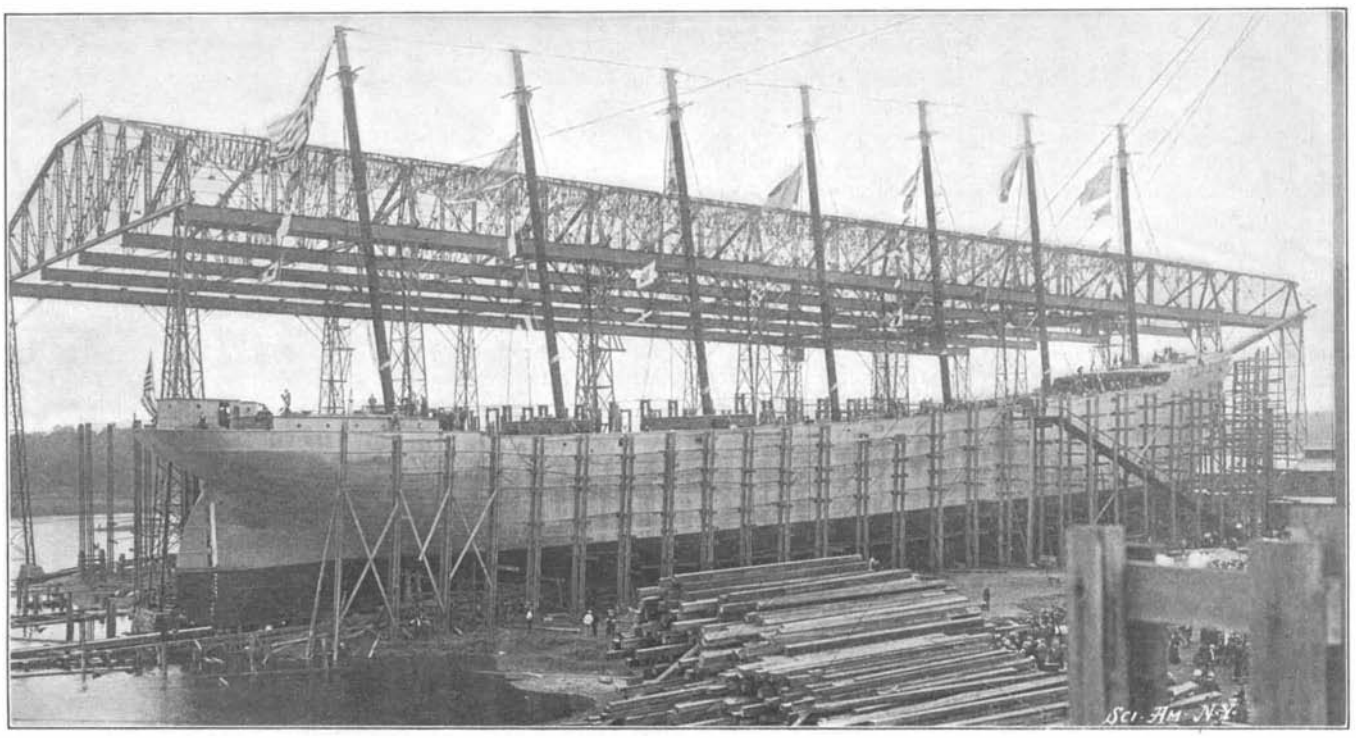
LAUNCH OF THE FIRST SEVEN-MASTED STEEL SCHOONER.

The recent launching at the yards of the Fore River Ship and Engine Building Company of the seven-masted steel schooner "T. A. Lawson" was an event of more than common significance in the shipping world. The fore-and-aft trading schooner is a distinctly American craft. The history of its development from the original two-sticker up to the multi-masted vessels is full of interest. It is only of late years that the many-masted type has received any extensive development; but so successful have the four, five and six-masted schooners been, that it was only a question of time when a seven-masted craft should be constructed, for in this matter of shipbuilding, as in so many other forms of construction characteristic of our modern industrial life, it holds true that the bigger the unit, the less the cost of operation, and the larger the profits.



LAUNCH OF THE FIRST SEVEN-MASTED STEEL SCHOONER.

The largest schooner previous to the launch of the "Lawson" was a six-masted vessel which measured 330 feet in length, 48 feet in beam and 22 feet depth of hold, with a maximum carrying capacity of 5500 tons of cargo. That vessel, like all of her predecessors, was built of wood. The ship recently launched, however, is a great advance on her predecessors in every respect. In the first place she is built throughout of steel, with a cellular double bottom and three complete steel-plated decks. The lower masts throughout the vessel are also built of steel. The total length of the ship over all is 395 feet, beam 50 feet, and molded depth 34 feet 5 inches. She has a dead weight cargo capacity of 7500 tons and her displacement at her maximum draft is 10,000 tons. The sail plan is drawn on a generous scale. The main masts are all 135 feet in length from the mast step to the top of the upper band, and they are all of a uniform diameter throughout of 32 inches. The topmasts are of one length, being 58 feet in length over all and tapering from 18 inches to 10 inches in diameter. The total sail area of the lower sails and top sails is 40,617 square feet. The sails will be handled largely by steam power, the plant including a 9 x 10 double-cylinder ship engine, and five 6 x 8 hoisting engines, with two vertical boilers, one in the forward and one in the after house. As a result of the installation of steam power for hoisting the anchors and handling the same, the number of hands necessary to work this huge vessel will be reduced to nineteen men. The total cost is $250,000. The craft was designed by B. B. Crowninshield, of Boston.

Test of the 10-Inch Coast Defence Gun.

It will be remembered that in last week's SCIENTIFIC AMERICAN was chronicled the test made at Fort Monroe with an 8-inch gun. On July 28 at Sandy Hook a 10-inch gun on a barbette carriage was fired for rapidity and endurance observations. The first ten shots were fired in exactly sixteen minutes, the shortest intervals between shots being one minute twenty-five and two-fifth seconds.

After this test a series of thirty rounds was fired. The official time between the firing of the first and tenth shot of this series of thirty was thirteen minutes and twenty-two seconds. The next ten shots were fired by another crew in nearly nineteen minutes time. The final ten rounds were fired by a base-ball and foot-ball detachment, whose training was such that the ten shots were fired in ten minutes and fifty-nine and two-fifth seconds. The firing of the entire thirty rounds took only forty-six minutes.

HINTS FOR AMERICANS—TRANSPORTATION IN SOUTH AMERICA.

BY C. E. ROST.

After an extended tour through South America, the writer is convinced that one important reason why American goods are so seldom seen is because we will not adapt ourselves to the transportation facilities on that vast and populous continent. In all but one or two of the many large ports of South America steamers anchor off shore and all merchandise is transferred to the small docks by means of lighters. This necessitates an extra handling of goods, and therefore stauncher packing, a very essential point. In many places goods are carried by natives or Indians, either on their backs or suspended from a pole which rests across the shoulders of two men. In this manner quite a considerable weight is often carried. I have seen cases weighing 400 pounds carried through the streets by two men; on one occasion I saw four men carry an upright piano. This, however, only holds good in the smaller cities; in the larger ones transportation is chiefly by wagons. It is into the interior, however, that most of the imports find their way, and as the continent is vast in size, the area of South America being equal to two and one-third times that of the United States, long distances must be covered, the method of transportation being as a rule to pack goods on the backs of burros. When we find horses they are of very small stature, excepting in the southern or colder sections, and these small animals have a limited carrying capacity. Roads being scarce, goods must be packed on the backs of these diminutive animals, and packages should not weigh more than 150 pounds, and even that is strenuously objected to in many localities.

In some sections of the continent, especially along the west coast, I found the modes of transportation strangely interesting and picturesque. These conditions vary in the different localities. Arriving at Mollendo, a port of southern Peru, through which pass practically all imports and exports of Bolivia, I found it was a most difficult problem to bring goods ashore on account of the rough waters, merchandise and passengers alike being hoisted onto the small dock by means of a steam crane. From here starts the great Arequipa and Puno Railroad, which has its terminus 317 miles away at Puno, on Lake Titicaca, whence merchandise is transshipped via steamer to Chililaya, in Bolivia, a country which has no seaport, having lost the province of Antofagasta some years ago. From here all goods are transported on the backs of burros, the typical donkey, for Bolivia is the home of this valuable pack animal. The burro will carry some 300 pounds on his back and travel day after day with but very little food or water. In the higher altitudes, and Bolivia is one of the highest inhabited countries on the globe, La Paz, the capital being some 12,000 feet above sea level, we find that graceful and invaluable pack animal, the llama, which will travel farther and with even less food than the burro, but will not carry more than 150 pounds. The llama resembles a camel, kneeling in camel fashion to receive its load, and it will not arise if more than 150 pounds are placed on his back; moreover, the weight must be evenly distributed over his back and sides.

LLAMAS USED IN TRANSPORTING GOODS FROM AND INTO BOLIVIA.

BURROS USED IN TRANSPORTING GOODS THROUGH PERU AND BOLIVIA.

Much complaint is made by the South Americans about the marking of cases. They should be marked in Spanish, the official language of all South American countries except Brazil, where Portuguese is

spoken. The contents of the case, giving the exact weight, net, tare, and gross, should be plainly marked. To these matters the English and German merchant, who control the South American trade, pay strict attention, and this is one of the reasons why they receive the preference.

Americans will not lay any strong hold upon the great South American trade so long as the existing conditions in those countries are not made the subject of more careful study. Their credit system does not appeal to us, for it is a long time credit, six months on the average, but European houses vie with each other in the persistent effort to control the rapidly-growing markets of South America. Commercially it is a land of present importance and great future promise. Two cities on the east coast have each a population of one million; on the west coast there are also many cities densely populated.

The objections to the credit system could be overcome, but we must first learn to pack our merchandise in small, light and strong cases, suitable to the conditions exacted by the unavoidable circumstances of primitive transportation. Although it is true that many railroads exist, and that several of consequence are in course of construction, this vast continent contains millions of inhabitants who depend absolutely on the burro and llama for transportation.

THE GREAT FLOATING DOCKS OF BERMUDA AND ALGIERS, LA.

BY ROBERT C. FYFE.

Particular interest attaches just now to the question of dry docks, on account of the fact that the "Illinois," the latest of our battleships to be put in commission, is now in drydock abroad, for the repair of serious damage done to her hull by running aground while she was on the European station. It was this fine vessel that was chosen to represent the United States at the great naval review at Spithead, which was organized as part of the ceremonies attendant on the coronation of King Edward VII. After the postponement of the review, the "Illinois" had the misfortune to run aground on rocky bottom and tear open the forward part of her hull, thereby flooding one of the forward compartments and rendering extensive repairs in drydock necessary.

This sudden crippling of our finest battleship will naturally direct renewed attention to the two great floating drydocks which have recently been constructed and placed in service. One of these, constructed for Bermuda, was built by Messrs C. S. Swan & Huster, of Wallsend-on-Tyne; another, which is now at Algiers, La., was built by the Maryland Steel Company at Sparrow Point. Both of these were designed by Messrs. Clark & Standfield, London. Although the Bermuda dock is actually the largest, the Algiers dock is the more powerful. It may be interesting here to institute a comparison between these two and also the old floating dock, which was towed out to Bermuda in 1869, and which is to-day one of the largest floating docks in the world.

	New Bermuda Dock.	Algiers Dock.	Old Bermuda Dock.
Length of dock	545 feet	525	381
Length of end pontoon	120 feet		
Length of middle pontoons	300 feet		
Width between fenders	100 feet		84
Width of pontoons	96 feet		
Height of vertical walls	53 feet 3 in.		
Length of vertical walls	435 feet		
Thickness of wall	13 feet 1 in.		
Total width of structure	126 feet	100 feet	123 feet 9 in.
Lifting power up to deck level	15,500 tons	18,000 tons	8,000 tons
Extreme lifting power	17,500 tons	20,000 tons	10,000 tons
Weight of hull	6,500 tons	5,850	

When it became evident that a new dock must be made at Bermuda the Admiralty were anxious to get an ordinary graving dock made. Borings were made, but everywhere the geological formation proved unsuitable for the purpose. The old dock was rendered obsolete, not from decay, but because ships have increased so greatly in weight and in dimensions.

The simplest definition of a graving dock (by which we mean the sunken or excavated type) is a hole dug out in the foreshore below high tide level, with its seaend closed by a caisson or gate. The vessel is floated into the excavation, the ends closed by a gate, and the water then pumped out. Similarly a floating dock may be defined as a box built of wood or steel, which is allowed to fill with water so that it sinks. The vessel to be docked is drawn over it, the water in it pumped out, and by its buoyancy it lifts the vessel out of the water.

The modern floating dock is "self-docking." This means that it is capable of taking itself to pieces and lifting any one part out of the water when necessary for cleaning or repair. This is a very necessary condition in a hot climate, where floating structures are exceedingly liable to have their bottoms incrusted with marine organisms and slime.

The new Bermuda floating dock consists mainly of five chief parts, comprising three pontoons and two side walls. The three pontoons form the bottom of the dock and are placed between the side walls; they form the main lifting portion of the dock. The two side walls are chiefly designed to give stability and to afford control over the dock in sinking it to take the ship on board; they also do some of the lifting work. The center pontoon is 300 feet long and is rectangular in shape; the two end pontoons are each 120 feet long and have each 70 feet of the length rectangular in plan, the outer portions being beveled off in a way that will facilitate towing. The side walls are each 435 feet long and 53 feet 3 inches high. For the purpose of admitting light and air under the bottom of a vessel when docked there are two large openings in each of the side walls. The ends of the side walls are beveled off to carry out the lines of the end pontoons. The vertical side walls are firmly attached to the pontoon bottom, being fastened by double fish-plates and tapered pins, to take which there are steel lugs built into the structure, both of the walls and pontoons.

The new Bermuda dock is both longer and heavier than any floating dock that has ever before been built. It is 545 feet long, and its clear width between rubbing-fenders is 100 feet. As the side walls are a little over 13 feet across, the total width of the structure is somewhat above 126 feet. The lifting power up to the floating deck level is 15,500 tons; but by using the shallow pound this can be increased to 17,500 tons. The weight of the hull is 6,500 tons. The sides or walls are high enough to enable a vessel of 32 feet draught to be berthed on the keel block, the latter being 3 feet 6 inches high.

The new dock is capable both of docking itself and also of docking a battleship or cruiser. Each of the side walls can be lifted separately out of the water, and each of the pontoons can be lifted separately, so that any portion of the dock can be examined, cleaned, repaired or painted as occasion requires.

For the docking of a vessel the dock is sunk to a certain depth by taking in water ballast; the ship is then floated over, and, the water being pumped out, the vessel is lifted out of the water, thus allowing of repairs being made in her under portions. The three pontoons are divided into 40 pumping divisions, and of these 32 are water-tight. The side walls have also 8 water-tight compartments in each. All these divisions are provided with a separate pipe each, with a valve. All the pipes on each side lead directly into the main drain of their respective side. There are four 18-inch centrifugal pumps in each wall, and any one pump can empty all the compartments in its half of the dock. If the whole of the pumping machinery on one side were to break down, the other half could still empty the dock, though, of course, at a slow pace. The pumps are driven each by a separate compound condensing engine directly attached.

Although the new Bermuda dock exceeds the Algiers structure in length by 20 feet and in weight by 650 tons, the latter has greater lifting capacity. It recently lifted the United States battleship "Illinois," a vessel of 11,565 tons displacement. Up to positive level it will raise 18,000 tons, and if the "pound" be utilized the capacity could be increased to 20,000 tons.

The battleship "Sans Pareil" was selected to test the new dock. This battleship is a sister ship to the ill-fated "Victoria," rammed by the "Camperdown" in the Mediterrean in June, 1893. She is 340 feet long and 70 feet wide. Her armor is 18 inches, tapering to 16, and she carries ten 16¼ 110-ton guns in one heavily armored turret well forward. These guns are the largest carried in any fleet. The "Sans Pareil" entered the dock about 12 o'clock, and she was then drawing about 27 feet 4 inches.

At a little after 2 o'clock the pumps were started and they were kept at work until the battleship was lifted out of the water and the pontoon deck was high and dry. The lifting of the "Sans Pareil" took about an hour, and the port guardship at Sheerness was then towed back to her moorings. During the docking care had to be taken that both sides of the dock rose equally, and on this occasion all fortunately went well.

The new Algiers floating dock recently successfully lifted the United States battleship "Illinois," of 11,565 tons displacement, and a word may be said here as to the different methods employed for docking vessels in the British and American navies. The American plan is to attach to the bottom of the ship exterior longitudinals or stout side keels. Rows of blocks are placed for these in the dock, as well as the usual blocks for the central keel. The vessel then sits upright on level blocks and requires no shoring except for centering. The British method is to poise the ship on her keel and prop it up by a large number of raking struts and bilge shores. The former plan certainly saves time, and it is stated that the docking keels have no appreciable effect on the speed of the ship with which they are built. Those who are against the American plan argue that as a ship passes very little of her time in dry dock it is better that such a weight should be at rest in one drydock than that hundreds of ships should have to transport the burden all over the world.

In certain quarters there has been, and is perhaps still, a prejudice against floating docks, but the successful docking of the "Sans Pareil" and the "Illinois" in the two new great docks should do much to convince critics that the floating dock is capable of performing any work that may be required of it. It would perhaps surprise many people to hear what an amount of sea these docks can stand. Floating docks have been moored in the open Pacific for a number of years, and we learn that they have succeeded in dealing with vessels in quite a respectable swell. The two floating docks of this type have often been at work in bad weather when the graving docks in the vicinity have been unworkable.

London, Eng.

British Trade.

Notwithstanding the heavy competition which Great Britain is experiencing in the shipbuilding industry, according to the recent issued official statement of navigation and shipbuilding, the United Kingdom is easily holding its own in this ramification of trade. During 1901 775,681 tons of vessels were built in British yards, being an increase of 40,000 tons over the tonnage for the previous year. The total tonnage of British merchant shipping in 1901 was 9,524,496 tons, or 130,000 tons in excess of what it was in 1900. Vessels totaling over 200,000 tons were built for foreign buyers. A very comprehensive estimation of the extent of British shipping may be gathered from the fact that during 1901 more than one-half of the total imports were brought on British vessels, and two-thirds of the exports were carried on vessels flying the English flag.

Wreck of the World's Largest Locomotive.

The huge locomotive recently built for the Santa Fé Railway to haul freight over the Step Raton Mountain Road, was wrecked on July 29. In company with two other engines the giant locomotive was taking a very long train over the mountains. Three times the train broke in two. When the last break came the long train started to back down the steep grade and the giant locomotive was unable to hold it. The brakemen, after having tightened every available brake, were finally compelled to jump for their lives. After a mad downward plunge of three miles the train jumped the rails on a bridge, 50 feet high, near Seymour. The engine and all the cars plunged down the cañon. The engine is the largest freight engine in the world.

The Krupps and the St. Louis Exposition.

News comes from Berlin that the Krupps have refused to exhibit at the St. Louis Exposition because the United States did not purchase the great gun which they sent to Chicago in 1893. Whether any reliance is to be placed upon this piece of information cannot at present be determined. At all events it cannot be denied that since it is against the policy of this country to confer decorations, many exhibitors will have nothing to show for their trouble. It is suggested that Emperor William recognize the best German exhibitors by bestowing orders upon them. No doubt this would overcome a difficulty which may hamper the officials of the exposition.

The Current Supplement.

The current SUPPLEMENT is opened by a well-illustrated article on the French sardine industry. The passage of the Panama Canal Bill has been of interest not only to Americans, but also to Europeans. For that reason a discussion of the canal from the English point of view is timely. An article written from such a point of view will be found in the SUPPLEMENT. Dr. Marcus Benjamin has prepared a digest of the public lectures read at the American Association for the Advancement of Science. "Counterfeiting and Counterfeiting-Protecting" is the title of a paper which tells much that is probably new to the general public. Mr. Howard Crosby Butler writes on the "Sculpture of Northern Central Syria." His paper is illustrated by photographs. Two natural history articles, the one on "The Dragon-Fly's Flight and the Means of Its Accomplishment," and the other on "The Nesting Season of Birds of Prey," are both entertaining and valuable. Just now the claims of rival inventors in the field of wireless telegraphy are attracting much attention in the daily press. Consequently a very exhaustive and very fully illustrated paper on the "Paternity of Wireless Telegraphy" is of rare interest. The miscellaneous notes and consular information will be found in their usual places.

A portable garbage crematory, the invention of Morgan J. Cragin, of Chicago, was recently tested at a New York apartment house. One of the features of the apparatus is the employment of a grate constructed of hollow piping, by means of which it is possible to combine the disposal of the garbage with the heating of water. In this manner it is possible to use garbage as a fuel.

Sir John Aird announces that the last coping stone of the Nile Dam at Assouan was laid on July 30.