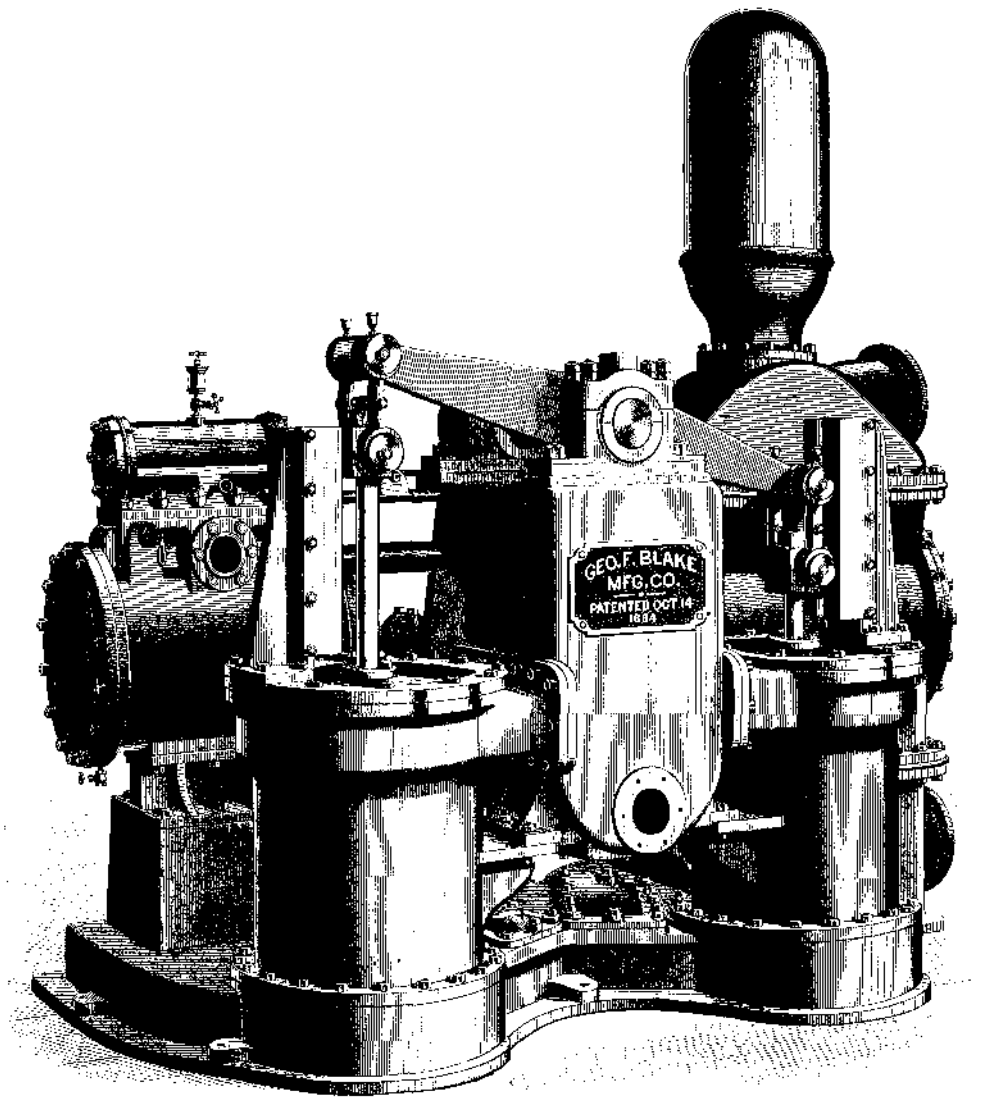
INDEPENDENT AIR AND CIRCULATING PUMPING ENGINE FOR THE UNITED STATES CRUISER CHICAGO.

The practice of using independent air and circulating pumps for marine engines was inaugurated some years ago to a limited extent in the merchant marine, but it was never carried into use in large sea-going vessels until the Naval Advisory Board took up the subject for consideration, and finally adopted this system for the new cruisers and naval dispatch boat which are being completed.

This system of divesting the engine of all pumps of every character is a great stride in economy and simplicity, as will be shown by a rehearsal of the advantages as below. It has been the common practice for many years to make the circulating pump an independent machine, either a direct acting or a centrifugal pump. Bilge pumps and feed pumps were also detached from the engines and made independent, and finally nothing was left but the air pump connected to the engine. It has now been found that to work the air pump independently is even of greater advantage. Briefly stated, the advantages gained by the use of independent air and circulating pumps are as follows: They work much more economically than connected pumps. The pump speed can be accurately regulated, according to the requirements of the main engines and the temperature of the circulating water, which latter, of course, varies with the season and climate. Pumps always work more efficiently at relatively low piston speeds; consequently, a slower speeded independent pump is much more efficient than one connected to the main engine, running at a higher rate of speed; in other words, there is much less loss by "slippage," the pumps performing nearer to their theoretical capacity. Combining the air and circulating pumps is an advantage, for the latter serves as a regulator to the former, inasmuch as it produces a steadier action, as the load on the air pump varies with the travel of the piston during its stroke. The vacuum can be maintained in the condenser while the main engines are stopped, simply by keeping the pumps traveling slowly. This is a matter of considerable importance, especially in war vessels when maneuvering, and in merchant steamers where they are continually stopping and starting during foggy weather. The vacuum being always kept up, the engine can be promptly started, and there is no danger of getting the condenser hot while the main engines are stopped. This is an incalculable advantage in ferry boats, as has been proved by the late tests on the Pennsylvania Railroad Company's boat Baltimore, a trial trip of which was reported in our columns a few weeks since. The air and circulating pumps can be used as wrecking or bilge pumps, and as their capacities are so vastly in excess of the ordinary pumps of the vessel, they become very important adjuncts to a vessel's safety. Many an engine has been broken down at sea from the air pumps not being able to withstand the racing of the engine.

The illustrations here given represent the arrangement of independent air and circulating pumps, as constructed by the Geo. F. Blake Manufacturing Company for the engines of the U. S. cruiser Chicago, a twin screw vessel of 5,000 indicated horse power.* There are two of these independent air and circulating pumping engines, one for each of the engines of the vessel.



PUMPING ENGINES FOR U. S. CRUISER CHICAGO.

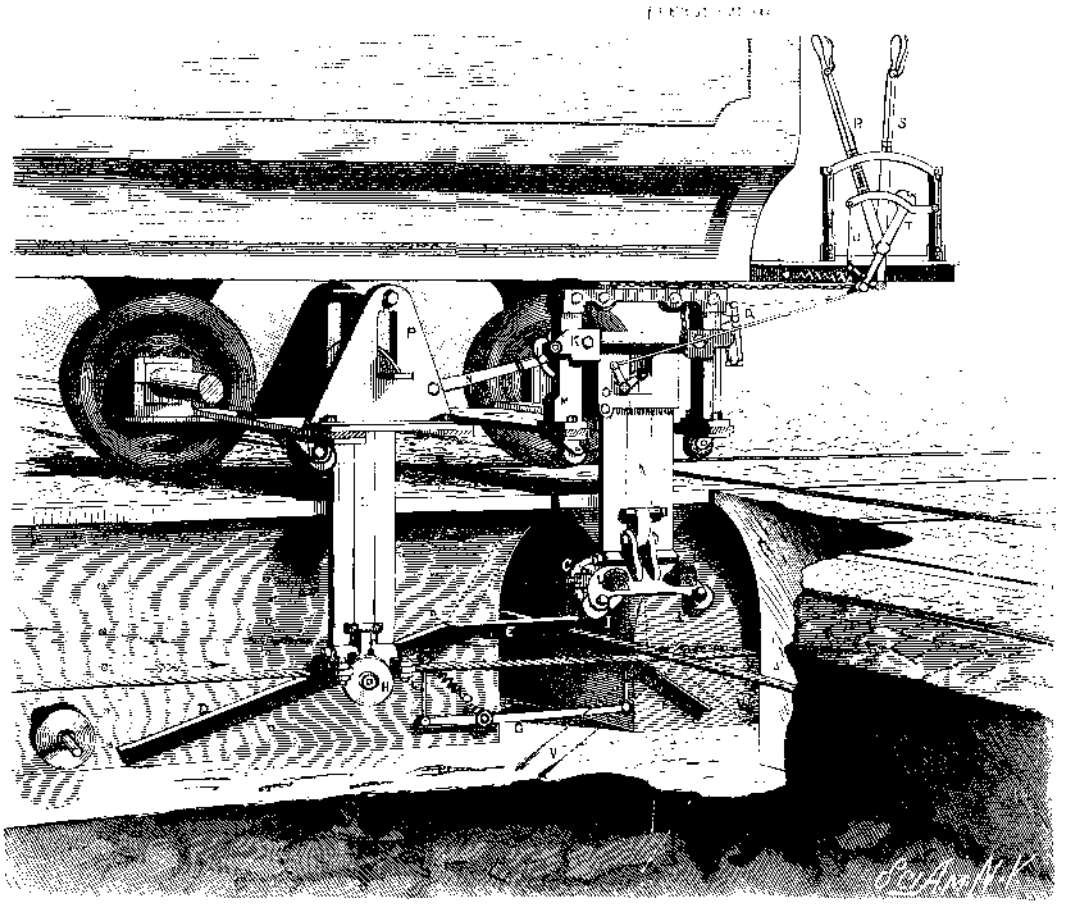
As will be readily understood by reference to the accompanying engraving, the combination is that of a double-acting horizontal circulating piston pump with two single-acting vertical air pumps. The circulating pump piston is connected directly to the piston of the steam cylinder; the buckets of the air pumps are operated from each end of a working beam, which receives its motion from a lever arm connected by a short link to the crosshead of the piston rod. The dimensions of each of these pumping engines are as follows: Steam cylinder, 20 inches diameter by 24 inches stroke; air pumps, each, 24½ inches diameter by 21 inches stroke; circulating pump, 26 inches diameter by 24 inches stroke; the capacity of circulating pump per minute, 55 ga lons; diameter of injection pipe, 15 inches; diameter of discharge pipe, 14 inches; single strokes per minute, 40 to 60. It might be well to state that the dimensions of the cylinders of each of the engines of the Chicago are as follows: High pressure steam cylinder, 45 inches diameter by 52 inches stroke; low pressure steam cylinder, 78 inches diameter by 54 inches stroke. The engine will run 75 revolutions per minute, and show 2,500 indicated horse power.

The air and circulating pumps of the Dolphin are practically duplicates of those for the Chicago.

* For description of this cruiser and Dolphin, see SCIENTIFIC AMERICAN of December 22, 1883.

NEW METHOD OF GRIPPING AND CROSSING CABLES.

The accompanying illustration represents a mechanism consisting of two grips, the first of which seizes the cable to propel the car ordinarily, while the second seizes the cable during the passage of the first one over a crossing cable. As the forward grip approaches another cable, which may cross the first one at any angle, the carrying pulleys run up an inclined plane, automatically close the back grip upon the cable, and release the forward one; the car is then propelled by the back grip. As soon as the front grip has passed the crossing cable, it falls in position over its own cable, which it is made to seize by a lever, when it again propels the car. The back grip, passing up the inclined plane, frees itself from the cable, and, passing over the crossing cable, drops in position with its jaws open over its own cable ready to be called into action at the next crossing. With this grip it is easy to switch from the cable of one road and go upon the cable of another running at right angles or at any other angle to the first. The action is positive all the time, thereby rendering unnecessary the dependence upon momentum to carry the cars anywhere when the grip is loosened from the cable; curves are rounded easily and without trouble.



RAMSDEN'S METHOD OF GRIPPING AND CROSSING CABLES.

The frame supporting the parts consists of bars extending beneath the car from axle to axle, and united by cross bars. Firmly secured to two of the cross bars are two vertical hollow slide posts, M, connected at the top by a cross girt, in each end of which are two pulleys. Under the posts are pulleys placed in line with the outside ones on the cross girt. A cross head, K, formed with rectangular slotted ends, slides vertically between the posts. Chains pass from each end of the cross head around the lower pulleys, through the posts and over the upper pulleys, to adjustable eye bolts, thus forming a parallel motion for the cross head, which is reciprocated by operating the lever, S, to the lower end of which it is connected by a chain. A link is fitted at its top end to oscillate freely on the central cylindrical part of the cross head.

The lower end of the link receives the ends of a forked plate, of proper thickness to pass freely through the slot of the conduit; the joint is so formed as to permit the plate to oscillate in the link, thereby allowing of side motion of the car while rounding curves, etc., without its materially affecting the passage of the plate through the conduit slot. The closed end of the plate is curved backward and dovetailed across its face, to receive a friction block; below the dovetail it is bent still further back to serve to guide the cable to its grip when the latter falls to the normal level of the cable. On one side of the plate is a roller, C, for carrying the grip up the inclined plane, D, in the conduit. On each side of the lower part of the grip are horizontally placed rollers so disposed as to be opposite the strain of the motor when rounding curves to the right or left. At each end is a carrier pulley for carrying the cable while the car is stopped.

A short plate of sufficient thickness is dovetailed to correspond with the dovetail of the vertical plate, to which it is hinged by a bolt; the short plate fits snugly between lugs on the other, and projects above and outward from them. The end of the projection is forked to admit one end of a link, whose other end is joined to a plate, A, sliding freely between the forks of the vertical plate. The upper end of the sliding plate, A, is connected with bell cranks having their fulcrum pin in the top of the vertical plate. The opposite end of the bell cranks is attached to a rod leading to the lower end of the lever, R, by means of which the short plate or movable jaw can be operated,