No. 701,456. Patented June 3, 1902.

T. VON ZWEIGBERGK.

CONTROLLER.

(Application filed Jan. 23, 1902.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

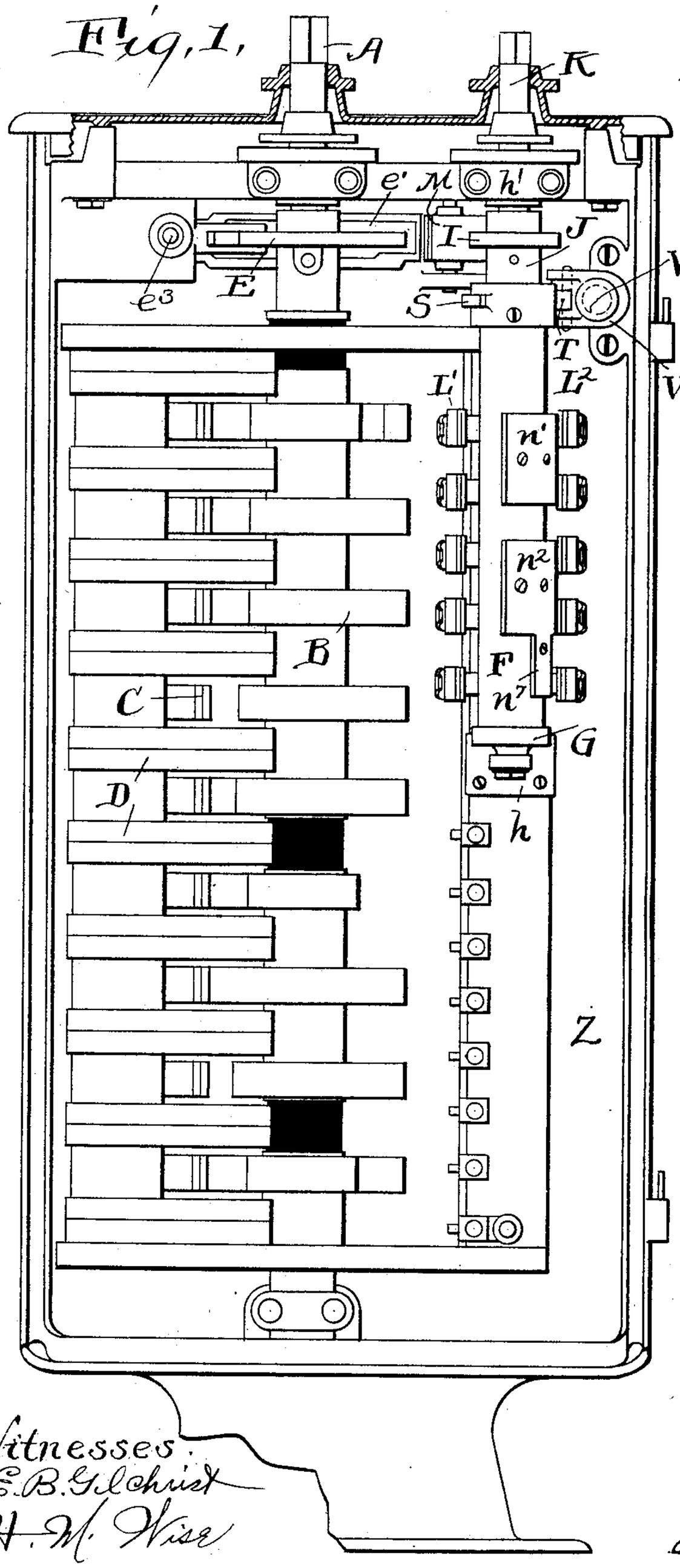
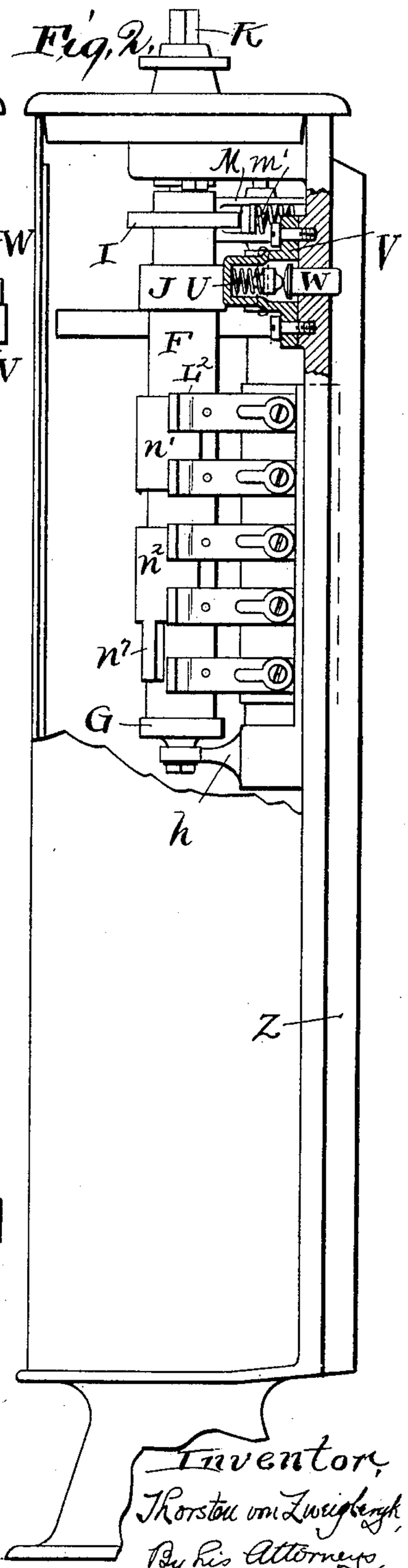


Fig. 2.



Witnesses:
E. B. Gilchrist
H. M. Wise

Inventor,
Thorsten von Zweigbergk,
By his Attorneys,
Thurston & Bates

No. 701,456. Patented June 3, 1902.

T. VON ZWEIGBERGK.

CONTROLLER.

(Application filed Jan. 23, 1902.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3,

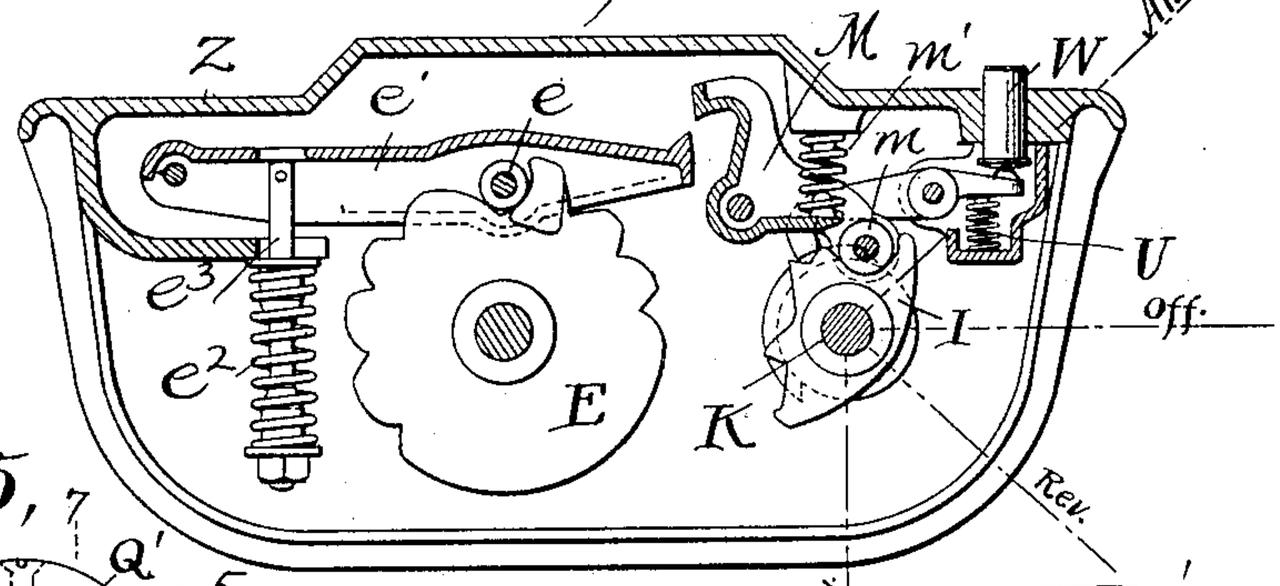


Fig. 5,

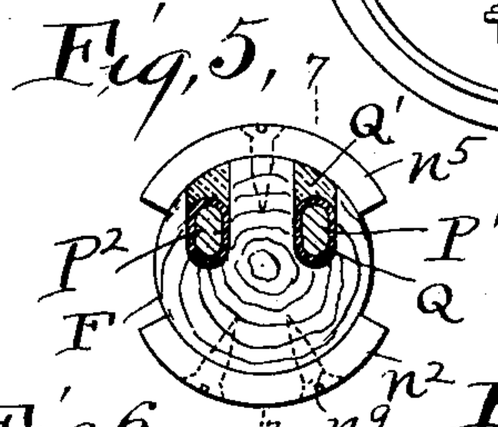


Fig. 4,

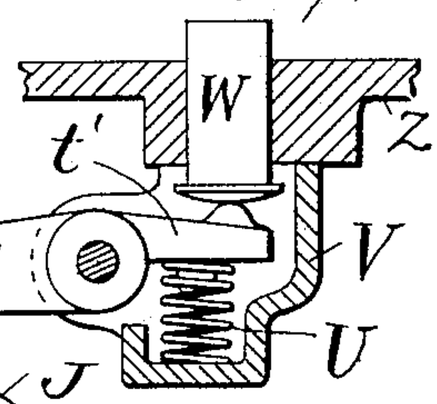


Fig. 6,

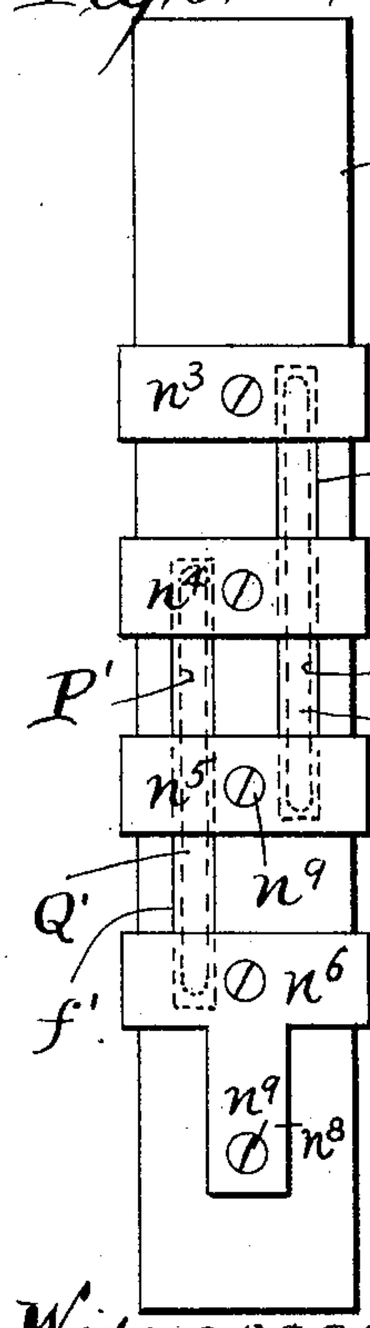


Fig. 7,

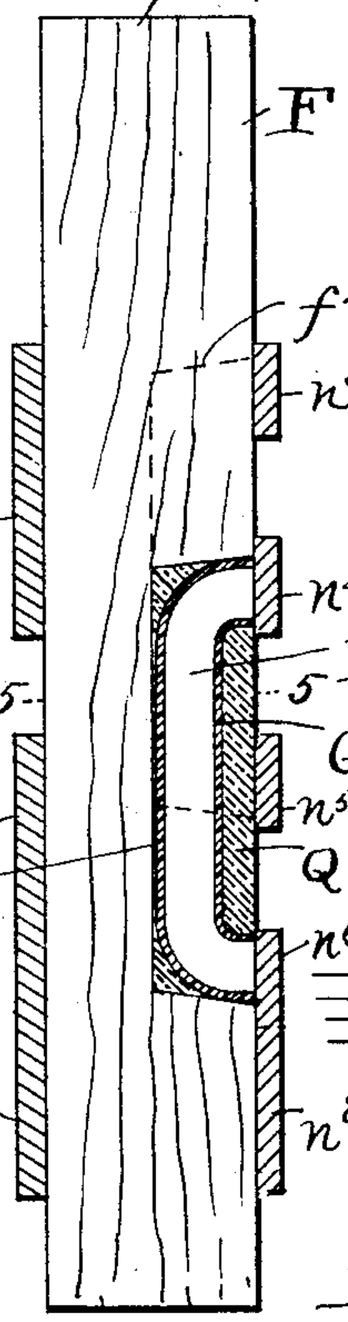
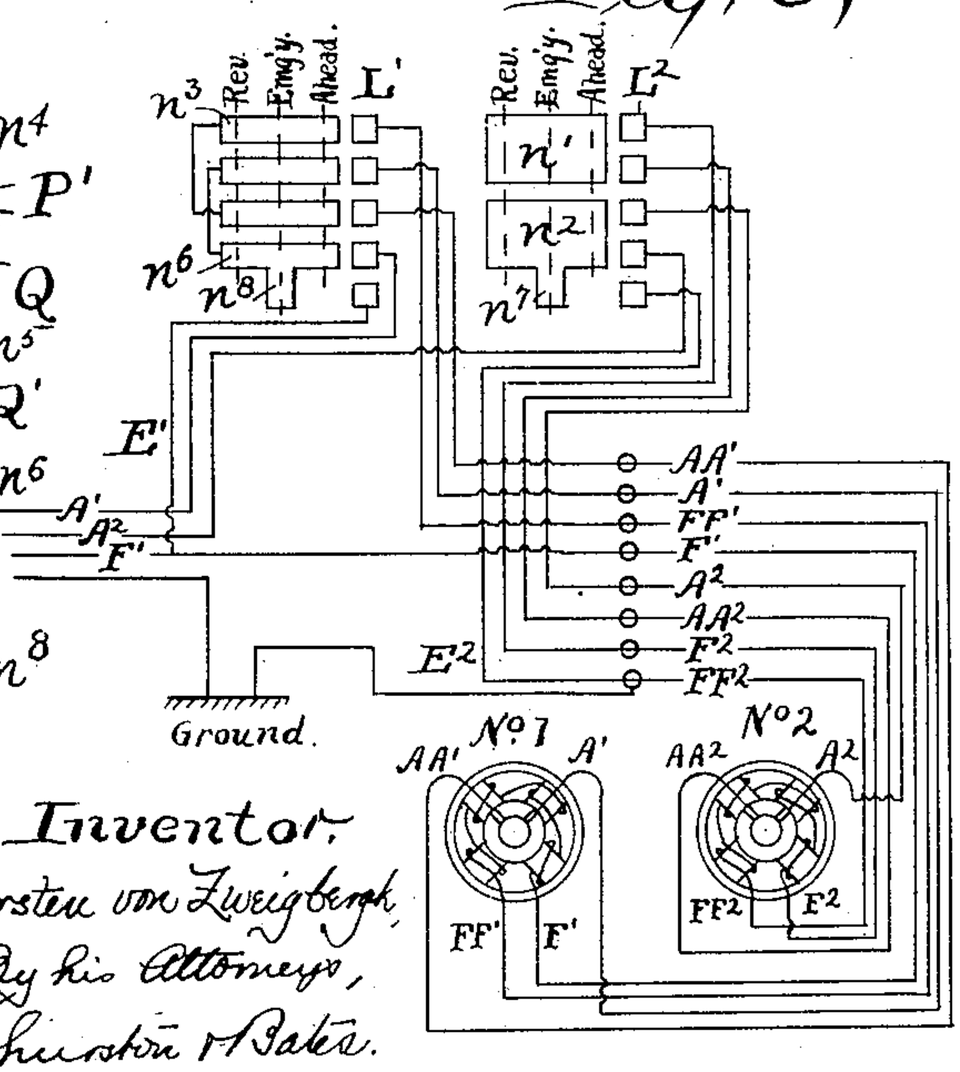


Fig. 8,



Witnesses,
E. B. Gilchrist
H. M. Wise.

Inventor:
Thorsten von Zweigbergk,
By his Attorneys,
Thurston & Bates.

UNITED STATES PATENT OFFICE.

THORSTEN VON ZWEIGBERGK, OF PRESTON, ENGLAND.

CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 701,456, dated June 3, 1902.

Application filed January 23, 1902. Serial No. 90,993. (No model.)

To all whom it may concern:

Be it known that I, THORSTEN VON ZWEIGBERGK, a citizen of the United States, residing at Preston, in the county of Lancaster, England, have invented a certain new and useful Improvement in Controllers, (Case B,) of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to controllers designed especially for railway use; and the object is to provide a reversing-switch having great simplicity of construction and one which shall be very efficient in operation, and associated with this switch a peculiar lock which when the reversing-switch is used to apply an emergency-brake prevents the switch being changed from this position by the ordinary operation of the lever. As its name implies, the emergency-brake is applied when it is necessary to stop the car immediately and its operation is to close the motors upon themselves. When once applied, such brake should not be released until the car stops, for otherwise the braking-current arcing at the reversing-switch would severely burn the switch. Now as the purpose of applying the brake will have been sometimes accomplished before the car comes to an actual stop the motorman is liable to desire to release the brake too soon. Moreover, the sudden retardation given to the car by the operation of the brake may give such a forward momentum to the motorman's body as he has his hand on the reversing-lever that the latter is liable to be unconsciously thrown forward. To avoid these results and any other accidental release of the brake, I provide my lock, which when the emergency-brake is once thrown on prevents it from being thrown off by movement of the reversing-lever. A push-button operated from the back side of the controller I provide for the purpose of thereafter releasing the reversing-switch.

My invention includes the construction and arrangement of the reversing-switch itself and the employment, broadly, of my automatic emergency-brake lock, as well as the more particular embodiment of that lock herein shown.

In the drawings, Figure 1 is a front elevation, and Fig. 2 is a side elevation, partly broken away and partly sectional, of a controller embodying this invention. Fig. 3 is a horizontal section of the controller, for the most part just above the indicator-wheels. Fig. 4 is an enlarged fragmentary horizontal section of the reversing-switch just below the indicator-wheels, showing the emergency-lock. Fig. 5 is a horizontal section of the reversing-switch body. Fig. 6 is a side elevation of such body, and Fig. 7 is a vertical section of the same substantially on the offset line 7 7 of Fig. Fig. 8 is a diagram illustrating the operation of the switch and emergency-brake.

Though this application relates to the reversing-switch, for completeness the drawings show this associated with a governing-switch of a usual type. The governing-switch is formed by a suitably-journaled shaft A, carrying contact-segments B, insulated and connected into suitable groups and coöperating with contact-fingers C, between which are the boxes of a solenoid blow-out D. On the shaft A is an indicator-wheel E, engaged by the roller e on an arm e', drawn forward by a spring e^2, surrounding a rod e^3, secured to the arm, as shown in Fig. 3.

The reversing-switch body is a solid wooden cylinder F, carrying at its lower end a cap-plate or ferrule G, having a projection by which it is journaled in a suitable stationary bearing h. At the upper end this wooden cylinder takes into a metal sleeve J, from which extends upward the operating-shaft K, journaled in the bearing h'. This body F carries suitable segments, which coöperate with suitable contact-fingers, whereby the partial rotation of the body will reverse the motors or apply the emergency-brake, as hereinafter explained. The contact-plates or segments of the reversing-switch are carried on opposite sides of its body and coöperate with two sets of contact-fingers L' L^2, the plates on one side of the body being in engagement with one set, while those on the other side are in engagement with the other set, and the reversal being caused by turning the body to interchange the positions of the two sets of plates. Thus on one side of the body is one set comprising the two plates n' n^2, adapted to overlap adjacent pairs of fingers, and on the opposite side of the body is the other set

of four plates n^3 n^4 n^5 n^6, which are alternately connected by the metallic rods P′ P², whereby these segments may connect together alternate fingers. Now one of the difficulties with controller-switches is to establish a simple and efficient electrical connection between the different segments. This is accomplished in this case very easily by means of my metallic rods P′ P², which are brazed or soldered to the inner sides of the corresponding plates and occupy elongated recesses f' f^2 in the switch-body. Before being put in place the bars P′ P² are wound with insulating-tape Q, and when in place the remaining space in the recess is filled with shellac Q′ or other insulating substance. The segments are held to the body by screws n^9. This allows the building of the switch in a very simple manner. At the same time the segments are very easily removable. The wooden barrel makes a most satisfactory insulation between different plates and seating at each end in a ferrule or sleeve it is well protected.

When the reversing-switch is at the "ahead" position, (shown in Figs. 1 to 4,) the rows of contact-fingers L′ L² occupy on the respective plates the position marked "Ahead" on the diagram Fig. 8, and the operating-lever (which engages the upper end of the shaft K) occupies the position indicated by the broken center line marked "Ahead" in Fig. 3. The ahead position of the indicator-wheel I also appears in Fig. 3, this indicator-wheel being on the shaft K and coöperating with the roller m on the arm M, pressed toward the indicator-wheel by the spring m'. The next position of the reversing-switch lever is the "off" position, which corresponds to the second notch in the indicator-wheel I and in which the two rows of contact-fingers L′ L² are out of engagement with any of the segments, being opposite the space between the two sets of segments on opposite sides of the switch-body. The next position of the reversing-switch is the "reverse" position and in this the series of fingers L′ now come into engagement with the plates n' n^2, while the series of fingers L² come into engagement with the plates n^3 to n^6, as indicated by the positions marked "Rev." in Fig. 8. Now in order to enable the reversing-switch to operate to apply an emergency-brake I provide a fourth position thereof, where the switch closes the motors on themselves. In this position (indicated by "Emg'y" in Figs. 3 and 8) the fingers L² come onto the central vertical line of the plates n^3 n^6 and fingers L′ on the corresponding position of the plates n' n^2, the result being that the motors are left reversed, but are closed on themselves by reason of the lines E′ E², which are normally idle, but which lead from the fields of the respective motors, being directly connected with the lines to the armatures by reason of the projections n^7 n^8 from the plates n^2 n^6, respectively, which are engaged in this position. This applies a violent brake to the motors, as will be readily understood. Two motors are indicated as Nos. 1 and 2 in the diagram, and the lines leading to and from their armatures and fields are designated A AA F FF with the exponents 1 and 2, respectively. The lines to the governing portion of the controller appear at the extreme left in the diagram. In railroad use particularly it is the most natural and convenient arrangement of the reversing-switch handle to have it extend directly crosswise at the off position and forward for the forward movement of the car and rearward for the reversed or rearward movement. Hence the emergency-brake is applied by an extreme rearward pull on the handle. A lock to prevent the release of the reversing-switch when it is turned to the emergency-brake position is, as heretofore stated, very desirable to prevent burning of the reversing-switch, and the particular position of the handle in the reversing-switch position renders such lock especially desirable in railway use, where the momentum of the motorman, due to the abrupt stopping of the car, is liable to cause accidental release of the brake. My emergency-lock prevents accidental release from any cause whatsoever. This emergency-lock is best illustrated in Figs. 3 and 4. On the sleeve J, which, as stated, is a part of the movable switch-body, is formed a segment of a collar S, and against the periphery of this collar bears the nose t of the pivoted dog T under the action of a spring U, compressed between a projecting tail t' of that dog and the wall of a stationary housing V, in which the dog is pivoted. This dog is normally idle; but as soon as the reversing-switch is turned into the "emergency" position the end of the segment S passes beyond the nose t of the pawl and the latter springs toward the shaft K, engaging the shoulder provided by the end of the segment, and thereby locks the reversing-switch in the emergency-brake position, preventing it being released by any movement of its operating-lever. To release the emergency-brake, I provide a push-button W, slidable in the back Z of the controller-frame and bearing against the tail t' of the dog. A pressure forward on the end of this button moves the nose of the dog out of engagement with the segment-collar S and releases the switch-body.

I claim—

1. An electric switch having a movable insulating-body with a longitudinal recess in it, a pair of separated contact-plates secured to the outer surface of said body, a metallic bar rigidly connected to each of said plates on their inner sides and occupying such recess, and insulating material filling the outer portion of such recess, substantially as described.

2. In an electric switch, in combination, a cylindrical wooden body, a pair of parallel recesses on one side thereof, separated segments on that side of the body extending across both recesses, a pair of longitudinal bars joining alternate members of said segments on the

inner sides thereof, one bar occupying one recess and one the other, substantially as described.

3. In an electric switch, in combination, a cylindrical wooden body, a pair of parallel recesses on one side thereof, separated curved plates on that side of the body extending across both recesses, screws passing through the plates into the body, a pair of longitudinal bars joining alternate members of said segments on the inner sides thereof, one bar occupying one recess and one the other, and insulating material filling the remainder of said recesses, substantially as described.

4. In an electric switch, the combination of a cylindrical wooden body having a pair of parallel longitudinal recesses on the same side thereof, four contact-segments extending crosswise of said recesses, two wider segments on the opposite side of the body, screws passing through said segments into the body for holding the segments in place, and a pair of longitudinal bars connecting alternate members of said four segments, said bars being on the inner sides of the segments, and rigidly connected therewith and occupying said recesses, and insulating material filling the space in the recesses in front of said bars and behind those segments which the bars cross but do not engage, substantially as described.

5. The combination with a rotatable reversing-switch body, an automatic spring-actuated lock independent of the operating-lever of the switch, which lock is adapted to engage a shoulder movable with the body when it is turned to the emergency position and prevent its return therefrom until the lock is extraneously released, substantially as described.

6. The combination of a body adapted to be turned on its axis and carrying contact-segments, an abrupt shoulder on said body, a dog spring-pressed against a smooth surface adjacent to said shoulder and adapted to engage the shoulder when the switch-body is turned into the emergency position, and means for releasing said dog, substantially as described.

7. The combination of a switch having a body adapted to be turned and carrying contact-segments, a collar on said body having an abrupt shoulder, a dog normally engaging the periphery of said collar, a spring constraining said dog in said position, said dog being adapted to engage said abrupt shoulder when the switch comes to a certain position, and means independent of the operating-lever of the switch for releasing said dog, substantially as described.

8. The combination with a controller-frame and a movable switch-body carried thereby, of a housing carried by the frame, a dog pivoted in said housing, a push-button slidable through the frame and adapted to operate said dog in one direction, a spring tending to move the dog in the other direction, said dog coöperating with said movable switch-body to lock the same at a certain position thereof, substantially as described.

9. The combination of a controller-frame, a housing carried thereby, a dog pivoted to said housing, a spring within the housing bearing against one side of the dog, a push-button movable through the housing and bearing against the other side of the dog, a reversing-switch carried by the controller-frame, a smooth peripheral surface rigid with the movable member of said switch, which surface the nose of said dog normally engages, said surface having an abrupt termination providing a shoulder with which the dog may lock under the influence of said spring and from which it may be released by said push-button, substantially as described.

10. The combination with a motor, electric circuits and contact-fingers at which they terminate, of a reversing-switch body adapted to move with reference to said contact-fingers to reverse said motor, said body having three different positions, namely, an ahead position, a reverse position, and an emergency-brake position, said last position completing the circuits the same as to drive the motor in the reverse direction but connecting an additional circuit to close the motor on itself, substantially as described.

11. A reversing-switch, comprising a series of contact-fingers, and two series of contact-plates on a relatively movable body, one series being adapted to connect adjacent fingers and the other series alternate fingers, each of said series having an extra narrower plate connected with one of the other plates and adapted to engage a certain finger in one position but not all operative positions of the switch, the fingers coöperating with such narrower plates being connected with lines leading from one side of the motors, and the fingers coöperating with the plates with which such narrower plates are connected being connected to lines leading from the other side of the motors, whereby an emergency position is provided where the motors are closed on themselves, substantially as described.

12. The combination with a motor, electric circuits and contact-fingers at which they terminate, of a reversing-switch body adapted to move with reference to said contact-fingers to reverse said motor, said body having four different positions, namely, an ahead position, an off position, a reverse position, and an emergency-brake position, said last position completing the circuits the same as to drive the motors in the reverse direction but connecting an additional circuit to close the motor on itself, and an automatic lock coming into action at said fourth position and adapted to prevent the accidental movement of the reversing-switch body from such emergency-brake position, substantially as described.

13. A reversing-switch having four positions, namely, ahead, off, reverse, and emergency, and comprising two series of contact-fingers, and two series of contact-plates on a relatively movable body, one series of plates being adapted to connect adjacent contact-

fingers and the other series alternate fingers, and each of said series of plates being adapted to engage either of said series of fingers, the other series of plates concurrently engaging the other series of fingers, said series of plates having extra members located intermediately of the lines of engagement of said plates at the ahead and reverse positions, and contact-fingers for said extra members, whereby said extra members are engaged by their contact-fingers in the emergency position but not in the other operative positions of the switch, substantially as described.

14. In a controller, a casing, a reversing-switch within the casing comprising contact-fingers and a relatively movable body, said body having four different positions, namely, ahead, off, reverse and emergency, combined with a lock within the controller-casing and carried one member by said movable body and the other by the controller-frame, and adapted to automatically lock said switch-body in the emergency position, and means extending through the casing for releasing said lock, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

THORSTEN VON ZWEIGBERGK.

Witnesses:
ARTHUR TAYLOR,
PERCY ROBINSON.