No. 657,159. Patented Sept. 4, 1900.

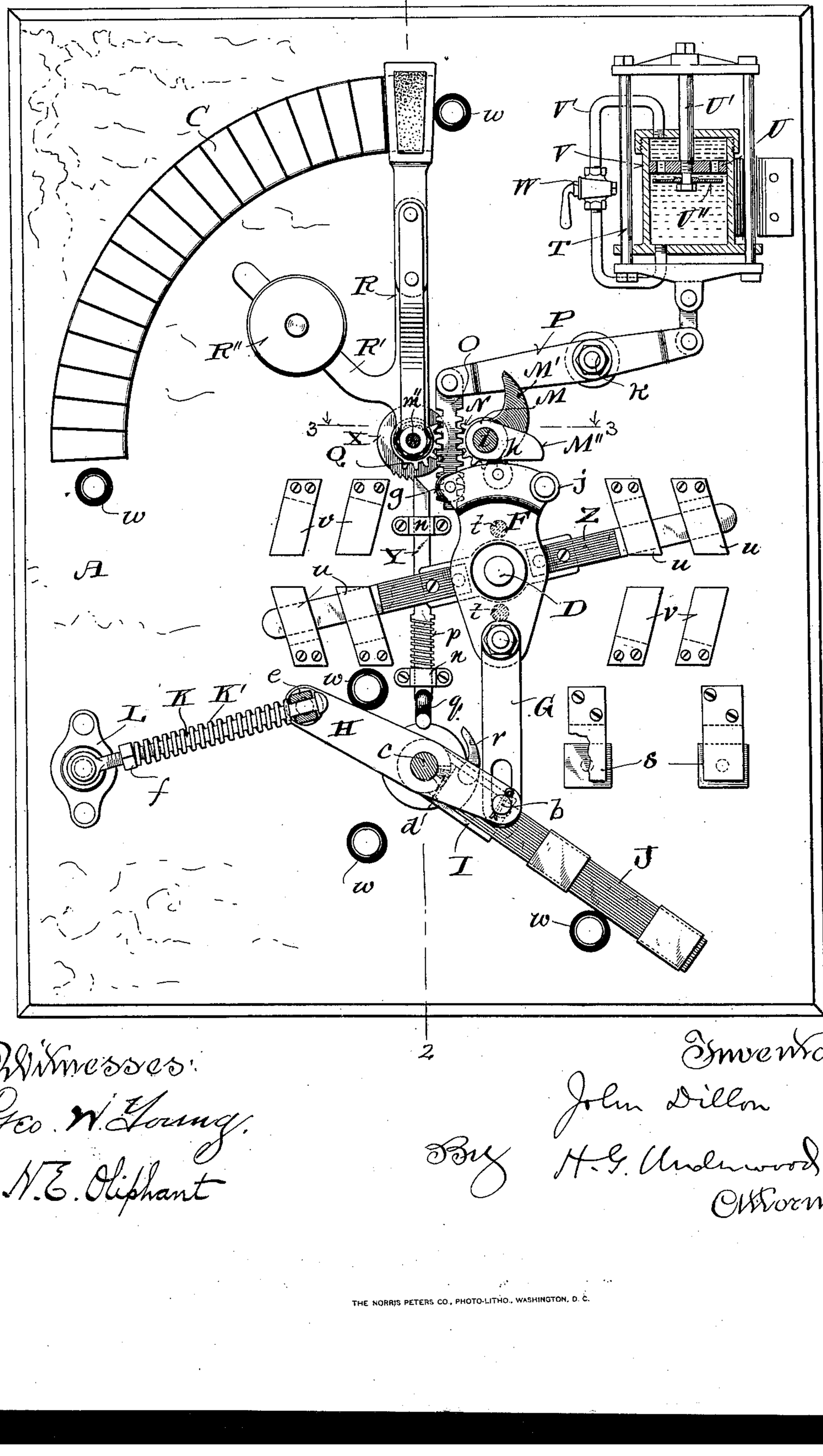
J. DILLON.

RHEOSTAT CONTROLLER.

(Application filed June 4, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses:
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Fig. 3.

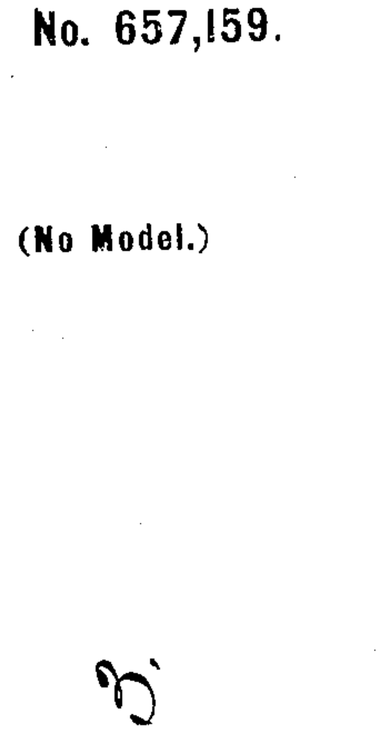


Fig. 4.

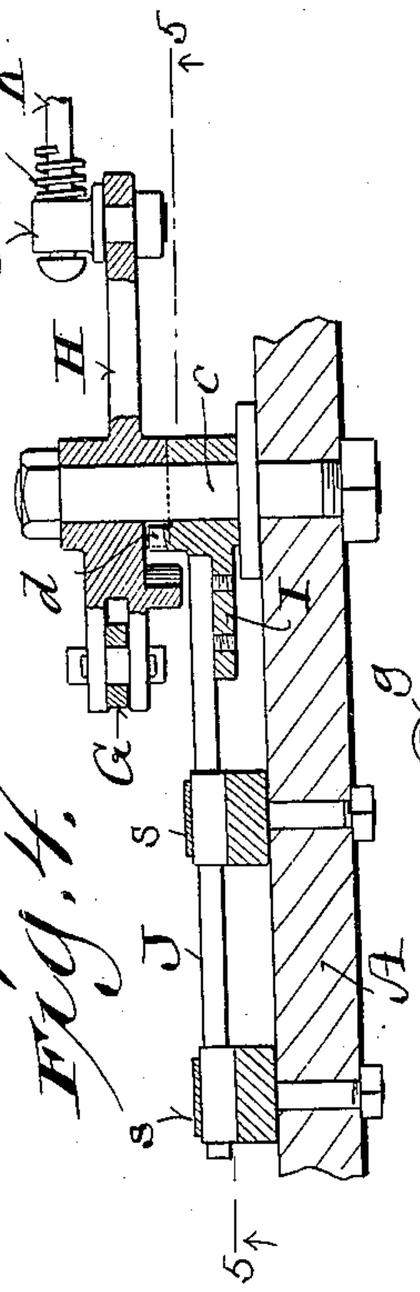


Fig. 5.

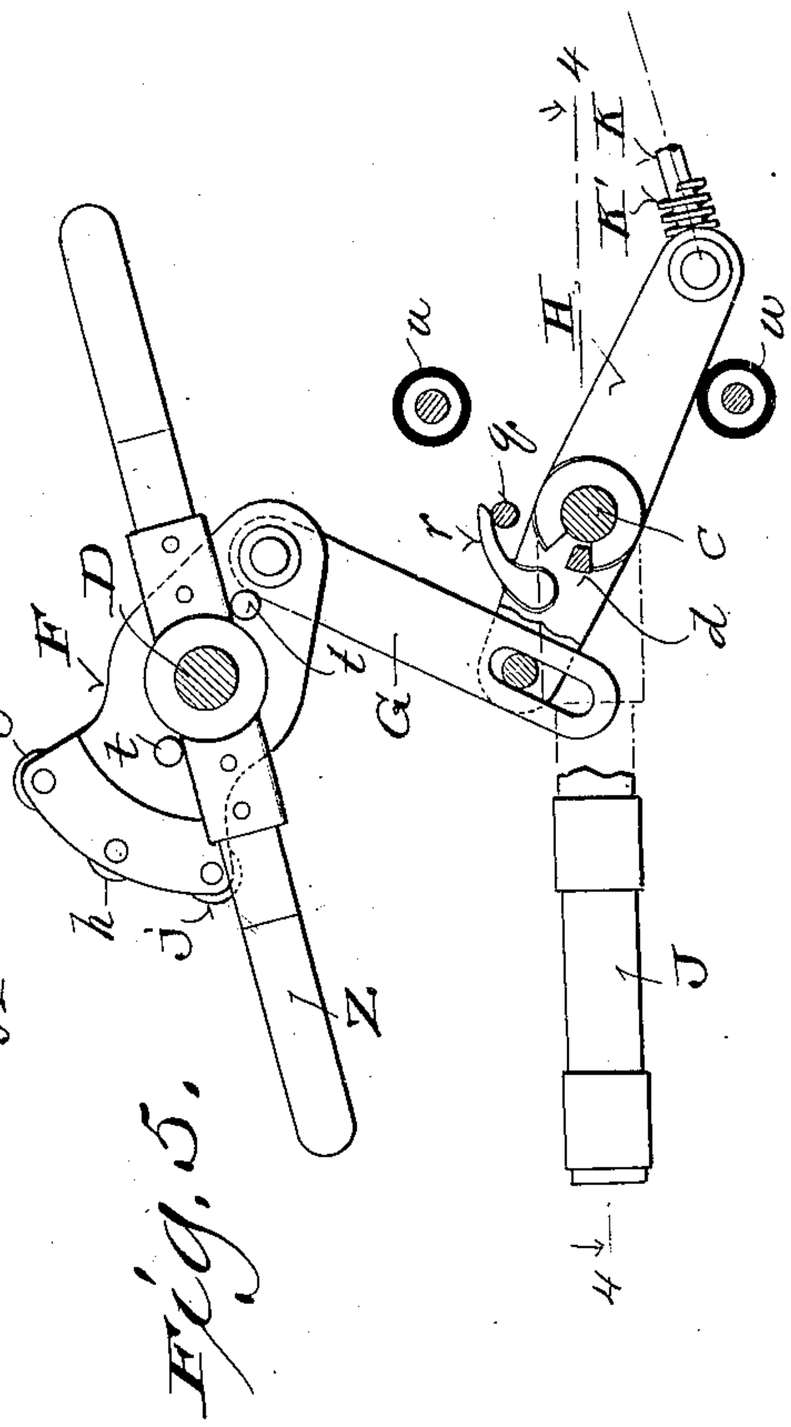
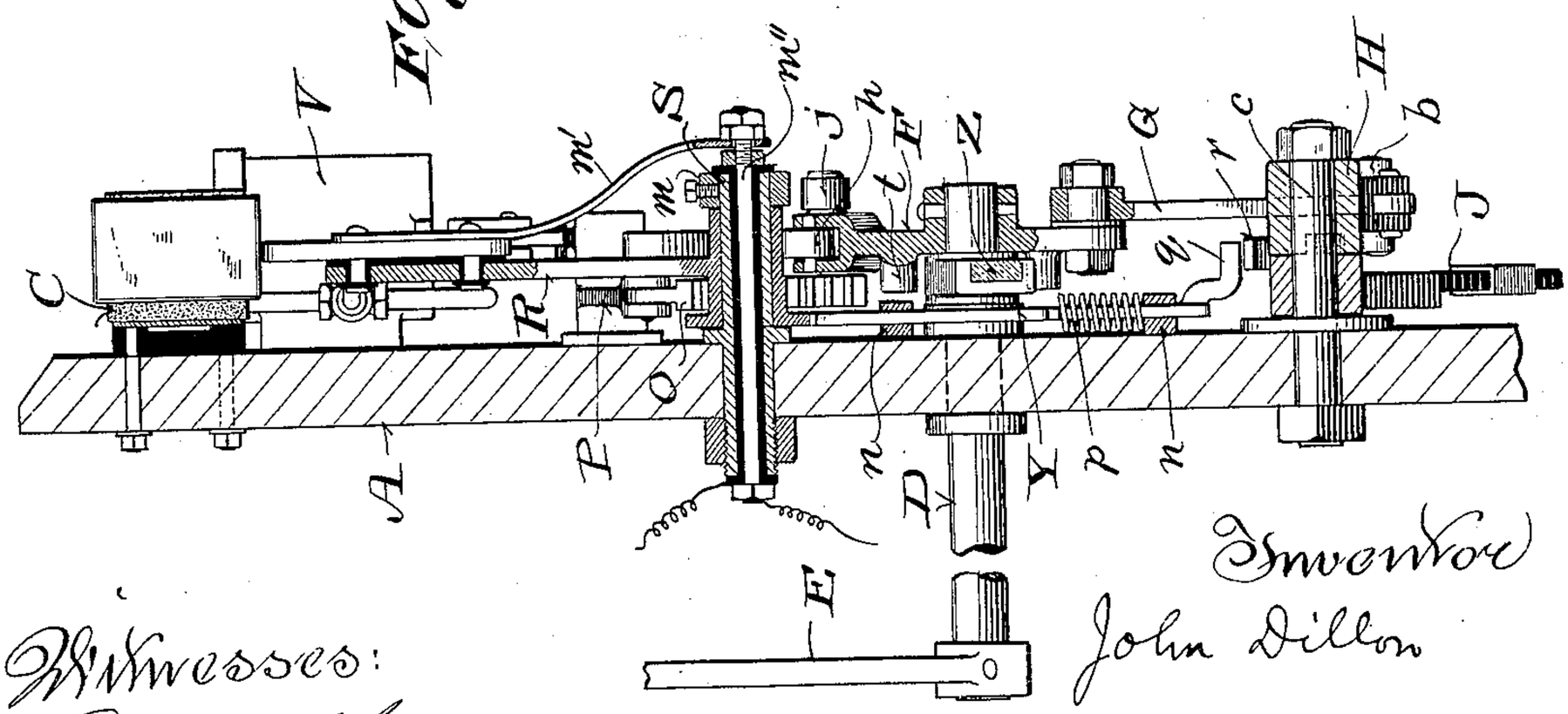


Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

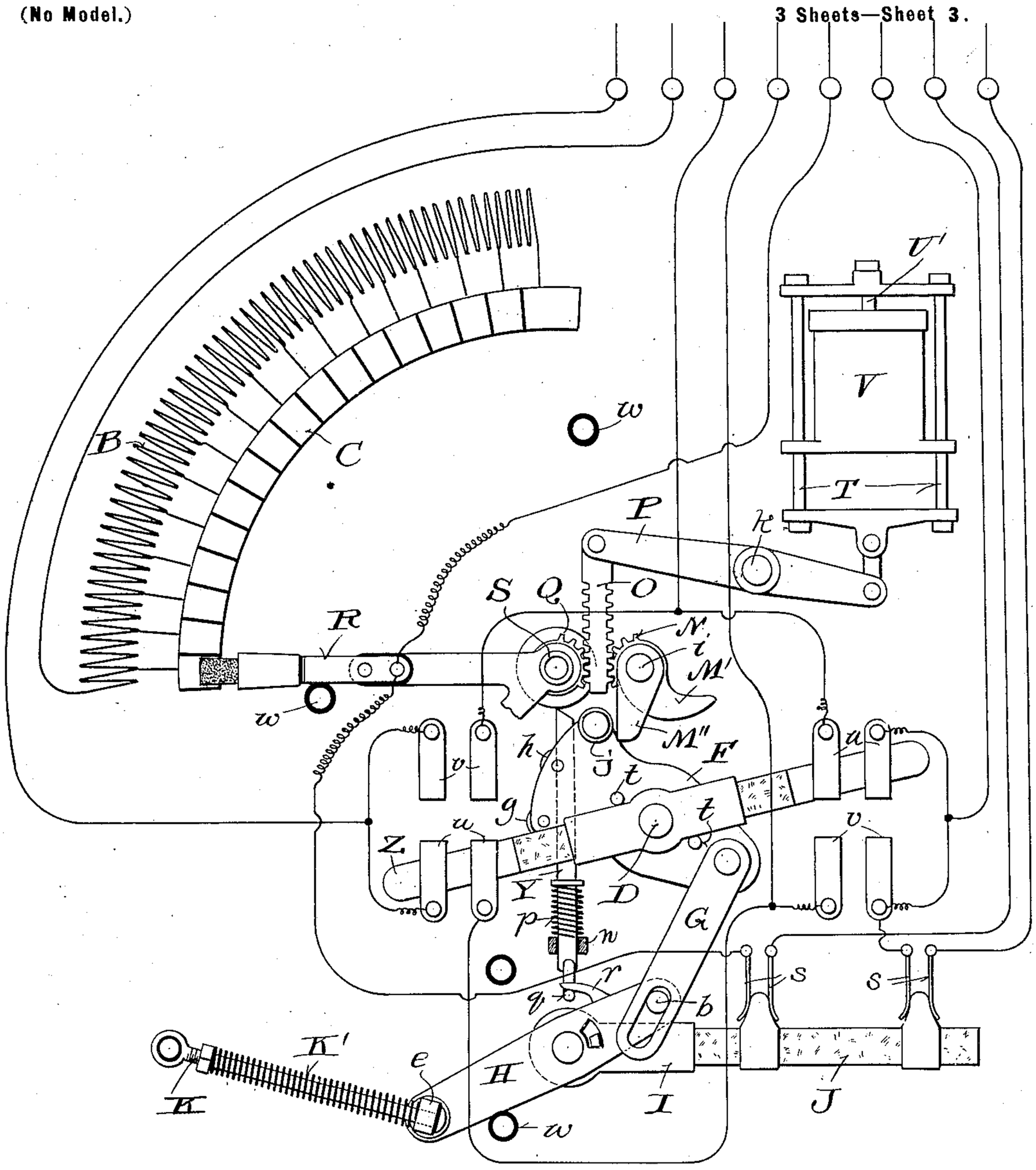

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN DILLON, OF MILWAUKEE, WISCONSIN.

RHEOSTAT-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 657,159, dated September 4, 1900.

Application filed June 4, 1900. Serial No. 18,940. (No model.)

To all whom it may concern:

Be it known that I, JOHN DILLON, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Rheostat-Controllers; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention has for its object to provide simple, economical, and semi-automatic controller mechanism for rheostats, especially those utilized in connection with electric motors employed to operate freight or passenger elevators, the principal features of the mechanism being a balanced reversing switch-bar, means for locking the rheostat-arm on full resistance when main switch is open, and other means for regulating displacement of oil or other fluid in a dash-pot constituting part of a governor for said arm, said invention consisting in certain peculiarities of construction and combination of parts hereinafter particularly set forth with reference to the accompanying drawings and subsequently claimed.

Figure 1 of the drawings represents a partly-sectional front elevation of rheostat-controller mechanism in accordance with my invention, the rheostat-arm being locked on full resistance and the electric circuit broken; Fig. 2, a sectional view of the mechanism, this view being indicated by line 2 2 in the preceding figure; Fig. 3, a detail plan view, partly in horizontal section, on the plane indicated by line 3 3 in the first figure; Fig. 4, a similar view on the plane indicated by line 4 4 in the succeeding figure; Fig. 5, a detail elevation, partly in section, on the plane indicated by line 5 5 in the fourth figure; and Fig. 6, a diagram illustrating wiring of my rheostat-controller mechanism, the main switch being closed, the rheostat-arm on least resistance, and the balanced switch-bar in the same position shown in preceding figures.

Referring by letter to the drawings, A represents a support upon which the mechanism in accordance with my invention is mounted, this mechanism involving a set of electric resistance-coils B, having terminals thereof joined to contacts C in series on a segment of a circle, the resistance being in a main circuit controlled by said mechanism. A shaft D has its bearings in support A, and an operating-lever E is made fast on one end of the shaft. Keyed on the other end of the shaft to radiate in opposite directions therefrom is a plate F, and a link G is in pivotal connection with an extremity of the plate. The link is provided with a lower longitudinal slot, and a coupling-pin *b*, engaging the slot, connects said with one end of a lever H, having a hub intermediate of its extremities loose on a stud *c*, extending from the aforesaid support. The lever-hub is provided with a segmental notch engaged by a lug *d* of an arm I, that is also loose on stud *c*, the main switch-bar J being made fast on this arm. The other end of lever H is provided with a swivel *e*, engaged by a rod K, having pivotal connection with a bracket L on support A, and a spiral spring K′ is arranged on the rod between a tension nut *f* and the swivel. The other extremity of plate F is concentric with shaft D and provided with a peripheral groove. Antifriction-rollers *g h*, journaled to the plate in its groove, operate in conjunction with a cam-arm M′ of a sleeve M, loose on a stud *i*, extending from support A, this sleeve being provided with another cam-arm M″, arranged to be actuated by an antifriction-roller *j*, that is also carried by said plate. In one piece with the sleeve and its cam-arms is a toothed segment N, that meshes with one edge of a rack O, hung from one end of a lever P, fulcrumed intermediate of its extremities to a stud *k* on support A, the opposite edge of the rack being in mesh with another toothed segment Q, provided on the hub end of rheostat-arm R, loose on a sleeve S in connection with said support, a guard-collar *m* being on said sleeve in opposition to said hub end of the rheostat-arm. This arm is shown as comprising two sections in insulated connection, and a conductor-plate *m′*, joined to one of the arm-sections, is in loose electrical connection with a conductor-rod *m″*, central of sleeve S, but insulated from the same and collar *m* thereon, as clearly illustrated in Fig. 2. In practice the conductor-rod is connected to the wires that, as a matter of convenience, are shown in diagram, Fig. 6, joined to a section of the rheostat-arm. The other end of lever P is linked to a frame T in connection with the rod U′ of a piston U, that reciprocates in a covered dash-pot or cylinder V, con-

taining a fluid, preferably oil, and having its heads connected by a pipe V′, provided with a faucet W, by which to regulate the flow of oil from one side to the other of said piston, the latter being perforated and opposed by a valve-disk U″, that plays on its rod. Instead of the perforated piston and opposing valve-disk a check-valve with a restricted passage may be employed in oil-pipe, the piston in this case being solid.

Adjacent to toothed segment Q the hub end of the rheostat-arm is provided with an annular flange X, having peripheral teeth, and the toothed portion of this flange engages a latch-bar Y, loose in guides *n* on support A against a surrounding spiral spring *p*, mounted on one of the guides. The lower end of the latch-bar is provided with a crook-lug *q*, and a hook branch *r* of arm I catches on the lug to retract said latch-bar when the main switch-bar J is engaged with the contacts *s*, mounted on the support above specified.

Loose on shaft D, back of plate F, is the central hub of a reversing switch-bar Z. Hence it is obvious that this reversing switch-bar is balanced. The plate F is provided with diametrically-opposite back lugs *t*, and by means of these lugs the reversing switch-bar Z is actuated to move from one set of contacts *u u* to another set of contacts *v v*, these contacts being mounted on the support for the mechanism herein set forth.

A weight R″ is arranged on a branch R′ of the rheostat-arm R, and the fall of this weight is retarded by the governor mechanism involving the piston and cylinder above specified.

Insulating-stops *w* are arranged on support A in opposition to lever H, switch-bar J, and rheostat-arm R set forth in the foregoing.

Assuming the parts to be in the position shown in Fig. 1 and the operating-lever E is moved to swing plate F to the position shown in Fig. 6, the lever H will be pulled toward horizontal position by link G, thereby compressing spring K′ on rod K and bringing a boundary of the segmental notch in the lever-hub in contact with the lug *d* of arm I to which main switch-bar J is fastened. On the instant the lever H is moved far enough to have the swivel connection therewith of rod K pass the line of center it is evident that because of the engagement of coupling-pin *b* with the slot of link G the main switch-bar will be automatically thrown into immediate engagement with its contacts by the expansive force of spring K operating on said lever, and at the same time the hook branch *r* of arm I will catch on crook-lug *q* of latch-bar Y to retract the latter from the toothed flange X of the hub end of said rheostat-arm. In the meantime the cam-arms M′ M″ being cleared by the antifriction-rollers carried by plate F, there is descent of weight R″ retarded by the governor mechanism in gear with the hub end of the rheostat-arm, the latter moving in the direction necessary to gradually cut out resistance to electric current, whereby the motor in circuit with the rheostat is eventually run at full speed. Now if plate F be swung back to position shown in Fig. 1, the antifriction-roller *j*, carried by said plate, will operate against cam-arm M″ to actuate the pinion-and-rack gear connecting the rheostat-arm and its governor, whereby said arm is operated to cut in the entire resistance. At the same time the lever H is again pulled toward horizontal position by link G against resistance of spring K′ on rod K to disengage the hook branch of arm I from the crook-lug *q* of latch-bar Y, whereby the latter is free under expansion of spring *p* to engage the toothed flange X of the hub end of the rheostat-arm and lock this arm in full resistance, it being obvious that when the swivel connection of said lever and rod again passes the line of center the main switch-bar is suddenly brought away from its contacts to thus open the circuit. If the plate F be moved to cause an exertion of force by its lugs *t* on balanced reversing switch-bar Z to bring the same from contacts *u u* to contacts *v v*, this operation will take place in advance of the swing of main switch-bar J to close circuit, and the antifriction-roller *g*, carried by said plate, clears cam-arm M″ to permit gradual descent of the rheostat-arm, whereby resistance is cut out. A return of plate F to normal or vertical position will operate to again open the main switch and cut out resistance, the reversing switch-lever being left on its contacts *v v*; but if the throw of said plate be continued said reversing-switch will be again brought on its contacts *u u* after the opening of said main switch. Therefore it will be understood that at any time the reversing-switch is thrown the operation takes place while the main circuit is open, the throw being either previous to the closing of said circuit or subsequent to the opening of same, according to the throw of plate F aforesaid.

By employing oil as the contents of the dash-pot or cylinder V the piston U is always lubricated to prevent cutting, and by regulating the flow of said oil from one side to the other of said piston the throw-speed of the rheostat-arm on its axis may be finely adjusted to suit various conditions under which the apparatus herein set forth is utilized. By utilization of a perforated piston and a valve-disk for controlling same in the arrangement shown or by proper disposition of a check-valve in the pipe connecting the heads of the cylinder should a solid cylinder be utilized retardation of the oil flowing through said pipe from one side to the other of the piston will be effective only upon the throw of the rheostat-arm to cut out resistance, it not being desirable to restrict the movement of said arm when on throw to cut in resistance.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A pivotal rheostat-arm having a weight

in connection therewith, a governor mechanism in gear with the arm against power of its weight, a main switch-lever, gear-control mechanism operative in conjunction with the main switch-lever to permit gravity throw of the rheostat-arm subsequent to a circuit-closing operation of said lever but which restores said arm to normal position previous to a circuit-opening operation of the aforesaid lever, a reversing switch-bar, and means in connection with the gear-control mechanism for actuating said bar.

2. A pivotal rheostat-arm having a weight in connection therewith, a governor mechanism in rack-and-pinion gear with the arm, a pivotal cam in pinion connection with the rack of the aforesaid gear, a cam-controlling swing-plate, a link in union with the plate, and a spring-controlled switch-lever having loose-play connection with the link.

3. A pivotal rheostat-arm having a weight in connection therewith, a governor mechanism in rack-and-pinion gear with the arm, a pivotal two-arm cam in pinion connection with the rack of the aforesaid gear, a swing-plate movable in either direction from normal position to clear both cam-arms but operative on return movement upon one or the other of said arms, a link in union with the plate, a spring-controlled switch-lever having loose-play connection with the link, and a reversing switch-bar controlled by said plate.

4. A pivotal rheostat-arm having a weight in connection therewith, a governor mechanism in rack-and-pinion gear with the arm, a pivotal cam in pinion connection with the rack of the aforesaid gear, a cam-controlling swing-plate, a link in union with the plate, a spring-controlled switch-lever having loose-play connection with the link, a spring-controlled latch for locking the rheostat-arm on full resistance, and a branch of said switch-lever operative to retract the latch.

5. A pivotal rheostat-arm having a weight in connection therewith, a governor mechanism in rack-and-pinion gear with the arm, a pivotal two-arm cam in pinion connection with the rack of the aforesaid gear, a swing-plate movable in either direction from normal position to clear both cam-arms but operative on return movement upon one or the other of said arms, a link in union with the plate, a spring-controlled switch-lever having loose-play connection with the link, a reversing switch-bar controlled by said plate, a spring-controlled latch for locking the rheostat-arm on full resistance, and a branch of the aforesaid switch operative to retract the latch.

6. A pivotal rheostat-arm, a main switch-lever, means in connection with the arm and lever for operating the former, a balanced reversing switch-bar, and means whereby the throw of said bar is had when the main switch is open either previous to closing circuit or subsequent to opening of same.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

JOHN DILLON.

Witnesses:
H. E. OLIPHANT,
B. C. ROLOFF.