ASBESTOS

THE MAGIC MINERAL

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the creation of asbestos
a miracle of heat, pressure and time

Deep within the earth's crust of a remote geologic age, there occurred a tremendous subterranean upheaval. Masses of molten rock spewed upward, torn by the irresistible forces of terrific heat and pressure. Then hot mineral-bearing waters poured in. Slowly, over a long period of time, the character of the rock underwent certain changes.

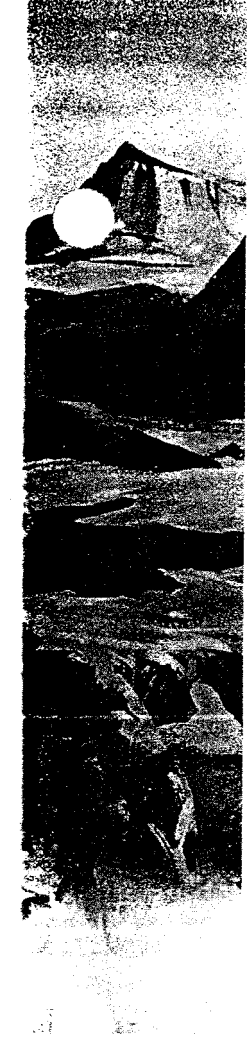
Later—millions of years later—another great uplift took place. Again the hot waters rushed in, drenching the rock with their mineral-carrying solutions. Again the rock underwent a change. But this time there was a difference. Now there were numerous openings in the rock and the hot waters could penetrate it intimately. In doing so, they dissolved some of the twice-changed rock, becoming saturated solutions. As the water cooled, the dissolved rock was precipitated as crystals. Eventually, the cracks and crevices through which the water had circulated became a network of fibrous crystalline veins that ran irregularly throughout the masses of surrounding rock.

So, the geologist theorizes, was asbestos created in nature's underground laboratory—a miracle of heat, pressure and time.

Miracle is not too strong a word to describe this

The Tablecloth that Averted a War . . .

The Emperor Charlemagne is said to have so mystified his rude warrior guests by throwing an asbestos tablecloth into the fire and then withdrawing it, unharmed from the flames, that these envoys from a rival kingdom departed in haste to warn their ruler not to make war against so powerful a magician!

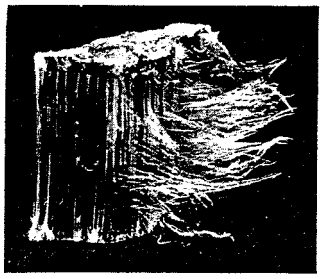


remarkable fibre of stone. Its very name is an index of its enduring character, for the word asbestos, derived from the ancient Greek, means inconsumable or indestructible. As nearly everyone knows, asbestos cannot burn. It is immune to the forces of rot, rust and decay. It resists heat and the action of most ordinary chemicals. There is no other fibre—natural or man-made—quite like it.

It would appear that nature was in a generous mood when she created asbestos, for deposits exist in many countries throughout the world and there are some thirty known varieties. Only six of these, however, are of economic importance and one type, chrysotile, is so superior to the others for most industrial purposes, that it accounts for about ninety-five per cent of the total world production of all natural mineral fibres.

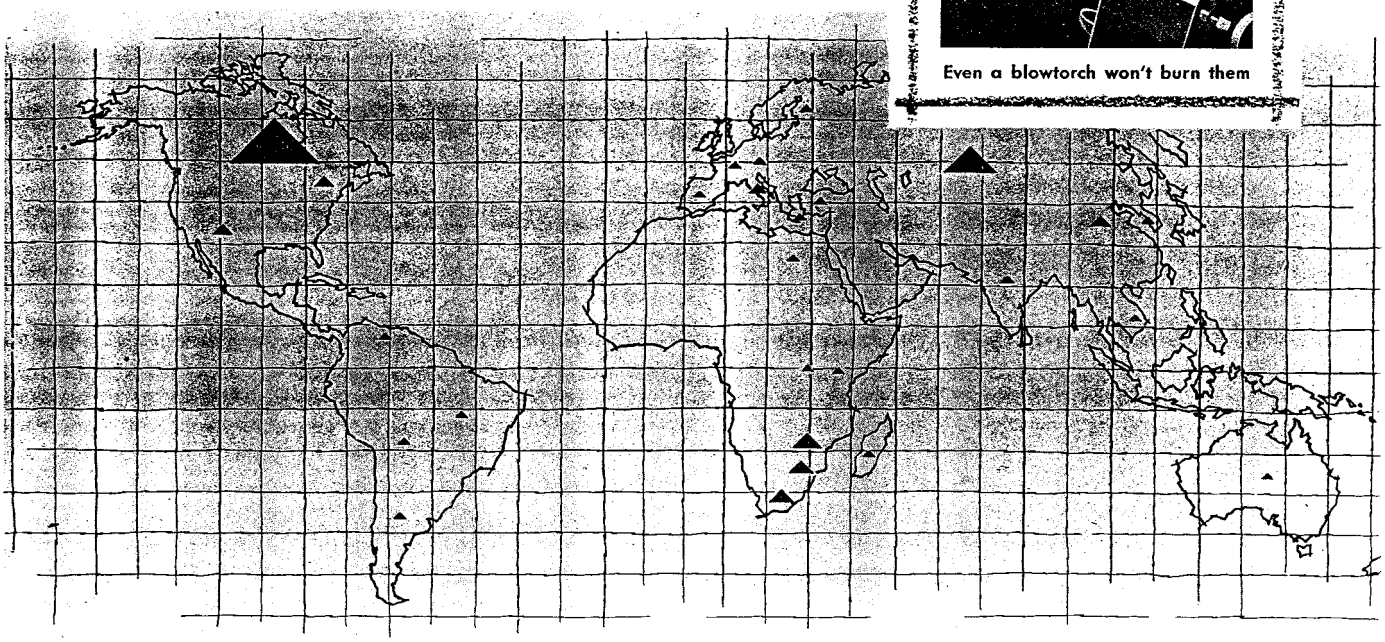
Canada is the largest producer of chrysotile asbestos and the fibres which come from the province of Quebec are noted for their high tensile strength, their unusual flexibility and their extreme fineness. Many of these fibres are actually as strong as some types of steel wire! Yet they are soft and silky and so fine that a single individual fibre can be seen only with the aid of the most powerful microscope.

Asbestos veins in the mother rock



Fine as silk, yet strong as steel

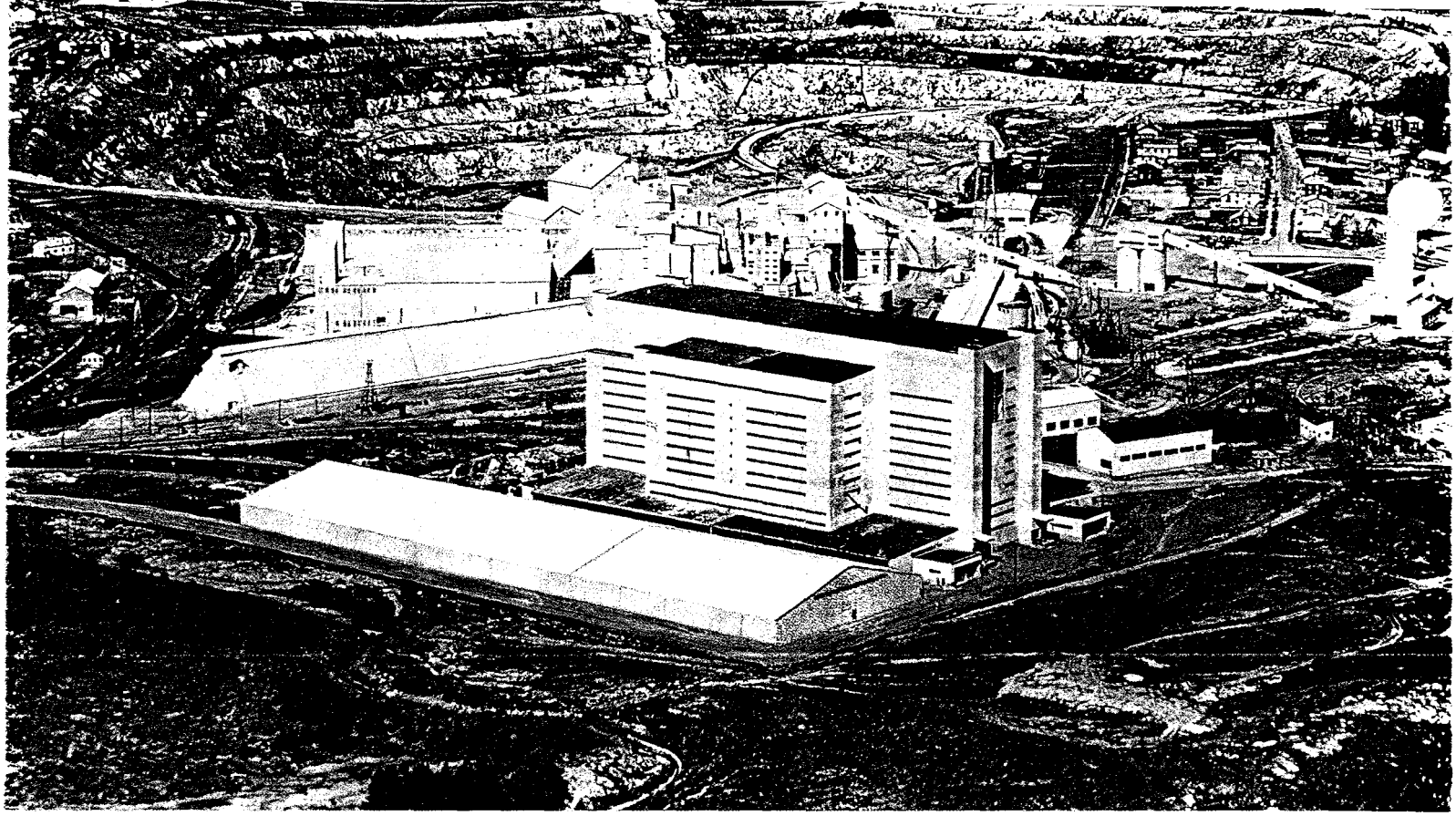
Even a blowtorch won't burn them



The map indicates the major areas where asbestos is found. Size of symbols indicates relative importance of deposits

Tale of a Venetian Traveler...

When Marco Polo returned from what is now Siberia in the thirteenth century, the Venetian traveler brought news of a strange cloth which, when "put into the fire," was drawn out uninjured and became "white as snow." Like many others before his time, he, too, was acquainted with asbestos.

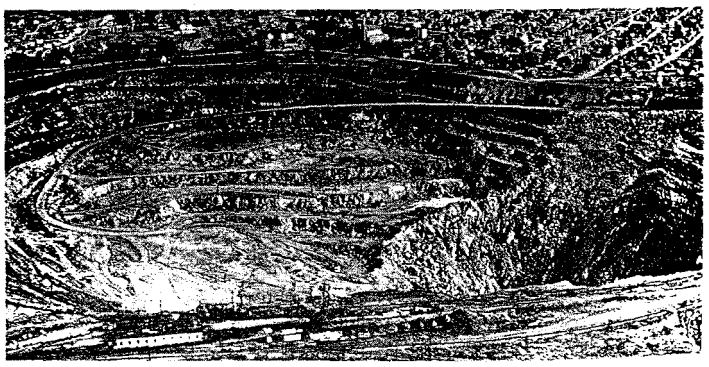


Aerial view showing J-M asbestos fibre mill in foreground, headframe of underground mine at right and open pit mine in background

a trip through a modern asbestos mine

There are two ways of mining asbestos. One way, the open pit method, is to remove the ore from the top of the deposit. The other way is to go underground and remove it from the bottom. Because the asbestos-bearing rock is generally located near the earth's surface as well as at considerable depths below it, most Canadian mines have at one time or another employed both methods. The trend today, however, is toward underground mining, since most of the open pits have now been worked to the economic limit.

The Johns-Manville Jeffrey mine at Asbestos, Quebec, provides a typical example of how underground operations are conducted in a modern asbestos mine. Producing more than 500,000 tons of high grade asbestos fibres yearly, mostly by the underground method, it is the largest asbestos mine in the world. Even at the present high rate of production, it is estimated that there are sufficient reserves of ore in this mine for

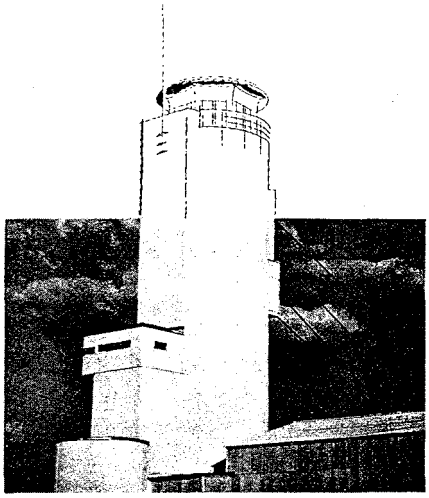


The huge open pit at Asbestos is over half a mile in diameter

The "Silk Stone" of Webb's Ledge...

The site of the Jeffrey mine was once a farm owned by Charles Webb and the rocky hillside where the asbestos outcroppings were discovered was known as Webb's Ledge. Legend tells us that the local people liked to go there on Sundays to pick cherries and to dig the "silk stone" out of the rock.

a period of more than 75 years. In addition to the Jeffrey mine, Johns-Manville owns and operates a mine in Munro Township, Northern Ontario and has a 51% interest in the Southern Rhodesian Mines of Rhodesian Asbestos Limited. Thus, a dependable source of supply for industry's varied and ever-increasing requirements is assured.

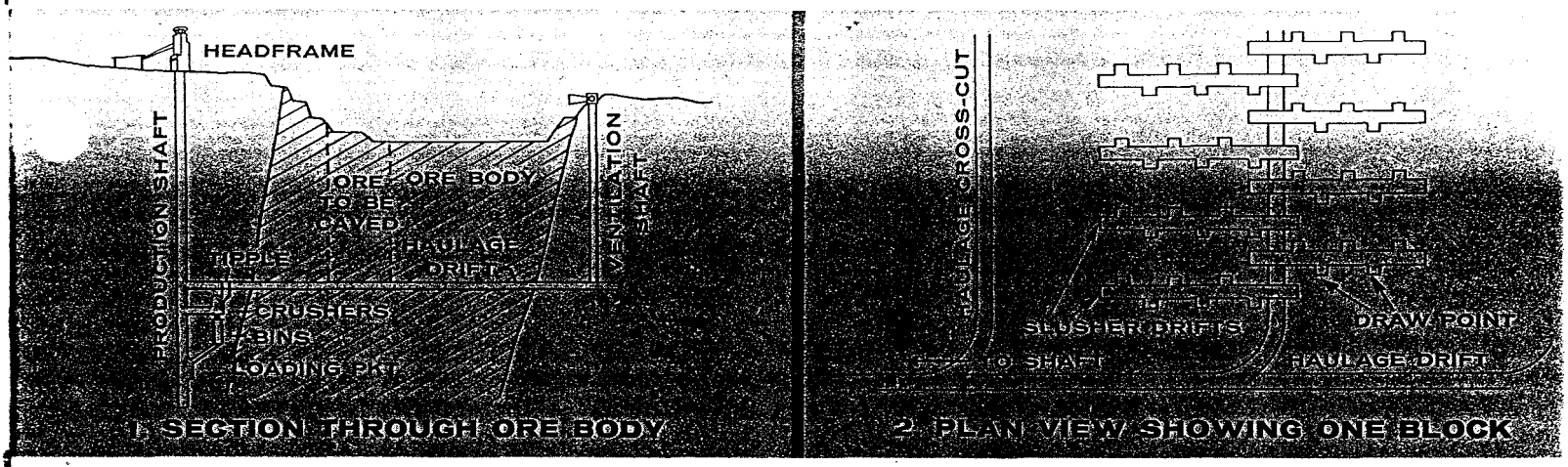


Headframe of the underground mine

A group of miners goes off duty

caving huge blocks 40 stories high

The method of underground extraction is known as block caving. Essentially, it consists of undermining a large block of ore in such a way that the entire block caves or breaks down from its own weight. After the production shaft has been sunk, tunnels are extended through the ore body. These are known as haulage drifts. Each area to be caved is a block or cube measuring 200 ft. square and extending upward about 400 ft. to the bottom of the pit. There are approximately one and a half million tons of ore in a block. (See Diagram 1)

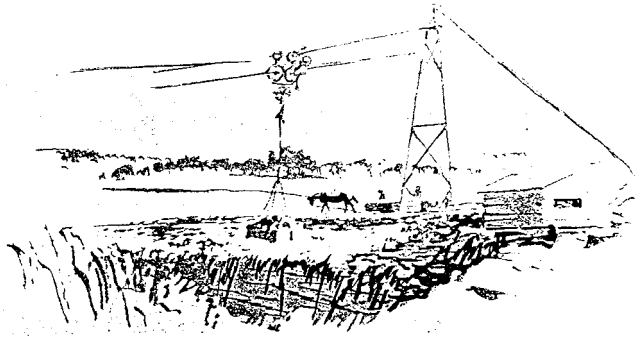


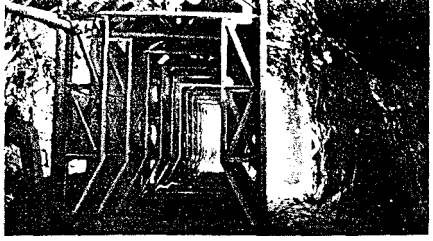
At right angles to the main haulage drifts, haulage cross cut tunnels are driven at 200 ft. intervals under the area to be caved. In each 200 ft. square block 8 tunnels called slusher drifts are driven at right angles to and above the haulage cross cuts. (See Diagram 2)

Drilling preparatory to block caving

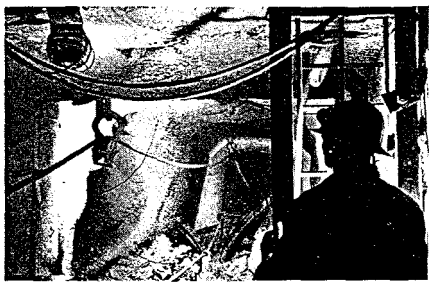
The One-Horsepower Hoist...

In the early days, ore from the open pit workings at Asbestos was slowly brought to the surface by means of a wooden derrick powered by a single horse that walked round and round the drum. Today the ore is hoisted from the underground mine at the rate of more than ten tons a minute.

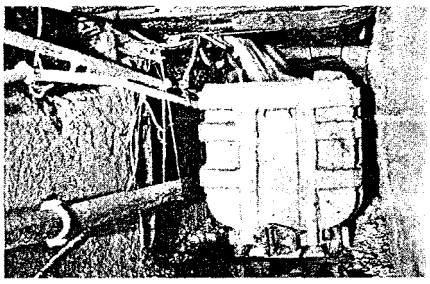




Unfinished drift with concrete forms in place



The caved ore is dragged to an opening . . .



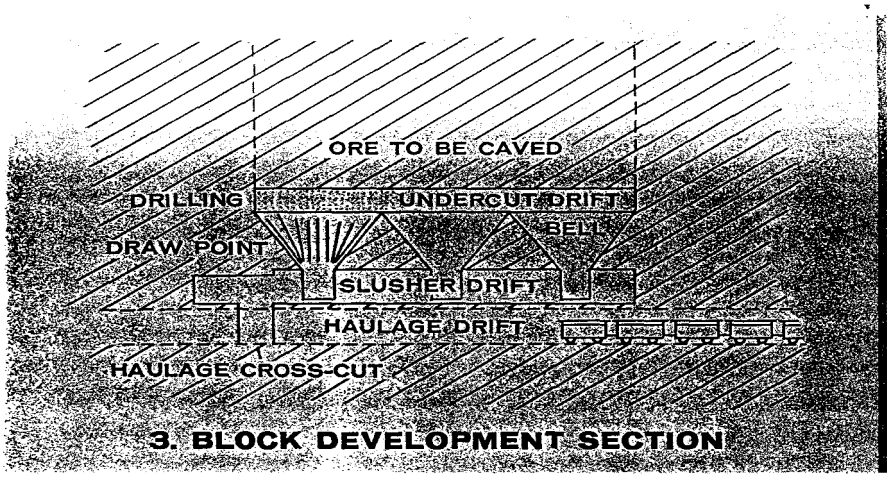
. . . it falls into cars that wait below

From the slusher drifts funnel-like openings called draw points are excavated upward. Through them the ore will be extracted. (See Diagram 3.) Slusher drifts and draw points are lined with poured concrete which is prepared in a mixing plant above ground. The ready mixed concrete is conveyed by gravity and compressed air through large pipes to the point where it is needed underground.

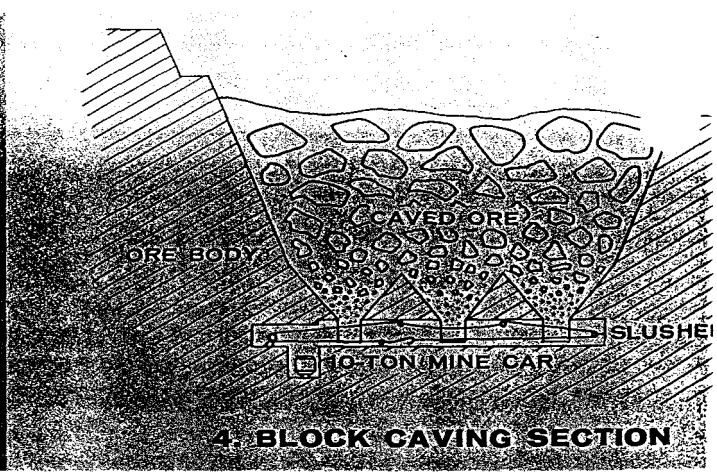
Using carefully tested calculations a 7 ft. high slice of the huge block to be caved, the undercut, is next honeycombed by drilling, the miners working from undercut drifts located directly above the slusher drifts. With everything in readiness the draw points are extended to the undercut drift. It is then blasted in progressive stages. The fractured rock is withdrawn and the caving starts.

how the loose ore is removed

As the rock tumbles down through the draw points and overflows into the slusher drifts it is removed by an electrically operated machine called a slusher which, in miners' parlance, is known as, "the devil's elbow." In crab-like fashion the

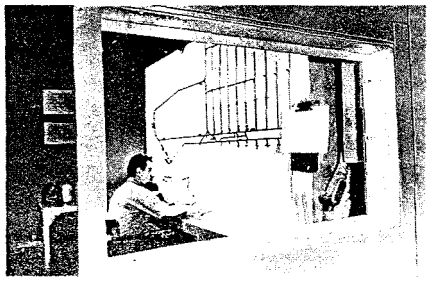


3. BLOCK DEVELOPMENT SECTION



4. BLOCK CAVING SECTION

The underground dispatcher's office



slusher blade scuttles to the newly fallen rock and drags it to an opening at the end of the drift where it falls into cars that wait in the cross cut tunnel below. (See Diagram 4.)

When loaded, the ten-car train is dispatched to the rotary tipple where the cars are emptied, two at a time, the ore sliding down a giant chute to the primary crushers which are located sixty-six feet below, at the 816 foot level. The powerful

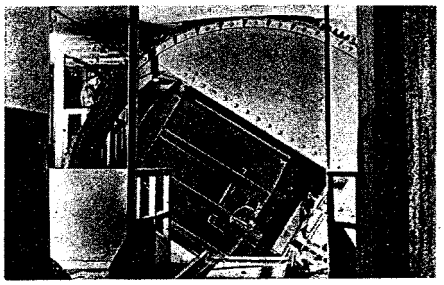
A Bell for Asbestos . . .

There was no steam or other power to operate a whistle when asbestos mining started at the Jeffrey mine seventy-five years ago. Consequently, the pit boss, as he was called at that time, summoned the men to work by ringing a large bell which was hung from the limb of a convenient tree.

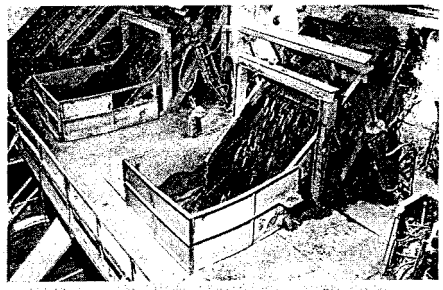
jaws of these crushers break up the large chunks of rock, some of which weigh more than a ton, into six-inch fragments.

From the crusher, the ore goes downward into bins and then a loading pocket from where it is hoisted to the surface in twelve and one-half ton mouthfuls by fast moving skip buckets operated by push button control. There, after undergoing further crushing to break it up into pieces of more manageable size, it is dried and then stored in a huge bin until required for processing at the mill.

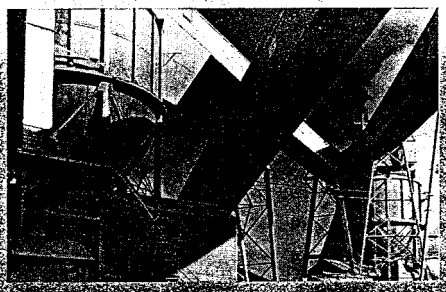
Each twelve and one-half ton bucketload of ore that comes to the surface yields less than two tons of asbestos fibres. The remainder is waste rock—for when nature formed asbestos she surrounded the comparatively small fibre veins with large rock masses which, although worthless, must be removed from the earth along with the treasure which the rock contains.



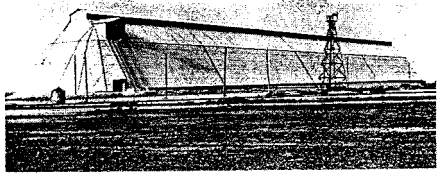
The cars are emptied at the rotary tipple



The ore enters the primary crushers



Above ground the ore is moved by conveyor



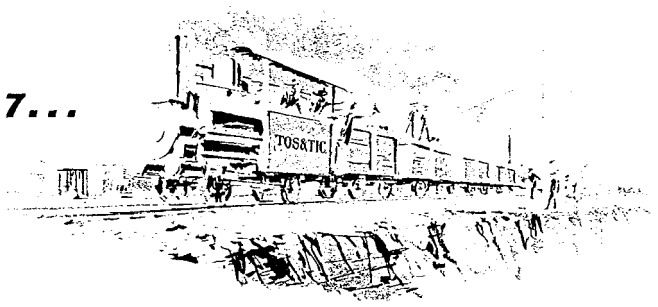
Here ore is stored until needed at the mill

safety the watchword

At the Jeffrey mine, you will search in vain for the grimy underground worker of an earlier day. The men come to work in their own cars, and change clothes in spacious locker rooms. For convenience, they lunch underground in a centrally located lunchroom which is built into the mine at the 750 foot level. Here also are such service facilities as repair shops, store rooms, power substation and a dispatcher's office from which the movements of the electric powered trains that haul the asbestos ore are controlled. This is done by means of two-way radio contact with the locomotive operators and by a system of red and green signal lights operated from the dispatcher's desk. There are more than fourteen miles of tunnels in the mine and many miles of track.

Although it might be supposed that an underground operation requiring the daily removal of thousands of tons of rock would involve many hazards, actually this is not the case. The use of efficient safety devices and modern safety equipment worn by the miners helps prevent many accidents before they happen. Careful planning and a never-ending safety campaign under the supervision of a safety director and a staff of competent safety engineers prevent others. All of these things have helped to make block caving, as practiced at the Johns-Manville Jeffrey mine, the world's safest method of underground mining.

The First Locomotive Arrives—1897...

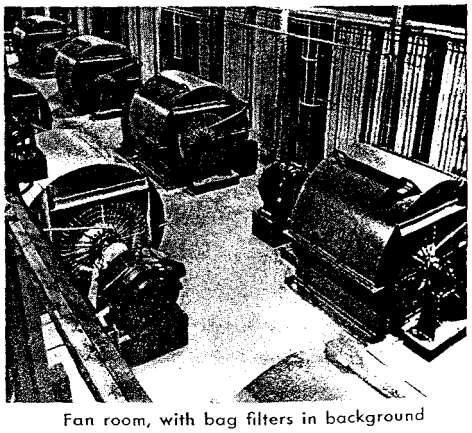


It was called "Tos & Tic," deriving its rather curious name from the company which operated the mine at that time—The Asbestos and Asbestic Company. Running on a narrow gauge track, this miniature giant hauled the ore in small flat cars from the rim of the mine pit to the nearby mill.

processing the fibre

The massive fourteen-story structure pictured above is not a modern office building, although at first glance it might well be mistaken for one. It is the world's largest asbestos mill, located at Asbestos, Quebec. Here the asbestos-bearing rock from the Johns-Manville mine comes for processing—hundreds of tons of it every hour of the day.

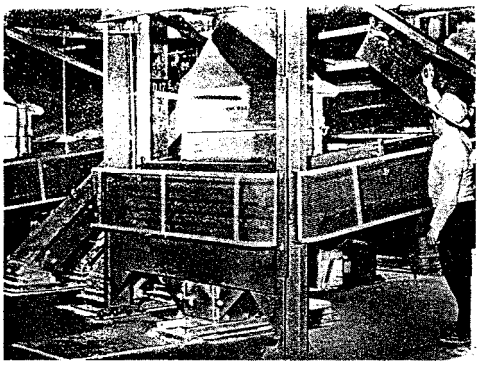
Designed as it is for the mass production of high quality asbestos fibres, this modern mill is also a clean and healthy place in which to work. Despite the daily handling of so much rock and fibre, the atmosphere is remarkably free of dust, thanks to a highly efficient system of dust control. Some idea of its extent—and, incidentally, of the scope of the operations that are carried on here—may be gained from the fact that there are some thirty acres of cloth bags in the filters and more than four thousand dust enclosures in the system.



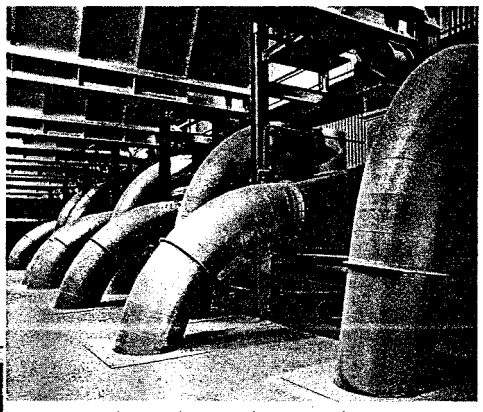
Fan room, with bag filters in background

Picking the "Stone of Cotton"...

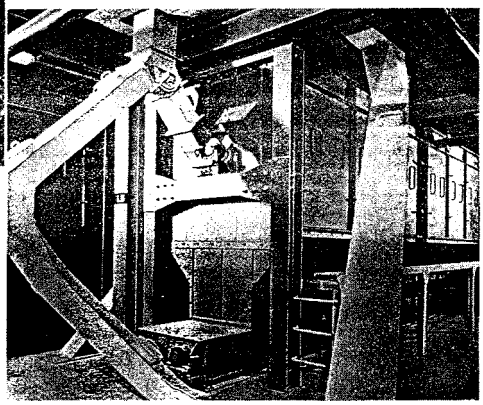
Originally, the ore was carried in bags to a picking shed where French-Canadian boys were employed to separate the pierre-à-coton (stone of cotton) as they called it, from the rock. A diligent boy could sometimes earn more in this way than the miners who toiled in the open pit.



Vibrating screens with air suction hood



Ventilating ducts in dust control system



The fibres are graded in machines like this

milling

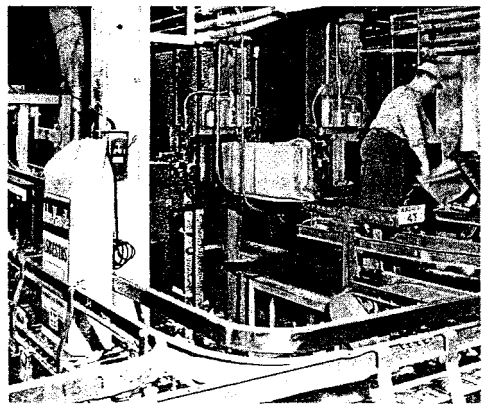
Although the milling process is complicated in its many repetitive operations, it is fundamentally one of separating the fibres from the mother rock. This is accomplished by a series of crushing operations, following each of which the ore is passed over vibrating screens which effect a rough separation of the loose, partially opened fibres from the rock. Powerful suction hoods, functioning like enormous vacuum cleaners, lift the freed fibres leaving the heavier rock and the still unopened fibres, which are conveyed to another crusher. The crushing, screening and lifting operations are repeated until all the fibre has been separated and only waste rock remains.

From start to finish, the milling process is continuous, the rock and unopened fibres traveling by conveyor and gravity from one operation to the next, and the separated fibres being drawn upward by air currents to large cyclone type collectors through an extensive system of ducts.

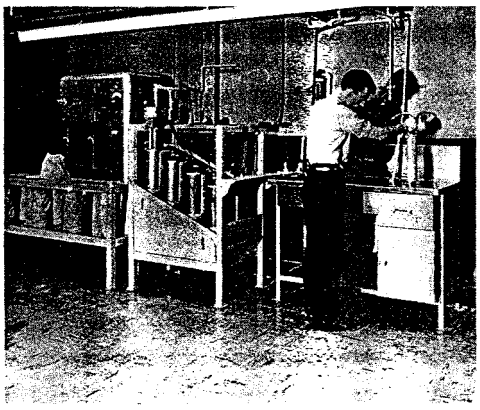
cleaning and grading

After separation, the fibres are thoroughly cleaned and carefully graded according to length. Since fibre length determines ultimate use, grading is an important step in processing. Specially designed machines separate the longer from the shorter fibres, producing upwards of eighty different grades which range in length from major fractions of an inch down to fibres so short that they resemble a fine powder in appearance. Grading is in accordance with rigid industry specifications and test samplings are continuously made to assure conformity with these standards in the finished product.

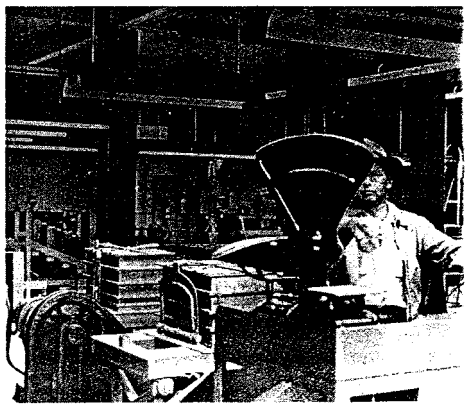
When the cleaned and graded fibres have been packaged in 100-pound containers, they are ready for shipment to the many plants throughout the world where they will be used as essential ingredients in the manufacture of a great variety of useful products.



Packaging the graded fibres for shipment



Quality is controlled at every step

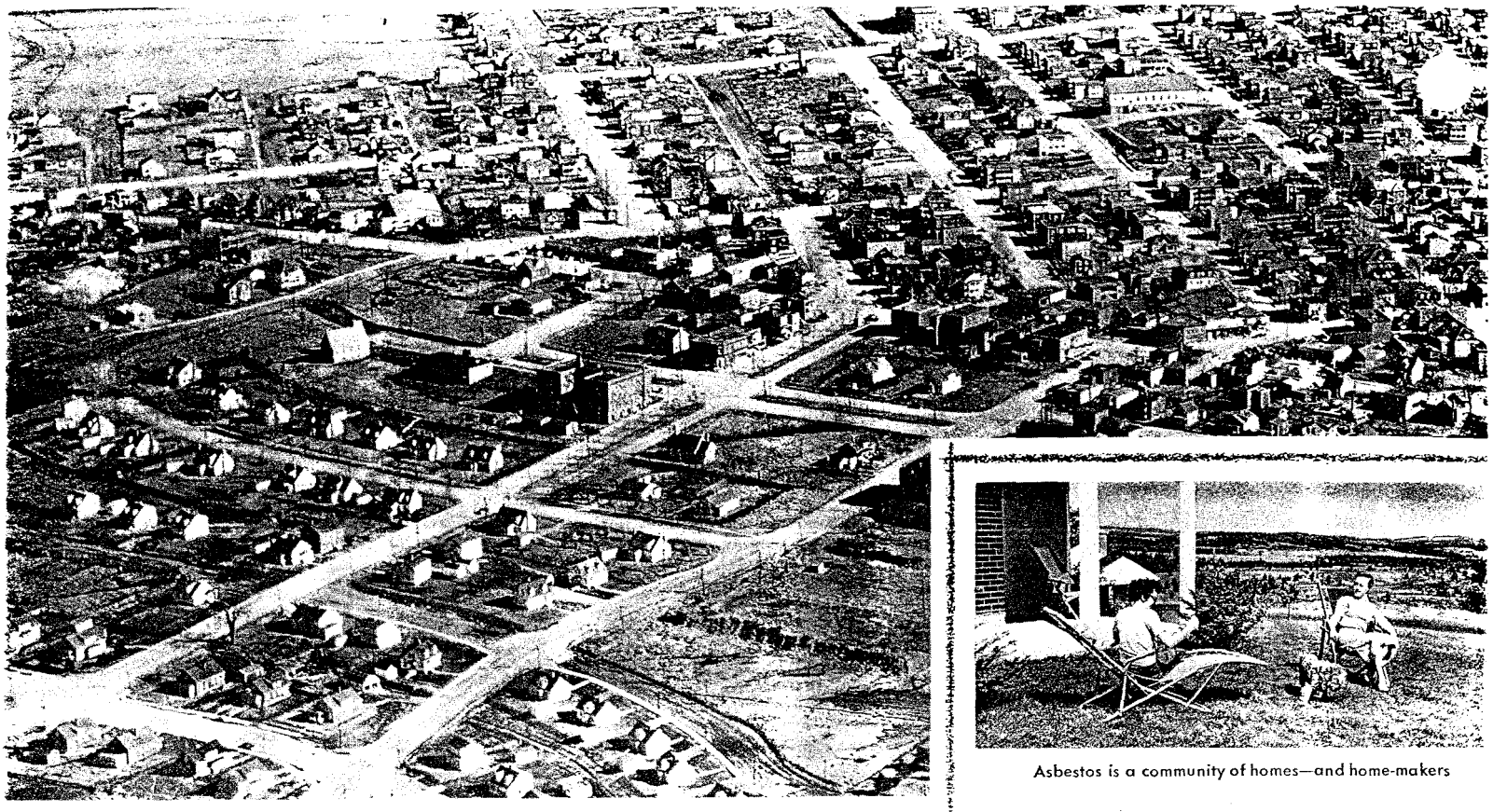


A standard test for product uniformity

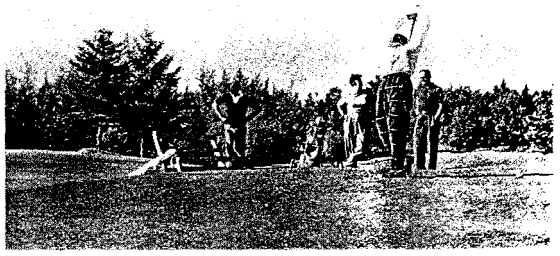
Danville Haul . . .

When the first mill was built at Asbestos, there was no railroad and the crushers and other heavy milling equipment had to be hauled in from Danville on wagons specially built for the purpose. Fifteen to sixteen pairs of horses were required and it took a full day to make the four-mile trip.

a visit to a modern a



Asbestos is a community of homes—and home-makers

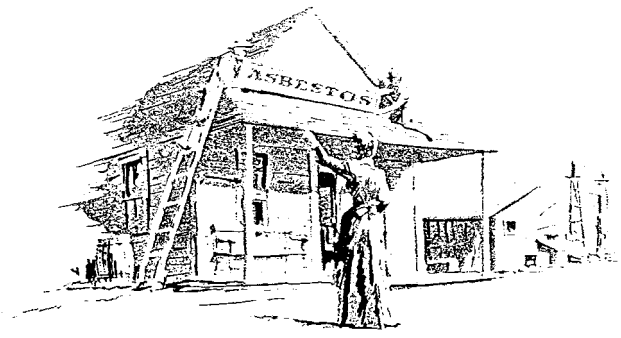


A foursome tees off at the golf course

The municipal swimming pool is a popular spot

Little more than three-quarters of a century ago, the spot where Asbestos, Quebec, now stands was part of a poor farming community. Later, when the mine was in an early stage of development, a small mining town typical of its time sprang up. Today, Asbestos is a growing city of ten thousand people, a majority of whose breadwinners earn their livelihood at the nearby Johns-Manville mine and mill.

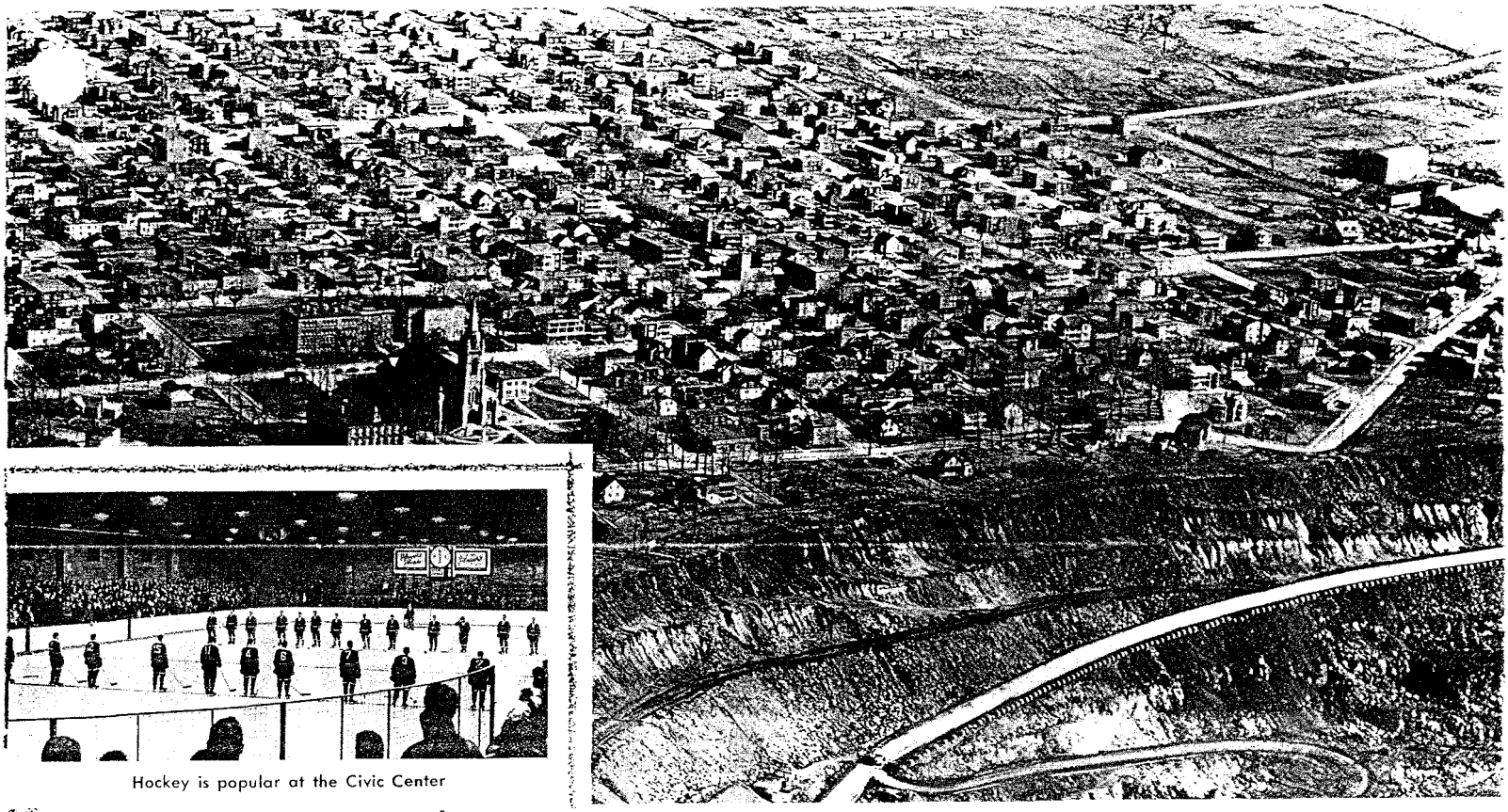
Just what sort of a place is this modern asbestos mining town? First of all, perhaps, it is a city of homes—more than 1500 of them, to be precise. Most are individually owned. Asbestos naturally has its churches and schools, its movie theaters, and its paved streets and other civic improvements one expects to find in any modern community. Many of its citizens are either active participants in, or followers of, competitive sports and the city is justly proud of its fine Civic Center which houses



How It was Named . . .

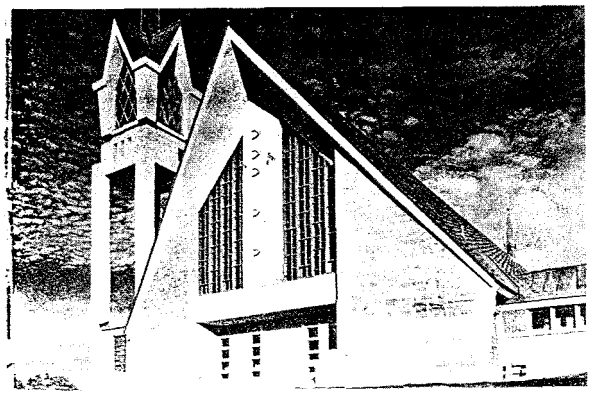
The little mining town that grew up on the edge of the Jeffrey mine was nameless for a number of years. Eventually a post office was established and the first postmistress, Mrs. Church, decided it would be fitting to name the town after the mineral that was responsible for its being. So it became Asbestos.

sbestos mining town



Hockey is popular at the Civic Center

The company-operated hospital and clinic



One of the community's attractive churches

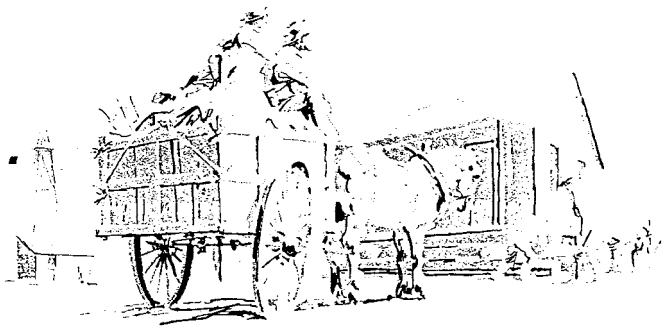
a skating rink, and its Athletic Association building which includes a rifle range, bowling alleys, a well equipped gymnasium and a spacious auditorium. There is also a municipal swimming pool and a 9-hole golf course for the use of those who enjoy the game.

The cultural life of the community includes a lively interest in music and Asbestos can boast of a splendid band of more than forty pieces which is generally rated as one of the best in the province. A series of weekly concerts is given each summer, in true Canadian-American tradition.

All in all, Asbestos, Quebec, is not unlike many other cities of its size in Canada and the United States. Which is equal to saying that it is a friendly, progressive and thriving community whose ten thousand people live and work together as good citizens and good neighbors.

Too Close for Comfort...

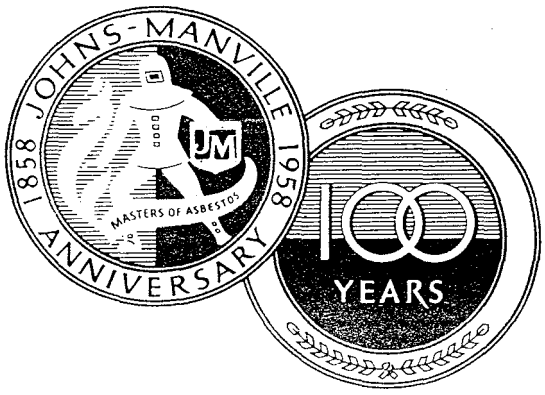
Some years ago, the people of Asbestos learned that their city had grown up a little too close to the mine for comfort. The business section was located on part of the deposit! So it was moved to another spot to enable the miners to reach the valuable fibres which nature had placed in the underlying rock.



when you think of asbestos...

you think of

Johns-Manville



100 years of J-M growth

The 100-year history of Johns-Manville has been one of ceaseless invention and improvement of products designed chiefly for controlling heat, cold, sound and motion and for providing protection against fire, weather and wear.

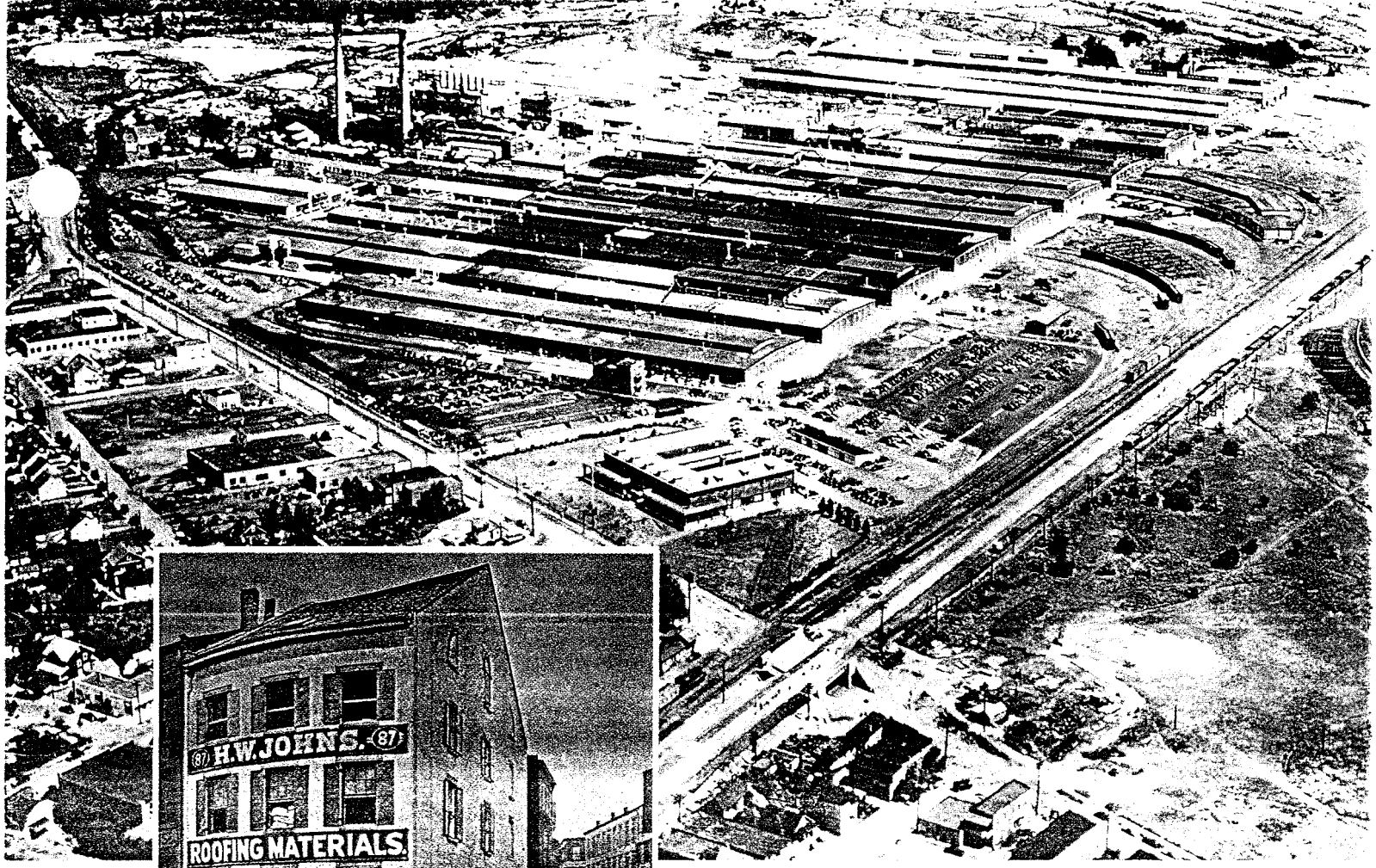
For a full century Johns-Manville has been a leader in the creation of better homes and greater industrial efficiency through the application of science.

The company as it is known today was founded in a New York basement in 1858 by H. W. Johns. A pioneer in roofing and insulating products, Johns was a founder of the modern asbestos industry.

In those days there were two men on the payroll and their "research" equipment consisted of a clothes wringer and a tea kettle with a flattened spout. With only this equipment, Mr. Johns was able to make his first asbestos roofing out of manila paper, burlap, asphalt and asbestos fibre.

This work with asbestos was suggested to Mr. Johns by a bit he read about the mineral in the American Encyclopedia. The article said:

"ASBESTOS: a mineral of the hornblende family which occurs in veins in the serpentine and primary formations. Cloth made of this mineral is not affected by any degree of heat and may be thrown into the fire with no other effect than cleaning it.



This plant at Manville, N. J. is one of 26 operated by the company today

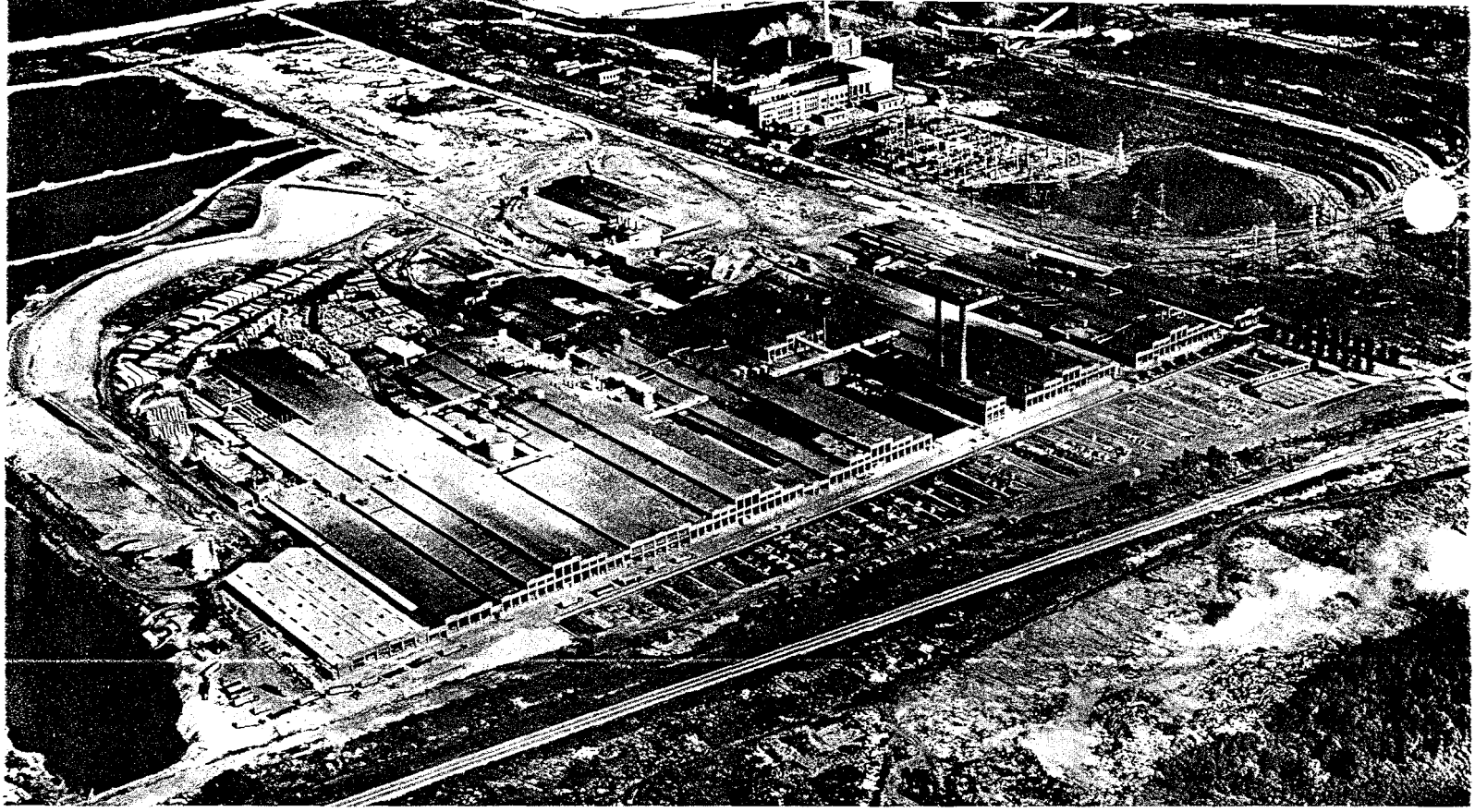
Birthplace of an industry—the New York store of H. W. Johns

Such cloth was used by the ancients in which to wrap bodies of the illustrious dead on the funeral pyre for preserving their ashes. The mineral is abundant in this country and on Staten Island in New York harbor it is found in bundles of fibre resembling dry wood. Asbestos has also been used for the lining of fireproof safes and as a filter for chemical purposes. *It is, however, in very little demand although it is by no means a rare mineral."*

Mr. Johns accepted that last sentence as a challenge. His active mind constantly was conceiving new ideas for the use of asbestos. All these ideas he would jot down in a little black-backed notebook. Time would not permit him to develop all of them. Later, when a new patent was issued to someone else, he sometimes would take out this little notebook and say to his wife:

"I jotted down the germ of that idea long ago but never worked it out."

The Manville family entered the picture in 1886. In that year C. B. Manville with his three sons—T. F., C. R., and H. E.—founded the Manville Covering Company in Milwaukee. This company produced various types of pipe coverings and other insulations for plumbing and heating systems, but their line did not include asbestos materials.



The Johns-Manville plant at Waukegan, Illinois

One of their first products was a mixture of blue clay and a paper pulp mash. It was highly effective as an insulator for steam pipes, although the odor the vegetable matter in it gave off when heated was highly undesirable.

Later a wool shoddy was added as a binder to hold the blue clay together. This product became widely known as Manville's Sheep's Wool Cement.

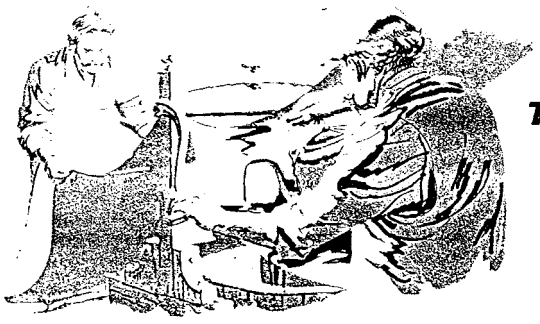
Meanwhile, Mr. Johns had been developing new uses for asbestos for a number of years. While he was opening up a market for his products, the Manville Company was expanding in the Midwest. With rapidly changing industrial production methods came a demand for higher-temperature insulations. This led to an arrangement by which the Manville Covering Company took over the Chicago branch of the H. W. Johns Manufacturing Company, which handled the rapidly developing asbestos products for high-temperature insulations.

In 1901, three years after the death of Mr. Johns, the Manville Covering Company of Milwaukee was merged with the H. W. Johns Manufacturing Company of New York, under the firm name of H. W. Johns-Manville Company. At that time the sales volume was about $3 million a year.

During the next quarter of a century expansion was rapid. The asbestos mine in Asbestos, Quebec, from which the company had been purchasing asbestos fibre for a number of years was acquired. The company grew and prospered and earned a nation-wide reputation for its products. By 1927 its sales volume had grown to more than $40 million.

In 1925 T. F. Manville, president, died and plans to reorganize the company were launched.

Until 1927 the company had been a closely held "family" enterprise. In that year it was reorganized and became a company of widespread ownership with many new stockholders from all parts of the country. It then became known as Johns-Manville Corporation.



Two Men and a Clothes Wringer . . .

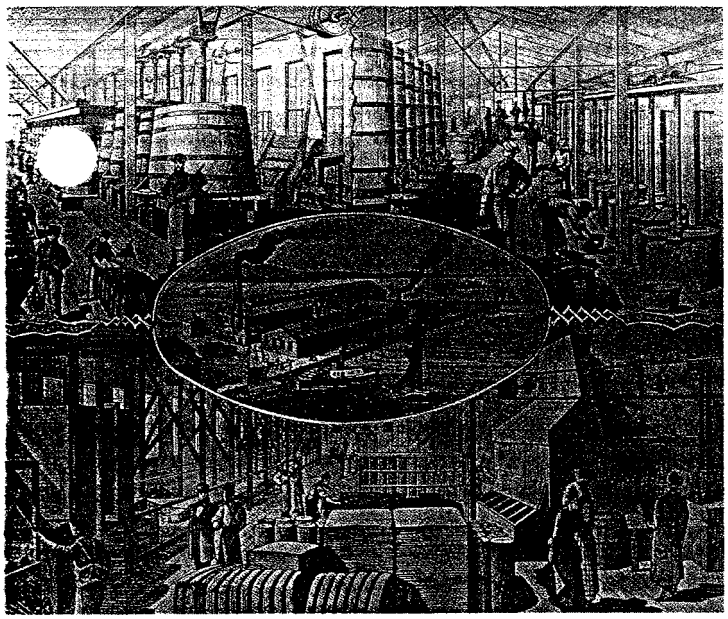
Undoubtedly the first "pilot plant" for testing the practicability of an asbestos product was the famous clothes wringer of H. W. Johns. With this crude device and the help of an assistant, the man who pioneered in putting the magic mineral to work succeeded in producing the first successful asbestos roofing.

At about the time that Johns-Manville passed to public control in 1927, T. F. Manville's son—"Tommy"—disposed of the large holdings he had inherited from his father and ended all connections with the company.

In 1927 Lewis H. Brown came to Johns-Manville as assistant to the president. From 1929 to 1951 he was J-M's chief executive officer, as president from 1929 to 1946 and as chairman of the board from then until his death in 1951.

L. M. Cassidy, who had served the company since 1926, succeeded Mr. Brown. He in turn was succeeded in 1957 by A. R. Fisher, the present chairman, whose J-M career had started in 1923.

Johns-Manville up to 1946 had two distinct periods in its 88 years of existence—the period of closely held private ownership up to the 1920's and the period of widespread ownership since that time. What may be described as the third period in the progressive history of the company began with the start of a long-term improvement and expansion program at the end of World War II.



This 1881 woodcut depicts scenes in H. W. Johns' Brooklyn factory

To give impetus to this program, Johns-Manville, in 1946, announced reorganization of the production and sales activities of the company into six streamlined operating divisions to function virtually as independent businesses.

These divisions were the Building Products Division, Industrial Products Division, Celite Division, Asbestos Fibre Division, Canadian Products Division and International Division. The following year the Dutch Brand Division was added.

Operations were further streamlined late in 1955 to keep abreast of the company's continued expansion and diversification. At that time the Industrial Products Division was reorganized and expanded into three separate divisions—the Industrial Insulations Division, the Pipe Division, and the Packings and Friction Materials Division.

By the end of 1957 more than $220 million had been invested in new plants, equipment, modernization and replacement in the postwar expansion program.

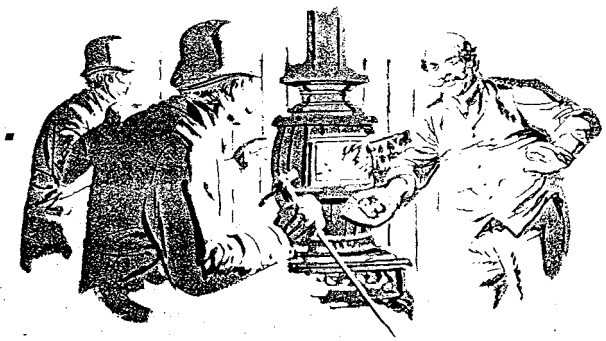
Entirely new plants have been built since World War II at Denison, Texas; Klamath Falls, Ore.; Natchez, Miss.; North Bay, Ontario; Savannah, Ga.; Stockton, Calif.; Tilton, N. H.; and Toronto, Ontario. Additional plant facilities have been added at Lompoc, Calif.; and Marrero, La.

Through acquisition of other companies, plants have been added at Chicago, Illinois, and New Brunswick, New Jersey.

Asbestos mining operations at Asbestos, Quebec, have, for the most part, been changed over from open-pit to underground, and a huge new mill has been constructed. A second asbestos mine has been opened up near Matheson in Northern Ontario.

And there have been constructed near Manville, N. J., Research and Engineering Centers providing the largest facilities in the world devoted to research on building materials, insulations and allied industrial products, and for the design of special engineering equipment and facilities needed for manufacture of new and improved products.

The Merchant-Magician . . .



A dramatic demonstration of the fireproof qualities of asbestos frequently occurred in the store of H. W. Johns. Wearing asbestos mittens, Johns would amaze his customers by drawing out a handful of red-hot coals from the stove, later displaying both hands and mittens to show that no damage had been done to either.

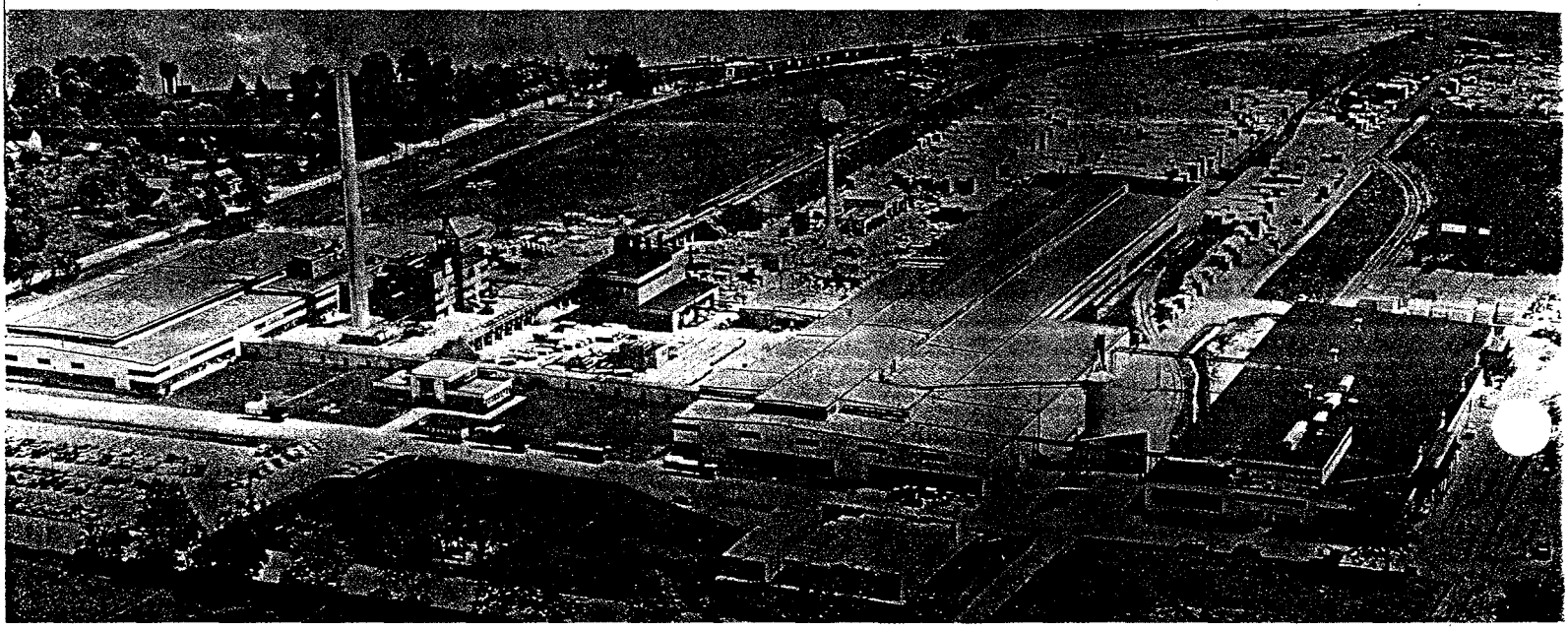
A new era of product line expansion followed the reorganization in 1927. Before that time the company's principal basic raw materials were asbestos fibre, asphalt and cement. Since then Johns-Manville has added wood fibres and mineral fibres as well as diatomite, rubber, plastics and other raw materials for the widely diversified line of J-M products. Mineral wool insulations, insulating board products, tapes, Celite® (diatomite) products and Transite® (asbestos-cement) pipe are some of a number of important additions to the line since 1927.

Johns-Manville has become not one but a combination of some twenty-two different businesses. the market for one or another particular line of products might be temporarily depressed.

In 100 years of progress Johns-Manville has grown from a company with two men on the payroll to an organization of more than 21,000 men and women, of whom more than 1,600 have served the company for twenty-five or more years.

From a basement beginning, the company's extensive mining and manufacturing and other properties and assets have grown to represent an investment, after depreciation, of more than $200 million. Sales exceed $300 million annually.

From a closely held "family" organization in 1927



The Johns-Manville plant at Toronto, Ontario is one of three which serve the company's Canadian customers

Today, Johns-Manville manufactures more than four hundred different lines of products. There are twenty-six J-M plant and mine locations in the United States and Canada.

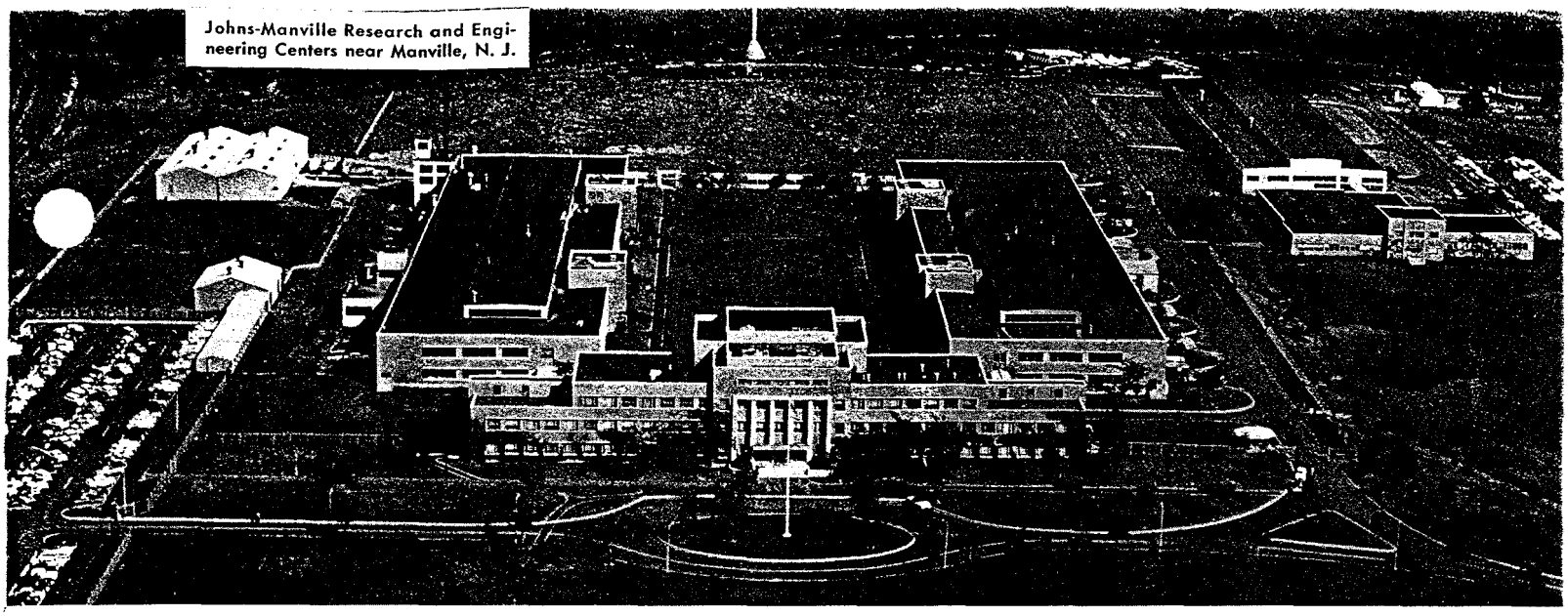
Serving essential needs of nearly every industry, these products are marketed through far-flung sales organizations and through many thousands of dealers and distributors in the United States and Canada and throughout the free world.

This diversification has been carefully planned to give the company greater stability in times when the company's ownership has been broadened and Johns-Manville is now owned by more than 19,000 stockholders.

The company typifies the kind of industrial achievement which can come about only through the invested savings of thousands of men and women who have faith in enlightened capitalism combined with the loyal service of other thousands of men and women who make careers in creating products and providing services which contribute to the public welfare.

Dutch girl joins the family . . .

The familiar Dutch girl, trade mark of Dutch Brand products, joined the J-M family in 1947 as part of Johns-Manville's post-war expansion program. Dutch Brand products include many different kinds of industrial and household tapes, automotive rubber products and rubber cements.



Johns-Manville Research and Engineering Centers near Manville, N. J.

research and engineering

will shape the next 100 years

Research by Johns-Manville—long known for scientific accomplishment in the control of heat, cold, sound and motion, and in arresting the destructiveness of fire, weather and wear—enters its second century of service to home and industry.

Symbolizing this service is the Johns-Manville Research Center near Manville, New Jersey, providing the largest research facilities in the world devoted to building materials, insulations and allied industrial products.

A J-M technician at the electron microscope, which can magnify 100,000 times

Long before industrial research became a standard operating procedure in American business, H. W. Johns, a founder of the company, was busy experimenting in his small New York basement shop.

In the 100 years since 1858, Johns-Manville has been a leader in the development of new and better products for home and industry. The Research Center is dedicated to a broadening of this service. From it will come the new ideas and the improvements on old ideas which will greatly increase Johns-Manville's contribution to better living in the next 100 years.

Nearly a century ago Mr. Johns laid down a fundamental policy. It was:

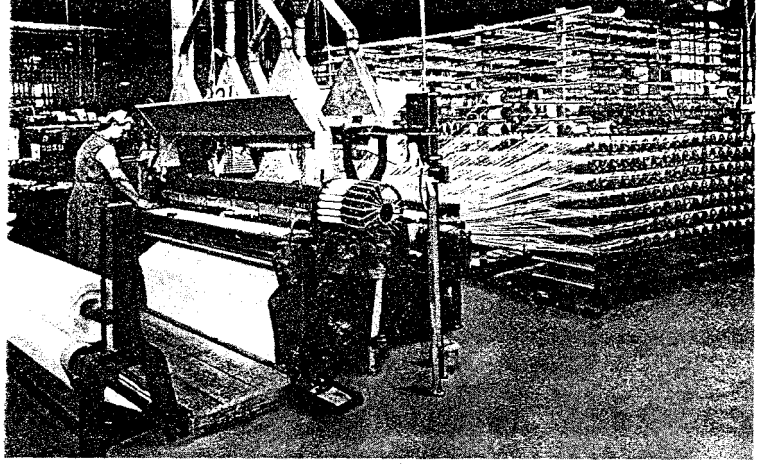
"We promise and claim less than many others but shall endeavor as heretofore to furnish the best materials of the kind and to make every resource available for their improvement."

This is the tradition of Johns-Manville research and the principle upon which it has been built.

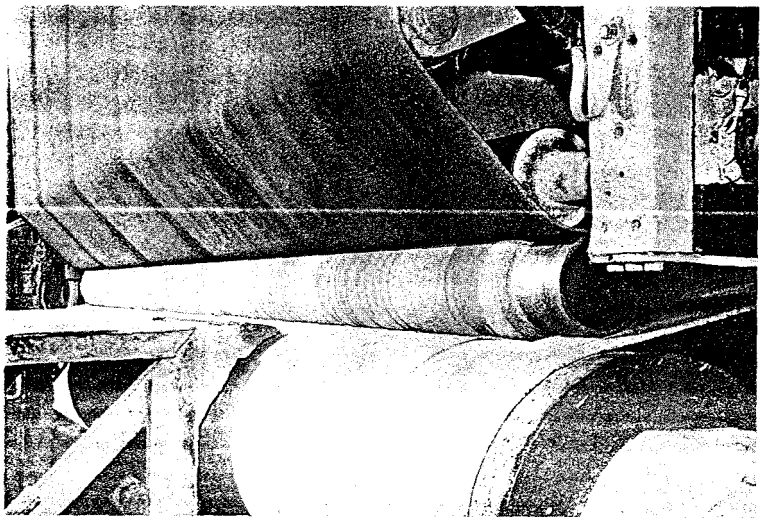
Today, countless new developments in Johns-Manville's many fields are beckoning; other fields of service and products as yet undreamed of are awaiting discovery.

Product development pays off...

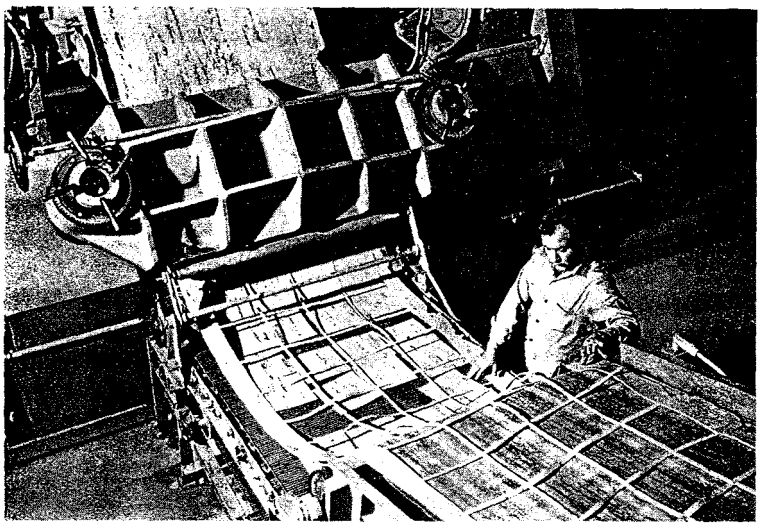
Results obtained from J-M's continuing product development program are typified by Seal-O-Matic® shingles. These patented asphalt shingles, which have proved to be best sellers, seal themselves down thru the sun's heat by means of a special ribbon of cement on the under side. Hurricane force winds do not dislodge them.



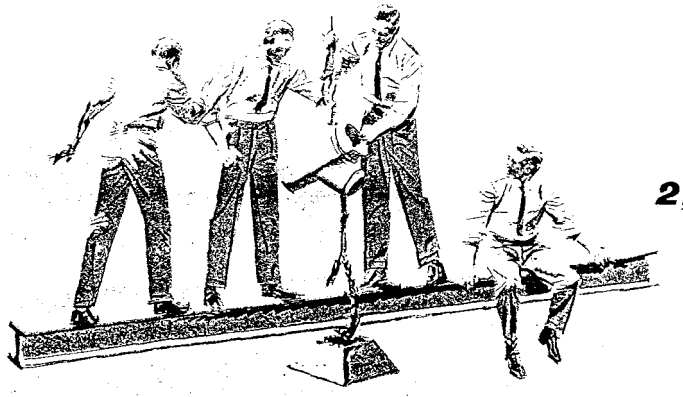
On looms like this, asbestos yarns are woven into fireproof asbestos cloth



The fibres are united with portland cement to form strong rustproof Transite pipe



Here, long-wearing floor tiles are produced from asbestos and vinyl resins



how Johns puts the magic

What do we do with asbestos fibres when they are received from the processing mill? How are their unusual properties utilized to make existing products better and to create new and improved ones?

The illustrations on these pages provide a partial answer to such questions, but a word of explanation will help to a better understanding of the many ways in which nature's magic mineral is put to work.

combined with portland cement

Because of their great strength, asbestos fibres find their most important use as a reinforcement in combination with other raw materials. The manufacturer of building products combines them with portland cement under heavy hydraulic pressure to produce structural building boards that are outstanding for their strength and durability. Strong, corrosion-resistant Transite® asbestos-cement pipe, the familiar "white pipe" of many uses, is also produced in this way. The reinforcing network of countless numbers of tiny, yet amazingly strong, asbestos fibres imparts to each of these products a tensile strength which is many times greater than that possessed by conventional concrete products of equal thicknesses.

and with other raw materials

In a similar manner, asbestos fibres lend their remarkable reinforcing properties to products made of plastics. Vinyl asbestos floor tiles, with their rugged wear resistance, are a typical example. Asbestos is also united with other minerals such as diatomite and

2,000-pound pull . . .

In ten month's time a one-ton weight hanging from a J-M Transite® (asbestos-cement) sewer pipe "Y" fitting failed to pull it apart. Transite pipe was introduced in the United States by Johns-Manville in 1929. Seven J-M plants now produce this pipe. It is used in industry, in the home, on farms and in thousands of municipalities.

Manville mineral to work

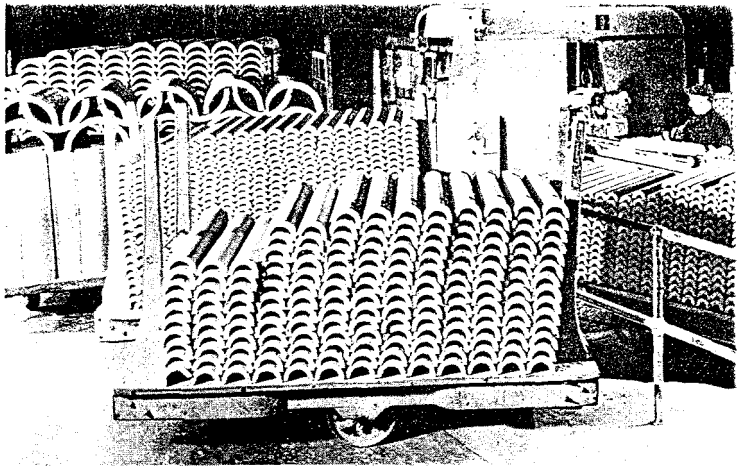
magnesia to produce many specialized products in the field of high temperature insulations. These take a variety of shapes and forms, including pipe and block insulations and a light weight, yet structurally strong insulating panel called Marinite®.

asbestos textiles

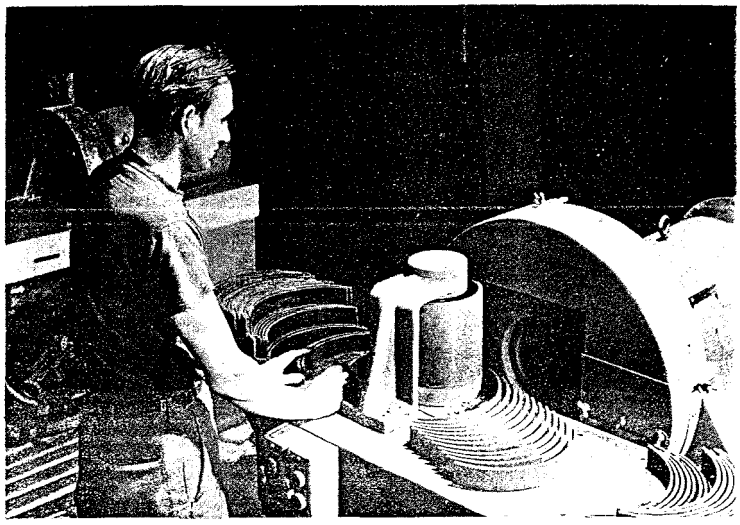
Their great strength, coupled with their unusual fineness and exceptional flexibility also adapt asbestos fibres to the spinning process. Like cotton and other natural fibres, they are readily spun into yarn and woven into cloth. But unlike textiles made from most other fibres, these asbestos textiles are fireproof, rotproof, and capable of withstanding high temperatures. When combined with metal and with rubber and other impregnants and binders, they become important components of such useful products as brake linings and industrial packings and gaskets.

asbestos paper products

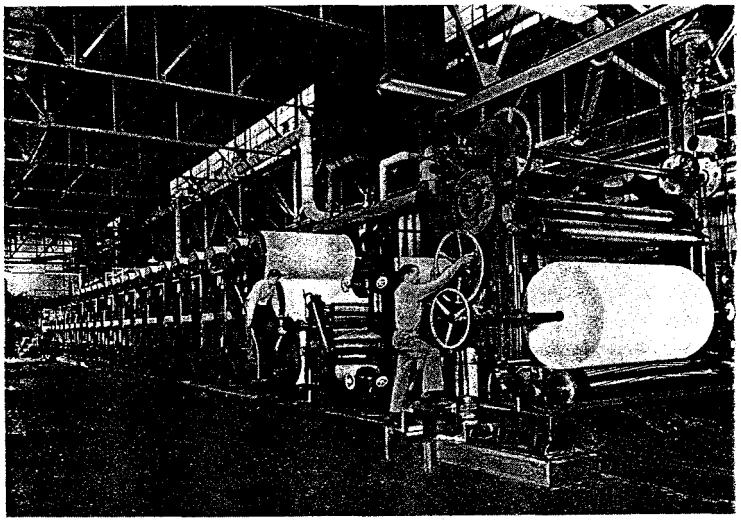
Just as asbestos fibres can be made into textiles by standard processes, so, too, can they be felted to produce paper. Asbestos papers are made in much the same manner as wood fibre paper, but here the basic ingredient is asbestos instead of wood pulp. The products that come from asbestos paper machines include tissue-thin electrical insulations, as well as heavy sheets that are more than one-half inch in thickness. Special asbestos papers are impregnated with asphalt to form roofing felts. These felts are used in the fabrication of weather-resistant built-up roofs for industrial and commercial buildings.



These asbestos-reinforced pipe insulations are tougher, stronger, more efficient

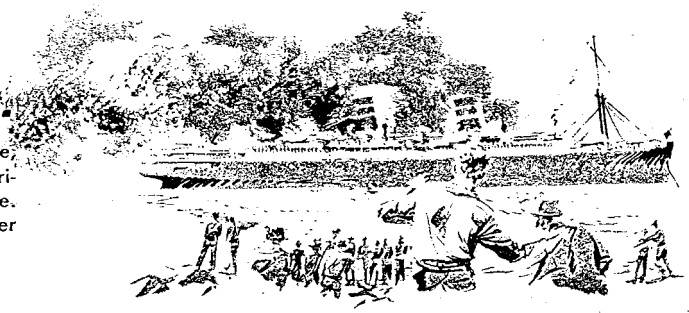


Heat resistant asbestos fibres are important components of brake linings

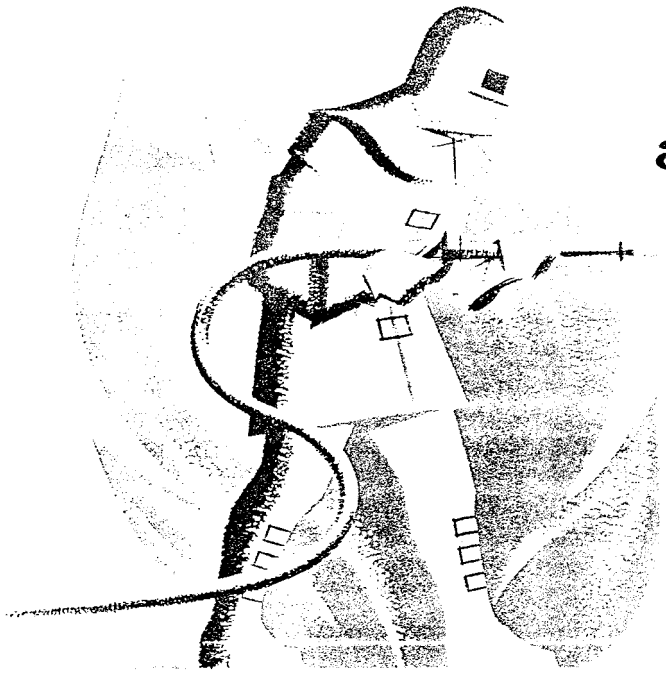


Asbestos papers made on this machine are used in roofing, and pipe line felts

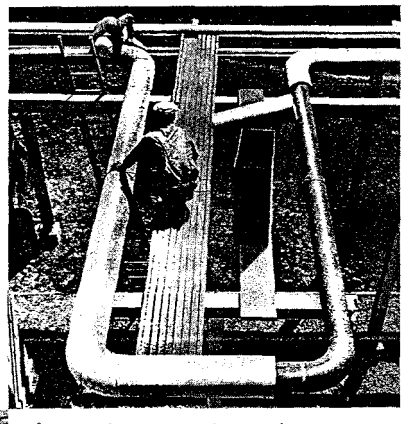
Disaster at sea . . .



The terrible fire aboard the *Morro Castle* in 1934, with great loss of life, hastened research work by J-M which resulted in the development of Marinite® a light-weight, fireproof joiner material made of asbestos and diatomite. All walls, partitions and ceilings on the S.S. *United States* and many other American built vessels are Marinite.



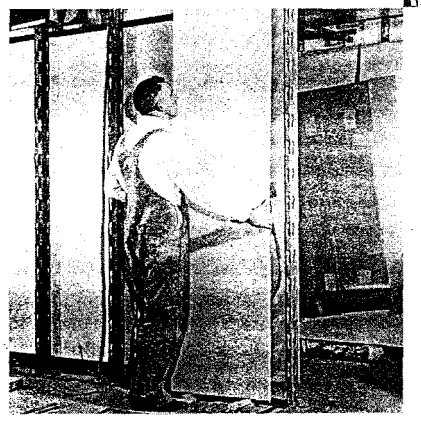
asbestos products



As heat-conserving insulations

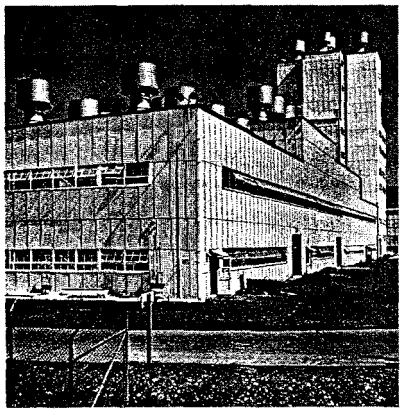
As modern water and sewer mains

As long-wearing office floors



As movable office partitions

As rotproof built-up roofings



As a maintenance-free siding

One hundred years ago, the mineral asbestos was virtually unknown to industry. Today, it is not an overstatement to say that asbestos products serve *all* industry.

They contribute to the efficiency of office and factory as long-wearing tile floors that are quiet and comfortable to walk on...as acoustical ceilings that help reduce unwanted noise ... and as convenient movable partitions that can be taken down and relocated whenever the need requires.

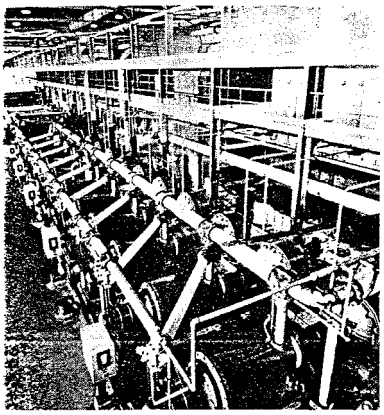
On the exteriors of industrial buildings of many types, asbestos products serve as durable sun-resistant built-up roofings and, in the form of corrugated asbestos-cement sheets, as a fireproof, rustproof siding material that is practically indestructible.

Another asbestos-cement product, Transite pipe, plays an important role as the underground water and sewer mains in both mu-

The Man in the Asbestos Suit . . .

Perhaps you have never seen him, but he is a familiar figure wherever fire-fighting risks require the protection of asbestos safety clothing. Welders, foundrymen and blast furnace operators also depend on asbestos garments to protect them against extreme heat, flame, sparks and other hazards.

...ve throughout industry



As piping for process lines

As a protective cable housing

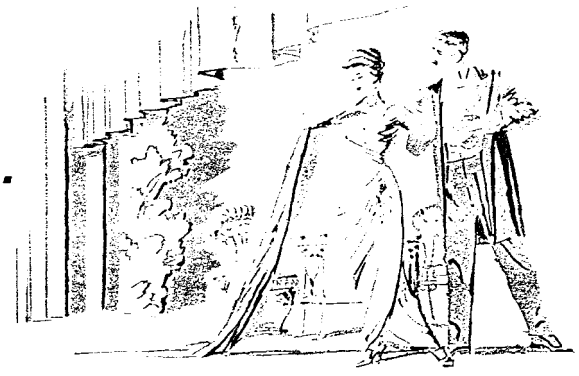
As efficient packings and seals

nicipal and industrial systems. Non-metallic and therefore immune to rust and highly resistant to corrosion, this pipe also has many applications as a carrier of industrial processing liquids. A related product, Transite ducts, serves a more specialized field as a protective housing for the underground cables of electrical distribution systems.

The electrical equipment industry has for many years depended on fireproof, heat-resistant asbestos textiles for insulating conductors that range from fine gauge wires up to heavy cables. Asbestos papers serve here, too, their development as tissue-thin insulations being responsible for increased service life of such equipment as electric motors, generators and transformers. Heavier asbestos papers, asphalt impregnated, protect thousands of miles of the underground metallic pipe lines that carry petroleum products and natural gas.

In the power plant, efficient high temperature insulations made with asbestos keep valuable heat where it is needed, thereby reducing industry's fuel bill millions of dollars each year. In such fields as petroleum processing, where even higher temperatures prevail, other asbestos insulations assure the accurate heat control so vital today in many processing operations.

Modern industry could scarcely function without asbestos friction materials, which, as brake linings and clutch facings, control the motion of power shovels, hoists, trucks and other heavy industrial machines. Nor could it get along without asbestos packings and gaskets, those indispensable companion products which, by providing the seals that prevent leakage of steam, air, water and other liquids and gases, help assure the steady, uninterrupted flow of industrial production.

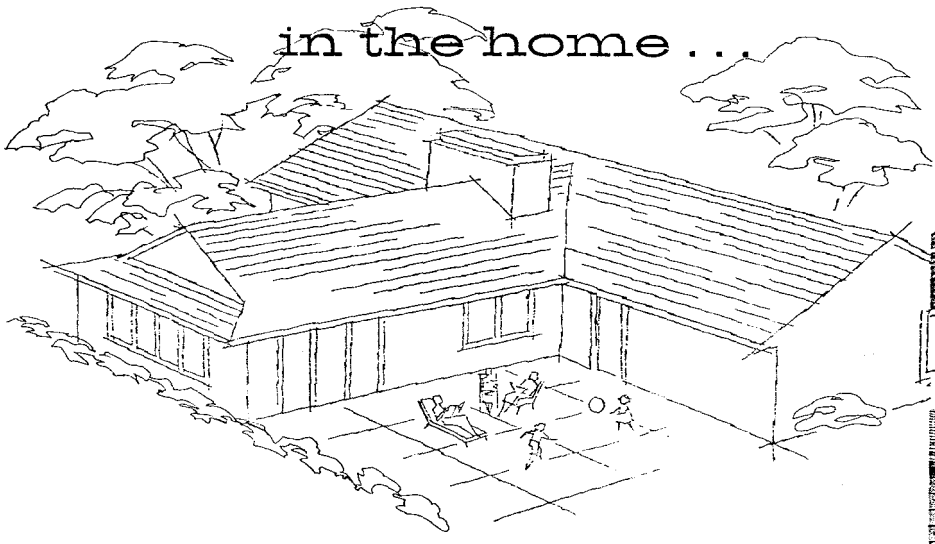


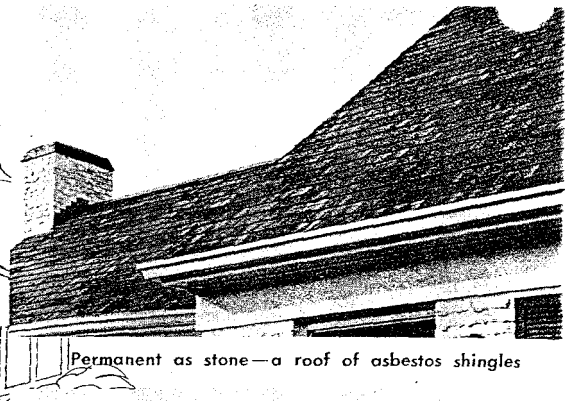
When the Curtain goes up . . .

. . . it is almost sure to be a fireproof *asbestos* curtain. That's because fire regulations in nearly all communities require it as protection against the spread of backstage fires. Theater curtains are one of a great number of useful things that are made of asbestos cloth and other fireproof asbestos textiles.

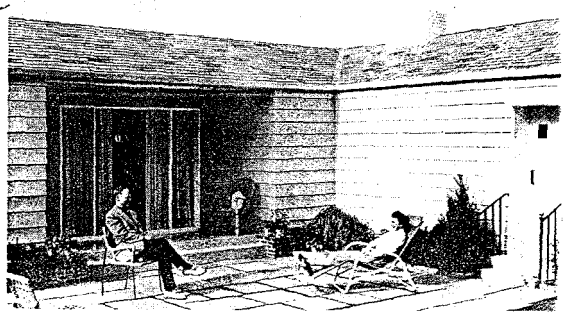
how asbestos products c

in the home . . .





Permanent as stone—a roof of asbestos shingles



Colorful asbestos sidewalls add charm to any home

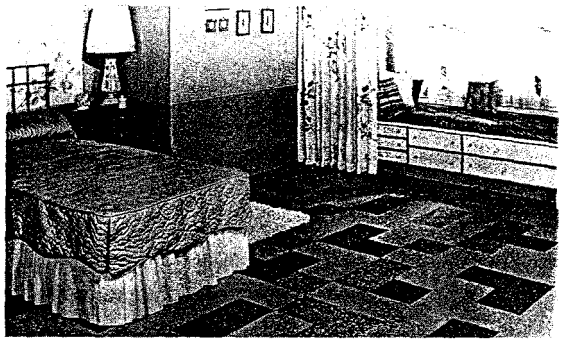
From basement to attic . . . from roof and exterior sidewalls to finished floors, walls and ceilings, asbestos building products make many important contributions to better living in today's homes.

For example, those smartly styled asbestos roofing and siding shingles one sees on so many attractive homes are fireproof, have the permanence of stone, and are virtually maintenance-free.

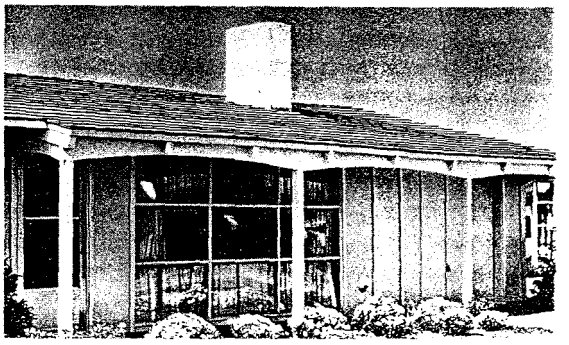
And those glamorous vinyl asbestos tile floors that make rooms so bright and cheerful with their beautiful clear colors—they, too, are a source of lasting satisfaction and pride.

Flexboard® is another asbestos product that figures importantly in the homes of today. This flexible asbestos-cement board can be sawed and nailed like lumber and even fitted to curved surfaces. It makes economical, easy-to-erect walls and ceilings; in the popular "board and batten" construction, it also serves as the exterior sidewalls for many of today's finest homes.

No discussion of asbestos building products would be complete without mentioning the family of Transite pipes for the home. Serving as a building sewer pipe for conveying sewage to the street sewer or the septic tank, as a pipe for venting gas-burning appliances, and as a duct for heating and cooling systems in homes built on poured concrete slabs, each of these durable, rustproof asbestos-cement pipes makes its own special contribution as a safeguard to the comfort and livability of the modern home.



Beauty without bother—a floor of vinyl asbestos tiles

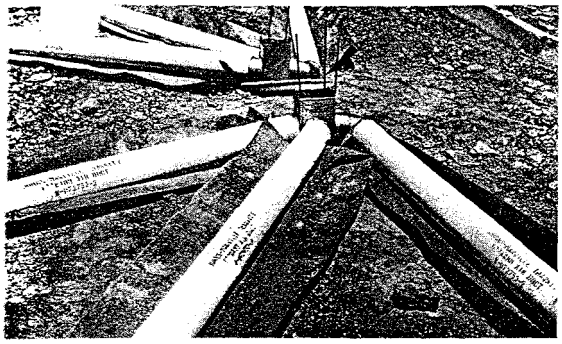


Flexboard sidewalls reflect the modern in home design

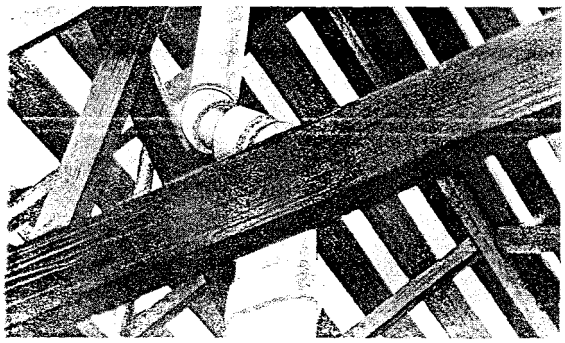
An Invisible Servant . . .

In addition to its visible uses mentioned above, asbestos also serves in our homes in unseen ways. In textile form, it insulates the heater cord which we plug in for our morning coffee . . . the heating elements of our electric toaster and electric range . . . the electric blanket that keeps us snug on cold winter nights.

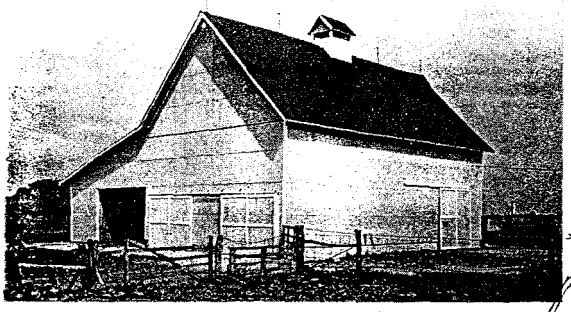
ɔntribute to better living



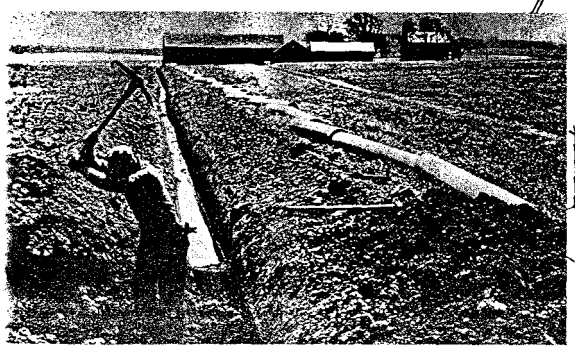
Heating system ducts of strong, durable Transite



Transite pipe also serves as a vent for gas appliances



Asbestos cement sheets reduce farm building upkeep



Transite pipe brings water to the farm—economically

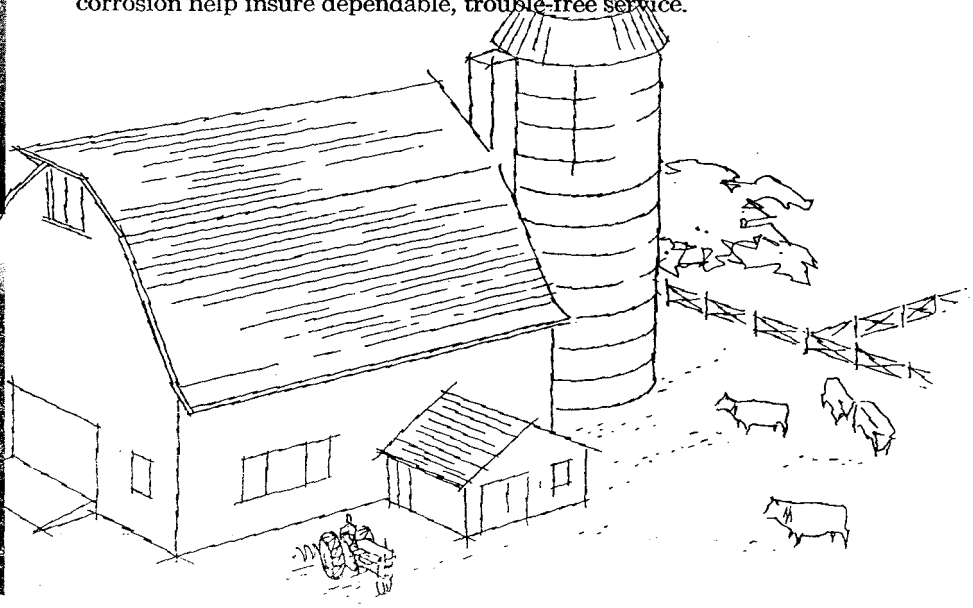
on the farm . . .

There was a time when building deterioration and upkeep were problems with which every farmer had to contend. That day is now largely past for the farmer whose buildings are protected by asbestos.

The modern farm building, with its roof of asbestos shingles or asbestos roll type roofing and its exterior sidewalls of Flexboard is no longer an easy prey to weather because these asbestos building products are immune to rot, rust and decay. Just as important, they provide the fire protection to building exteriors which the farmer cannot afford to be without.

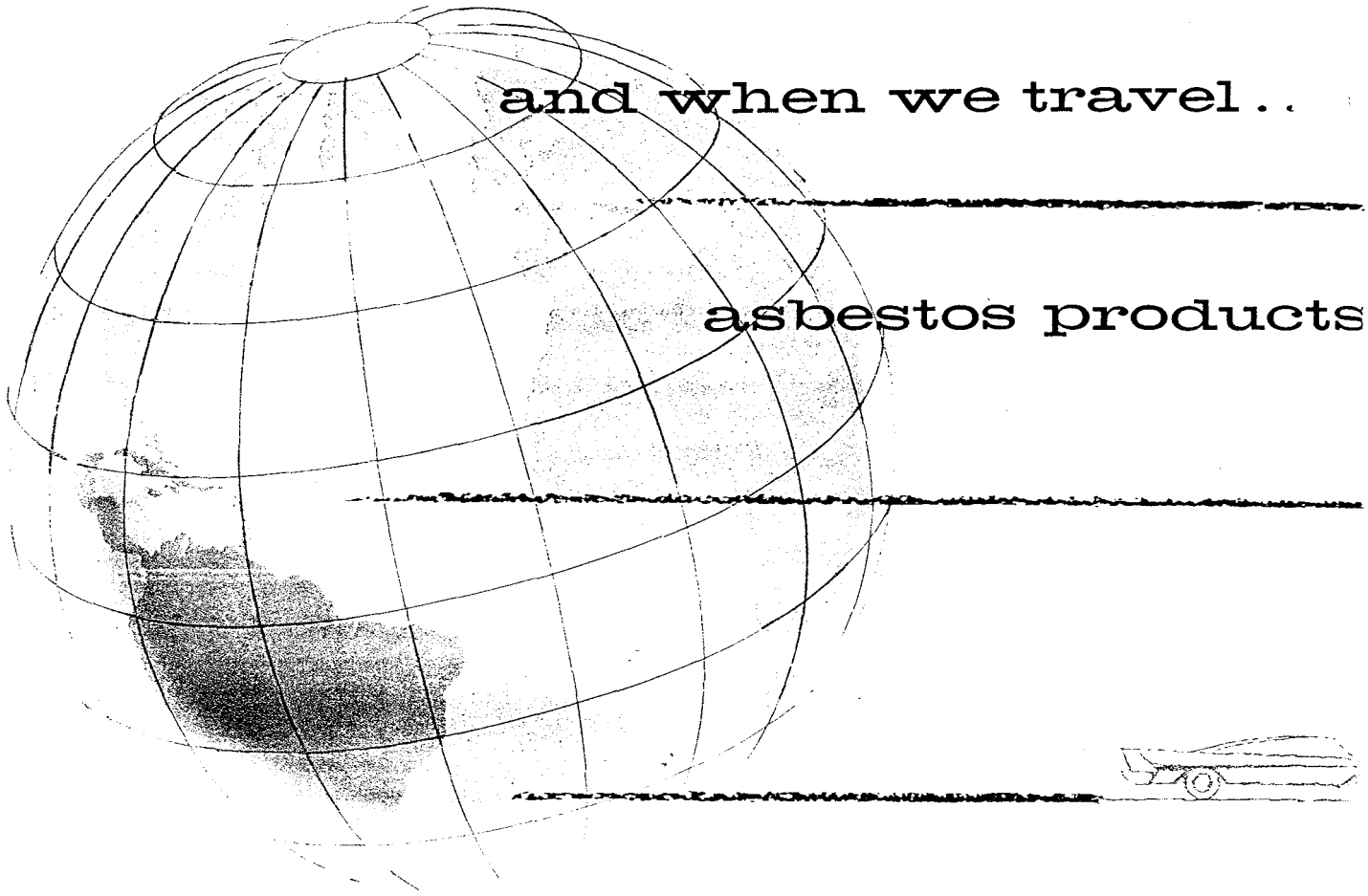
Asbestos products also provide the answer to problems of sanitation and maintenance of farm building interiors. As a lining for dairy barns and milkhouses, for example, asbestos-cement Flexboard has proved to be one of the most practical and economical materials ever developed. Its hard smooth surfaces are sanitary and easy to clean; its stonelike durability is assurance of low upkeep expense.

Bringing water to the farm is another essential service which is performed better with the help of asbestos. Here Transite asbestos-cement pipe contributes both to economy of operation and maintenance. The smooth interior surface of the pipe helps keep pumping costs to a minimum, while its immunity to rust and resistance to corrosion help insure dependable, trouble-free service.



A Cool Smoke . . .

During the first stages of its commercial development, the magic mineral was utilized in many unusual ways. One of the strangest was an asbestos tobacco mixture which, according to a contemporary account, was "very cool to smoke." The inventor was obviously unaware of the fact that asbestos cannot burn.



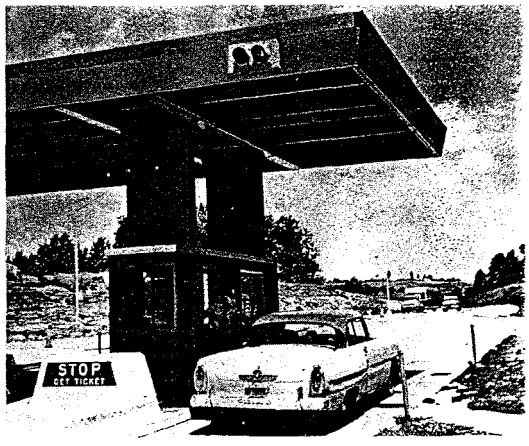
and when we travel . .

asbestos products

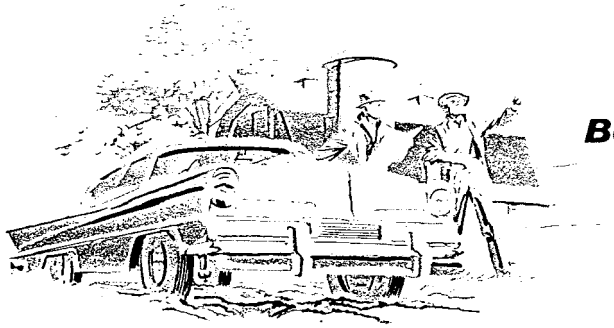
We who live in a travel-minded age are fortunate in having a choice of conveyances to take us wherever we want to go. Regardless of which one of these we choose, asbestos products are ready to help speed us on our way in safety and comfort.

If we go by car or bus, asbestos brake linings bring us to a safe, sure stop. It is significant that almost from the beginning, motor car manufacturers have depended exclusively on brake linings made of asbestos for this vitally important job. The reason is, that only asbestos can successfully absorb the destructive frictional heat generated by the stopping of a fast-moving vehicle.

If we travel by air, parts of our plane are shielded from the engine's searing heat by firewall seals made of asbestos cloth; spe-



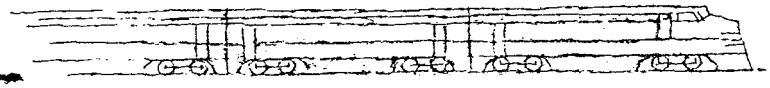
Asbestos protects your safety on the road



Better Undercoating for Your Car . . .

The underbody coating that protects your car from rust and corrosion is one of many products of its type that does a better job when asbestos fibres are used as a reinforcement. Mixed with the asphalt compound, they toughen the film, giving it greater resistance to the impact of stones and sharp objects.

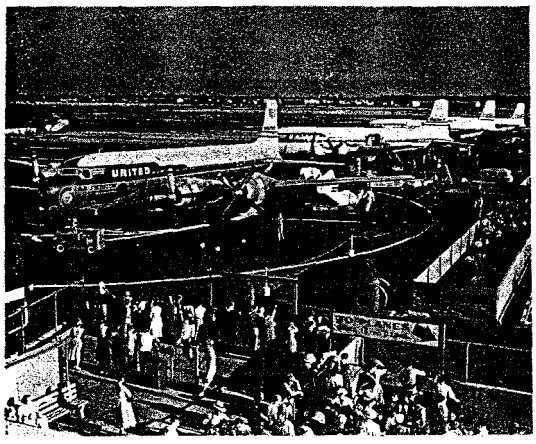
help assure our safe arrival



cially designed asbestos gaskets seal and protect the engines and accessories; and other components are insulated and fireproofed with asbestos textiles in tape and tubular sleeving form.

Our journey by train is made more comfortable by jacketed asbestos insulations that cover the steam pipes of the heating system, and we ride in modern coaches that have quiet, comfortable floors of vinyl asbestos or asphalt-asbestos tiles. The diesel-powered locomotive that whisks us along also depends on asbestos—in the form of gaskets and packings that contribute to its efficient performance.

When we travel by water, our ship is safer because of asbestos. To meet rigid Coast Guard requirements for fire-safety at sea, all American passenger ships are constructed with firescreen bulkheads, or partitions, of Marinite, the fireproof structural insulation made of asbestos fibres combined with diatomite. It is largely because of this built-in safety feature that American ships are today universally considered the safest afloat from the standpoint of fire protection.



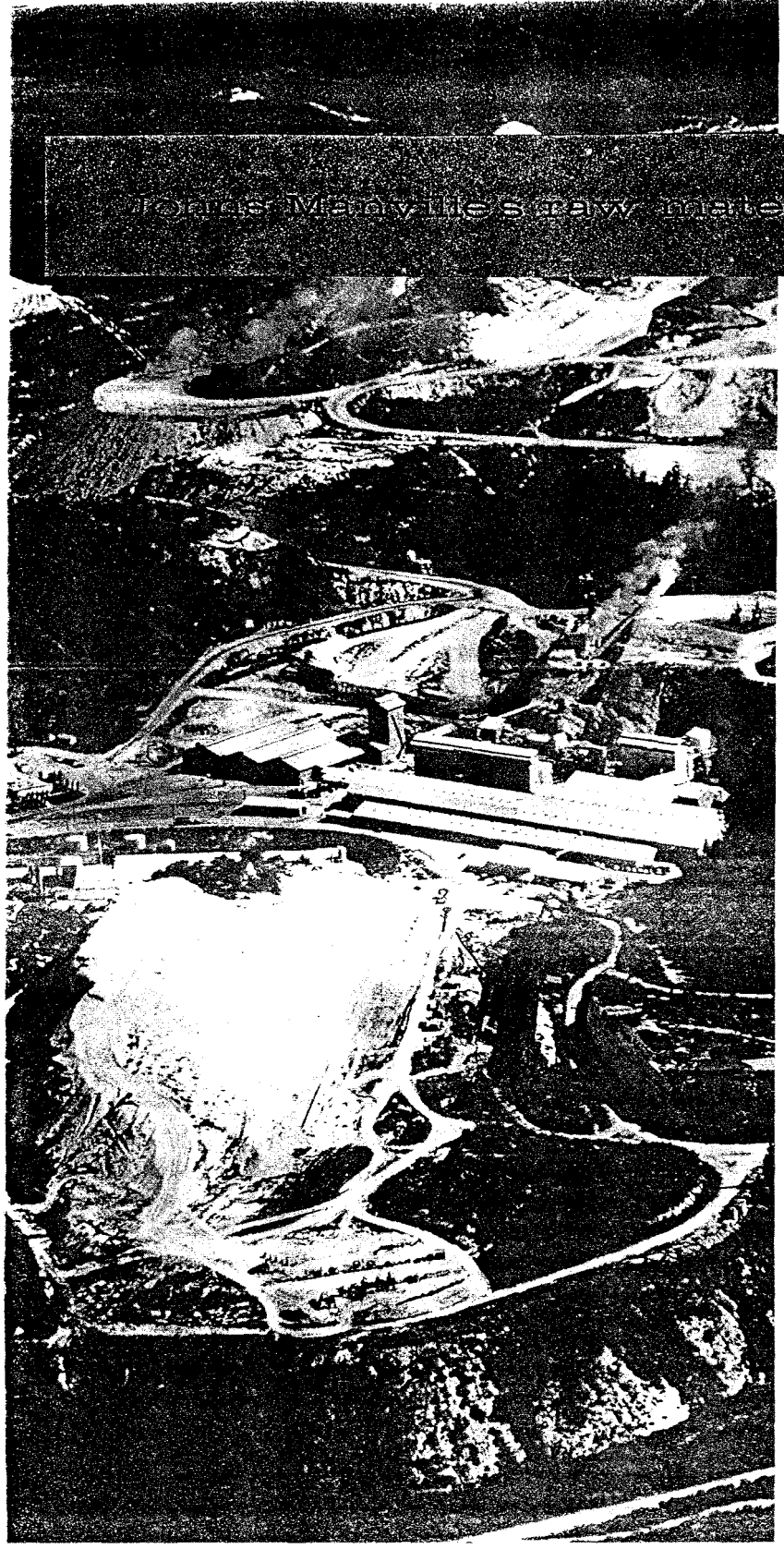
. . . shields your plane from destructive heat

. . . makes your train ride more comfortable

. . . guards your ship from the hazards of fire

Balloon Travel, circa 1850 . . .

Back in the nineteenth century, asbestos served still another means of travel when it was used to construct a fireproof balloon. This predecessor of modern flight was inflated by lighting a spirit lamp attached to the neck. It was claimed that it could be raised or lowered simply by turning the lamp up or down.



The Johns-Manville Celite plant and a portion of the diatomite deposit at Lompoc, Calif.

Johns-Manville's raw materials in abundant supply

Of the many raw materials which go into Johns-Manville's diversified lines of products, four stand out in importance. These are: ASBESTOS FIBRES . . . the story of which is given in the first section of this book . . . DIATOMITE . . . WOOD FIBRES . . . MINERAL FIBRES. Assured sources of these raw materials place the company in an unusually strong position for many years to come. Asbestos and diatomite supplies are owned by J-M. Timberlands are either owned or controlled under long-term contracts. Raw materials for production of mineral fibres are abundant.

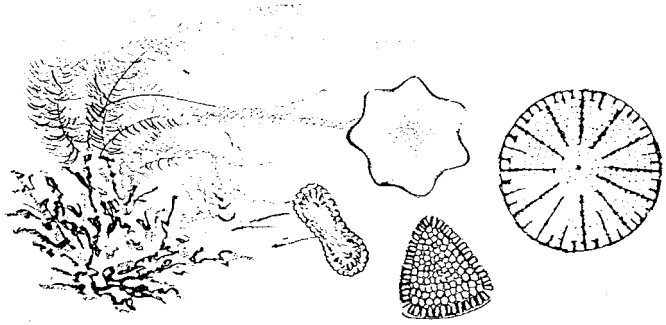
diatomite from prehistoric times

Diatomite is the fossilized remains of microscopic marine plants, diatoms, which lived and died millions of years ago. As they died they sank to the bottom of the sea and their tiny skeletons piled up layer on layer to great thicknesses in areas where conditions were favorable.

At Lompoc, California, in an area once submerged beneath the sea, Johns-Manville owns and works by far the largest, purest and most uniform deposit of diatomite ever discovered. This deposit has been worked since 1893 and has been owned by Johns-Manville since 1928. At the present rate of production it will last for many decades to come.

From it Johns-Manville manufactures its Celite® line of products. These include filter aids for clarifying such materials as sugars, beverages, dry cleaning fluids, oils and chemicals; fillers for paints and varnishes, soaps and polishes; high temperature insulations for industrial furnaces and kilns.

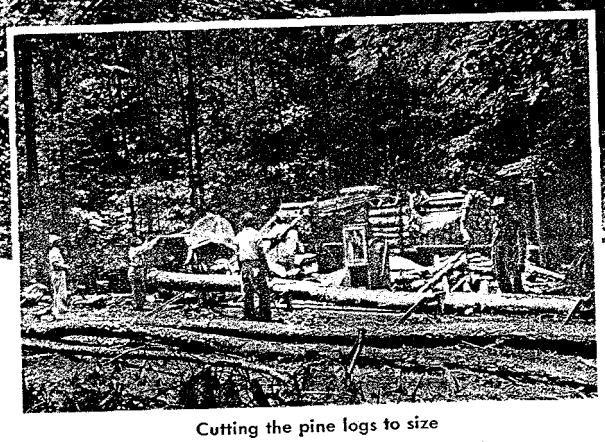
In 1956 a new plant was completed at Lompoc for the manufacture from diatomite of synthetic silicates made by a process developed by J-M.



Jewels of the Sea . . .

Powerful magnification makes the skeletons of diatoms appear like jewels. J-M's diatomite deposit at Lompoc, Calif., was formed some fifteen million years ago. It built up slowly at the bottom of a sheltered sea for many thousands of years until it eventually reached the thickness of some 1,400 feet.

The Johns-Manville insulating board plant at Natchez, Miss.



Cutting the pine logs to size

wood fibres from the forests

By a process similar to paper making wood fibres may be formed into thick, strong sheets known as insulating board. Both as a structural building material and as an insulation this board finds many uses in the construction field.

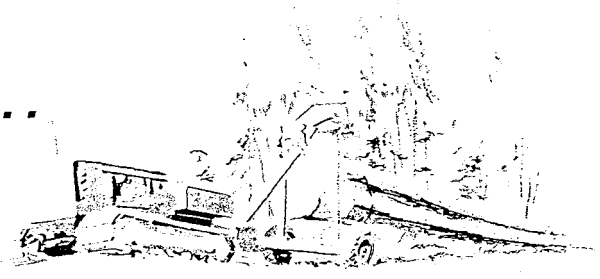
J-M completed its first insulating board plant at Jarratt, Va., in 1938. Since then three more have been added, at Natchez, Miss., Klamath Falls, Ore., and North Bay, Ontario. Continuing supplies of pulpwood for these plants are assured by extensive company ownership of timberlands in Mississippi and Virginia and by long-term government contracts in Oregon and Ontario.

J-M insulating board products include large sheets of building board, decorative ceiling panels and wall plank, insulating board sheathing, acoustical panels and roof insulation; also a three-in-one roof deck providing roof planking, roof insulation, and a decorative ceiling all in one operation. Builders report that it saves up to $300 per house.

A new J-M plant at Natchez, Miss., produces hardboard products from wood fibres. These products are denser, tougher and more waterproof than the wood from which they are made. Typical uses include paneling, shelving, counter and table tops, furniture, partitions and magazine racks.

Woodpulp supply forever . . .

Modern forestry methods as practiced by Johns-Manville on its own or leased timberlands are on a "sustained yield" basis. Each year no more timber is cut than is replaced by natural growth. Theoretically the supply of woodpulp for JM's four insulating board plants and one hardboard plant will last forever.



The new spinning process which produces superior mineral fibres

J-M mineral fibres are friendly to handle

mineral fibres from rock or slag

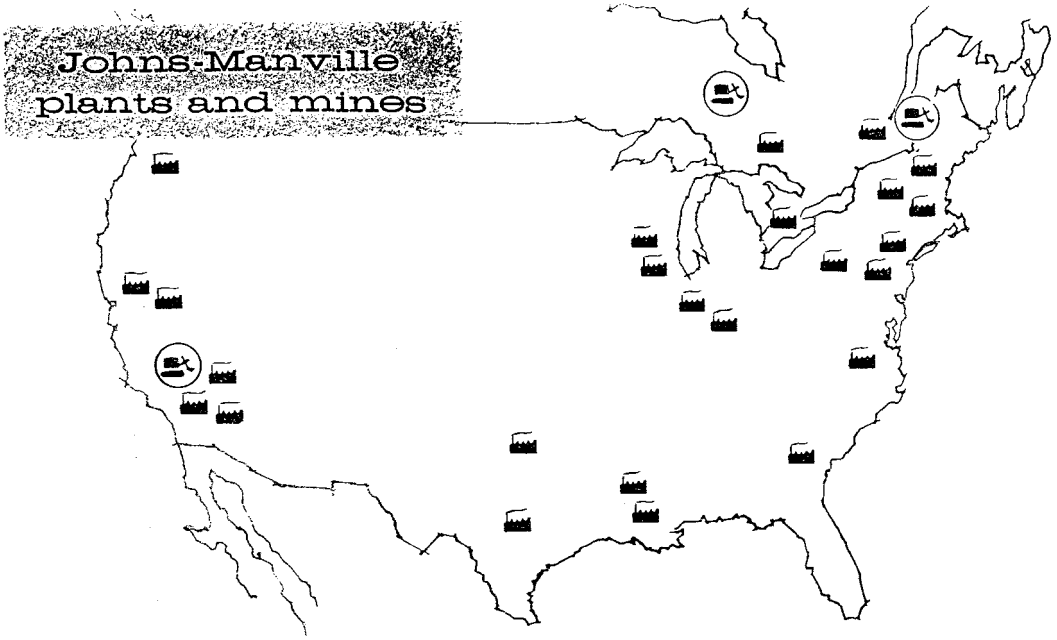
Mineral fibres used in many different types of insulation were formed originally from limestone melted in a special type of furnace known as a cupola. In recent years Johns-Manville has used slag obtained in the refining of metals, rather than limestone, to produce a superior type of mineral fibre by a newly developed spinning process.

Starting in 1928 Johns-Manville pioneered in the development of a mineral wool product and method by which the walls and attics of existing houses could be insulated. The mineral wool is formed into small nodules and blown into the walls of older, uninsulated houses by special blowing machines. J-M mineral fibre products for home insulation include Spintex® *Blown* Home Insulation and Spintex batts and blankets. These fibres are also used to produce insulations widely used in industry by manufacturers of home freezers, refrigerators, kitchen ranges, air-conditioning ducts, and many types of industrial equipment.

Johns-Manville plants manufacturing mineral wool products are located at Alexandria, Ind., Manville, N. J., Richmond, Ind., Watson, Calif., Waukegan, Ill., and Toronto, Ontario.

Pele's hair . . .

Mineral wool is sometimes formed by nature in an erupting volcano. Finding some of this natural mineral wool in the crater of Kilauea, the Hawaiians believed it was the hair of their volcanic queen, Pele, who, according to legend, was holding court in the seething pit of the mountain.



Johns-Manville plants

Plant Location	Principal Products Manufactured
Alexandria, Indiana	Mineral wool and allied products for home, industrial insulations and acoustical products
Asbestos, Quebec	Asbestos paper and millboard, asbestos textiles, packings, heat-insulation materials, asphalt and asbestos-cement roofings and sidings and friction materials
Billerica, Massachusetts	Marinite® products for marine bulkheads and partitions and structural insulations
Denison, Texas	Transite® (asbestos-cement) pipe products
Chicago, Illinois	Friction and rubber insulating tapes, Plastic electrical tape, industrial adhesive tapes, industrial and household masking tapes, automotive rubber products, rubber cements, mechanical rubber goods molded to specifications, rubberized fabrics, sponge rubber, Dec-O-Tape, sandblast stencil and filler cement
Fort Worth, Texas	Asphalt roofing and shingles and rag felt
Jarratt, Virginia	Wood fibre insulating board and allied products such as acoustical ceiling panels, wall plank, Weathertite® sheathing and Roofinsul®
Klamath Falls, Oregon	Wood fibre insulating board and allied products such as acoustical ceiling panels, wall plank, Weathertite sheathing and Roofinsul
Lompoc, California	Celite® (diatomite) insulations, filter aids, fillers and synthetic silicates
Los Angeles, California	Asphalt roofing and shingles, pipe line felts
Manville, New Jersey	Practically all J-M products with the major exceptions of insulating board, Marinite, Sanacoustic® and moulded linings. Products designed for the control of heat and cold, sound and motion, and protection against fire, weather and wear, such as asbestos textiles, packings, friction materials, insulating materials, asbestos and rag felt papers, asphalt and asbestos-cement roofings and sidings, floor tile, floorings, Transite (asbestos-cement) roofing and siding, mineral wool insulations, Transite (asbestos-cement) pipe products, sound-absorption materials, Flexboard® and Transitop®
Marrero, Louisiana	Transite (asbestos-cement) pipe, floor tile, asphalt and asbestos-cement roofings and sidings, roofing cements and putties

Moll, Belgium*	Asbestos-cement siding, pipe, roofing products, and miscellaneous asbestos-cement products
Nashua, New Hampshire	Asbestos-cement products such as Transite, Flexboard, Asbestos Ebony®, Transite Unit Partitions, Ohmstone®, Colorlith® and Chemstone®
Natchez, Mississippi	Wood fibre insulating board and allied products, such as acoustical ceiling panels, wall plank, Weathertite sheathing and Roofinsul Hardboard products
New Brunswick, New Jersey	A diversified line of metal and metal-containing gaskets for industrial requirements
North Bay, Ontario	Wood fibre insulating board and allied products such as acoustical ceiling panels, wall plank and Weathertite sheathing
Pittsburg, California	Asbestos and rag felt paper, insulating cements, asphalt and asbestos-cement roofings and sidings, Flexboard, corrugated Transite
Richmond, Indiana	Mineral wool insulations for equipment such as automobile bodies, refrigerators, stoves, airplane cabins, and railroad cars
Savannah, Georgia	Asphalt roofing and shingles
Stockton, California	Transite (asbestos-cement) pipe products
Tilton, New Hampshire	Asbestos paper for electrical insulations such as Quinterra® and Quinorgo®
Toronto, Ontario	Transite (asbestos-cement) pipe, insulating and refractory cements, mineral wool insulations for industrial and home use, Flexboard and Transitile®
Watson, California	High temperature insulations, Transite (asbestos-cement) pipe and mineral wool insulations for industrial and home use, packings and cut gaskets
Waukegan, Illinois	As with Manville plant, practically all J-M products with the major exceptions of textiles, insulating board, and Marinite. Waukegan has the distinction of being the home of the moulded brake lining—a J-M development which made possible the internal brake
Zelienople, Pennsylvania	Insulating fire brick and refractory cement

Johns-Manville mines

Mine Location	Description, Operation and Production
Asbestos, Quebec	Asbestos mining and milling operations. Mining is by the open pit method and by the underground block-caving method. The average yearly rate of production of asbestos fibre (1951-1955 inclusive) was approximately 515,000 tons. The fibre is used in the manufacture of products such as textiles, clothing, electrical insulations, asbestos-cement products, cements and putties, moulded plastics and brake linings, floorings and others
Lompoc, California	Diatomite quarries and mills for the production of Celite products. Modern crushing and special processing equipment for the production of improved filtration and filler materials are provided. The average yearly rate of production of processed ore (1951-1955 inclusive) was approximately 154,000 tons
Munro Township, Ontario	An asbestos deposit with qualities that make it superior for certain products to any other grade produced by Johns-Manville. This mine and mill started production in the summer of 1950. The average yearly rate of production of asbestos fibre (1951-1955 inclusive) was approximately 23,800 tons
Mashaba, Southern Rhodesia*	This mine and mill, placed in operation in 1954, provides Johns-Manville with an even greater variety of asbestos fibre. The fibre is of the chrysotile type and is suitable for the manufacture of asbestos-cement products, including Transite pipe

*Majority owned.

JOHNS-MANVILLE CORPORATION

Headquarters: 22 East 40th Street, New York 16, N. Y.

Offices in Principal Cities of the United States

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CANADIAN JOHNS-MANVILLE CO., LIMITED

Toronto, Ont. Montreal, P.Q. Winnipeg, Man. Vancouver, B.C.

Asbestos, P.Q. Matheson, Ont.

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