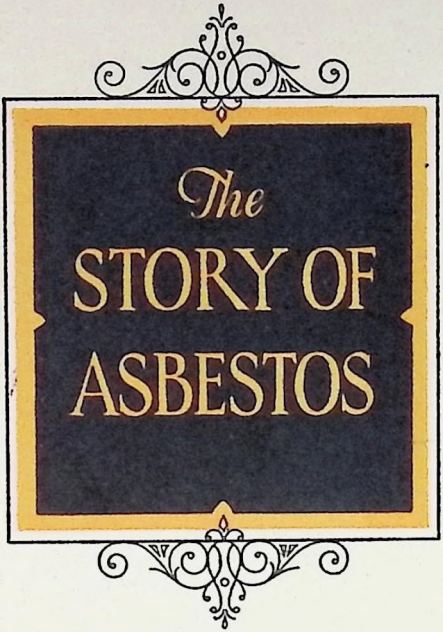


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THE STORY OF ASBESTOS



THE PHILIP CAREY COMPANY

Lockland, CINCINNATI, OHIO

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foreword

A few years ago the name "Asbestos" meant little or nothing to the average individual. The output was small and confined to a few uses. Today, the mining of Asbestos and the manufacture of articles from this material has become one of the great industries of the world, and the various articles into which it is made play such an important part in our every-day life that we believe the following pages will be found both interesting and instructive.

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A BRIEF HISTORY OF ASBESTOS

ASBESTOS, from the Greek, meaning "unquenchable—unconsumable" is older than anything in the animal or vegetable kingdoms, and has been so little affected by the dissolving influences of time, that during untold centuries when hardest rocks have crumbled away, it has had no appreciable effect on the asbestos contained in them.

Just what caused the original formation of this fibrous mineral, Asbestos, will probably never be known, but scientists and geologists have shown in nearly all cases that it resulted from the action of intense heat.

The valuable properties of Asbestos have been known for thousands of years. It was first mined by the Romans in the Italian Alps and woven by them into various fabrics, mainly shrouds used in cremation, to prevent the ashes of the corpse from mingling with the wood ashes of the funeral pyre. One of these shrouds was found in an old sarcophagus in the year 1702 with a quantity of ashes in it, and by the order of Clement the Eleventh, was deposited in the library of the Vatican where it may still be seen.

Another early use of Asbestos dates back to the time of Charlemagne, who is reputed to have possessed a table cloth woven from asbestos fibres, which when soiled, was purified by being thrown into the fire and the particles of food burned up, leaving the cloth immaculately clean. Another case on record is that of a Chinese merchant who displayed handkerchiefs in 1676, woven from asbestos fibres.

The Eskimos of Labrador used a fabric woven from asbestos for lamp wicks. Another similar material called Carpasian Linen was used in sacred lamps centuries ago. This "Carpasian Linen" (Asbestos from Cyprus) formed the only lamp wick not consumed by fire.

The early growth of the Asbestos industry was coincident with the development of steam engines for various purposes. In the early 60's the first asbestos packings for steam glands were made. Another early use of Asbestos

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was in the manufacture of insulating cements and fire-proof papers. However, the practical adaptation of asbestos to industrial purposes remained unrecognized until about 1877 when, in grading the tracks of the Quebec Central Railroad, the workmen uncovered large deposits in that section. From then until 1899 its importance does not appear to have been greatly appreciated, probably due to the fact that the cost of extraction was excessive and the stability of the deposits uncertain. Since that time, however, Asbestos has become a constantly increasing article of importance and ranks as one of the essential materials of modern times.

WHAT IS ASBESTOS?

In industry the name "asbestos" is applied indiscriminately to several classes of fibrous minerals. In mineralogy, however, three minerals are classified under the term "Asbestos," namely—

1—The Serpentine group.
Chemical composition; Hydrated Silicate of Magnesia.

2—The Amphibole or Hornblende groups.
Chemical composition; Silica associated with Oxides of Iron and Magnesia usually with Sodium and Potassium present.

3—The Anthophillite group.
Chemical composition; Magnesia Iron and Silicon Oxides.

There are many minerals included in the above groups but only two or three are sought commerically. These, in order of their importance are:

1—Chrysotile in the Serpentine group.
2—Crocidolite in the Hornblende group.
3—Amphibole.

Chrysotile (white)

This family is by far the most important in the Asbestos industry, containing about 90% of the fibre mined. Practically all of the white, silky fibre known to the layman as Asbestos, mined in Canada, Rhodesia, and Russia is of this variety. It occurs in seams of the Serpentine rock, appearing as continuous veins in which the fibres are perpendicular to the masses of Serpentine on either side. The ore is quarried and crushed and after separating the fibres from the mass of rock they are graded according to length. Usually the length of any fibre is identical with the thickness of the vein as the fibres are formed as fine threads extending from one wall of Serpentine to the other. The length may vary from a small fraction of an inch to five or six inches. The diameter of each fibre is much finer than cotton as approximately 25,000 could be laid side by side to measure one inch. Under the microscope the fibres appear to be smooth, square strands.

In chemical structure, Chrysotile is generally thought a hydrated magnesium silicate, of the form 3Mgo, 2Sio2, 2H20. Various impurities occur

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which greatly influence the character of the fibre. Iron is almost always found and often times aluminum and calcium occur, as well as other alkalies. Table No. 1 shows analysis of several specimens of this grade.

Crocidolite

Much of the commerical fibre from Africa falls under this heading. In general these grades have a brilliant, beautiful blue or brown cast. The shades seem to depend principally upon chemical composition and slightly upon the occurance of the fibre in the mine as they appear to have been influenced by centuries of exposure to the weather. Table No. 1 will show that the chemical composition of the Crocidolite grade indicates a larger percentage of iron and the fibre seems to partake of the nature of iron in that it is usually harsher, stiffer and stronger than the Chrysotile grade. The fibres are somewhat larger in diameter than the Chrysotile grade and are also found in greater lengths. Crocidolite seems to contain more impurities or rather a greater number of chemicals than Chrysotile, hence more care must be used in its applications.

TABLE I
ANALYSIS OF ASBESTOS FROM VARIOUS SOURCES

Name of Source	Silica %	Magnesia %	Iron (Combined) %	Alumina %	Water (Combined) %	Alkalies %
CHRYSOTILE						
Canadian—Thetford	39.05	40.07	2.41	3.67	14.48	.....
Canadian—E. Broughton	39.20	42.97	2.95	.....	13.87	.....
Canadian—Black Lake	39.36	42.15	3.31	.....	14.50	.....
Canadian—Danville	41.84	41.99	2.23	.....	14.28	.....
Arizona	41.71	41.99	.50	2.80	12.81	.09
Russian	42.45	42.58	.08	.....	15.31	.....
Rhodesian	43.06	38.61	3.42	.62	14.41	.....
CROCIDOLITE						
African Blue	51.10	2.30	35.80	.....	3.90	6.90
African Amosite	50.24	3.96	39.80	.....	3.00	2.12
AMPHIBOLE						
Georgia	57.12	29.44	6.36	.75	5.47	.....

Amphibole

This is a fibre found in the United States and in almost every part of the world but owing to its limited applications is only mined in rare instances. Small quantities are produced for the filtrations of acids and alkalies. The chemical structure of this grade is almost identical with that of Chrysotile excepting that there is practically no water of hydration in the Amphibole. The fibre consequently appears very similar to the Chrysotile until it is handled then it is found very brittle and with practically no strength. As it occurs in nature the fibre is extremely long, often times ranging to 12 inches but it cannot be separated without breaking, so it is impossible to mine it without destroying the length. In appearance it is extremely white sometimes having a sparkle like Mica. Perhaps future developments will show man how to broaden the uses of this beautiful grade.

PROCESS OF EXTRACTION

Since a great majority of Asbestos used in the United States is a Chrysotile variety from Canada, we are more vitally interested in the operations of the Canadian mines than others.

The extraction of Asbestos from the Serpentine is simple as compared with that of metallic ores. The mine consists of an open pit or quarry from which the ore is blasted. The rock is carried to a mill where it is crushed and the valuable ores separated from the mass of the rock. Before the ore is sent to the second crusher, it passes inspectors where the rocks containing the longest fibres are taken out and the fibre extracted by means of a hand hammer. This product is known as "Crude" and commands the highest prices. The mill rock after crushing and drying is passed over screens where the Asbestos is separated from the rock. This is usually done by means of a vacuum and air suction. The rock passes to the dump and an Asbestos mine is readily distinguishable by a tremendous heap of dump rock. The fibre is passed through grading screens thence to bags and finally to storage in preparation for shipment.

The percentage of Asbestos recovered from the rock mined will vary from 8 to 15 per cent, and the length of the fibres recovered will likewise show considerable variation. Naturally the shorter fibre will be recovered in greatest volume.

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Asbestos, The Wonder Fibre

Asbestos fibre has the appearance of cotton with all the impression of its inflamability, yet the Asbestos will resist fire as well as the parent rock from which it springs. It seems akin to the vegetable kingdom with a texture as fine as silk, never-the-less it is a mineral. Sometimes it has the brown color of flax, but instead of growing cells it is crystaline. The fibres are extremely strong so that it is possible to spin them into a cloth that will resist both flame and heat. Asbestos fibres in the mass appear as light and fluffy as thistle down, still the density of an individual strand is far greater. One of its most valuable properties is its indestructability which enables it to resist decay under almost every condition of heat and moisture. Its incombustible nature renders it a complete protection from flames in its manufactured state.

It is no wonder that the popular conception of this mineral is sometimes wrong because it has the appearance of the commonest of fibres, but has characteristics peculiarly its own. Do not mistake it for a vegetable, as it will serve purposes for which no vegetable fibre is fitted. Asbestos cannot be grown, but must be mined as one of the valuable ores of the earth. As the nature of this material becomes better known it will be used for an increasing number of products requiring those properties of strength with lightness, toughness with softness and flexibility with fire-proofness, which Asbestos alone can give.

Use of Asbestos

Fibres

Asbestos Fibres are the basic materials from which all Asbestos products are manufactured but they are rarely used alone. One such use should be mentioned, namely, the direct application of certain short grades of fibre as insulating cement for pipe and boiler covering. Many cements for the same purpose are composed principally of fibre with bonding agents. Refractory cements, plaster and stucco often have Asbestos fibre for strengthening and to resist cracking.

Shingles and Roofing

Asbestos and Portland Cement are combined under special manufacturing process to form fire-proof shingles. These shingles are becoming more popular each year due to the many attractive colors in which they are made and the fact that they are practically indestructible, never requiring paint or other attention.

The same material is also made into sheets, both flat and corrugated for use as roofing and siding on manufacturing plants, especially where the material must withstand the damaging effects of fumes, smoke, acids, etc.

Pipe and Boiler Covering

The lost heat from bare or improperly covered steam pipes and boilers amounts to unbelievable figures, often from 15% to 25% of the entire boiler capacity. To prevent these losses many types of Asbestos insulations for pipe and boilers have been developed and are playing an important part in reducing power cost in all lines of industry.

Paper

Asbestos paper is an excellent fire resisting material extensively used and especially valuable for the protection of wood partitions, walls, ceilings and in lining weather boards and floors in all kinds of building construction. Practically all warm air furnace pipes are covered either with plain or corrugated Asbestos Paper, which serves as insulation, seal and fireproofing.

Millboard

Large quantities of Asbestos Millboard are used each year in the stove

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and range industry, mainly for lining ovens and doors. Millboard is also used for lining grates, furnaces, making fire screens, partitions and many other places requiring heat and fire protection.

Packing

The use of Asbestos Packing is increasing extensively wherever steam is used. Asbestos has many advantages over packings made of organic substances as it will last longer at high temperatures. Many types of packing are manufactured from Asbestos among them are sheet gaskets, rope and wick packings, sheet rubber packing and numerous styles of woven or braded gaskets or packings.

Roofing Felts

Asphalt Saturated Asbestos Felts are used in large quantities for roofing purposes, both as a base for Prepared Roll Roofing and in the Built-Up type of roofing used on large industrial plants. This Asphalt Saturated Asbestos Felt is also used to wrap underground pipe lines to protect them from corrosive action of Alkali soil.

Sheathing

Asbestos sheathing is finding increased use in manufacturing plants and other places calling for fire-proof construction. This material comes in sheets and panels and can be handled almost as easily as lumber. It is also used for switch board panels and other electrical purposes where a fire-proof insulating material is required.

Miscellaneous

Among the many other products manufactured from Asbestos are—theatre curtains, brake linings, asbestos clothing, roof paints, insulation for electrical wires, floor and wall tile, conveyor belts, gaskets, table mats.

The products mentioned above are only a few of the many items manufactured but they will give you some idea of the size and future of the Asbestos industry.

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