

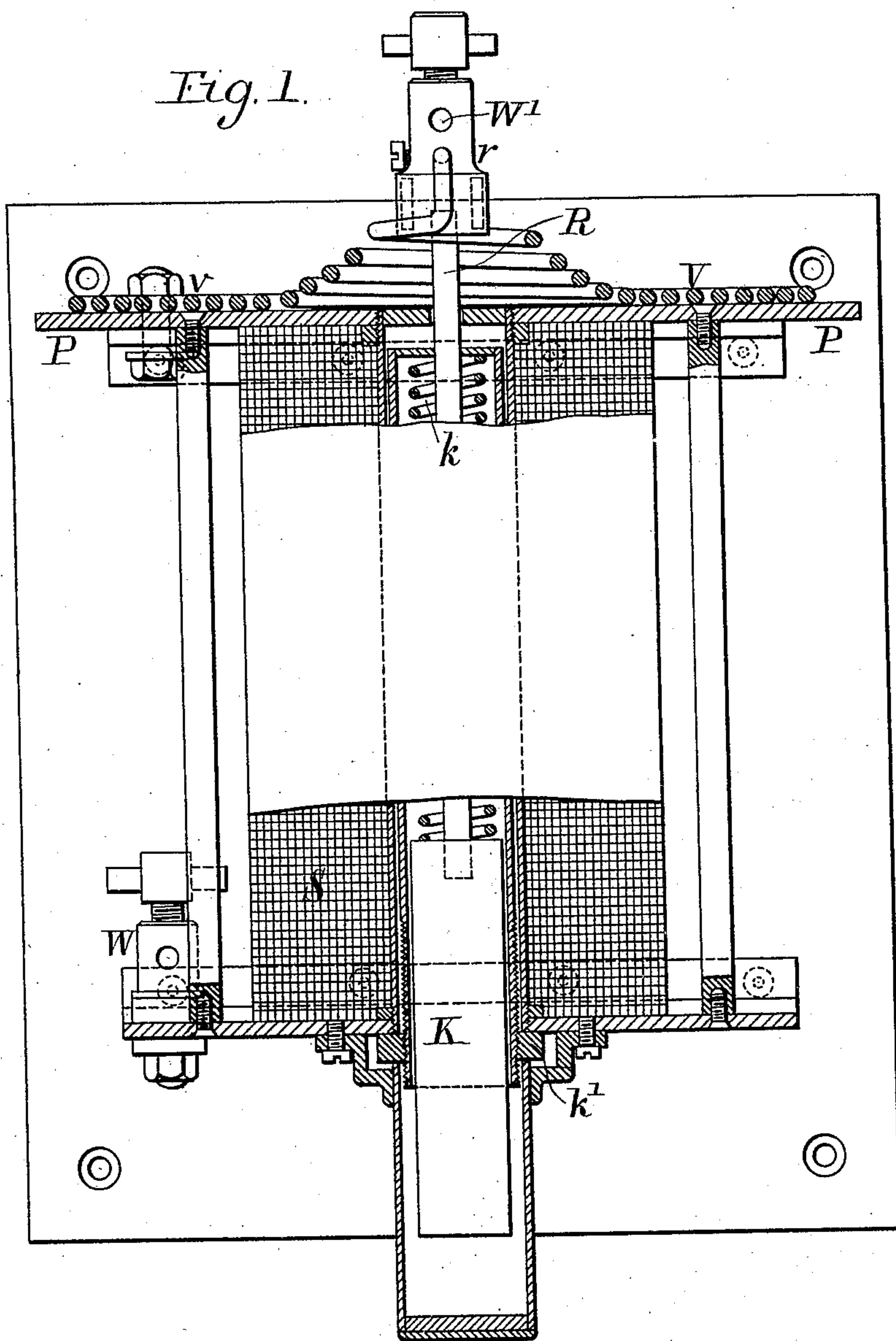
(No Model.)

2 Sheets—Sheet 1.

E. J. HOUGHTON & W. WHITE.
AUTOMATIC REGULATOR.

No. 488,121.

Patented Dec. 13, 1892.



Witness:
J. A. Rutherford.
Robert Emmett.

Inventors:
Edward J. Houghton
William White.
By James L. Norris.
Attorney.

(No Model.)

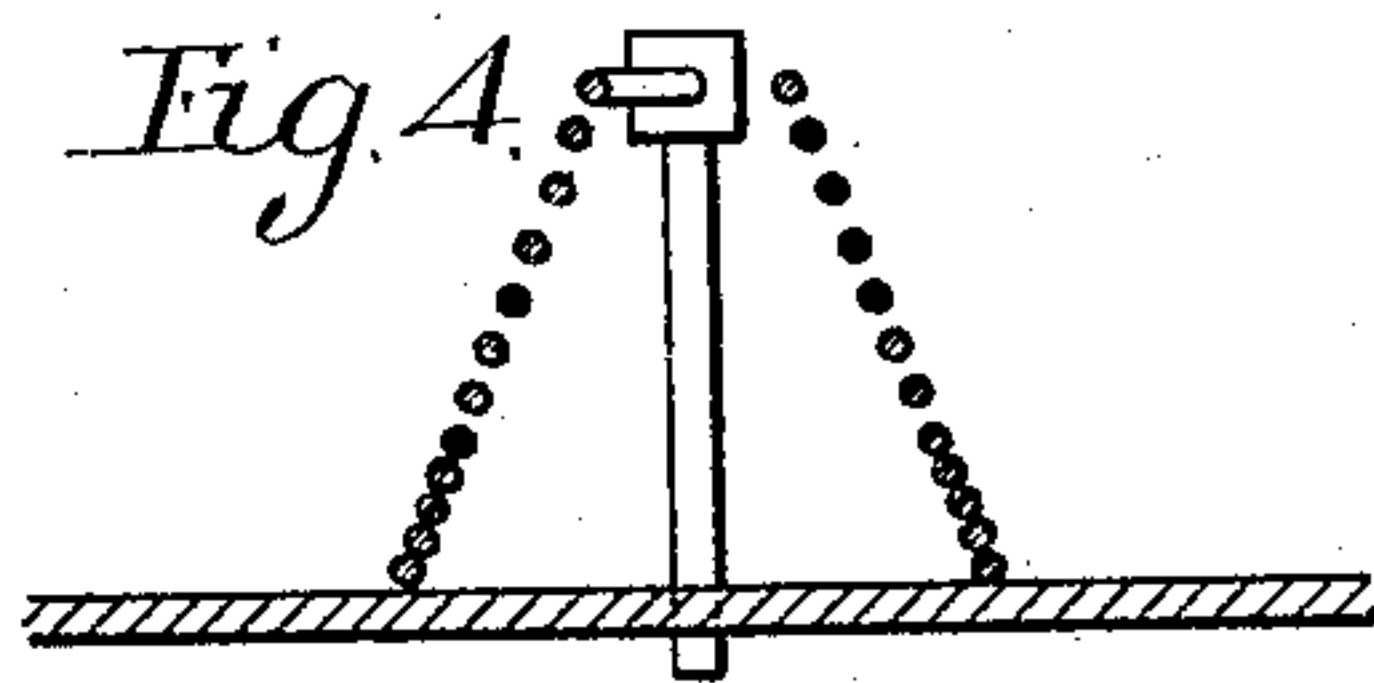
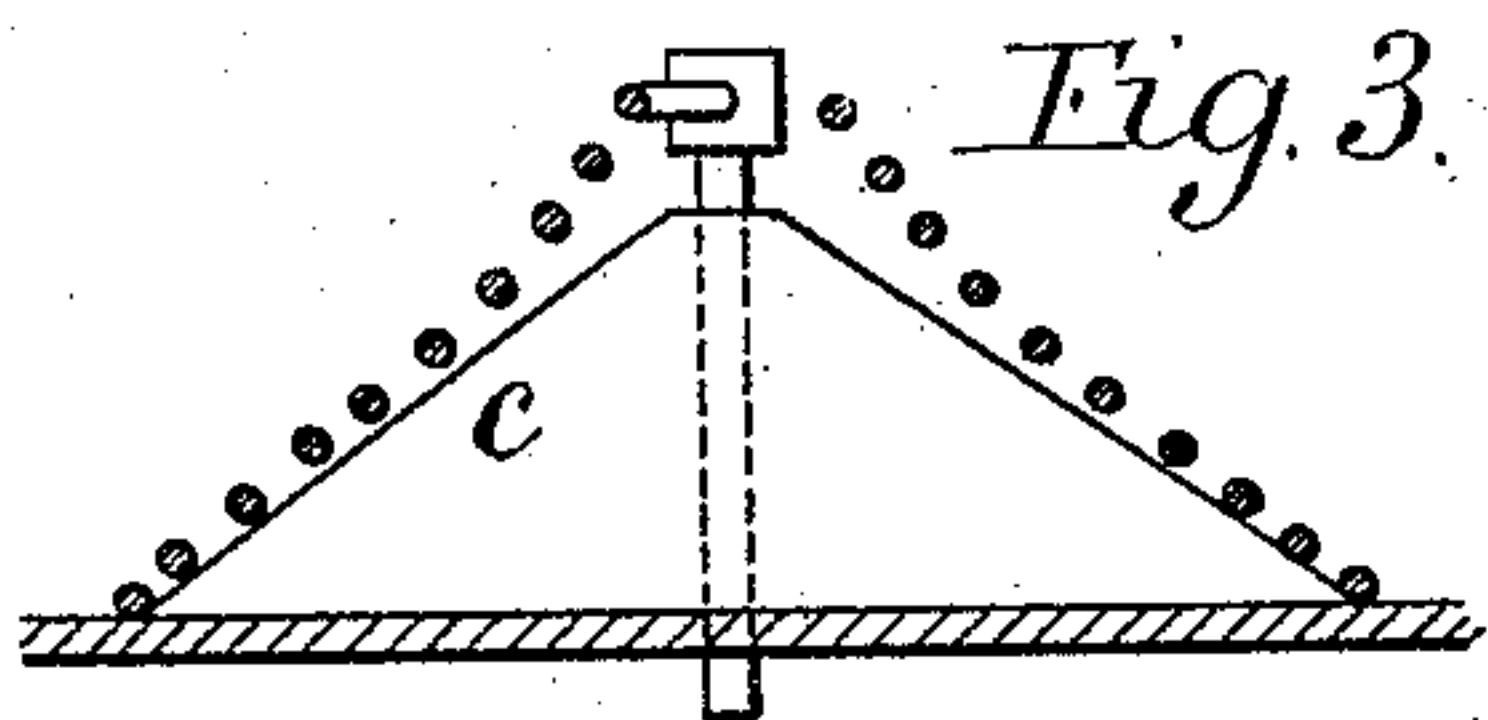
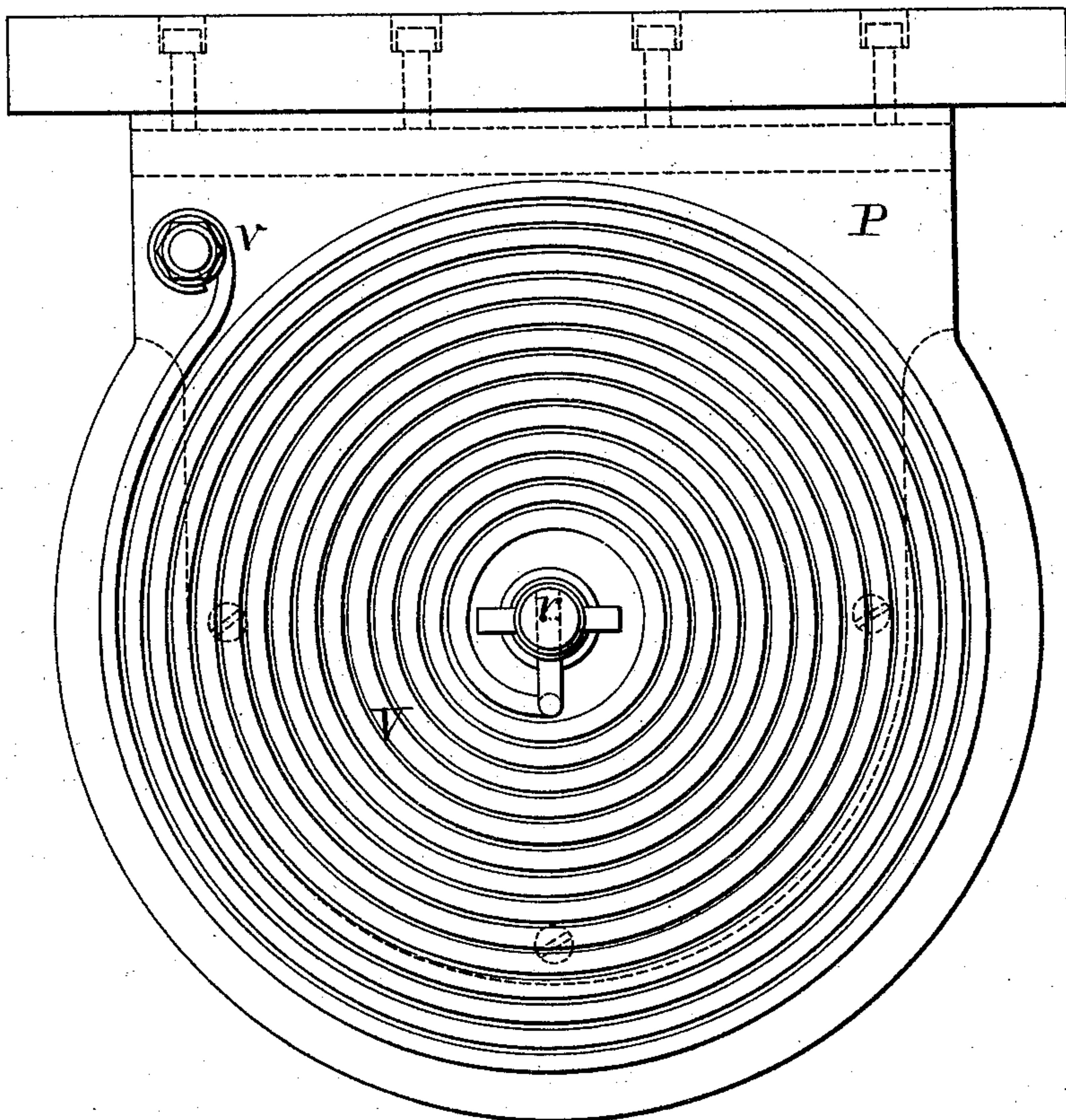
2 Sheets—Sheet 2.

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Fig. 2.



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UNITED STATES PATENT OFFICE.

EDWARD J. HOUGHTON AND WILLIAM WHITE, OF LONDON, ENGLAND.

AUTOMATIC REGULATOR.

SPECIFICATION forming part of Letters Patent No. 488,121, dated December 13, 1892.

Application filed March 26, 1892. Serial No. 426,626. (No model.)

To all whom it may concern:

Be it known that we, EDWARD JOHN HOUGHTON, residing at Camden, Underhill Road Dulwich, in the county of Surrey, and
5 WILLIAM WHITE, residing at 58 Bread Street, in the city of London, England, citizens of England, have invented new and useful Apparatus for Automatically Regulating Electric Currents, of which the following is a specification.
10

This invention relates to apparatus which automatically introduces into an electric circuit more or less resistance according as the electro-motive force of the current is greater
15 or less, and thus serves to regulate the current in the circuit.

Figure 1 of the accompanying drawings is a vertical section, partly in elevation; and Fig. 2 is a plan of regulating apparatus according
20 to this invention.

S is a solenoid-coil, forming part of the circuit to which the regulator is applied, or it may be in a shunt to the circuit taking a portion of the current.

25 K is an iron core, pressed down by a spring *k* contained within a tube, the lower end of which is screwed through a nut *k'*, so that by screwing the tube more or less downward the force of the spring *k* can be adjusted. On a rod
30 R, extending up from the core K, is fixed a head *r*, to which is screwed the innermost convolutions of a wire V, bent into the form of a spiral or volute, having a number of convolutions, the outermost convolution being attached
35 at *v* to a bed-plate P, of copper or other good conducting metal, on which some of the convolutions lie. The wire V is of metal—such as German silver—which is of low conductivity, offering considerable resistance to passage of
40 an electric current. The conductors being attached at W and W', the current passes through the solenoid-coil S and also through the wire volute V. When the electromotive force in the circuit and in the coil S is low,
45 the core K, not being strongly attracted upward, is forced down by the spring and most or all of the convolutions of the wire V then lie upon the bed-plate P, so that the current passes mostly through the plate, meeting
50 with very little resistance; but when the electromotive force increases the core K is at-

tracted upward, lifting a number of the convolutions of V up from the plate, and the current having then to pass through all these convolutions meets with considerable resist- 55
ance, by which it is regulated.

The convolutions of V, instead of being such as to lie on a flat bed-plate, may take a conical form, resting on a cone C, as shown diagrammatically in Fig. 3, or the cone C 60
may be dispensed with, as shown diagrammatically in Fig. 4, all the convolutions being in contact with each other, except such as are separated by the lifting of the innermost convolution. 65

Having thus described the nature of our invention and the best means we know for carrying the same into practical effect, we claim—

1. An apparatus for automatically regulat- 70
ing electric currents, consisting of a solenoid-coil S, a core K movable therein, a spiral resisting-wire V, forming part of an electric circuit and having a greater or less number of its convolutions short-circuited, and a rod 75
R, connecting the core with the innermost convolution of the spiral resisting-wire, substantially as described.

2. The combination, in an apparatus for automatically regulating electric currents, of 80
a solenoid-coil S, a core K, movable therein, a spiral resisting-wire V, forming part of an electric circuit and having a greater or less number of its convolutions short-circuited, a connection between the core and the inner- 85
most convolution of the spiral wire, and a spring *k*, acting to press the core outward from the solenoid-coil, substantially as described.

In testimony whereof we have signed our names to this specification, in the presence of 90
two subscribing witnesses, this 18th day of February, A. D. 1892.

EDWARD J. HOUGHTON.
WILLIAM WHITE.

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