CONSTRUCTION AND DETAILS OF THE KNAPP ROLLER BOAT.

In our issue of October 30 of last year we commented editorially upon the Knapp roller boat and pointed out what seemed to us to be the difficulties in the way of such a boat attaining the results anticipated by the inventor. On December 18 we published a letter from Mr. R. C. Rayson, a friend of Mr. Knapp, in which the theories upon which the boat was built were set forth.

The facts to which we drew attention were, first, that if the boat were to run at any considerable speed, the water would be carried up by skin friction on the rear half of the cylinder and act as a brake to check the rotation; and, secondly, that the great area presented by the cylinder would render it impossible to propel it in the face of a gale of wind. Mr. Rayson's letter, to which the reader is referred, is indorsed by Mr. Knapp, whose letter is quoted below. From the two letters and the accompanying photograph it is possible to have a clear idea of the points of difference between the Knapp boat and that of Mr. Bazin and the ordinary type of boat as represented by the "St. Louis" or the "Lucania." It is claimed that, as the disk-shaped wheels of the Bazin boat and the wedge-shaped hull of the "St. Louis" are both deeply immersed, they progress through the water by displacing it to the right and left, and that, as the speed increases, the resistance of the water to displacement increases at a rapidly multiplying ratio, or as the cube of the speed. On the other hand, the designer of the cylindrical form of roller boat expects that at high speeds the resistance of the water to displacement will be so great that the boat will tend to climb to the surface and travel with practically no immersion, being sustained in somewhat the same way as a flat pebble that skims over the surface of a pond, the first moving with a rolling and the latter with a sliding contact. We pointed out at the time that, although the cylinder, if propelled at sufficient speed over still water, might tend to climb to the surface, just as a 30-knot torpedo boat will lift several feet of her forefoot above the water at her highest speed, it could only be done at the cost of great power; since it would not merely be necessary to raise the 100 tons weight of the cylinder some two or three feet (the draught of the vessel), but power must be absorbed in maintaining it at that level.

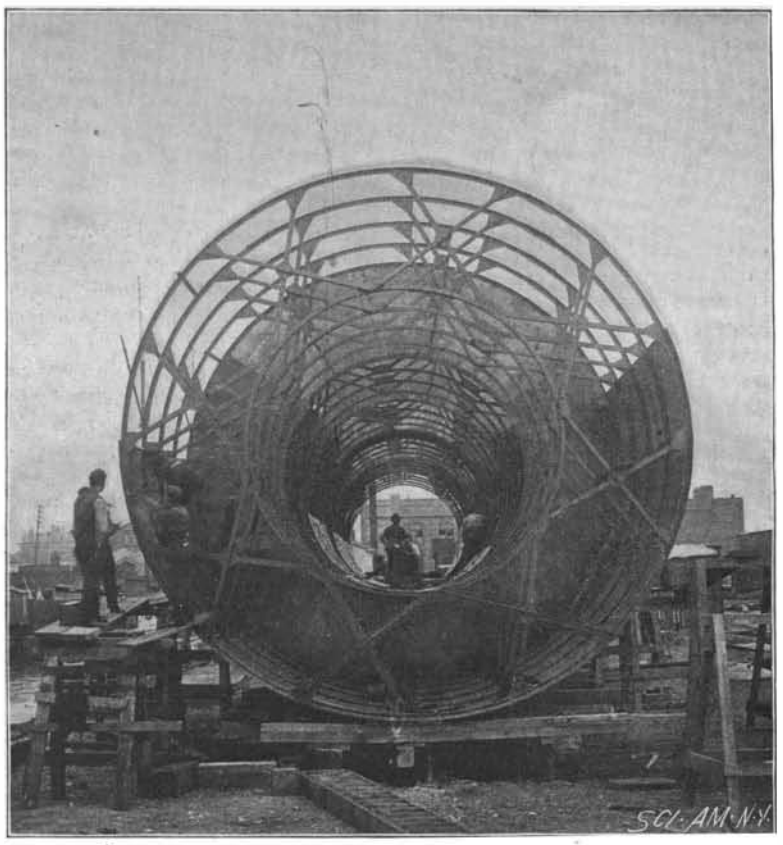
Mr. Knapp, however, does not believe this, and we give his statement of the case in his own words:

"If you cannot displace more water with a body than it weighs, how can my boat possibly displace any water when it meets a resistance greater than its weight, taken broadside on, to get the greatest possible resistance? It is this resistance which brings the boat to the surface, and if you maintain or increase the speed, how in the world can it sink again until the speed is decreased, thereby lessening the resistance or support? It is not the power which holds it up, but the water, which becomes a 'granolithic pavement,' so to speak."

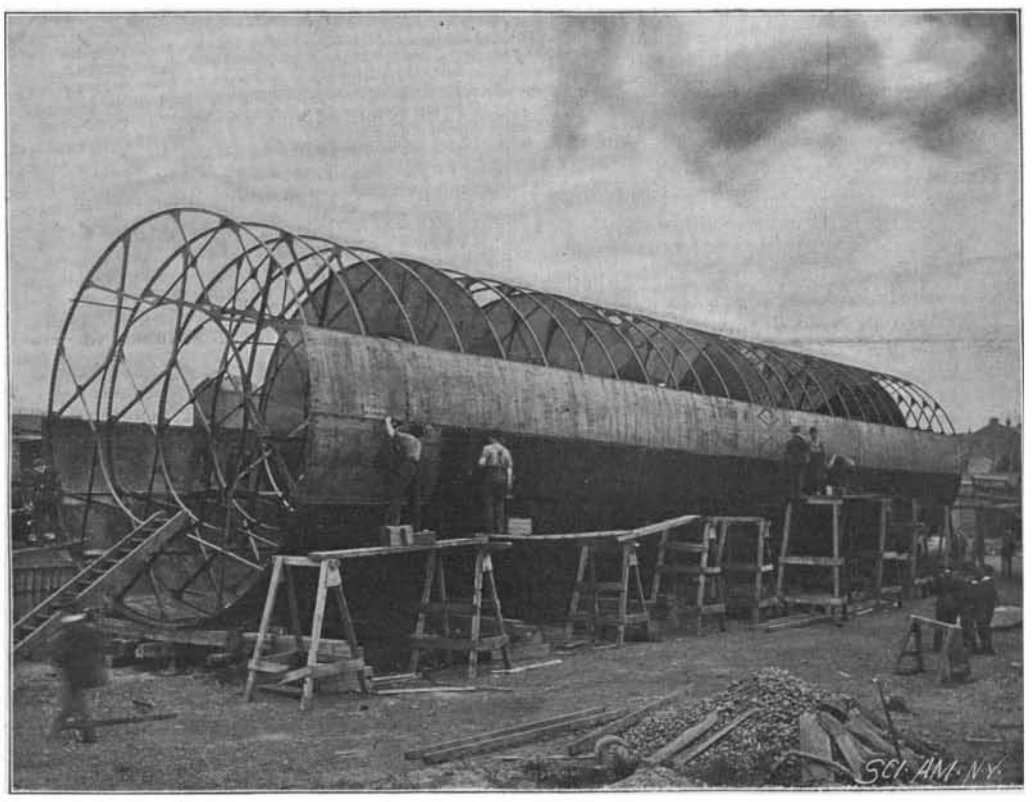
Mr. Knapp has recently favored us with the accompanying photographs, showing the construction of his boat, and with some particulars of the first trials and of a second boat that he is building, which we think will prove of interest to the readers of the SCIENTIFIC AMERICAN. It will be seen that the hull is formed of an outer and inner shell laid upon circular frames. There are twenty-six frames, spaced about 5 feet apart. They are built of angle iron, and each inner and outer frame is tied together with trussing of angle iron. The space between the two shells is divided into compartments by six plate bulkheads, and the ends are also plated in, as shown in the accompanying view of the vessel. At the center of the hull sixteen buckets are riveted to the outside of the shell.

The propulsion is effected by two sets of engines mounted on platforms, which travel on the inside of the outer shell, one near each end of the boat, in the following manner: Two rails are laid with a gage of 14 feet entirely round the shell. Upon these is a four-wheeled engine platform which carries two boilers and a two-cylinder high pressure engine, which is geared in the ratio of one to two to the forward axle of the platform. When the engines are started, the platforms rotate the cylinder in much the same way as a squirrel turns its cage.

Mr. Knapp informs us that on the trial trip the boat displaced 100 tons and drew 3 feet of water, and that it made 4½ miles an hour when the engines were indicating 15 horse power. The trouble which we anticipated would arise from the water being carried over by the shell did not, Mr. Knapp informs us, occur at the speed obtained at the trial. The combined horse power of the two engines is 100, and their failure to produce better results was due to the slippery state of the rails, caused by condensed steam and insufficient adhesive weight on the driving axles of the platforms.



END VIEW SHOWING INNER AND OUTER FRAME AND INTERMEDIATE TRUSSING.



BOAT IN FRAME AND PARTIALLY PLATED.

It was the wish of the inventor to apply the motive power to a central crank shaft rigidly attached to the hull and located at its axis. The engines and boilers were to be carried on a platform suspended from the crank shaft and the whole motive power was to have been located at the mid-length of the hull. A larger boat is now being constructed embodying these changes, and it is expected that the trials will soon take place.

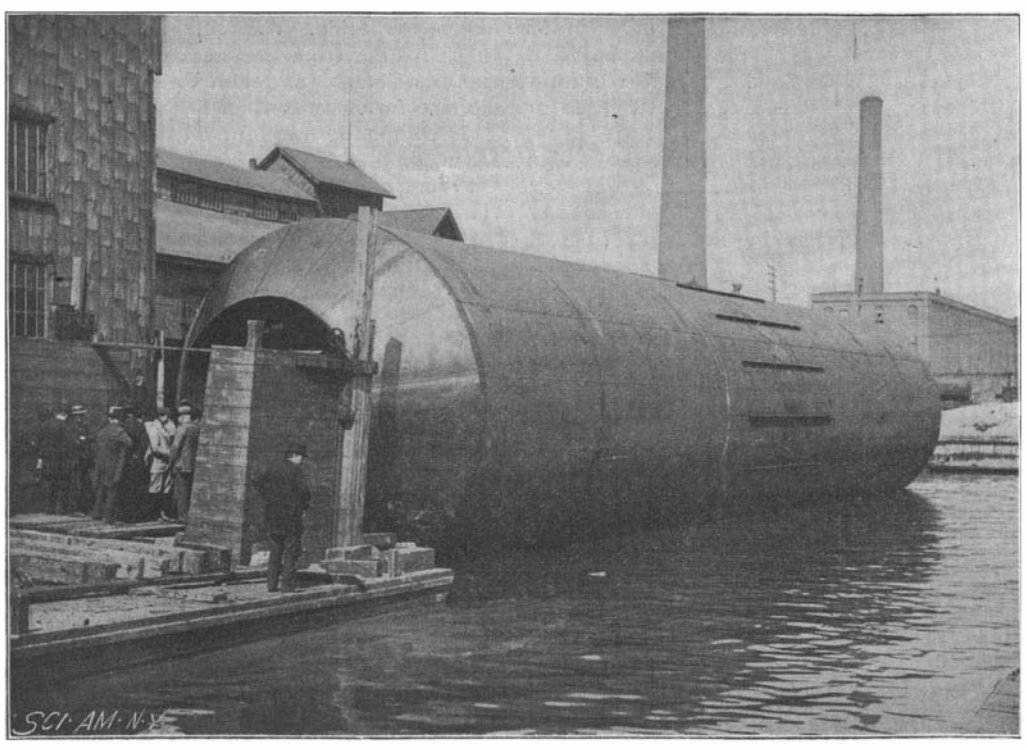
The World's Export Trade.

A translation of an article in the Antwerp Journal of Maritime Interests gives figures of the export trade of leading nations of the world for 1896, as compared with 1872, 000's omitted, as follows:

Countries.	Amount of exports. 1872.	1896.	Increase.	Rel. rank. 1872.	1896.
England.....	$1,235,200	$1,422.000	$207,475	1	1
United States ...	490,583	1,050,692	620,109	4	2
Germany	559,700	994.156	384,456	3	3
France....	726.066	656.393	*69,673	2	4
Russia..... ...	270,586	513.908	261,322	5	5
Austria-Hungary	250,900	369,016	118,116	6	6
Belgium.....	193,000	283.324	90,324	7	7

*Decrease.

"The most remarkable feature of this statement," says Consul Morris, of Ghent, "is the decrease in the trade of France, which has fallen from second to fourth place. The trade of the United States, on the contrary, increased more rapidly than that of any other country, or nearly 150 per cent in the twenty-five years. Besides the countries mentioned, Japan, Australia, and the East Indies have, in greater or less degree, increased their exports. France alone sees its trade gradually declining in the volume of the world's commerce."



THE KNAPP ROLLER BOAT.