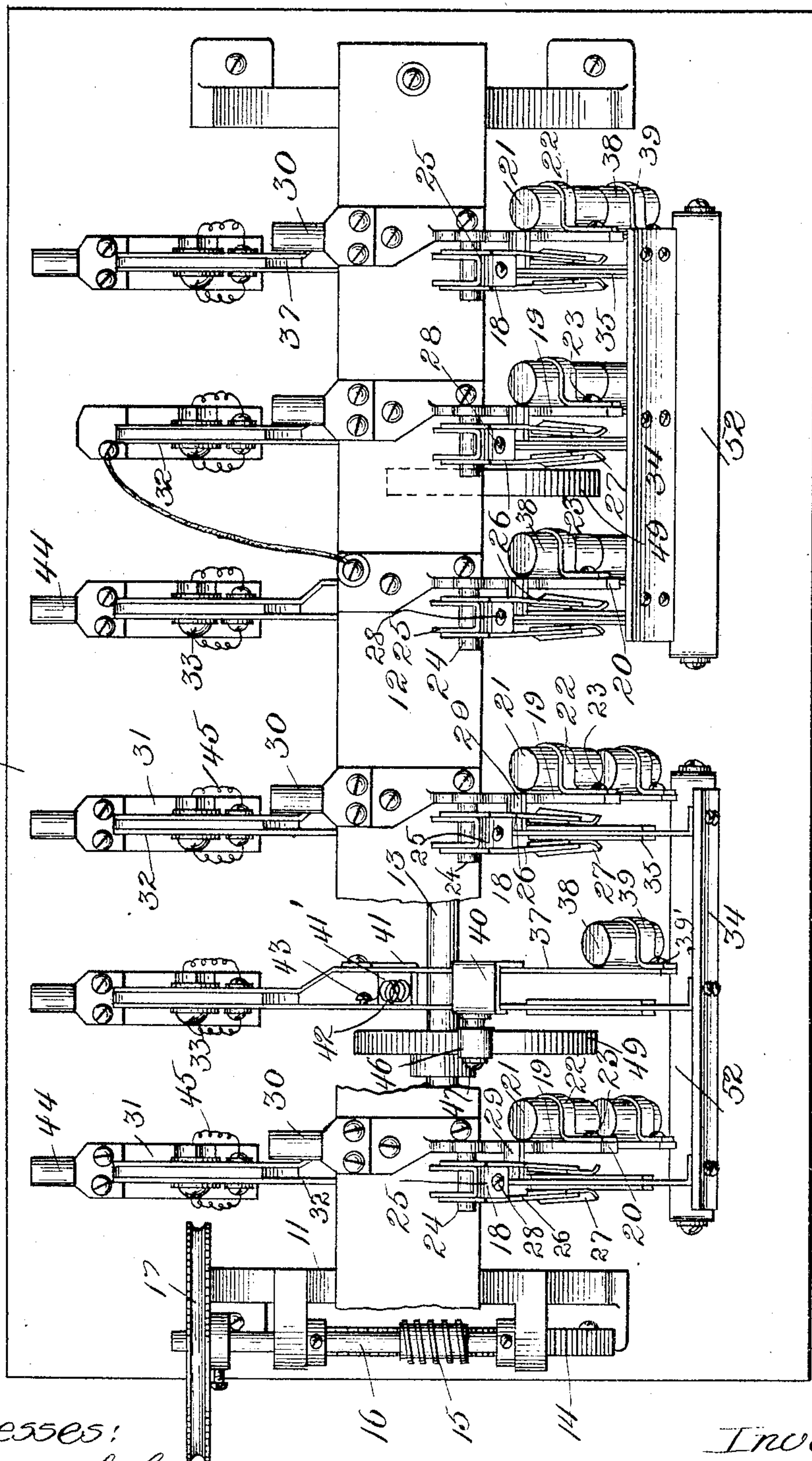


E. R. DULL.
AUTOMATIC ELECTRIC SWITCH.
APPLICATION FILED JAN. 12, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

19



Witnesses:

Samuel Pollock
Ray White

By

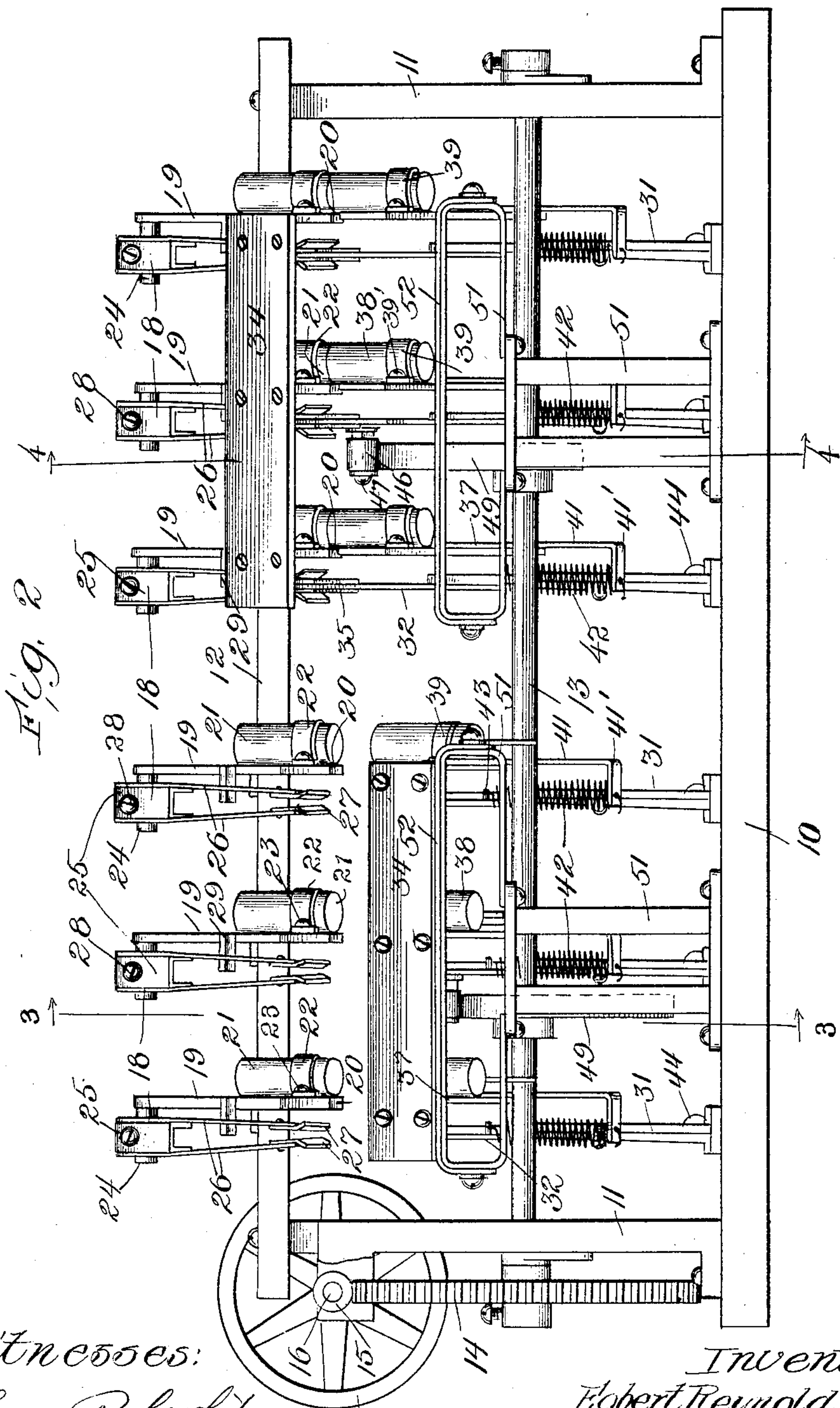
Inventor:

Egbert Reynolds Dull,
Forster Bain Atty.

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3 SHEETS—SHEET 2.



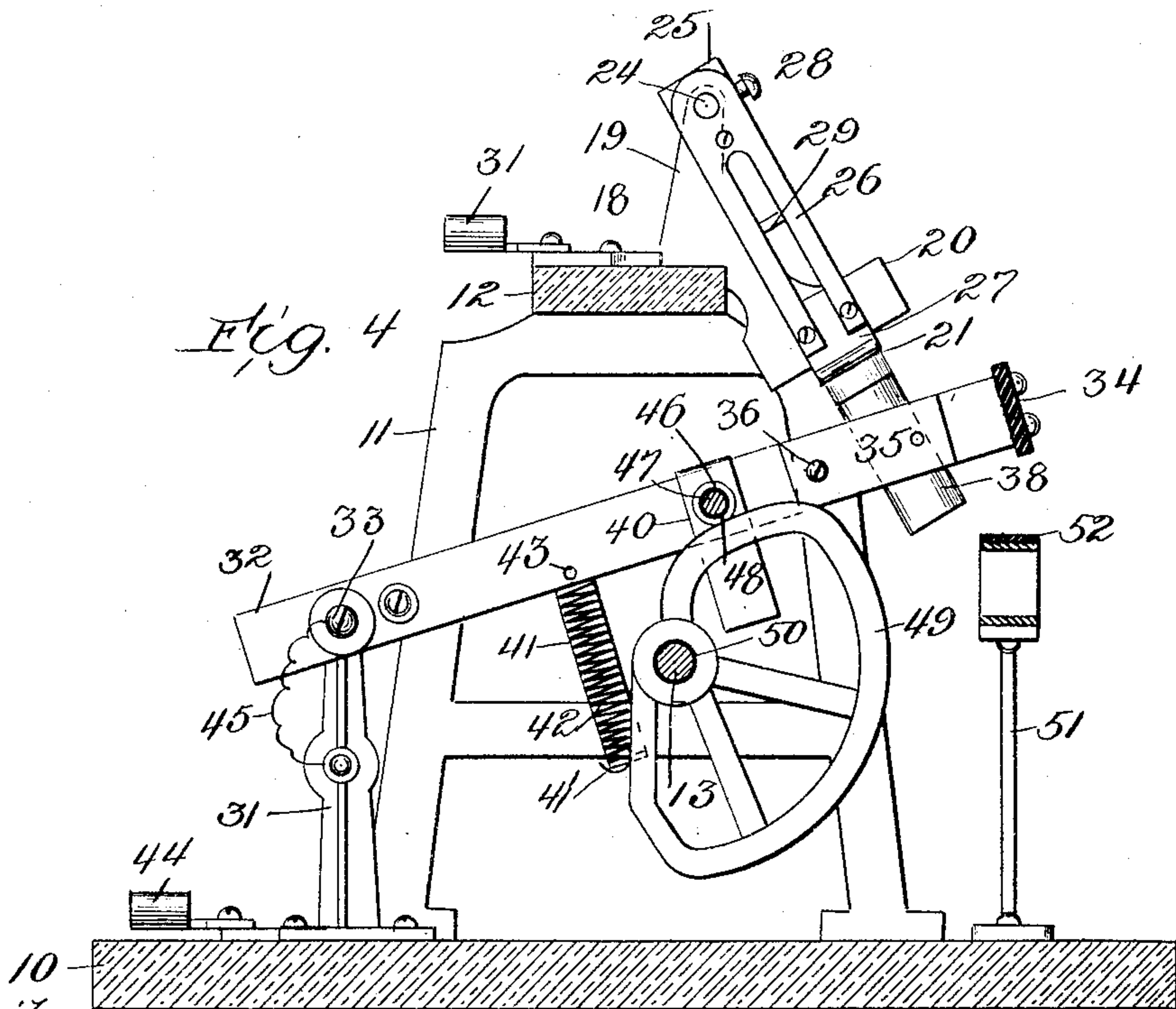
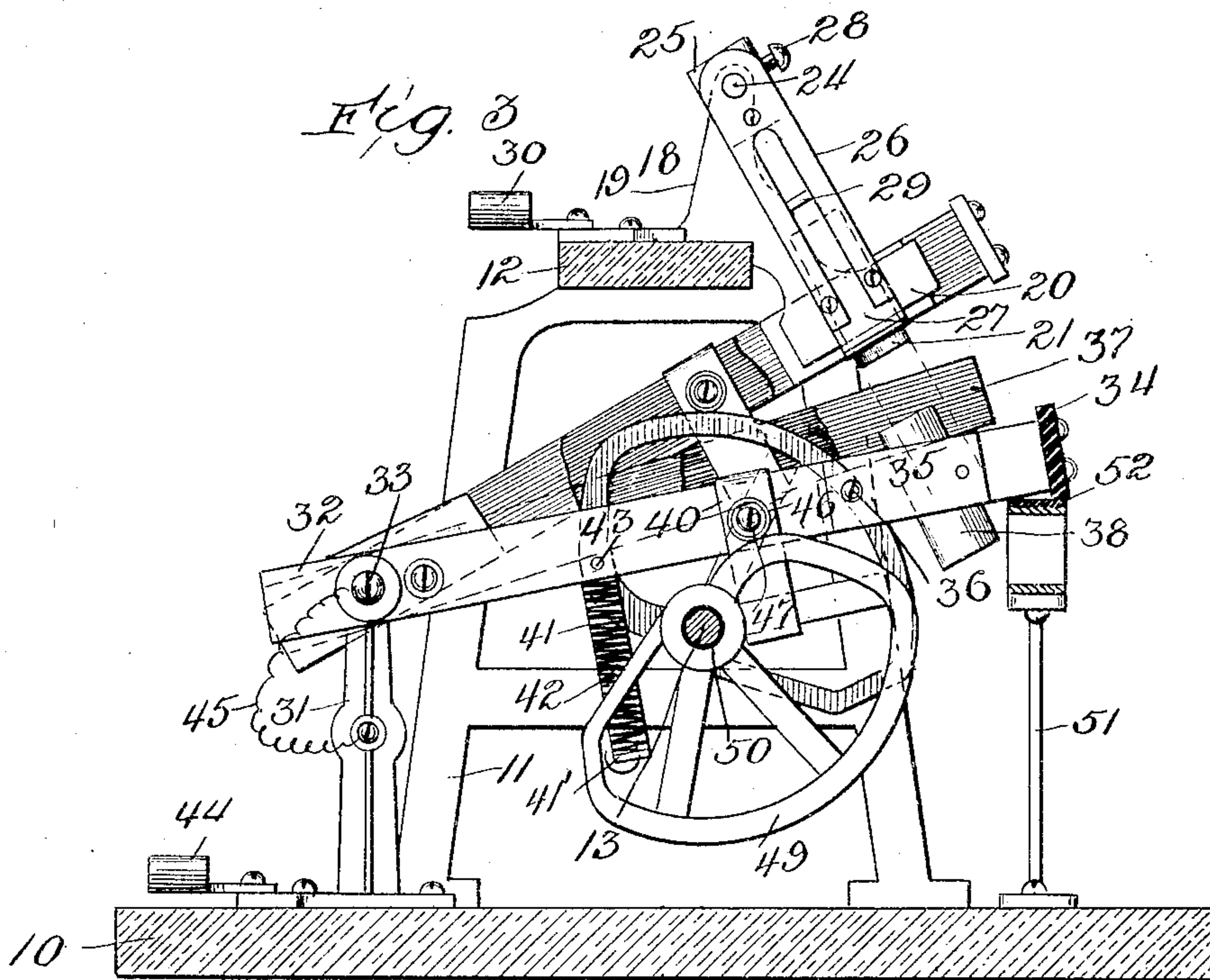
Witnesses:
Harry R. White
Ray White.

Inventor:
Egbert Reynold Dull,
By Jesse Bain Atty.

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3 SHEETS—SHEET 3.



Witnesses:
Harry R. White
Ray White.

By

Inventor:
Egbert Reynolds Dull,
Joseph Bain Atty.

UNITED STATES PATENT OFFICE.

EGBERT REYNOLDS DULL, OF CHICAGO, ILLINOIS.

AUTOMATIC ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 780,641, dated January 24, 1905.

Application filed January 12, 1904. Serial No. 188,791.

To all whom it may concern:

Be it known that I, EGBERT REYNOLDS DULL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and
5 useful Improvements in Automatic Electric Switches; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.
10

My invention relates to improvements in automatic electric switches, and particularly to that class of switches commonly known as "flashers" and employed to commutate electric circuits to intermittently energize sign-lamps in predetermined order.

One of the objects of my invention is to provide a device of the character specified wherein the movable switch members are cam-impelled to circuit-closing position and are returned to circuit-opening position under the influence of gravity.

Another object of my invention is to provide a device of the character described wherein the switch unit of each circuit comprises two complete elements, each composed of two
25 coacting switch members arranged to afford parallel paths for the electric current when the circuit is closed through the switch unit, the members of one of said pairs being provided with carbon contact-surfaces and the members of the other pair being provided with metallic contact-surfaces.

A further object of my invention is to provide a device of the character described wherein the movable members of the two switch elements forming one complete switch unit are mounted for oscillation about a common axis and are so related that the carbon contact is made before the metallic contact is effected and that said carbon contact is broken after the completion of the break of the metallic contact.

A further object of my invention is to improve generally and in detail the construction of devices of the character described; and a yet further object of my invention is to provide a device of the character described wherein two or more switch units are connected in
45 series circuit, so that upon the rupture of

said circuit the break in one side thereof is simultaneously effected at two or more points.

With a view to attaining these and other objects, which will become apparent to those skilled in the art from the following description, my invention consists in the features of construction and arrangement hereinafter more fully described, and specified in the claims.

In the drawings, wherein I have illustrated
60 my invention as applied to an operative sign-lamp flasher, Figure 1 is a plan view of a complete flasher with parts broken away. Fig. 2 is a front elevation of the same. Fig. 3 is a transverse vertical section on line 3 3 of
65 Fig. 2, showing the switch devices in one position of movement. Fig. 4 is a similar section on line 4 4 of Fig. 2, showing one of the switch members in another position.

Throughout the drawings like numerals of
70 reference refer always to like parts.

In the drawings, 10 indicates a base-plate of slate or suitable insulating material, 11 11 side frame-pieces of suitable configuration, and 12 a top plate of slate or the like supported on the side pieces 11.

Extending longitudinally of the frame and suitably supported in bearings carried by the frame-pieces 11 11 is an actuating-shaft 13, adapted to be suitably driven, as through the
80 usual instrumentalities comprising a gear-wheel 1, secured to the shaft and arranged in mesh with a worm 15, carried by a shaft 16, said shaft 16 being provided with a suitable driving-pulley 17. This particular gearing
85 forms no part of my invention, and any suitable gearing may obviously be employed.

Mounted upon the frame are the switch units, each unit comprising two parallel relatively movable members and two coacting
90 relatively stationary members. A single pair of coacting members will hereinafter be called an "element" to distinguish such a pair from the complete unit of two pairs of such coacting members. These switch units are arranged
95 in gangs, with any suitable number in a gang, the machine which I have herein illustrated comprising two gangs of three switch units each. It will be obvious, however, that the number of units in a gang and the number of
100

gangs employed may be varied to suit the particular requirements of the machines's environments and use. Referring to the structure shown, 18 18 indicate the stationary switch members generally, one of which I will now describe.

19 indicates a bracket of suitable configuration provided with a relatively extended head portion 20, overhanging the front edge of the insulating top bar 12.

21 indicates a carbon contact-rod adjustably secured to the extension 20 by a metallic strap 22, attached at its opposite ends to the said head, as by adjusting-screws 23.

24 indicates a stud projecting from the upper extremity of the bracket 19 and arranged to carry a stationary metallic knife switch member comprising a block 25 and two separated blades 26 26, each bifurcated, as best illustrated in Fig. 3, and provided at its end with a removable contact-shoe 27 connecting the bifurcated ends of the blade. The parts described are so proportioned and adjusted that carbon rod 21 extends below the level of shoes 27.

28 indicates a set-screw for positioning the stationary knife switch member upon its stud 24.

29 indicates a finger, preferably formed integrally with the bracket 19 projecting therefrom in such position as to engage one of the bifurcated blades of the knife switch members to maintain the latter against rotation upon its stud.

30 indicates a terminal post secured to the bracket 19 in good electrical contact therewith. It will be understood that terminal posts 30 are attached to only such of the brackets 19 as are to be connected with the exterior circuit-wires.

The coacting movable switch members are arranged to extend across the frame below the stationary switch members and are adapted to be oscillated to coact with the stationary members, as hereinafter described.

Specifically, 31 31 indicate standards, preferably one for each switch unit, properly positioned upon the base-plate 10 toward the rear thereof.

32 32 indicate switch-blades of the metallic or knife switch elements mounted upon pivot-pins 33, bearing in the standards 31. The blades 32 extend forward a suitable distance beyond the overhanging head extension 20 of the brackets 19, and at their outer ends those blades of members constituting a gang are fixedly secured together by a suitable strip of insulation, such as a fiber of the like, (indicated at 34.) Each of the blades 32 is provided with suitable metallic shoes 35 35 detachably secured to the opposite faces thereof, as by screws 36, in such position as to coact with the shoes 27 of the stationary switch-blades 26 in operation.

Concentrically mounted upon each of the

studs 33 and yieldingly positioned relative to the corresponding blade 32 is a movable switch-blade 37, constituting the movable member of the carbon switch element.

38 indicates a carbon contact-rod adjustably secured to blade 37 by a strap 39 and screws 39' (similar to the strap 22 and screws 23 of the stationary member) in such position as to make contact with the carbon rod 21 during the oscillation of the said blade 37. These parts are so arranged that the carbon 38 normally projects above the contact-shoes 35 of the movable metallic switch member. The carbon switch-blade 37 and the knife switch-blade 32 are yieldingly connected, as by a spring, for movement together.

Specifically, 40 indicates a metallic strap secured to the blade 32 and overlying the blade 37 to form a guide therefor and a stop to limit its upward movement relative to the knife switch-blade 32.

41 indicates a metallic strip secured to the arm 37 and depending therefrom, the strip being provided with an end portion 41', bent toward the switch-blade 32.

42 indicates a coiled compression-spring at one extremity secured to the inturned end 41' of the strip 41 and at its other end secured to the pin 43, carried by the switch-blade 32.

It will be apparent now that the carbon switch-blade 37 is normally definitely positioned relative to the knife switch-blade 32, but may be moved downwardly relative thereto in its movement putting under abnormal tension the spring 42, which tends to return the arm 37 to its normal position, the said arm in its movement relative to the arm 32 being guided by the guide 40.

Electrical connection is made through the movable switch-arms from a terminal piece 44, suitably secured to each of the standards 31, to which an exterior circuit-wire is to be connected, the pivot-joints of the switch members being protected by flexible wire coils 45 45, connected at their opposite extremities to the standard and to the respective movable switch members to bridge the pivotal joints.

Means are provided for actuating the gangs of switch members to close or open the circuits controlled thereby, as follows: 46 indicates a roller mounted upon a pin 47, carried by one of the switch members 32, preferably the central one of the gang, and insulated therefrom, as by a fiber sleeve 48. 49 indicates a cam carried by the shaft 13 and adapted to coact with said roller, said cam being preferably insulated from the shafts by a fiber sleeve 50. The cam may obviously be of any suitable configuration to accomplish the result desired, that herein indicated being a form which I have found well adapted for the practice of my invention. A means is also provided for supporting each of the gangs of movable switch members when said switch members are in normal or inactive position.

In the drawings, 51 indicates a suitably-supported metallic framework of generally ob-long shape provided with a buffer or cushion of rubber or other suitable material upon its
5 top surface, as indicated at 52. The cushion is so arranged that in normal position the connecting-strip 34 of a gang rests thereon, as indicated in Fig. 2.

The operation of the device constructed as
10 above described will be as follows: Assuming that the parts are in operation, rotation is imparted to the actuating-shaft 13 and through it to the cam 49. In its rotation the cam 49 first meets the roller 46 of the switch-gang in
15 the position illustrated in the foreground in Fig. 3. As it continues in rotation the cam acts upon the roller to raise the switch members until the carbon contact-rods 38 and 21 meet in contact, as illustrated in Fig. 4. At
20 such time the movable member of the knife switch element is not in contact with its relatively stationary blade. As the movement of the cam continues until the highest point of its periphery passes under the roller 47, the
25 switch-blade 32 of the knife switch element is further raised to the position illustrated in the background in Fig. 3, entering between the separated parallel stationary blades 26 26 and effecting good electrical connection there-
30 with through the contact of the shoes 35 and 27 upon the respective movable and stationary members. During this latter movement the movable blade of the carbon switch element remains stationary in contact with the
35 stationary carbon member, so that the blades 32 and 37 are separated and the spring 42 is put under tension. In this last-named condition, with both the movable switch-blades making their respective contacts with their
40 relatively stationary members, the parts remain while the highest portion of the cam's perimeter is passing beneath the roller. When the said elevated portion of the cam's perimeter has passed the roller, however, the parts
45 return under the influence of gravity to their initial positions, the movable members of the knife switch elements first leaving their engagement with their stationary contact members, so that the switch parts return substan-
50 tially to the position illustrated in Fig. 4 and the movable blades of the carbon knife switch elements then returning together under the influence of gravity to the position illustrated in the foreground in Fig. 3. Any shock caused
55 by the dropping of the switch members is taken up by the buffer or cushion 52.

It will be apparent that as regards the influence of a switch unit upon its circuit when the switch members are separated the paths
60 therethrough are broken; but as the movable switch-blades are raised the circuit including the unit in question is first closed through the contact of the carbon rods and subsequently closed in parallel thereto by the lower resist-
65 ance connection of the metallic or knife

switch members. In the opening of the switch elements this order, as heretofore stated, is reversed, so that in any event any arcing caused by closing or opening of the circuit is taken by the carbon contact-rods while
70 the load upon the carbons is relieved by the subsequent closure of the metallic knife switch members.

I have found that by the construction here-in described I am enabled to handle relatively
75 heavy currents with facility and without damage to the apparatus. I have also found that where it is desired to handle exceedingly heavy currents good effects are obtained by arranging two or more of the switch units in
80 series circuit, as illustrated to the right in Fig. 1. In such portion of the drawing the switch-gang is illustrated as equipped for connection in a two-wire circuit, one of the
85 wires being arranged for a series break of two switches. Obviously under such condition the circuit including in series the two switch units is simultaneously broken in two places when the carbon contact members of
90 said switch units are separated.

While I have herein described in some detail one operative embodiment of my invention, I do not desire to be understood as limiting myself thereto in all particulars, as it
95 will be obvious that numerous changes might be made therein without departing from the spirit and scope of my invention.

Having described my invention, what I claim, and desire to secure by Letters Patent
100 of the United States, is—

1. In a device of the character described, a frame, an actuating-shaft journaled in said frame, a gang of switch units associated with the frame, each switch unit of said gang comprising a stationary contact member, and a
105 movable switch-blade, connections interposed between the switch-blades of said several units to unite the same for simultaneous movement, a roller operatively associated with one of said switch-blades for movement there-
110 with, and a cam mounted upon the actuating-shaft arranged to coact with said roller to move the switch-blades of said gang.

2. In a device of the character described, a switch unit comprising a metallic contact-
115 switch element and a carbon contact-switch element, said elements having stationary members and coaxially-pivoted movable blades arranged for dissimultaneous connection with their respective stationary members, a yield-
120 ing connection between the movable blades of the two elements, and means associated with one of the connected blades for moving both thereof.

3. In a device of the character described, a
125 switch unit comprising two stationary members and two movable members pivoted for movement about a common axis, one coacting pair of such members being provided with metallic contact-surfaces, and the other pair
130

provided with carbon contact-surfaces arranged to make connection before the metallic connection is established, a spring associated with said pivoted members to yieldingly hold them in predetermined relative position in movement, and means associated with the movable metallic contact member for moving both of said members into connection with their respective stationary members.

4. In a device of the character described, a frame, an actuating-shaft mounted in the lower part of the frame, a gang of relatively stationary switch members mounted in the upper portion of the frame, a gang of coacting movable switch members pivoted therebeneath for movement into contact therewith, and a cam device carried by the shaft arranged and adapted to move said movable members of the gang upward into contact with their stationary members, and to permit them to return to their initial position under the influence of gravity.

5. In a switch, a bracket provided with a stud, a bifurcated switch-blade mounted on said stud, and a finger projecting from said

bracket engaging the bifurcated switch-blade to hold the same against rotation in the stud.

6. In a switch, a movable blade, a carbon contact-rod, a strap encircling said contact-rod, and adjustable screws securing said strap to the blade to adjustably hold the carbon rod.

7. In an electric sign-flasher, a gang of switch units each comprising a relatively stationary member and a relatively movable member, the movable members of the units of the gang being connected for simultaneous operation, electrical connections associating a plurality of said switch units in series, and terminal connections associated with the members of said connected series of units farthest removed in electrical continuity, substantially as and for the purpose described.

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

EGBERT REYNOLDS DULL.

In presence of—

FORÉE BAIN,

MARY F. ALLEN.