

No. 869,598.

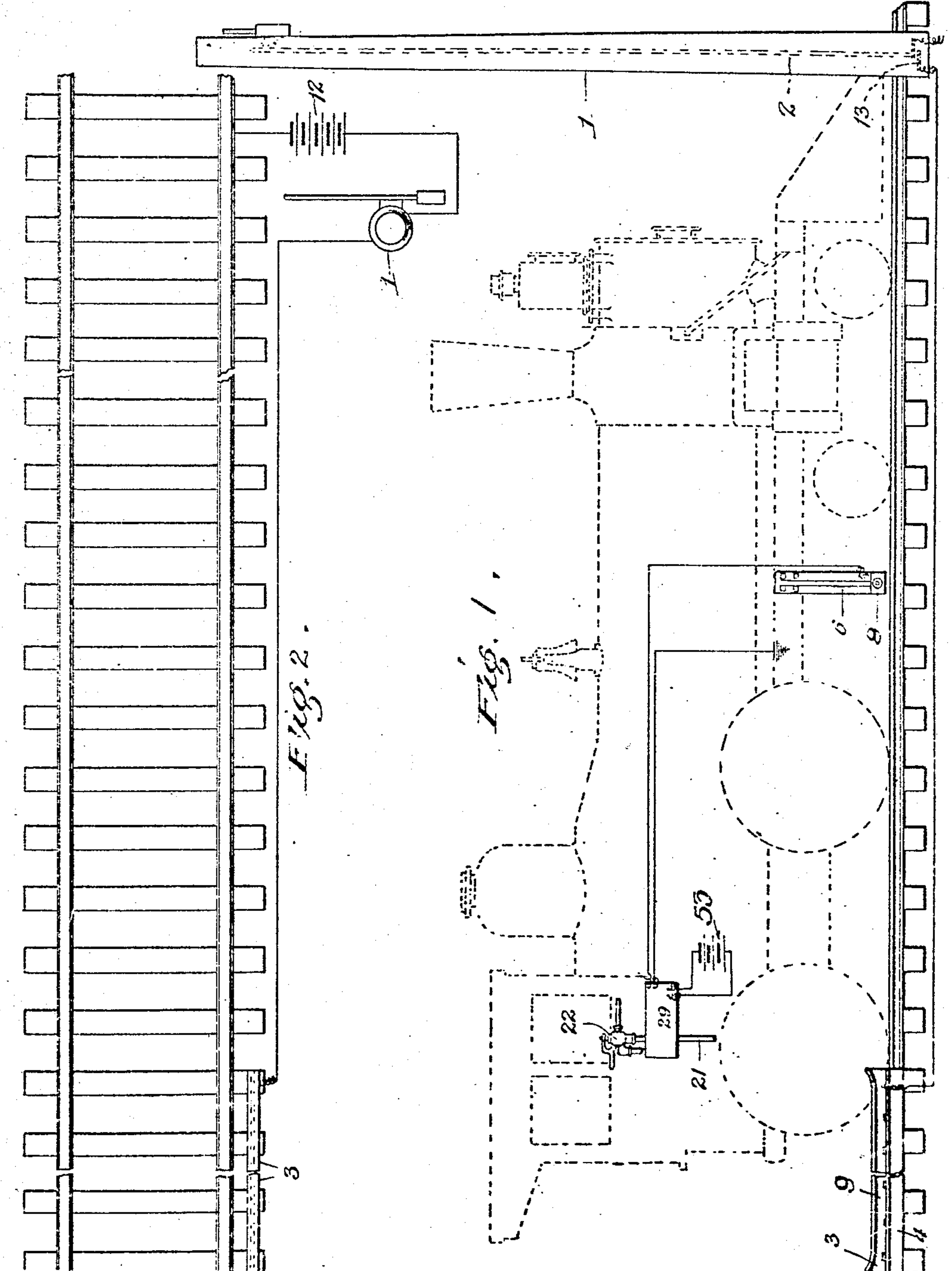
PATENTED OCT. 29, 1907.

J. T. THOMPSON.

CONTROLLING APPARATUS FOR RAILWAY TRAINS.

APPLICATION FILED MAY 12, 1907.

4 SHEETS—SHEET 1.



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J. T. THOMPSON.
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4 SHEETS—SHEET 2.

Fig. 3.

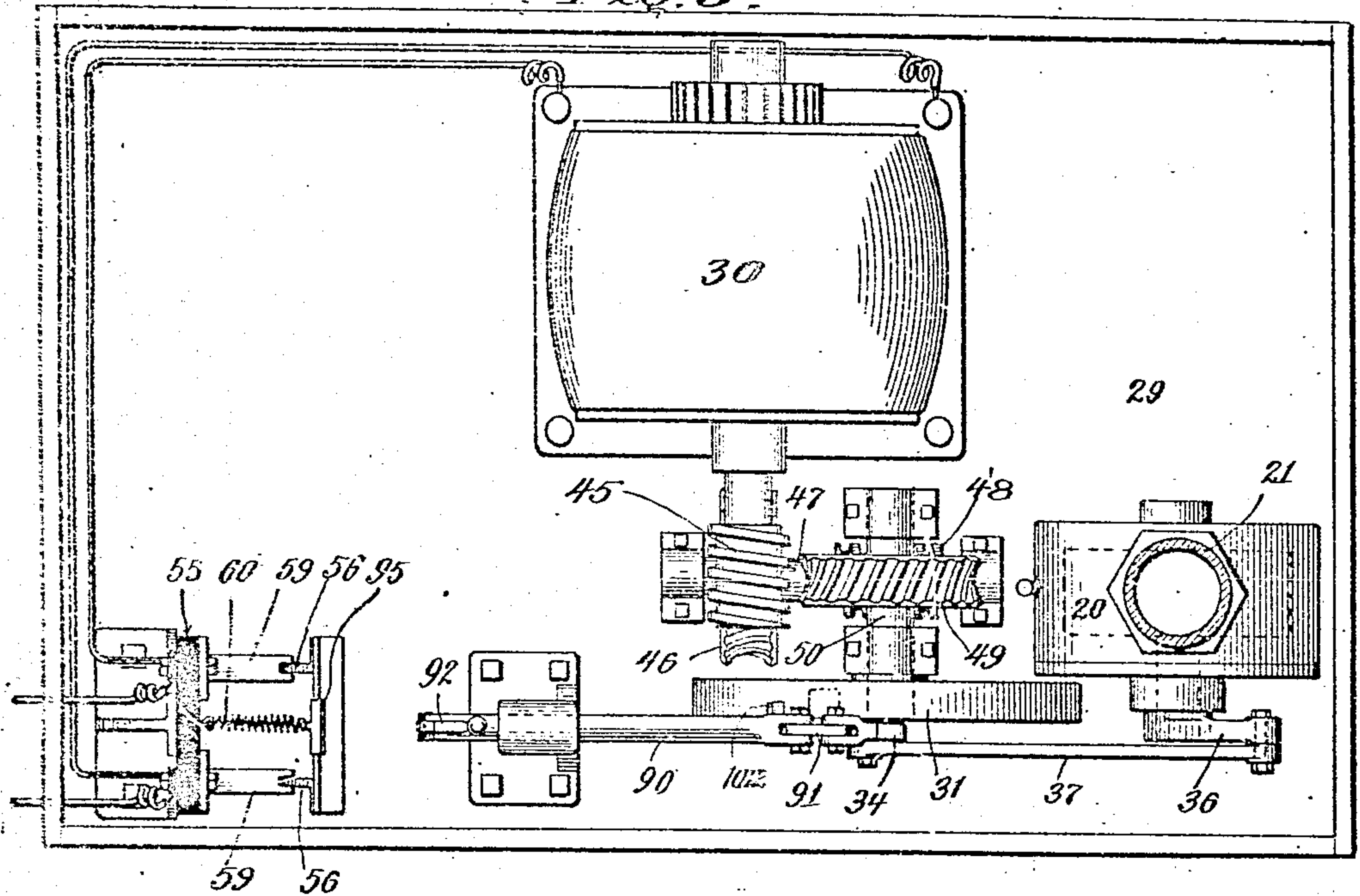
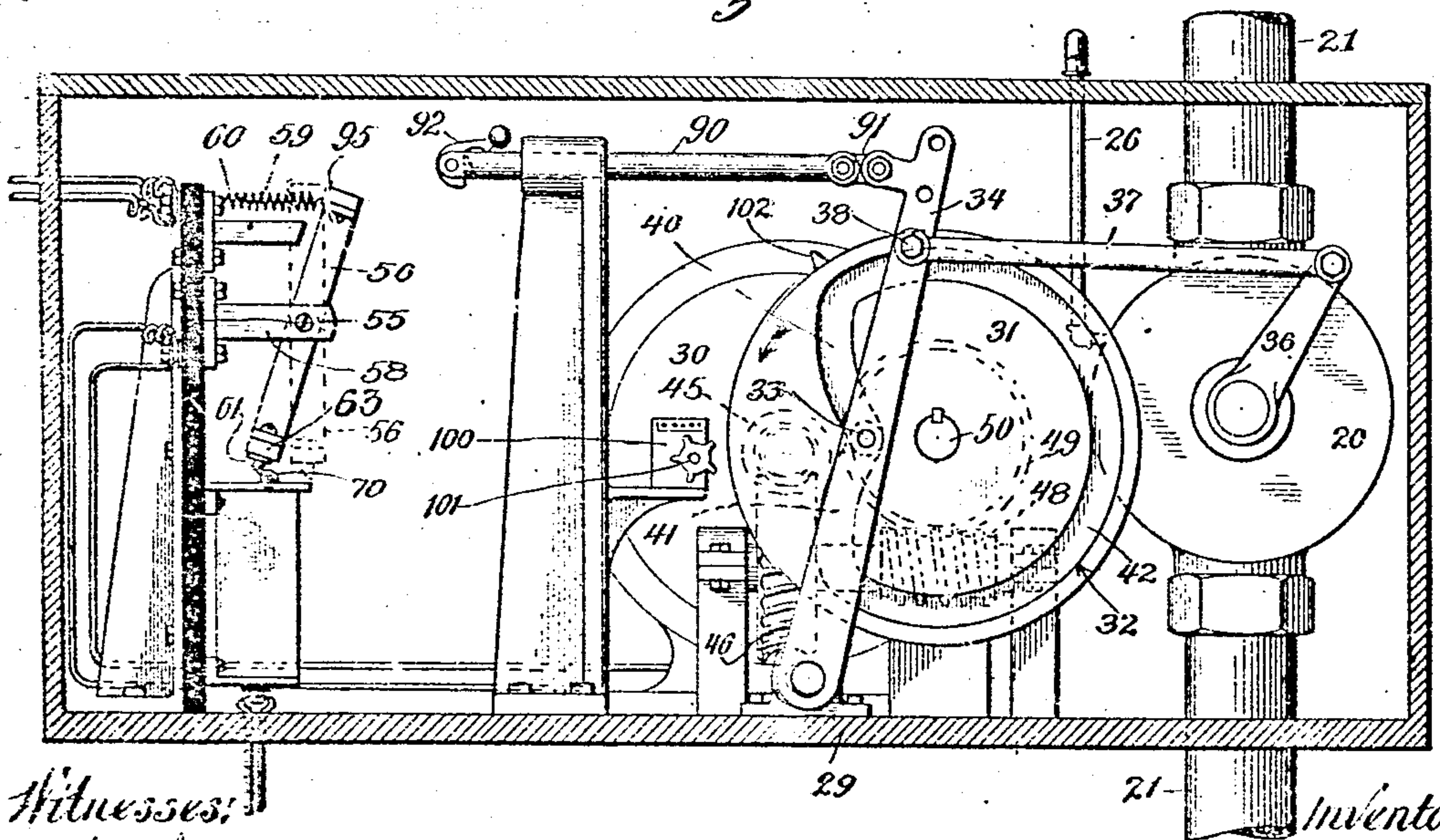


Fig. 4.



Witnesses:
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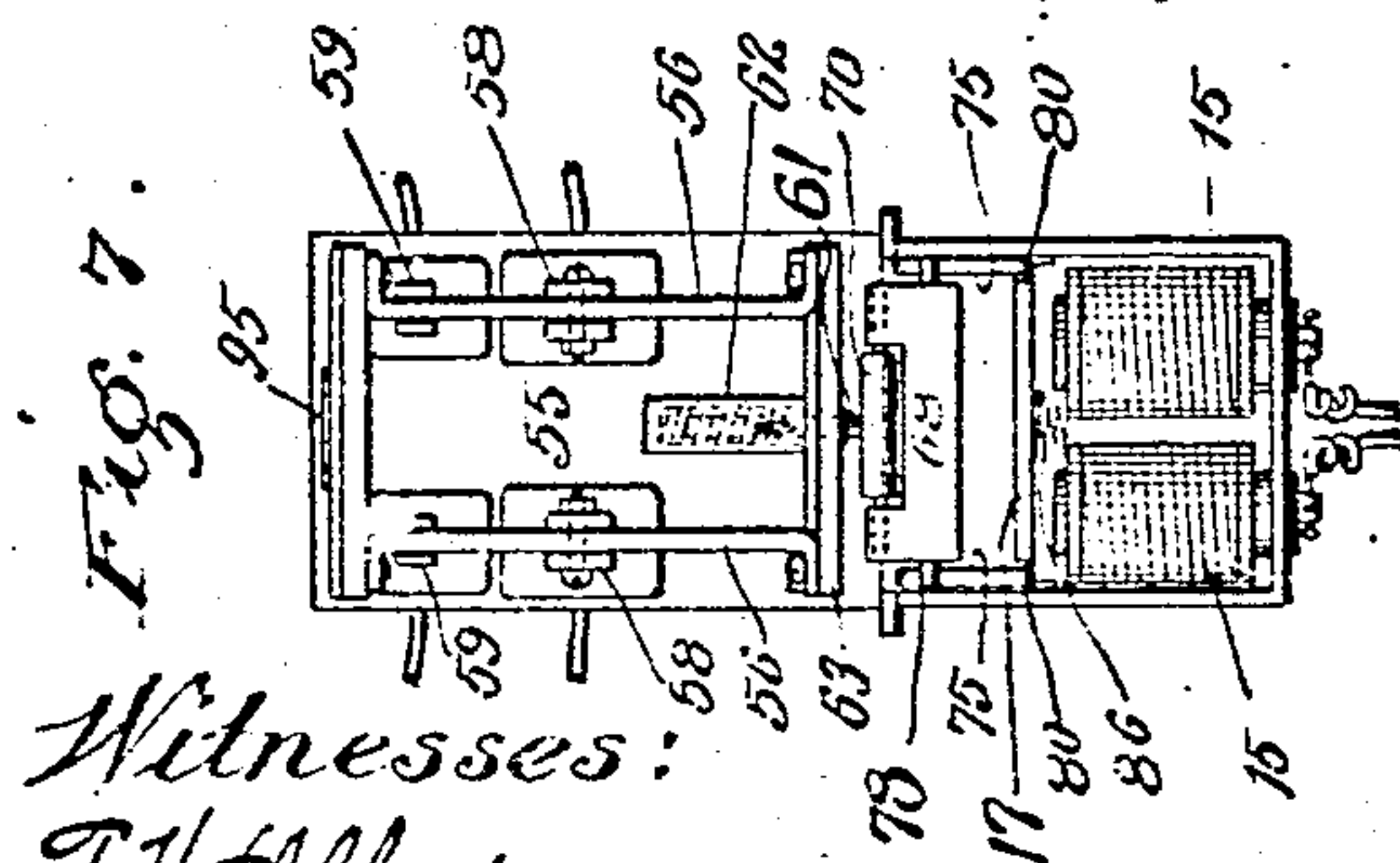
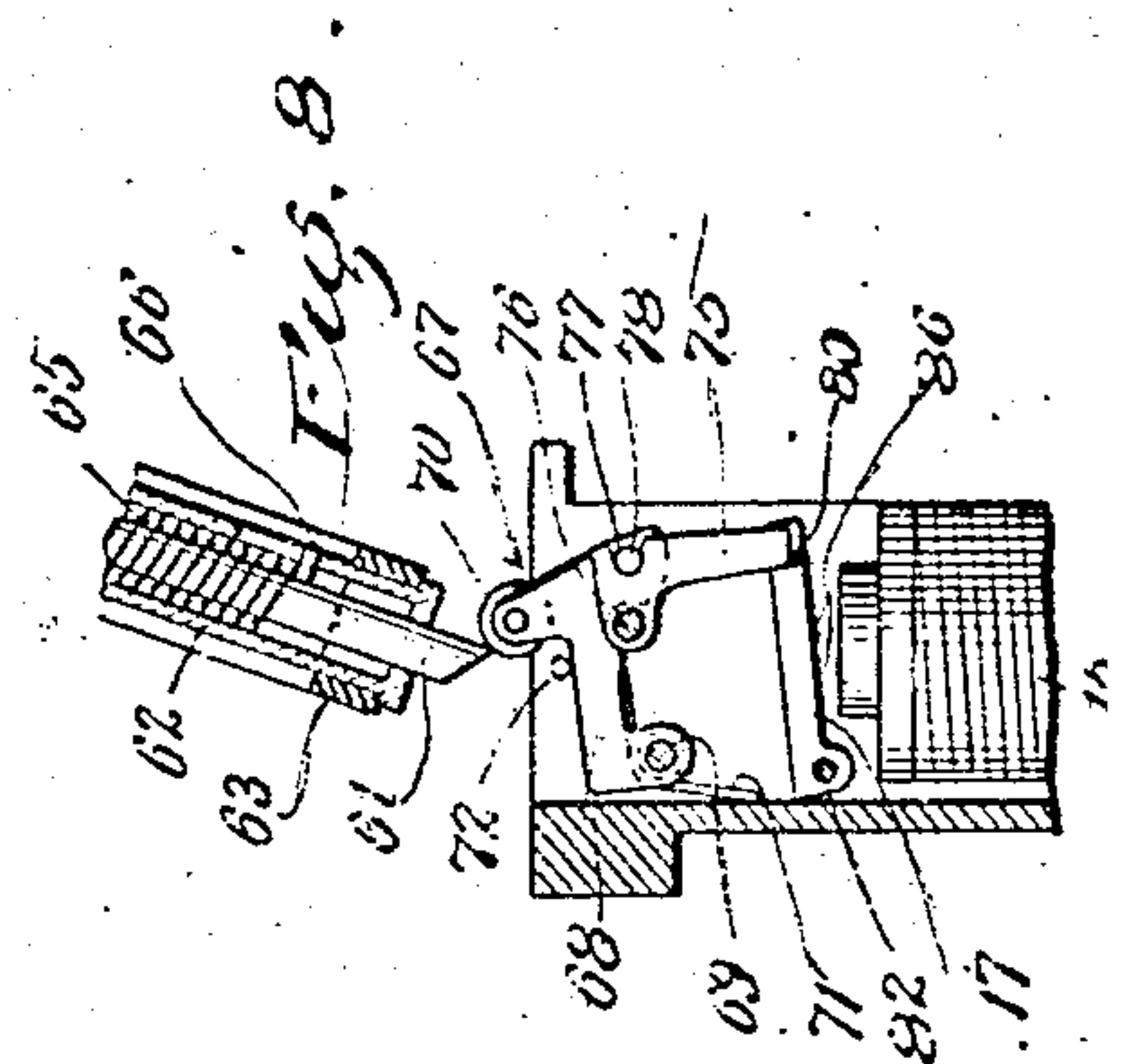
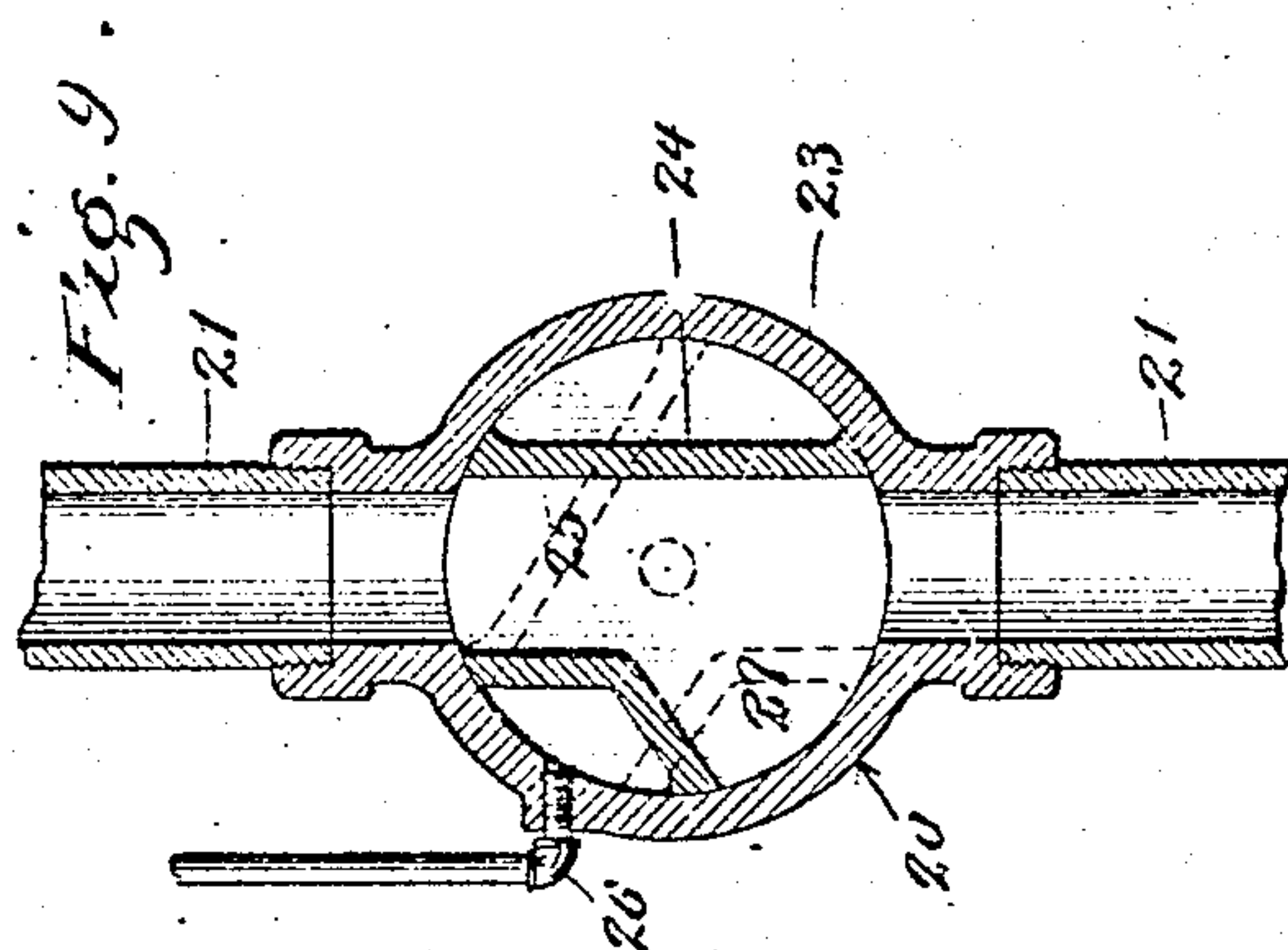
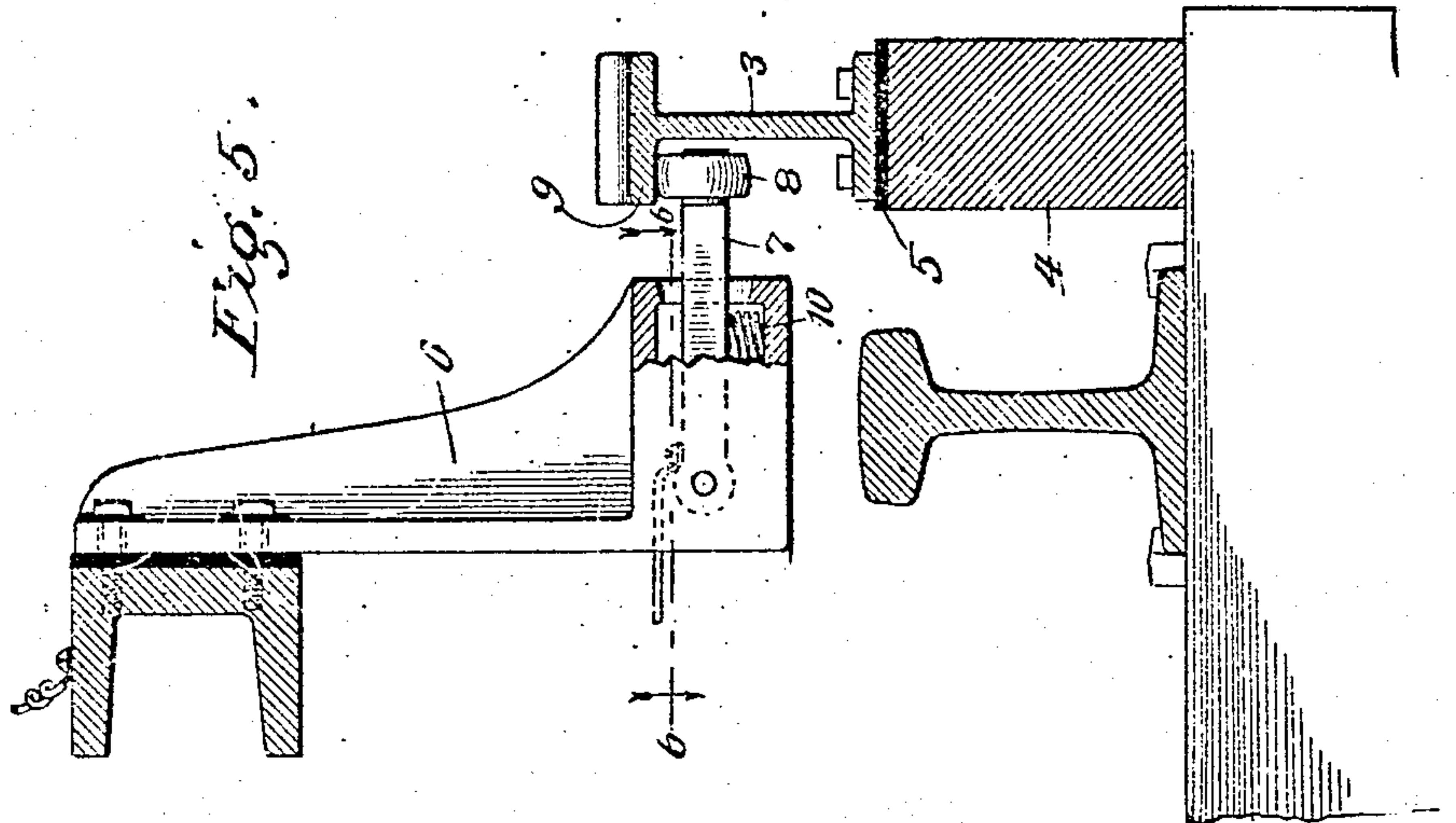
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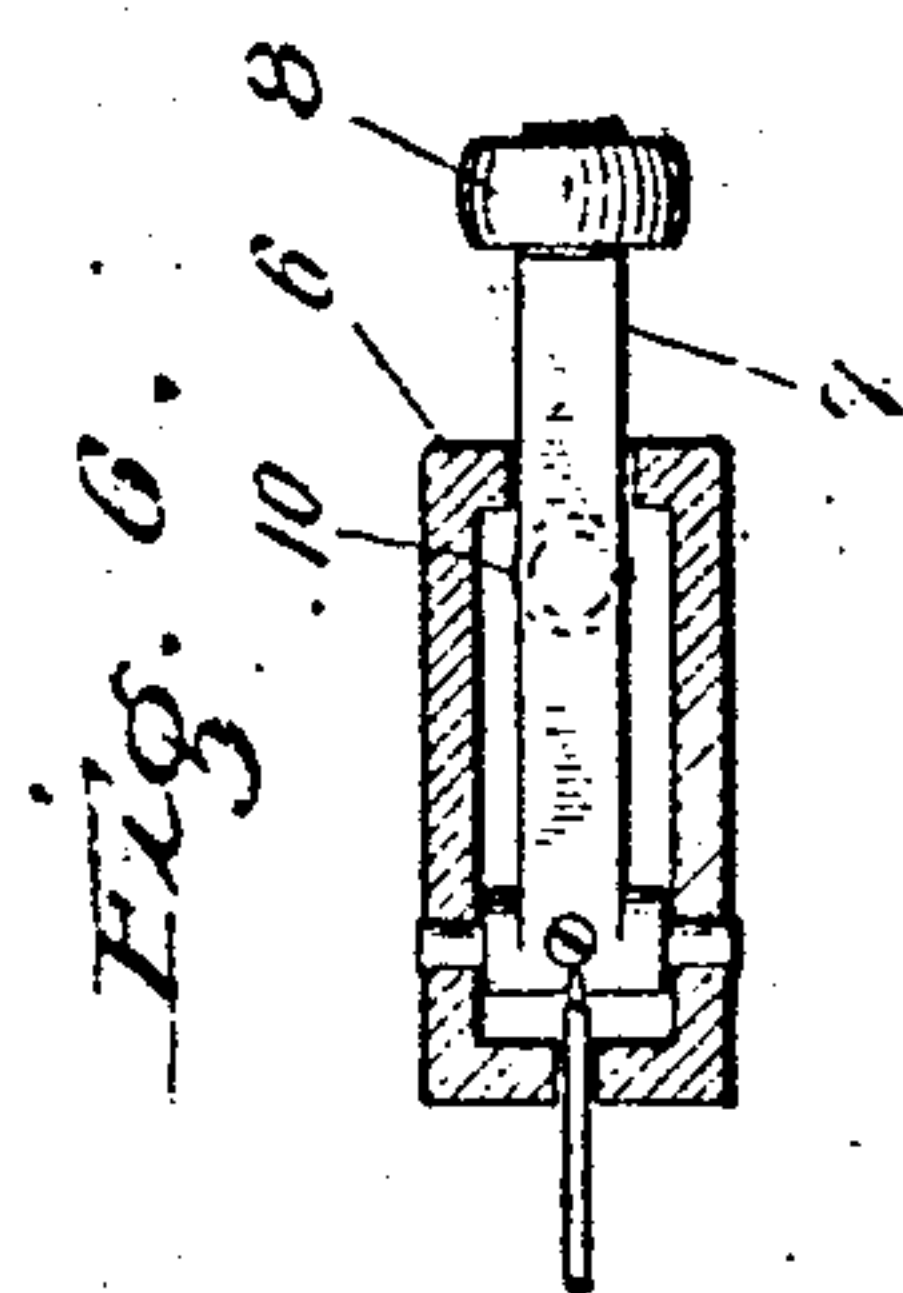
PATENTED OCT. 29, 1907

J. T. THOMPSON.
CONTROLLING APPARATUS FOR RAILWAY TRAINS.
APPLICATION FILED MAY 18, 1907.

4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

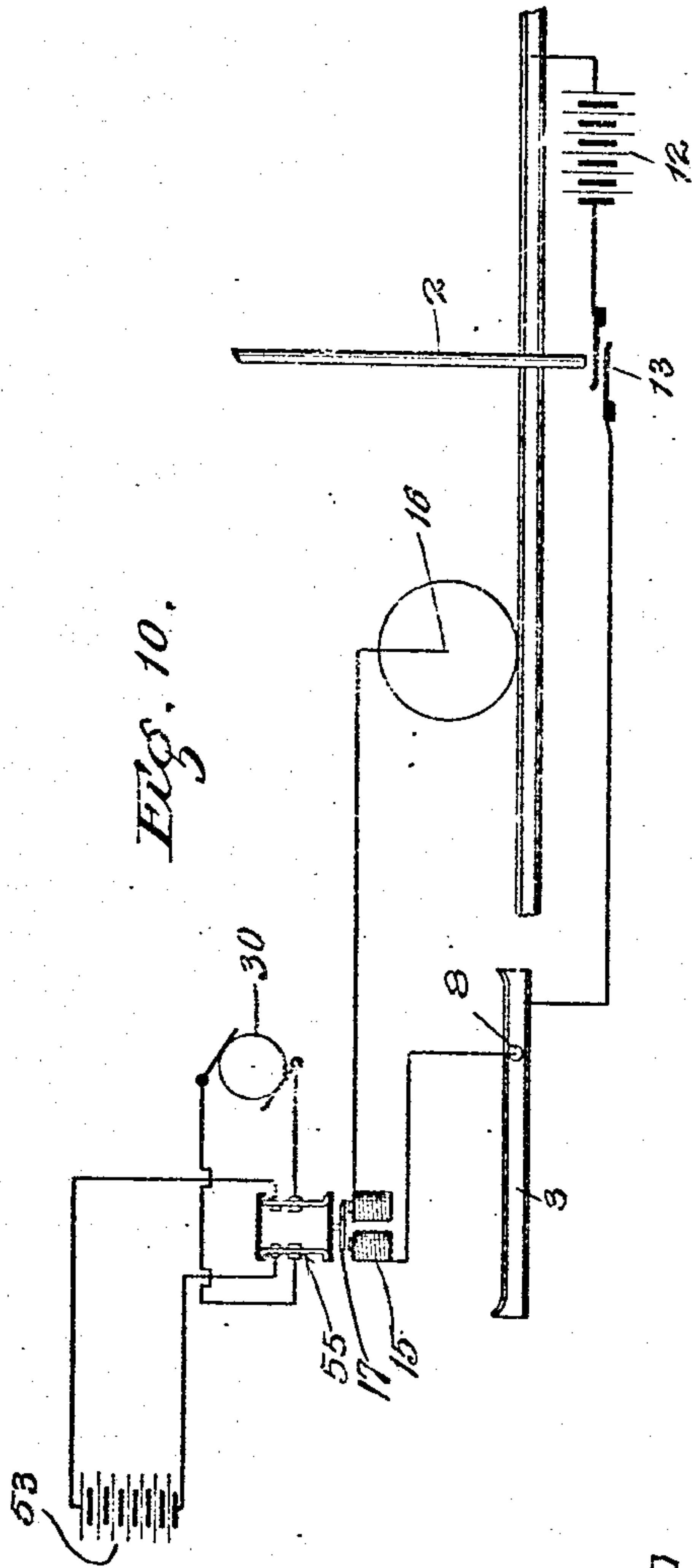


Fig. 10.

Fig. 12.

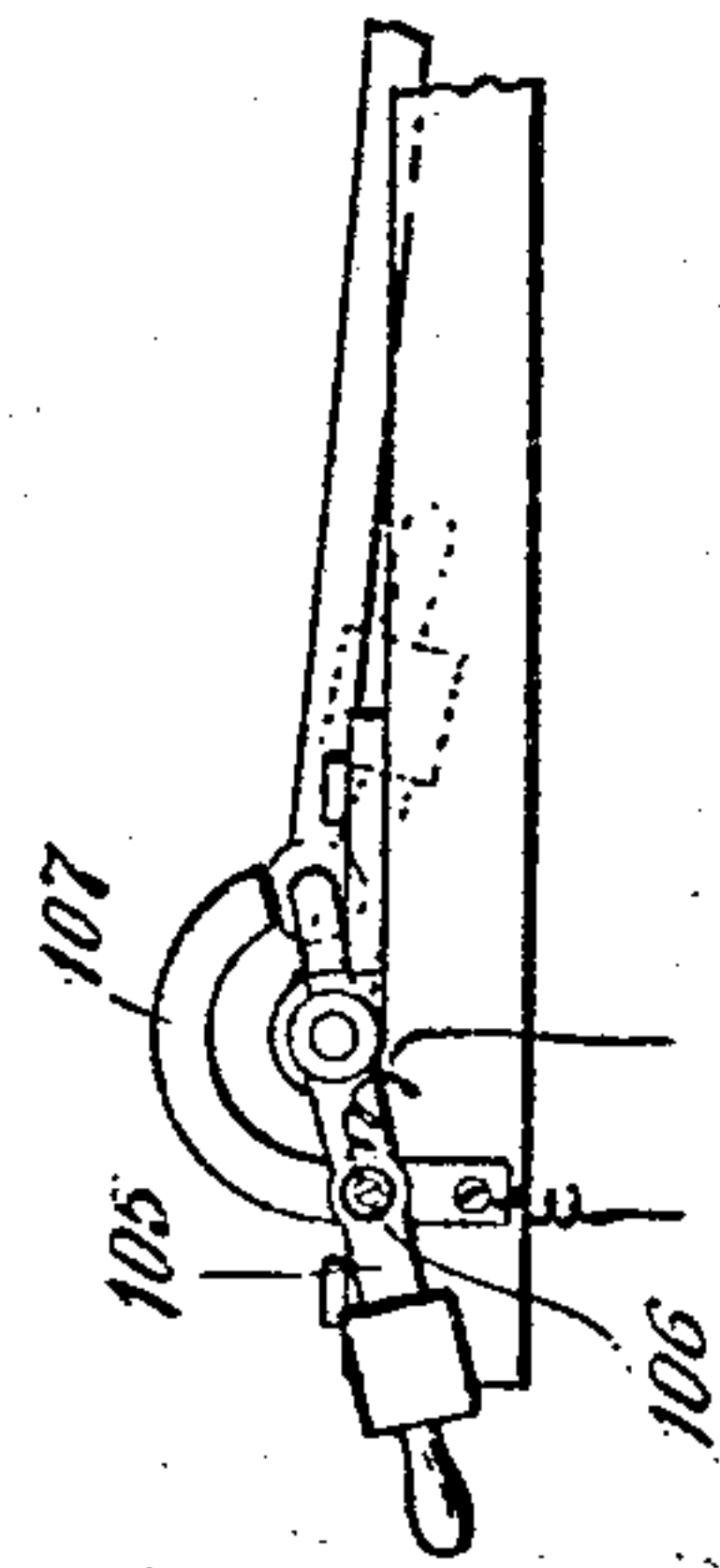
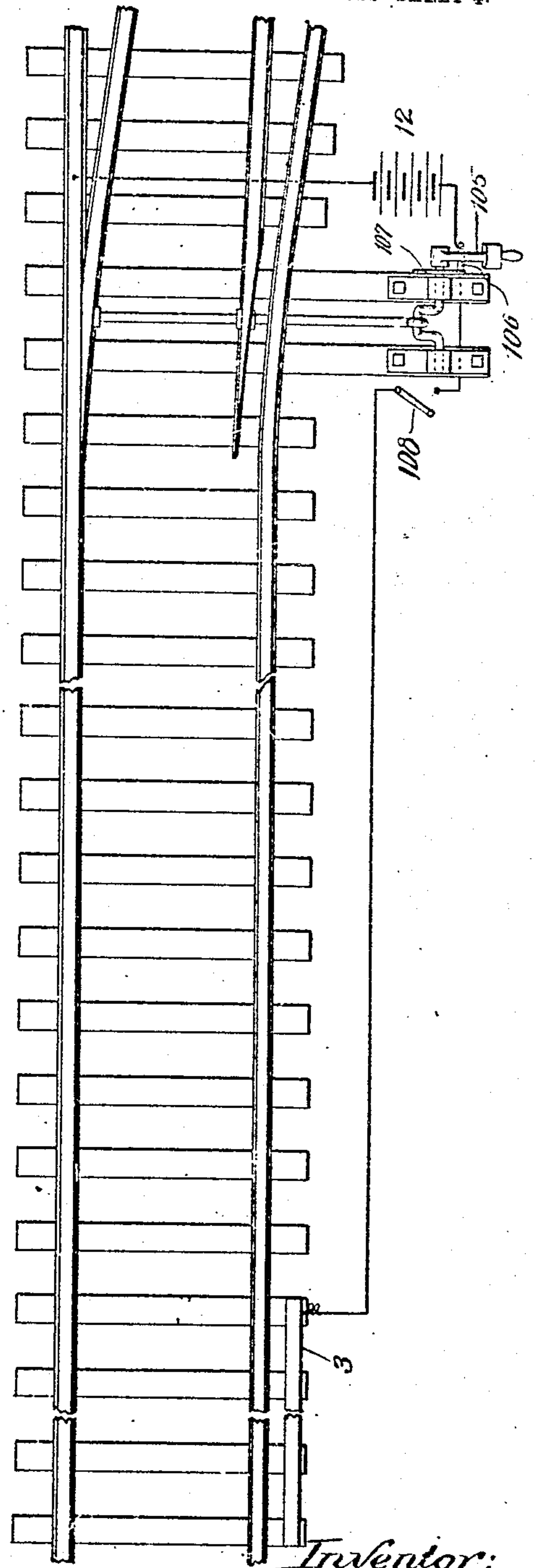


Fig. 11.



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UNITED STATES PATENT OFFICE.

JAMES T. THOMPSON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-THIRD TO CHARLES S. ROSENTHAL AND ONE-THIRD TO T. P. GALLIGAN, OF CHICAGO, ILLINOIS.

CONTROLLING APPARATUS FOR RAILWAY-TRAINS.

No. 869,598.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed May 18, 1907. Serial No. 374,411.

To all whom it may concern:

Be it known that I, JAMES T. THOMPSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented
5 certain new and useful Improvements in Controlling Apparatus for Railway-Trains; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked
10 thereon, which form a part of this specification.

This invention relates to means for automatically applying the brakes to a railway train and stopping the train whenever the train is driven past the semaphore of a block-signaling apparatus set in a danger
15 position, or whenever at other times it is desired to stop the train through the agency of a force applied from without the train.

The invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.
20

In the drawings:—Figure 1 is a view showing in dotted outlines a locomotive equipped with my improved apparatus. Fig. 2 is a plan view of a short section of railway track, showing a contact rail which
25 engages a part carried by the locomotive to set in operation the brake applying apparatus. Fig. 3 is a plan view of the mechanism on the locomotive for operating the air valve of the air brake system, illustrating also the said valve and its connection with
30 said actuating mechanism. Fig. 4 is a side elevation of the parts shown in Fig. 3, showing the case inclosing the parts in vertical section. Fig. 5 is a view showing in transverse vertical section a track rail and the adjacent contact rail, together with the contact-
35 ing parts carried by the locomotive. Fig. 6 is a horizontal section, on the line 6—6 of Fig. 5. Fig. 7 is a view showing in end elevation the electro-magnetically controlled switch for closing the circuit through the actuating motor. Fig. 8 is an enlarged fragmentary
40 detail of a portion of the device shown in Fig. 7. Fig. 9 is a vertical axial section of the air releasing valve constituting part of my apparatus. Fig. 10 is a diagram showing the arrangement of the electric circuits. Fig. 11 is a plan view of a section of the railway track
45 including a switch, illustrating an arrangement whereby my device may be set in operation by the movement of the switch. Fig. 12 is a side elevation of the switch throwing device illustrated in Fig. 11, showing the circuit closing devices thereon for closing at the
50 switch the controlling circuit on the track.

As shown in said drawings, 1 indicates a semaphore post of ordinary form carrying near its top end a swinging arm designed to indicate to an engineer if the block division of the track beyond said semaphore
55 post is clear or obstructed. Operatively connected

with said arm is a vertically reciprocating rod 2, constituting means for actuating circuit closing devices at the base of the semaphore post, as will hereinafter more fully appear.

3 indicates a horizontal contact rail or bar located 60 parallel with and closely adjacent to one of the track rails. Said bar 3 is here shown as bolted to a block of wood 4 which rests upon the ties, and the bar is insulated therefrom by an insulating strip 5. Upon the frame of the locomotive is mounted a downwardly
65 depending bracket 6 in the lower end of which is pivoted a horizontal arm 7 carrying at its outer end a roller 8 which is arranged to make contact with the lower surface of a horizontal flange 9 comprising part of the contact rail 3. The arm 7 is pressed upwardly
70 at its outer end against a suitable limiting stop by means of a coiled spring 10, and the parts are so arranged that the spring will hold the roller in contact with the contact rail when the locomotive is driven past the same. In order to facilitate engagement of
75 the roller with the lower surface of the flange as the roller approaches the same, the ends of said flange are inclined upwardly as shown in Fig. 1. When my apparatus is applied to a single track, two of such contact bars or rails 3 are employed, one on each side of
80 the track, one coming into use for each direction of travel of the locomotive.

Each contact bar 3 and an adjacent roller 8 constitute the terminals of a normally open electric circuit. The said circuit includes a battery 12 (Figs. 2 and 10) which
85 may be located either on the engine or on the right of way near the track, and a switch closing device 13 designed to be actuated by the semaphore rod 2 connected with the semaphore arm as stated. The battery 12 is shown as located on the right of way. Said circuit,
90 which is hereinafter for convenience designated as the track circuit, also includes, on the locomotive, an electro-magnet 15 which controls a switch that closes the circuit of the motor that operates the air releasing valve of the air brake system, as will hereinafter appear, and
95 is completed through the wheels of the locomotive, as indicated at 16, and one of the rails of the track. The said circuit closing device 13 comprises two metal contact fingers arranged one above the other, and they are
100 designed to be pressed together by the downward movement of the rod 2, the parts being so arranged that the said rod is moved downwardly when the semaphore arm is raised to indicate that the track ahead is obstructed. The closing of said electric circuit through the circuit closing device 13, and through the contact
105 rail 3 and roller 8 energizes the electro-magnet 15 which, by attracting its armature 17, effects the closing of the switch which controls the motor circuit before referred to. When the semaphore arm is lowered or moved into
110 a position to indicate a clear track, the contact fingers

13 are separated so that the passage of a train into the block at this time and the engagement of the roller 8 with the contact rail 3 does not act to close said motor circuit controlling switch.

- 5 Referring now to the mechanism for applying the brake by the momentary closing of an electric circuit through said roller 8 and the rail 3, when an attempt is made to enter a closed block or to pass the semaphore set to indicate danger, said parts are made as follows:
- 10 20 indicates a valve in the train pipe 21 at the upper end of which pipe is located the engineer's controlling valve 22, the latter being operated in the usual manner to control the air brake system for both ordinary and emergency service. The valve 20 is located in the pipe 21
- 15 below the engineer's valve 22 and operates independently of the latter valve. It is also incased so as to be inaccessible to the engineer. Said valve 20 is normally open to provide free communication between the engineer's valve and the train pipe so as not to interfere
- 20 with the usual operation of the air brake system: The valve comprises, as shown in Fig. 9, a casing 23 having oppositely extending hollow branches which communicate with the pipe 21 above and below the same, and a rotative plug 24 provided with a through-port 25 which
- 25 stands normally in register with said branches so as to afford an unobstructed passage therethrough. The casing is provided at one side with an escape-nipple 26 normally closed by the plug. The said plug is provided with a branch port 27 that is so related to the
- 30 through-port and said nipple that when the plug is rotated to bring one end of said through-port into register with the escape nipple, as indicated in dotted lines in Fig. 9, the branch port is in communication with the lower or outlet branch of the valve, thus affording an
- 35 avenue of escape of air through the port from the train pipe below the valve. The valve at this time may assume the function of an emergency valve to release air from the train pipe in a manner to set the brakes. It will be observed that when the valve assumes the position
- 40 shown in dotted lines in Fig. 9 it is in position to cut off the escape of air from the main reservoir thus maintaining the proper pressure at the engineer's valve to operate the brake system as soon as the valve 24 assumes its normal position. The mechanism for operating the valve 24 is such that the valve is opened and
- 45 automatically closed at a predetermined period of opening, and when closed leaves the air brake system in full control of the engineer. The mechanism for operating said valve, which is inclosed together with the valve 20
- 50 in a case or box 29, embraces in this instance an electric motor 30 operatively connected with a cam disk 31 provided with a cam slot 32 which engages with a roller bearing stud 33 on a valve operating lever 34 hinged at its lower end to the casing and arranged parallel with
- 55 the plane of the cam disk. The parts are so arranged and the cam slot is so disposed that the valve is shifted to its emergency position and held in such position for a predetermined time and is shifted back to its normal position by the continuous rotation of said cam disk in one
- 60 direction.

To the movable part or plug of the valve 20 is fixed a short crank-arm 36 to the outer end of which is pivoted one end of a horizontal link 37, the other end of the link being pivoted by a pivot stud to the lever 34 near its

65 upper end. The said lever 34 is conveniently provided

near its upper end with two or more openings to receive the pivot stud 38, whereby the point of attachment of the link 37 with said lever may be changed in order to vary the angular distance through which the valve is moved. The cam slot 32 is so shaped as to provide two eccentric parts 40 and 41, respectively, and a concentric part 42, one of said eccentric parts operating to open the valve, the other to close the same and the concentric part operating to hold the valve open. The cam disk is rotatively connected with the motor 30 by means of a double reduction worm gear mechanism to impart a suitably slow speed to the disk from the relatively high speed motor. Said worm gearing comprises a worm 45 on the armature shaft meshing with a worm wheel 46 on a countershaft 47, and a worm 48 on the opposite end of said countershaft which meshes with a worm wheel 49 on a shaft 50 to which is fixed said cam disk.

As shown in Fig. 4, the stud 33 is at a place in the cam slot where the two eccentric portions 40 and 41 meet and the valve operating lever 34 is at the extreme right hand end of its travel, these positions corresponding to the normal position of the valve 20.

The motor 30 is included in an electric circuit, hereinafter for convenience designated as the motor circuit, which is energized by a battery 53 or other suitable source of electrical energy carried upon the locomotive. In the event a continuously running generator, as a dynamo, be installed on the engine or train for other services, such source of energy may consist of said generator. Said circuit includes a switch, designated as a whole by 55, by the closing of which the motor 30 is set in motion to effect the operation of the valve 20 in the manner above described. Means are provided as follows for actuating the switch 55 to close the same by the momentary passing of an electric current through the track circuit: Said switch 55, which is similar to an ordinary double knife switch, is herein shown as comprising two contact blades 56, 56 which are pivoted to terminal members 58, 58 and adapted to make contact with stationary contact members 59, 59. A spring 60 is provided which acts to close said switch when unrestrained. Said switch 55 is normally retained in its open position, as shown in Fig. 4, against the influence of said spring 60 by a latch device constructed as follows: 61 designates a rod sliding in a tube 62 which is located between said switch blades and fixed to a cross bar 63 joining the lower ends of the switch blades. Said rod 61 is pressed outwardly or downwardly by a spring 65 contained within the tube, and the outward movement of the rod is limited by a pin 66 carried by the rod and extending through a short slot in the tube for engagement with a shoulder at the lower end of said slot. The rod engages at its outer or lower end with a trigger device, indicated as a whole by 67. Said device comprises a horizontally arranged, vertically swinging member 68 which is pivoted at one end to a horizontal pivot rod 69 mounted in the frame of the switch, and is provided at its other end with an upturned portion in which is mounted a horizontal roller 70 adapted to be engaged by the end of said rod 61 in a manner to prevent said rod from moving past the roller, as shown in Figs. 4 and 8. The said trigger is held yieldingly in its raised position by means of a spring 71 and its upward movement is limited by a stop-pin 72. The outer or lower end

of the rod 61 is provided with a beveled or inclined face so arranged that when the parts are moved in a direction to open the switch, the engagement of the said inclined face with the roller 70 depresses the trigger and also
 5 pushes said rod inwardly, thereby permitting the rod to pass the roller when the switch is moved into its open position. 75, 75 indicate two vertically swinging arms or levers which are hinged at their upper ends to a horizontal pivot rod 76 and are provided between their
 10 ends with forwardly opening notches 77 which engage with a pivot rod 78 passing horizontally through the forward end of the trigger 68. By reason of the engagement of the rod 78 with the notches in the levers 75, downward movement of said trigger 68 moves the levers
 15 75 about their pivots 76 in a manner to swing their lower ends rearwardly or toward the left as shown in Fig. 8. The said levers are normally prevented from being so moved by engagement of their lower ends with shoulders 80 formed on the free forward margin of a horizontally
 20 arranged flat plate which is hinged at its rear margin to a horizontal pivot rod 82 mounted in the switch frame. Said flat plate is the armature 17 of the pair of electro-magnets 15 before referred to and shown in Fig. 10, as well as in Figs. 7 and 8. Said armature is
 25 normally held in its raised position, as shown in Fig. 8, by a coiled spring 86 and is swung downwardly when the magnets are energized. The said shoulders 80 are formed in the armature 17 by providing recesses or notches in its forward margin, which are adapted to receive
 30 the lower ends of the trigger arms 75. The engagement of the bottom portions of said notches with the end faces of the trigger arms limits the upward movement of the armature.

From the foregoing it will be seen that by closing the
 35 track circuit at the closing device 13, and completing the track circuit through the contact rail or bar 3 and the roller 8, the electro-magnets are energized and act to draw downward their armature 17. This movement releases the trigger arms from engagement with the
 40 shoulders 80 and permits said arms to swing rearwardly at their lower ends, or toward the left, as seen in Fig. 8, thereby allowing the trigger 68 to move downward and release the rod 61 from its engagement with the roller 70. The spring 60 then acts to close the switch 55 and
 45 complete the circuit through the motor 20 which is set in motion to operate the valve mechanism as above described.

Means are provided as follows for again opening the switch 55 at such time, during the rotation of the motor
 50 30, that the parts will come to rest with the valve 20 again in its closed position, as shown in Fig. 4. Said means comprises a horizontally moving rod 90 attached by means of a link 91 to the upper end of the valve actuating lever 34 and provided at its free end with a
 55 swinging gravity hook or pawl 92 which is designed, in the movement of said rod toward the left, or when the valve is being opened, to pass the upper end of the switch, or a cross-bar 95 connecting the upper ends of the switch blades, and in the movement of said rod toward
 60 wards the right, at which time the valve is being closed, to engage said cross-bar 95 and move said switch into its open position.

A registering device 100 is arranged to be actuated each time the supplemental valve 20 is operated,
 65 whereby the operating superintendent may be advised

of the number of times an engineer has attempted to drive his train into a closed block and has been stopped by the apparatus described. The said registering device is located in a position inaccessible to the engineer so that it may not be tampered with. Conveniently it
 70 is located in the casing which incloses the valve and its actuating mechanism. It is provided with an actuating star-wheel 101 that is engaged by a radial arm 102 on the periphery of the cam disk 31, in each revolution of said cam disk.

In Figs. 11 and 12 is shown a modified arrangement of the track circuit wherein the track circuit, instead of being closed at one point by movement of the semaphore, is closed by the movement of the switch throwing lever 105 of familiar construction which shifts or
 80 moves the point rails of the switch. In this construction the switch throwing lever is equipped with a contact device 106 insulated therefrom, and adapted to contact when the lever is swung from its closing to its opening position with an arc shaped member 107 fixed
 85 to a stationary part of the switch throwing device. The said curved contact member 107 is arranged in a plane parallel to and closely adjacent to the plane in which the switch throwing arm moves and is of such length that when said arm occupies any position except the
 90 one in which the switch is closed to the main track, the contact members will be brought together to close at this point the track circuit. The circuit in which said contact members are included is completed through the
 95 battery 12, the track rails and the contact rail or bar to the roller of the contact shoe or device on the locomotive. The said contact rails 3 in the latter construction are, in practice, placed at such distance from the switch points (at either side thereof) as to give the train ample
 100 time to stop before reaching the open switch, thus avoiding the train being derailed by an open switch carelessly or maliciously left partially or wholly open.

Means are provided for rendering the device inoperative, when it is desired to switch a train into the switch track without having it stopped by the braking device, by opening the track circuit at any convenient point, as at a switch 108, or by separating the contact members 106 and 107.

I claim as my invention:—

1. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for actuating said valve comprising an electric motor and its circuit constructed and arranged to open and close the valve during a continuous operation thereof, operative connections between said motor and valve, and means for controlling the motor circuit embracing a stationary circuit closing device adjacent to the railway track.

2. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing the valve comprising an electric motor and its normally open circuit, and operative connections between said motor and said valve operating during the continuous rotation of the motor in one direction to open the valve and to reverse and close the same, and means for closing the motor circuit embracing a circuit controlling device adjacent to the railway track.

3. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing

ing the valve comprising an electric motor and its normally open circuit, and operative connections between said motor and valve operating during the continuous rotation of the motor in one direction to open the valve and to reverse and close the same and constructed to hold the valve open for a predetermined time, and means for closing the motor circuit embracing a circuit controlling device adjacent to the railway track.

4. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing the valve comprising an electric motor and its normally open circuit designed to be closed through the medium of a circuit controlling device adjacent to the railway track, a cam geared to and rotated by said motor through the medium of a speed reducing mechanism, and operative connections between said cam and valve, constructed to open and close the valve and to hold the valve open for a predetermined period.

5. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing the valve comprising an electric motor and its normally open circuit designed to be closed through the medium of a circuit controlling device adjacent to the railway track, a cam geared to and rotated by said motor through the medium of a speed reducing mechanism, operative connections between said cam and valve, constructed to open and close the valve and to hold the valve open for a predetermined period, and means operated during the closing movement of the valve for opening said motor circuit.

6. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing the valve comprising an electric motor and its normally open circuit designed to be closed through the medium of a circuit controlling device adjacent to the railway track, a cam disk geared to and rotated by said motor through the medium of a speed reducing mechanism and provided with a cam groove, a swinging lever provided with a stud engaging said groove, and operative connections between said lever and the valve, said cam groove being so arranged as to act through said lever to open and close the valve during one rotation of the cam disk and to hold the valve open for a predetermined period.

7. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing the valve comprising an electric motor and its normally open circuit, a switch for closing said motor circuit designed to be closed through the medium of a circuit controlling device adjacent to the railway track, a cam geared to and rotated by said motor through the medium of a speed reducing mechanism and provided with a cam groove, a swinging lever provided with a stud engaging said groove and operatively connected with said valve, said cam groove being so arranged as to act through said lever to open and close the valve during one rotation of the cam and to hold the valve open for a predetermined period, and means connected with said swinging lever for opening the motor circuit controlling switch.

8. Means for arresting a moving railway train comprising, in combination with the train pipe and the engineer's valve located therein, an auxiliary valve located in said pipe between the engineer's valve and the service pipes of the air brake system, said valve being normally in position to permit free passage of air through the pipe to the engineer's valve, mechanism on the locomotive for opening and closing said valve comprising an electric motor and its normally open circuit, and means carried by the locomotive adapted for contact with a contact device on the railway track for closing said motor circuit.

9. Means for arresting a moving railway train comprising, in combination with the train pipe and the engineer's valve located therein, an auxiliary valve located in said

pipe between the engineer's valve and the service pipes of the air brake system and provided with a vent nipple, said valve being normally in position to close said vent nipple and permit free passage of air through the pipe to the engineer's valve and adapted to close said pipe to the engineer's valve and open it to the vent nipple, mechanism on the locomotive for opening and closing said valve comprising an electric motor and its normally open circuit designed to be closed by a circuit controlling device adjacent to the railway track, and operative connections between said motor and said valve.

10. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing the valve, and a normally open electric circuit for setting said valve actuating mechanism in operation provided with two circuit closing devices, one located on the track right-of-way and destined to be automatically operated to close said circuit at one point through the usual operation of a part of the track service equipment, and the other circuit closing device comprising a stationary member located on the right-of-way and a member carried by the locomotive and adapted to be brought into contact with said stationary member as the locomotive passes the latter.

11. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing the valve, constructed to hold the valve open for a predetermined period, and a normally open electric circuit for setting said valve actuating mechanism in operation provided with two circuit closing devices, one located on the track right-of-way and designed to be automatically operated to close said circuit at one point through the usual operation of a part of the track service equipment, and the other circuit closing device comprising a stationary member located on the right-of-way and a member carried by the locomotive and adapted to be brought into contact with said stationary member as the locomotive passes the latter.

12. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve, mechanism on the locomotive for opening and closing the valve, a normally open electric circuit for setting said valve actuating mechanism in operation, a switch throwing device, and two circuit closing devices, one located at the switch throwing device and adapted to be operated to close the circuit at this point when the switch is open or partially open, and the other circuit closing device comprising a stationary member located on the right-of-way and a member carried by the locomotive and adapted to be brought into contact with the stationary member as the locomotive passes the latter.

13. Means for arresting a moving railway train comprising, in combination with the train pipe and the engineer's valve therein, an auxiliary valve located in said train pipe between the engineer's valve and the service pipes of the brake mechanism, said auxiliary valve being constructed and arranged to permit the air to pass freely through said pipe to the engineer's valve, mechanism on the locomotive for opening and closing the auxiliary valve, and a normally open electric circuit for setting said valve actuating mechanism in operation provided with two circuit closing devices, one located on the track right-of-way and designed to be automatically operated to close said circuit at one point through the usual operation of a part of the track service equipment, and the other circuit closing device comprising a stationary member located on the right-of-way and a member carried by the locomotive and adapted to be brought into contact with said stationary member as the locomotive passes the latter.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 9th day of May A. D. 1907.

JAMES T. THOMPSON.

Witnesses:

WILLIAM L. HALL,
T. H. ALFREDS.