P. UTNE.

APPARATUS FOR CONTROL OF RAILWAY TRAINS.

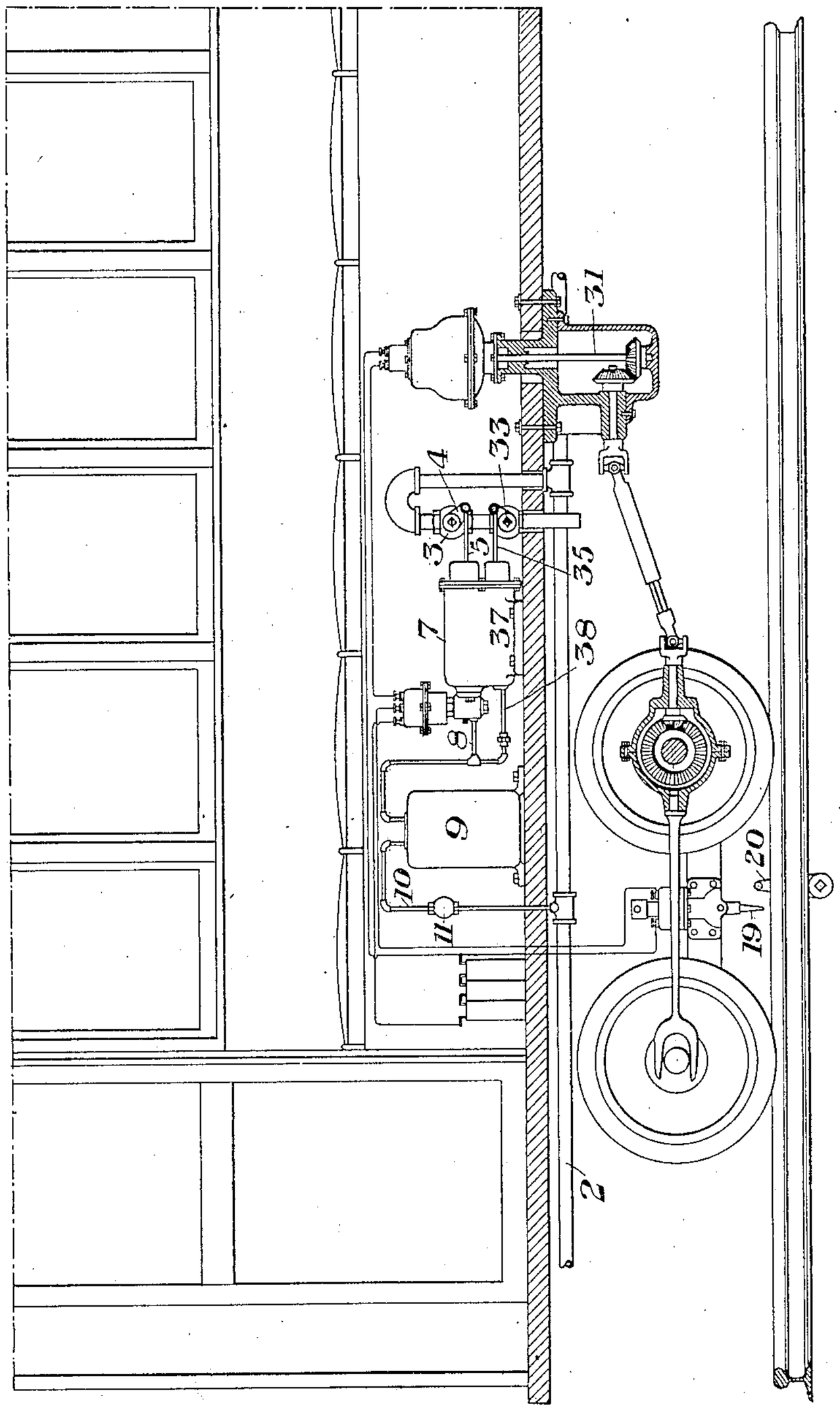
APPLICATION FILED AUG. 3, 1908.

919,982.

Patented Apr. 27, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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3 SHEETS—SHEET 2.

Fig. 2.

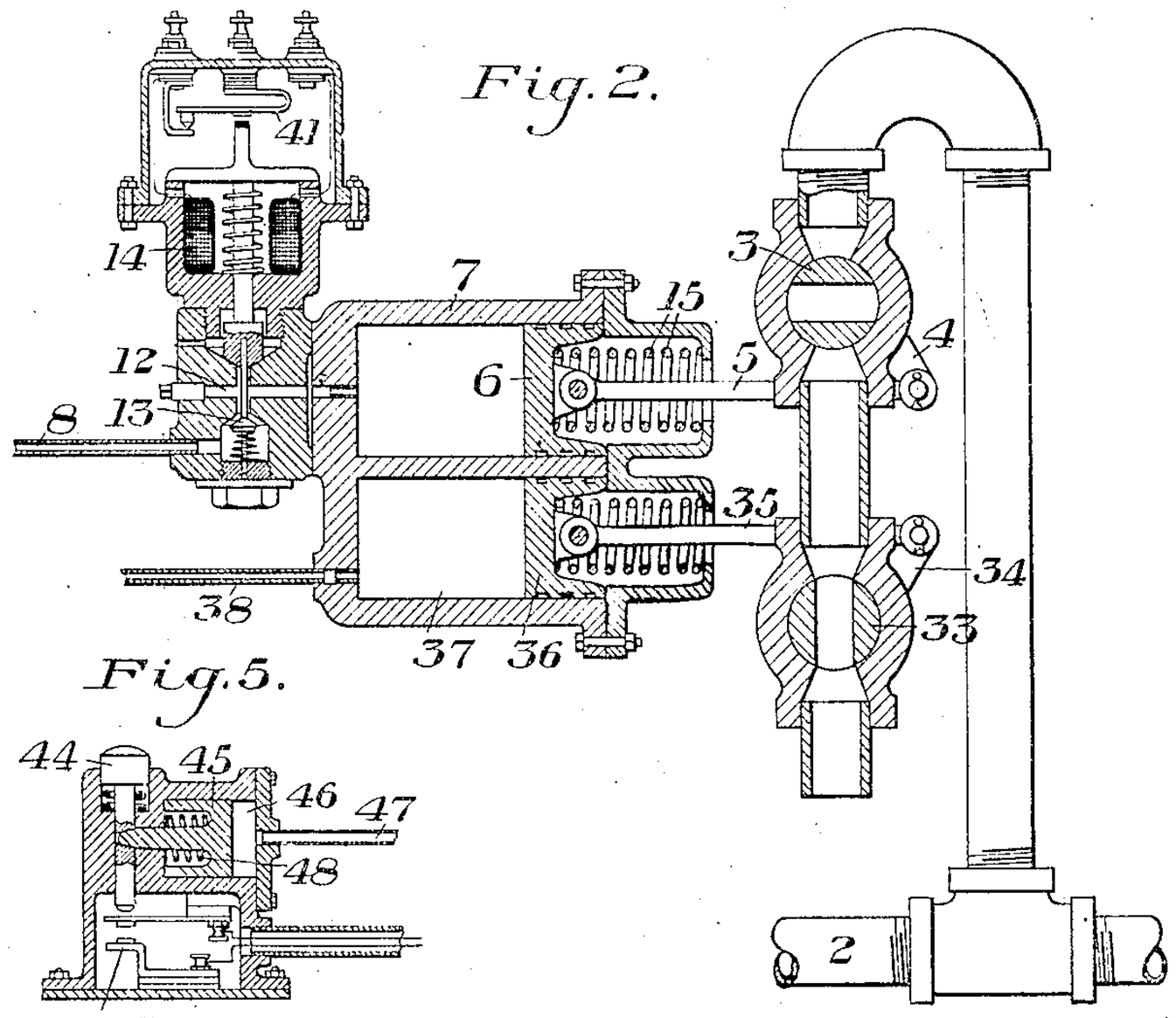

Fig. 5.

41a

Fig. 3.

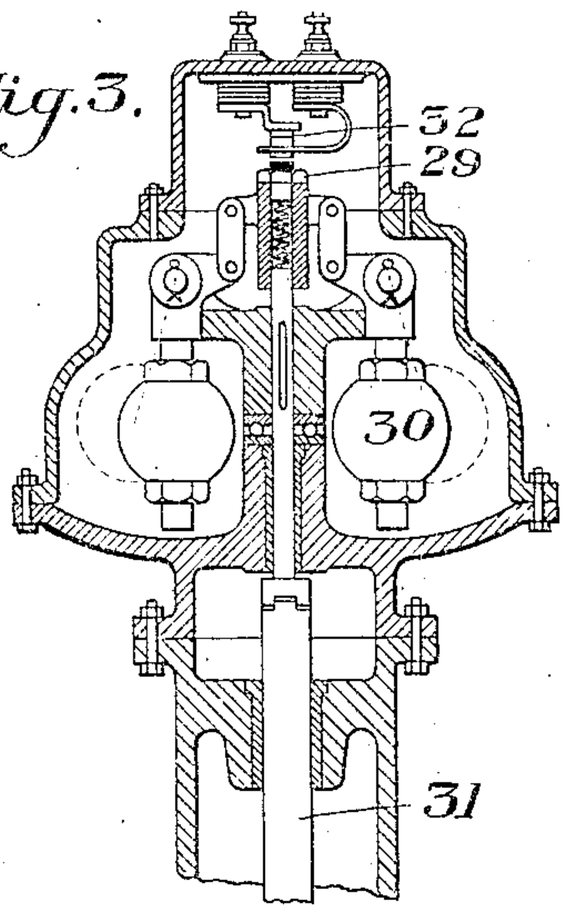

Fig. 4.

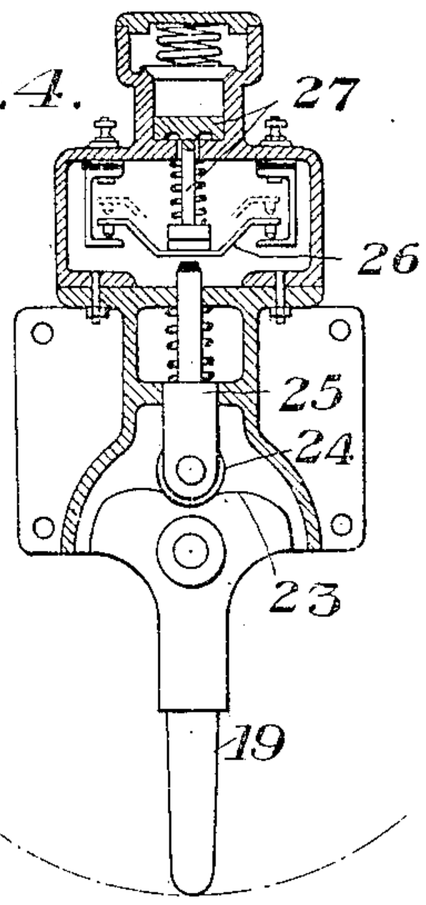

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Fig. 6.

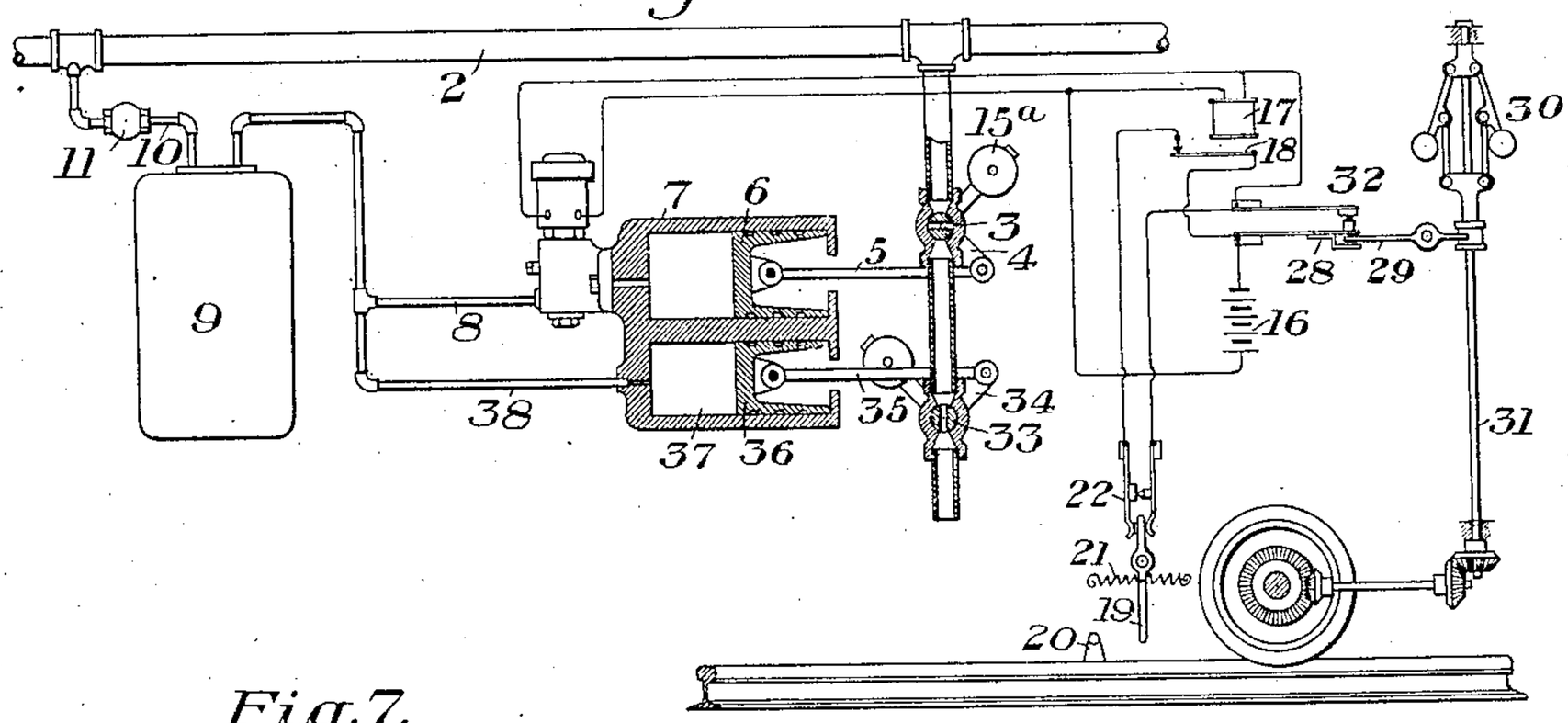


Fig. 7.

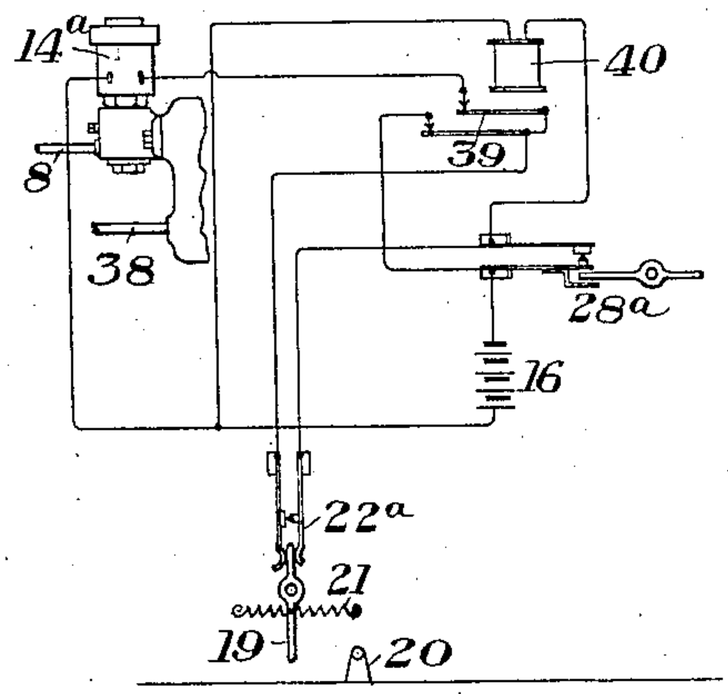


Fig. 8

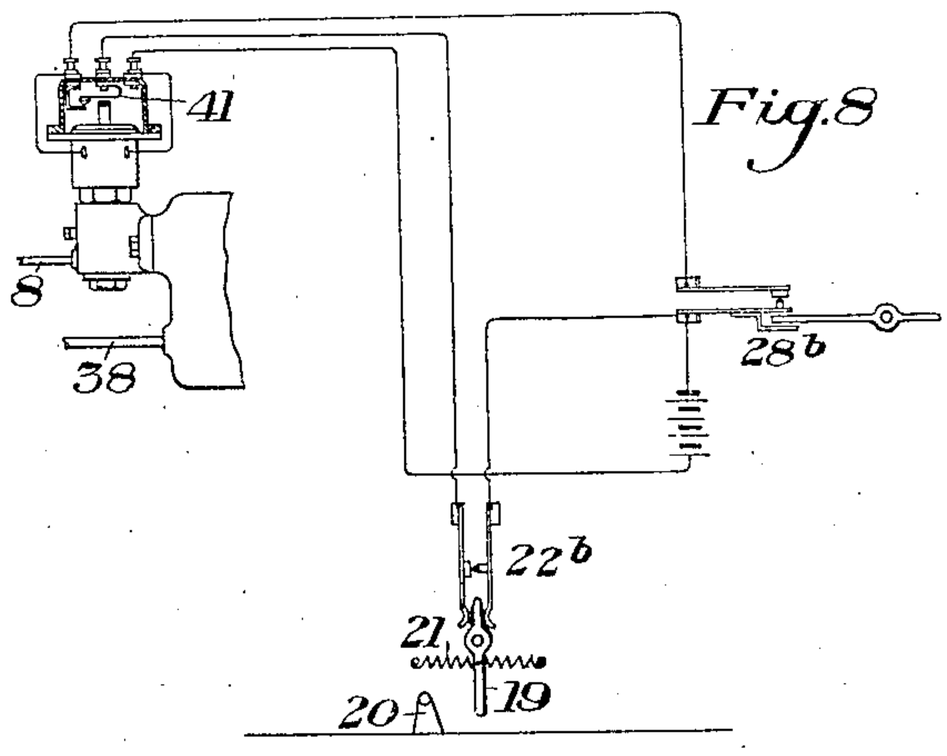
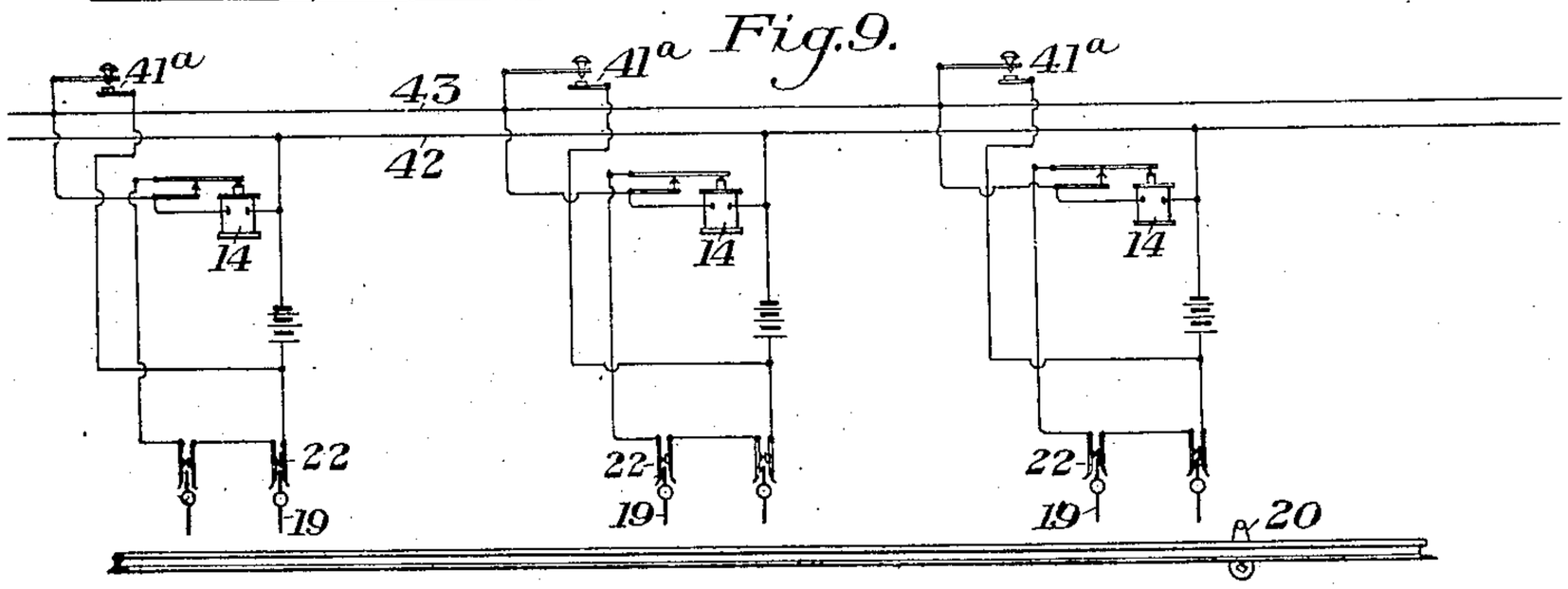


Fig. 9.



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UNITED STATES PATENT OFFICE.

PER UTNE, OF NEW YORK, N. Y., ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

APPARATUS FOR CONTROL OF RAILWAY-TRAINS.

No. 919,982. Specification of Letters Patent. Patented April 27, 1909.

Application filed August 3, 1908. Serial No. 446,715.

To all whom it may concern:

Be it known that I, PER UTNE, of New York, in the county of New York and State of New York, have invented a new and useful Apparatus for the Control of Railway-Trains, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional elevation of a portion of a car or other vehicle showing one arrangement of apparatus embodying the main features of my invention; Fig. 2 is a detail sectional view of the mechanism for operating the exhaust valves; Fig. 3 is a detail sectional view of one form of governor which may be employed; Fig. 4 is a sectional detail view showing one form of trip arm; Fig. 5 is a detail sectional view showing means which may be employed for locking the circuit breaker; Fig. 6 is a diagram of the operating parts shown in Fig. 1; Figs. 7 and 8 are diagrams showing modifications; and Fig. 9 is a diagram showing the arrangement of circuits whereby the circuit breakers on a number of cars or vehicles may be closed from any car or vehicle.

My invention has relation to the control of railway trains, and more particularly to apparatus which is designed to effect the automatic stopping of trains or the reduction in train speed, should the train attempt to pass certain points along the track contrary to information conveyed at such points by block signals or other means.

The invention is designed to provide simple and effective apparatus of this character, possessing certain other novel features of construction and arrangement hereinafter described.

The precise nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made therein by those skilled in the art, without departing from the spirit and scope of my invention, as defined in the appended claims.

While my invention will be described as applicable to train control I desire it understood that the term "train" is intended to include not only trains proper, but also single vehicles, except as to those features thereof hereinafter described, which have special reference to a train composed of a number of attached cars or vehicles. I desire it further understood that while I have shown the apparatus arranged to control the exhaust valve of a train brake pipe, my invention may be used in connection with any suitable means for reducing or stopping the speed of the train.

In the drawings, the numeral 2 designates the usual train pipe, which is provided with an exhaust valve 3. The stem of this valve has an arm 4, to which is connected a piston rod 5, connected to a piston 6, working in a cylinder 7. The cylinder 7 receives its supply of air by a connection 8 with a reservoir 9, which is suitably supported on the car or other vehicle, and which is connected with the train pipe 2 by a pipe 10, having therein a check valve 11, which is arranged to tend to keep the maximum pressure of the train pipe in the reservoir, regardless of pressure variations in the train pipe.

Air is admitted to the cylinder 7 through the port 12, which is controlled by a valve 13. This valve is normally held in open position, as shown in Fig. 2, by the action of an electromagnet 14, the piston 6 being normally held in position to keep the valve 3 closed by the pressure of air admitted to the cylinder 7, through the open valve 13. The piston 6 is moved in the opposite direction by a spring 15, to close the valve, assisted, if desired, by a counter-weight 15ª, attached to the stem of the valve. The magnet 14 is connected in an electrical circuit supplied by a battery 16, or other suitable means, and in the arrangement shown in Fig. 6, is in parallel with a relay magnet 17, having a movable contact arm 18.

19 is a pivoted trip arm which is suitably supported on the locomotive, car or other vehicle and which depends therefrom in position to contact with a track stop 20, placed along the track at the desired point. These track stops may be connected with signal mechanism so as to be moved into and out of operating position in correspondence with the movement of the signals, or they may be fixed stops, placed at the points along the track where it is desirable to insure the control of passing trains.

In the drawings, I have shown the trip arm

as normally held in its central operating position by means of springs 21, but this may be accomplished by any suitable means.

22 designates a circuit breaker, which is operated by the movement of the trip arm 19. This circuit breaker is shown diagrammatically in Fig. 6, and may be of any suitable character. One form of circuit breaker suitable for the purpose is shown in detail in Fig. 4. In the construction shown in this figure, the upper portion of the arm 19 has a cam surface 23, which is engaged by a roller 24, on the lower end of a spring-pressed rod 25. The rod 25 is arranged upon its upward movement to engage a movable contact bar 26, carried by a plunger 27, the arrangement being such that when the trip arm 19 is moved in either direction by its engagement with one of the track stops, the rod 25 will be actuated to engage the contact-carrying member 26, and thereby open the circuit. 28 is another circuit breaker, which is normally closed, but which is arranged to be opened by means of a connection 29 with the movable member of a centrifugal governor 30, which is driven by suitable driving connections 31, with an axle or other moving part of the car or other vehicle on which the apparatus is mounted. One form of governor suitable for this purpose is shown in Fig. 3. The governor of this figure is an ordinary ball governor. The movement of the balls 30 under the centrifugal action of rotation effects a movement of the movable member 29, and thereby effects the opening of the circuit at the contacts 32. The circuit breaker 22 is in series with the movable member or armature 18, of the relay magnet 17, and in parallel with the circuit breaker 28.

The operation of the apparatus, as thus far described, is as follows: Supposing the vehicle or train to be moving below the predetermined speed toward one of the trip arms 19; the centrifugal action of the governor 30 at this speed is not sufficiently great to open the circuit breaker at 28, so that when the trip arm 19 strikes the track stop 20, and thereby opens the circuit breaker 22, the relay magnet 17 and the valve-operating magnet 14 remain energized. The pressure on the reservoir 9, remains in the cylinder 6, thereby holding the valve 3 in its closed position. If, however, the speed of the train exceeds the predetermined limit, the circuit breaker 28 is continuously held open and when the trip arm 19 engages the track stop 20, and opens the circuit breaker 22, the relay 17 is thereby deënergized. This deënergizes the magnet 14, and the valve 12 is immediately closed by the action of a spring or other suitable means, thereby causing the piston 6 to move to the other end of the cylinder 7, either by the spring 15 or it may be by the action of gravity, if the cylinder is located in a vertical position. This movement of the piston 6 opens the valve 3, and permits air to exhaust from the train pipe, until the speed of the train is reduced to the limit at which the governor 30 will act to close the circuit breaker 28 to again energize the relay 17 and the magnet 14.

The time transpiring between the opening and the closing of the circuit breaker 22 while the trip arm 19 is being dragged over the stop arm, should be made long enough to permit the armature 18 of the relay 17 to drop. This may be accomplished through the medium of any suitable retarding device, such as a dash-pot, in connection with the trip arm, for the purpose of making its movement back to central position after being tripped, a relatively slow one.

I have shown the train pipe 2, as provided with a secondary valve 33, whose stem is connected by an arm 34 and rod 35 with a piston 36, working in a cylinder 37, connected by a pipe 38, with the reservoir 9. The purpose of this valve 33 is to close the exhaust from the train pipe independently of the valve 3, in case the pressure in the train pipe, as well as that in the reservoir 9, should be exhausted at the same time, so as to enable the building up of pressure in the train pipe sufficiently to actuate the piston 6 to close the valve 3. The cylinder 37 and its piston 36 are preferably so constructed as to operate on a slightly higher pressure than the cylinder 7, in order to permit the valve 3 to close before the valve 33 opens, when the pressure is raised in the reservoir 9. It will be noted that the connections to the two valves are such that the valve 3 is held closed by the pressure in the cylinder 7, while the valve 33 is held in its open position by the pressure in the cylinder 37.

Fig. 7 shows a modified arrangement in the control circuit for the magnet 14^a, corresponding to the magnet 14, of Fig. 6, the holding current for this magnet being carried through a separate movable contact 39, of the relay 40, which corresponds to the relay 17 shown in Fig. 6. In this arrangement of the circuits, this relay 40 is connected in parallel with the magnet 14^a, while the movable contact 39 is in series with the magnet 14 and also in series with the trip-operated circuit breaker 22^a, and the governor-operated-circuit breaker 28^a.

In the modification shown in Fig. 8, the relay is omitted and the function of this relay is performed by means of a circuit breaker 41, which is arranged to be opened to break the circuit when the magnet is deenergized by the opening of the train and governor-controlled circuit breakers 22^b and 28^b. Fig. 2 shows the details of this circuit breaker 41.

If the absolute stopping of the train is desired, the speed governor 30 may be omitted and the circuit breaker arranged in the form

of a push button or other manually-operated device, which may be operated by hand only when the train has been brought to a full stop. In such case, this circuit breaker is normally open, as the closing of its contact serves only to energize the relay long enough to pick up its armature and close its own holding current, and thus bring the valve 3 to its closed position again. Such an arrangement is illustrated diagrammatically in Fig. 9. This figure also shows an arrangement wherein the train has more than one trip valve, such as is the case with an electric train having more than one motor car, and means are provided whereby all the trip valves may be closed at one time from either one of the circuit breakers. In this figure, 41[a] designates the normally open circuit breakers of the different cars. One contact of each of these circuit breakers is connected in series with the trip-operated circuit breakers 22, and thence through the battery into a conductor 42, which extends throughout the train. The other contact of each circuit breaker is connected to a second line conductor 43. It will be readily seen from this diagram that by closing either of the circuit breakers 41, all of the relay magnets 14 may be energized, these magnets being connected in multiple between the two conductors 42 and 43. This arrangement obviates the necessity for getting off the train, and hunting throughout its length to find all the valves that have been tripped for the purpose of closing them by hand.

It is preferable to lock the circuit breakers 41[a] in their open position, in such a way as to make them inaccessible unless one or more of the valves 3 have been opened and the train pipe exhausted. This may be accomplished in various ways One means for this purpose is shown in detail in Fig. 5, in which the movable push button member 44, which actuates the movable contact of the circuit breaker 41[a] is normally locked against movement by means of a piston 45, working in a cylinder 46, having a connection 47 with the train pipe. The piston 45 is normally held in the locking position shown in Fig. 5 by the train pipe pressure, but when this pressure has been exhausted, the lock is released by the action of a spring 48 or other suitable means, which will move the piston 45 out of locking engagement with the push button 44.

It will be understood that various other modifications may be made in the details of construction and arrangement. The trips 20 together with the train-carried trip arms 15, may be of any well known or suitable character, various kinds of circuit breakers may be used in connection with the trip arms 19 to be operated thereby, the form of governor and the driving connections for operating the same, together with the circuit breaker operated thereby, may be of widely different character, and the arrangement of circuits can be changed in many ways without departing from the spirit and scope of my invention.

What I claim is:

1. In apparatus for train control, a speed-controlling valve, a motive device for holding said valve in closed position, electro-magnetic means for reversing said motive device, and trip means for controlling the circuit of the electro-magnetic means; substantially as described.

2. In apparatus for train control, a speed-controlling device, a motor for holding said device in one position, an electro-magnetic device for reversing the action of the motor, and trip mechanism operated by the movement of the train for controlling the circuit of the magnet; substantially as described.

3. In apparatus for train control, a speed controlling device, a motor for holding said device in one position, a trip operated device for reversing the action of the motor to change the operative position of the speed controlling device, and a centrifugal device operated by the movement of the train for controlling the action of the trip; substantially as described.

4. In train control apparatus, a train pipe having an exhaust valve, a motor for normally holding said valve in closed position, means operated by the movement of the train for reversing said motor, a secondary exhaust valve, a motor for holding the last named valve in its open position, a reservoir for supplying said motors, and means operated by failure of pressure in said reservoir to reverse the action of the last named motor, substantially as described.

5. In apparatus for train control, a train pipe having an exhaust valve, a motive device for normally holding said valve in closed position, electromagnetic means for controlling the operation of the motive device, and trip-controlled means for controlling the operation of the electromagnetic means, substantially as described.

6. In apparatus for train control, a train pipe having an exhaust valve, a motive device for normally holding said valve in closed position, a magnet for controlling the operation of the motive device, trip mechanism for controlling the circuit of the magnet and arranged when actuated to effect a reversal of the action of the motive device, and manually-operated circuit-controlling means for effecting the energization of the magnet after the operation of the trip mechanism, substantially as described.

7. In apparatus for train control, a speed-controlling valve, a motive device for holding said valve in inoperative position, electromagnetic means for controlling the operation of the motive device, trip mechanism

for opening the circuit of said means, a manually-operated circuit-closing device for closing such circuit, and means whereby the manually-operated device can not be operated unless the trip mechanism has been operated, substantially as described.

8. In apparatus for train control, a train pipe having an exhaust valve, a motive device for operating said valve, electromagnetic means for controlling the operation of the motive device, trip mechanism for controlling the circuit of the electromagnetic means, a manually-operated circuit-closing device for closing such circuit, and a lock for said device controlled by train pipe pressure, substantially as described.

9. In apparatus for train control, the combination with a plurality of speed-controlling devices located on different cars or vehicles of the train, and mechanisms for operating said devices, of means whereby the speed-controlling devices of a plurality of cars or vehicles can be restored to normal position after operation from any car or vehicle, substantially as described.

10. In apparatus for train control, the combination with a train pipe having a plurality of exhaust valves located on different cars or vehicles of the train, electromagnetic means for controlling the position of said valves, trip mechanisms for controlling the circuits of the electromagnetic means, and circuit-closing devices arranged to effect the closing of said circuits throughout the train by the operation of any one of such devices, substantially as described.

11. In apparatus for train control, a train pipe having a plurality of escape valves on different cars or vehicles of the train, trip-operated mechanism for effecting the opening of such valves under predetermined conditions, and means whereby all the open valves on the train may be closed from one point on a train, substantially as described.

In testimony whereof, I have hereunto set my hand.

PER UTNE.

Witnesses:
R. P. TUTTLE,
H. UTNE.