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the key winder



THEN

the stem winder



AND NOW .. *the watch that winds itself . . .*



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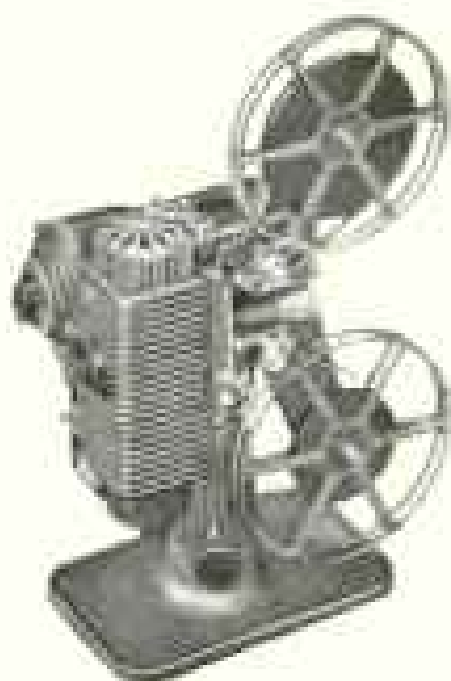


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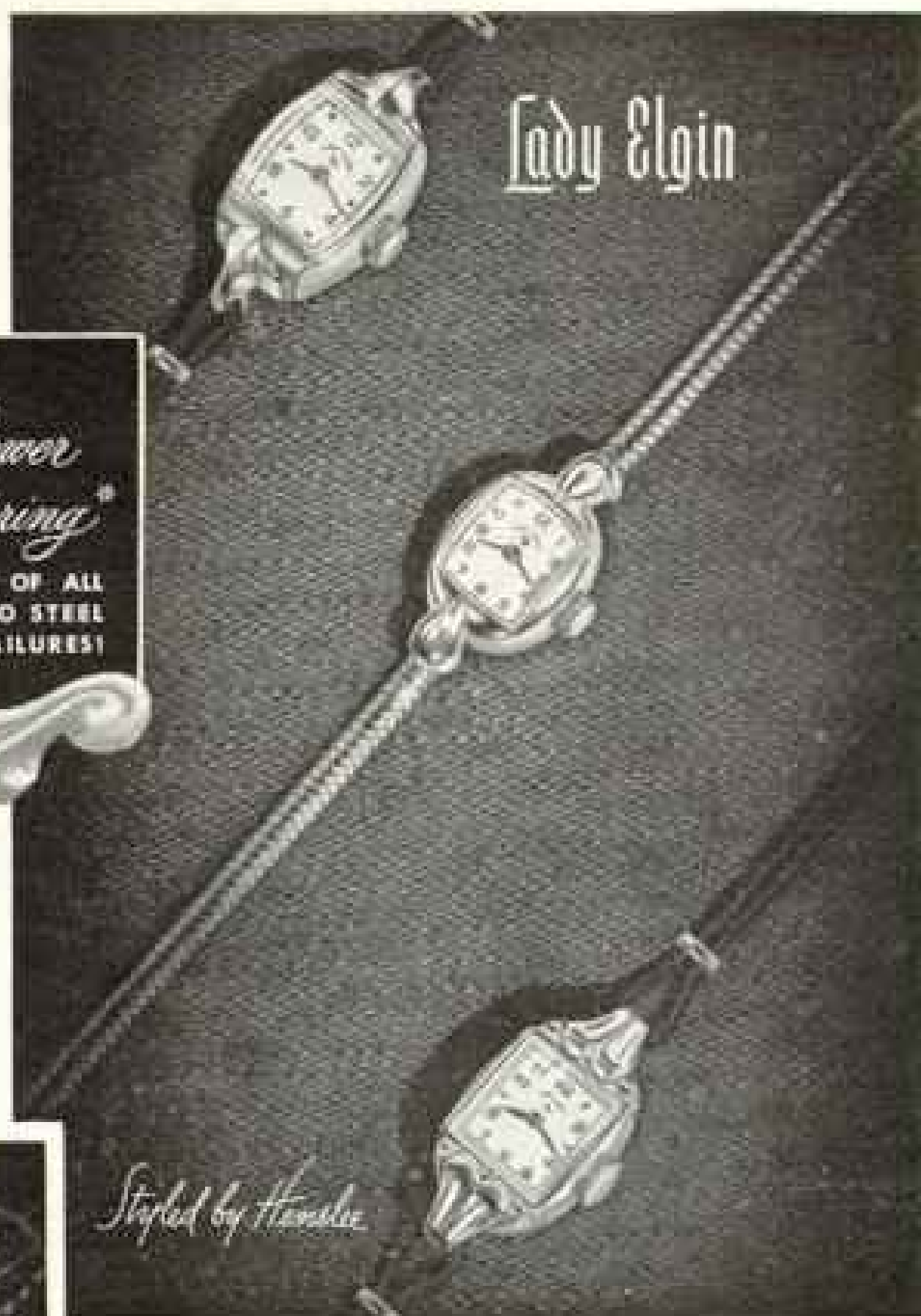
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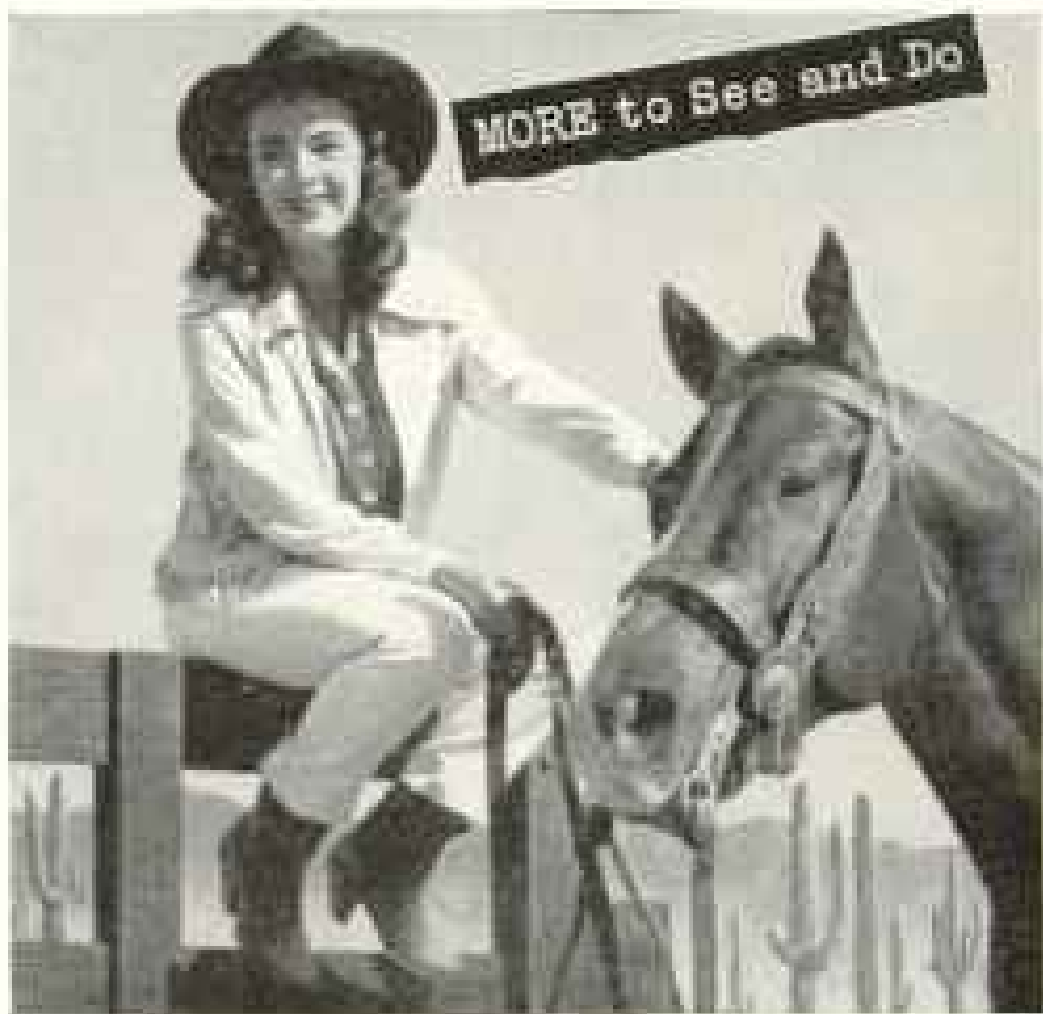
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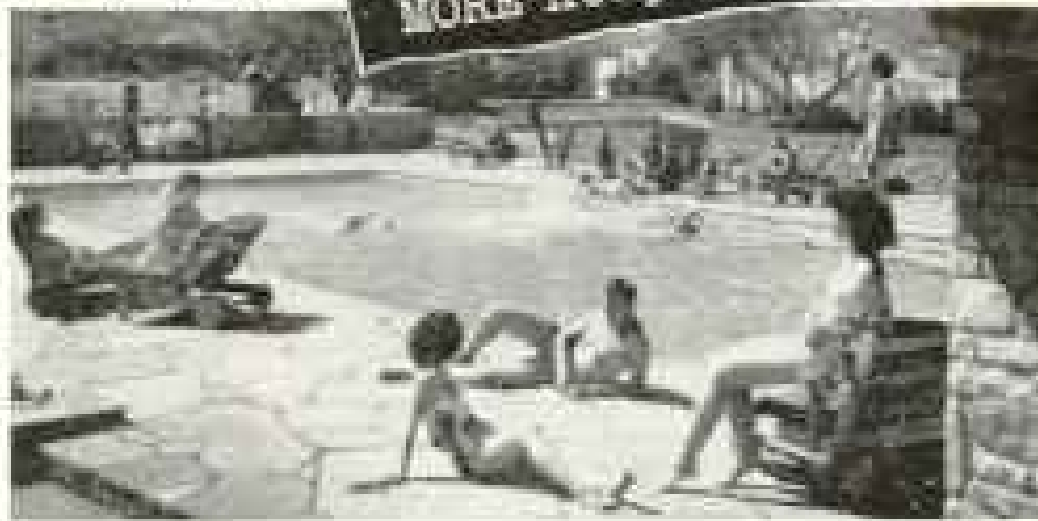
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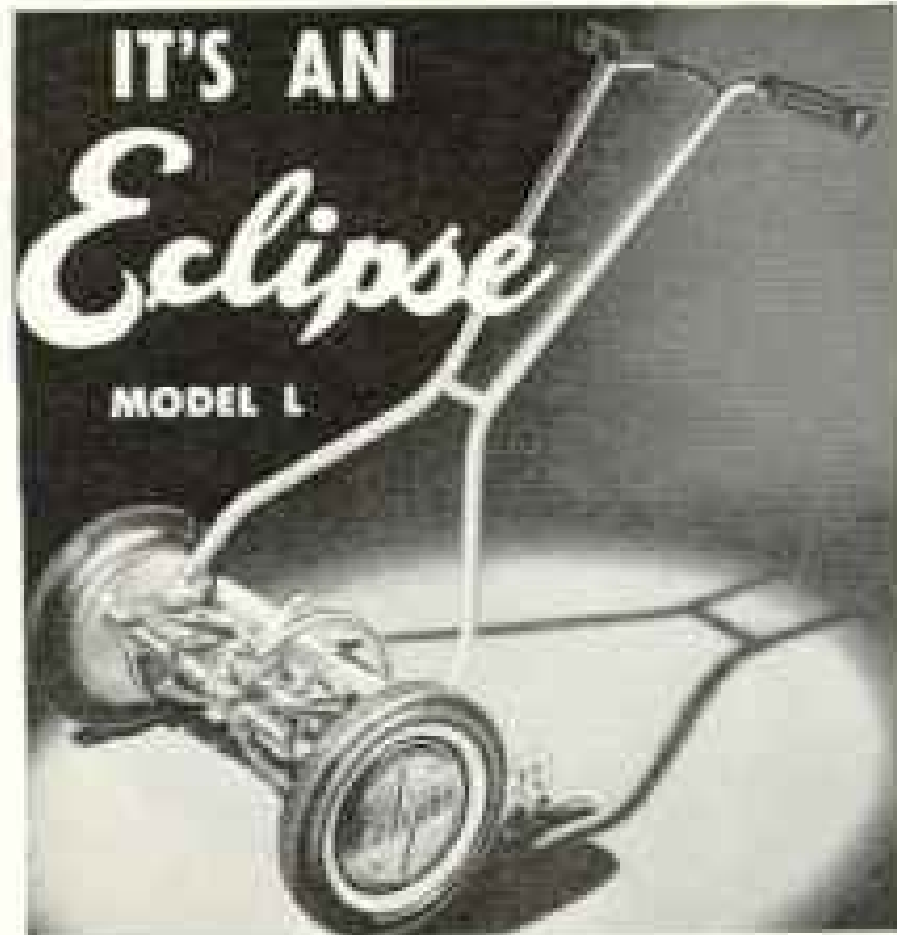


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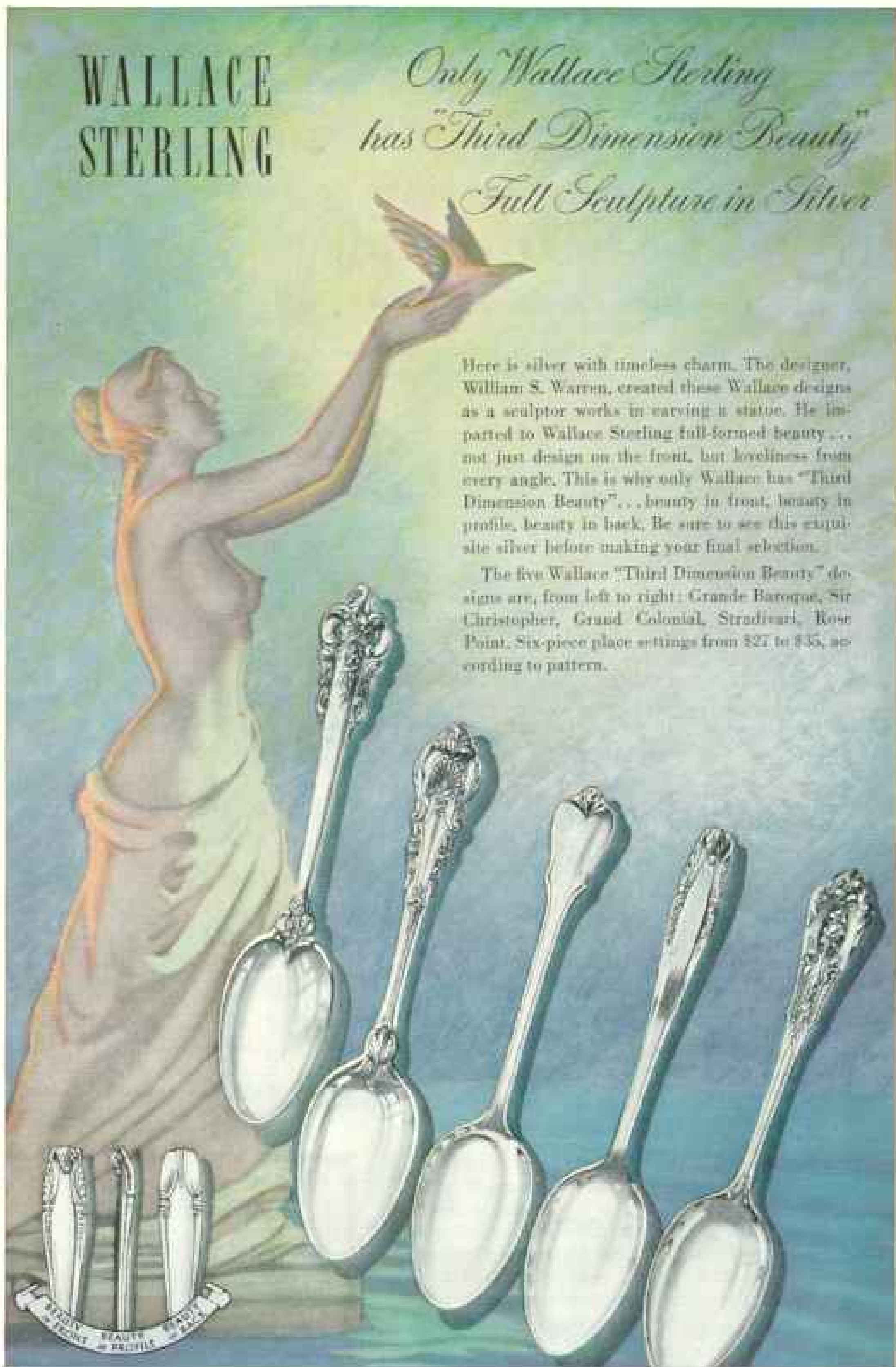
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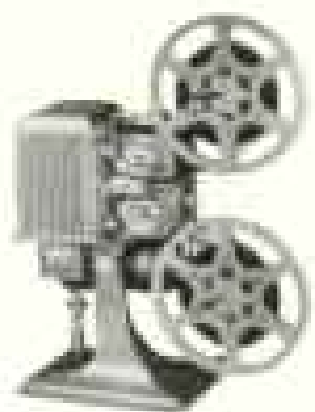
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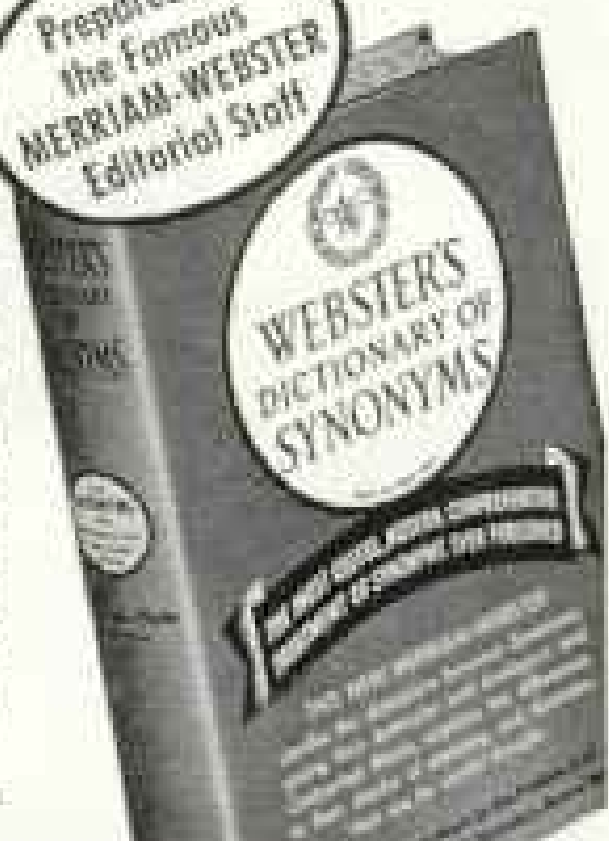
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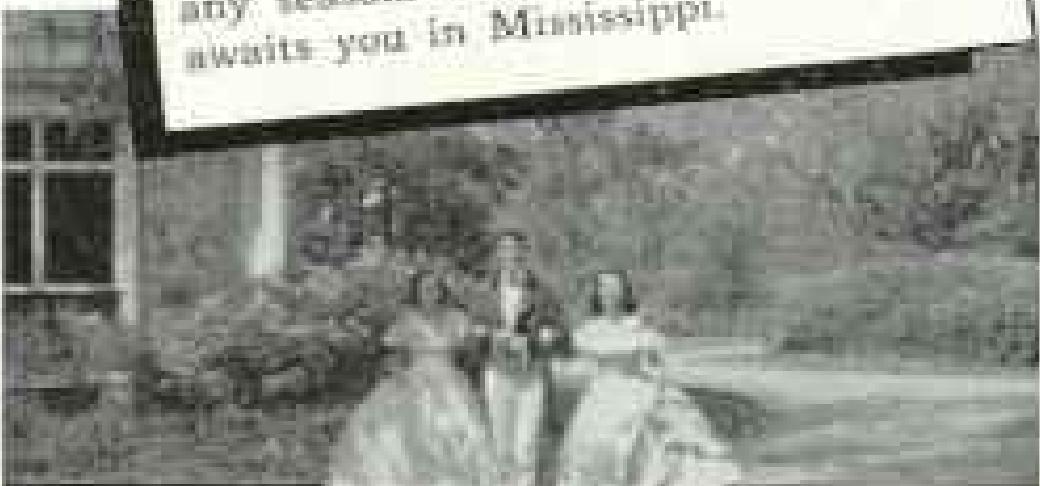
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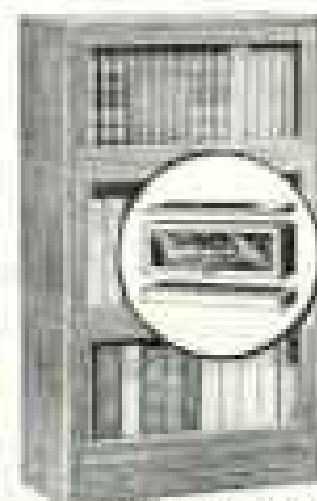


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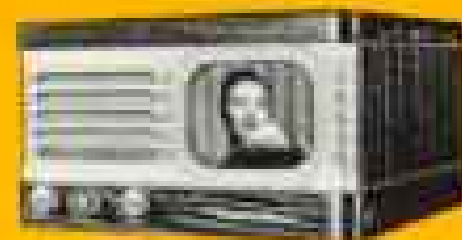
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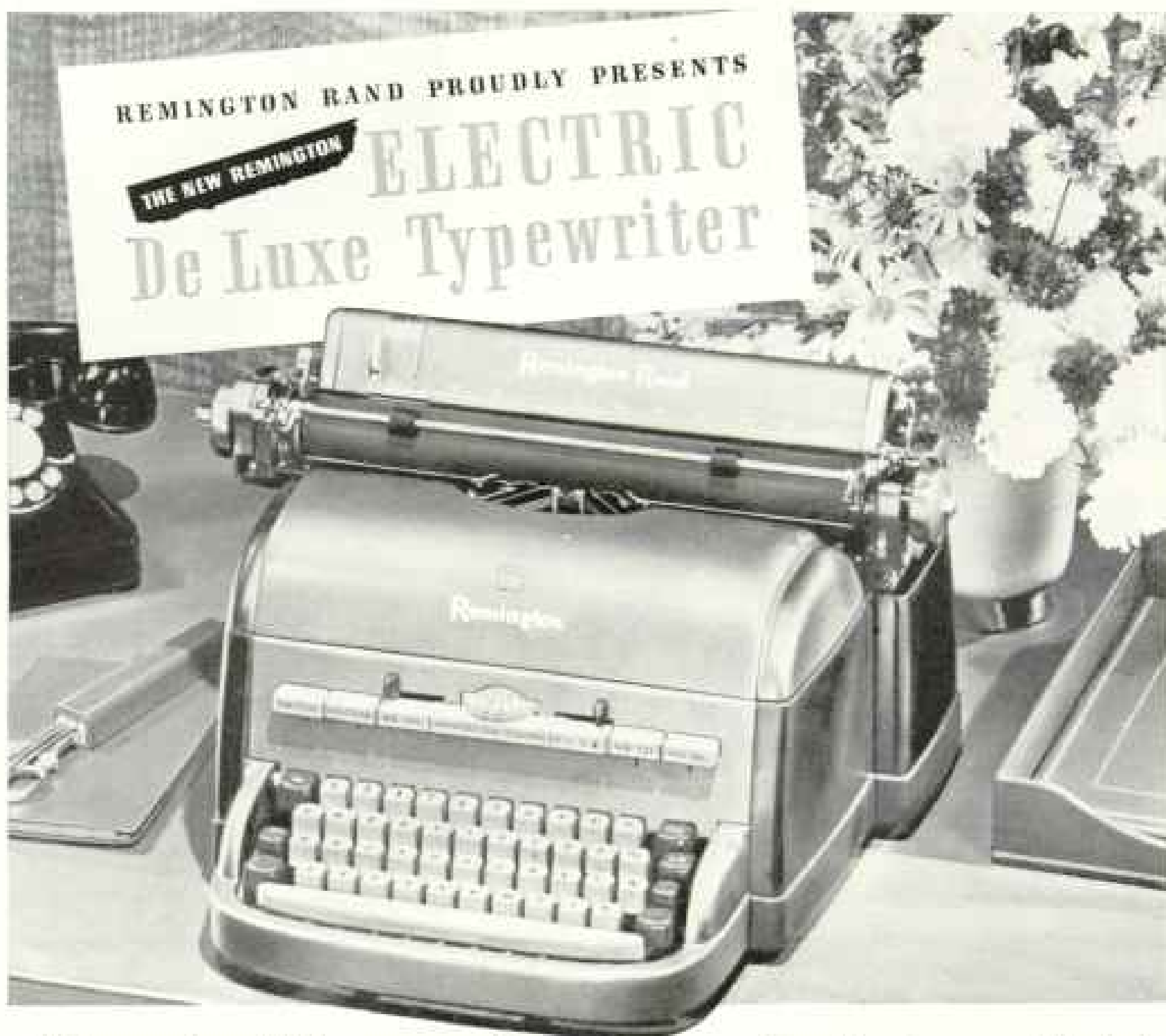
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