No. 837,593. PATENTED DEC. 4, 1906.

L. E. STEELE.

SWITCH THROWING MECHANISM.

APPLICATION FILED FEB. 12, 1906.

3 SHEETS—SHEET 1.

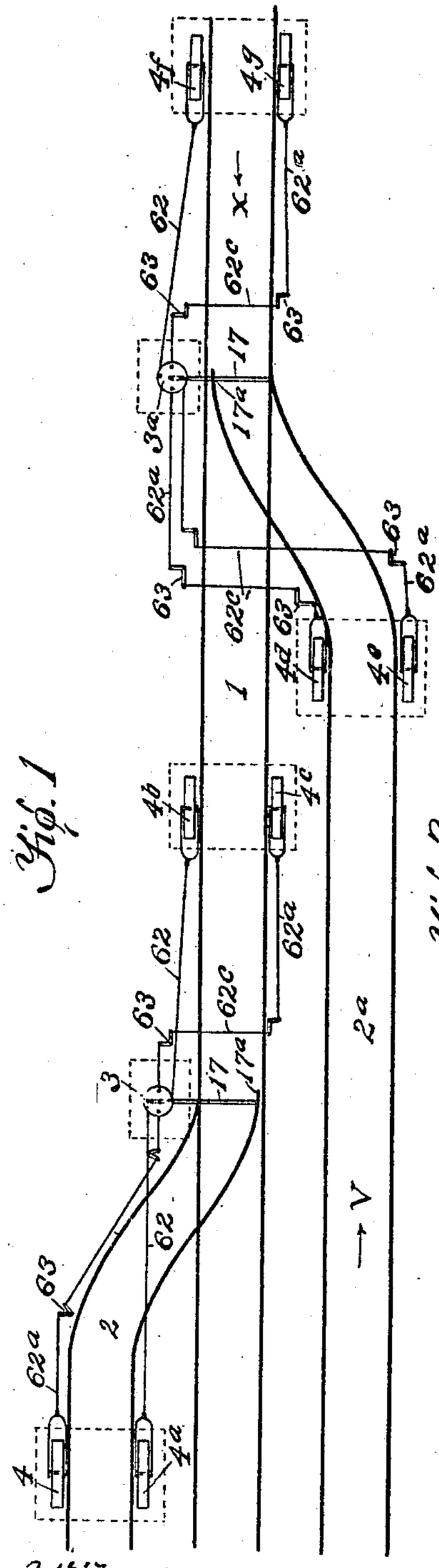

Fig. 1

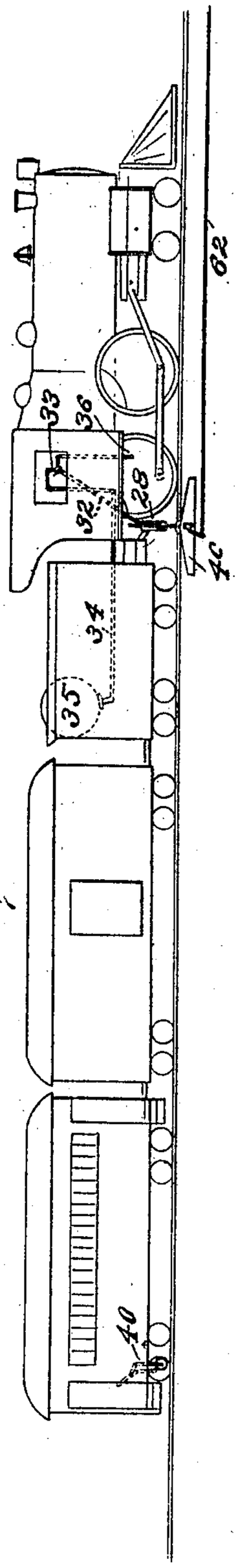

Fig. 2

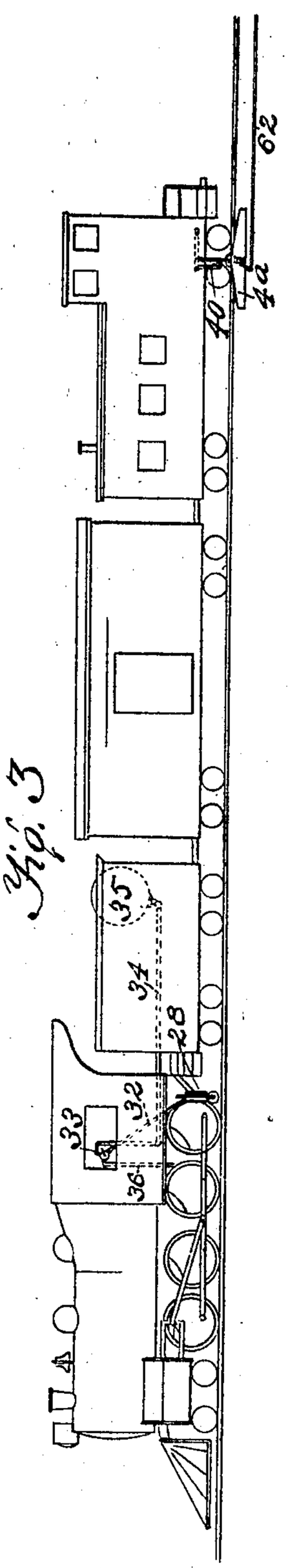

Fig. 3

Witnesses
E. V. Lichtenberg
Clara McKee

Inventor
Lewis E. Steele
by N. DuBois.
Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

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3 SHEETS—SHEET 2.

Fig. 4

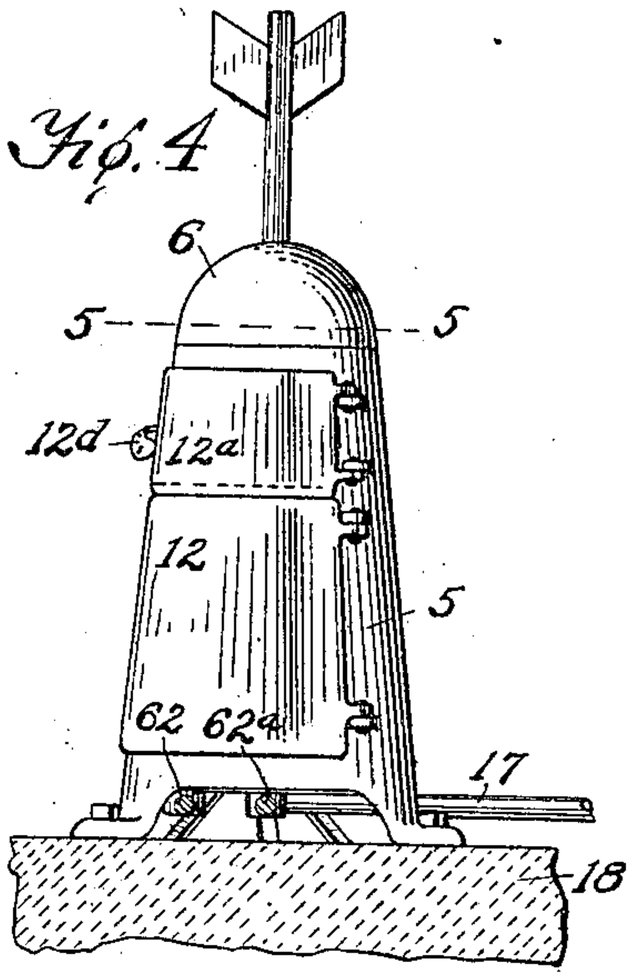


Fig. 6

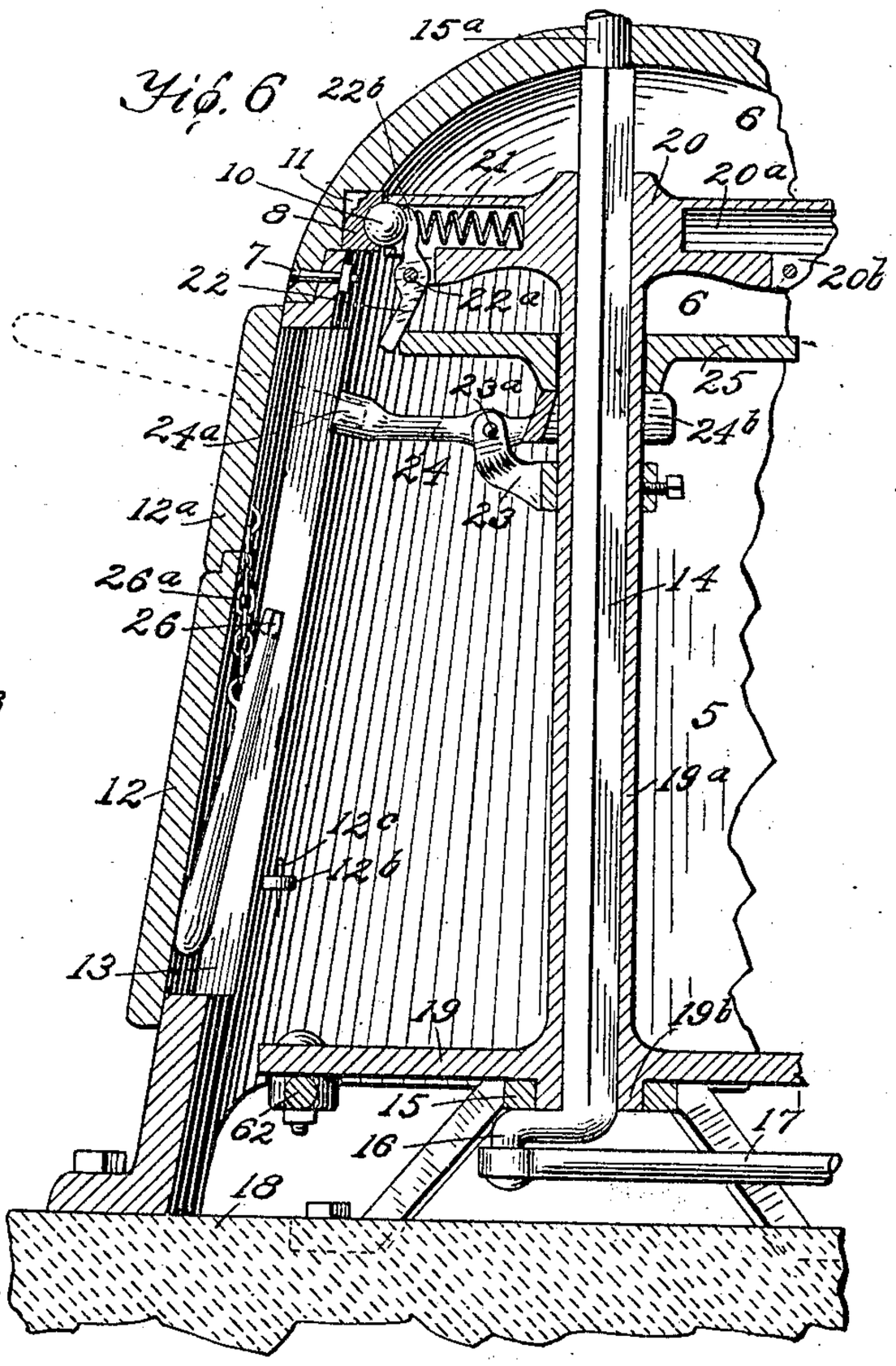


Fig. 8

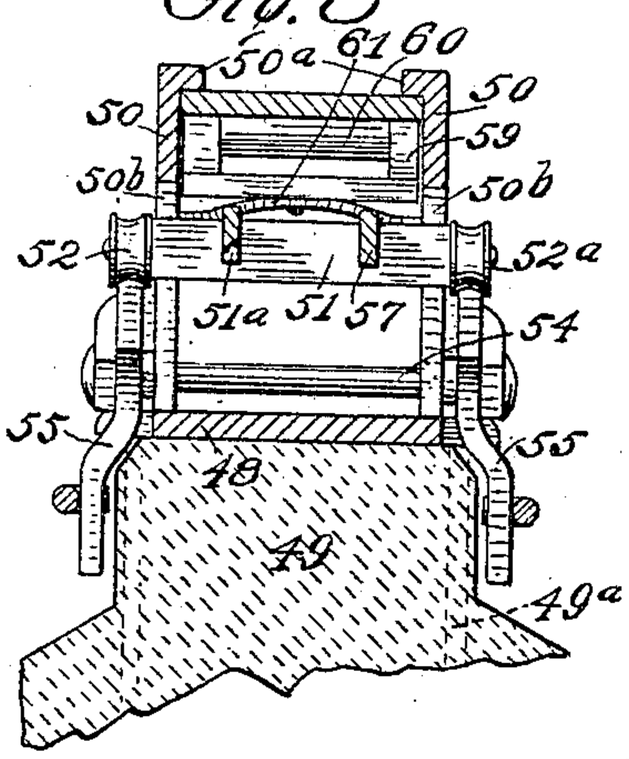


Fig. 9

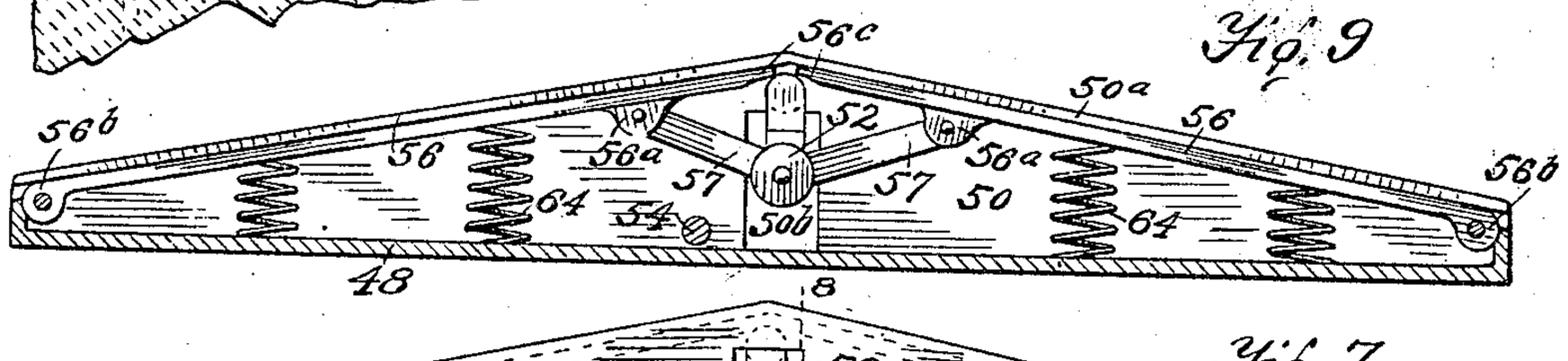
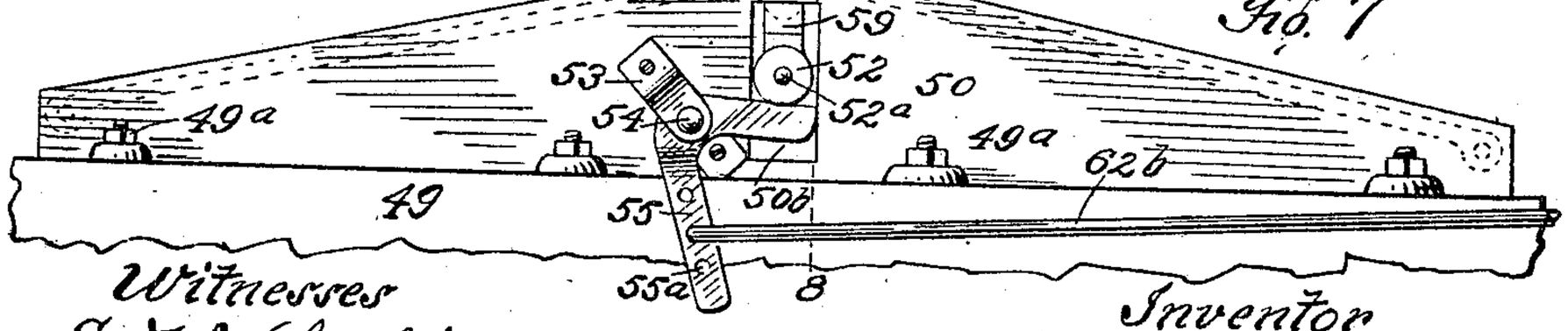


Fig. 7



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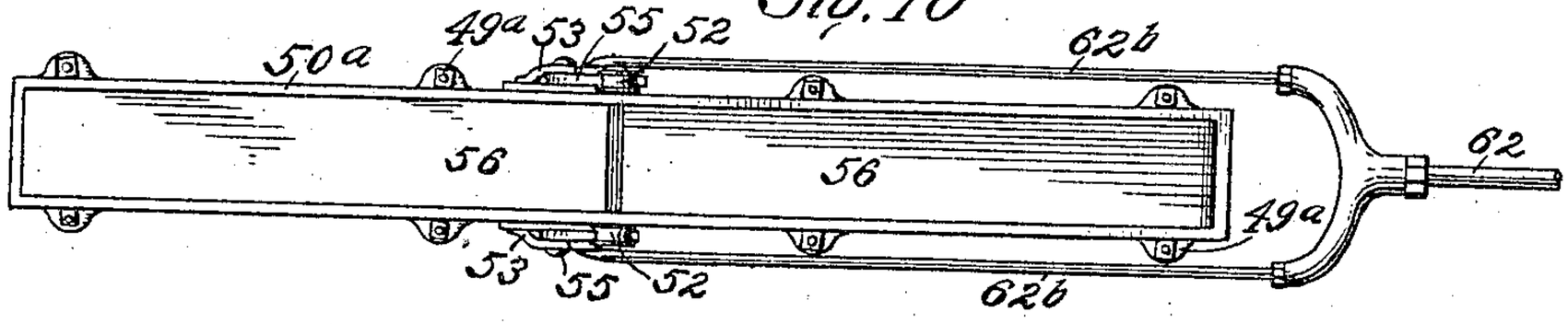
3 SHEETS—SHEET 3.

Fig. 10



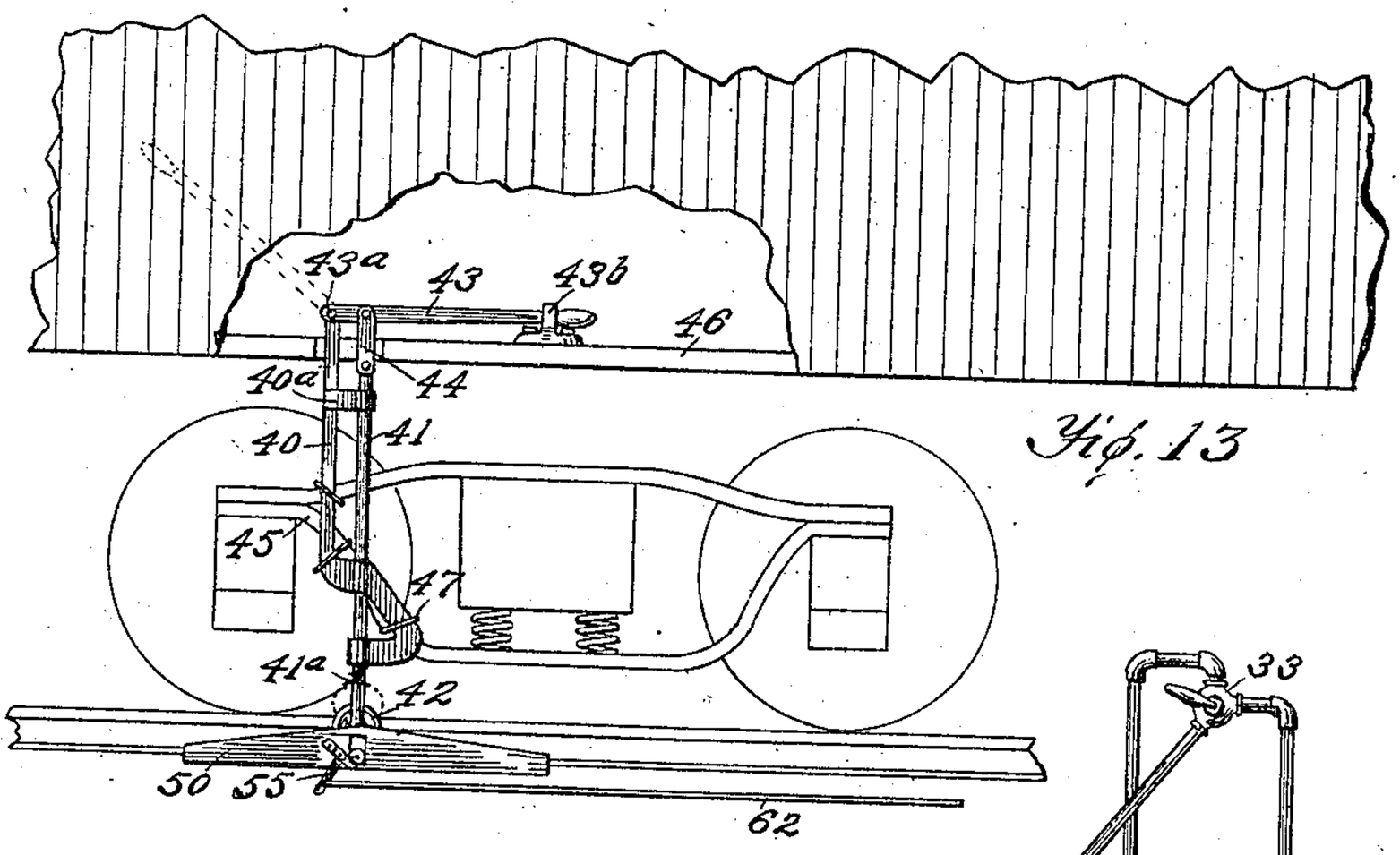


Fig. 13

Fig. 11

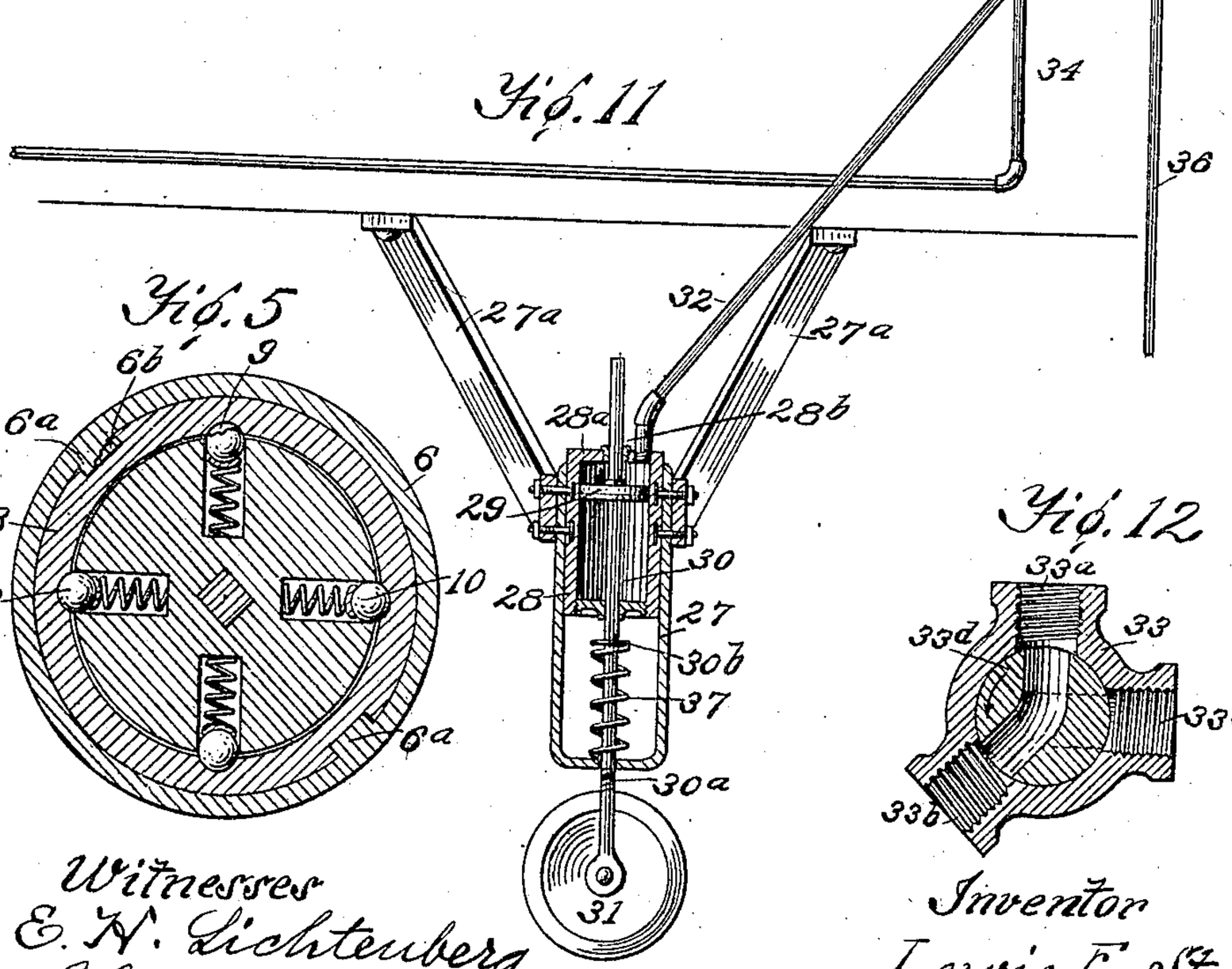


Fig. 5

Fig. 12

Witnesses
E. N. Lichtenberg
Clara McKee

Inventor
Lewis E. Steele
by N. DuBois.
Atty

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LEWIS E. STEELE, OF LINCOLN, ILLINOIS, ASSIGNOR OF ONE-HALF TO PERLIE H. LEFFEL, OF LINCOLN, ILLINOIS.

SWITCH-THROWING MECHANISM.

No. 837,593. Specification of Letters Patent. Patented Dec. 4, 1906.

Application filed February 12, 1906. Serial No. 300,686.

To all whom it may concern:

Be it known that I, LEWIS E. STEELE, a citizen of the United States, residing at Lincoln, in the county of Logan and State of Illinois, have invented a new and useful Switch-Throwing Mechanism, of which the following is such a full, clear, and exact description as will enable others skilled in the art to which it appertains to make and use my said invention.

This invention relates to switch-throwing mechanism operative by means under the control of the engineer or other person on a moving train.

The general purposes of my invention are to provide means whereby the engineer on a moving train may in case his train is about to run into an open switch quickly and effectively close the switch and enable the train to proceed safely on the main track, and to provide means adapted to effect a great saving of time and expense in the handling of trains and also to greatly enhance safety in the operation of railway-trains, or if he wishes to run his train onto a side track and the switch to that track is closed he may operate the device to open switch and permit the train to run onto the side track.

More specific purposes of my invention are to provide a switch-stand so constructed and arranged that it may be operated by means of actuators connected with a moving train and running on depressors alongside of the track and may not be manually operated by any unauthorized person, but may be operated by hand by persons authorized to operate it; to provide depressors of improved construction operatively connected with the switch-stand; to provide means mounted on the locomotive or on a car of a train and connected with the compressed-air supply of the train, so that the air may be utilized to bring into action a suitable actuator, such as a wheel or equivalent device or devices, serving to operate the depressors; to provide means connected with a car of the train (preferably the rear car) and operative by hand to bring into action a suitable actuator for operating the depressors, and to provide other novel features of construction hereinafter more particularly described.

With these ends in view my invention consists in the novel features of construction and combinations of parts shown in the annexed drawings, to which reference is hereby made and hereinafter particularly described and finally recited in the claims.

Referring to the drawings, in which similar reference characters designate like parts in the several views, Figure 1 is a diagram of part of the main track and side tracks of a railroad and shows the location of the switch-stands and the depressors relative to the tracks. Fig. 2 is an elevation of the right-hand side of a train, the actuators being shown as connected with the locomotive and the rear car of the train. Fig. 3 is an elevation of the left-hand side of a train, the actuators being shown as connected with the rear car of the train. Fig. 4 is an elevation of the switch-stand. Fig. 5 is an enlarged horizontal section on the line 5 5 of Fig. 4. Fig. 6 is an enlarged partial axial section through the switch-stand. Fig. 7 is an enlarged side elevation of one of the depressors. Fig. 8 is an enlarged vertical transverse section on the line 8 8 of Fig. 7. Fig. 9 is an enlarged elevation of one of the depressors, one of the side plates being removed to show the parts within the depressor. Fig. 10 is an enlarged top plan of one of the depressors. Fig. 11 is an enlarged axial section of an automatic actuator operative by compressed air. Fig. 12 is an enlarged sectional view of the valve controlling the supply of air to the actuator-cylinder, and Fig. 13 is an enlarged side elevation of a hand-operated actuator mounted on a car-truck.

Referring to Fig. 1 of the drawings, the several parts are designated by reference-numerals as follows: 1, the main track; 2 and 2^a, side tracks; 3 and 3^a, switch-stands; and 4, 4^a, 4^b, 4^c, 4^d, 4^e, 4^f, and 4^g are depressors.

The switch-stands are all exactly alike and the depressors are all exactly alike, so that the description of one switch-stand and one depressor will be sufficient to clearly set forth the construction of all of the switch-stands and all of the depressors.

The operating parts of the switch-stand are contained within a suitable cast-iron shell 5, which is firmly secured on a suitable foundation 18, preferably of concrete. A cap 6 fits on the upper end of the shell 5 and is se-

cured thereon by bolts 7. A ring 8, preferably of hardened steel, fits on top of the shell 5 and has suitably-placed pockets 9, adapted to accommodate balls 10, the depth of the pockets being somewhat less than half the diameter of a ball. Lugs 6[a] on the cap 6 fit in notches 6[b] in the ring 8 and prevent the ring from turning in the cap. On the inside of the cap 6 is a circular way 11, in which the ring 8 fits, and when the cap is in position on the shell the ring lies in the way 11 and on top of the shell 5 and the cap bears firmly on the ring to prevent turning of the ring.

Doors 12 and 12[a] have a hinge connection with the shell and cover the opening 13. The door 12[a] overlaps the door 12 and may be secured by any suitable lock 12[d], the key to the lock being held only by authorized persons. A lug 12[b] on the door 12 extends through a hole in the shell 5, and a pin 12[c] fits in a hole through the lug and secures the door, so that it is necessary to remove the pin before the door can be opened.

A circular crank-plate 19 is connected with a circular chamber-plate 20 by a sleeve 19[a], preferably integral with both plates, and has a hub 19[b] turning in a stationary support 15 central to the shell 5. A semaphore-shaft 14 fits in the sleeve 19[a] and turns in a bearing 15[a], central to the cap 6, and has at its lower end a crank 16. The parts 14, 19, and 20 are so connected that all turn together. The switch-rod 17 connects the switch-points 17[a] with the crank 16.

Rods 62 and 62[a] connect the crank-plate 19 with the depressor-levers 55 or the bell-crank levers 63, as the case may be. The rods 62 are provided with prongs 62[b], which connect with the levers 55 on both sides of the depressors, so that both levers pull alike on the rod.

The chamber-plate 20 has radial bores 20[a], in which spiral springs 21 fit loosely. Levers 22 turn on pivots 22[a] in slots 20[b] in the plate 20 and have upwardly-extending spoon-shaped parts 22[b], which fit on the periphery of the balls.

A collar 23, secured on the sleeve 19[a], has an upwardly-extending fork 23[a]. A lever 24 is mounted to oscillate in the fork 23[a] and has at one end a fork 24[b], through which the sleeve 19[a] passes, and at the other end a socket 24[a], adapted to receive one end of a bar 26. The bar 26 is connected to a chain 26[a], which has one end secured within the shell 5, and when in use the bar projects through the opening 13, as indicated by dotted lines in Fig. 6. Doors 12 and 12[a], hinged on the shell, cover the opening 13, and when the doors are closed and the bar is not in use it remains inside of the shell, where it is accessible to any one having the key to the door, but cannot be reached by any unauthorized person.

A circular plate 25 rests on top of the fork 24[b] and is slidable on the sleeve 19[a]. The downwardly-extending members of the levers 22 lie on the edge of the plate 25.

When the outer end of the lever 24 is depressed by pushing downward on the bar 26, the part 24[b], acting on the under side of the plate 20, raises the plate, and the perimeter of the plate acting on the downwardly-extending members of the levers 22, pushes them outward, causing the spoon-shaped members 22[b] to compress the springs 21, thereby permitting balls 10 to enter the bores 20[a], so that the plate 20 may be easily turned by moving the bar 26 to the right or the left, as the case may be. The strength of the springs 21 is such that they press the balls 10 into the pockets 20[a] with such force that the semaphore-shaft and connected parts cannot be turned by hand, but may be turned by the weight of the locomotive or the car applied on the depressors, as hereinafter explained.

Each of the depressors 4 4[a] 4[b], &c., consists of a depressor-box having vertical sides and hinged top plates inclining downwardly in both directions from the center and moving between the side plates.

The depressor (shown in detail in Figs. 7, 8, 9, and 10) has a base-plate 48 supporting side plates 50, and the base-plate and side plates are firmly connected together and secured on a foundation 49, preferably of cement, by bolts 49[a], embedded in the foundation. Parallel vertical openings 50[b] in the plates 50 accommodate a bar 51, slidable in the openings. Grooved rollers 52 turn on spindles 52[a] on the bar 51. Brackets 53 are secured on the plates 50. A shaft 54 turns in suitable bearings in the brackets 53 and the plates 50. Bell-crank levers 55, having a number of holes 55[a] for different settings of the rods 62[b], are secured on the shaft 54. The grooved wheels 52 lie upon the horizontal members of the levers 55, and when the bar 51 is pressed downward the grooved wheels cause the levers to turn so that the levers will pull on the rods 62[b]. Depressor-plates 56 fit under the flanges 50[a] of the plates 50 and have downwardly-extending lugs 56[a] and hinges 56[b], connecting the plates with the base 48. Bars 57 fit in notches 51[a] in the bar 51 and are pivotally connected with the bar and the lugs 56[a]. Coiled springs 64 underlie and normally support the plates 56. A bolster 59 is slidable vertically between the plates 50. A roller 60 is mounted on the bolster 59 and supports the adjacent ends of the plates 56. A spring 61 supports the bolster on the bar 51 and forms a cushion between the bar and the bolster adapted to prevent breakage of the parts. The beveled parts 56[c] of the plates 56 normally lie on the roller 60 and as the plates are depressed

their adjacent ends approach each other. The roller 60 prevents dirt from passing between the ends of the plates, and the flanges 50^a prevent the entrance of dirt along the edges of the plates.

Rods 62 and 62^a pivotally connect the plate 19 within the switch-stand with the depressor-levers 55 or the bell-cranks 63, as the case may be, and rods 62^c connect the bell-cranks 63 with each other.

When the actuators are applied on the depressors 4 4^a 4^b, &c., the rods 62 or 62^a, as the case may be, pull on the plates 19, respectively, to turn the plate 19 and the shaft 14 so as to throw the connected switch.

For convenience in description I designate the means for depressing the depressor-plates as "actuators."

Two different forms of actuators may be used, one operative by hand and the other operative by compressed air or steam. The actuator or actuators operating by compressed air or steam are preferably mounted on the locomotive, but may without departure from my invention be located in any suitable and convenient position on a car of the train. The actuators which are operated by compressed air or steam are hereinafter referred to as "automatic" actuators, and the actuators which are operated by hand are referred to as "hand-operated" actuators.

The construction of the automatic actuator is shown in detail in Figs. 11 and 12, and the hand-operated actuator is shown in Fig. 13. The main structure of the automatic actuator preferably consists of a suitable tubular frame 27, firmly secured on the frame of the locomotive by braces 27^a. A cylinder 28 is secured in the frame 27, and the cylinder-heads 28^a are provided with suitable glands 28^b. A piston 29 is secured on a piston-rod 30 axial to the cylinder 28. The piston-rod 30 has at its lower end a fork 30^a. A wheel 31 turns in the fork 30^a. A pipe 32, connected with a valve 33, supplies compressed air to the cylinder 28. A pipe 34 connects the valve with the compressed-air cylinder 35. (See Fig. 2.) The valve 33 (shown in section in Fig. 12) has openings 33^a, 33^b, and 33^c, in which the pipes 34, 32, and 36, respectively, fit. When the valve is open, as shown in Fig. 12, air from the pipe 34 flows through the valve into the pipe 32, and thence into the cylinder 28 above the piston. When the valve-plug 33^d is turned as indicated by dotted lines in Fig. 12, air from the cylinder 28 will pass through the pipe 32, through the valve, and thence through the pipe 36 to the atmosphere. A collar 30^b is secured on the piston-rod 30. A spring 37 surrounds the piston-rod 30 between the collar and the bottom of the frame 27. When compressed air is admitted through the pipe 32, the air within the cylinder 28 above the piston acts to move the piston downward, and the downwardly-moving collar 30^b compresses the spring 37. If then the plug 33^d be turned to a position indicated by dotted lines in Fig. 12, air from the cylinder will flow through the pipe 32, through the valve 33, and the pipe 36 to the atmosphere, thereby removing the pressure from the piston, and the spring 37 will act to raise the piston and connected parts.

The frame 40 of the hand-operated actuator (clearly shown in Fig. 13) is secured on the truck-frame 45 by suitable securing devices 47. A rod 41 slides in guides 40^a on the frame 40 and has at its lower end a fork 41^a, in which the wheel 42 turns. A lever 43 is connected with the upper end of the frame 40 by a hinge 43^a. Links 44 connect the lever 43 with the upper end of the rod 41, so that when the lever is turned to the inclined position indicated by dotted lines the rod 41 will be slid upward far enough to raise the wheel 42, so that it will pass over the depressors without striking them. A latch 43^b, connected with the car-floor 46, keeps the lever 43 in a horizontal position and prevents upward movement of the lever when the wheel 42 rides on the depressor. When the actuator is not in use, the lever 43 occupies the inclined position, and the wheel 42 is raised above the depressor, as indicated by dotted lines. When it is desired to lower the actuator to operate the depressor, the lever 43 will be moved to a horizontal position and caught under the latch 43^b, as shown.

It will be understood that automatic actuators may be placed on one or both sides of the locomotive, and hand-operated actuators may be placed on one or both sides of a car. In practice I prefer to place automatic actuators on both sides of the locomotive and the hand-operated actuators on both sides of the car.

When the actuators are placed, as described, the automatic actuators on the locomotive will normally act on the depressors in the direction in which the train is headed with the locomotive in front to open or close the switches at the discretion of the engineer—that is to say, if the locomotive is approaching an open switch the automatic actuator may be applied to close the switch, or if the switch is closed and it is desired to go from the main track onto the switch the actuator may be applied to open the switch. The hand-operated actuators are under the control of the conductor or an authorized trainman, and may be used in various ways in the discretion of the operator to open and close the switches.

In practice when it is desired to operate a switch the actuator-wheel is lowered into position to ride on top of the depressor-plates

56, and the weight carried on the wheel and applied on top of the plates depresses them and causes them to press downward the bar 51, thereby causing the rollers 52 to push downward on the levers 55, so that the levers will pull on the rods 62 or 62[a], as the case may be, and the rods pulling on the plate 19 will turn it and the shaft 14, which will cause the plate 20 to make a quarter-turn and stop with the balls 10 in the pockets 9. The quarter-turn of the shaft 14 will slide the switch-rod 17 to open or close the switch according to the direction in which the shaft is turned.

The operation of the device will be understood by reference to Fig. 1. If a train be moving forward on the main track in the direction indicated by the arrow X and the switch leading to the left-hand track 2[a] be open, the engineer will, if he wishes to proceed on the main track, open the valve 33 to apply the air to the automatic actuator and the actuator riding on the depressor 4[g] will cause the closing of the switch. In like manner the same train moving in the same direction if the switch to the right-hand track 2 is found to be open he will operate the automatic actuator to act upon the depressor 4[c] to close the switch. If the train be on the side track 2[a] headed in the direction indicated by the arrow Y and the switch be closed, as shown, the engineer will operate the valve 33 to cause the automatic actuator to act on the depressor 4[e] to open the switch.

If it is desired to place on the side track 2[a] a train running on the main track and headed in the direction indicated by the arrow X, the switch being closed against the train, the engineer will bring into action the actuator acting on the depressor 4[f] to open the switch, so that the train can pass onto the side track, and as the train continues to move on the side track the proper hand-operated actuator will be applied to the depressor 4[e] to close the switch and leave the main track clear, and so on, according to the depressors which are brought into action.

From the foregoing it will be seen that the actuators at either end of the train may be applied to open or close any of the switches in the discretion of the authorized operator and that the switches cannot be manually operated by any unauthorized person.

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

1. In a switch-throwing mechanism, the combination of a stationary shell, a semaphore-shaft turning within the shell, a cap fitting on the shell and having a way accommodating a ring, means for securing the cap on the shell, a ring fixed in the way of the cap and provided with pockets adapted to receive balls, a chamber-plate secured on said shaft and having axial chambers matching the pockets in said ring, springs in the chambers of said plate, balls kept in the pockets of said ring by the action of said springs, and means for compressing said springs to permit the withdrawal of the balls from the pockets in the ring.

2. A depressor for switch-throwing mechanism, comprising a bottom plate, side plates secured on the bottom plate and having inwardly-extending flanges and vertical openings, a bar provided with rollers and slidable in the openings through the side plates, depressor-plates hinged on the base-plates, springs supporting the depressor-plates, an oscillative shaft extending through the side plates, bell-crank levers secured on said shaft and acted upon by the rollers of said slidable bar, a bolster under said depressor-plates and vertically movable between said side plates, a spring supporting said bolster on said slidable bar, and rods connecting said depressor-plates with said bar.

3. In a switch-throwing mechanism, the combination of depressors adjacent to the track with which the mechanism is used, a switch-stand operated by said depressors to open or close switches, an actuator operative by compressed air and adapted to be connected with a train running on the track, a valve mounted in the engineer's cab, a pipe connecting said valve with the compressed-air tank of the train, a pipe connecting said valve with the cylinder of the actuator and a pipe communicating with and adapted to exhaust the air from said cylinder.

4. In a switch-throwing mechanism, the combination of a stationary shell having an opening and a door safeguarding said opening, a semaphore-shaft axial to said shell, a sleeve surrounding said shaft, a collar secured on said sleeve and adapted to support a lever, a lever mounted on said collar and spanning said sleeve and provided with a socket, a handle fitting in the socket of said lever, a plate above said lever and slidable on the sleeve, a chamber-plate on the sleeve and having radial chambers, springs fitting in the chambers of the chamber-plate and matching corresponding ball-pockets in the shell, and levers mounted on the chamber-plate and extending upward between the balls and the spring and having downwardly-extending members engaged by the slidable plate on the semaphore-shaft.

5. In a switch-throwing mechanism, the combination of an automatic actuator connectible with a locomotive and controlled by a valve in the engineer's cab, a hand-operated actuator attachable to a car of the train pulled by the locomotive and operative by a lever within the car, and depressors adjacent to the track on which the train runs and connected to operate the switches of the track;

all so constructed and arranged that the engineer may operate the automatic actuator for emergency or ordinary setting of switches, and a trainman may operate the hand-operated actuator for ordinary setting of the switches.

In witness whereof I have hereunto subscribed my name, at Lincoln, Illinois, this 3d day of February, 1906.

LEWIS E. STEELE.

Witnesses:
O. A. MERKEL,
E. H. LICHTENBERG.