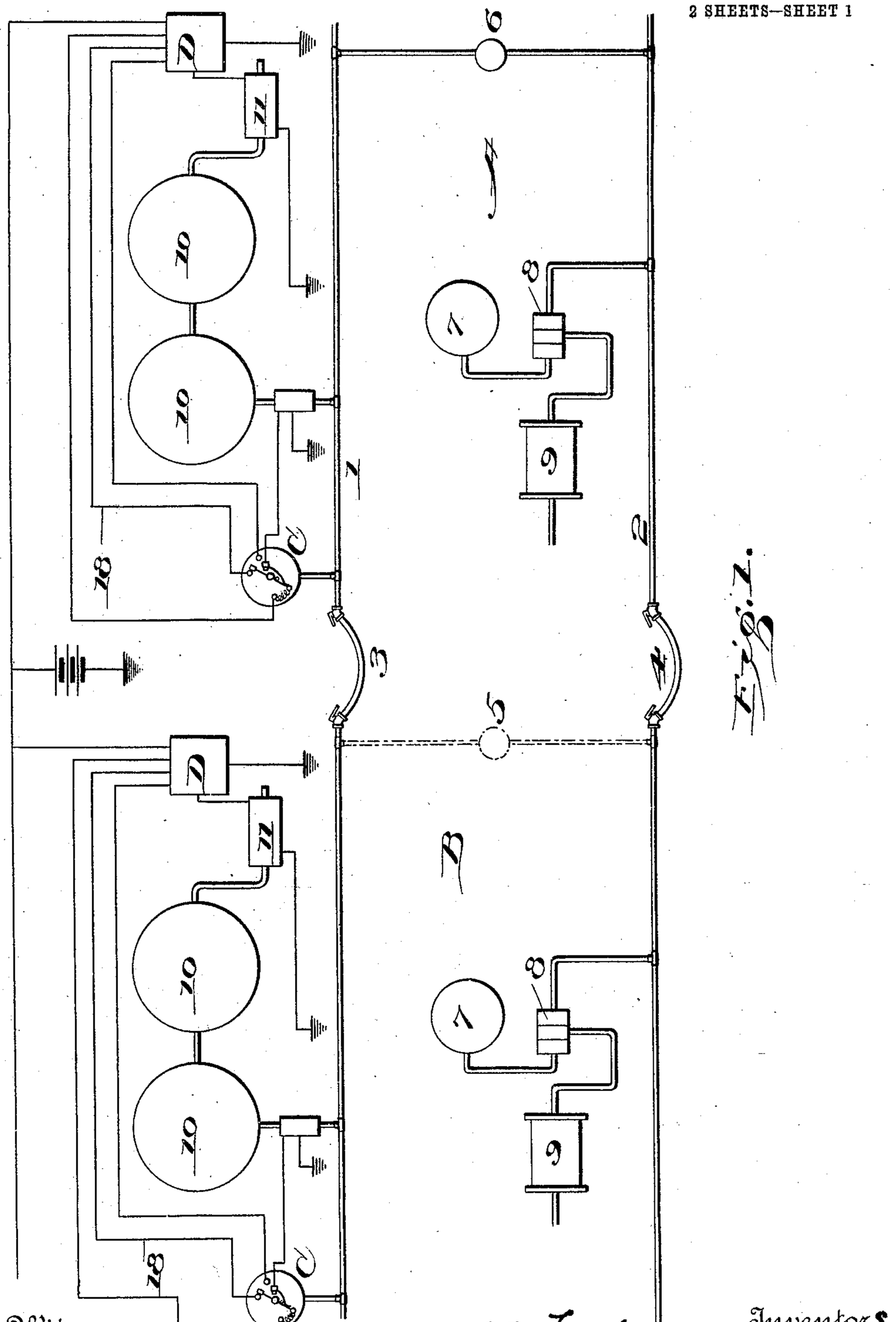
No. 842,358. PATENTED JAN. 29, 1907.

R. C. & E. TAYLOR.

WIRELESS BALANCE FOR ELECTRIC GENERATORS.

APPLICATION FILED AUG. 8, 1904.

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2.

Fig. 2.

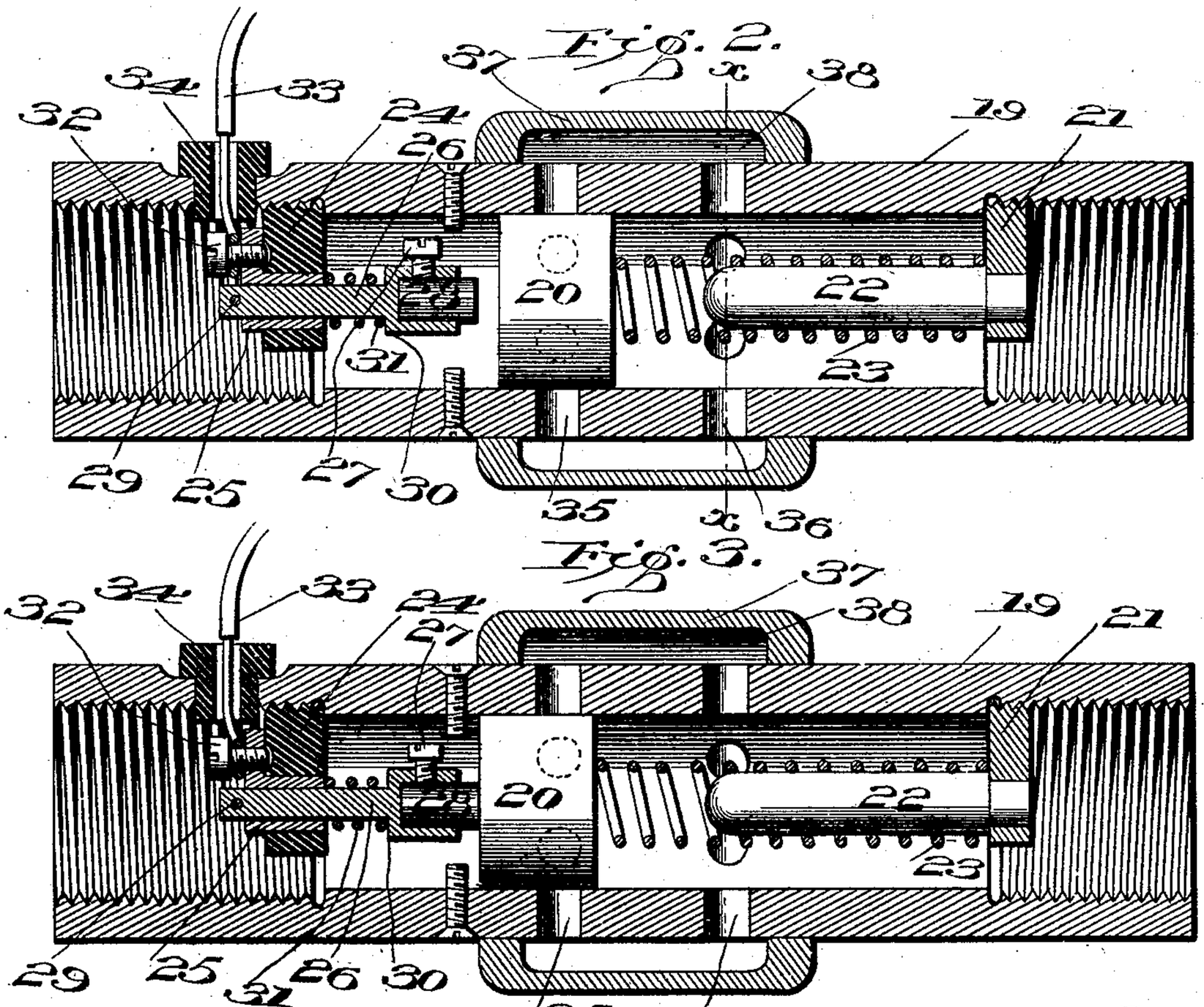


Fig. 3.

Fig. 4.

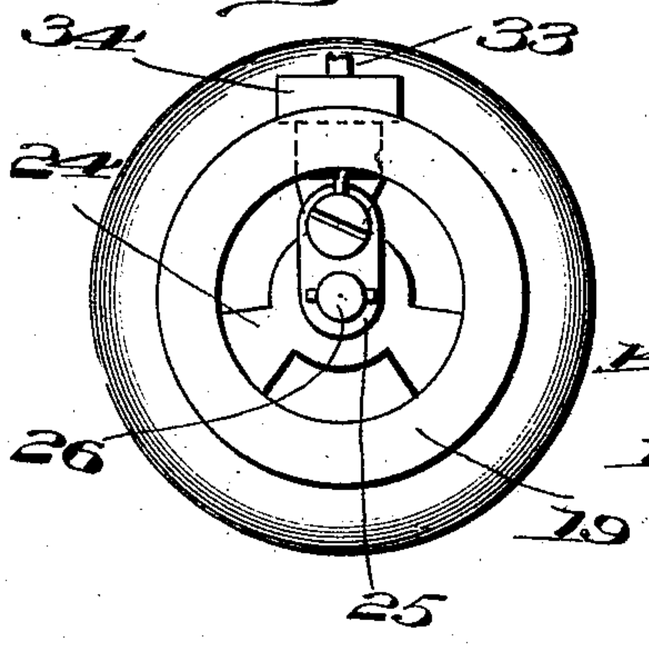


Fig. 6.

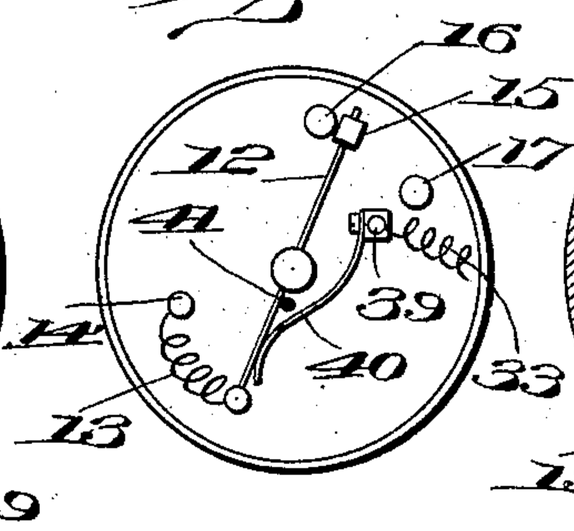
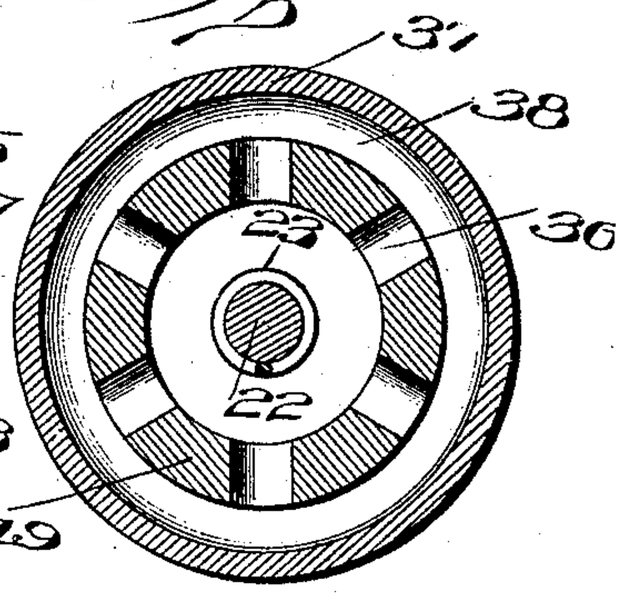


Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

ROBERT C. TAYLOR AND EDWARD TAYLOR, OF BROOKLYN, NEW YORK, ASSIGNORS TO WESTINGHOUSE AIR-BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

WIRELESS BALANCE FOR ELECTRIC GENERATORS.

No. 842,358. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed August 8, 1904. Serial No. 219,865.

To all whom it may concern:

Be it known that we, ROBERT C. TAYLOR and EDWARD TAYLOR, residing in the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Wireless Balances for Electric Generators, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to air-braking systems and means of control of the pumps thereof.

One of the objects thereof is to provide a simple and efficient means whereby upon the operation of one pump the remaining pumps in the same system are automatically started.

Another object is to accomplish the above without the use of additional wires or other connections between the cars in which the system is installed.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the apparatus herein described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is shown one of various possible embodiments of our invention, Figure 1 is a diagrammatic plan showing the several parts in operative relation. Fig. 2 is a sectional elevation of a balance embodying certain specific features of our invention. Fig. 3 is a similar view showing the parts in another position. Fig. 4 is an end elevation of the same. Fig. 5 is a cross-section taken on the line $x\ x$ of Fig. 2. Fig. 6 is a plan of the dial of a governor embodying certain features of our invention.

Similar reference characters refer to similar parts throughout the several views.

Preliminary to a description of the embodiment of our invention herein set forth it may be noted that it has been customary upon certain types of trains to provide upon several of the cars separate pumps and storage-reservoirs for the braking mechanism and means adapted upon the pressure in the system falling to a certain predetermined point simultaneously to start these pumps. As these last-mentioned means, commonly termed "governors," determine the times at which the corresponding pumps are started, an exact adjustment of the same is necessary in order to insure the simultaneous action of the pumps. The maintenance of the governors in a sufficiently fine state of adjustment to prevent one pump starting before the others without the use of auxiliary mechanism has been found to be impracticable, and consequently the pump whose governor is set for actuation at the highest point is started alone. When this occurs, it will be obvious that it will tend to raise the pressure in the system, and thus lessen the chances of the other pumps starting. Owing to this fact, one or more of the pumps are often required to do the work of the entire system. Former attempts to remedy this serious defect have involved the use of additional pipelines or wires extending throughout the train and necessitating the use of extra hose or wire connections between the several cars or have been otherwise complicated and inefficient. These connections are obviously undesirable, as they tend to consume time in making up the train and are also objectionable in other ways.

The defects above indicated and others are substantially eliminated in constructions of the nature of that hereinafter described.

Referring now to Fig. 1, A and B represent diagrammatically the mechanism upon two successive cars of a train, which may obviously consist of any number of cars, if desired, without changing the operation of our system. Running throughout these cars are the reservoir-line 1 and the train-line 2, provided with suitable hose connections, as indicated at 3 and 4. These lines are of a form well known in the art and are connected by means of engineers' valves, as indicated at 5 and 6, for use in the ordinary manner. Train-line 2 is connected with air-braking mechanism, of which the auxiliary reservoir, triple valve, and brake-cylinder are diagrammatically indicated at 7, 8, and 9. As this brake mechanism forms no part of the present invention and operates in a well-known manner, no more detailed description of the same will be given.

Mounted adjacent reservoir-line 1 are the main reservoirs 10, each supplied by a pump 11. These pumps are controlled in the well-known manner by means of a governor C, the dial of which is shown in Fig. 6. The hand 12 of this dial is electrically connected at one end by means of a small flexible wire 13 with

a binding-post 14, which itself may be connected with any desired form of controlling mechanism. This hand is provided at its opposite end with a contact member 15, which is adapted to move between contacts 16 and 17. As hand 12 is controlled by the air-pressure in the reservoir-line in a well-known manner, it will be seen that when this pressure falls to a certain predetermined point contact will be made between members 15 and 16 and a circuit completed from binding-post 14 through wire 13, hand 12, and contact 15 to contact 16, from which point it is carried, by means of a conductor 18, to a well-known form of controlling apparatus D, which is adapted to cause the actuation of the electric pump 11. This controlling apparatus, which forms in itself no part of the present invention, is so constructed that upon a current being passed through the same in such manner as to start the motor of pump 11 the same will continue in operation until a current is passed through a certain other circuit. This second-mentioned circuit is led to the governor-dial at contact 17, which is adapted to coact with contact 15 upon the pressure within the reservoir-line rising to the desired degree. It will thus be seen that if at any time a certain circuit is completed through the controlling apparatus D the pump will continue in operation until it is cut out by means of a certain other circuit comprising contacts 17 and 15.

Positioned between reservoir 10 and reservoir-line 1 is a connection or balance which embodies some of the more important features of our invention. A cross-section through the same is shown in Fig. 2, in which the member 19 is of a tubular form and may, if desired, be constructed from a piece of piping. This tubular member or "cylinder" is internally threaded at either end so as to be adapted to make connection with the reservoir 10 and the reservoir-line 1, respectively. At the central portion of the member or cylinder 19 is positioned a piston 20, which fits snugly within the same and is adapted to have a slight sliding movement limited as follows: Upon the end of the cylinder adjacent reservoir-line 1 there is adjustably inserted a member 21, which may be of any desired form, such that it will not obstruct the passage through the cylinder, but is preferably a triangular "spider" threaded at the outer ends so as to engage the internal thread before referred to. This spider has rigidly tapped into the center thereof a post or stop 22, against which the piston 20 is adapted to rest at one extreme of its path of travel. The movement against this stop is preferably cushioned by means of a spiral spring 23, substantially as shown. At the end of the cylinder adjacent reservoir 10 there is inserted a similar member or spider 24, of insulating material, within which is mounted, by means of bushing 25, a metallic post 26, having a recess in one end in which is preferably secured, by means of set-screw 27, a carbon block 28. This post is adapted to reciprocate freely within the bushing 25, and such movement may be limited in any desired manner, as by means of a cotter-pin 29 and shoulders 30. The movement of post 26 toward spider 24 is preferably cushioned by means of a spiral spring 31, as shown. Connected with bushing 25 by means of a screw 32 is a wire 33, hereinafter referred to. This wire is led through the walls of cylinder 19, passing through a sleeve or bushing 34 of insulating material. Substantially at the center of cylinder 19 are two sets of radial openings 35 and 36, extending through the walls thereof, as is shown in Figs. 2, 3, and 5. Surrounding the portion of the cylinder in which these openings are located is a casing or jacket 37, which forms an annular chamber or by-pass 38 outside the walls of the cylinder. The set of openings 35 is normally covered by the piston 20, thus closing the passage through the cylinder. Upon the increase of pressure upon the reservoir side, however, the piston is moved in an obvious manner against the stop 22, thus uncovering the radial openings or ports 35 and permitting air or other fluid to pass in this manner around the piston and through ports 36. Upon the pressure on the reservoir-line side becoming the greater, however, the piston is moved in the opposite direction against the carbon block 28, thus maintaining the passage through the cylinder in a closed condition, and simultaneously completing a circuit, which will be more fully described hereinafter.

Upon the dial-face of governor C, before described, is positioned a post 39, of insulating material, upon which is mounted a flexible spring 40, adapted to maintain contact with the hand 12 when the same is in connection with contact member 16 and during the movement thereof toward contact member 17 for a considerable portion of its path of travel. Before contact 15 has reached contact 17, however, the spring 40 engages a stop 41 and is thus prevented from further following the hand. Spring 40 is connected with the wire 33, as shown in Fig. 6 of the drawings.

The operation of the above-described embodiment of our invention is as follows: Assuming that the pressure in the reservoir-line falls to such a point that one of the pumps 11 is started, this pump—as, for example, that upon car A—will tend to raise the pressure in the corresponding reservoir 10. When the pressure in this reservoir has become slightly greater than that in the reservoir-line, the piston 20 in the corresponding balance or connection 19 is forced in a direction away from carbon block 28 to a position against the stop 22. In this position

compressed air or other fluid has a free passage through spider 24, ports 35, by-pass 38, ports 36, and spider 21 to the reservoir-line. Air is thus forced into the reservoir-line, raising the pressure of the same above that in the several remaining reservoirs—as, for example, that upon car B. In the balance upon car B the piston 20 is exposed to a greater pressure upon the side toward reservoir-line 1 than upon that toward the reservoir of this car, and the piston is consequently moved against carbon block 28. Substantially irrespective of the position of the governor-hand 12 a circuit will now be completed through wire 13, hand 12, spring 40, wire 33, bushing 25, post 26, carbon block 28, piston 20, and thence to ground in a manner which should be obvious, as the cylinder 19 is connected with the piping of the car. Upon a current flowing in this circuit through the controller of the pump the latter is started in a well-known manner, and the same is continued in operation until the hand 12 has completed a circuit with contact 17. The operation of the pump will continue irrespective of the fact that the pressures within the reservoir 10 and reservoir-line 1 may be substantially equalized and the piston 20 moved away from carbon block 28. The pump will also be positively stopped when hand 12 reaches contact 17 without respect to the movement of piston 20, as before this point has been reached the circuit is broken at the governor-dial by reason of spring 40 engaging stop 41. It will thus be seen that even though the piston 20 should stick in cylinder 19 or the mechanism become in other ways inoperative the action of the pump will not be continued and the pressure raised above the desired point.

It will thus be seen that we have provided apparatus which possesses marked advantages in the matters of inexpensiveness of construction and readiness of installation in braking systems of a well-known type. Also it may be noted that the several parts are of such construction as to render the apparatus extremely durable and reliable. The several parts are substantially unaffected by weather conditions, require no precise adjustment, and are easily duplicated and easily assembled.

Although the above description has been given with reference to an air-braking system, it will be obvious that the same may be used in connection with a system in which the brakes are applied by any other fluid-pressure, and the following claims are intended to comprehend such a construction.

The terms "reservoir-line," "reservoir," and "pump" are used in the following claims in their ordinary sense, which is familiar to those skilled in the art.

As many changes could be made in the above construction and many apparently widely-different embodiments of our invention could be made without departing from the scope thereof, we intend that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In apparatus of the class described, in combination, a reservoir, a pump adapted to force a fluid into said reservoir, and means comprising two circuits adapted upon either of said circuits being completed to cause the actuation of said pump.

2. In apparatus of the class described, in combination, a reservoir, a reservoir-line, a pump adapted to force air into said reservoir, and means comprising a connection between said reservoir and said reservoir-line adapted to permit air to pass from said reservoir to said reservoir-line and upon air tending to pass from said reservoir-line to said reservoir to start said pump.

3. In apparatus of the class described, in combination, a reservoir, a reservoir-line, a connection between said reservoir and said reservoir-line, and means comprising a movable member in said connection adapted upon the pressure in either said reservoir or said reservoir-line becoming lower than that of the other to cause air to flow into that of the lower pressure.

4. In apparatus of the class described, in combination, a reservoir, a reservoir-line, a pump adapted to force air into said reservoir, a connection between said reservoir and said reservoir-line, means comprising two circuits adapted upon either of said circuits being completed to cause the actuation of said pump, pressure-controlled means adapted to complete one of said circuits, and means comprising a movable member within said connection adapted to permit the passage of air from said reservoir to said reservoir-line and upon air tending to pass in the reverse direction to complete the other of said circuits.

5. In apparatus of the class described, in combination, a reservoir, a reservoir-line, a pump adapted to force air into said reservoir, a connection between said reservoir and said reservoir-line, a movable member within said connection adapted in one position to obstruct the passage therethrough, in a second position to permit the passage of air through said connection and in a third position to maintain said passage in obstructed condition and to complete an electric circuit, said movable member being exposed upon separate portions of its surface to the pressures from said reservoir and from said reservoir-line respectively and being adapted to assume said second and said third positions ac-

cording as the pressure from said reservoir or from said reservoir-line preponderates, and means connected with said electric circuit adapted upon the same being completed to start said pump.

6. In apparatus of the class described, in combination, a reservoir, a reservoir-line, a pump adapted to force air into said reservoir, a connection between said reservoir and said reservoir-line, a movable member within said connection adapted in one position to obstruct the passage therethrough, in a second position to permit the passage of air through said connection and in a third position to maintain said passage in obstructed condition and to complete an electric circuit, said movable member being exposed upon separate portions of its surface to the pressures from said reservoir and from said reservoir-line respectively and being adapted to assume said second and said third positions according as the pressure from said reservoir or from said reservoir-line preponderates, means connected with said electric circuit adapted upon the same being completed to start said pump, and a spring tending to maintain said movable member in said first position.

7. In apparatus of the class described, in combination, a reservoir, a reservoir-line, a pump adapted to force air into said reservoir, a connection between said reservoir and said reservoir-line, a movable member within said connection adapted in one position to obstruct the passage therethrough, in a second position to permit the passage of air through said connection and in a third position to maintain said passage in obstructed condition and to complete an electric circuit, said movable member being exposed upon separate portions of its surface to the pressures from said reservoir and from said reservoir-line respectively and being adapted to assume said second and said third positions according as the pressure from said reservoir or from said reservoir-line preponderates, means connected with said electric circuit adapted upon the same being completed to start said pump, means adapted upon the pressure of said reservoir-line attaining a certain value to stop said pump, and means adapted automatically to break said circuit before said last-mentioned pressure is attained.

8. In a braking system, a reservoir-line, a plurality of reservoirs , a plurality of pumps, and means positioned between said reservoirs and said reservoir-line adapted upon the pressure in said reservoir-line becoming greater than that in the corresponding reservoir to cause a pump to force air into said reservoir and adapted upon the pressure in one of said reservoirs becoming greater than that in said reservoir-line to permit the free passage of air from said reservoir to said reservoir-line.

9. In a braking system, a reservoir-line, a reservoir, a pump, means adapted upon the pressure in said reservoir-line falling to a certain point to cause the actuation of said pump, and means adapted upon the pressure in said reservoir-line increasing to cause the actuation of said pump independently of said first-mentioned means.

10. In a braking system, a reservoir-line, a reservoir, a pump, means adapted upon the pressure in said reservoir-line falling to a certain point to cause the actuation of said pump, and means interposed between said reservoir and said reservoir-line adapted upon the pressure in said reservoir-line exceeding that in said reservoir to cause the actuation of said pump independently of said first-mentioned means.

11. In a braking system, a pump, a reservoir, a reservoir-line, means adapted to cause the operation of said pump upon the fall of pressure in said reservoir-line to a predetermined point, and means adapted to cause the operation of said pump independently of the condition of said first-mentioned means.

12. In a braking system, a reservoir-line, a reservoir, a pump, means adapted upon the fall of pressure in said reservoir-line to a certain predetermined point to complete a circuit and cause the actuation of said pump, and means adapted upon the increase of pressure in said reservoir-line above that in said reservoir to complete another circuit and cause the actuation of said pump.

13. In a controlling apparatus, two receptacles adapted to contain a fluid under pressure, a connection between the same, and a movable member in said connection the opposite sides of which are respectively exposed to the pressure within said two receptacles and the path of travel of which is limited by a stop and an electric contact.

14. In a controlling apparatus, two receptacles adapted to contain a fluid under pressure, a connection between the same, a movable member in said connection the opposite sides of which are respectively exposed to the pressure within each of said two receptacles and the path of travel of which is limited by a stop and an electric contact, and a by-pass about said removable member normally closed thereby and adapted to be opened upon the pressure in one of said receptacles exceeding that in the other.

15. In a controlling apparatus, two receptacles adapted to contain a fluid under pressure, a connection between the same, a movable member in said connection the opposite sides of which are respectively exposed to the pressure within said two receptacles and the path of travel of which is limited by a stop and an electric contact, and a by-pass

about said movable member normally closed thereby, said movable member being adapted upon movement against said stop to open said by-pass and upon movement against said electric contact to complete an electric circuit.

16. In a controlling apparatus, two receptacles adapted to contain a fluid under pressure, a connection between the same, a movable member in said connection the opposite sides of which are respectively exposed to the pressure within said two receptacles and the path of travel of which is limited by a stop and an electric contact, and a by-pass about said movable member normally closed thereby, said movable member being adapted upon the pressure in one of said receptacles exceeding that of the other to be forced against said stop and open said by-pass and upon the pressure in the latter receptacle becoming the greater to be forced in the opposite direction against said electric contact and complete an electric circuit.

17. In a controlling apparatus, two receptacles adapted to contain a fluid under pressure, a connection between the same, a movable member in said connection the opposite sides of which are respectively exposed to the pressure within said two receptacles and the path of travel of which is limited by a stop and an electric contact, and a by-pass about said movable member normally closed thereby, said movable member being adapted upon the pressure in one of said receptacles exceeding that of the other to be forced against said stop and open said by-pass and upon the pressure in said last-mentioned receptacle becoming the greater to be forced in the opposite direction against said electric contact and complete an electric circuit and maintain said by-pass in a closed condition.

18. In a braking system, a reservoir-line, a reservoir, a pump, a connection between said reservoir and said reservoir-line, and a movable member in said connection the opposite sides of which are respectively exposed to the pressure within said reservoir and said reservoir-line and the path of travel of which is limited by a stop and an electric contact, said movable member being adapted upon engagement with said electric contact to complete an electric circuit and cause the actuation of said pump.

19. In a braking system, a reservoir, a reservoir-line, a pump, a connection between said reservoir and said reservoir-line, a movable member in said connection the opposite sides of which are respectively exposed to the pressure within said reservoir and said reservoir-line and the path of travel of which is limited in one direction by an electric contact, and a by-pass about said movable member normally closed thereby, said movable member being adapted upon the pressure in said reservoir-line exceeding that in said reservoir to be forced against said electric contact and complete an electric circuit and cause the actuation of said pump.

20. In a braking system, a pump, a reservoir, a reservoir-line, means adapted upon the pressure in said reservoir-line falling to a certain predetermined point to complete an electric circuit and cause the actuation of said pump, a connection between said reservoir and said reservoir-line, and a movable member within said connection the path of travel of which is limited in one direction by an electric contact, said movable member being adapted upon engagement with said electric contact to complete another electric circuit and cause the actuation of said pump.

21. In a braking system, a reservoir-line, a reservoir, a pump, means adapted upon the pressure in said reservoir-line falling to a certain predetermined point to cause said pump to force air into said reservoir, a connection between said reservoir-line and said reservoir, and a movable member within said connection the opposite sides of which are respectively exposed to the pressure within said reservoir and said reservoir-line and the path of travel of which is limited by a stop and an electric contact, said movable member being adapted upon pressure in said reservoir-line exceeding that in said reservoir to be forced against said electric contact and complete an electric circuit and cause said pump to force air into said reservoir.

22. In a braking system, a reservoir-line, a reservoir, a pump, means adapted upon the fall of pressure in said reservoir-line to a certain point to complete an electric circuit and cause said pump to force air into said reservoir, a connection between said reservoir and said reservoir-line, a movable member within said connection the position of which is controlled by the relative pressures in said reservoir and said reservoir-line, an electric contact against which said movable member is forced upon the pressure in said reservoir-line exceeding that in said reservoir, and a by-pass about said movable member normally closed thereby and adapted to be opened upon the pressure in said reservoir exceeding that in said reservoir-line, said movable member upon engagement with said electric contact completing an electric circuit and causing the actuation of said pump.

23. In a braking system, a plurality of reservoirs, a reservoir-line, a pump associated with each reservoir, a connection between each reservoir and said reservoir-line, and a movable member within each connection the position of which is controlled by the relative pressures in said reservoir-line and in the reservoir with which it is associated, said parts being so arranged and constructed that upon the operation of one pump the pressure in said reservoir-line will be raised, the movable members in said other connections will be ac-

tuated and the pumps associated therewith started.

24. In a braking system, a reservoir, a reservoir-line, a pump, means adapted upon the pressure in said reservoir-line falling to a certain predetermined point to cause the operation of said pump and upon the pressure therein rising to a certain other point to cause the stopping of said pump, and means positioned between said reservoir and said reservoir-line adapted upon the pressure in said reservoir-line exceeding that in said reservoir to cause the operation of said pump until the same is stopped by said first-mentioned means and adapted upon the pressure in said reservoir exceeding that in said reservoir-line to permit the free passage of air from said reservoir to said reservoir-line.

In testimony whereof we affix our signatures in the presence of two witnesses.

ROBERT C. TAYLOR.
EDWARD TAYLOR.

Witnesses:
MARTIN D. BRADLEY,
FRANK H. BURROUGHS.