

No. 622,628.

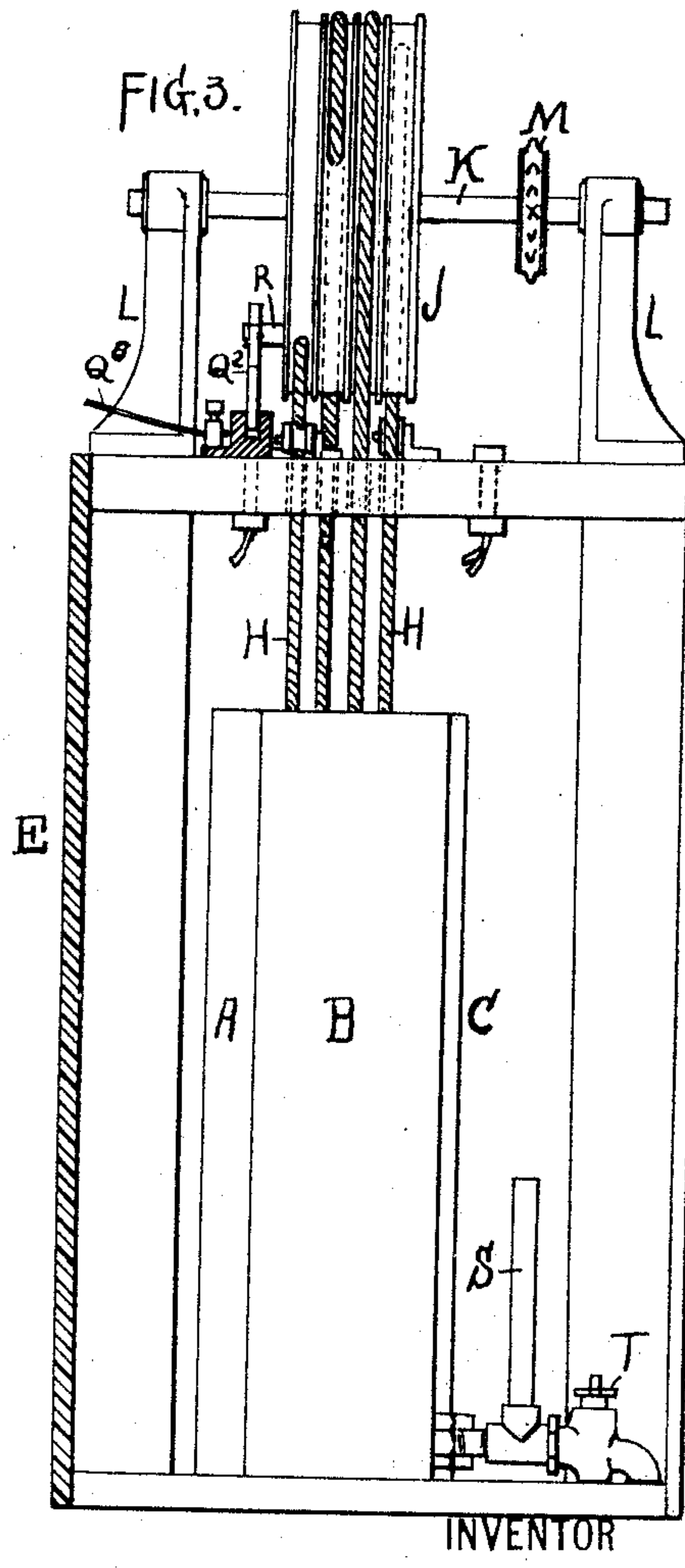
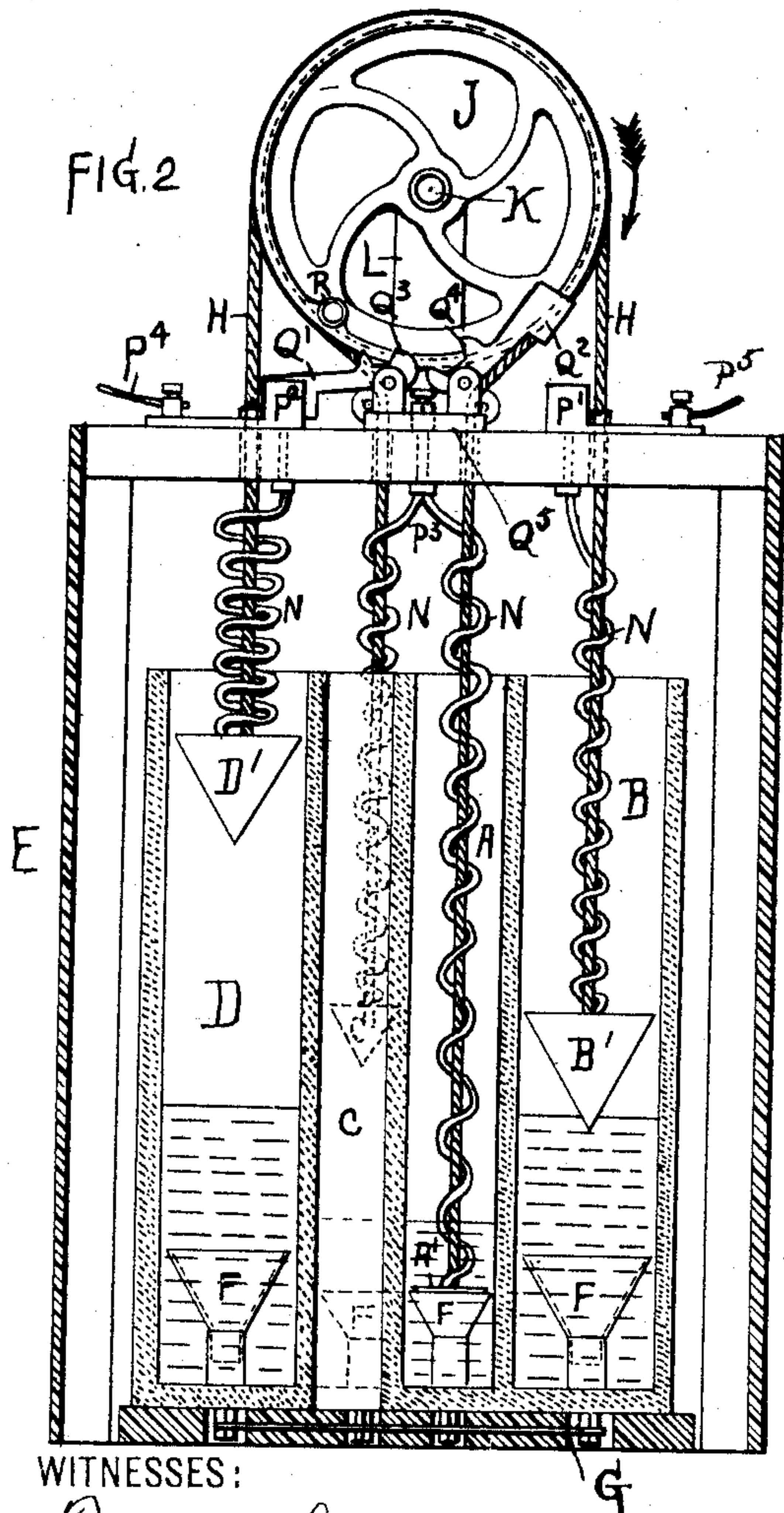
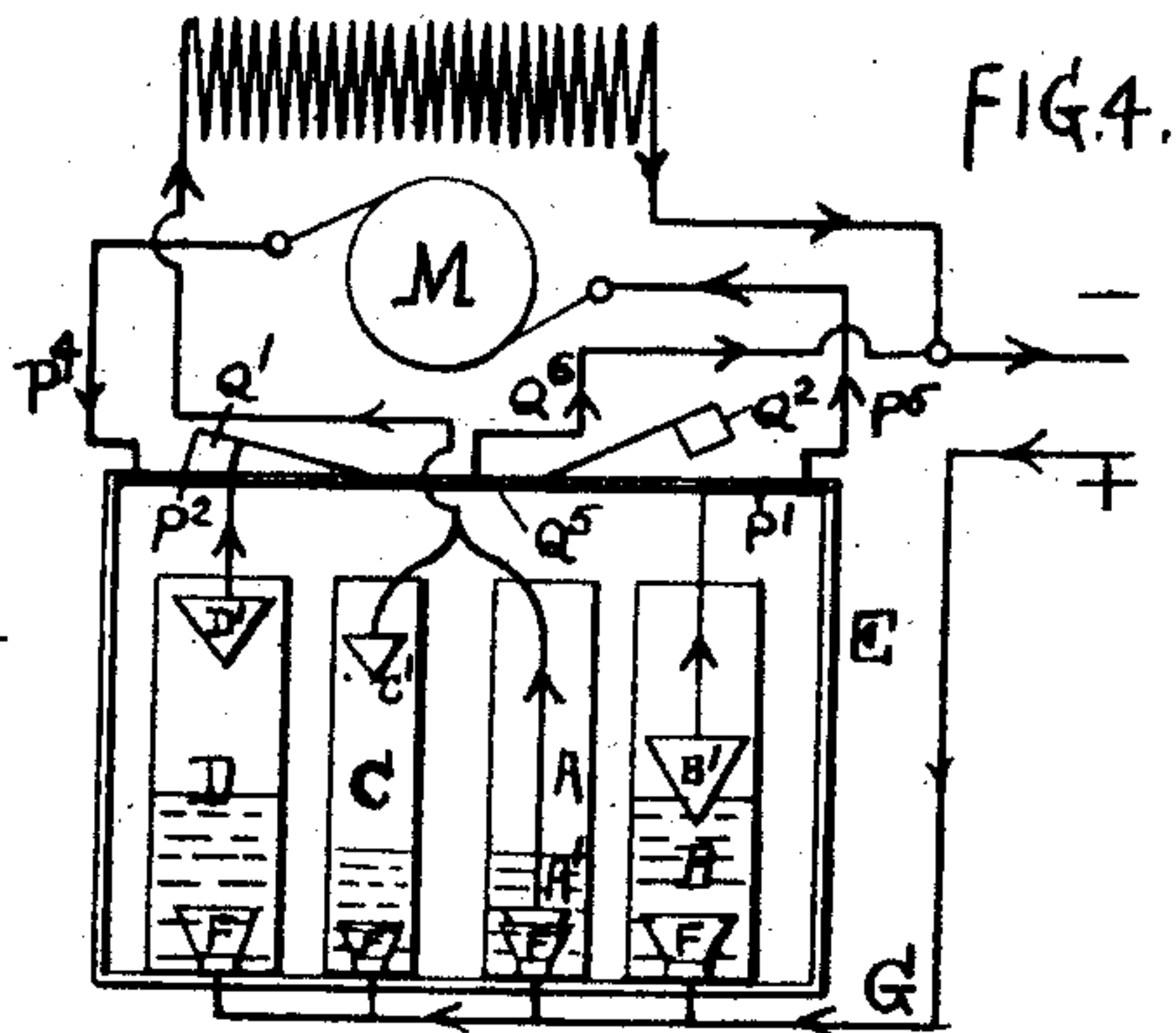
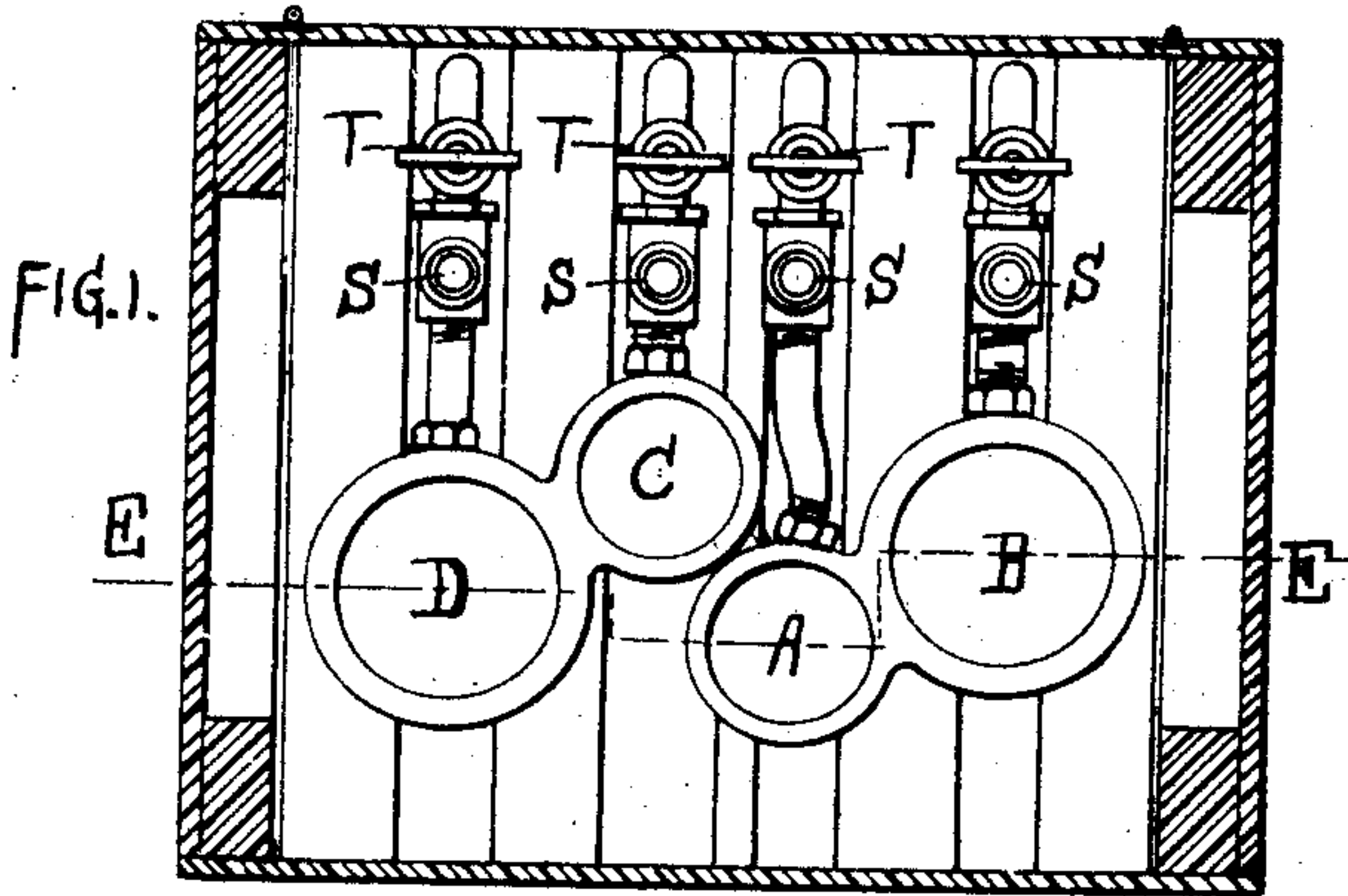
Patented Apr. 4, 1899.

H. LYON.

RESISTANCE AND CONTACT APPARATUS FOR ELECTRIC CURRENTS.

(Application filed July 6, 1898.)

(No Model.)



WITNESSES:

P. W. Wright.
L. C. Connor

INVENTOR

HENRY LYON

BY

Howe and Howe
HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

HENRY LYON, OF GLASGOW, SCOTLAND, ASSIGNOR OF ONE-HALF TO THE
D. STEWART & COMPANY, LIMITED, OF SAME PLACE.

RESISTANCE AND CONTACT APPARATUS FOR ELECTRIC CURRENTS.

SPECIFICATION forming part of Letters Patent No. 622,628, dated April 4, 1899.

Application filed July 6, 1898. Serial No. 685,280. (No model.)

To all whom it may concern:

Be it known that I, HENRY LYON, a subject of the Queen of Great Britain and Ireland, and a resident of Glasgow, Scotland, have invented certain Improvements in Resistance and Contact Apparatus for Electric Currents, (for which I have applied for British Patent, No. 28,859, dated December 7, 1897,) of which the following is a specification.

My said invention comprises new and improved arrangements of resistance and contact apparatus for electric currents, which arrangements are advantageously applicable for various purposes—such as, for example, for starting, stopping, and reversing motors for hoists, winches, cranes, and the like.

My improved arrangements are shown on an accompanying sheet of explanatory drawings.

Figure 1 is a horizontal section, and Figs. 2 and 3 vertical sections as at right angles to each other. Fig. 4 is a diagram showing the electrical connections between the source of supply, my apparatus, and a shunt-wound motor.

As shown in the drawings, there are four jars A B C D, of earthenware or other suitable material, arranged in a box or casing E. Two of these jars A C will generally be, as shown, smaller than the other two B D. In the bottom of each jar there is a conical metal cup F, connected through the bottom with an external metal conductor G, which is connected to a conductor of the main electric supply. In each jar A B C D there is a metal cone A' B' C' D', each suspended by a non-conducting cord H, which passes more or less around and is in each case fastened to the grooved rim of an overhead multiple pulley J at such points in the circumference of the pulley that each suspended cone can reach the corresponding cup F when the pulley is suitably turned, as hereinafter described. The pulley J is on a shaft K, carried by brackets L, extending up from the casing E, and the shaft K has on it a sprocket-wheel M, which may be acted on by a pitch-chain led from any desired point, so as to turn the pulley J in either direction. The cones A' B' C' D' are connected each by a flexible coil of wire N, Fig. 2, to three terminals P' P² P³, con-

nected to separate metal conductors. The wires N from the two smaller cones A' C' go to one terminal P³ for the shunt-current for a motor, as when reversing the motor the shunt-current does not require to be reversed. The connections from the other two terminals P' P² are through two contact-pieces Q' Q², hinged to a plate Q⁵, and projections Q³ Q⁴ on the contact-pieces are acted on by a pin R on one side of the pulley J, so that one of the contact-pieces will be lowered into contact and the other raised out of contact, accordingly as the pulley J is turned in one direction or the other, as hereinafter described. The plate Q⁵, to which the contact-pieces Q' Q² are jointed, has connected to it a conductor Q⁶, connected to the return-conductor of the electric supply. Water or other suitable feebly-conducting liquid, such as a solution of a salt of the same metal as that of which the cups and cones are made, is put in each jar A B C D, so that its upper surface is at a suitable height above the cups F. These may be fitted in connection with each jar glass gage-tubes S to show the height of the liquid in each jar, and a drain-cock T may also be fitted to each jar. When all the cones A' B' C' D' are entirely above the liquid, the circuits are broken. On any cone being lowered, as hereinafter described, the point first makes contact with the liquid without sparking, and the resistance of the liquid gradually diminishes as the cone descends until it makes complete contact with its cup F. If any of the cones is stopped short of its cup, the electric current will experience resistance corresponding to the depth of liquid still between it and its cup.

As shown in the drawings, the parts of my improved apparatus are in the position assumed when the motor to which it is applied is being started to run in one direction. The pulley J has been turned in the direction of the arrow in Fig. 2 by the pull of the pitch-chain acting on the sprocket-wheel M, so that one, A', of the smaller cones has been lowered through the liquid in its jar A down to its cup F, thus completing the circuit for the shunt-current for exciting the field-magnets. At the same time the pin R on the side of the pulley J, acting on the projection Q³ of the

contact-piece Q' , has turned that piece down, so as to make contact with the terminal P^2 , which has fixed to it a conductor P^1 , connected to the motor, and which leads the current from the motor through the contact-piece Q' to the piece Q^5 . The continued movement of the pulley J in the same direction then lowers one, B' , of the larger cones, which on touching the liquid in its jar B makes contact, but with some resistance, which is slowly diminished as the cone B' approaches its cup F , on reaching which the current passes by a conductor P^5 , fixed to the terminal P' , to the motor. Thus the starting of the motor is effected gradually and without abruptness and with either a partial or full load. To reverse the motor, the pulley J is turned in the direction opposite to that of the arrow in Fig. 2, whereby the cones A' and B' are raised out of the liquid in their jars A and B , and at the same time the other two cones C' D' are lowered through the liquid in their jars C D exactly in the manner described with reference to the cones A' B' , the pin R on the side of the pulley J at the same time also raising the contact-piece Q' and

lowering the other contact-piece Q^2 . When the pulley J has been turned so that the pin R is exactly between the projections Q^3 Q^4 on the contact-pieces Q' Q^2 , both these pieces will have been raised out of contact, and all the cones A' B' C' D' are out of the liquid. The circuits will then be broken and the motor stopped.

I claim as my invention—

Resistance and contact apparatus for main and shunt electric currents having liquid-containing jars, a metal cup in each jar, metal cones in the jars, a pulley to which the cones are secured, so as to cause certain cones to make contact and others to break contact upon the operation of the pulley, in combination with hinged contact-pieces and means carried by the pulley for operating the contact-pieces, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY LYON.

Witnesses:

EDMUND HUNT,
GEORGE PATTERSON.