

No. 688,891.

Patented Dec. 17, 1901.

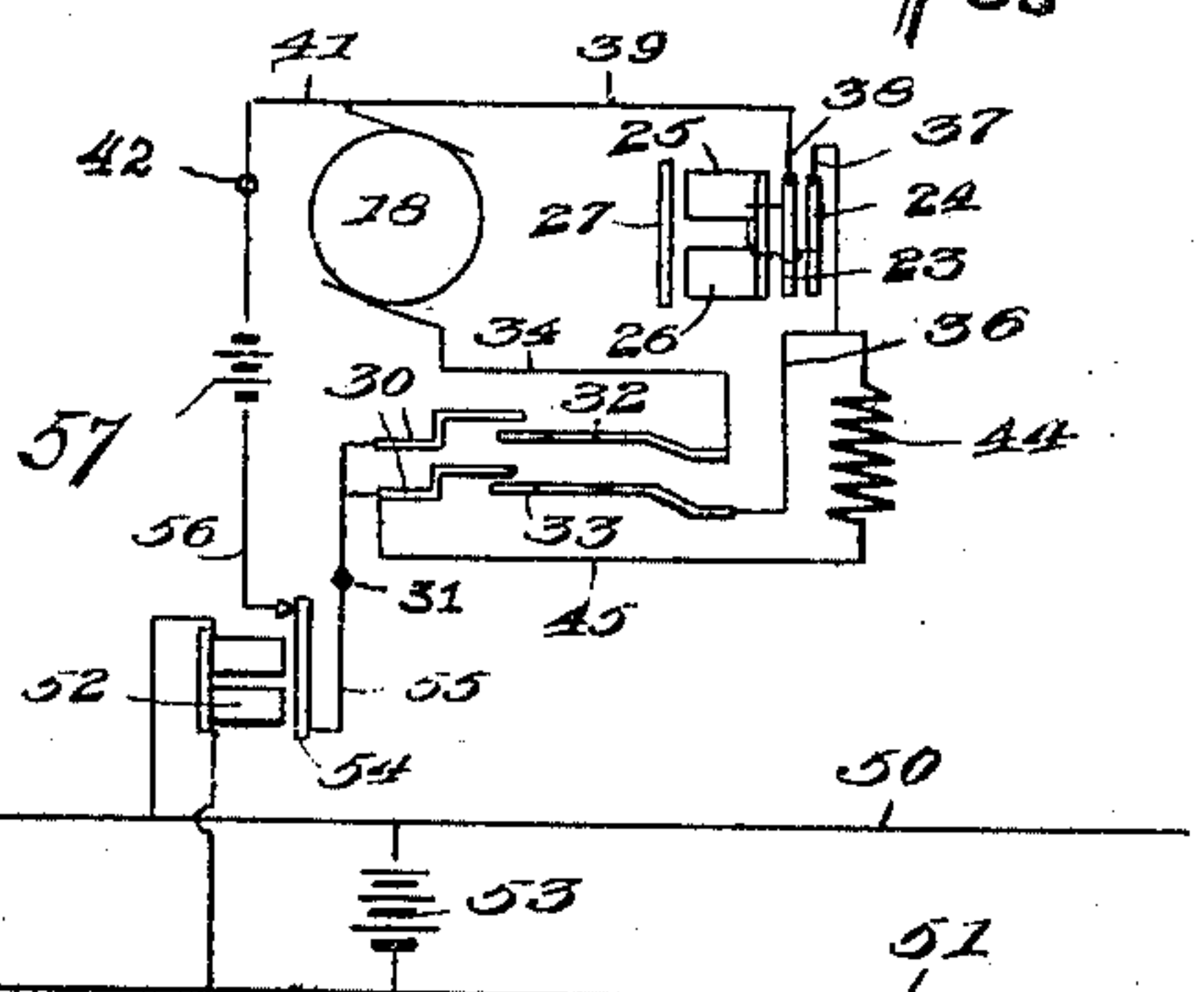
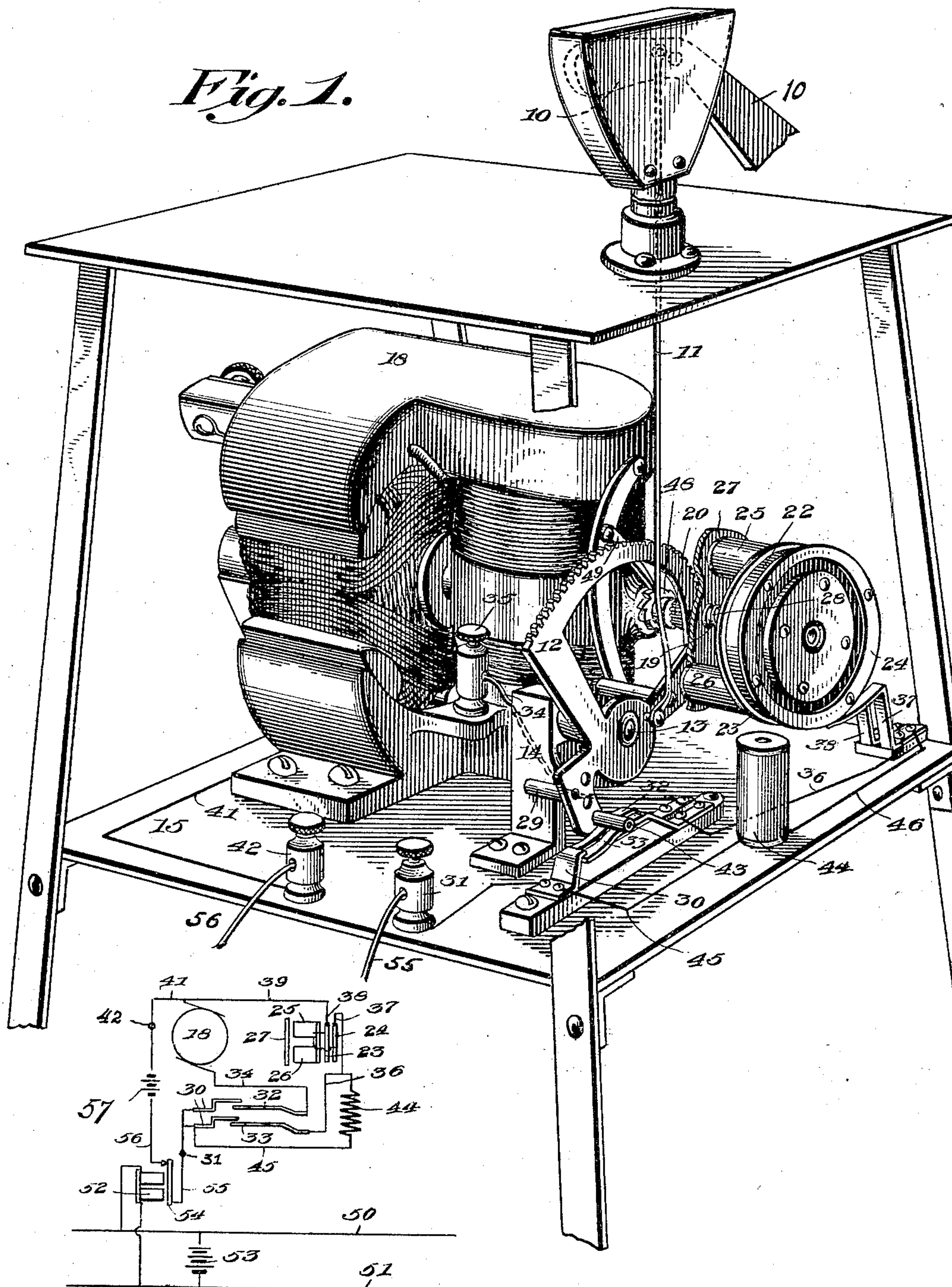
J. SHOECRAFT.  
SEMAPHORE OPERATING DEVICE.

(Application filed May 31, 1901.)

(No Model.)

2 Sheets—Sheet 1.

*Fig. 1.*



Witnesses  
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*Fig. 4.*

by

*J. Shoecraft, Inventor*  
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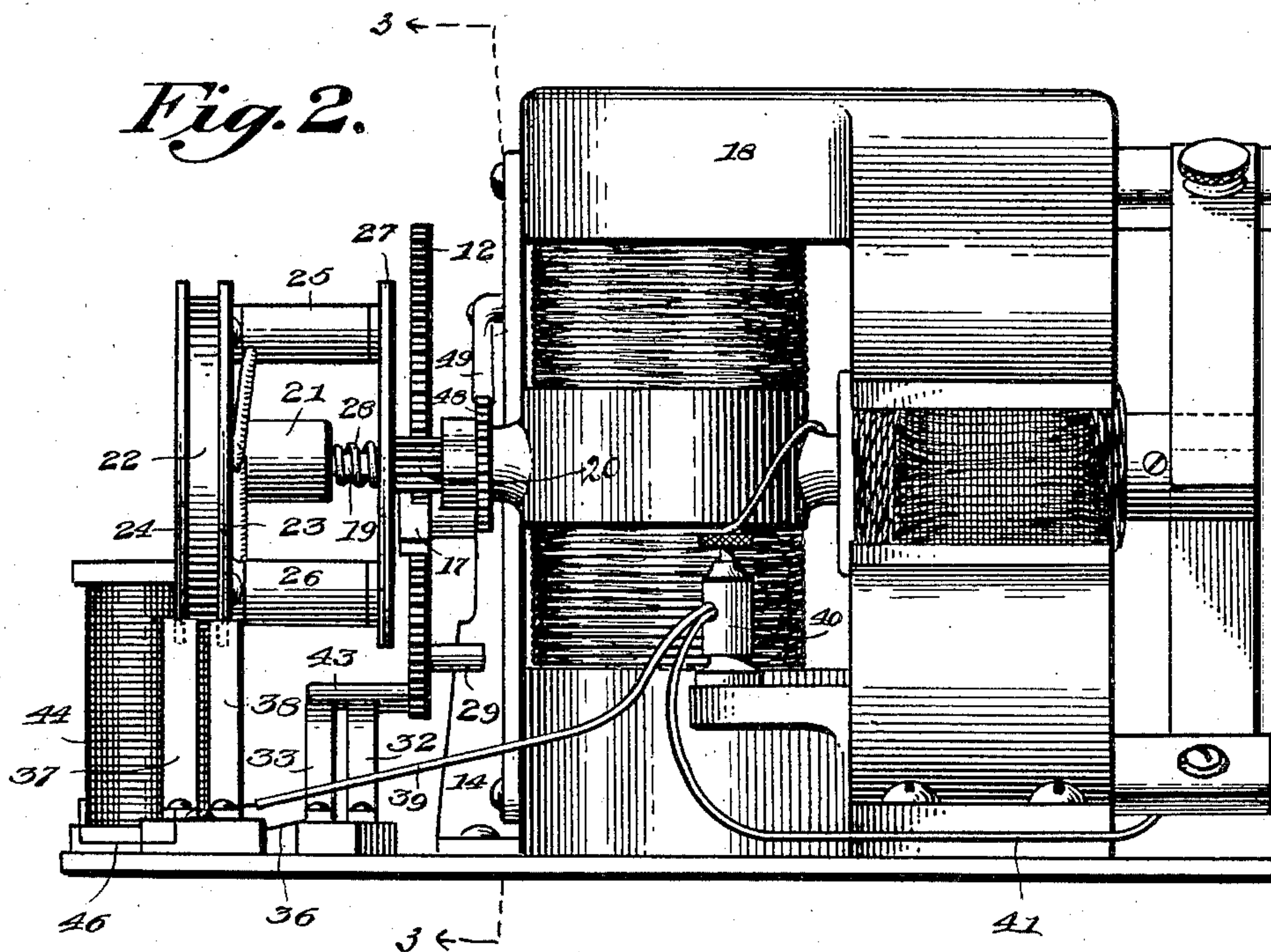
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Witnesses  
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# UNITED STATES PATENT OFFICE.

JUDSON SHOECRAFT, OF ESKRIDGE, KANSAS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO WARREN MARSHALL AND GEORGE SKINNER, OF ESKRIDGE, KANSAS.

## SEMAPHORE-OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 688,891, dated December 17, 1901.

Application filed May 31, 1901. Serial No. 62,630. (No model.)

*To all whom it may concern:*

Be it known that I, JUDSON SHOECRAFT, a citizen of the United States, residing at Eskridge, in the county of Wabaunsee and State of Kansas, have invented a new and useful Semaphore-Operating Device, of which the following is a specification.

This invention relates to semaphore-signal mechanisms used in connection with railways; and it has for its object to provide a construction wherein the semaphore-arm will be quickly raised to the danger position when a train enters a block and will be instantly lowered when the train passes from the block, a further object of the invention being to provide a construction wherein the movements of the semaphore-arm will be positive.

An additional object of the invention is to so arrange the parts and circuits that there will be an economical consumption of current, a choking-coil or artificial resistance being introduced after the parts have been actuated to permit of only that flow of current as will retain the parts in their adjusted positions, the shifting of the circuits being done automatically.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a perspective view showing the complete mechanism. Fig. 2 is a side elevation of the operating mechanism. Fig. 3 is a transverse sectional elevation of a portion of the same on the line 3 3 of Fig. 2. Fig. 4 is a diagram illustrating the electrical connections.

Referring now to the drawings, there is shown a semaphore 10, which is pivotally mounted in the usual manner and to which is connected a rod 11, which when raised moves the outer end of the arm downwardly against the tendency of a counterweight upon the semaphore-arm. To reciprocate the rod to raise and lower the semaphore-arm, the lower end of the rod is pivoted to a segmental gear 12, which is mounted for oscillation in a vertical plane upon a stub-shaft 13, engaged in a post 14, mounted upon the base-plate 15, which carries the mechanism and

which is disposed within a suitable casing upon the semaphore-post. The counterweight of the semaphore-arm tends to hold the arm raised, and the segmental gear is also provided with a counterweight 17, which is so disposed as to augment the action of the weight of the arm. Thus when the arm is moved into lowered position it is against the tendency of these two counterweights, and this movement is accomplished by rocking the segmental gear in an upward direction. To alternately rock the gear upwardly and release it, the following mechanism is provided and includes a motor 18, on the shaft 19 of which is loosely mounted a pinion 20, which is engaged by the segmental gear and which is of sufficient length that it may be shifted to some extent longitudinally of the shaft without disengagement from the gear. Normally the pinion is free upon the shaft for rotation thereon, and to clutch it to the shaft at times, so that the segmental gear may be rocked by rotation of the motor-shaft, an electromagnetic clutch is provided. This clutch comprises a hub 21, which is fastened upon the shaft to rotate therewith at all times and on which hub is secured a vulcanite or other form of insulating annular carrier 22, upon the opposite faces of which are secured the metal collector-rings 23 and 24. On the face of the carrier adjacent to the motor are secured the two electromagnets 25 and 26, and which magnets are connected in series between the two collector-rings, as shown in the diagram, Fig. 4. To the end of the pinion 20 adjacent to the electromagnets is secured an iron disk 27, which forms a common armature for the two electromagnets, and when the electromagnets are energized the disk is drawn into engagement with the poles thereof and is held with such force that if the motor be rotated the disk will rotate with the motor-shaft, and consequently will carry the pinion with it to rock the segmental gear. When the magnets are deenergized, the disk is released, and the pinion being then free to rotate there is nothing to hold the segmental gear against rotation, and in consequence it drops to its original position under the influ-



ence of the counterweights. To move the disk positively from the poles of the magnets, to which it may have a tendency to stick because of residual magnetism, a helical spring 28 is disposed upon the shaft and bears at its opposite ends against the end of the hub of the clutch and the adjacent face of the disk, the disk being moved by the magnets against the tendency of this spring. The rocking movement of the segmental gear is limited by the stops 29, carried thereby and which are disposed to engage opposite faces of the post 14, upon which the gear is mounted.

In order that the circuit of the motor may be broken when the semaphore has been moved to its lowered position and that there may be an economic use of current while the arm is lowered, a switch is provided comprising the fixed contact 30, which is connected with one of the leading-in binding-posts 31, and engaged with the under side of this contact, which is in the form of a Z-shaped plate, are the spring contact-fingers 32 and 33, one of which, 32, is connected by wire 34 with one binding-post 35 of the motor. The other finger, 33, is connected by wire 36 with a brush 37, which makes contact with one of the collector-rings of the magnetic clutch, a brush 38 being in contact with the other collector-ring and having electrical connection through wire 39 with the second binding-post 40 of the motor, this second binding-post of the motor being connected by wire 41 with the second leading-in-wire binding-post 42. Thus the motor and the clutch are connected in multiple between the leading-in binding-posts. The segmental gear carries a circuit-breaking finger 43, which projects at right angles thereto, and when the gear has moved to lower the semaphore-arm this finger engages the contact-fingers of the switch and depresses them to break the circuits of both the motor and clutch. Should the clutch be deenergized at this time, however, the armature thereof would be permitted to rotate, and therewith the pinion, so that the segmental gear would return to its normal position to raise the semaphore-arm. To insure a degree of energy in the clutch therefore when the circuit is broken at this point, a shunt is provided around the switch and includes a resistance-coil 44, one end of which is connected by wire 45 with the fixed contact of the switch, while the other terminal is connected by wire 46 with the brush 37. Thus when the direct or low resistance circuit of the clutch is broken the entire current is shunted through the resistance-coil, which permits only such a flow of current as is required to hold the disk from rotating against the tendency of the electromagnets of the clutch. With the arm in lowered position there is of course a tendency to reverse rotation of the motor-shaft, and to prevent this the shaft is provided with a ratchet 48, in cooperative relation to which is pivoted a pawl 49, which hangs normally in engagement with the ratchet, and while per-

mitting of rotation of the motor-shaft in a direction to lower the semaphore-arm prevents rotation in a direction to raise the arm. 70

This apparatus is employed in connection with such a system illustrated in diagram in Fig. 4, wherein 50 and 51 represent track-rails, to which are connected the terminals of the winding of a relay 52, a relay-battery 53 being also connected with its terminals to the track-rails, so that while normally the entire current from the battery passes through the relay when a train enters a block, including the rails, the battery is short-circuited through the wheels and axles of the train. One point 54 of the relay is connected by wire 55 with one of the leading-in binding-posts of the apparatus, while the other point is connected by wire 56 with the other binding-post through a battery 57. 75 80 85

The operation of the apparatus is as follows: The circuit of the battery 57 being closed through the clutch and motor by action of the relay when the block is clear the disk of the clutch is attracted and held to the magnets to clutch the pinion to the motor-shaft and at the same time the motor rotates and the segmental gear is rocked in one direction to raise the gear and lower the arm against the tendency of the counterweights. When the gear has moved sufficiently far to lower the arm, the striker-finger on the gear engages the contact-fingers of the switch and depresses them to break the circuit of the motor and the direct low-resistance circuit of the clutch. The motor then stops, but a sufficient quantity of current flows through the clutch-magnets to hold the disk, and therewith the pinion, against return movement, this flow being by way of the shunt and through the high resistance therein. When a train enters the block, the relay-battery is short-circuited, and the relay being deenergized the contacts thereof separate, thus breaking the circuit of the battery 57. The clutch-magnets are then deenergized so that they release the disk armature, which is then free to rotate, and the segmental gear being no longer held against rotation it moves downwardly and the semaphore-arm quickly rises. When the train passes from the block, the whole current of the relay-battery again passes through the relay, with the result that the circuit of battery 57 is again closed through the motor and clutch and the semaphore-arm is again lowered in the same manner as above described. 90 95 100 105 110 115 120

It will be understood that in practice modifications of the specific construction shown may be made and that any suitable materials and proportions may be used for the various parts without departing from the spirit of the invention. 125

What is claimed is— 130

1. The combination with a semaphore, of an electric motor, means for imparting motion from the motor to the semaphore, including an electromagnetic clutch, a battery in the



circuit of which the clutch and motor are connected in multiple, a switch operable by the motor to break the circuits of the motor and clutch, and a shunt for the clutch around the switch and including an artificial resistance.

2. The combination with a semaphore of an electric motor, an oscillatory gear connected with the semaphore, for actuating it, a pinion on the motor-shaft with which the gear is engaged, an electromagnetic clutch comprising a member fixed to the motor-shaft and a member loose thereon and attached to the pinion, a battery in the circuit of which the motor and clutch are connected in multiple, a switch controlled by the motor for breaking the circuit of the motor and clutch at a point, and a shunt for the clutch around the switch and including an artificial resistance.

3. The combination with a semaphore, of an oscillatory segmental gear connected therewith, means for holding the gear normally at one limit of its movement to hold the semaphore correspondingly, a motor, a pinion mounted loosely upon the motor-shaft and having an armature attached thereto, an electromagnet fixed upon the shaft and in the field of which the armature is disposed to hold the pinion to rotate with the shaft at times,

said gear being engaged with the pinion, a battery in the circuit of which the motor and magnets are connected in multiple, a switch for the circuits of the motor and magnets, for opening said circuits, a striker carried by the gear for opening the switch, and a shunt for the magnet around the switch and including an artificial resistance.

4. The combination with a semaphore, of an electric motor, means for imparting motion from the motor to the semaphore in one direction and including an electromagnetic clutch, a battery in the circuit of which the motor and clutch are connected in multiple, a switch controlled by the motor for opening the motor-circuit, means for returning the semaphore mechanism when disengaged from the motor, and means for holding the motor against reverse movement under the influence of said returning means.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JUDSON SHOECRAFT.

Witnesses:

GEO. H. CHANDLER,  
HARVEY T. WINFIELD.