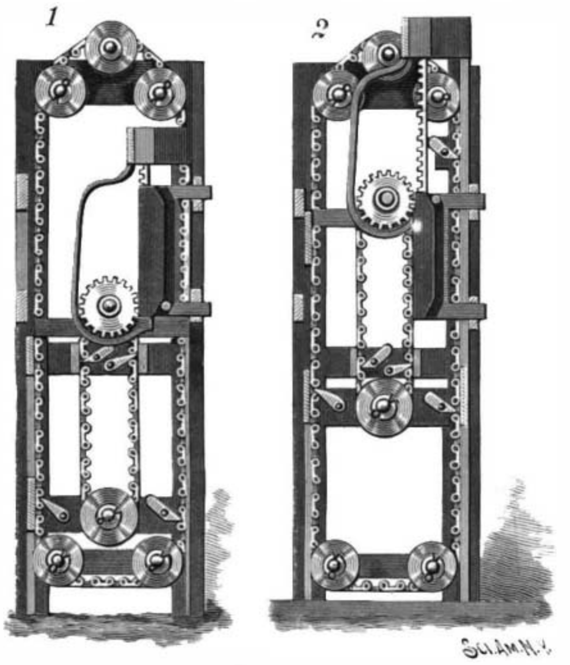
A NEW TIDE MOTOR.

The main difficulty with tide motors is that at the ebb and the flow of the tide there are two points at which the motor is forced to stop. This defect in tide motors is obviated in the invention of Mr. Silas P. Tomkins, of Tilly Foster, N. Y., which is adapted to give a continuous motion to the shaft irrespective of the period when the motor is inactive. The power for the purpose of imparting motion to the shaft during the period of rest is practically stored up by the motor during the period of action of the tide. A casing of



TOMKINS' TIDE MOTOR.

any approved construction is erected over the tidal flow, and is adapted to receive a slidable cage which travels in the casing and is actuated by a float which rises and falls with the tide. At the top of the casing are three chain wheels, the center one being secured to a shaft from which the power is taken off. There are two chain wheels at the bottom. This arrangement is duplicated on both sides, so that there are ten chain wheels in all. Over these chain wheels pass chains which are engaged by pawls secured to the cage. The pawls are given an inclination in opposite directions, so that uniform motion in one direction is given to the shaft whether the cage ascends or descends. There are bars fixed across the casing which secure pawls which engage shorter chains which pass around two wheels secured to the upper and lower parts of the cage. To the shaft of the upper cage wheel is secured a pinion which engages a rack which is adapted to move a weight which is secured to it. The rack runs in a groove in a frame which is secured to the casing in such a manner that it slides laterally, so as to bring the rack into communication with the pinion, which is accomplished by a pin which is an integral part of the movable cage. It will be seen by the nature of the channel in which the pin runs that, at the top and bottom of the stroke, the pin forces the rack out of engagement with the pinion. At the up stroke the pawls engage the chain, causing the pinion to revolve and, consequently, the rack to move upward, carrying the weight with it until it reaches the highest position shown in our Fig. 2. There is then an interval of time before the tide ebbs. The rack has been forced out of engagement and the pawl on the weight catches the chain and by force of gravity turns the shaft through the medium of the chain and chain wheels. When the cage begins to descend, the pinion again meshes with the rack, the pinion being turned by the chains which are caught by the pawls on the fixed bar. This motion of the pinion causes the weight to remain stationary while the cage is descending, the condition being shown in our Fig. 1. When the cage reaches its lowest point, the rack is disengaged, the weight drops down the same distance as before, keeping up a continuous motion, and when the cage begins to ascend, the pin and rack engage and the weight is raised to its highest position and the operation is repeated.

THE LARGEST FLOATING DOCK IN THE WORLD.

The great floating dock recently constructed for the Vulcan Company, Stettin, Germany, by Messrs. Swan & Hunter, of Wallsend, Newcastle-on-Tyne, surpasses in capacity the floating dock built by the same firm for the Spanish government and now in operation at Havana. We illustrated the Havana dock in our issue of October 6, 1897, and the remarkable achievement of towing it successfully across the Atlantic Ocean is fresh in the public mind.

The present dock, like its predecessor, was built from the designs of Messrs. Clark & Standfield, of Westminster, the well known dock engineers. It has been constructed with special reference to the lengthening and re engining of two of the Atlantic liners of the North German Lloyd Company.

The principal dimensions are: Length over all, 510 feet; extreme breadth, 110 feet 9 inches; height from bottom of pontoon to top of walls, 43 feet 7 inches. The internal width is sufficient to allow vessels up to 82 feet beam to be docked, and the depth over the keel blocks is 24 feet. The maximum lifting power is about 12,000 tons.

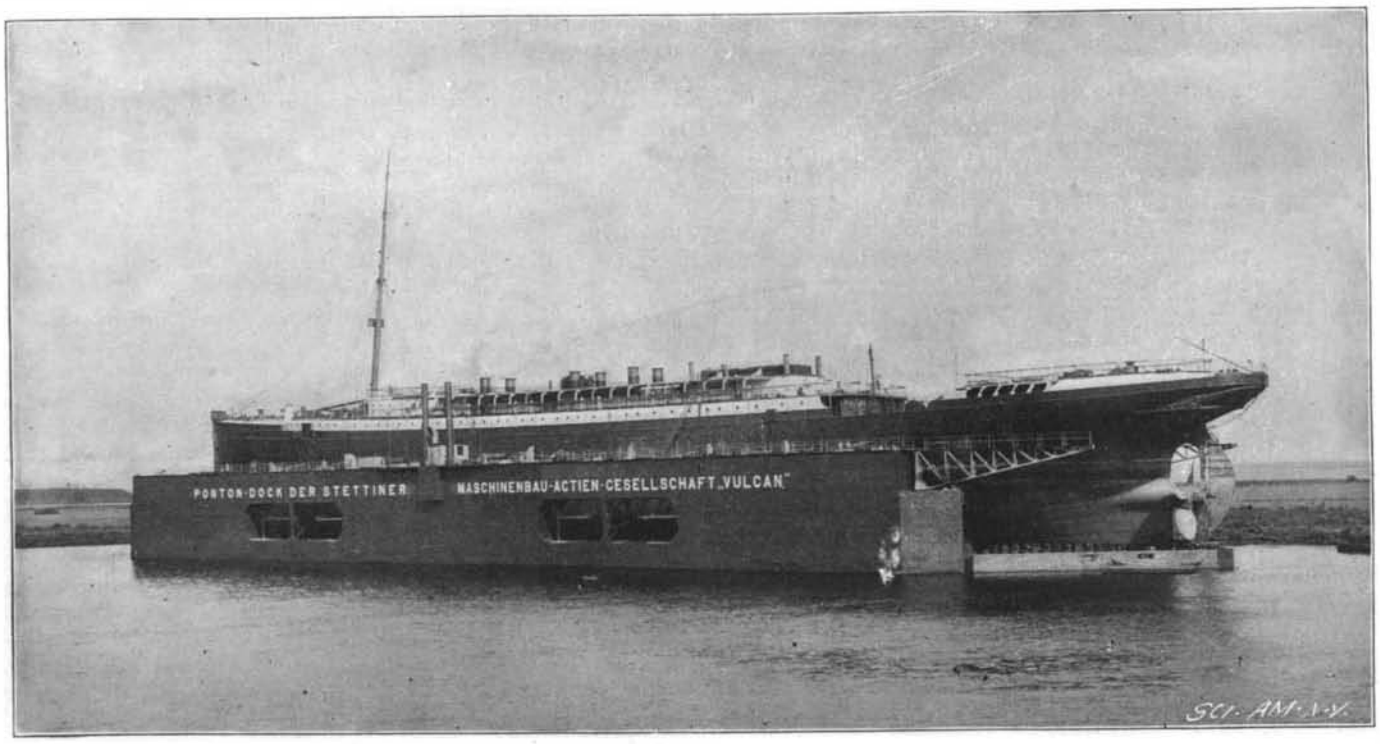
The dock is what is known as the self-docking type, that is to say, access to all the external surfaces is possible for painting or repairs. Longitudinally it consists of two side walls, between which are connected three pontoons, the center one being 240 feet long, and the two end pontoons 135 feet. The pumping and controlling machinery consists of eight horizontal centrifugal circulating pumps, placed four in each wall of the dock. These pumps have large vertical shafts, geared by means of bevel wheels and horizontal shafts to two sets of compound engines of 125 horse power each, which are placed on a deck near the top of the walls. There are four engines in all, and each of them drives two 15-inch centrifugal pumps, the whole machinery being capable of lifting a ship of about 11,000 tons displacement clear of the water in about two and a half hours. The dock is divided into 38 watertight compartments, each emptied or filled by separate valves. Each engine is supplied by a large, horizontal multitubular marine boiler which is placed in the walls in close proximity to it.

The main line of suction pipes is laid at the bottom of the pontoon walls, and runs the entire length of the same. Branches are carried through the walls into the pontoon itself, connection being made by means of flexible joints. The valves for regulating the emptying and filling of the dock, of which there is of course a great number, due to the subdivision of the pontoon, are all manipulated by means of rods and levers from central houses placed one on each wall. From this position also the engines for driving the pumps can be started or stopped at the will of the engineer in charge. The whole of the controlling gear is so arranged that two men, one on each wall, can control the pumping gear of the entire structure.

We have referred to the Stettin dock as being a self-docking structure. It is so named because of the facility with which all parts of the structure can be got at, if desired, for painting, etc. Each pontoon can in turn be detached, lifted, and hung up on the side walls, and while it is in this position any part of it may be examined and repairs, etc., carried out. The underneath portion of the walls, moreover, may be exposed by careening the structure; in fact, any work may be done upon the dock that in any other floating structure would necessitate a visit to a drydock.

In docking a ship, the dock is sunk until the upper floor of the pontoons is well below the level of the ship's bottom. The ship is then floated in between the walls and secured in the desired position. The pumps are then started, and as the buoyancy of the pontoons increases, they lift the vessel steadily out of the water.

The advantages of this form of dock are that its first cost is far less than that of a first-class graving dock; it may be moved to any desired position when the depth of water is sufficient for its operation; it may be built and towed many thousand miles, as in the case of the Havana dock, to its destination, and as compared with the timber docks, it is more reliable and durable.

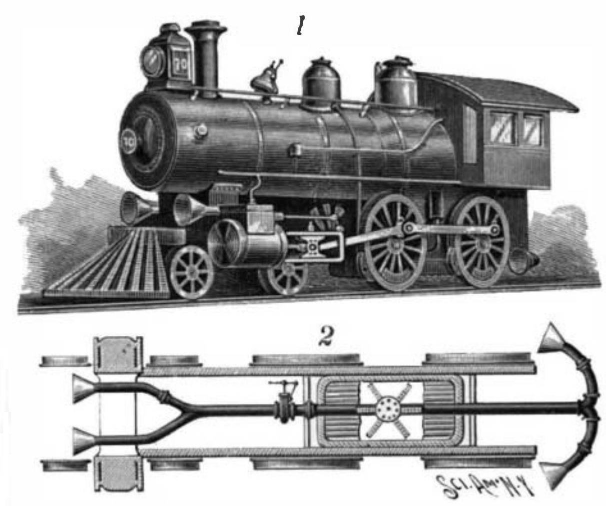


STETTIN FLOATING DRYDOCK, CARRYING THE NORTH GERMAN LLOYD STEAMSHIP "SPREE."

Dimensions of Dock: Length, 510 feet; extreme breadth, 110 feet 9 inches; height, 43 feet 7 inches. Lifting power, 12,000 tons.

DRAUGHT ATTACHMENT FOR LOCOMOTIVES.

Our engraving represents a new draught device for locomotive engines invented by Mr. Michael Kelly, of Bloomington, Ill. In this arrangement funnels are mounted on the forward end of the locomotive and also at the rear of the driving wheels, extending outside the same so that the air will have free access to them. The funnels open forward and are each connected with an air pipe which conducts the air into the ash pan, where they are connected with a T. From this T a vertical pipe extends upward and is surmounted by a



DRAUGHT ATTACHMENT FOR LOCOMOTIVES.

series of pipes extending radially which are perforated upon their upper surface so as to discharge the air beneath the grate. The forward section of the air supply pipe may be closed by a valve or damper which may be closed when desired. When this device is in use, the dampers of the ash pan are preferably closed and the flow of air through them prevented, but, if desired, the dampers may be opened, so as to admit an additional quantity of air. When the locomotive is running, the air is forced through the funnels and directed into the firebox in a strong stream, causing a rapid combustion of fuel upon the grate. The device has been tested on the Chicago and Alton Railroad by Mr. H. Monkhouse, superintendent of machinery. Engine No. 86, in running 5,860 passenger miles, used 233 tons of coal, or $25\frac{15}{100}$ miles per ton, while engine No. 170, fitted with Mr. Kelly's device, ran 1,810 passenger miles with 38 tons of coal or $47\frac{63}{100}$ miles per ton. The same engine, in running 1,263 freight miles, used 68 tons of coal or $21\frac{51}{100}$ miles per ton. The total average was $28\frac{99}{100}$ miles per ton for the 3,073 miles run. The engines were both in good order. There was also less back pressure with the new draught mechanism and it admitted of working more steam on a hard pull.

IT is stated that Alberto Ricci, of Turin, has discovered that solution of hydrogen dioxide rapidly disintegrates hardened masses of cerumen in the ear. A small quantity of the liquid is poured in, allowed to remain a few moments, and the passage is then syringed with water.