No. 778,336. PATENTED DEC. 27, 1904.

E. M. ROBINSON.

RAILWAY SWITCH STAND OPERATING A POINT LOCK AND DISTANT SIGNAL.

APPLICATION FILED APR. 11, 1904.

6 SHEETS—SHEET 1.

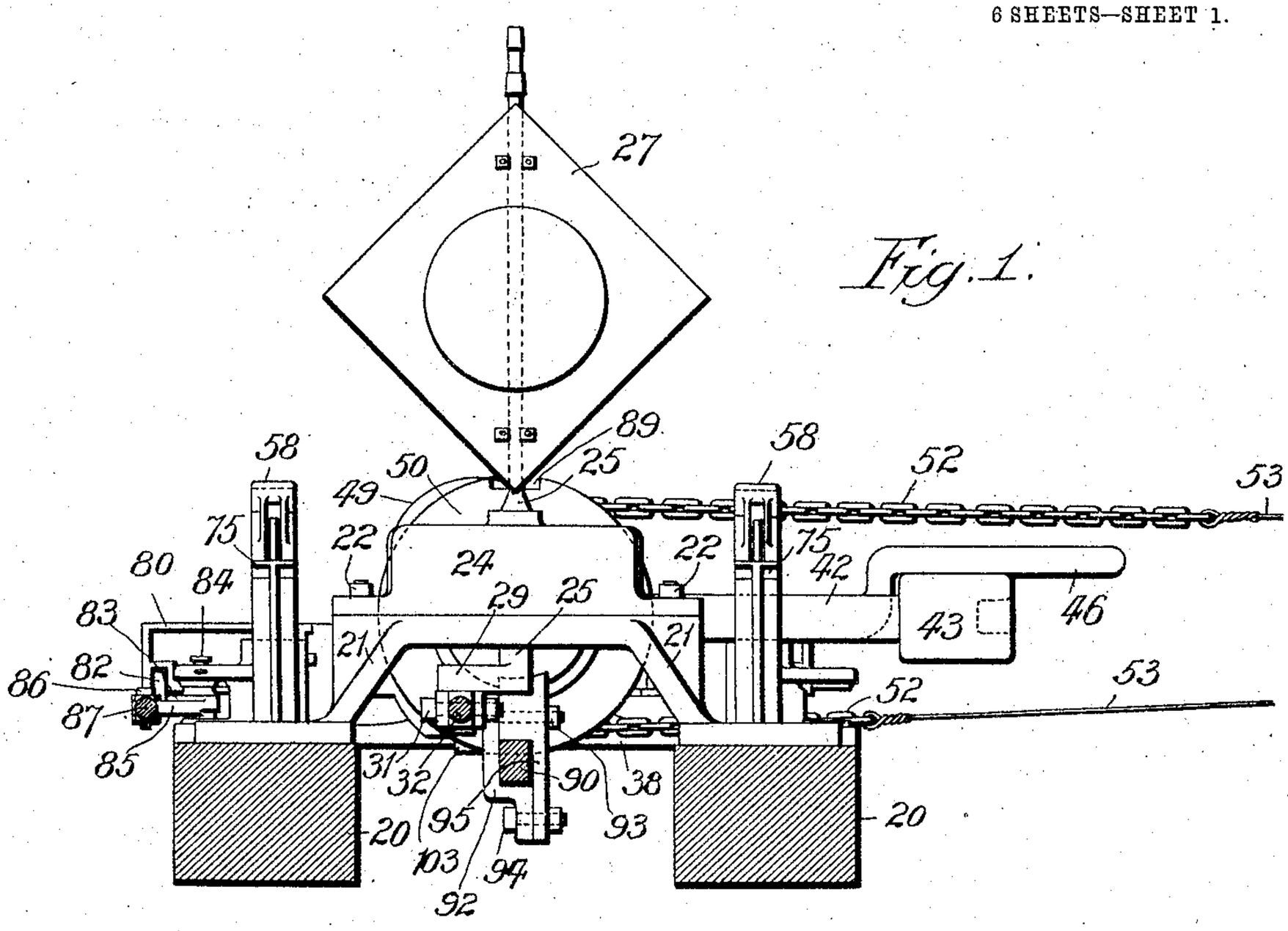

Fig. 1.

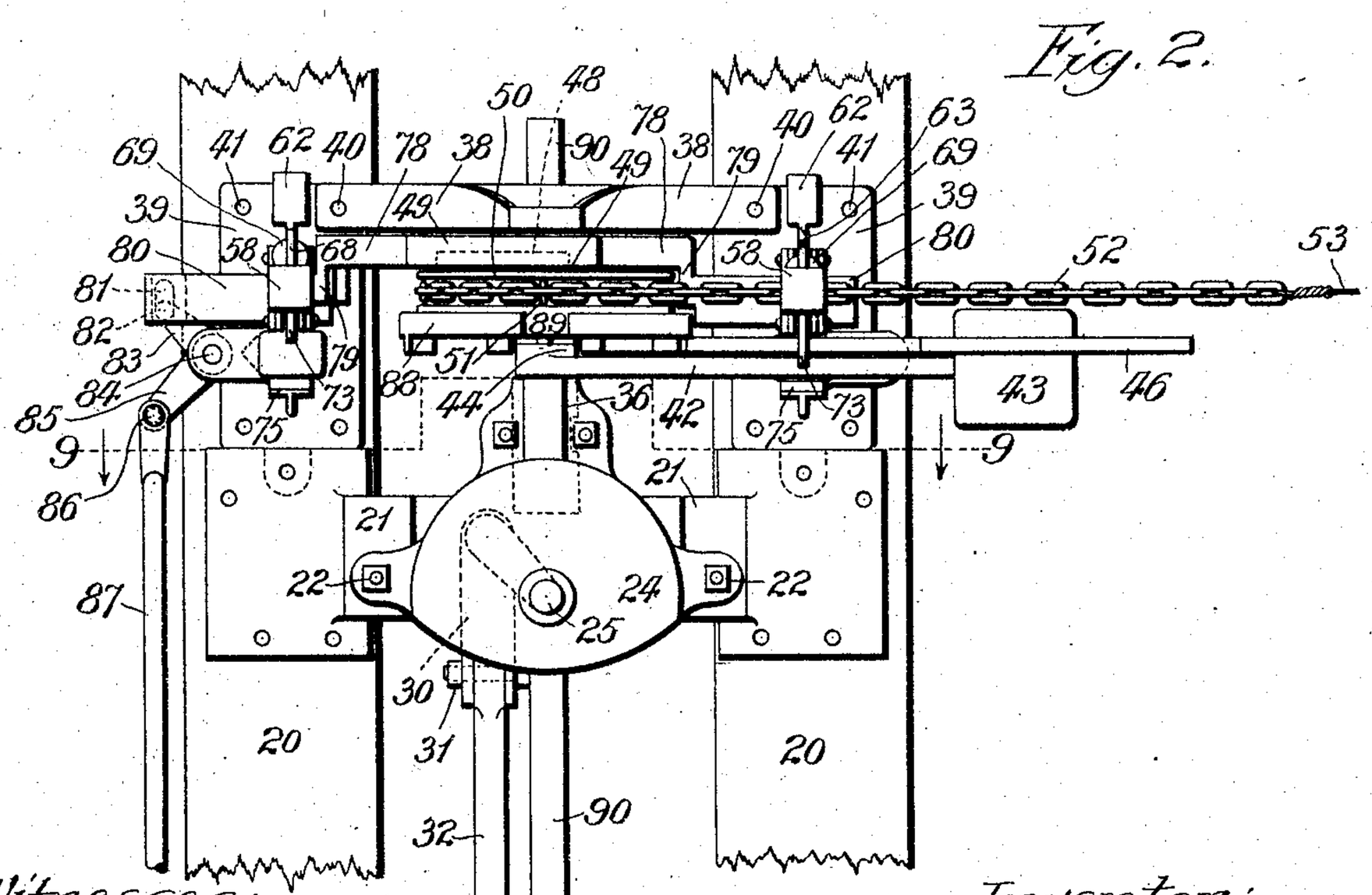

Fig. 2.

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By Dwight B. Cheever
Att'y.

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Fig. 3.

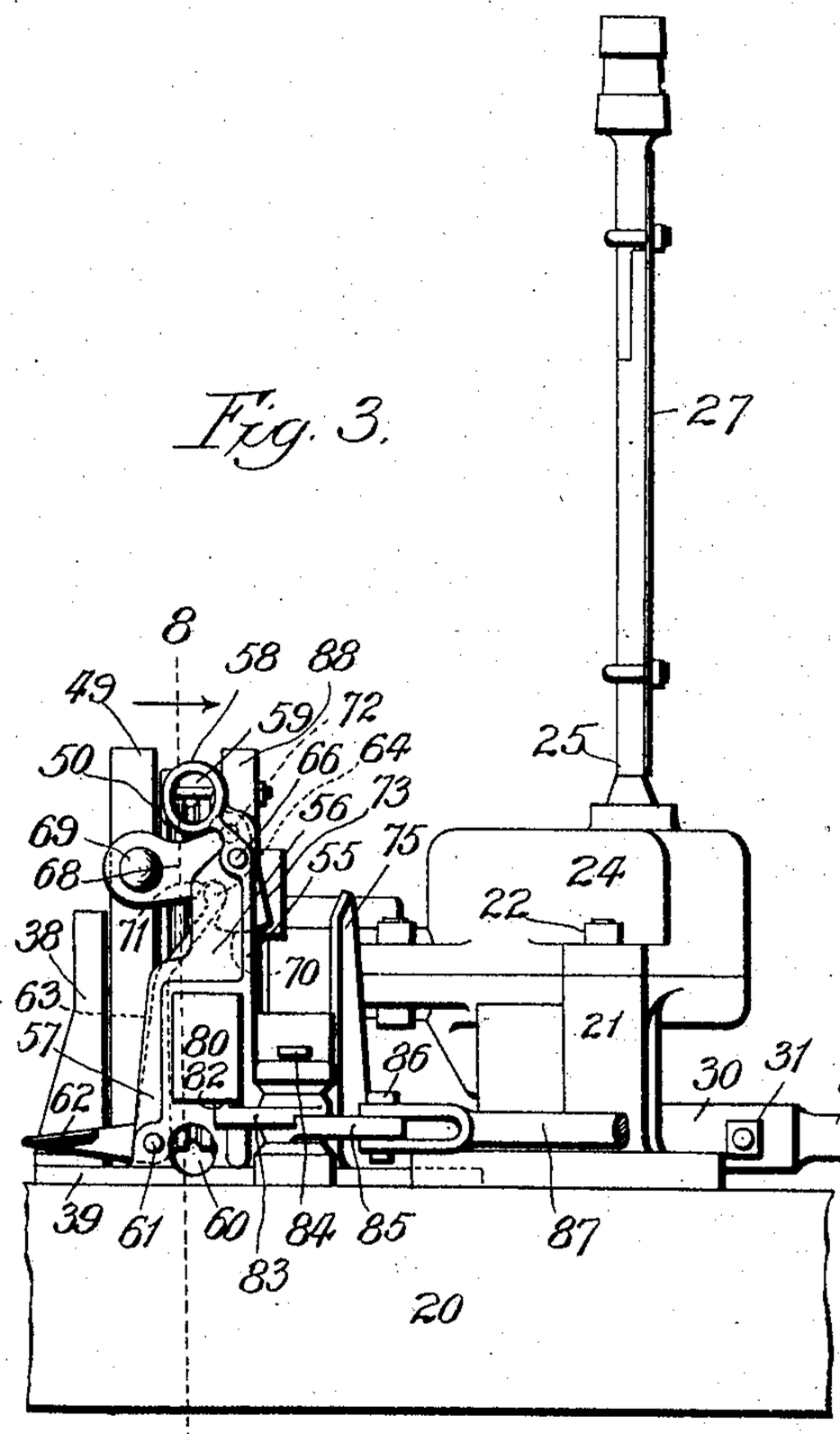


Fig. 4.

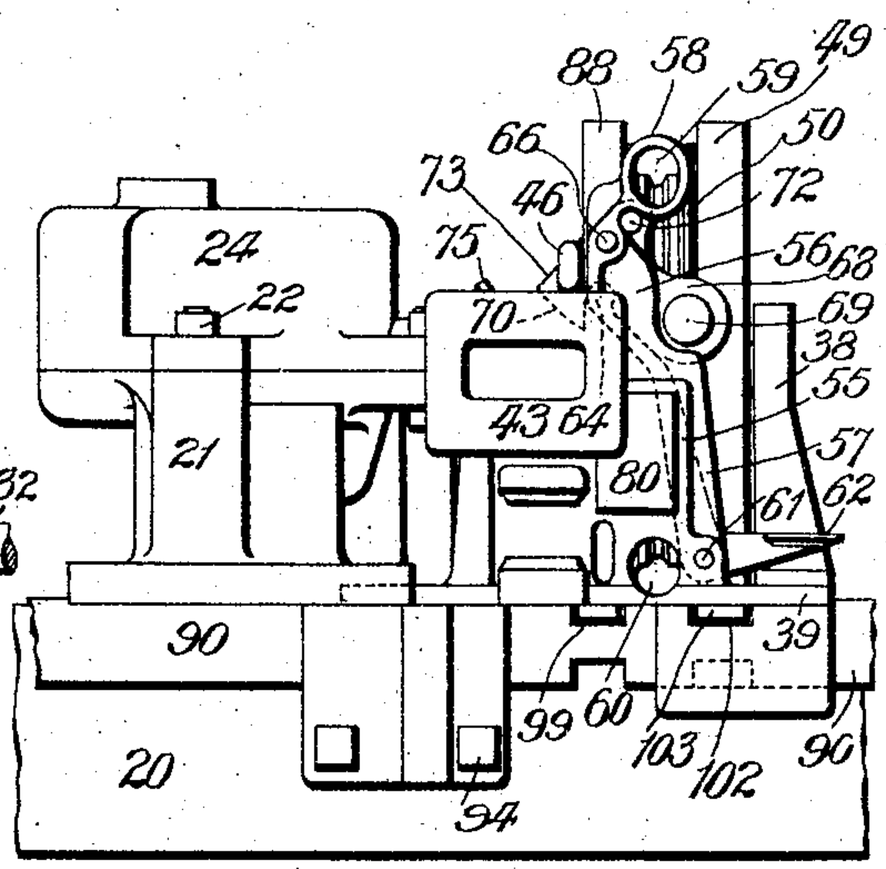


Fig. 5.

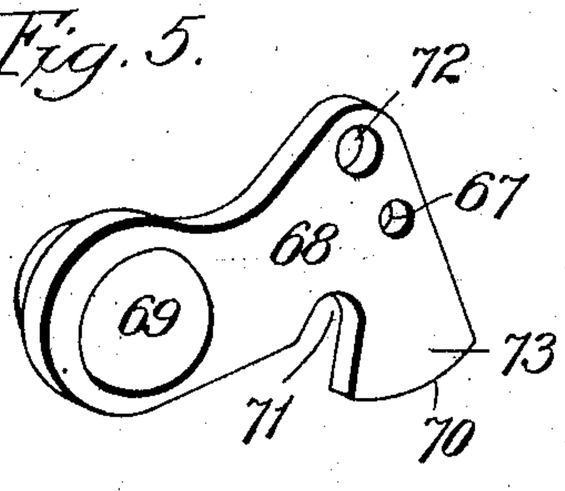
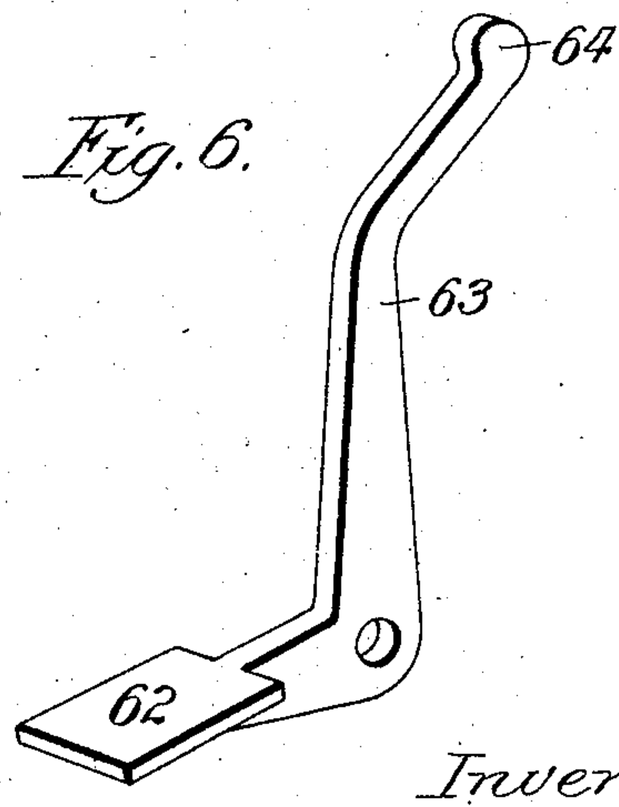


Fig. 6.



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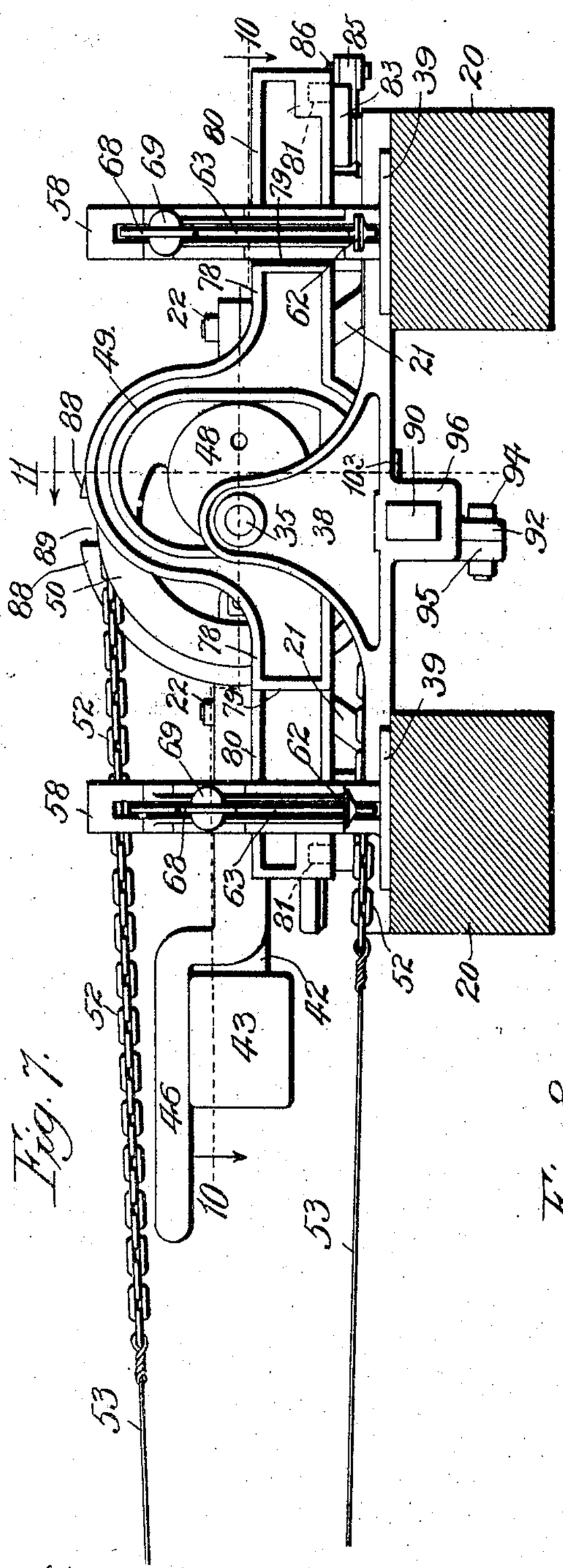

Fig. 7.

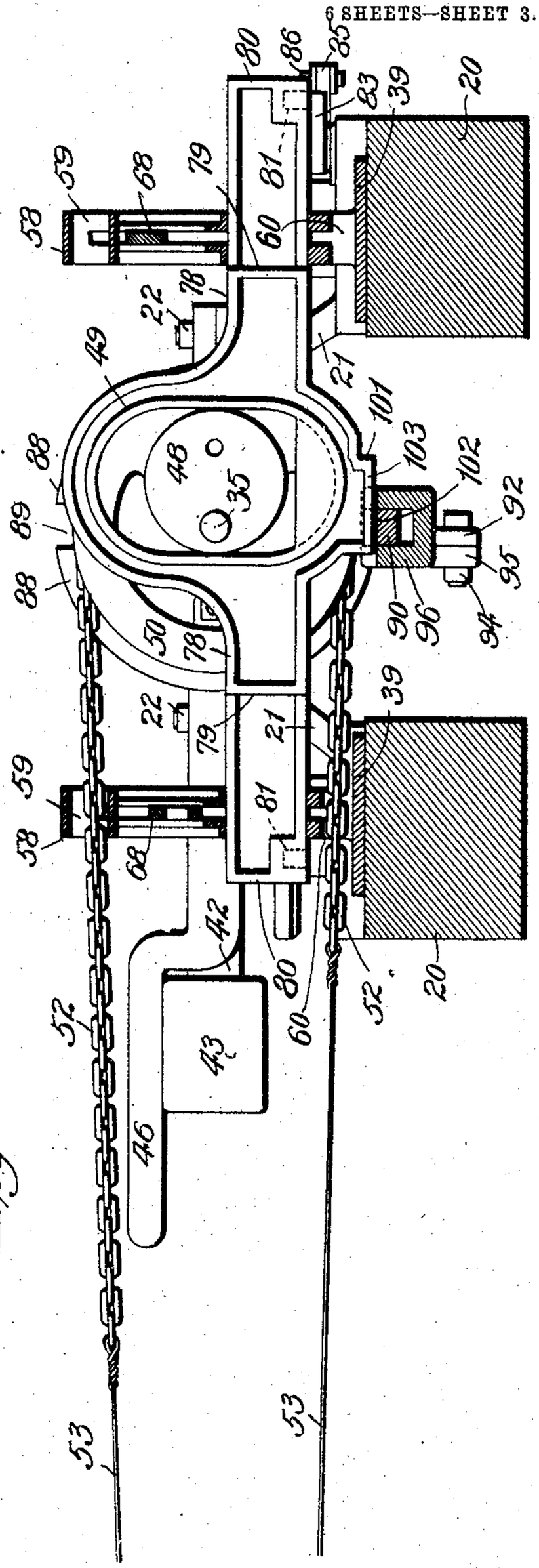

Fig. 8.

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6 SHEETS—SHEET 4.

Fig. 9.

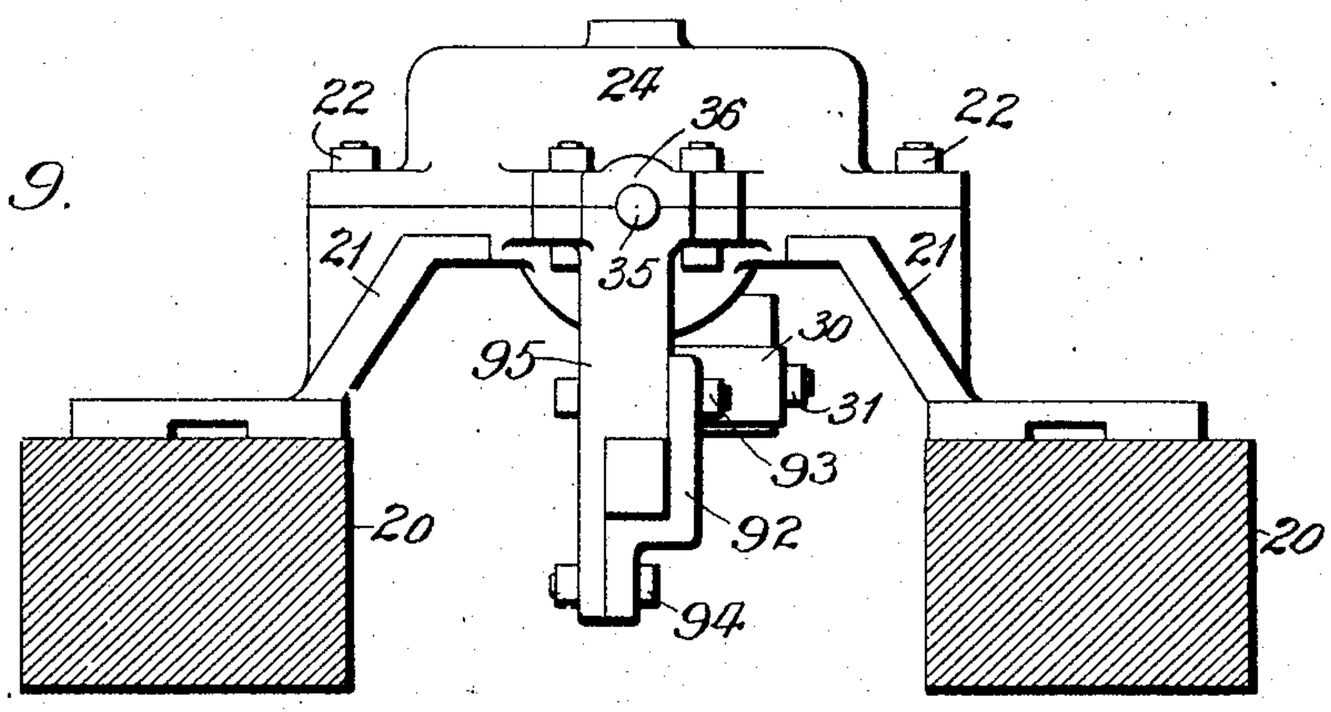


Fig. 10.

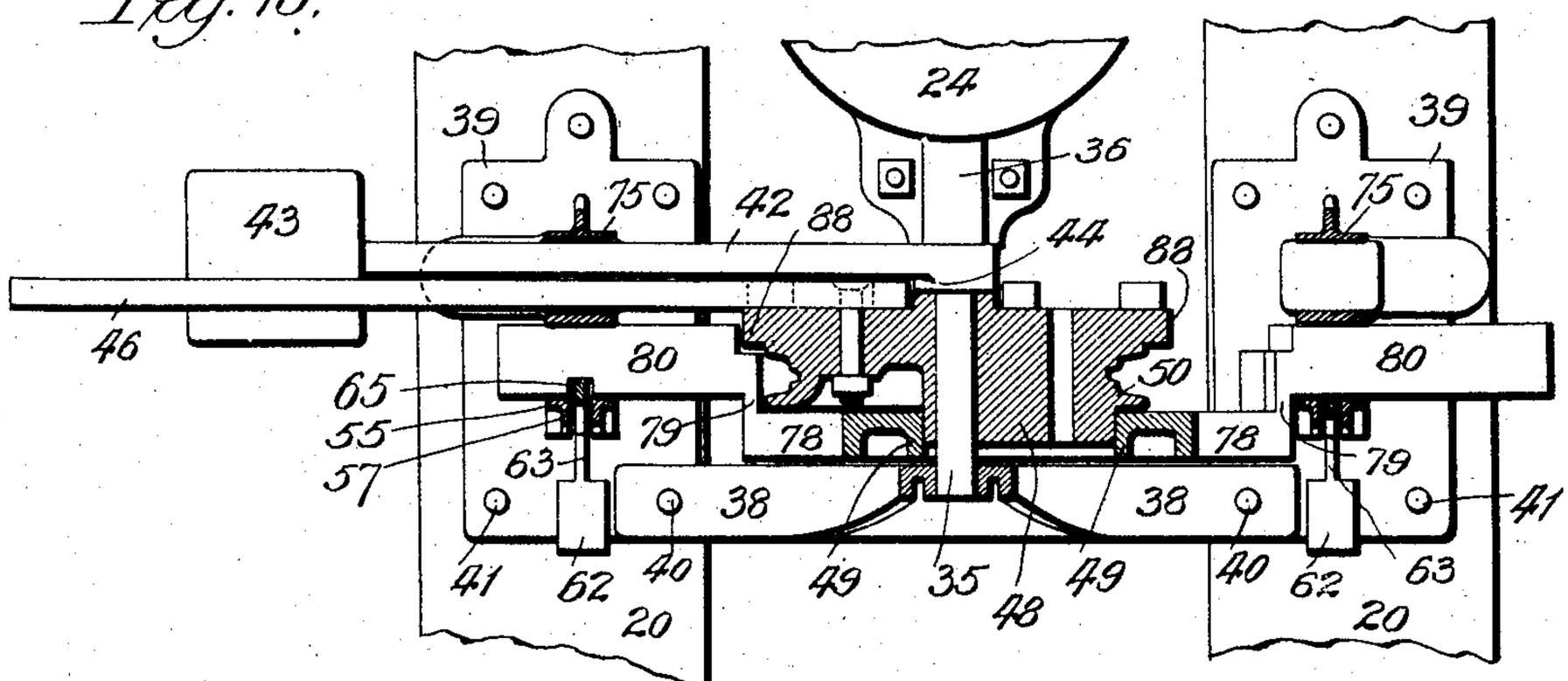
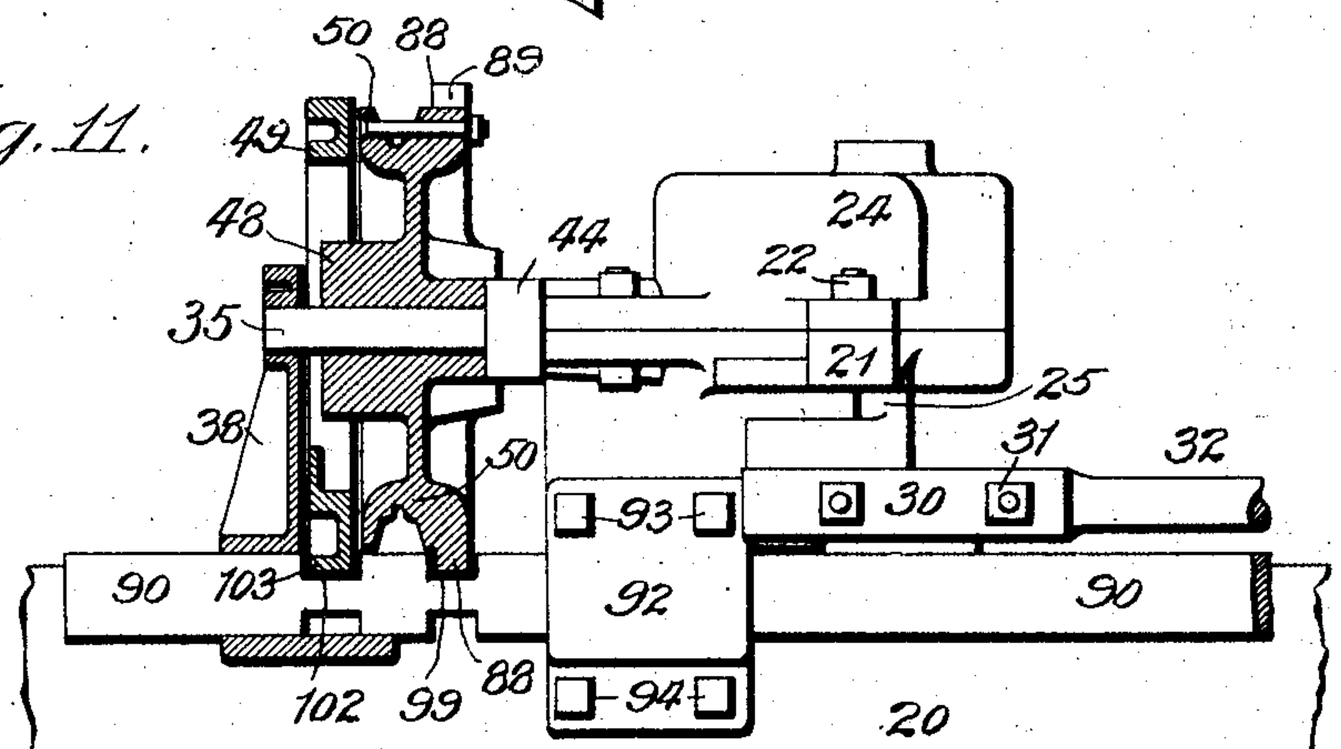


Fig. 11.



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6 SHEETS—SHEET 5.

Fig. 12.

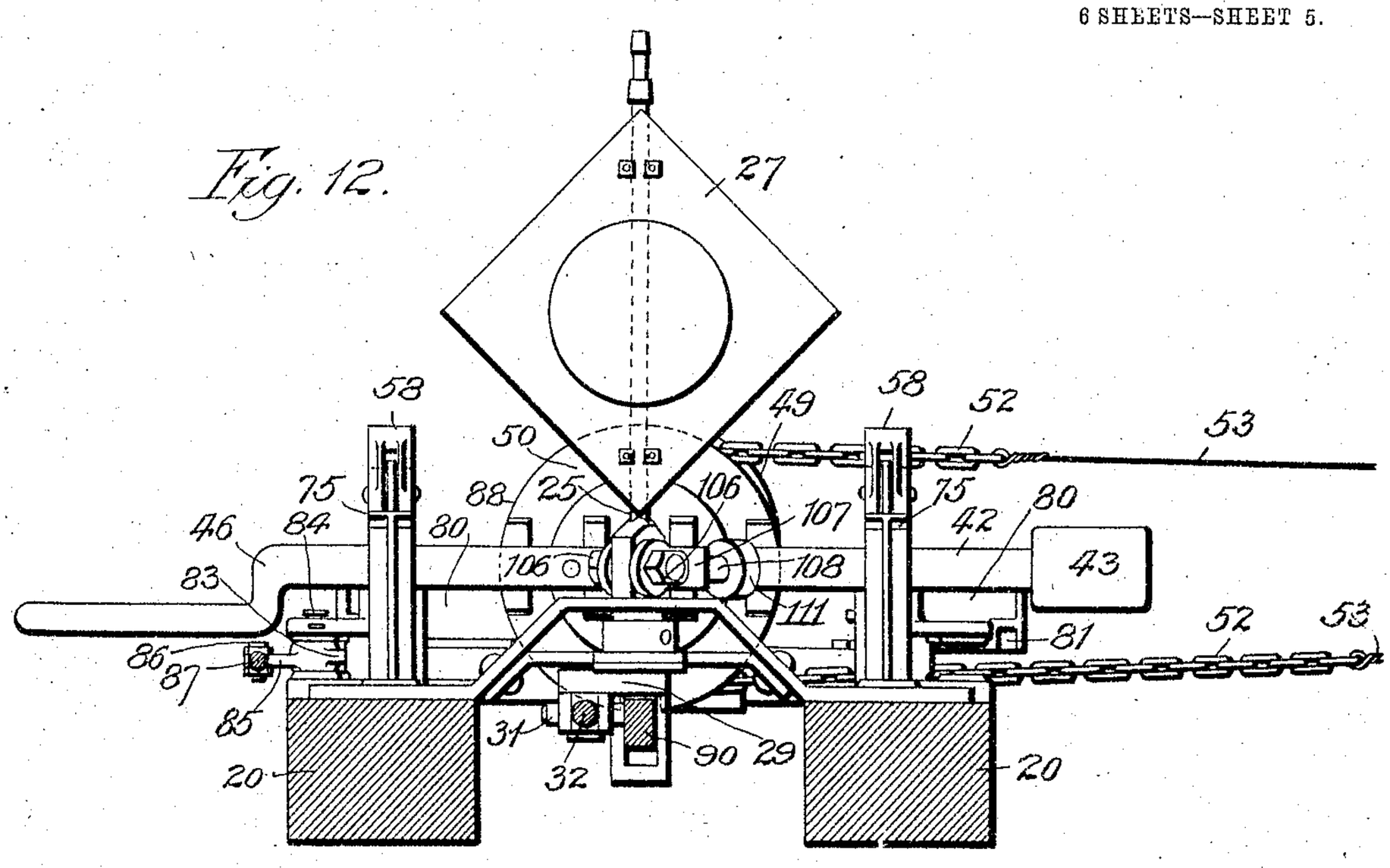
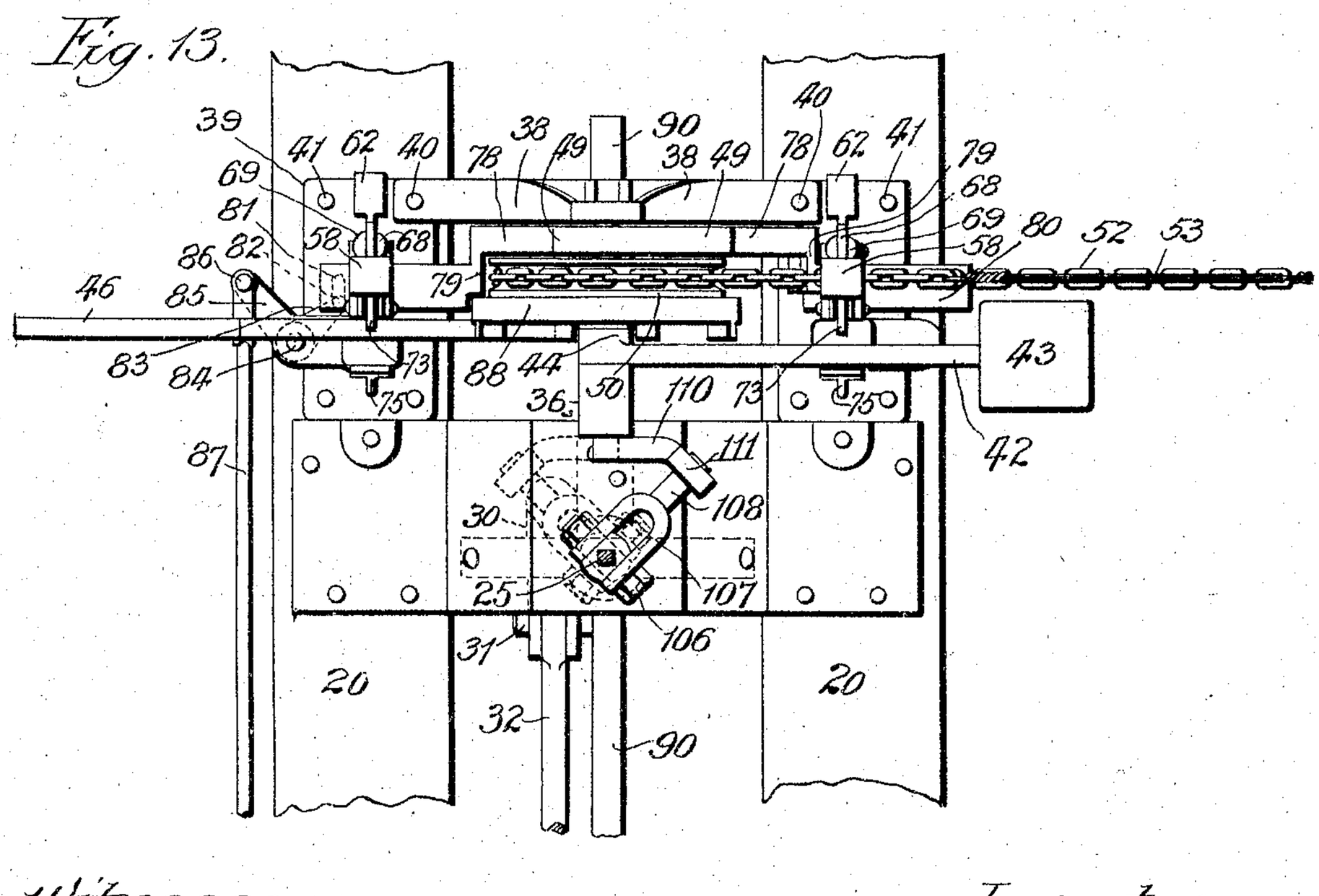


Fig. 13.



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6 SHEETS—SHEET 6.

Fig. 14.

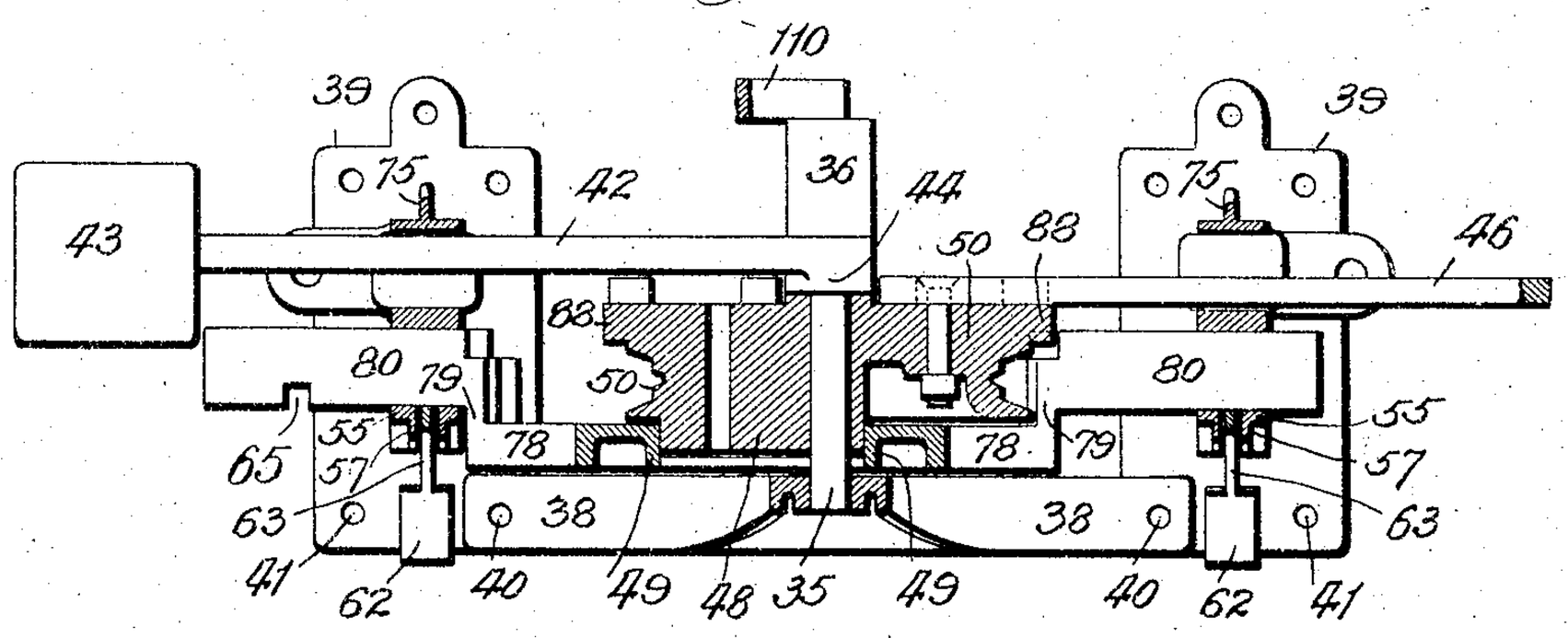


Fig. 15.

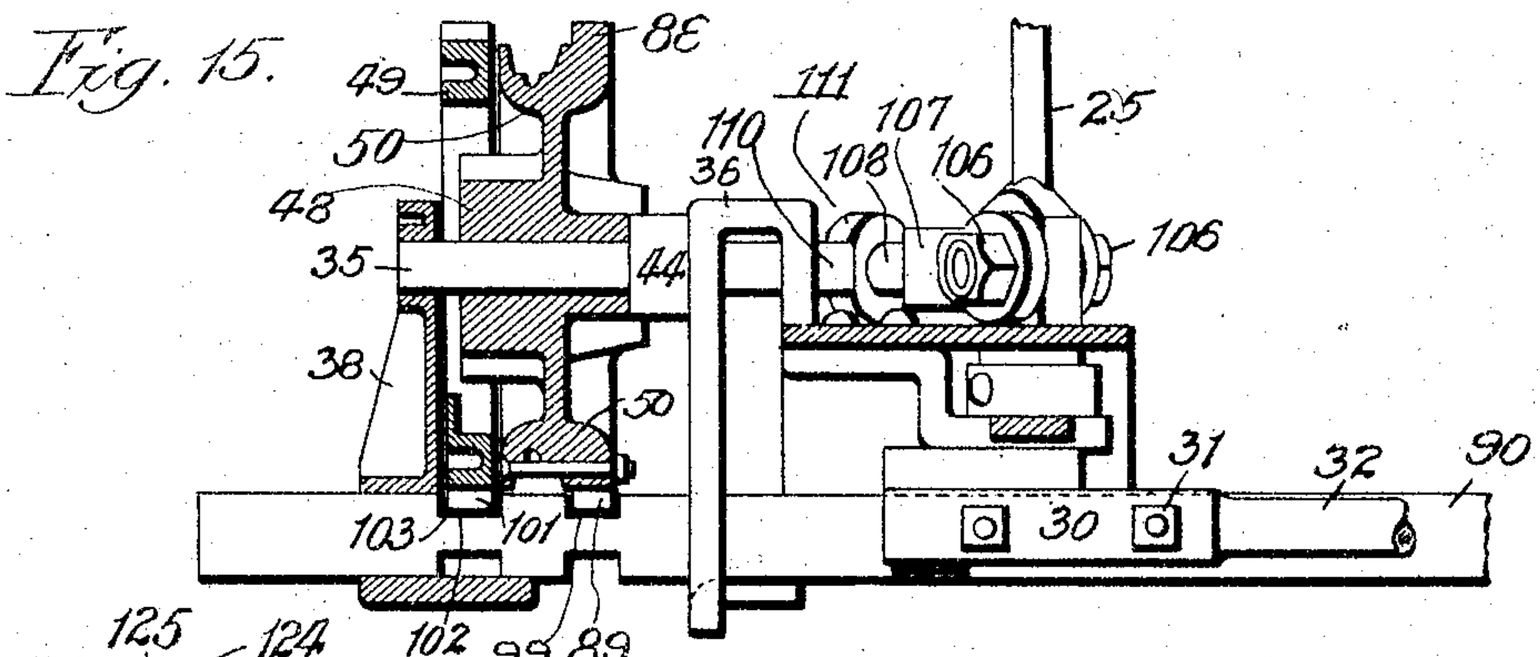


Fig. 16.

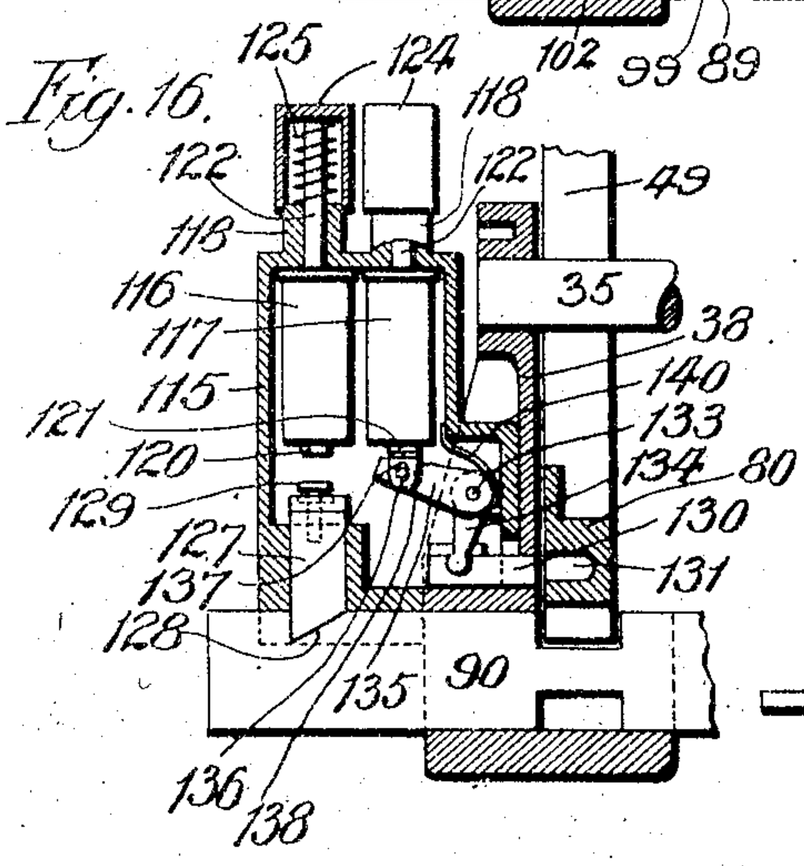
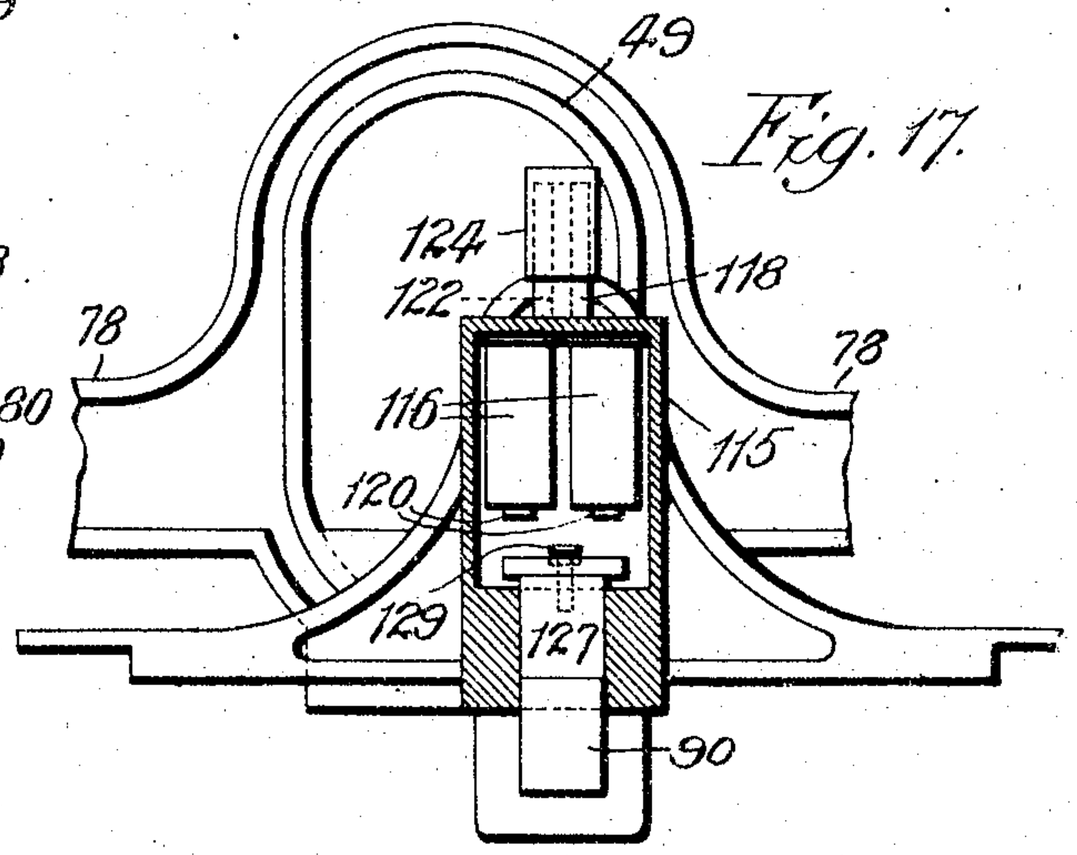


Fig. 17.



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No. 778,336. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

EUGENE M. ROBINSON, OF CHICAGO, ILLINOIS.

RAILWAY-SWITCH STAND OPERATING A POINT-LOCK AND DISTANT SIGNAL.

SPECIFICATION forming part of Letters Patent No. 778,336, dated December 27, 1904.

Application filed April 11, 1904. Serial No. 202,594.

To all whom it may concern:

Be it known that I, EUGENE M. ROBINSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Railway-Switch Stand Operating a Point-Lock and Distant Signal, of which the following is a specification in its best form now known to me, reference being had to the accompanying drawings, in which similar numerals indicate the same parts throughout the several views.

My invention relates to switch-stands used upon railways to control and lock an adjacent switch and substantially at the same time to set a distant signal to indicate the condition of said switch.

The object of my invention is to provide such mechanism which can be economically applied to any one of the several forms of switch-stands now in use, which shall positively set at "danger" a distant signal before it is possible to disturb the setting of the switch-point in any way, and which will effectually lock the signal at "danger" until such time as the switch has been returned absolutely to its proper position for "safety" and then turn the signal to indicate "safety."

My invention consists in mechanism whereby when it is desired to repeatedly and continuously switch backward and forward from a main track to a siding controlled by the switch, as in the case of making up or distributing cars from a freight-train, it is possible to set the signal at "danger" and keep it there until such switching is completed, thereby protecting the switching train, though the switch may in the meantime be repeatedly set back to "safety" or main-line position for the switching of cars, as above indicated.

It also consists in mechanism, preferably electrically controlled, by which the switch is in communication with the operator at the station or the towerman, so that the stand cannot be operated by the switchman without the previous consent of such distant man.

My invention also consists in mechanism capable of accomplishing the above objects which can be easily and cheaply constructed, which is of neat and compact form, efficient in operation, and not liable to readily get out of order.

It also consists in many details of construction which will be hereinafter more fully described and claimed as the specification proceeds.

In the drawings, Figure 1 is a front, Fig. 2 is a plan, and Fig. 3 is an end, view of the switch-stand embodying the mechanism of my invention. Fig. 4 is a view of the opposite end of the device from that shown in Fig. 3. Fig. 5 is a perspective view of a latch, and Fig. 6 is a perspective view of a foot-lever for operating the same. Fig. 7 is a full rear view of the device shown in Fig. 1. Fig. 8 is the same view with the rear journal-support removed, the latch-support being shown in section taken on line 8 of Fig. 3. Fig. 9 is a detail view of the stand-casting, taken on line 9 of Fig. 2. Fig. 10 is a detail sectional view taken on the irregular line 10 of Fig. 7, showing the detail of the chain-wheel and the eccentric, the switch-lever and the signal-lever being together in the position which they assume when the track is clear and the signal is at "safety." Fig. 11 is a vertical sectional detail view of the same parts, taken on line 11 of Fig. 7 under the same conditions specified in Fig. 10. Fig. 12 is a front elevation, and Fig. 13 is a plan view, of a modified form of different switch-stand of commercial manufacture having my invention applied thereto. Fig. 14 shows the position of the parts shown in Fig. 10 when the signal has been thrown to indicate "danger." Fig. 15 shows the parts of Fig. 11 in the position which they assume when the signal-lever has been thrown to indicate "danger." Fig. 16 is a sectional detail view of a magnetic device adapted to lock the switch-stand, so that it cannot be operated without the permission of the station operator, interlocking towerman, or other distant individual in the control of the yard or locality. Fig. 17 is a sectional view through the case inclosing the mechanism of Fig. 16, showing a side view of the magnet and operating mechanism.

The device of my invention is a modification of the invention for the same purpose

embodied in an application of the same title as this, filed by me August 18, 1902, Serial No. 120,129, the drawings and specification of that application showing a one-lever switch-stand capable of operating a point-lock and distant signal with substantially the same results as will be hereinafter specified in this case, the operation of the invention of this case being accomplished by two independent levers interlocking each other, one operating a switch-point and the other operating a distant signal.

As in my previous application, I have in mind in designing the mechanism of my invention to make use of switch-stands of various standard types now in use by various railroads, so that by a slight alteration of the patterns or the models for such stands when being constructed in the shop my attachment can be applied to them, so as to form a new stand embodying my invention without it being necessary for such railroads to entirely discard their previous designs or instruct their men in the use of a stand very radically different in the parts which are old from the stand they have been in the practice of using. One form of such an old stand is illustrated in the lower half of Fig. 2, and, referring to this figure and to Fig. 1, the numeral 20 indicates the ties of a railroad or other suitable foundation on which the frame 21 of a low switch-stand of ordinary type is adapted to be fastened by a lag-screw or bolts 22. Secured to the main frame 21 by bolts 22 or other suitable means is a top casting 24, in the center of which is journaled a vertical mast 25, having on its top target-signal wings 27 or other track-condition-indicating devices, such as a lantern. On the lower end of this mast is a crank-arm 29, to which is journaled connecting-link 30, connected at its opposite end by bolt 31 to the switch-rod 32, connected at its opposite end to the switch-point to be operated by the device. Extending from the rear of this switch-stand is a shaft 35, journaled at its inner end in the bearing 36 in the frame of the old-style stand 21 24, above referred to, and at its outer end in a supplemental supporting-casting 38, secured to supplemental bases 39 by the bolts 40, the supplemental bases 39 being secured to the ties by bolts 41, as shown. Rigidly secured upon the shaft 35 by the hub 44 is a lever 42, having at its outer end a weight 43. On the shaft 35, inside of the stand-top 24, is bevel-gearing (not shown) adapted to engage with other bevel-gears (not shown) to operate the crank-arm 29, heretofore described. When the weighted lever 42 is in normal position, or that shown in Fig. 2, the switch-rod 32 is also in normal position with the switch-point in normal position—say with the main track open and the siding closed—and when the weighted lever 42 is thrown through one hundred and eighty degrees the switch-rod 32 will be moved to such a position that the switch-point (not shown) is moved to its opposite position from normal—say with the main track closed and the siding open.

Journaled upon the shaft 35, heretofore described, and preferably adjacent to the weighted lever 42 is a hand or signal lever 46, having a portion, as the handle, over said weight 43 or lever 42 when the parts are in normal position. Also journaled on the shaft 35, adjacent to said hand-lever, is an eccentric 48, inclosed in an eccentric ellipse 49, and also journaled upon said shaft, preferably integral with said lever 46, is a chain-wheel 50, having upon it and rigidly secured to it by a staple 51 or other suitable means a chain 52, connected by rods 53 to a distant signal. As shown, this wheel 50 and eccentric 48 are made in one piece, but manifestly they may be made separate, if desired. When the lever 46 is in normal position, as shown in Fig. 2, these rods or wings 53 should be in such a position that the distant signal is set at "safety," to correspond with the setting of the switch-point when the switch-lever 42 is in the position in Fig. 2 and the parts are so proportioned that when the lever 46 is thrown over to the position of Fig. 14 the distant signal will be at "danger."

Rising from the supplemental bases 39, heretofore described, are two upright standards 55, preferably castings, reinforced by the webs 56 and 57. In the upper ends 58 of these standards 55 are holes 59, through which chains 52, heretofore described, are adapted to pass. Similarly on the bottom of these standards 55 are other holes, 60, through which the lower chains 52 are adapted to pass. Pivoted to these standards 55 at 61 are foot-levers 62, having extending at right angles to them angular fingers 63. These fingers 63 are adapted when in certain positions to fit into a notch or notches 65, cut in the side of the bar 80, to be hereinafter described. Pivoted to the standards 55 at 66 in the holes 67 is a latch 68, angular in form, as shown in Fig. 5, and having on one arm a weight 69 and having the end of the other arm preferably cut away in the curved line 70. On the lower side of this latch 68 is cut a recess 71, in which the semicircular head 64 of the finger 63, heretofore described, is adapted to fit and work. On the upper portion of the latch 68 is cut a hole 72, through which a padlock is adapted to pass in the manner to be hereinafter described. As shown in Fig. 2, the weighted lever 42 and the signal-lever 46 both move in vertical semicircles adjacent to each other and the signal-lever is in contact with one of the standards 55 on each side of the device in each of the extreme positions of the lever. The two levers are held close together at each of the extreme portions by a post 75, rising from the supplemen-

tal standard 39, so as to form a recess or pocket for the levers between them and the standards 55, heretofore described. The latch 68 and the operating foot-lever just described are so arranged and proportioned that when the parts are in normal position arm 63 of the latch controlling the normal position of the stand rests in notch 65 of the bar 80, and the face 70 of the locking-finger 73 fits over the top of the lever 46. In this position the hole 72 clears the face of the standards 55 sufficiently so that a padlock may be inserted through the hole, thereby locking the two levers 42 and 46 in position. On depressing the foot-lever 62 and moving it from the position shown in Fig. 4 to the position shown in Fig. 3 the finger 63 moves out of notch 65 and raises the latch 68 against the falling action of the weight 69, and thereby moves the locking-face 70 to a position farther than that shown in Fig. 3, where it is out of the way of the lever 46 and the lever 46 can be operated. It will, however, be noticed that in this position the finger 68 has moved to such a position that the padlock-hole 76 is against the portion of the standard 55, so that it is impossible to insert a padlock through the hole 72. As soon as the bar 80 is slightly moved by the operation of lever 46, as hereinafter described, the notch 65 is moved out of register with the arm 63 and the main body of the bar 80 holds the arm 63 in this new position with the padlock-hole 76 behind the standard 55, so it cannot be padlocked until the parts are returned to the normal position above described, as will hereinafter more fully appear.

Extending from the eccentric ellipse 49, heretofore described, are signal-bars 78 79 80, the portions 80 of said bars passing through slotted openings made for them in the standards 55, heretofore described. When the chain-wheel 50 is rotated, and consequently the eccentric 48 is rotated in the eccentric ellipse 49, these bars 78, 79, and 80 move backward and forward through these standards. In the end of one or both of the bars 80 is an elongated slot 81, having slidably mounted in it a pin 82 on the end of the bell-crank arm 83, pivoted at 84 to the supplemental base 39 of the switch-stand, the opposite bell-crank arm 85 being connected by the crank-pin 86 to a rod 87, extending away to an electric signaling device (not shown) or to other mechanism which it is desired to operate by the motion of the signal-lever 46.

From the foregoing description it will be seen that I have shown and described two methods of connecting the signal-lever 46 with a distant signal mechanism, one being the wires 53, connected to the chain 52, running over the wheel 50, mounted on the shaft 35, and the other being by means of this last-described connecting-rod 87, connected through the bell-crank described to the eccentric ellipse 49, operated by the eccentric 48. Where it is convenient and desirable to do so, both of these means may be simultaneously used, and, if desired, a similar bell-crank and connecting-rod construction may be added to the opposite end of the bar 80; but manifestly either of these signal-transmitting means may be omitted without departing from the broad principle of my invention.

On the wheel 50, heretofore described, is a flange 88, having cut in its top a notch 89, adapted to permit a locking-bar 90 to slide therein when the locking-bar and the wheel are in proper position with reference to each other. This locking-bar slides horizontally through the stand in recesses or slots formed in the center of the stand by means of the angular plate 92, secured by bolts 93 and 94 to the depending arm 95 and to the back of the stand by the angular plate 96 and the bolts 97, secured to the depending arm or lug 98. This locking-bar 90 has cut in it a notch 99, through which the flange 88 is adapted to pass, the width of the notch 99 being but slightly greater than the width of the flange 88. Similarly, the width of the notch 89 in the top of the flange 88 of the wheel 50 is slightly greater than the width of the locking-bar 90, from which it will be seen that when the bar and the wheel are moved until they are in register with each other or until one is over the notch in the other either the wheel or the bar may be moved through the notch in the other, but that when one of these two members—the wheel or the bar—is moved away from this position the other cannot be moved. For instance, if the wheel is moved so that the notch is entirely out of register with the bar, the edges of the bar will catch against the wheel and prevent the bar being moved. Under these conditions the wheel, however, in practice may be moved through a complete revolution, if desired. On the other hand, if the bar be moved so that the notch in it is not directly under the flange of the wheel the edges of the notch in the wheel will catch against the solid portions of the bar and the wheel cannot be moved. Under these conditions the bar may be moved backward and forward while the wheel is locked. Similarly there is a notch 101 (a corner cut out) in the eccentric ellipse 49, adapted to register with another notch, 102, similar to notch 99, also cut in the locking-bar 90, the lower portion of the ellipse 103 being straight and adapted to slide crosswise of the bar 90 through this notch 102. These notches are so placed in their respective members that on the same principle as the locking of the wheel and the bar just described the bar and eccentric ellipse lock each other, so that only one of the notches 101 and 102 are in register with each other, either the bar 90 or the ellipse may be moved, but when one has been moved the other is locked. The end of the

locking-bar 90 is connected to a facing-point of a switch and the bar moves freely through the stand by movement of the switch alone, there being no other propelling mechanism connected to the locking-bar and such movement of the locking-bar is only impeded by the position of the flange 88 or the ellipse-base 103, as just described. In the operation of this portion of the mechanism the parts are in the normal position, (shown in Fig. 2,) with the weighted lever 42 and the signal-lever 46 both on one side of the switch-stand and held in position by the latch 63, the latch being padlocked through the hole 72 in the manner heretofore described. In this position the switch-point is in the safety position and the signals attached to the stand either by means of the chains 52 or the rod 87, or both, are set at "safety," and in this position the wheel 50 is turned with the notch 99 in the locking-bar, so that the bar cannot be moved, the notch 89 in the wheel being, as shown, at the top of the device. The bars 80 are also in such a position that the eccentric ellipse locks the bar 90 and is in the position farthest away from interlocking position. The operator desiring to throw the switch first moves the padlock from the hole 72 and depresses the foot-lever 62, thereby throwing the latch 68 from the position shown in Fig. 4 beyond the position shown in Fig. 3, thereby releasing the weighted lever 42 and the signal-lever 46. The handle of the signal lever being over the weight 43, as shown, the weighted lever 42 controlling the switch cannot be moved until the signal-lever 46 is moved—this independently of the operation of the locking-bar. The operator now takes hold of the signal-lever 46 and swings it through one hundred and eighty degrees to the position shown in Fig. 12. This operation has rotated the wheel 50, bearing the flange 88, one-half way around, so that the notch 89 in the flange of the wheel is at the bottom and in register with the notch 99 in the locking-bar, and it has also moved the eccentric ellipse 49 and the bars 80 to such a position that the notch 101 is in register with the notch 102. This movement of the bar 80 has, as heretofore described, moved notch 65 away from finger 63, thereby, as described, locking padlock hole 72 behind the upright 55. This operation has set both of the distant signals to indicate "danger." The operator now takes hold of the weight 43 and moves the weighted lever 42 through one hundred and eighty degrees. This operation rotates the mast 25, as heretofore described, and thereby causes the switch-rod 32 to move the switch-point. The movement of the switch-point moves the locking-bar 90 through the notches 89 and 101, heretofore described, and as soon as this operation starts the bar locks the wheel-flange 88, the eccentric 49, and consequently both signal mechanisms at "danger," which condition must continue to exist as long as the switch-point is open the least bit. The operator continues the throw of the weighted lever 42 from one side of the stand to the other, and when the motion is completed the switch-rod has been set for the siding or other working position in which the main track is at "danger." In this position the signal-lever being below the weighted lever the signal-lever can never be moved back to its original position or to "safety" even if it were not for the presence of the locking-bar until the weighted or switch lever has been moved backward. This weighted lever may, however, be moved at pleasure, thereby allowing the trainman to switch backward and forward from side track to the main track while all the time under the protection of the distant signal set at "danger."

In Figs. 12 and 13 is shown an adaptation of my invention to a modified form of switch-stand in use on many roads. In a stand of this type the mast 25, operating the switch-rod 32, has journaled upon a bolt 106 connected to it a fork 107, having extending from it a lever-arm 108, in the stand of commercial practice extending out two or three feet and carrying on its end a weight. (Not shown in the drawings.) To operate such a switch-rod 32, the operator takes hold of the weighted lever 108 and carries it upward, over and down again from the full-line position of Fig. 13 to the dotted-line position shown at the left of Fig. 13. This motion results in giving the mast 25 a quarter-revolution and moves the switch-rod 32 a sufficient distance to operate the switch-point. In my modified construction I cut off the weight on the end of the lever 108 and operate this lever by means of a half-revolution of lever 42, heretofore described, the connection between the two consisting in a crank-arm 110, mounted on the end of shaft 35, having loops 111 inclosing the end of the shortened lever 108, as shown. The device is operated by raising the lever 42 from its normal position (shown at the right of Fig. 13) and moving it over through one hundred and eighty degrees to the left side of the figure. Such a motion will rotate the crank-arm 110 through a half-revolution and give to the lever-arm 108 the same motion as that imparted to it by the peculiar hand motion of the ordinary weighted lever, as just described. By this construction I am able to apply my device to this well-known type of stand and also make it easier for the operator to operate such a stand, it being easier to move lever 42 through a perfectly plane circular path than to by hand give the lever 108 the peculiar motion which it requires to operate the mast 25. In other respects the device shown in Figs. 12 and 13 is identical with that shown in the other drawings of this application.

I also provide a supplemental electrical locking mechanism for my switch-stand located at some point adjacent to both the locking-bar and to a part of the signal mechanism. In the particular instance illustrated I show it as secured by any suitable means to the back of the supplemental support 38, heretofore described. This mechanism consists in a housing or casing 115, having mounted therein either one or two sets of magnets 116 and 117, rigidly secured to the housing. Inside of the magnet 116 is a core 120 and inside of the magnet 117 is a core 121. Extending above the tops of the coils and rigidly secured thereto are stems 122, having their upper ends rigidly secured to caps 124, slidably mounted on projections forming a part of the top of the housing, as shown. Between the tops of these projections 118 inside of the caps 124 are coil-springs 125, adapted, as shown, to normally hold the stems 122, with magnets attached, up, as shown. Below the core 120 is a latch 127, forming a magnetic armature for the core 120, entering a notch or recess 128, cut in the locking-bar 90, as shown in Fig. 16. In the upper end of the main latch 127 is a supplemental armature 129, adapted to have by mechanism not shown in detail a slight play up and down with reference to the main latch 127, this play, however, being slight, so that when the supplemental armature-latch 129 is taken hold of it may lift the main armature-latch 127. In practice I find that a magnet of a size which will lift three or four ounces at one-quarter of an inch away from its armature will lift about twenty pounds when the armature is actually in magnetic contact with it, and in order to take advantage of this fact I make this construction as shown and operate it as follows: Assuming that a current of electricity from a source of electrical energy (not shown) is passing through the magnet 116, I press down upon the cap 124 over the magnet 116, thereby moving the stem 122 down against the action of spring 125. When the lower end of this core 120 comes close to the supplemental armature 129, this supplemental mechanism, being light, is attracted into contact with the core 120, and as soon as this physical connection is completed a magnetic connection is thereby completed through armature 127, and I then have power enough to lift the latch 127 out of the notch 128, thereby unlocking the latch 127 from the locking-bar 90. As the signal-bar 80 is at right angles to the switch-locking bar 90, just referred to, I have to arrange the mechanism connected with the magnet 117 so that the latch will enter this bar 80 and move it out at right angles to the armature-latch just described. In order to do this, I provide a horizontal latch-pin 130, adapted, as shown, to move through a hole in the supplemental support 38 into the hole in the signal-bar 80. Pivoted at 133 within the housing 115 is a bell-crank having one arm, 134, adapted as it rotates to move the latch-pin 130 backward and forward and having its other crank-arm, 135, extend horizontally to a point under the core 121 of the magnet 117. On this bell-crank arm 135 is a pin 136, entering slot 137 in the supplemental armature 138. In this case the bell-crank arm 135 acts as a main armature for the core 121, and the supplemental armature 138 serves the same function as the supplemental armature 129 with reference to the main armature 127, as heretofore described. In the operation of this part of the device the armature is operated by pressing down the cap 124, as heretofore described in the operation of the magnet 116. In Fig. 16 the parts are shown with the operation completed and the armature 138 upward and the core 121 and the pin 130 out of engagement with the bar 80. In order to lock the bar, all the operator has to do is to cut off the current and the latch 130 will be thrown under the action of spring 140 against the bar 80 into the hole provided for it as soon as the bar is moved to "safety" position. I can omit either the magnet 116 and and its attached parts, using only the magnet 116 with its attached parts to lock the lever 90 without departing from my invention, and I can use the magnet 117 and the parts attached to it to lock the bar 80 and omit entirely the magnet 116 with its attached parts without departing from my invention, or I can use both magnets to lock both bars, if desired.

In a crowded railroad-yard where there is a siding at some distance from the station (either beyond the limits of an interlocking-tower system or where there is not such system in use) it frequently occurs that a freight-train conductor standing on the siding desires to use the main track for switching purposes and that so far as the trainman knows there is time for him to do so before a through fast train is due to pass. It also frequently occurs that because of telegraph or telephone information the station operator knows that there is no time for the trainman to so use the main track before the fast train is due. The mechanism just described is of great value in connection with this particular stand of my invention and also with the other stands to place the distant signal under the control of the station operator so that under such conditions the switchman cannot open the switch for the waiting freight-train without the permission of the station operator, thereby avoiding the danger of collisions and frequently wrecks. One way of using the combined device for this purpose is to connect the magnet 116 by suitable wires through a source of electrical energy to a push-button in the office of the station operator and to connect the rod 87 either to an electrical or to a mechanical indicating device in the office of the station operator. Under

these conditions when the train or switch man unlocks my stand and moves the lever-handle 46 from the position shown in Fig. 2 to the position shown in Fig. 13 he thereby causes the rod 87 to work the signaling device in the station-operator's office, thereby asking permission to use the switch controlled by the stand in question. The station operator receiving this call through the indicator attached to the rod 87 knows whether or not there is time for the trainman to do the necessary work at the switch-stand, and if there is the operator presses the switch controlling the magnet 116, and thereby energizes that magnet. As soon as this occurs the switchman can press down the cap 114 and lift the latch 127 in the manner heretofore described. As soon as this is done he can swing the weighted lever 42 and set the switch as heretofore described. This arrangement has the disadvantage that the switchman in moving the lever 46 to call the operator has set the distant signals controlled by this lever to "danger," thereby perhaps unnecessarily delaying the approaching through train. Another way to use this device is to place an ordinary push-button adjacent to the stand and to let the trainman operate this push-button to signal the station operator instead of partially operating the switch-stand in the manner heretofore described. This system has the advantage of not setting the distant signal to "danger" and thereby perhaps delaying the through train, but it has the disadvantage unless put under a separate lock and key of being liable to be operated by mischievously-inclined persons.

I do not wish to be understood as limiting myself to the exact details of construction, which may be varied within reasonable limits without departing from the principle of my invention.

I claim—

1. In apparatus of the class described, the combination of a signal-lever handle, mechanism by which said lever is adapted to operate a distant signal, an independent switch-lever, mechanism by which said switch-lever is adapted to operate a switch-point and a locking-bar moving with the switch-point engaging said signal mechanism in such a way that only one of said levers can be moved at one time.

2. In apparatus of the class described, the combination of a signal-lever handle, mechanism by which said lever is adapted to operate a distant signal, an independent switch-lever, mechanism by which said switch-lever is adapted to operate a switch-point and a locking-bar moving with the switch-point engaging said signal mechanism in such a way that only one of said levers can be moved at one time, the levers being so located with reference to each other that the signal-lever must be moved fully to "danger" position before the switch-operating lever can be moved.

3. In apparatus of the class described, the combination of a switch-stand, a lever movable thereon, mechanism connecting said lever to a distant signal and a locking-bar connected to and moving with the switch-point engaging said signal mechanism in such a way that said lever and said switch-point cannot both be in motion at one time.

4. In apparatus of the class described, the combination of a signal-lever handle, a member adapted to be moved by said lever-handle backward and forward between two different positions, a locking-bar rigidly connected to an adjacent switch-point, said locking-bar and said movable member each passing through a notch in the other, whereby when said bar and said member are in such a position that the notches are in register with each other, either the said bar or the said movable member may be moved and when one has been moved from said position, it locks the other.

5. In apparatus of the class described, the combination of a switch-stand, a lever-handle mounted therein, a wheel adapted to be rotated by said lever-handle and a locking-bar rigidly secured to an adjacent switch-point, said locking-bar and said wheel each passing through a notch in the other, whereby when said bar and wheel are in such a position that the notches are in register with each other, either said bar or wheel may be moved and when either said bar or said wheel is moved from said position, the other is locked in position.

6. In apparatus of the class described, the combination of a signal-lever, a member adapted to be moved by said signal-lever backward and forward between two different positions to operate a distant signal, an independent switch-lever, mechanism by which said switch-lever is adapted to operate a switch-point and an independent locking-bar moving with the switch-point, said locking-bar and said member moved by the signal-lever, each passing through a notch in the other, whereby when the movable member and the locking-bar are in such a position that the notches are in register with each other either of said parts may be moved and when either of said parts is so moved, it locks the other part.

7. In apparatus of the class described, the combination of a signal-lever, a member adapted to be moved by said signal-lever backward and forward between two different positions to operate a distant signal, an independent switch-lever, mechanism by which said switch-lever is adapted to operate a switch-point and an independent locking-bar moving with the switch-point, said locking-bar and said member moved by the signal-lever, each passing through a notch in the other, whereby when the movable member and the locking-bar are in such a position that the notches are in register with each other either of said parts may be moved and when either of said parts is so

moved it locks the other part, the levers being so located with reference to each other that the signal-lever must be moved fully to "danger" position before the switch-operating lever can be moved.

8. In apparatus of the class described, the combination of a signal-lever, a wheel adapted to be rotated by said signal-lever to operate a distant signal, an independent switch-lever, mechanism by which said switch-lever is adapted to operate a switch-point and a locking-bar moving with the switch-point, said locking-bar and said wheel each passing through a notch in the other, whereby when said bar and said wheel are in such a position that the notches are in register with each other, either said bar or said wheel may be moved from said position and when so moved it locks the other.

9. In apparatus of the class described, the combination of a signal-lever, a wheel adapted to be rotated by said signal-lever to operate a distant signal, an independent switch-lever, mechanism by which said switch-lever is adapted to operate a switch-point, and a locking-bar moving with the switch-point, said locking-bar and said wheel each passing through a notch in the other, whereby when said bar and said wheel are in such a position that the notches are in register with each other, either said bar or said wheel may be moved from said position and when so moved it locks the other, the levers being so located with reference to each other that the signal-lever must be moved fully to "danger" position before the switch-operating lever can be moved.

10. In apparatus of the class described, the combination of a lever, a support for a latch, a latch mounted in said support, adapted to latch said lever when it is in normal position, means for locking said latch located in such a position that it can be locked when the lever is in normal position and so located that when said lever is unlatched said locking means is obstructed so that the latch cannot be locked and mechanism moved by said lever adapted to hold said latch in said unlockable position whenever said lever is moved from its normal position.

11. In apparatus of the class described, the combination of a lever, a support for a latch, a latch mounted in said support adapted to latch said lever when it is in normal position, there being a hole in said latch clear of said support through which a padlock may be inserted to lock said latch and said hole being in such a position that when said lever is unlatched said hole is obstructed so that said padlock cannot be inserted and mechanism moved by said lever adapted to hold said latch in said unlockable position.

12. In apparatus of the class described, the combination of a lever-handle, a support for a latch adapted to latch said lever in normal position there being a hole in said latch in such a position that a padlock may be inserted in it to lock said latch when the lever is in normal position and said hole also being in such a position that when said lever is unlocked said hole is obstructed by the support for the latch so that a padlock cannot be inserted, a lever adapted to operate said latch and a member moving with said first-mentioned lever-handle adapted to engage said latch operating the lever in such a way that said latch is held in unlockable position whenever said first lever is out of normal position.

13. In apparatus of the class described, the combination of a lever-handle, a support for a latch adapted to latch said lever in normal position there being a hole in said latch in such a position that a padlock may be inserted in it to lock said latch when the lever is in normal position and said hole also being in such a position that when said lever is unlocked said hole is obstructed by the support for the latch so that a padlock cannot be inserted, a lever adapted to operate said latch and a bar moving with said first-mentioned lever-handle adapted to engage said latch-operating lever in such a way that said latch is held in unlockable position whenever said first lever is out of normal position.

14. In apparatus of the class described, the combination of a vertical shaft adapted to be rotated to operate a switch-point, a lever pivotally mounted upon said vertical shaft adapted to swing up and down in the plane of the shaft, an operating-lever independently journaled adjacent to said shaft adapted to move in a vertical plane and a crank-arm on said operating-lever engaging the lever on the switch-shaft, all of the parts being so located that moving the operating-lever in a vertical plane will rotate the vertical switch-shaft, substantially as described.

15. In apparatus of the class described, the combination of a signal-lever handle, mechanism by which said lever is adapted to operate a distant signal, an independent switch-lever, mechanism by which said switch-lever is adapted to operate a switch-point and a locking-bar moving with the switch-point engaging said signal mechanism in such a way that only one of said levers can be moved at one time, the levers being so located with reference to each other that the signal-lever must be moved fully to "danger" position before the switch-operating lever can be moved, an independent latch adapted to normally lock said signal mechanism in "safety" position, and an electromagnet, under the control of an operator at a distance, adapted when energized to release said independent latch.

16. In apparatus of the class described, the combination of a switch-stand, a lever movable thereon, mechanism connecting said lever to a distant signal and a locking-bar con-

nected to and moving with the switch-point engaging said signal mechanism in such a way that said lever and said switch-point cannot both be in motion at one time, an independent latch adapted to normally lock said signal-connecting mechanism in "safety" position and an electromagnet under the control of an operator at a distance, adapted when energized to release said independent latch.

EUGENE M. ROBINSON.

Witnesses:
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