accomplish this task an insulated wire was led from the laboratory of the university, Birmingham, England, to a flag-staff on the roof; the wire terminated in a number of fine points and as widely separated as possible. The base of the wire was connected to the positive pole of a high-tension electric machine.

The opposite or complementary pole was laid to the earth, the system resembling very much a sending station for wireless telegraphy, except that the spark-gap was not utilized, since this would have set up oscillatory currents, whereas the desired object was to keep the wire constantly charged with positive electricity.

When the dense fog had enveloped the building with a cloak so thick that the eye could scarcely penetrate it for more than a foot or two the professor and his associates mounted the roof while an assistant was left in charge of the high-tension generator.

When the signal was given and the machine had attained its maximum working velocity, the electrical energy was literally poured from the elevated points into the surrounding fog. The result was as gratifying as it was remarkable, for the fog cleared away in the immediate vicinity of the points leaving a space absolutely clear.

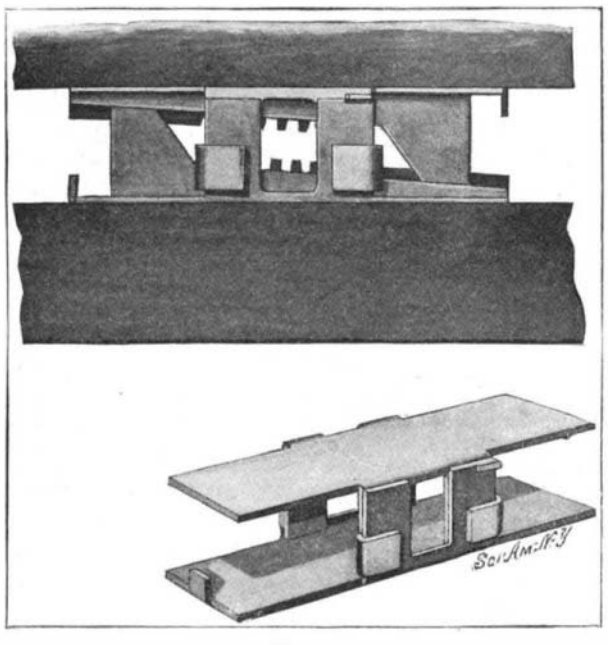
To put into effective operation this scheme of defogging the atmosphere, Sir Oliver proposed that stations be erected on either side of the River Mersey where as a result of much fog there are many collisions. Static electric machines, while giving the requisite high voltage, do not give a sufficient amperage, and the energy from induction coils is also too limited.

To overcome these objections Lodge proposes the use of an alternating current generator, and raising its voltage to the proper potential by means of a transformer; to the terminals of the latter a Cooper Hewitt mercury vapor interrupter is interposed and from the electrodes of the latter connectors lead to the aerial and earthed wires.

Such an apparatus could be installed with profit along the North and East rivers in New York city, and it would require but little energy to clear the Chicago River of fog, besides other places innumerable. Vessels could use the apparatus with telling effect and by its means many of the disastrous collisions could be averted.

QUOIN FOR LOCKING TYPE FORMS.

A patent has just been granted to Mr. William V. Crockett, of Corsicana, Tex., on an improved quoin for locking type forms. The quoin differs from the ordinary in being provided with bearing plates, which are so connected that by a sliding movement of the wedges the plates will be spread apart without lengthwise movement. This arrangement, it will be evident, prevents any movement of the type, as sometimes happens, when the wedges engage directly therewith. The accompanying illustration shows the quoin in position, and also shows a perspective view of the bearing plates. The wedges, it will be observed, are each formed with a heel portion, the heel portion of one wedge having sliding engagement with the inclined surface of the other wedge. To prevent lateral movement of the wedges, one relatively to the other, the heel portion of each wedge is provided with a channel to receive a rib on the inclined portion of the other wedge. On their inclined or adjacent surfaces the wedges are provided with teeth designed to be engaged by a suitable tool so as to facilitate moving the wedges lengthwise in opposite directions. The tool may consist of a key having teeth formed on its shank. The bearing plates are formed with interlocking side pieces, so arranged as to permit only a limited sliding movement of one plate with the other. To limit the outward movement of the wedges with relation to the plate, the latter are provided at opposite ends with lugs. In operation, after placing the form in the chase, the quoin is placed therein in the usual manner, then the wedges are operated by the tool to cause the bearing plates to spread apart and thus clamp the type.



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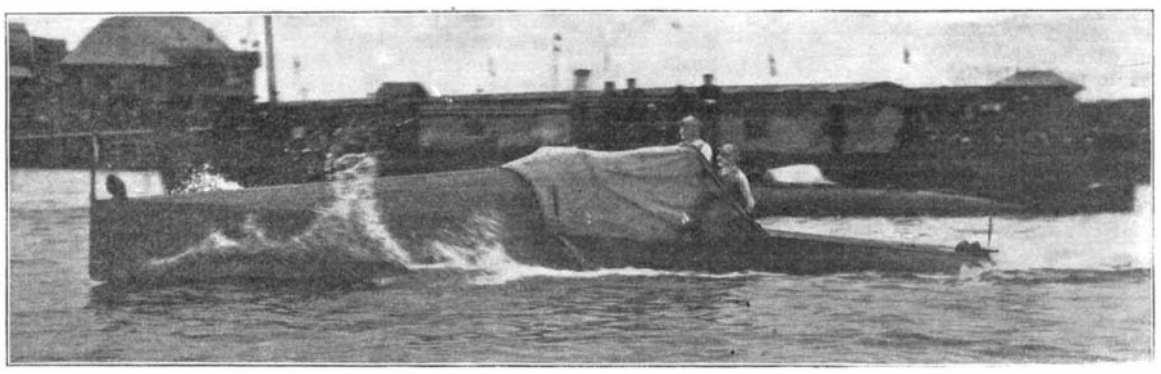


"NAPIER II.," A CONTESTANT IN THE INTERNATIONAL MOTOR BOAT RACE. SPEED, 20 KNOTS AN HOUR.

The towing tests of full-sized models on the results of which this boat was patterned were illustrated in our issue of May 21.

THE INTERNATIONAL MOTOR-BOAT CONTEST. "NAPIER II."

A short time ago we described in the SCIENTIFIC AMERICAN a series of experiments that had been carried out by Messrs. Yarrow & Co., of Poplar, London, to determine the best form of hull for high-speed motor boats, and we illustrated the type of craft which caused the least disturbance of water when traveling at high speed.

The Yarrow-Napier launch herewith illustrated, which was built to compete for the International Cup in England, is built upon the results achieved from those trials. It measures 40 feet over all, 40 feet water line, and has a beam of 5 feet. The hull is constructed throughout of steel. The boat has a straight sheer line falling from the stem to the stern. There is an ample turtle deck forward and a nearly flat deck aft. The tumble-home top sides aft and the substantial wall-sided bow give an impression of stability and speed. The decks are of steel and the rudder and "A" brackets are steel forgings. The two gasoline motors, which are of the Napier machine racing type, develop 90 horse-power. They are carried on a substantial girder run fore and aft of the boat and are also attached to the side of the craft on special frames. Thus the boat and motor are absolutely tied together, and experience has demonstrated that this method of securing motors and thrust block is quite satisfactory.

The reverse gear for the starboard engine—the boat is fitted with twin screws—and the thrust bearings of both engines are in metal box-shaped castings, also secured to the motor girders. These boxes are filled with oil, and being quite watertight enable the bearings, especially the thrust bearing, to run entirely submerged in oil. The engines are connected to the shaft by Napier metal-to-metal marine clutches, which run in oil and are operated by pedals actuated by the steersman, thus placing the boat under his complete control.

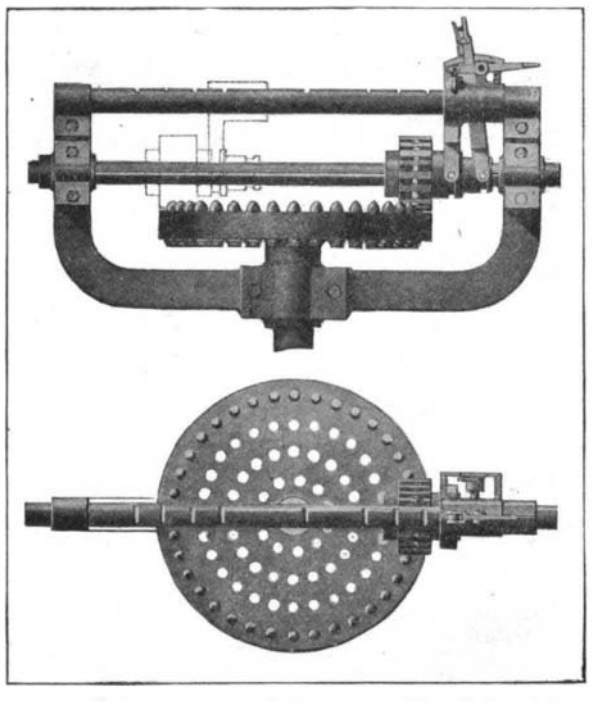
The exhaust of the Napier water-jacketed exhaust system, and the exhaust receivers and pipes are kept quite cool throughout their entire length. The water circulation is accomplished by two pumps for each motor, which by means of transfer pipes and cocks can be connected together. In the event of one circuit breaking down one pump serves to supply the water jacket of the engine, and the other supplies the water-jacketed exhaust. In addition to these pumps auxiliary hand-pumps are fitted which can be immediately brought into play when required. The gasoline reservoir is also water jacketed and is carried aft, with the direct supply tank for the motors placed forward. The gasoline is pumped up from the reservoir to the supply tank by means of a hand pump, and the overflow simply runs back again into the store tank, and indicates when it is doing so in a gage. The lubrication is triplecate, drip feed, splash and forced lubrication being in operation simultaneously. All bearings thus have three distinct methods of oil supply. The lubricant is carried in a store tank and is pumped by hand to feed whatever part is required through pipes leading from a distributer.

The steering acts directly from the wheel to the rudder quadrant without any intermediate pulleys or turns in the wire. This produces practically the same result as tiller steering and is extremely sensitive in operation. Attached to the engine is an instrument board to which all regulators and so forth are brought, so that everything is immediately before the engineer, and he can manipulate the two engines to a nicety and steer the boat if necessary by the two screws, should the rudder become deranged. A new system of automatic bilge ejection has been adopted which is capable of dealing with vast quantities of water with very little expenditure of power and which is quite automatic in its action. The engines are fitted with high-tension synchronized ignition, accumulators, and coil, and the motors are started by the simple operation of a switch. Either engine can be started by the other.

For the International Cup race off Cowes there were 9 boats entered, of which 5 were British, 3 French, and 1, the "Challenger," was from the United States. In the preliminary trials two boats, "Napier II." and "Napier Minor," proved to be superior to their British competitors, and although "Napier II." at times showed better speed than "Napier Minor," the latter was selected to meet the French boat "Trèfle-a-quatre" in the final, which she won. She covered the 7.8 miles course in 23m. 3s. as against a time of 24m. 27s. for the French boat, the winner's speed being about 20 knots an hour. The prize, however, went to the French boat on a technical protest.

IMPROVED VARIABLE SPEED AND REVERSING GEAR.

In the accompanying illustration we show an improved form of variable speed and reversing gear, invented by Mr. John Busche, of 17 Brown Avenue, Turtle Creek, Pa. The gear will permit the convenient reversing of the motion and varying of the speed, both forward and backward, without requiring stopping of the driving member. The driving member consists of a disk on the power shaft, with its upper face studded with pins. The pins are arranged in concentric circles, and are secured to the disk by means of tapered shanks, which enter tapered openings and are held in place by split rings engaging grooves in the shanks at the under side of the disk. The driven pinion is mounted to turn with and slide lengthwise on a shaft running at right angles to the power shaft. The pinion comprises a hub adapted to slide within a body portion which carries the teeth. The teeth are formed with inwardly-projecting tongues adapted to co-act with the inclined walls of an annular groove in the hub and thus be withdrawn within the pinion when the hub is moved lengthwise relatively to the body portion. A sleeve mounted to slide on a shaft lying above the pinion shaft is formed with a shifting-fork adapted to engage an annular groove in the body portion of the pinion. This sleeve is provided with a locking pin adapted to engage one of a series of notches in the shaft, and thus hold the pinion in engagement with the corresponding circle of pins in the driving wheel. The sleeve also carries a forked lever which engages an annular groove in the hub. When it is desired to vary the speed, the forked lever is operated to slide the hub within the body portion of the pinion, thus withdrawing the teeth within the pinion. The locking pin is then raised and the sleeve with the pinion is shifted to the desired notch on the shaft. The forked lever is now moved back to project the teeth which will then engage with the desired circle of pins. If the pinion is moved past the center of the wheel its direction of rotation will be changed.



IMPROVED VARIABLE SPEED AND REVERSING GEAR