

**A PROBLEM IN SHIP PROPULSION.**

It would seem as though our friends across the border were determined to find some method of ship propulsion radically different from that by which the rest of the world seems content to drive its vessels. It is not so many months ago that the Knapp roller boat was very much in the public eye by virtue of the attempts of its inventor, alike ambitious and novel, to replace



DUMP AT THETFORD, CANADA.

the ordinary type of ship with a huge cylindrical vessel, whose progress should be in direction at right angles to its longitudinal axis, and which should be trundled over the waves in much the same way as a barrel is rolled through the streets. Hitherto the rolling has been confined to more or less sheltered waters, although the inventor promises that before long freight and passengers will be rolled from New York to Queenstown and Liverpool.

We now present a couple of illustrations of another Canadian idea of ship propulsion, in which the hull, or a considerable part of it, instead of rolling, revolves. It is being built at Toronto for a syndicate of gentlemen in that city, who presumably expect to find advantages in their new device which cannot be realized in any existing type of boat, or otherwise. The vessel consists of a cigar-shaped, steel hull, which is encircled for about a third of its length by an outer revolving cylinder. The cigar-shaped portion of the vessel contains the motive power and the crew, and the outer cylinder, which serves as a propeller, is provided with projecting metal plates which are wound helically around it in the form shown in the illustration. The outer cylinder revolves upon the inner cylinder, friction being reduced by interposing careful constructed roller bearings. It is driven through a gear wheel, 12 inches in diameter, which works in a water-tight case and engages a circular rack formed upon the inner face of the outer cylinder. The vessel is driven by a four-horse power gasoline engine. In order to prevent any rotary movement of the inner cylinder, it is provided with a keel which is about 12 inches in depth and is hung below the vessel in the manner as shown. The keel is also intended to prevent the vessel from making leeway. The shallow depth of the keel, and the fact that it weighs only about 125 pounds, will render it difficult to keep the boat on an even keel, and it has been suggested that a deeper keel, carrying a cigar-shaped weight, something after the fashion of the bulb-keel racing yacht, would give better results. In addition to the accommodation within the hull there is a deck at each end of the boat which is protected from the wash of the water by flaring coamings, connection from one deck to another being had by means of a bridge which extends above the revolving cylinder. The boat has recently been completed at the shops of Walter Dean, boat builder, Toronto, and its trials are due to take place early in April.

**Duty on Natural Gas Refunded.**

The Treasury Department has refunded \$21,814.50 which had been collected at Detroit from one concern as duty, on natural gas brought into Detroit from the Canadian gas fields. The duty was levied at 10 per cent ad valorem as an "unenumerated raw or manufactured article." The refund was based on a decision of the United States Supreme Court on another case in which the court held that natural gas could only be classified as crude bitumen. The only tariff fixed on this article being \$1.50 a ton, it was impossible to levy a tax on the gas.

**American Locomotives in Germany.**

The Prussian Minister of Railways has expressed a favorable opinion of the American locomotives that have been tried in Bavaria. He says: "Notwithstanding their faultless construction, they cost considerably less than locomotives of similar style of Prussian make."

**THE ASBESTOS MINES AT THETFORD, CANADA.**

BY L. P. GRATACAP.

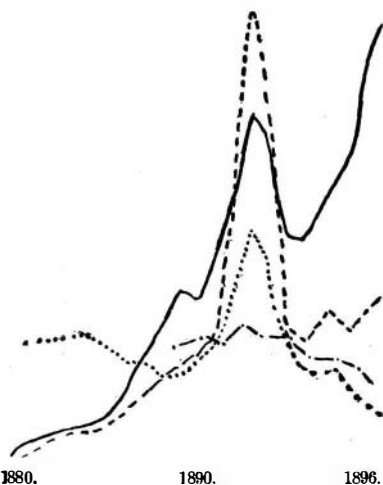
The asbestos products of the world are principally furnished from mines in Canada, and of prime importance among these are the large and important quarries at Thetford, Province of Quebec, Canada. Here are three large companies whose properties embrace many acres in the Cambrian areas of the region, be-



DERRICKS AT THE ASBESTOS MINE.

tween the valleys of the St. Francis and Chaudière Rivers. The mining grounds both at Thetford, and Black Lake twelve miles south, are situated in a group or range of low hills penetrated by the Quebec Central Railroad by whose instrumentality they have been brought into commercial usefulness.

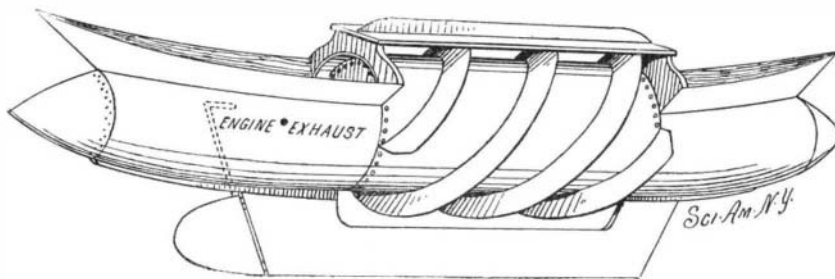
The matrix rock of asbestos is here serpentine, and the asbestos is a silky, fibrous form of this mineral, usually designated by mineralogists as chrysotile. It occurs in veins, seldom in their maximum development over three inches wide, occasionally six, and far more



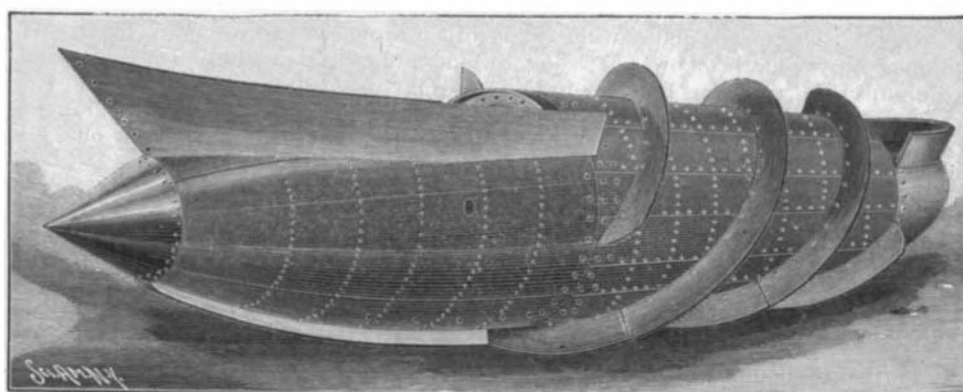
PRODUCTION OF CANADIAN ASBESTOS.

commonly one inch. It is recognized instantly by the sheen and luster of its surface. These veins traverse the dark serpentine rocks in varying directions, and the excavations made in this hilly country to reach these valuable skeins of mineral thread are very extensive.

A view into the dark cavernous pits, now formed into one colossal opening in the Bell Company's workings, through the removal of their separating walls, is extremely picturesque. The pits vary from 100 to 150 feet in depth, and the cliffs frowning above them are sprinkled with derricks along whose steel cables, as



REVOLVING BOAT AS COMPLETED, SHOWING THE KEEL AND CONNECTING BRIDGE.



TORONTO REVOLVING BOAT DURING CONSTRUCTION.

they descend into the pits, run the swaying carriages bringing up their cradles of stone which are dumped into waiting cars, and carried to the separators, crushers and dump. The scene on the floor of the pit is full of action, and gangs of workmen at various points are blasting, hammering, or prying open the ledges, and exposing new surfaces of the serpentine.

The production of asbestos from this source, viz.,



ASBESTOS MINES AT THETFORD, CANADA.

chrysotile, has greatly increased since its first discovery, and has now attained the dimensions of a valuable industry. In 1890, the output was surprisingly great, and has exceeded all previous or subsequent years. The accompanying diagram illustrates very graphically the fluctuations and course of asbestos mining in Canada. It is taken from the Geological Survey of Canada for 1896. The solid line shows the production in tons, the broken dash line the varying value of the product, the dotted line average value per ton, the dot and dash line the exports, average value per ton.

The money value of this material is not inconsiderable. For the years from 1880 to 1896 the following table shows the total values for Canada.

Year	Tons.	Value.
1880.....	380	\$24,700
1881.....	540	35,100
1882.....	810	52,650
1883.....	955	68,750
1884.....	1,141	75,097
1885.....	2,440	142,441
1886.....	3,458	206,251
1887.....	4,619	226,976
1888.....	4,404	255,007
1889.....	6,113	496,554
1890.....	9,860	1,260,240
1891.....	9,279	999,878
1892.....	6,082	390,462
1893.....	6,331	310,156
1894.....	7,630	420,825
1895.....	8,756	368,175
1896.....	12,250	429,856

There are three grades of asbestos, and of these the second is the most abundantly produced. Much of the floor of the Thetford mines, which is now being deepened, yields a poorer quality than the cliffs or sides. The best grades have been found below the surface. The surface specimens are harsh and asperated. This is the result of losing water; in the case of the Thetford mines, from forest fires, and in the Black Lake district from baking in the vicinity of the many igneous dikes which have entered the serpentine, and presumably calcined the chrysotile. As is well known, the water carried in the asbestos imparts the delicate texture, and when this is driven off by heat, the fibers become hard, brittle, and coarse.

The veins are sharply separable from the inclosing serpentine, and a blow of a hammer will detach the adhering rock on either side, liberating the lustrous bar of delicate mineral silk, which, soft and silken in its separate fibers, resists compression in the direction of their lengths. These bars are hackled and converted into wooly-like knots which are afterward carded and spun into asbestos thread. The treatment of the second and third grade asbestos varies somewhat from that of the first quality, and the final discharge of the jig-sieved fragments meets the discerning inspection of small boys who pick out useful material, which is again worked over. Much of the water-saturated material is dried in ovens.

The serpentine area is a disjointed or irregular succession of these ranges, or hill groups in which serpentine is found, extending from Oxford to Gaspé. The Thetford and Black Pond districts have proved the most productive, though prospecting continues in other sections, and recently some investigation in the Ottawa district has raised the hope of opening profitable mining in this new field. The development of these veins of fibrous serpentine is obscure. They have