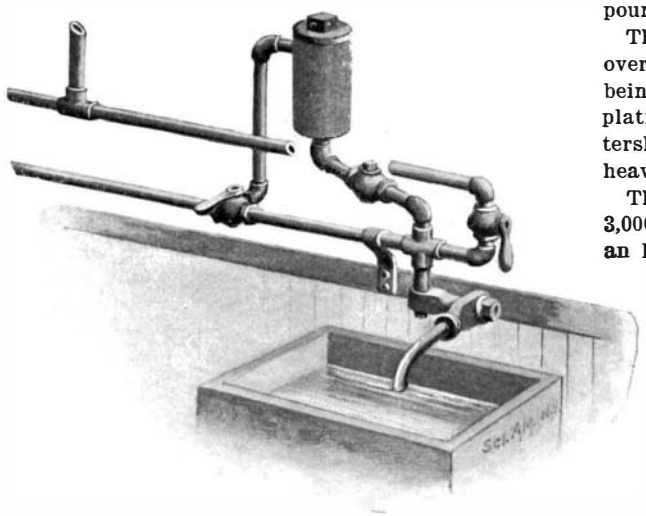
trate his system in London. Unfortunately there was really no necessity for the invention in those days. An invention to be of use must come at the proper time. There must be the want for it, otherwise it died. This accounted for the fact that the system of wireless telegraphy, which was now associated with the name of Lindsay, had been neglected.

A SOAP-DELIVERY ATTACHMENT FOR WATER PIPES.

A simple invention, patented by Charles R. Walker,



A SOAP-DELIVERY ATTACHMENT FOR WATER PIPES.

of Jamestown, N. D., provides a means whereby soap or water mixed with soap can be delivered at a kitchen sink. The inventor employs a double T or four-way coupling, which is connected with a hot-water supply pipe and with a cold-water supply pipe by means of its two horizontal arms. With the upper vertical arm of the T a pipe leading from a soap receptacle is connected. The soap receptacle is likewise connected by a pipe with the hot-water supply pipe, the pipe at its junction with the hot-water line being provided with a three-way valve. The lower vertical arm of the four-way T is connected with a pipe having a nipple and a discharge faucet adjustable relatively to the lower vertical arm of the T. All of the pipes are valved. By a proper manipulation of the valves it is possible to permit cold water, hot water, hot and cold water, hot water and soap, cold water and soap, or hot and cold water and soap to flow through the faucet.

A CALIFORNIA MARINE RAILWAY.

BY ENOS BROWN.

The first marine railway yet installed upon the Pacific coast has just been completed at Oakland, Cal. It is one of the Crandall type and is used in a shipyard for hauling vessels out of the estuary, when repairs below water-line are required. It has been in use for several months, and has proved expeditious and efficient. The railway itself consists of a platform 255 by 76 feet, resting upon trucks running upon four tracks, which themselves rest upon three tiers of pine timbers. The rails are flat, the inside 1⅜ by 10 inches and the pair outside 1⅜ by 5 inches in dimensions. There are seventeen standards on each side of the cradle, the bilge blocks, sliding on rails, being worked by a small winch on top of the standards. Patent relieving bilge blocks, which are released by a small wrench, are used. The total length of track is 700 feet, ending in 30 feet of water and inclining at an angle of 1 in 22.

Four chains 570 feet long are employed in hauling the cradle. Each link is 8 inches long and made of 21-16 iron. The power for raising and lowering the marine tramway is supplied by duplicate engines, working on a main shaft 12 inches in diameter. The engines have a stroke of 18 inches, with cylinders 14 inches in diameter. Together they are of 240 horse power, and they are geared up to 2,000 horse power. The foundations are of massive concrete resting upon piles driven to a great depth, and in large numbers. Steam is supplied by the boilers of the shipyard. The entire iron work of the engines is of the most solid and massive character, the main gears being 11 feet in diameter with a 14-inch face, the two weighing 24,000 pounds. They work at an average of 160 revolutions.

The endless chains for hauling up the platform pass over a gypsy, cast-steel, sprocket wheel, each link being caught as the wheel revolves. The speed of the platform is controlled by brakes acting upon the countershaft. These are used only when descending with heavy loads.

The railway is capable of hauling out a vessel of 3,000 tons' displacement. The largest yet handled was an English bark weighing 1,500 tons with 300 tons of load, making a total weight of 1,800 tons. This vessel was lifted in 20 minutes.

The terminus of the railway is 10 feet below the channel of the stream. The vessel to be docked is brought between two massive blocks of piles, which mark the situation of the cradle when under water. With the keel resting upon the center blocks the bilge blocks are worked up to the sides and the ship is secured.

It is claimed that this method of docking vessels is superior to the drydock, or the ordinary ways, inasmuch as the frame is subjected to less strain and much time is saved. An advantage is also secured in the easy operation of the machine.

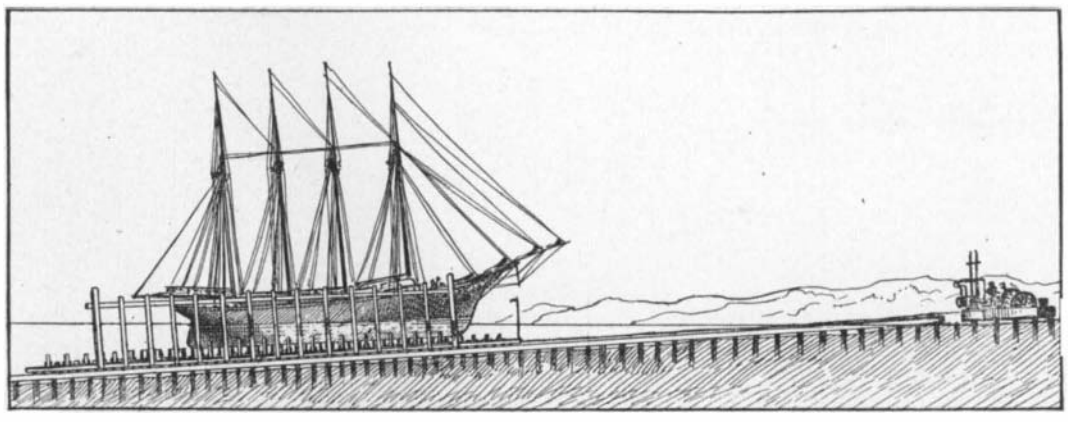
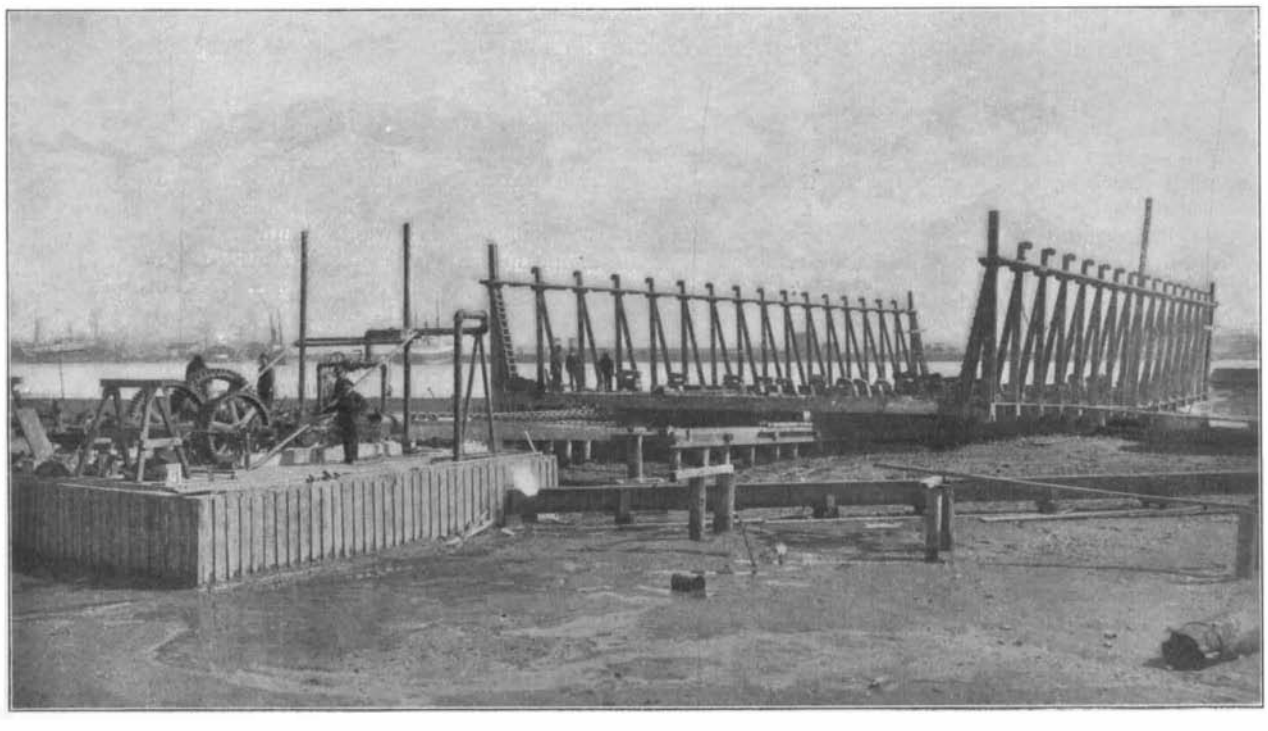


Diagram Showing Vessel Floated Into Cradle and Being Hauled Out by Stationary Engines on Shore.



The Hauling Engines and the Cradle.

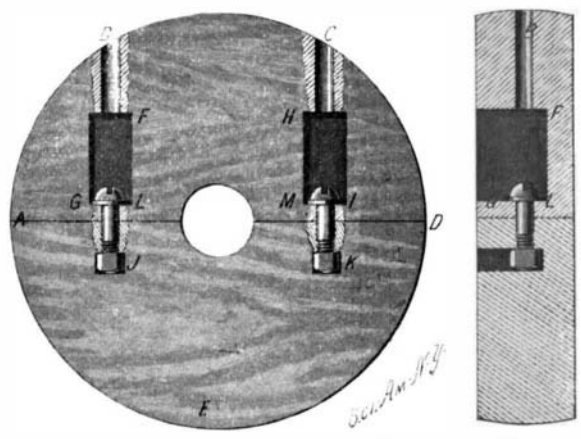
A CALIFORNIA MARINE RAILWAY.

HOW TO MAKE A SIMPLE SPLIT PULLEY.

Sir Charles B. Elliott, general manager of the Cape Government Railways (South Africa), recently paid a visit to this country and called upon the editor of the SCIENTIFIC AMERICAN, and he described an easily constructed split pulley which he had built, and he has given us the following description:

Take two pieces of hard wood and saw them into two semicircular disks, *A B C D* and *A E D*. The diameter, *A D*, may be 15 inches or any other diameter that may be required. The thickness of the wood may be 3 inches, or any other suitable thickness.

Make two rectangular holes about 3 x 1 inches in the upper disk, *F G* and *H I*. These holes should be just large enough for a 3-inch bolt to slip in easily. In the lower disk, *A D E*, cut two holes, *J*, *K*, about 1 x 1 inch, just large enough for the nut of a 3-inch bolt to slip in, so that when the bolt is screwed into it the nut will not turn round. Bore a ½-inch hole between *F G* and *J*, and another between *H I* and *K*, so that a 3-inch bolt may be inserted in *F G* and screwed into the nut at *J*. Bore a hole from *B* to *F*, large enough for a narrow screwdriver to be inserted, so as to screw the bolt into the nut. For this purpose the square edges under the head of the bolt should be filed or turned down, and the head of the bolt should have a slit sawed into it with a hack-saw, to receive the screwdriver. An iron washer, *L*, should be inserted under the head of the bolt. A similar hole



AN EASILY CONSTRUCTED SPLIT PULLEY.

should be bored at *C*, and another bolt screwed into the nut at *K*, with a washer, *M*, under the head of the bolt.

Before finally bolting the two disks together, it is well to place either a piece of veneer or a piece of thin pasteboard between the two disks. When they are firmly bolted together a hole should be bored in the center, the exact diameter of the countershaft on which the pulley is to run. The two disks may now be separated, the veneer or pasteboard removed, and the two disks should again be firmly bolted together on a mandrel the exact size of the countershaft, placed between the lathe centers, and be turned up to the exact dimensions required, rounding off the edges, and finishing with sandpaper. A side view of the finished pulley is represented in the engraving. The disks may be again separated and bolted onto the countershaft.

If the pulley is required to have two or more steps, four instead of two bolts may be used; and these will be sufficiently strong to hold the pulley firmly to the countershaft.

Nature of Lightning.

K. R. Koch (Physikal. Zeitschr.) has found that lightning conductors whose connections have become imperfect through rusting or otherwise, act, nevertheless, in quite an efficient manner in the case of a thunderstorm. This is, in his opinion, due to the oscillating character of lightning discharges. Electromagnetic waves are produced, which act upon the imperfect connections as upon a coherer, restoring their conductivity for a more or less long period. Lightning has hitherto been considered a continuous discharge, which often becomes apparently oscillatory by quick repetition. The author employs a rapidly revolving camera in order to test this question, but does not arrive at any definite conclusion, as the flashes photographed were all too distant.

One of the largest American manufacturers of street and railroad cars is to build a factory in England.