No. 745,502. PATENTED DEC. 1, 1903.

J. KYNOCH.

COMBINED TROLLEY AND AIR BRAKE CONTROLLER.

APPLICATION FILED APR. 20, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

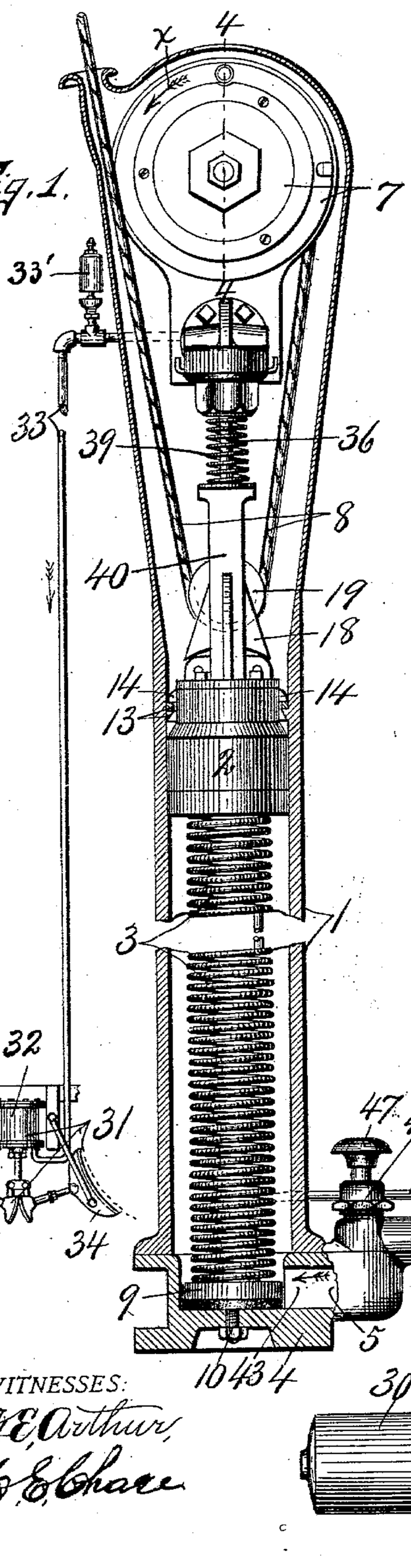

Fig. 2.

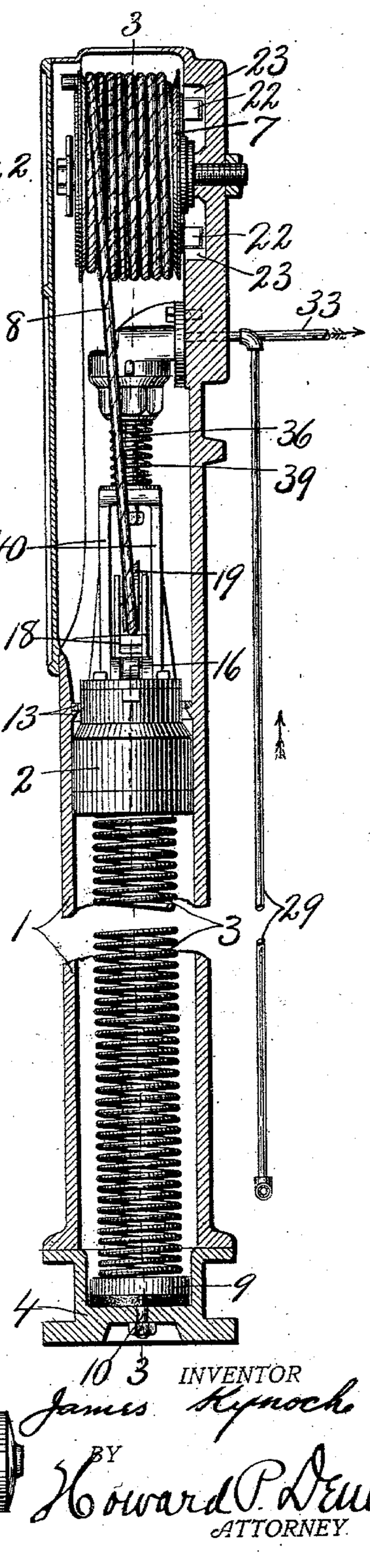

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Fig. 3.

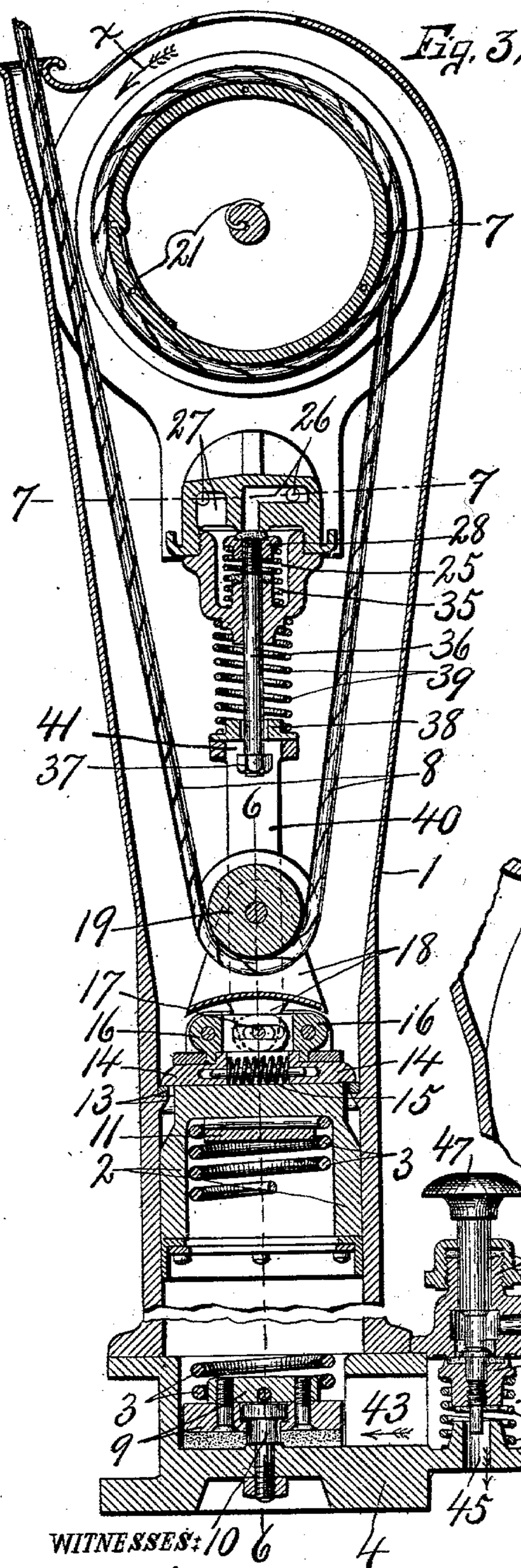


Fig. 4.

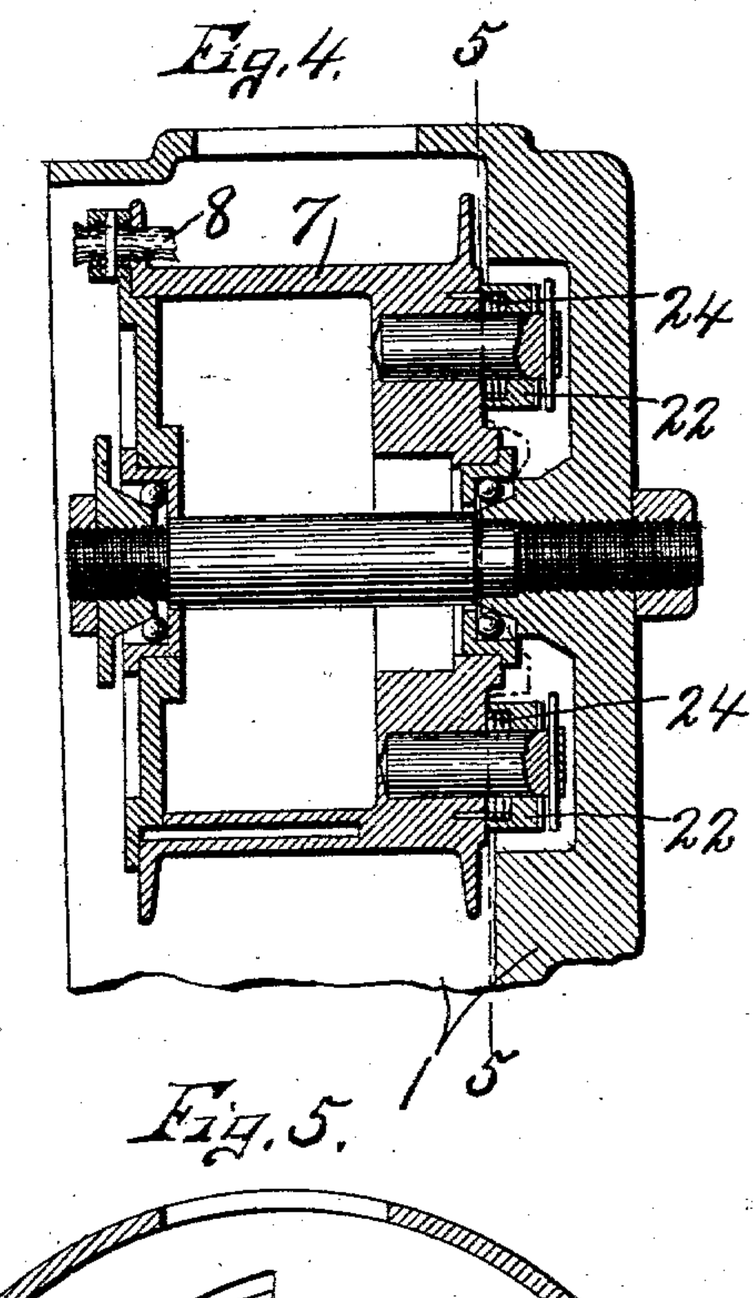
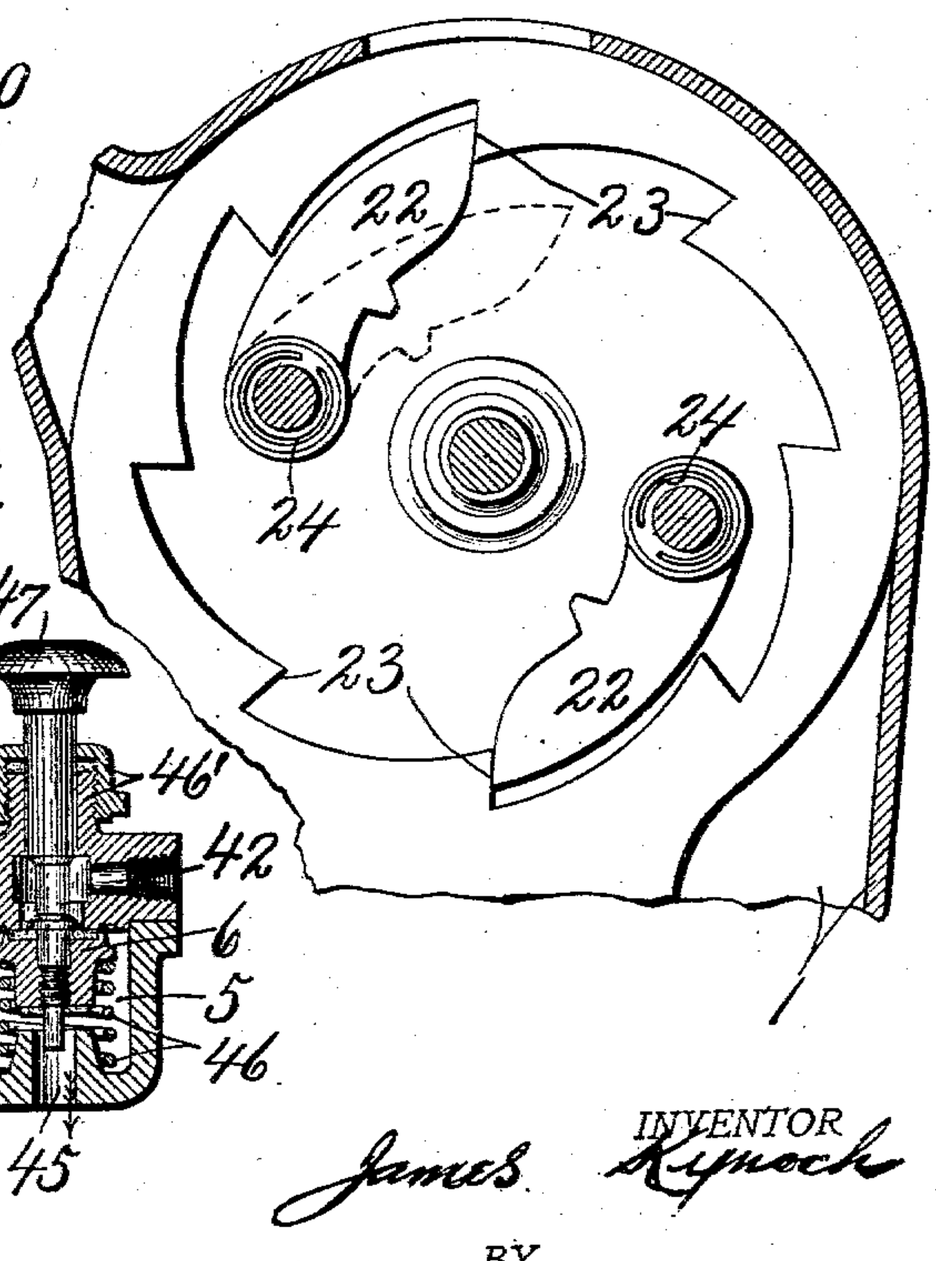


Fig. 5.



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APPLICATION FILED APR. 20, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

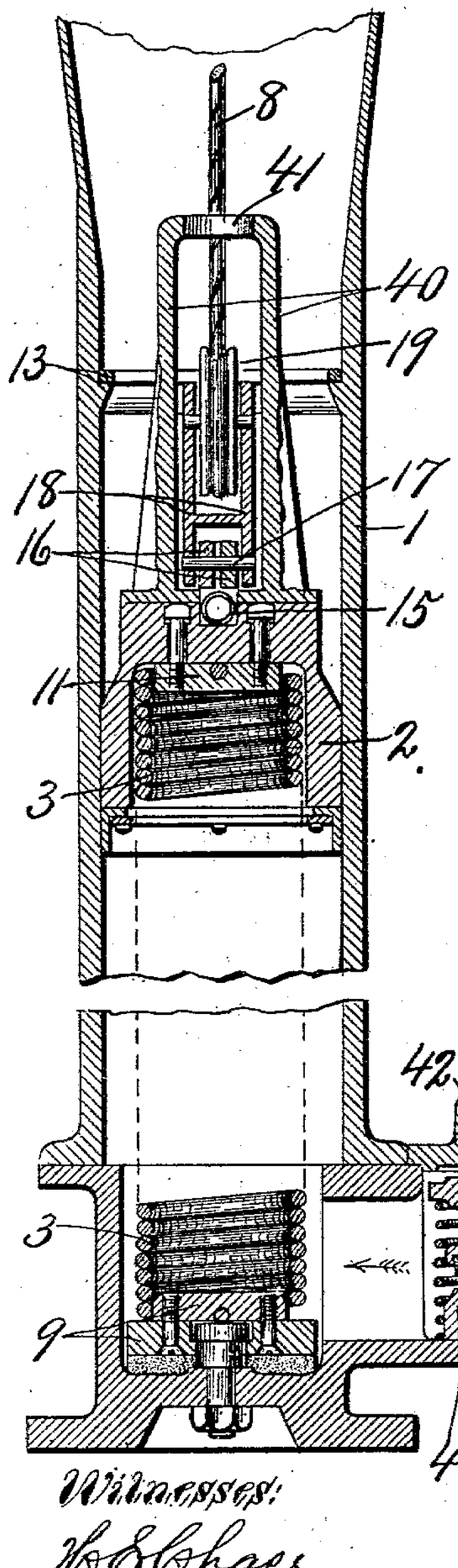
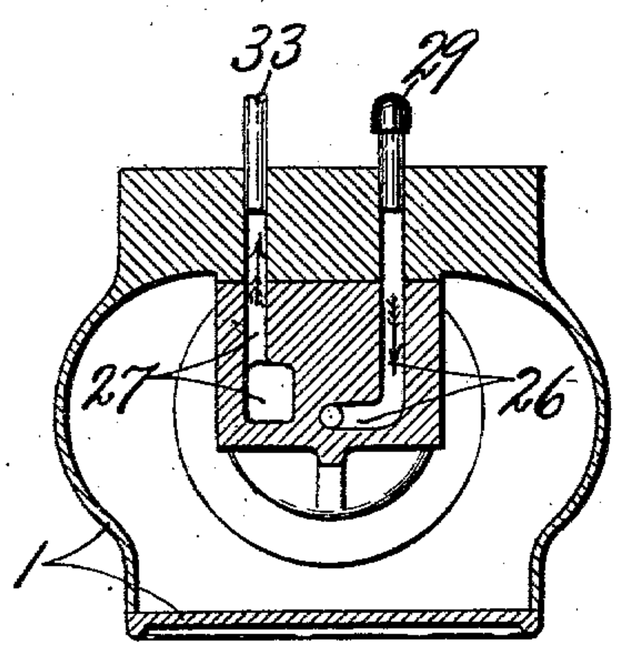


Fig. 7.



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No. 745,502. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

JAMES KYNOCH, OF TORONTO, CANADA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO INTERNATIONAL TROLLEY CONTROLLER COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

COMBINED TROLLEY AND AIR-BRAKE CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 745,502, dated December 1, 1903.

Application filed April 20, 1903. Serial No. 153,522. (No model.)

To all whom it may concern:

Be it known that I, JAMES KYNOCH, of Toronto, in the county of York, in the Province of Ontario, Canada, have invented new and useful Improvements in a Combined Trolley and Air-Brake Controller, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in trolley and air-brake controllers, the trolley-controlling mechanism being similar to that set forth in Patent No. 698,532, dated April 29, 1902, in which the controller-operating cord is connected to a suitable take-up device whereby the cord is lightly tensioned to take up any slack therein. The device set forth in this patent also provides means controlled by the trolley-arm-operating cord whereby a sudden jerk or pull upon the cord, such as is produced by the trolley leaving the wire, the cord and trolley-arm connected thereto are instantly drawn downwardly away from the wire to prevent contact with the tie-wires or supporting-brackets. I have discovered that the portions of the mechanisms involved in tqis patent may be utilized for other purposes and particularly for setting the air-brakes with which the cars are usually provided, so that when the trolley leaves the wire and suddenly brings into action the means for pulling the trolley-arm from the wire this same action opens a valve in the compressed-air-supply conduit leading to the brake-cylinder in which the piston moves which actuates the brakes.

My object therefore is to equip my trolley-controller with an automatic brake-controlling mechanism which is brought into action by the sudden movement of the trolley-operating cord caused by the trolley leaving the wire.

Another object is to provide means under the control of the attendant, such as the conductor or motorman, whereby the mechanism which draws the trolley-arm away from the wire is returned to its normal position by compressed air.

Further objects will appear in the subsequent description.

In the drawings, Figures 1 and 2 are longitudinal vertical sections, partly broken away, of a trolley and air-brake controlling device embodying the features of my invention, the outer casing being shown in section and the interior mechanism in elevation. Figs. 3, 4, and 5 are enlarged sectional views taken, respectively, on lines 3 3, Fig. 2, 4 4, Fig. 1, and 5 5, Fig. 4. Figs. 6 and 7 are sectional views taken, respectively, on lines 6 6 and 7 7, Fig. 3, the piston, however, being shown in its depressed position, a modified form of mechanism for controlling the compressed air which operates to return the piston to its normal position being shown.

Similar reference characters indicate corresponding parts in all the views.

In carrying out the objects of my invention I have shown an upright hollow case or shell 1, having a cylindrical lower end, in which is movable a piston 2 and spring 3, said shell being mounted upon a suitable supporting-base 4, having a chamber 5, in which is movable a valve 6. In the upper end of the case is mounted a revoluble take-up drum 7, to which one end of a trolley-operating cord 8 is secured, while the other end of the cord is connected to a trolley-arm. (Not shown.) The manner of connecting the cord with the trolley-arm being well known it is believed to be unnecessary to further illustrate or describe the trolley-arm or its connection with the cord.

The lower end of the spring 3 is connected or secured to a suitable anchorage 9 in the base 4, which anchorage is swiveled to the inner end of a clamping-bolt 10, which clamps the anchorage 9 to the base and prevents its endwise movement, although it is free to rotate upon the inner end of the bolt 10. The opposite or upper end of the spring is firmly secured to the piston 2 by a clamping-plate 11, so that when the piston is moved upwardly the spring is tensioned.

The shell or case 1 is provided with an inner annular shoulder 13, which is located substantially midway between the opposite ends of the shell and is adapted to be engaged by oppositely-acting pawls or detents 14, which are mounted upon the piston and serve to

hold the piston in its up position, with the spring 3 tensioned. These pawls or detents slide in suitable ways in the upper end of the piston and are normally forced outwardly by an interposed spring 15. Pivotally mounted upon the upper end of the piston is a pair of levers 16, one for each detent, said levers being provided with inwardly-extended slotted arms which receive a pin or stud 17 of a yoke 18, the latter being movable vertically independently of the piston. Mounted upon the upper end of the yoke is a revoluble sheave or idler 19, around which the cord 8 is looped between the drum 7 and the outer end which is attached to the trolley-pole.

The drum 7 is actuated in the direction indicated by arrow *x* by a spring-motor 21 for the purpose of taking up any slack in the cord 8, said drum being provided with a pair of diametrically opposite gravity-pawls 22, which are arranged to engage teeth 23 in the adjacent wall of the case 1 when the drum is rotated with considerable speed in the opposite direction. These pawls are normally held out of the path of the teeth by light coil-springs 24, so that the drum is free to rotate in opposite directions under normal conditions—that is, when the trolley-arm moves gradually up and down along the wire at various heights the take-up drum operates to maintain a light tension on the cord. Now, assuming that the trolley should leave the wire, which would produce a sudden jerk upon the cord 7 and at the same time would instantly cause a similar quick rotary movement of the drum sufficient to throw the pawls 22 into the path of the teeth 23 at the same instant, a sudden jerk is transmitted to the yoke 18 sufficient to operate the levers 16, and thereby draw the detents 14, with which the levers are engaged, inwardly out of holding engagement with the annular shoulder 13, whereupon the spring 3 immediately acts to draw the piston 2, yoke 18, and trolley-cord 8 downwardly with considerable force, so that the trolley-arm connected to the cord is also drawn downwardly away from the trolley-wire and held in this position until the piston is again returned, it being understood that the pawls 22 now hold the drum from rotary movement in an opposite direction from that indicated by arrow *x* and that the trolley-cord renders over the sheave 19 while the piston is being pulled downwardly.

I have thus briefly described the automatic means for drawing the trolley-arm downwardly from the wire in case the trolley should leave the wire instantly, and I will now proceed to describe the mechanism which forms the subject-matter of my present invention. One of these features consists in providing the upper portion of the case with a valve-chamber 25, having inlet and outlet passages 26 and 27, a suitable valve 28 being movable in the valve-chamber and normally closes the inlet-opening 26. A conduit or pipe 29 is connected to the inlet-opening 26 for conducting compressed air thereto, this conduit being usually connected to an air-pump or compressed-air reservoir 30, such as is generally used for supplying compressed air to an air-brake mechanism 31, Fig. 1. It is thus seen that the inlet and outlet passages 26 and 27 of the valve-chamber 25 form a portion of the conduit for the compressed air from the reservoir 30 to the cylinder 32 of the brake mechanism, the outlet-passage 27 being connected directly to the cylinder by a conduit 33, so that when the valve 28 is opened the inlet and outlet passages are connected through the medium of the valve-chamber and the compressed air readily passes to the cylinder 32 to operate the brake members 34 through the medium of the piston and its connection with the brake-shoes.

The valve 28 is automatically closed by a coil-spring 35, interposed between the lower end of the valve-chamber and an abutment to which the valve is secured. This valve is mounted upon a vertical stem 36, which is guided in an opening in the lower wall of the valve-chamber and extends downwardly a considerable distance beneath said lower wall, its lower end being provided with a shoulder or nut 37 and a sliding collar 38. A spring 39 is interposed between the collar 38 and bottom wall of the valve-chamber and surrounds the valve-stem 36 for the purpose of automatically opening the valve against the action of the spring 35. The spring 39 is somewhat heavier and of greater power than the spring 35, so that when the pressure of the spring 39 is relieved by the downward movement of the piston in the manner previously described the collar 38 is depressed against the shoulder 37 on the valve-stem 36, and thereby forces the valve 28 from its seat and also compresses the spring 35.

Secured to the upper end of the piston 2 and rising therefrom at the sides of the yoke 18 is a bracket 40, which moves vertically with the piston independently of the valve and its stem 36, but is arranged to abut against the lower face of the collar 38 when moved to the limit of its upward stroke for elevating the collar a slight distance and compressing the spring 39 so as to relieve the compression of the spring 35 and permit the latter to act upon the valve 28 to close the same against its seat, it being understood that although the spring 39 is heavier than the spring 35 the compression of the spring 39 on the upward stroke of the piston is sufficient to relieve the compression of the spring 35, the upper end of the bracket 40 being provided with an opening 41 to receive the shoulder 37 and also end of the stem 36 to permit the operation just mentioned. It is now apparent that when the trolley leaves the wire, and thereby causes a sudden tensioning of the cord 8, the detents 14 are withdrawn from the annular shoulder 13, whereupon the piston is automatically depressed with considerable force by means of

the spring 3 carrying the bracket 40 with it, and thus relieving the compression of the spring 39, which acts in the manner previously stated to immediately open the valve 28 and permit the compressed air to rush through the outlet-opening 27 and conduit 33 to the cylinder 32 for the purpose of operating the brake to either check the speed of the car or entirely stop it.

The operation just described is entirely automatic and it will be readily seen is of great importance, owing to the fact that the instant the trolley leaves the wire it is not only drawn downwardly away from the overhead obstructions, but the brake is also instantly applied to stop the car to permit the attendant to replace the trolley in contact with the wire.

I have now shown how the piston is drawn down to operate the brake and to draw the trolley away from the wire, and I will now proceed to describe the means for returning the piston to its normal up position. This is done by compressed air traveling through the same conduit that supplies air to the brake mechanism, the valve-chamber 5 being provided with inlet and outlet passages 42 and 43, the inlet-passage being connected to the conduit 29 by a branch conduit 44 and the outlet-passage communicating with the interior of the casing or cylinder 1 beneath the piston, so that when the valve 6 is open the air rushes into the valve-chamber and thence into the cylinder 1, thereby forcing the piston upwardly against the action of the spring 3 until the detents 14 engage the annular shoulder 13, whereupon the valve 28 is again closed and the compressed air which may be in the cylinder escapes through an exhaust-passage 45 in the base of the valve-chamber. The valve 6 is normally closed to prevent the entrance of compressed air into the valve-chamber and its outlet-opening by a spring 46, which is interposed between the bottom wall of the valve-chamber and annular shoulder provided on the valve. This valve is arranged so as to open communication between the inlet 42 and outlet 43 and to simultaneously close the exhaust-port 45, so that when the compressed air is being employed for elevating the piston the exhaust-port 45 is closed to prevent any leakage of the compressed air, and as soon as the valve is returned to its normal position by the spring 46 the exhaust is immediately opened to relieve the pressure in the cylinder in which the piston moves.

In Figs. 1 and 3 I have shown the valve 6 as provided with an upwardly-projecting stem passing through a suitable stuffing-box 46′, having its upper end provided with a foot-engaging portion 47, whereby the conductor or other attendant may readily depress the valve to open communication between the inlet and outlet passages 42 and 43 when desired to elevate the piston to its normal position, the spring 46 serving to return the valve to its normal position when the pressure on the foot-piece 47 is released.

In Fig. 6 I have shown a modified form of operating means for the valve in which the valve extends through the lower wall of the valve-chamber and is connected to a foot-piece 47′ by means of a yoke 48′, the foot-piece being mounted upon a sliding rod 50, which is movable in a guide 51 at one side of and parallel with the axis of the valve-stem. In this latter construction the compressed air is introduced through an inlet-opening 42′ and the air is exhausted from the cylinder through ports 44′.

Connected to the conduit 33 is an alarm or whistle 33′ of any well-known construction adapted to be operated by the air passing into the conduit 33 to signal the conductor or other attendant that the trolley has left the wire.

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

1. A trolley-arm-operating cord and a car-brake, in combination with mechanism operatively connected to the brake and cord and brought into action by a sudden jerk upon the cord for operating the brake.

2. A trolley-arm-operating cord and a car-brake, in combination with mechanism operatively connected to the brake and cord and brought into action by a sudden jerk upon the cord whereby the trolley-arm is drawn from the wire and the brake is simultaneously set.

3. A trolley-arm-operating cord and means controlled by the cord for automatically drawing the same downwardly when the trolley leaves the wire, in combination with an air-brake controlled by said means.

4. In combination with a trolley-arm-operating cord, a conduit for compressed air to operate a brake, a normally closed valve in the conduit, and connections between the cord and valve whereby when the trolley leaves the wire the valve is opened.

5. A trolley-arm-operating cord and an air-brake cylinder, a compressed-air conduit leading to the cylinder, a normally closed valve in the conduit, and means controlled by the cord to open the valve when the trolley leaves the wire.

6. The combination with a trolley-arm-operating cord, of a piston operatively connected to the cord and means controlled by the cord to move the piston when the trolley leaves the wire, a conduit for compressed air operating to return the piston, and manually-operated means to control the flow of air through the conduit.

7. In combination with a trolley-arm-operating cord, mechanism operatively connected to the cord and brought into action by a sudden tensioning of the cord whereby the trolley is drawn from the wire, a conduit for compressed air connected to return the mechanism to its normal position, and manually-operated means for controlling the flow of compressed air through the conduit.

8. A cylinder and a piston movable therein, a spring connected to move the piston in

one direction, means for holding the piston against the action of the spring in combination with a trolley-arm-operating cord operatively connected to trip said means when the cord is suddenly tensioned and pneumatic means to return the piston to its normal position.

9. A cylinder and a piston movable therein, a spring connected to move the piston in one direction, means for holding the piston against the action of the spring in combination with a trolley-arm-operating cord operatively connected to trip said means when the cord is suddenly tensioned, a closed conduit for compressed air connected to the cylinder for the purpose described, a normally closed valve in the conduit and means for operating the valve.

10. A cylinder and a piston movable therein, a valve-chamber having inlet and exhaust ports and communicating with the cylinder, a valve normally closing the inlet and adapted to be operated manually to close the exhaust-port, whereby when the inlet is opened the exhaust-port is closed and vice versa, a spring operatively connected to move the piston in one direction, a detent for holding the piston against the action of the spring, a trolley-arm-operating cord operatively connected to trip the detent when the cord is suddenly tensioned, and a compressed-air conduit connected to the inlet and whereby when the valve is open the compressed air returns the piston against the action of the spring.

11. A valve-chamber having an inlet and an outlet, a valve normally closing the inlet, a brake-cylinder connected to the outlet, and a compressed-air conduit connected to the inlet, in combination with a trolley-arm-operating cord operatively connected to open the valve when the cord is suddenly tensioned, whereby the compressed air operates the brake.

12. A valve-chamber having an inlet and an outlet, a valve normally closing the inlet, a brake-cylinder connected to the outlet, and a compressed-air conduit connected to the inlet in combination with a spring-actuated device and detent therefor, a trolley-arm-operating cord operatively connected to trip the detent when the cord is suddenly tensioned, said device being operatively connected to open the valve.

13. A valve-chamber having an inlet and an outlet, a valve normally closing the inlet, a brake-cylinder connected to the outlet, and a compressed-air conduit connected to the inlet in combination with a spring-actuated device and detent therefor, a trolley-arm-operating cord operatively connected to trip the detent when the cord is suddenly tensioned, said device being operatively connected to open the valve and pneumatic means for returning the piston to its normal position.

14. A valve-chamber having an inlet and an outlet, a valve normally closing the inlet, a brake-cylinder connected to the outlet, and a compressed-air conduit connected to the inlet in combination with a spring-actuated device and detent therefor, a trolley-arm-operating cord operatively connected to trip the detent when the cord is suddenly tensioned, said device being operatively connected to open the valve and an alarm in the connection between the outlet and brake-cylinder operated by compressed air.

In witness whereof I have hereunto set my hand this 10th day of April, 1903.

JAMES KYNOCH.

Witnesses:

BUELL G. TALLMAN,

PETER D. MILLOY.