

(No Model.)

2 Sheets—Sheet 1.

E. P. OWEN.

SIGNAL AND SWITCH INTERLOCKING APPARATUS.

No. 601,757.

Patented Apr. 5, 1898.

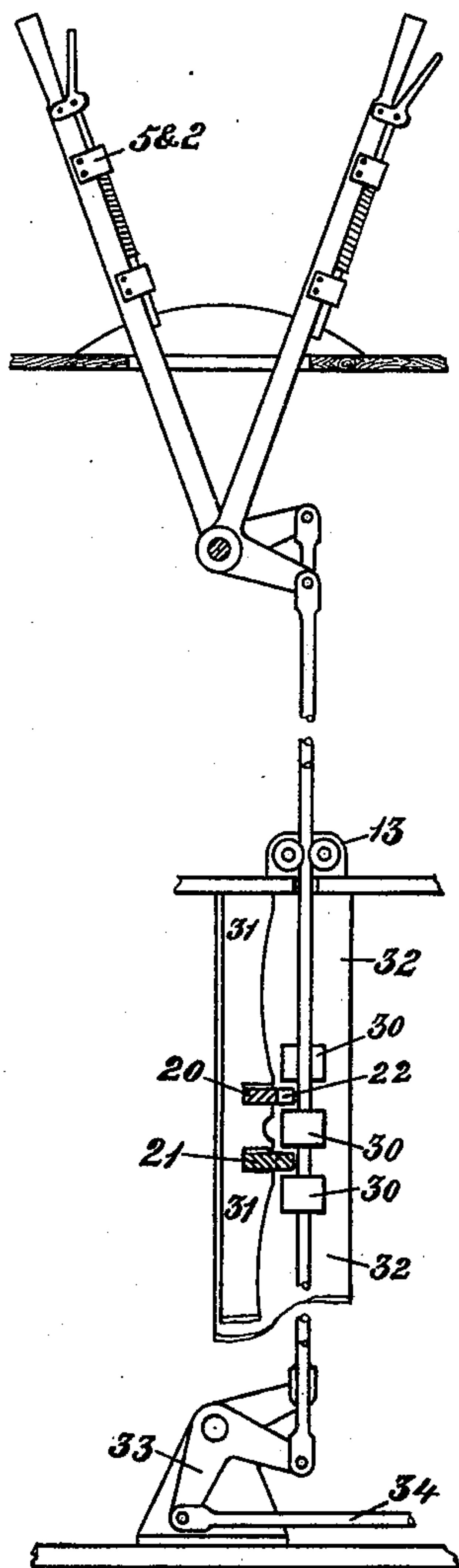


Fig. II

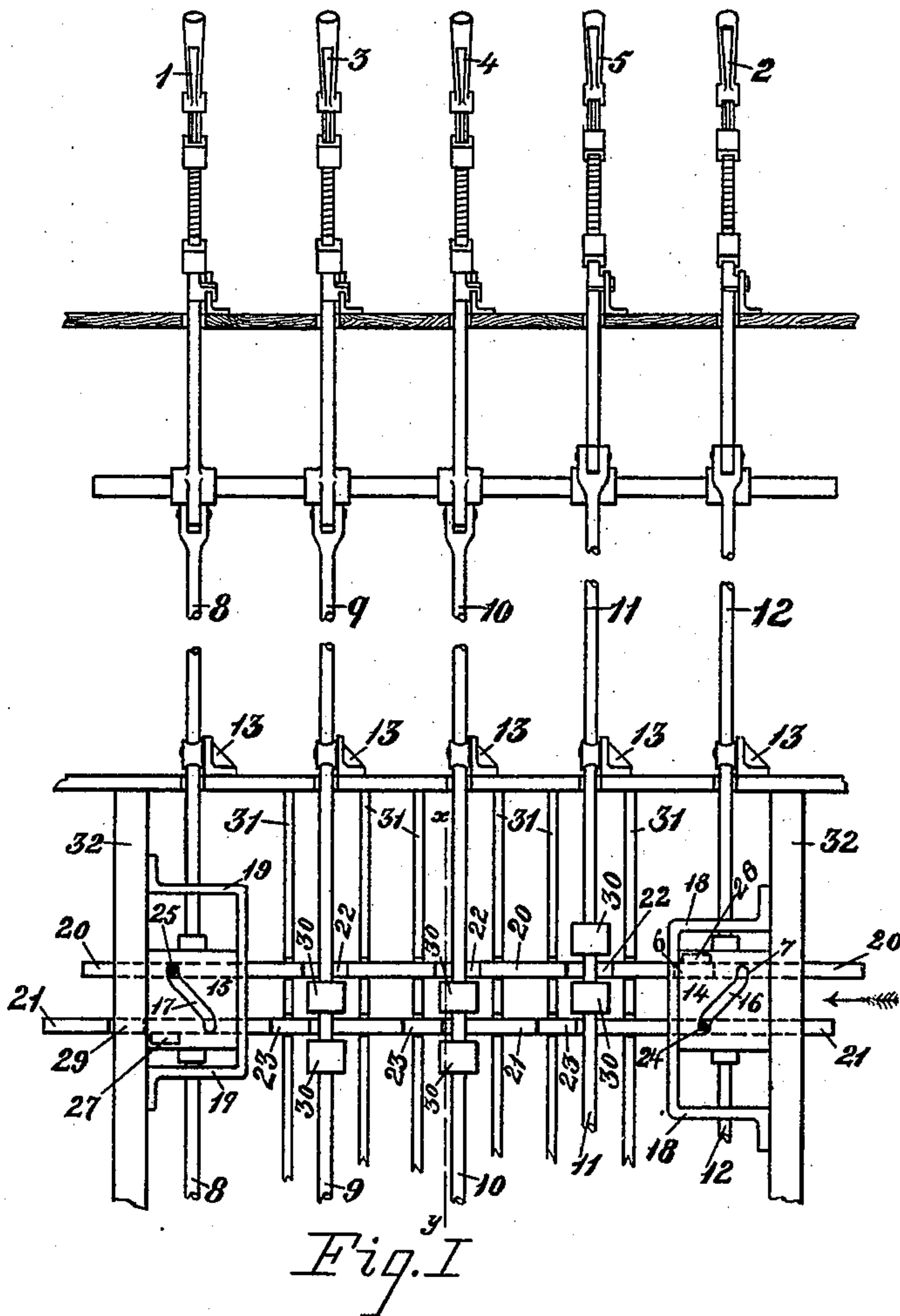


Fig. I

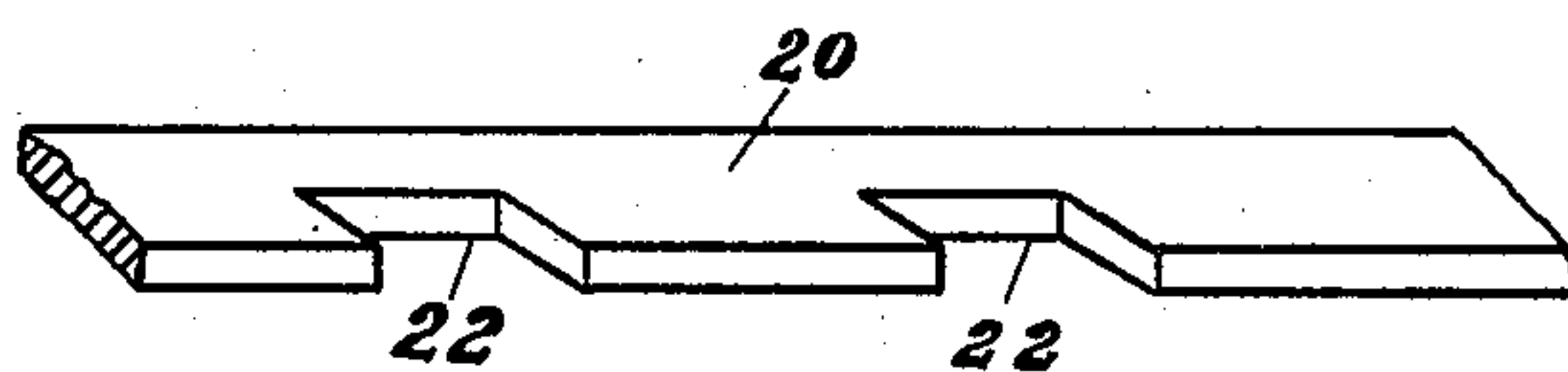


Fig. III

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BY

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ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

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Fig. IV

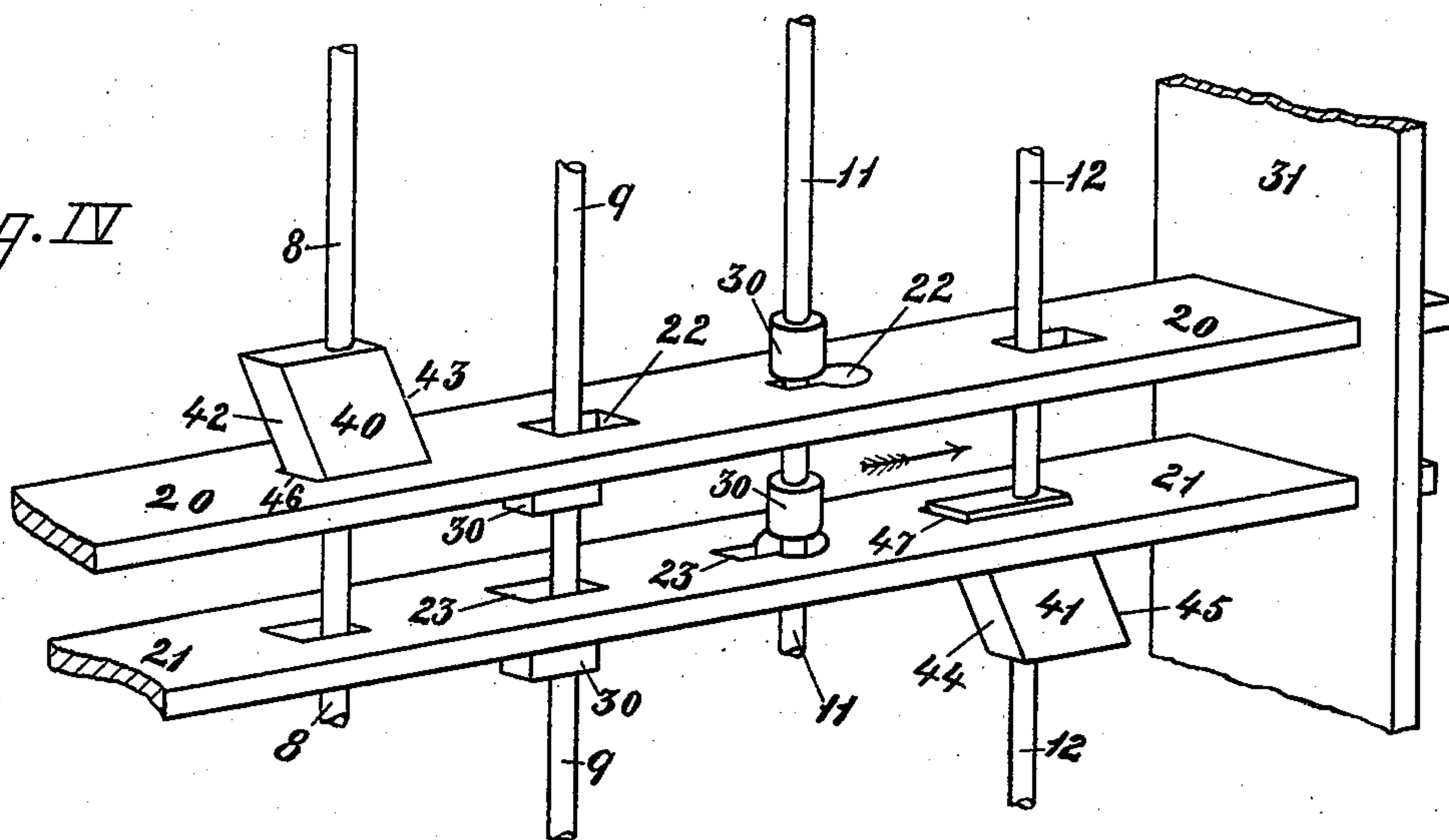


Fig. V

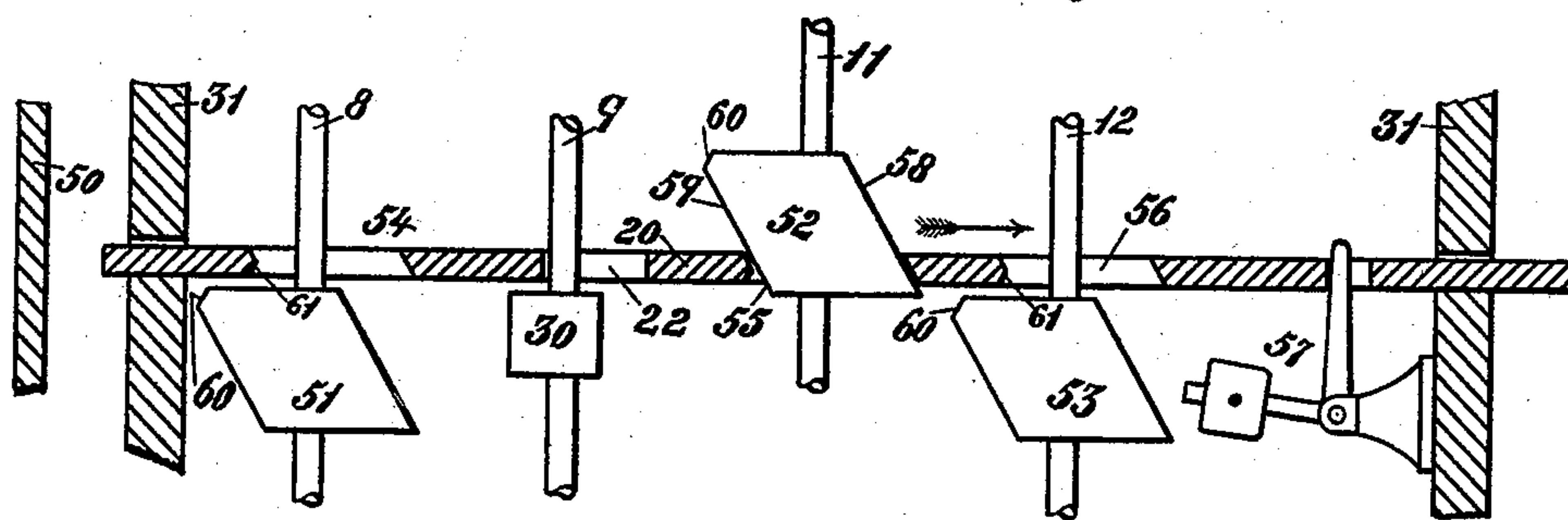
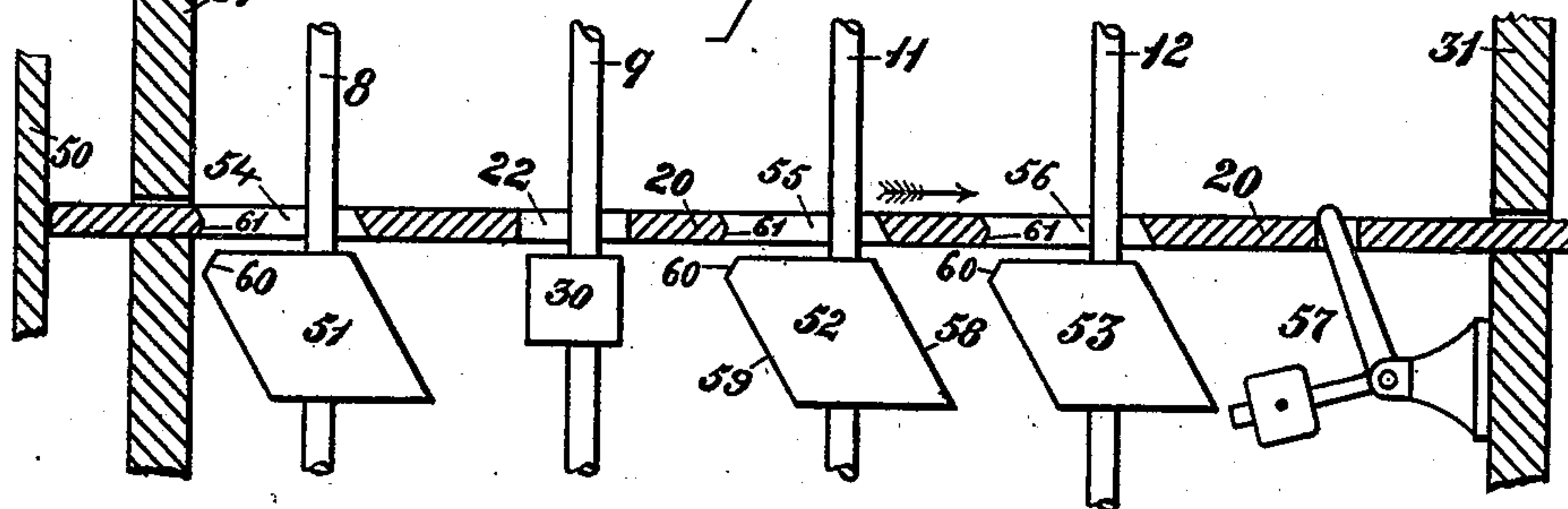


Fig. VI

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UNITED STATES PATENT OFFICE.

ELERSON PROCTOR OWEN, OF MANCHESTER, VIRGINIA, ASSIGNOR OF ONE-HALF TO MORTON RIDDLE, JR., OF PETERSBURG, VIRGINIA.

SIGNAL AND SWITCH INTERLOCKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 601,757, dated April 5, 1898.

Application filed August 11, 1897. Serial No. 647,919. (No model.)

To all whom it may concern:

Be it known that I, ELERSON PROCTOR OWEN, a citizen of the United States, and a resident of Manchester, in the county of Chesterfield and State of Virginia, have invented certain new and useful Signal and Switch Interlocking Apparatus, of which the following is a specification.

My improvement relates to interlocking apparatus as applied to railroad signals and switches; and it consists, essentially, of a simple and effective means for interlocking which can be readily applied to existing systems of signal-levers and switch-levers and their connections.

In the interlocking of signals and of switches there are different conditions to be provided for—as, for instance, that one in which a switch or switches having been set, and subsequently the signal which governs the said switch or switches having been set to the position of “safety,” the act of moving the lever which controls the said signal shall securely lock in their positions all switches and signals affected by the said signal, and again, for instance, that condition in which a switch having been set the act of operating that switch shall lock all other related switches and signals. I provide for these different conditions with the same system, but with a different arrangement of parts.

Referring to the accompanying drawings, which form a part of this specification, Figure I is an elevation showing my improved means for interlocking as applied to a system of signal and switch levers and their connections. Fig. II is a vertical section taken on the line $x y$ in Fig. I. Fig. III is a broken perspective view of the locking-bar. Fig. IV is a broken perspective view of my device, showing a modified way of constructing and operating certain parts of the same. Fig. V is a broken elevation, partly in section, showing another arrangement of parts, such as is preferable in cases where the moving of a switch is required to lock all other switches and signals or where the number of signals and switches is so great as to make it more easily adapted and operated than the arrangements shown in Figs. I, II, or IV. Fig. VI is another view of the same and show-

ing all other signals and switches locked by the operating of one of the switches.

In the employment of my improved means for interlocking no changes in the usual hand-levers, ground-rods, or other connections of the signals and switches are necessary.

In Fig. I, 1 and 2 are the usual levers, 8 and 12 are the usual connecting-rods, and 33 (see Fig. II) are the usual bell-cranks and 34 the usual ground-rods, by means of which the signals are controlled and operated from the “tower.” 3, 4, and 5 are the usual levers. 9, 10, and 11 are the usual connecting-rods, &c., by means of which the switches are controlled and operated from the same tower. Attached to the rods 9, 10, and 11, which are respectively connected with the switch-levers 3, 4, and 5, are blocks or dogs 30, so fixed that they rise or fall with the movement of the rods to which they are attached. Attached to the rods 8 and 12, which are respectively connected with the signal-levers 1 and 2, are blocks or plates or frames 15 and 14, (hereinafter referred to as “slotted” frames,) sliding, when their respective levers are operated, with an upward or a downward motion in suitable guides or frames 19 18, and each having a straight and diagonal slot—namely, the slot 17 in the slotted frame 15 and the slot 16 in the slotted frame 14.

20 and 21 are locking-bars sliding with an endwise motion in the braces, framing, or boxing 31 32, and having slots or apertures, as shown at 22 and 23, and as shown more clearly at 22 22 in Fig. III, the said slots or apertures being of sufficient size as to allow of the free passage through them of the blocks 30. The locking-bar 20 has a pin or friction-roller 25, which operates in the slot 17 of the slotted frame 15, which is attached to the rod 8, which in turn is connected with the signal-lever 1. The locking-bar 21 has a pin or friction-roller 24, which operates in the slot 16 of the slotted frame 14, which is attached to the rod 12, which in turn is connected with the signal-lever 2. On the slotted frame 15 is a block or dog 27, which corresponds with a slot or aperture 29 in the locking-bar 21, and on the slotted frame 14 is a block or dog 28, which corresponds with a slot or aperture 6 in the locking-bar 20.

13 13 are guides or rollers for steadying the rods 8, 9, 10, 11, and 12 and for guiding them in their proper line of motion.

In Figs. I and II the switch-lever 5 and the signal-lever 2 are shown "thrown."

The operation of my improved means for interlocking is as follows: Suppose that it is desired to set the switch which is operated by the lever 5 for an oncoming train. The operator throws the switch-lever 5, and so sets the switch which is connected with the said lever, the movement of the said lever raising the connecting-rod 11, and with it the blocks or dogs 30, which are attached to the said connecting-rod, to the position shown in Fig. I. The switch now being set, the operator, in order to allow the train to pass, must set the signal which governs the switch to "safety." This he does by throwing, for example, the signal-lever 2, thereby raising the connecting-rod 12, and with it the slotted frame 14, to the position shown in Fig. I. Now before the signal-lever 2 was thrown the pin or friction-roller 24, which is attached to the locking-bar 21, was embraced by the upper part 7 of the slot 16 of the slotted frame 14, but upon throwing the signal-lever 2, and so causing the slotted frame 14 to rise, the pin or friction-roller 24 was caused to pass to the lower end of the slot 16 of the slotted frame 14, and consequently the locking-bar 21, to which the pin or friction-roller 24 is attached, was made to move in a horizontal direction (indicated by the arrow) a distance depending upon the length and obliquity of the slot 16 of the slotted frame 14. This new position of the locking-bar 21 is clearly shown in Fig. I, wherein also the switch-lever 5 and the signal-lever 2 are shown thrown—that is, the switch which is operated by the lever 5 is set for the oncoming train and the signal which is operated by the lever 2 is set at "safety."

Referring again to Figs. I and II, it will now be seen that the slots or apertures 23 in the locking-bar 21 are not in the same vertical line with or directly opposite to the blocks or dogs 30 on any of the connecting-rods 9 10 11. Consequently the locking-bar 21, owing to its new position, will prevent the rods 9 and 10 from being raised and will also prevent the rod 11 from being lowered—that is to say, the switches which are controlled by the levers 3 4 5 are securely locked in position, and they will remain so locked until the signal operated by the lever 2 is thrown to its original position of "danger," thereby lowering the slotted frame 14 and so causing the locking-bar 21 to slide horizontally in a direction opposite to that indicated by the arrow to its original position, so bringing the slots or apertures 23 again in a direct line with and opposite to the blocks or dogs 30. It is sometimes necessary that the throwing of a signal to "safety" shall, in addition to locking switches, lock other signals. I provide for this condition by putting blocks or dogs on the slotted frames which are connected with

the signal-levers and additional slots or apertures in the locking-bars, such as the dog 27 on the slotted frame 15, with a corresponding aperture 29 in the locking-bar 21, and the dog 28 on the slotted frame 14, with a corresponding aperture 6 in the locking-bar 20. It will be seen on referring to Fig. I that the signal which is operated by lever 1 is locked by reason of the aperture 29 of the locking-bar 21 not being in a direct vertical line with the block or dog 27 on the slotted frame 15.

In the above description of the working of my improved interlocking apparatus I have taken, for the sake of example, the switch which is connected with the lever 5 and the signal which is connected with the lever 2 as the ones operated or thrown; but the same description will hold good whether any one or any number of the switches are operated, and the same description will also hold good whichever of the signals be operated, with this exception: If it is desired to set the signal which is connected with lever 1 to "safety," the lever 1 is operated in the usual manner, thereby raising the connecting-rod 8 and with it the slotted frame 15. Now before this upward movement of the slotted frame 15 was made the pin or friction-roller 25, which is attached to the locking-bar 20, was embraced by the upper part of the slot 17, as shown in Fig. I; but upon throwing the signal-lever 1 and so causing the slotted frame 15 to rise the pin or friction-roller 25 was caused to pass from the upper to the lower end of the slot 17, and consequently the locking-bar 20, with which the pin or roller 25 is connected, was caused to move in a horizontal direction, opposite to that indicated by the arrow, and a distance depending upon the length and obliquity of the slot 17 in the slotted frame 15, this distance being designed to be sufficient for the purpose of locking the dogs 30 30, and consequently the levers with which they are connected.

In constructing my improved interlocking apparatus it is immaterial in which direction the locking-bars are designed to move, whether in the direction indicated by or opposite to that indicated by the arrow, the direction depending only upon the direction of the obliquity of the slots 16 and 17 in the slotted frames 14 and 15, respectively.

In Fig. IV, which shows a modified manner of constructing certain parts of the apparatus shown in Figs. I and II, 20 and 21 are the locking-bars, which have the same functions as and are similar to the locking-bars 20 and 21 in Figs. I and II. 22 and 23 are, as in Fig. I, the slots or apertures, which may be of any suitable form or size, in the locking-bars 20 and 21. 8 and 12 are rods connecting levers with signals, and 9 and 11 are rods connecting levers with switches. 30 30 are blocks or dogs shaped to suit the slots or apertures 22 23 in the locking-bars 20 and 21 and attached to the connecting-rods 9 and 11; but in the arrangement shown in Fig. IV

I substitute for the slotted frames 14 and 15 (shown in Fig. I) the blocks 40 and 41, having faces 42 43 and 44 45 inclined to the vertical and working in the slots 46 and 47 in the locking-bars 20 and 21, respectively. The connecting-rod 8 and the block 40 are shown at the uppermost point of their travel—that is to say, the signal which is connected with the rod 8 has been set to “safety.” Now in raising the rod 8 and the block 40 to the position shown in Fig. IV the block 40, which works in the slot 46 of the locking-bar 20, has, by means of its inclined face 43, caused the locking-bar 20 to move in the direction indicated by the arrow, thus moving the slots or apertures 22 from their original position and so locking the switch-rods 9 and 11 (of which the former is shown at the lowermost point of its travel and of which the latter is shown at the uppermost point of its travel) by reason of the fact that the said slots or apertures 22 are not now in a direct vertical line and corresponding with the upper dogs 30 on the said switch-rods 9 and 11. In order to again free the switch-rods 9 and 11, the operator throws the signal which is connected with the rod 8 back to “danger,” thus lowering the rod 8 and the block 40 to their original position. Now in lowering the connecting-rod 8 and the block 40 to their original position the block 40, which works in the slot 46 of the locking-bar 20, has, by means of its inclined face 42, caused the locking-bar 20 to move in the direction opposite to that indicated by the arrow a distance sufficient to bring the slots or apertures 22 in a direct vertical line and in a position corresponding with the upper dogs 30 on the connecting-rods 9 and 11, so freeing the latter. The locking-bar 20 having now been moved to such a position that the upper dogs 30 can pass through the slots or apertures 22 and the lower dogs 30 being in a like position with regard to the slots or apertures 23 in the locking-bar 21 the rods 9 and 11 are free to be operated. The operation of the block 41, which is shown in its lowermost position and which is attached to the connecting-rod 12 and works in a slot in the locking-bar 21, is similar to that of the block 40, as described above, except that the block 41 when operated will cause the locking-bar 21 to lock the rods 9 and 11.

Figs. V and VI show an arrangement for use in cases where the setting of a signal or the shifting of a switch is required to lock all other switches and signals. In Fig. V the arrangement of parts is shown in such a position that any signal or switch is free to be operated, and, for the sake of example, we will take the switch which is connected with the rod 11 as the one the operating of which shall lock all other signals and switches, so preventing the setting of a signal to “safety” or the shifting of a switch from the position in which it was immediately before the operating of the said switch which is connected with the rod 11.

In Figs. V and VI, 20 is a locking-bar having slots or apertures 54, 22, 55, and 56 and sliding in guides 31. 50 is a fixed stop which limits the travel of the locking-bar 20 in one direction. 57 is any suitable yielding mechanism which shall tend to prevent the locking-bar 20 being accidentally moved from the position in which it is shown in Fig. V. 8 and 12 are rods connecting hand-levers with signals, and having, respectively, the blocks 51 and 53, which can engage in the slots or apertures 54 and 56, respectively, of the bar 20. 9 is a switch-connecting rod having a dog 30, which can pass through the slot or aperture 22 of the locking-bar 20 when the said locking-bar is in the position shown in Fig. V. 11 is a switch-connecting rod having a block 52, the said block having faces 58 and 59 inclined to the vertical and which can engage in the slot or aperture 55 of the locking-bar 20. If it were desired that the operating of the switch which is connected with the rod 9 should lock other signals and switches, it would be only necessary to remove from the rod 9 the dog 30 and to fix in place of it a block similar to the block 52 and to give the slot or aperture 22 a form similar to that of the slot or aperture 55. Again, if it were desired that any signal or switch should be free to be operated at any time, it is only necessary to remove the block or dog which is attached to the rod which is connected with the said signal or switch.

The operation of the arrangement of my improved means for interlocking, as shown in Figs. V and VI, is as follows: Let it be desired that the switch (hereinafter referred to as the “locking-switch”) shall be shifted, and in being shifted shall lock all other switches and signals. The operator throws the hand-lever, which, by means of the rod 11, is connected with the locking-switch, and so shifts the said locking-switch; but in so doing the operator raises the rod 11 and with it the block 52 to the position shown in Fig. VI. Now the block 52 in rising and by the action of its inclined face 58 against the corresponding end of the slot or aperture 55 of the locking-bar 20 causes the said locking-bar 20 to move in the direction indicated by the arrow, Fig. VI, and a distance sufficient to throw the slots or apertures of the bar 20 so far from their original position as to prevent the possibility of the blocks 51 and 53 engaging, respectively, in the slots or apertures 54 and 56 and of the dog 30 entering and passing through the slot or aperture 22—that is, a distance sufficient to cause it to lock in position the rods 8, 9, and 12, and consequently the hand-levers, signals, and switches connected therewith. This locking of the rods 8, 9, and 12 will be readily understood on referring to Fig. VI, in which it will be seen that were the operator to attempt to throw the hand-lever which is connected with either of the rods other than 11 the block or dog which is attached to the rod which is connected with the said hand-

lever would strike against and be prevented from rising by the locking-bars 20. Now in order to shift the locking-switch back to its original position the operator throws the hand-
 5 lever which is connected with the locking-switch in the direction opposite to that in which he first threw it, thus lowering the rod 11 and the block 52 to their original position, as shown in Fig. V; but in so descending to
 10 its original position the block 52 by the action of its inclined face 59 against the corresponding end of the slot or aperture 55 of the locking-bar 20 causes the said locking-bar 20 to move in the direction opposite to that indi-
 15 cated by the arrow, and it will continue to so move until the block 52 shall have disengaged itself from and be clear of the slot or aperture. The locking-bar 20 will now be in the position shown in Fig. V, in which it will be
 20 seen that the locking-bar is and consequently the slots or apertures in the same are in such a position that any one of the blocks 51 52 53 or the dog 30 can be raised—that is to say, that any one of the signals or switches is now
 25 free to be operated. It will be noticed that the dog 30 on the rod 9 in Figs. V and VI is different in form from the blocks 51 52 53 on the rods 8 11 12, respectively, for I have sup-
 30 posed, in the supposititious case which I have taken to illustrate this arrangement of my improved interlocking system, that the switch which is connected with the rod 9 is not a locking-switch and that it is sometimes re-
 35 quired that it shall be shifted, as well as either of the signals which are connected, respectively, with the rods 8 and 12 or the locking-switch which is connected with the rod 11. Let us suppose that it is desired to shift the
 40 switch which is connected with the rod 9 and also the locking-switch which is connected with the rod 11. Now if the dog 30 had a form similar to that of the block 52 whichever of the two was raised first in the act of shifting
 45 its connected switch would move the locking-bar to one side and so prevent the other from being raised, thus locking its connected switch; but by giving to the dog 30 a form similar to that shown in Figs. V and VI upon
 50 throwing the hand-lever with which it is connected and so raising the rod 9 the dog 30 will pass entirely through the slot or aperture 22, the depth of the said dog 30, measured in the
 55 direction of its line of motion, being such that when the rod 9 has reached the uppermost point of its travel the lower face or end of the dog 30 will be just above and clear of the upper surface of the locking-bar 20. The said
 60 locking-bar 20 will now be again free, and consequently the locking-switch can now be set, for the slot or aperture 55 is still in such a position that the block 52 on the rod 11, which is connected with the locking-switch, can, when raised, engage in it.

I have explained above that in shifting
 65 the block 52, which by means of the rod 11 is connected with the locking-switch, from the position shown in Fig. VI to its position as

shown in Fig. V the said block 52, by the action of its inclined face 59 against the corresponding end of the slot or aperture 55, causes
 70 the locking-bar 20 to return to its original position, as shown in Fig. V. Now in order that when any one of the blocks 51 52 53 is again raised that part of the said block which
 75 in descending last acted against the corresponding slot or aperture in the locking-bar 20 shall not catch against or foul the locking-bar at the said end of the said slot or aperture I bevel or round off the said part of the
 80 said block, as shown at 60, and I also bevel or round off the lower edge of the said end of the said corresponding slot or aperture in the locking-bar 20, as shown at 61. As an additional means for insuring the return of the
 85 locking-bar 20 to its original position I use a mechanical device, such as the weighted lever or spring 57 and a fixed stop, as at 50. The mechanical device, by keeping up a constant endwise pressure on the locking-bar in
 90 the direction opposite to that indicated by the arrow, tends to move the locking-bar in the said direction, the movement of the locking-bar in this direction being limited by the fixed stop.

Having now fully described my invention,
 95 what I claim, and desire to protect by United States Letters Patent, is—

1. In a signal and switch interlocking apparatus, the combination of a series of switch-operating rods and signal-operating rods, said
 100 rods being provided with blocks or dogs, a locking-bar perforated or slotted to permit the passage of the blocks or dogs through the perforations, and mechanism connected with one or more of the said rods, whereby the lock-
 105 ing-bar will be moved, when one of the rods which are provided with the said mechanism is operated, to lock the other rods; substantially as described.

2. In a signal and switch interlocking apparatus, the combination of a series of switch-operating rods and signal-operating rods, said
 110 rods being provided with blocks or dogs which may be intercepted by a locking-bar, a locking-bar perforated or slotted to permit the passage of the blocks or dogs through the per-
 115 forations or slots, and a plate or frame connected with one of the rods, and having means whereby it will, when operated, move the locking-bar to lock the other rods; substantially
 120 as described.

3. In a signal and switch interlocking apparatus, the combination of a series of switch-operating rods and signal-operating rods, said
 125 rods being provided with blocks or dogs which may be intercepted by a locking-bar, a locking-bar perforated or slotted to permit the passage of the blocks or dogs through the per-
 130 forations or slots when the locking-bar is in its normal position, and which may intercept the said blocks or dogs when it is moved from its normal position, and provided with means whereby it may be moved, said means being engaged by a plate or frame connected with

a switch-operating rod or signal-operating rod, and a plate or frame connected with one of the rods, and having an inclined face engaging the locking-bar, whereby it will, when operated, move the locking-bar from its normal position to lock the other rods; substantially as described.

4. In a signal and switch interlocking apparatus, the combination of a series of switch-operating rods and signal-operating rods, said rods being provided with blocks or dogs which may be intercepted by a locking-bar, a locking-bar perforated or slotted to permit the passage of the blocks or dogs through the perforations or slots when it (the locking-bar) is in its normal position, and which may intercept the blocks or dogs when it is moved from its normal position, and provided with means whereby it may be moved, said means being engaged by a plate or frame connected with a switch-operating rod or a signal-operating rod, and a plate or frame connected with one of the rods, and having an inclined face engaging the locking-bar, whereby it will, when operated, move the locking-bar from its normal position to lock the other rods; substantially as described.

5. In a signal and switch interlocking apparatus, the combination of a series of switch-operating rods and signal-operating rods, said rods being provided with blocks or dogs which may be intercepted by a locking-bar, a locking-bar perforated or slotted to permit the passage of the blocks or dogs through the perforations or slots when it is in its normal position, and which may intercept the blocks or dogs when it is moved from its normal position, and provided with a pin or friction-roller whereby it may be moved, said pin or friction-roller engaging a plate or frame connected with a switch-operating rod or a signal-operating rod, and a plate or frame connected with one of the rods, and having an inclined face or slot engaging said pin or friction-roller, whereby it will, when operated, move the locking-bar from its normal position to lock the other rods; substantially as described.

6. In a signal and switch interlocking apparatus, the combination of a series of switch-operating rods and signal-operating rods, said rods being provided with blocks or dogs so constructed that any one of them may, when operated, engage a locking-bar when in its normal position and move it from that normal position, and that they may be intercepted by the said locking-bar when it has been previously moved from its normal position, a locking-bar perforated or slotted to permit the passage of the blocks or dogs through the perforations or slots when it is in its normal position, and which may intercept the blocks or dogs when it is moved from its normal position, the said perforations or slots being so constructed that they may, when the locking-bar is in its normal position, neatly engage the said blocks or dogs, and blocks or

dogs connected with one or more of the rods, and having inclined faces, and which may engage in perforations or slots in the locking-bar when the locking-bar is in its normal position, and any one of which, when operated and engaging in one of the said perforations or slots, shall, by means of one of its inclined faces, move the said locking-bar from its normal position to lock the other rods, and which, when the locking-bar has been previously moved from its normal position, shall be intercepted by the locking-bar; substantially as described.

7. In a signal and switch interlocking apparatus, the combination of a series of switch-operating rods and signal-operating rods, said rods being provided with blocks or dogs so constructed that any one of them may, when operated, engage a locking-bar when in its normal position and move it from that normal position, and that they may be intercepted by the said locking-bar when it has been previously moved from its normal position, a locking-bar perforated or slotted to permit the passage of the blocks or dogs through the perforations or slots when it is in its normal position, and which may intercept the blocks or dogs, thus locking the rods to which the said blocks or dogs are connected, when it is moved from its normal position, the said perforations or slots being so constructed that they may, when the locking-bar is in its normal position, neatly engage the said blocks or dogs, and blocks or dogs connected with one or more of the said rods, and having inclined faces, and which may engage in perforations or slots in the locking-bar, and any one of which, when operated and engaging in one of the said perforations or slots, shall, by means of its said inclined face, move the said locking-bar from its normal position to lock the other rods, and having other inclined faces whereby when any one of them having been operated to move the locking-bar from its normal position that one is operated in the opposite direction, it shall move the locking-bar to its normal position, and which blocks or dogs shall, when the locking-bar has been previously moved from its normal position, be intercepted by the locking-bar; substantially as described.

8. In a signal and switch interlocking apparatus, the combination of a locking-bar having perforations or slots, the said perforations or slots having inclined or beveled ends, and a series of switch-operating rods and signal-operating rods, said rods being provided with blocks or dogs, the said blocks or dogs having faces inclined to the line of the direction of the motion of the rods, and having truncated corners, and adapted to engage neatly, when the rods to which they are connected are operated, in the perforations or slots in the locking-bar to move the said locking-bar; substantially as described.

9. In a signal and switch interlocking apparatus, the combination of a series of switch-

operating rods and signal-operating rods, said rods being provided with blocks or dogs having inclined faces and being so constructed that any one of them may engage in one of a series of perforations or slots in a locking-bar to move said locking-bar to lock the other rods when the rod to which it is connected is operated in one direction, and to move said locking-bar to unlock the other rods when the rod to which it is connected is operated in the opposite direction, a locking-bar having perforations or slots adapted to engage the said blocks or dogs, and adapted to be moved from its normal position by any one of the said blocks or dogs when that one is operated and engages in one of the perforations or slots, and adapted to intercept the other blocks or dogs and so to lock the rods to which they are connected when it is moved from its normal position, and mechanism engaging the said locking-bar and tending to keep the said locking-bar in its normal position; substantially as and for the purpose described.

10. In a signal and switch interlocking apparatus, the combination of a series of switch-operating rods and signal-operating rods, a locking-bar perforated or slotted to permit the engaging of blocks or dogs in said per-

forations or slots, blocks or dogs having inclined faces and truncated corners, and connected one with each of the said rods, and so constructed that any one of them may, when the rod to which it is connected is operated in one direction, engage in one of the perforations or slots of the locking-bar to move said locking-bar to intercept the other blocks or dogs and so lock the rods to which they are connected, and the locking-bar having been so moved, and when the rod to which the said block or dog is connected is operated in the reverse direction, to move the locking-bar to free the other blocks or dogs and so unlock the rods to which they are connected, and a counterbalance engaging the locking-bar, and, by exerting an endwise pressure on it in one direction, tending to keep it in such a position that all the blocks or dogs and the rods to which they are connected are free to be operated; substantially as and for the purpose described.

Signed at Richmond city, in the State of Virginia, this 6th day of August, A. D. 1897.

ELERSON PROCTOR OWEN.

Witnesses:

JOHN O'BRIEN,
EUGENE JONES.