all being employed. Inside the extension of mast and fastened to the base of main frame, a light four and one-half (4½ inch) inch brass tube is connected, forming a water conduit, carrying at its upper end a hydraulic packing joint, working inside mast extension and which tightens up under pressure.

This arrangement entirely obviates the accumulation of dead water in extension of mast, which in winter time might freeze and incapacitate the machine from service.

The manipulation of the tower is accomplished by a Pelton water wheel, placed on the body of the truck. This wheel is reversible, working both ways, two jets being used moving in opposite directions and controlled by a three-way valve. A lever in the hands of the fireman in charge enables him to shut off entirely, or open either jet.

The tower proper is raised by means of right and left-handed worms working segmental worm gears fastened to base of mast proper. By this means the tower is locked in all positions the moment the motor stops.

An unusually strong feature of the tower is, that it will operate at an angle of 35 degrees either way of the perpendicular and can be swung backward or forward through said angles while delivering its stream and at all pressures. To render this innovation possible, the water conduit connection between base of mast and main supply is made on the ball and socket joint principle, said joint being axially in line with the center line through trunnions of mast. When the tower is raised to an approximate vertical position, the fireman detailed for this purpose simply locks the segmental threaded connection between the main supply, previously mentioned, and ball joint of mast, by one-third of a turn. The advantage of the swinging mast is that an entire front of a building can thereby be covered, as the mast, when swinging through its entire arc oscillation of 70 degrees, will cover a frontage of no less than 90 feet.

The nozzle is at all times in a position to throw a stream clear through a building to the rear, a feat impossible when merely rotating the nozzle as in other towers. However, the nozzle on the Gorter tower also possesses a rotary movement to its vertical axis.

The second main feature is that the extension of the mast is both raised and lowered by the water motor, and can at all times be raised and lowered while the tower is in action, by which means the stream can be instantly changed from the eighth to the third story, and *vice versa.*

No tower heretofore built has or does embody this feature. Of course by raising or lowering the nozzle, the stream from this tower can be deflected up or down, but the same objection holds good in this case as that which exists when rotating a nozzle horizontally; namely, that a stream thus deflected fails to reach the rear of a building and consequently loses much of its usefulness.

The raising and lowering of extension of the mast is done by means of two test chains running over two chain pulleys, fastened to two worm-geared wheels mounted in base of mast proper. These test chains run over idlers fastened to upper head of mast and connected with base of mast extension at both ends, thereby forming endless chains, which raise or lower "mast extension" as the chains are pulled up or down.

These worm-geared wheels are operated by worms which are in turn worked by an internally meshed gear connected by intermediate gearing on a vertical shaft driven through a knuckle joint. And the continuation of said shaft is connected by means of a clutch with the motor.

The knuckle joint works axially in line with center line through trunnions, so that it will work through any operative angle assumed by the tower.

The clutch connecting motor with mechanism for raising and lowering the extension is so connected with a corresponding clutch working mechanism for operating main mast, that by engaging one, the other becomes disengaged, thus avoiding danger of accidents.

Another strong point is, that the up and down movement of the nozzle at the top of the extension is effected through a ball and socket joint and operated from below by means of a hollow shaft, and an octagonal extension in same, to which is connected a worm working a segmental gear fastened to the nozzle proper. This feature entirely eliminates the danger of mishaps caused from bursting hose. The nozzle being mechanically connected, can at all times be maintained in any desired position, as it is not dependent on the pressure to raise same as when hose is used. In latter case, when hose is used as in other towers then the elevating of the nozzle depends on the tendency which hose has to straighten out under pressure. The Gorter tower is not thus handicapped.

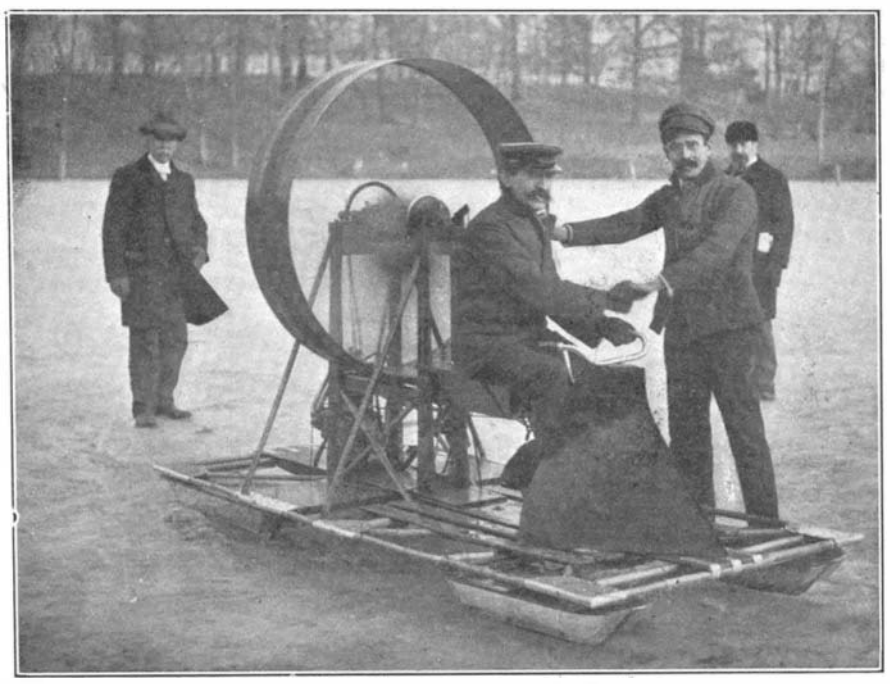
The truck of the tower proper carries a receiver having eight 3-inch inlets and surmounted by an air chamber, the latter being necessary to minimize excessive pumping vibration. In addition there is carried on forward part of truck a Gorter Monitor battery, also telescopic and attaining a height of ten feet from ground when fully extended, and being employed to throw a stream from a third story to basement. Diameter of battery nozzle is 3 inches, with different reducing tips when smaller jet is desired.

When working to its utmost capacity the tower will receive the water from four first-class fire engines and deliver about 4,500 gallons per minute, weighing about 37,500 pounds.

The nozzle of tower proper is 2¼ inches in diameter, and it will be understood that a nozzle of this size working on a lever 76 feet long exerts an enormous power tending to capsize the tower.

To prevent same, there is attached to top of tripod frames a swinging strut carrying at its outer end a pair of compass legs, which, in opening out form an "A" frame. Two chains fastened to truck an equal distance apart from center of tripod frame hook in two eyes movably mounted on outer end of said strut. These eyes connect with a screw, and by merely turning a small handle on outer end of strut described, can be moved in or out.

To operate this strut it is simply necessary to swing out same at right angles to truck, hook in the chains in eyes, open out compass legs, permitting them to rest on the ground, then by merely turning the handle, chains will pull out, force down strut on "A" frame, pressing same in ground, thus forming a rigid self-supporting brace. This construction avoids difficulty found in other struts or braces made to engage with the ground by means of sharp points, which, on cement or stone sidewalks and hard-paved streets, often slip.



A SLED DRIVEN BY AN AIR-PROPELLER.

The tower is ready to throw a stream within 90 seconds from the time of connecting up the engines, and its weight complete is about five and one-half tons, or a load easily pulled by three horses to any part of the city.

Altogether the Gorter tower has won distinction as a fire fighter unequaled as a water tower, and in it San Francisco claims a perfect machine for its splendid fire department.

Wireless Telegraphy Between Guadeloupe and Martinique.

Regular daily communication has been established between Guadeloupe and Martinique by a system of wireless telegraphy. The station in Guadeloupe is situated near Gosier lighthouse, and that in Martinique somewhere on the peninsula of La Caravelle on the east side of that island. These stations have been installed by a detachment of army engineers. Thus far only official messages between the governments of the two colonies have been exchanged. The system in use is not that of Marconi, but one devised by the French engineer corps.

In a recent number of Petermann's Mitteilungen, Dr. G. Schott gives a summary of recent observations in respect to the distribution of the surface salinity of the oceans. It appears that in the Atlantic there are two large areas, north and south of the equator, with a very high percentage of salinity, but in the Pacific there is one comparatively small area with a like percentage, south of the equator. W. Stavenhagen sketches the history and present condition of cartography in Russia, and the editor, Dr. Supan, sums up the scientific results of the German and English antarctic expeditions so far as they have been received.

A MOTOR-DRIVEN ICE-BOAT.

An interesting experiment touching the problem of transportation on ice, is the air-sled or ice-boat driven by an air propeller, which is illustrated herewith.

The craft has a platform 12 feet in length by 4 in width, made of stout wooden slats, mounted on four big wooden skates fitted with steel blades, the front ones being so made as to respond to the steering gear, and turn, similarly to the front wheels of an automobile.

The steersman sits astride a narrow plank seat, which runs from the motor and propeller to the front end. His legs are protected behind a wind shield shaped like a plow. He guides his craft by means of an ordinary pair of bicycle handle bars, while the levers for controlling the spark, the mixture, and the clutch are within his reach. The propeller, which is 4 feet in diameter, is mounted on a frame above the motor, which is a 2¾ h. p. de Dion, connected with it by sprocket and chain. Its four blades are inclosed at the periphery by a flat band of their own width, riveted to them. This outer rim and the shape of the blades or pitch of the screw, are the vital features of the construction, and hold the secret of the successful operation of the machine. The inventor says that this mode of construction prevents the waste of any particle of air, all of it which comes in contact with the propeller being used for propulsion.

When the motor is started at slow speed and the clutch is thrown in, the propeller begins to revolve slowly, and gradually gains headway. As soon as it has attained a certain velocity of revolution, the sled starts slowly and gains speed, along with the propeller, until the maximum velocity of revolution is reached. This is about five hundred revolutions per minute.

There is no jerking motion, either when starting or stopping, a brake being provided that enables the operator to bring the sled to a stop in a very short distance.

Only one model has been made, but this was successfully tested, a few weeks ago, on the ice of a lake at Ridgewood, Long Island, when it carried three full-grown persons at a rate of fifteen miles an hour. The inventor believes twenty miles per hour can be attained by it, and a machine with twin propellers, operated by two 10 horse power motors, would easily make two miles a minute. At this trial of the model the weight of even six passengers did not affect its speed. It seems to run just about as fast across or into the wind, as against it; but when it goes into the wind, the number of revolutions increases and the motor runs faster.

The sled is the invention of Mr. J. Bruce Macduff, a native of Scotland, now residing in Brooklyn, N. Y.

Mechanical Brick-making.

A brickyard with an exceedingly up-to-date equipment is in operation at Dover, N. H., which is said to be the first radical departure from the time-honored methods of the ancients. By this means the item of labor, which has been one of the greatest considerations of brick yard operation, is now one of the least. Hand labor has been almost abolished, and its place has been taken by mechanical means. Thus, one man is said to take the place of fifteen or twenty.

The time required to put the bricks through all the various stages, and the great number of pieces to be handled, makes the conveyor system as now in general use unavailable for this purpose, but an adaptation of it was devised by which the material is handled in units of fifteen hundred. These are known as "stacks." The bricks are piled in these stacks after being shaped, and remain in the frames until they have passed through all the various operations. The "green" bricks are placed in these, just as they are piled in the stacks in kilns under ordinary circumstances. In this manner they are conveyed to the kilns, where they are baked. Here, by an ingenious arrangement, the bricks just entering are placed at a part of the kiln where the air striking them has been tempered by passing over the drier bricks, which have been there longer and consequently are nearer finished. This has the advantage of making a better brick, for the reason that the moist pieces are not twisted or warped out of shape by an intensely hot blast. It also represents economy of fuel. This plant has been in operation long enough to demonstrate its economies beyond all question of doubt, and it is exceedingly likely that the idea will be adopted in other parts of the country.