

No. 737,949.

PATENTED SEPT. 1, 1903.

E. J. McALLISTER.  
CIRCUIT CONTROLLER.  
APPLICATION FILED JULY 29, 1902.

NO MODEL.

5 SHEETS—SHEET 1.

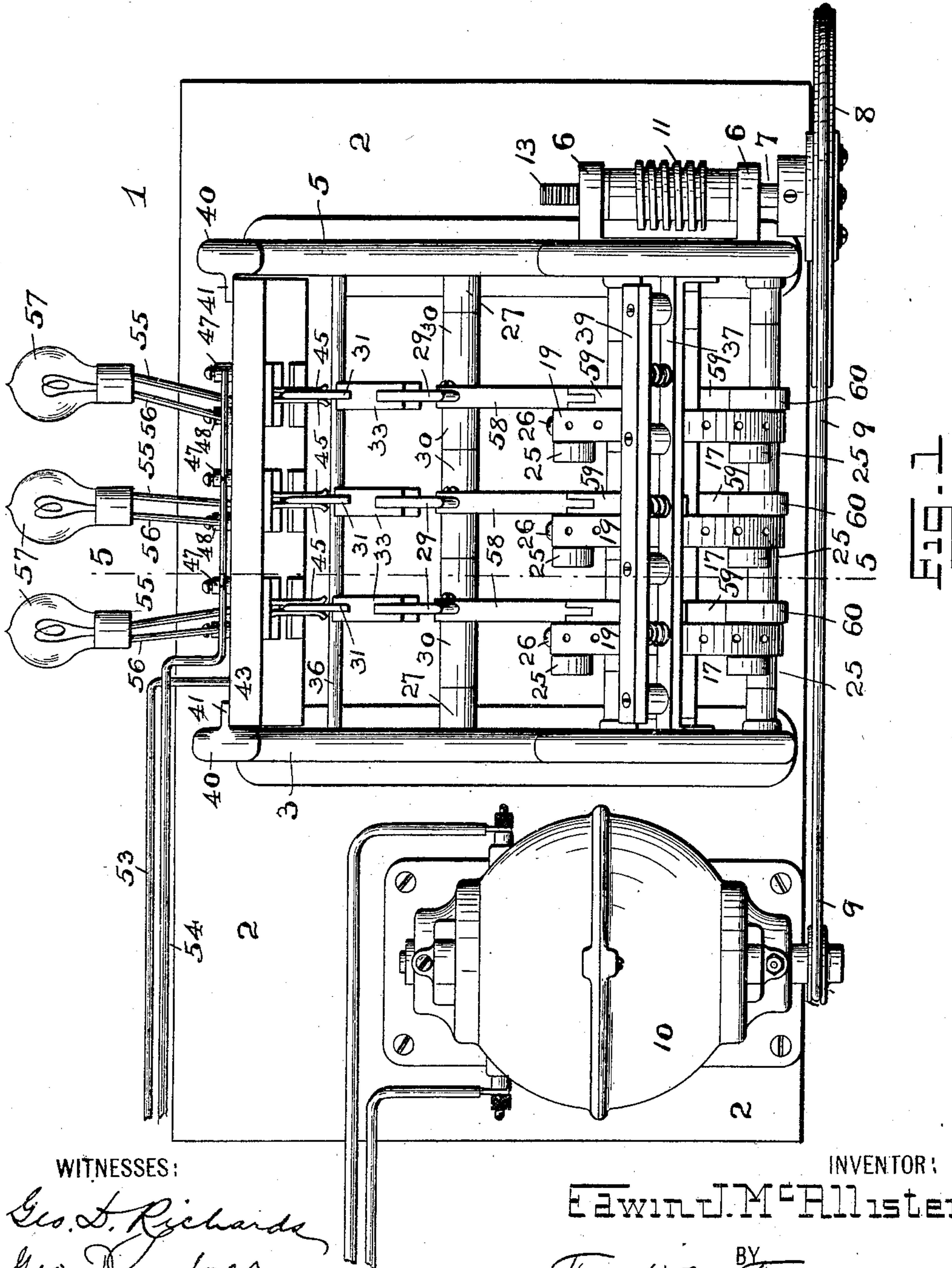


Fig. 1

WITNESSES:

*Geo. S. Richards*  
*Geo. Douglass*

INVENTOR:

*E. J. McAllister*

BY

*Fred L. Fraentzel*  
ATTORNEY

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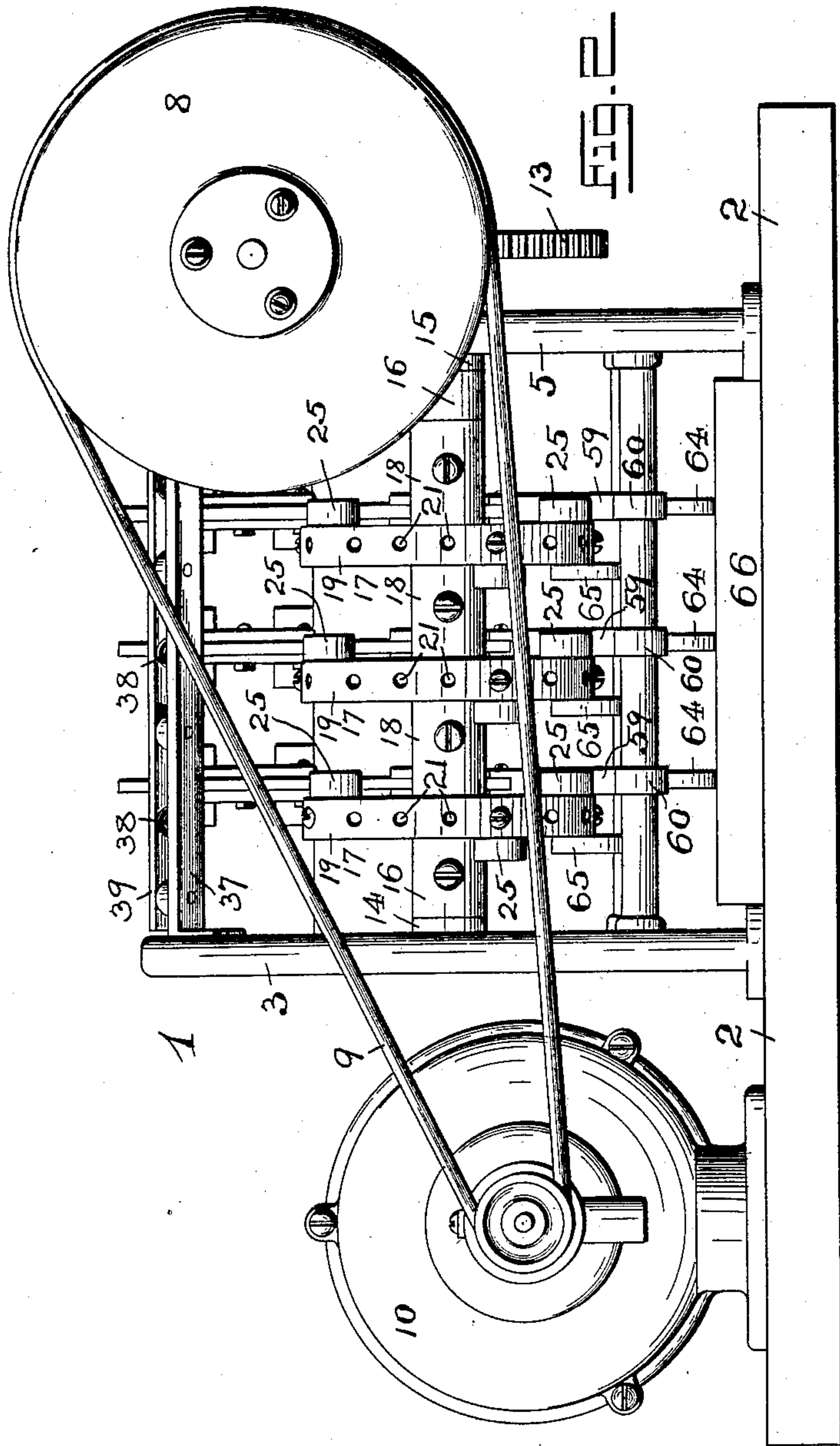
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5 SHEETS—SHEET 2.



WITNESSES:

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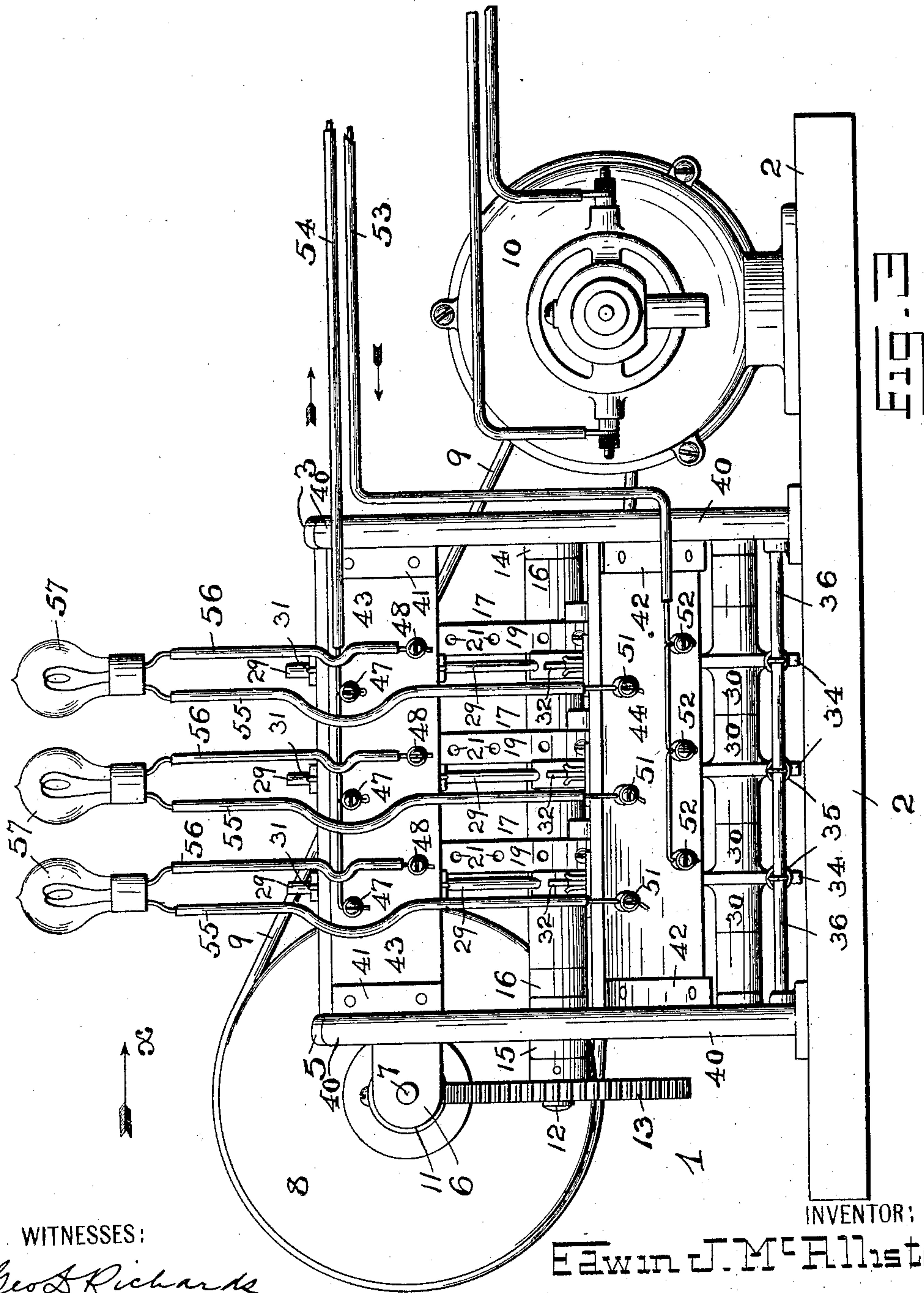
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5 SHEETS—SHEET 3.



WITNESSES:

*Geo. S. Richards*  
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INVENTOR:

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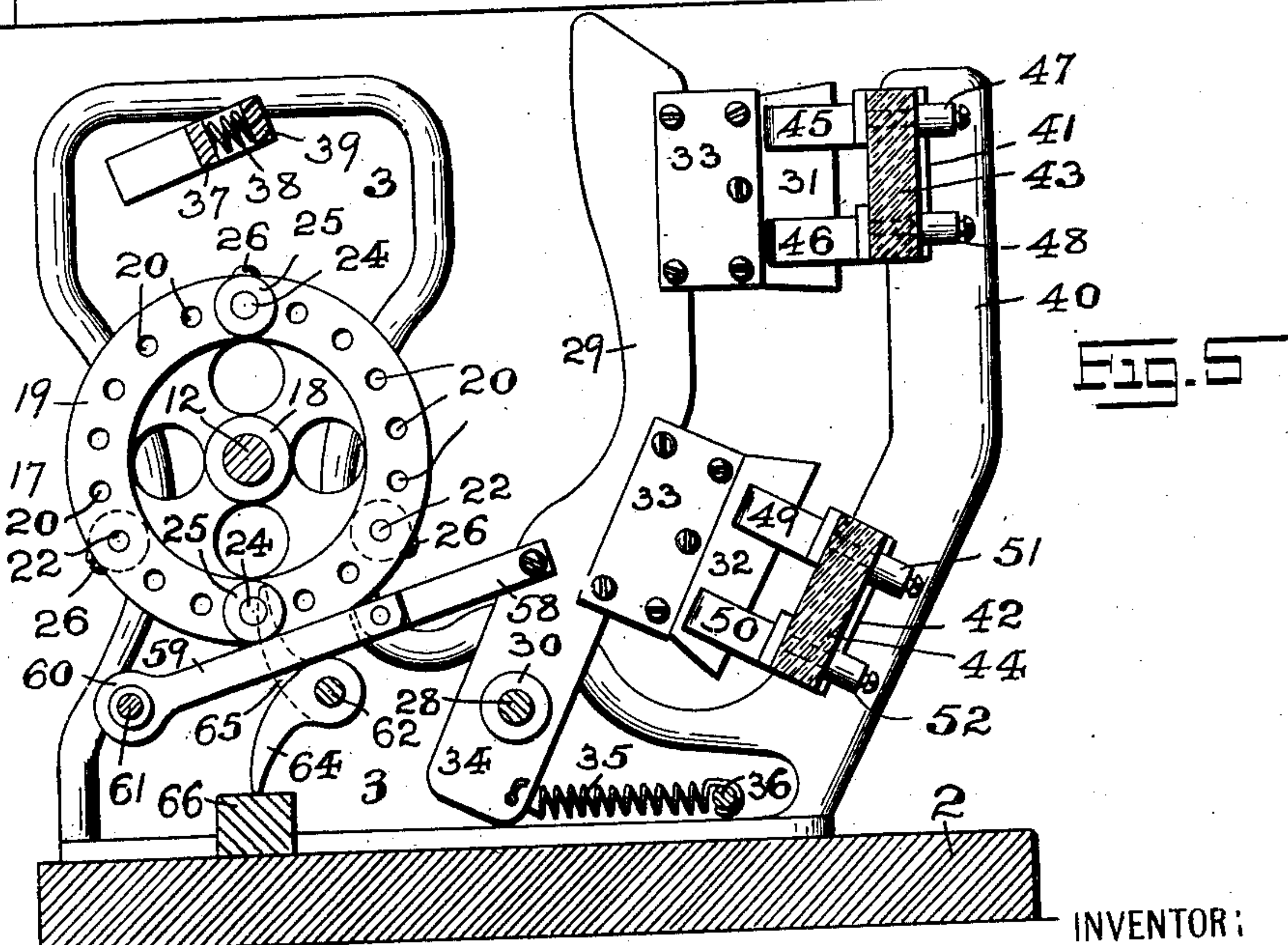
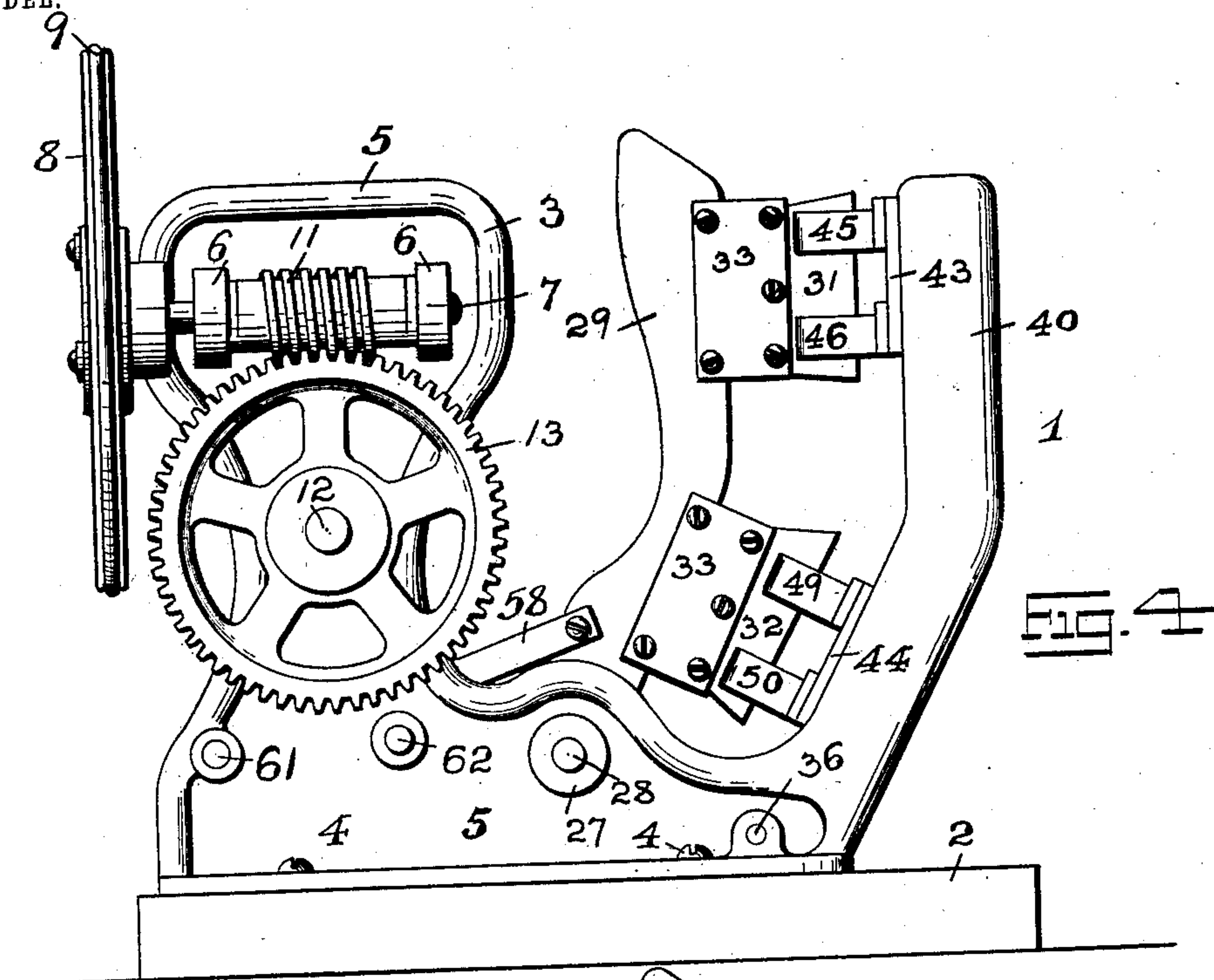
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5 SHEETS—SHEET 4.

NO MODEL.



WITNESSES:

*Geo. S. Richards*  
*Geo. Douglass*

INVENTOR:  
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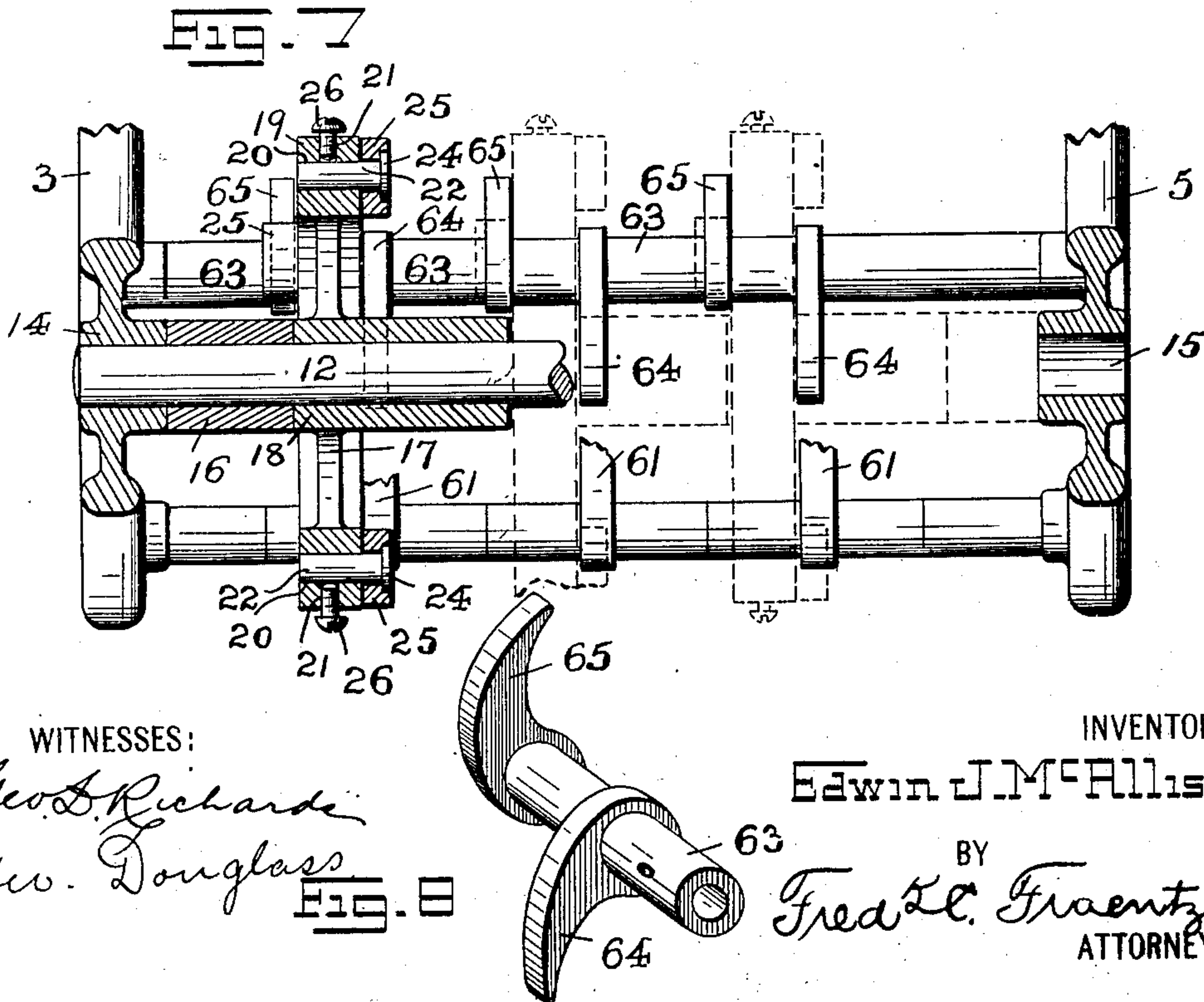
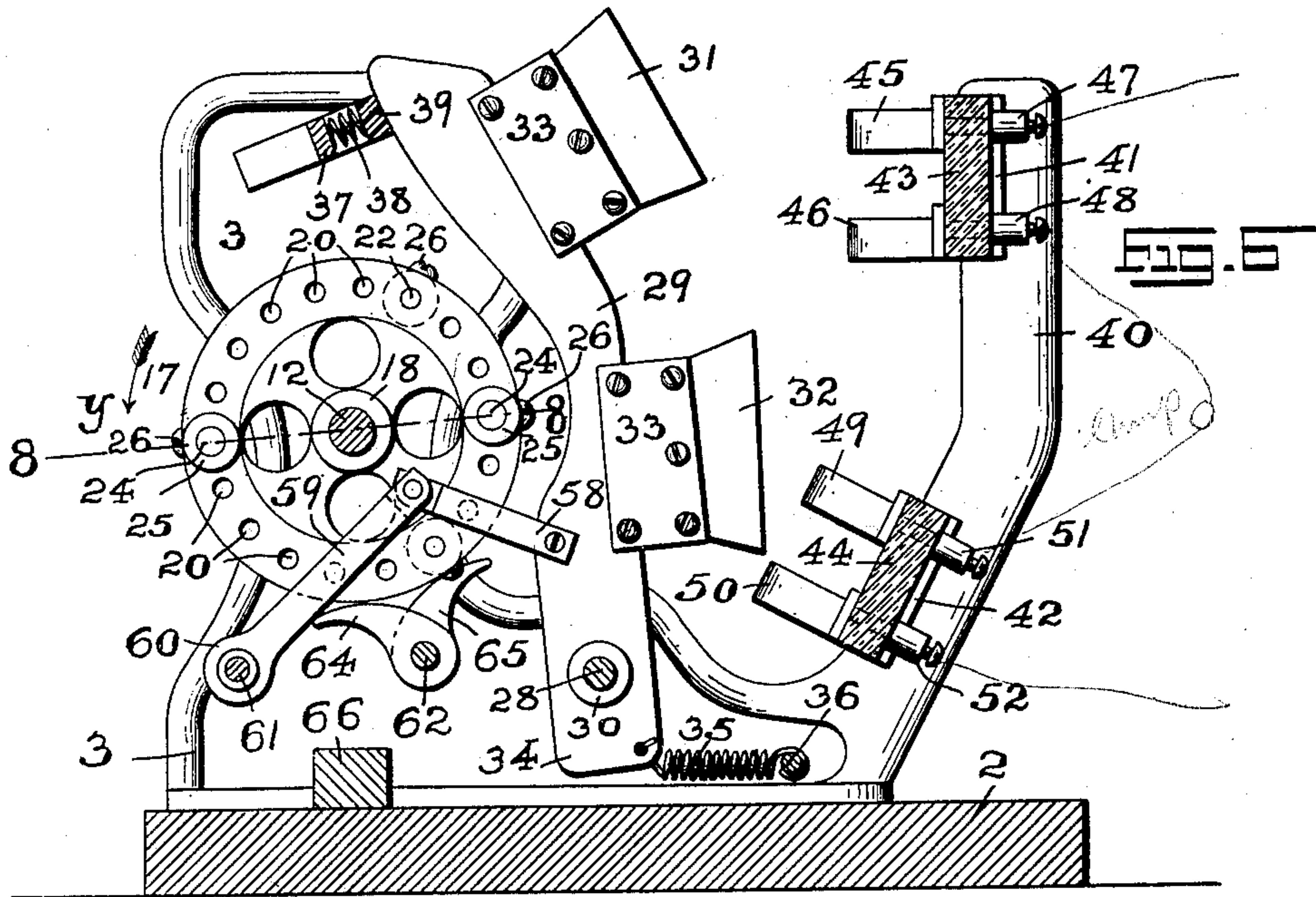
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CIRCUIT CONTROLLER.

APPLICATION FILED JULY 29, 1902.

NO MODEL.

5 SHEETS—SHEET 5.



WITNESSES:

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Fig. 8

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# UNITED STATES PATENT OFFICE.

EDWIN J. McALLISTER, OF NEWARK, NEW JERSEY.

## CIRCUIT-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 737,949, dated September 1, 1903.

Application filed July 29, 1902. Serial No. 117,465. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN J. McALLISTER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Circuit-Controllers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention relates to a novel construction of circuit-controller for automatically lighting and extinguishing any number of electric lamps to direct the current to such lamps forming the letters of an illuminated sign or other electrical illumination to produce scenic effects; and the invention has for its principal objects to provide a simply-constructed and effectively-operating controller that may be readily adjusted to direct the current to the respective letters of a sign in any desired order, lighting the lamps of each letter in succession or sequence and then extinguishing the letters all at the same time, or lighting the lamps of the letters and extinguishing the same in any other desired combination.

A further object of the invention is to provide a novel construction of apparatus having any suitable number of double-pole contacts adapted to independently complete or control an independent circuit in which the lamps of a letter or the like are arranged, the mechanism for operating and actuating the double-pole contacts being independent of and entirely out of the electrical circuit or circuits, so that there will be no current passing through any part or parts of the apparatus proper.

Other objects of this invention not at this time more particularly mentioned will be clearly evident from the following description of the apparatus embodying the principles of this invention.

The present invention therefore consists, primarily, in the novel construction of apparatus hereinafter more fully set forth; and, furthermore, this invention consists in the

various novel arrangements and combinations of devices and parts, as well as in the details of the construction thereof, all of which will be described in detail in the following specification and then finally embodied in the clauses of the claim, which are appended to and form a part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a plan or top view of a circuit-controller embodying the features of the present invention. Fig. 2 is a front elevation, and Fig. 3 is a rear elevation of the same. Fig. 4 is an end elevation of the apparatus looking in the direction of arrow *x* in Fig. 3, a source of motive power in the form of an electric motor shown in said Figs. 1, 2, and 3 having been omitted from this view. Fig. 5 is a transverse vertical section taken on line 5 5 in Fig. 1, representing the double-pole switch or contacts operated whereby a complete electric circuit is established through the lamps of one of the letters of a sign. Fig. 6 is a similar transverse section, the parts of the double-pole switch or contact, however, being represented in their normal initial positions when the circuit is broken and the lamps are extinguished. Fig. 7 is a detail horizontal section of the mechanically-operating parts of the apparatus, said section being taken on line 7 7 in Fig. 6 and the parts being represented on an enlarged scale. Fig. 8 is a perspective view of one of a set of cam-shaped arms or actuating-fingers used with the said parts which are represented in said Fig. 7.

Similar characters of reference are employed in all of the said hereinabove described views to indicate corresponding parts.

Referring now to the several figures of the drawings, the reference character 1 indicates the complete circuit-controller, the same comprising a suitable stand or base 2, preferably a piece of insulating material—such as a slate, marble, or other similar slab—on which is arranged and secured, preferably by means of screws 4, a pair of suitably-constructed standards or supporting-brackets 3 and 5, one of which, as 5, is provided with a pair of bearings 6, in which is rotatively arranged a spindle or shaft 7. The said spindle or shaft 7 is provided with a pulley 8, preferably a



grooved wheel, as shown, over which passes a belt 9, operated from the driving-wheel of an electric motor 10, suitably arranged and secured upon the base 2. Of course it will be understood that in place of the electric motor any other source of electrical or mechanical energy may be employed. That portion of the said spindle or shaft 7 between the said bearings 6 is provided with a suitably-constructed worm 11, which is in operative mesh with a worm-wheel 13, suitably secured upon the end of a main shaft or spindle 12 for producing the revolutions of said spindle or shaft in its bearings 14 and 15 in the respective side frames 3 and 5 of the apparatus. A pair of collars 16 are arranged and secured upon the said spindle or shaft 12, said collars being closely located against the inner surface portions of the hubs of said bearings 14 and 15, as clearly illustrated in Fig. 3 of the drawings, to prevent any displacement of the said shaft or spindle from said bearings, and thereby constantly retaining said shaft or spindle in its rotative and operative position. Suitably secured in fixed positions upon the said shaft or spindle 12, so as to revolve with the same, are any desirable number of wheels or disks 17, each disk having a hub 18, by means of which it is arranged upon the said spindle or shaft 12. Each wheel or disk 17 is also made with an approximately heavy and wide rim 19, provided with any desirable and suitable number of receiving holes or perforations 20, all on a circle having its center in the central longitudinal axis of the shaft or spindle 12 and all holes or perforations extending from the one side to the other side of said rim 19, as clearly illustrated. Each disk or wheel 17 is also provided in its cylindrical surface of the rim 19 with a number of diametrically-extending and screw-threaded holes 21, corresponding in number to the number of holes 20 and each hole 21 being in communication with a hole 20, substantially as shown in Fig. 7 of the drawings. In any one or more of said holes 20 of each disk or wheel 17 are suitable pins 22, provided with the heads 24. Each pin has rotatively arranged on its portion extending beyond the side of the rim 19 between its head 24 and the said side of the rim a roller 25, substantially as illustrated in the several figures of the drawings and for the purposes to be hereinafter more particularly set forth. To retain the said pins 22 in their respective positions in the holes 20 and against accidental displacement therefrom, a set-screw 26 is screwed in the proper hole 21, so that the end of the screw 26 will firmly bear against the pin 22, and thereby retain the latter in its fixed position with a portion projecting from either the right or left side of the rim 19, as the case may be, until the said screw 26 is again unscrewed to permit of the removal of the pin 22 and its roller 25 thereon, and arrange said pin in another hole 20, if desired, in which it can then

be held in the manner just described. The said side frames or standards 3 and 5 are also provided with another set of bearings 27, in which is an oscillating bar 28, upon which I have fixed, by means of suitable hubs 30, a number of upwardly-extending lever-arms 29, said arms corresponding to the exact number of wheels or disks 17 used, and each lever-arm 29 having suitably secured thereto a pair of contacts 31 and 32, each contact 31 and 32 being insulated from the arm 29 by a block 33 of any suitable insulating material. Each lever-arm 29 has also attached to its lower end portion 34 the end of a coiled spring 35, which in turn is connected at its opposite end with a rod 36, suitably arranged between the side frames 3 and 5 of the apparatus, or the ends of said springs may be attached to any other parts of the framework of the apparatus. The normal tendency of the said springs 35 is to throw the upper portions of each lever-arm 29 back against a suitably-cushioned stop, consisting, essentially, of a bar 37, suitably secured between the inner surfaces of the side frames 3 and 5 and provided with suitably-disposed springs 38 and a flexible cushion 39 of rubber or the like, all of which is clearly illustrated in Fig. 6 of the drawings. Each side frame 3 and 5 is also made with an upwardly-extending bracket or post 40, each bracket or post 40 being provided with a pair of inwardly-extending ribs or lugs 41 and 42. To the upper ribs or lugs 41 I have secured, in any suitable manner, a plate or bar 43 of a suitable insulating material, as slate or the like, and to the lower ribs or lugs 42 I have secured another bar 44 of insulating material, such as slate or the like. The upper plate or bar 43 is provided with a pair of spring-contacts 45 and 46, a binding-post 47 being connected with the contact 45 and a binding-post 48 being connected with the contact 46. The lower plate or bar 44 is in a like manner provided with pairs of spring-contacts 49 and 50, a binding-post 51 being connected with the contact 49 and a binding-post 52 being connected with the contact 50. Thus when the contacts 31 of any one or more of the lever-arms 29 are shunted, respectively, between and across the spring-contacts 45 and 46, and the contacts 32 of the same arms 29 are shunted, respectively, between and across the spring-contacts 49 and 50, the respective posts 52 being in the main-circuit wire 53, the posts 47 being in the other main-circuit wire 54, and the respective posts 51 and 48 being in a circuit 55 56, in which is arranged one or more electric lamps, as 57, according to the effect desired, a complete electrical circuit will be established through the wire 53 to post 52, from post 52 to spring-contact 50, and by the contact 32 to the spring-contact 49, then to post 51, wire 55, lamp or lamps 57, and wire 56 to the binding-post 48, then to spring-contact 46 and bar-contact 31, to spring-contact 45, to binding-post 47, and finally com-



pleting the electric circuit through the main return-wire 54. In this manner a complete electrical circuit can be established by the mechanical apparatus or circuit-controller 5 without having any of the principal parts of the apparatus in the main circuit, and thus there is no necessity of passing the current through any one of the essential parts of the apparatus.

10 The operations of the various mechanical parts of the apparatus for actuating the lever-arms 29 are such that the electric circuits can be completed through any one or more lamps 57 or any one or more sets of lamps in 15 any order desired whereby the lamps can all be lighted at one time and then extinguished at one time, or the lamps can be lighted in sequence and thrown out of circuit simultaneously, or vice versa, or any other enumerable combinations for producing various illuminating effects can be produced. The mechanism actuating the said lever-arms 29, where- 20 by the double-pole contacts are made, comprises a set of pivotally-connected links 58 and 59, the link 58 being pivotally connected in any suitable manner with a lever-arm 29, and the other link 59 having an eye portion 60 arranged on a cross-rod 61 between the two side frames 3 and 5. Of course it will 30 be understood that in the apparatus there are the same number of sets of links 58 and 59 as there are disks or wheels 17 and lever-arms 29. Upon another rod 62 between the said side frames 3 and 5 are a number of sleeves 63, corresponding in number to the 35 number of wheels or disks 17, the said sleeves 63 being formed with a pair of cam-shaped arms or fingers 64 and 65, extending at different angles from said sleeve 63, as will be clearly seen from an inspection of the several figures of the drawings, and more particularly from Fig. 8. The said cam arms or fingers 64 and 65 on each sleeve 63 are spaced 40 far enough apart that when the sleeves 63 have been arranged upon the rod 62 the cam arms or fingers 64 will be located in close proximity to the right sides of the rim 19 of the wheel or disk 17, and the cam arm or finger 65 will be located at the left side of the 50 said rim 19, as will be seen from an inspection of Fig. 7.

The operation of the apparatus is, briefly, as follows: The normal initial positions of the various parts of the machine are clearly illustrated in Fig. 6 of the drawings. Now when 55 the electric or other motor 10 drives the wheel 8 and shaft 7 the worm 11 actuates the worm-wheel 13, whereby the main shaft 12 and the various wheels or disks 17 are revolved in the direction of the arrow *y* in said Fig. 6. During the rotary movement of the disk or wheel 17 a roller 25 on the right side of the rim 19 of the disk or wheel will be brought in rolling engagement with the upper edge of the 60 link 59, causing the two links 59 and 58 to assume a straightened-out relation, as clearly indicated in Fig. 4. This action of the two

links 59 and 58 has moved the lever-arm 29 from its normally inoperative position represented in said Fig. 6 to its contact-producing position illustrated in said Fig. 4. 70 At the same time the lower edge of the link 59 has caused the cam arm or finger 64 to be moved in a lowered position until brought in engagement with a stop 66 (see Fig. 5) and 75 bringing the other cam arm or finger 65 in the raised position indicated in said Fig. 5. During the further rotation of the said disk or wheel 17 the lever-arm 29 remains in its contact-making position until a roller 25 on 80 the left side of the rim 19 of the wheel or disk 17 is brought against the now raised cam arm or finger 65 and forces the same into its previously-lowered position. At the same time the other cam arm or finger 64 is 85 raised against the lower edge of the link 59, the links 59 and 58 being brought into their angular relation and causing the contacts 31 and 32 of the lever-arm 29 to be withdrawn from the previous contact relations with the 90 spring-contacts 45 and 46 and 49 and 50, the spring 58 coacting with the lever-arm 29 to return its upper end portion into its initial normal position against the spring-cushion, as previously described, and as illustrated in 95 Fig. 6.

From the hereinabove description it will be obvious that by the adjustable arrangement of the pins 22 and the rollers 25 thereon and used in connection with the said disks or 100 wheels 17 any number of different combinations may be made for causing the illumination of the different letters of a sign or for producing other illuminated effects, and it will also be evident that my novel circuit-con- 105 troller may also be used for controlling different electric-light circuits for cutting in and out of circuit differently-colored lamps.

I am fully aware that changes may be made in the various arrangements and combina- 110 tions of the parts, as well as in the details of the construction of the said parts, without departing from the scope of my present invention. Hence I do not limit my invention to the exact arrangements and combinations 115 of the parts as described in the foregoing specification and as illustrated in the accompanying drawings, nor do I confine myself to the exact details of the construction of the said parts. 120

It will also be understood by setting the two side frames 3 and 5 of the apparatus closer together or farther apart, making the various shafts and rods of corresponding lengths, that 125 the number of disks or wheels 17; the lever-arms 29, the double-pole contacts, and other parts of mechanism coöperating with the said disks or wheels may be varied, and, furthermore, the respective disks or wheels 17 may be provided with any desirable number of 130 holes 20 and 21 and with one or more pins 22 and rollers 25, whereby an electric circuit may be completed and interrupted but once during one complete revolution of a wheel or



disk 17, or the circuit may be completed and broken several times during each revolution of a disk or wheel 17.

Having thus described my invention, what I claim is—

1. A circuit-controller, comprising, an arrangement of brackets, connecting-bars of insulating material between said brackets, double-pole contacts on said bars, a series of pivoted lever-arms, insulated contacts on said lever-arms, adapted to be brought in contact with said double-pole contacts, and means coöperating with said lever-arms for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

2. A circuit-controller, comprising, an arrangement of brackets, connecting-bars of insulating material between said brackets, double-pole contacts on said bars, a series of spring-actuated lever-arms, insulated contacts on said lever-arms, adapted to be brought in contact with said double-pole contacts, and means coöperating with said lever-arms for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

3. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, and a pair of brackets, connecting-bars of insulating material between said brackets, double-pole contacts on said bars adapted to be arranged in said circuits, a series of pivoted lever-arms, insulated contacts on said lever-arms, adapted to be brought in contact with said double-pole contacts, and means coöperating with said lever-arms for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

4. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, and a pair of brackets, connecting-bars of insulating material between said brackets, double-pole contacts on said bars, adapted to be arranged in said circuits, a series of pivoted and spring-actuated lever-arms, insulated contacts on said lever-arms adapted to be brought in contact with said double-pole contacts, and means coöperating with said lever-arms for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

5. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, a series of double-pole contacts adapted to be arranged in circuits, a series of pivoted lever-arms, insulated contacts on said lever-arms, adapted to be brought in contact with said double-pole contacts, a main shaft rotatively arranged in bearings in said side frames, wheels on said shaft, and mechanism intermediately arranged between said wheels and said lever-arms for producing

a swinging movement of said arms, substantially as and for the purposes set forth.

6. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, a series of double-pole contacts adapted to be arranged in circuits, a series of pivoted and spring-actuated lever-arms, insulated contacts on said lever-arms adapted to be brought in contact with said double-pole contacts, a main shaft rotatively arranged in bearings in said side frames, wheels on said shaft, and mechanism intermediately arranged between said wheels and said lever-arms for producing a swinging movement of said arms, substantially as and for the purposes set forth.

7. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, a series of double-pole contacts adapted to be arranged in circuits, a series of pivoted lever-arms, insulated contacts, on said lever-arms adapted to be brought in contact with said double-pole contacts, a main shaft rotatively arranged in bearings in said side frames, wheels on said shaft, interchangeable actuating-rollers on said wheels, and means intermediately arranged between said wheels and said lever-arms with which said rollers are brought in engagement for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

8. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, a series of double-pole contacts adapted to be arranged in circuits, a series of pivoted and spring-actuated lever-arms, insulated contacts on said lever-arms adapted to be brought in contact with said double-pole contacts, a main shaft rotatively arranged in bearings in said side frames, wheels on said shaft, interchangeable actuating-rollers on said wheels, and means intermediately arranged between said wheels and said lever-arms with which said rollers are brought in engagement for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

9. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, a series of double-pole contacts adapted to be arranged in circuits, a series of pivoted lever-arms, insulated contacts on said lever-arms adapted to be brought in contact with said double-pole contacts, a main shaft rotatively arranged in bearings in said side frames, wheels on said shaft, provided with perforations, pins removably arranged in said perforations, a roller on each pin, and means intermediately arranged between said wheels and said lever-arms with which said rollers are brought in engagement



for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

10. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, a series of double-pole contacts adapted to be arranged in circuits, a series of pivoted and spring-actuated lever-arms, insulated contacts on said lever-arms, adapted to be brought in contact with said double-pole contacts, a main shaft rotatively arranged in bearings in said side frames, wheels on said shaft, provided with perforations, pins removably arranged in said perforations, a roller on each pin, and means intermediately arranged between said wheels and said lever-arms with which said rollers are brought in engagement for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

11. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, a series of double-pole contacts adapted to be arranged in circuits, a series of pivoted lever-arms, insulated contacts on said lever-arms, adapted to be brought in contact with said double-pole contacts, a main shaft rotatively arranged in bearings in said side frames, wheels on said shaft provided with perforations, pins projecting from the opposite sides of each wheel removably arranged in said perforations, a roller on each pin, a cross-rod between said side frames, a pair of pivotally-connected links, respectively connected with a lever-arm and with said cross-rod, a second cross-rod between said side frames, and cam-shaped fingers on said second rod, the rollers on one side of the wheel engaging with one of said links for forcing a lever-arm in a forward direction to make electrical contact, and the rollers on the other side of the wheel engaging with one of said cam-fingers for causing the return of the lever-arm to its initial normal position, substantially as and for the purposes set forth.

12. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, comprising a pair of side frames, a series of double-pole contacts adapted to be arranged in circuits, a series of pivoted and spring-actuated lever-arms, insulated contacts on said lever-arms adapted to be brought in contact with said double-pole contacts, a main shaft rotatively arranged in bearings in said side frames, wheels on said shaft provided with perforations, pins projecting from the opposite sides of each wheel removably arranged in said perforations, a roller on each pin, a cross-rod between said side frames, a pair of pivotally-connected links, respectively connected with a lever-arm and with said cross-rod, a second cross-rod between said side frames, and cam-shaped fingers on said second rod, the rollers on one side of the wheel

engaging with one of said links for forcing a lever-arm in a forward direction to make electrical contact, and the rollers on the other side of the wheel engaging with one of said cam-fingers for causing the return of the lever-arm to its initial normal position, substantially as and for the purposes set forth.

13. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, a series of contacts adapted to be arranged in said circuits, combined with a rotary wheel provided with a number of perforations in the sides thereof, of interchangeable setting means arranged and secured in said perforations, and means adapted to be actuated by said setting means for completing an electric circuit through said contacts, substantially as and for the purposes set forth.

14. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, a series of contacts, adapted to be arranged in said circuits, combined with a rotary wheel provided with a number of perforations in the sides thereof, of interchangeable setting means arranged and secured in said perforations, and means adapted to be actuated by said setting means for completing an electric circuit through said contacts, consisting essentially, of a pivoted lever-arm provided with an insulated contact, and intermediately-arranged and pivotally-connected links with which said setting means is brought in operative engagement, substantially as and for the purposes set forth.

15. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, a series of contacts adapted to be arranged in said circuit, combined with a rotary wheel provided with a number of perforations in the sides thereof, of an interchangeable setting means arranged and secured in at least one of said perforations and extending from one side of the wheel, and an interchangeable releasing means, arranged and secured in at least one other of said perforations and extending from the opposite side of the wheel, and devices adapted to be actuated by said setting means for completing an electric circuit through said contacts and to be actuated by said releasing means for breaking said circuit, substantially as and for the purposes set forth.

16. The combination, with electric circuits and lamps arranged to form words or scenic effects, a circuit-controller, a series of contacts, adapted to be arranged in said circuit, combined with a rotary wheel provided with a number of perforations in the sides thereof, of an interchangeable setting means arranged and secured in at least one of said perforations and extending from one side of the wheel, and an interchangeable releasing means arranged and secured in at least one other of said perforations and extending from the opposite



side of the wheel, a pivoted lever-arm provided with an insulated contact, and intermediately-arranged and pivotally-connected links with which said setting means is brought  
 5 in operative engagement for setting said lever and its contact and thereby establish a complete electrical circuit, and a set of cam-shaped fingers one of which is actuated by the movement of said links for setting the  
 10 second cam-shaped finger, and said second cam-shaped finger being adapted to be engaged by said releasing means on the opposite side of the wheel to cause the return of the said lever-arm to its normal initial position, substantially as and for the purposes set forth.

17. A circuit-controller, comprising, a pair of side frames, a series of double-pole contacts, a series of pivoted lever-arms, insulated  
 20 contacts on said lever-arms adapted to be brought in contact with said double-pole contacts, a rotatable shaft arranged between said side frames, wheels on said shaft, and mechanism intermediately arranged between said  
 25 wheels and said lever-arms for producing a swinging movement of said arms, substantially as and for the purposes set forth.

18. A circuit-controller, comprising, a pair of side frames, a series of double-pole contacts, a series of pivoted and spring-actuated lever-arms, insulated contacts on said lever-arms adapted to be brought in contact with  
 30 said double-pole contacts, a rotatable shaft arranged between said side frames, wheels on said shaft, and mechanism intermediately arranged between said wheels and said lever-arms for producing a swinging movement of said arms, substantially as and for the purposes set forth.

19. A circuit-controller, comprising, a pair of side frames, a series of double-pole contacts, a series of pivoted lever-arms, insulated contacts on said lever-arms adapted to be brought in contact with said double-pole contacts, and a rotatable shaft arranged between  
 40 said side frames, wheels on said shaft, interchangeable actuating-rollers on said wheels, and means intermediately arranged between said wheels and said lever-arms with which  
 45 said rollers are brought in engagement for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

20. A circuit-controller, comprising, a pair of side frames, a series of double-pole contacts, a series of pivoted and spring-actuated lever-arms, insulated contacts on said lever-arms adapted to be brought in contact with  
 55 said double-pole contacts, a rotatable shaft arranged between said side frames, wheels on said shaft, interchangeable actuating-rollers on said wheels, and means intermediately arranged between said wheels and said lever-  
 60 arms with which said rollers are brought in engagement for producing a swinging movement of said lever-arms, substantially as and for the purposes set forth.

21. A circuit-controller, comprising, a series of contacts, a rotary wheel provided with a number of perforations, of interchangeable  
 70 setting means arranged and secured in said perforations, and means adapted to be actuated by said setting means for completing an electric circuit through said contacts, consisting, essentially, of a pivoted lever-arm  
 75 provided with an insulated contact, and intermediately-arranged and pivotally-connected links with which said setting means is brought in operative engagement, substantially as and for the purposes set forth.

22. A circuit-controller, comprising, a series of contacts, a rotary wheel provided with a number of perforations, an interchangeable setting means arranged and secured in at least one of said perforations and extending  
 85 from the side of the wheel, and an interchangeable releasing means arranged and secured in at least one other of said perforations and extending from the opposite side of the wheel, and devices adapted to be actuated by said setting means for completing an electric circuit through said contacts and to be actuated by said releasing means for breaking such circuit, substantially as and for the purposes set forth.

23. A circuit-controller, comprising, a series of contacts, a rotary wheel provided with a number of perforations, an interchangeable setting means arranged and secured in at least one of said perforations and extending  
 100 from the side of the wheel, and an interchangeable releasing means arranged and secured in at least one other of said perforations and extending from the opposite side of the wheel, and intermediately-arranged and  
 105 pivotally-connected links with which said setting means is brought in operative engagement for setting said lever and its contact and thereby establish a complete electric circuit, and a set of cam-shaped fingers one of  
 110 which is actuated by the movement of said links for setting the second cam-shaped fingers, and said second cam-shaped finger being adapted to be engaged by said releasing means on the opposite side of the wheel to  
 115 cause the return of said lever-arm to its normal initial position, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this  
 25th day of July, 1902.

EDWIN J. McALLISTER.

Witnesses:

W. LOCKE ROCKWELL,  
 GEO. D. RICHARDS.