

No. 760,387.

PATENTED MAY 17, 1904.

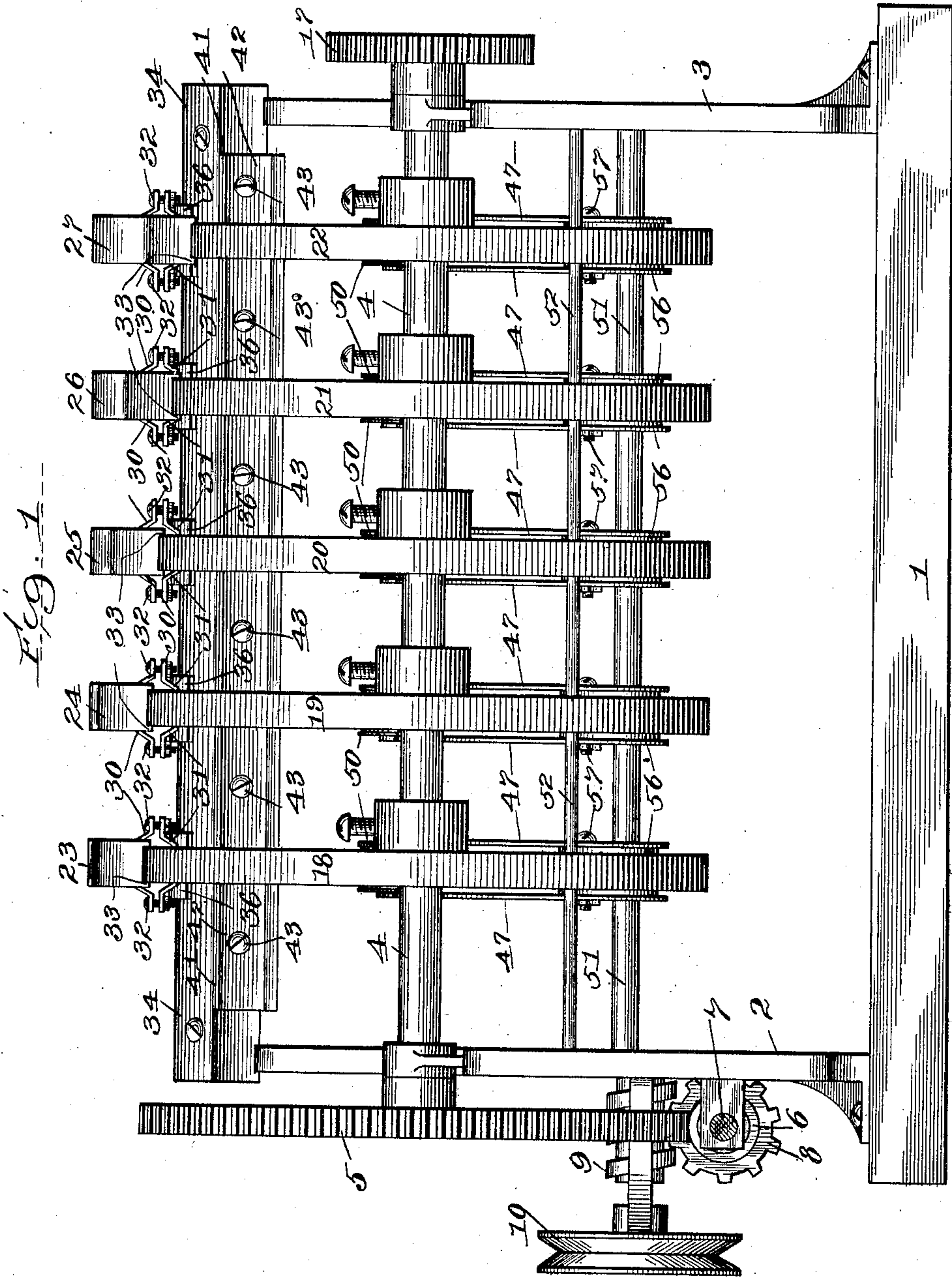
E. R. DULL.

ELECTRIC SWITCH.

APPLICATION FILED AUG. 5, 1901.

NO MODEL.

5 SHEETS—SHEET 1.



Witnesses:
Ray White.
Ray & White!

Inventor:
Egbert R. Dull.

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Jon's Bain Attorney

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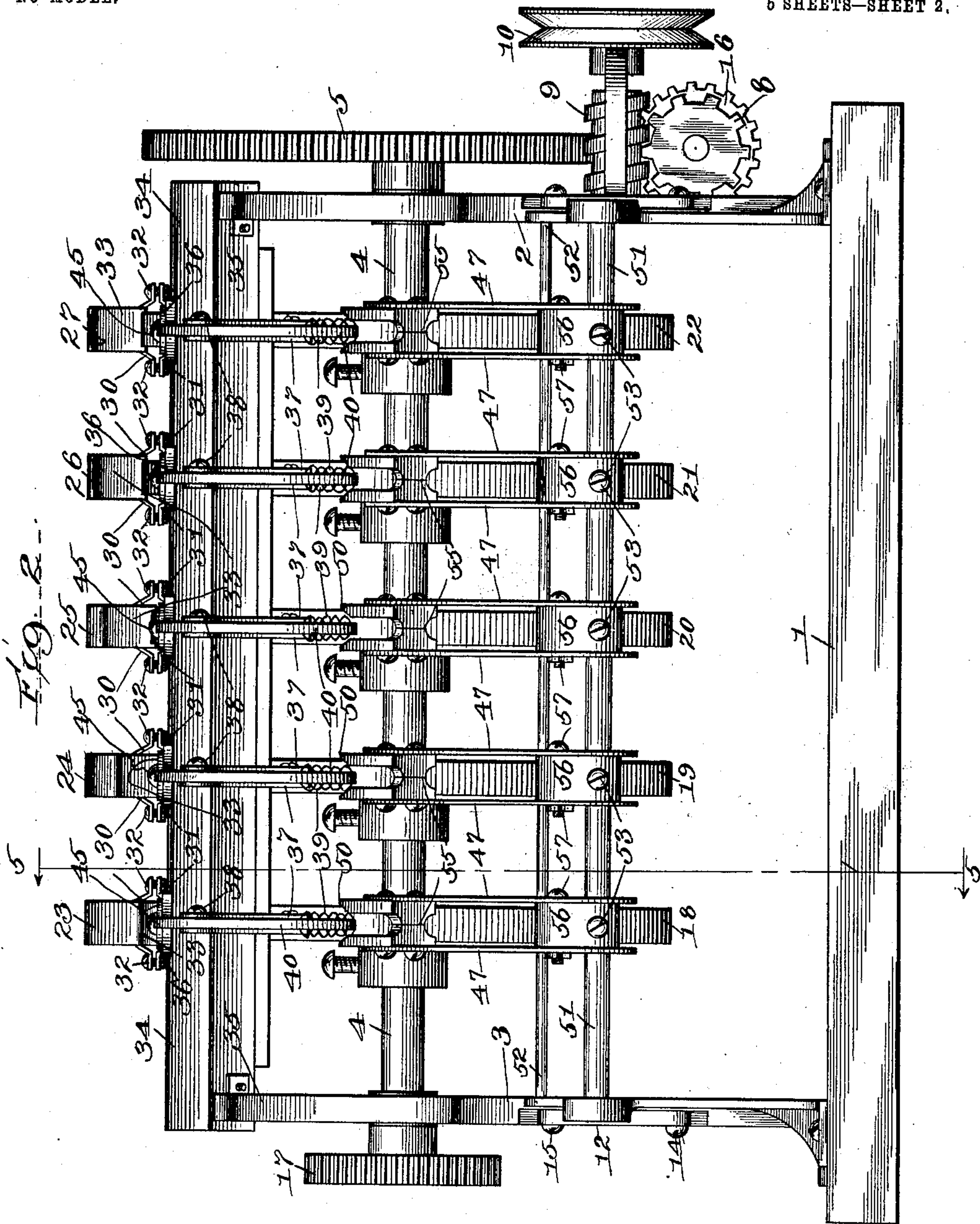
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5 SHEETS—SHEET 2.



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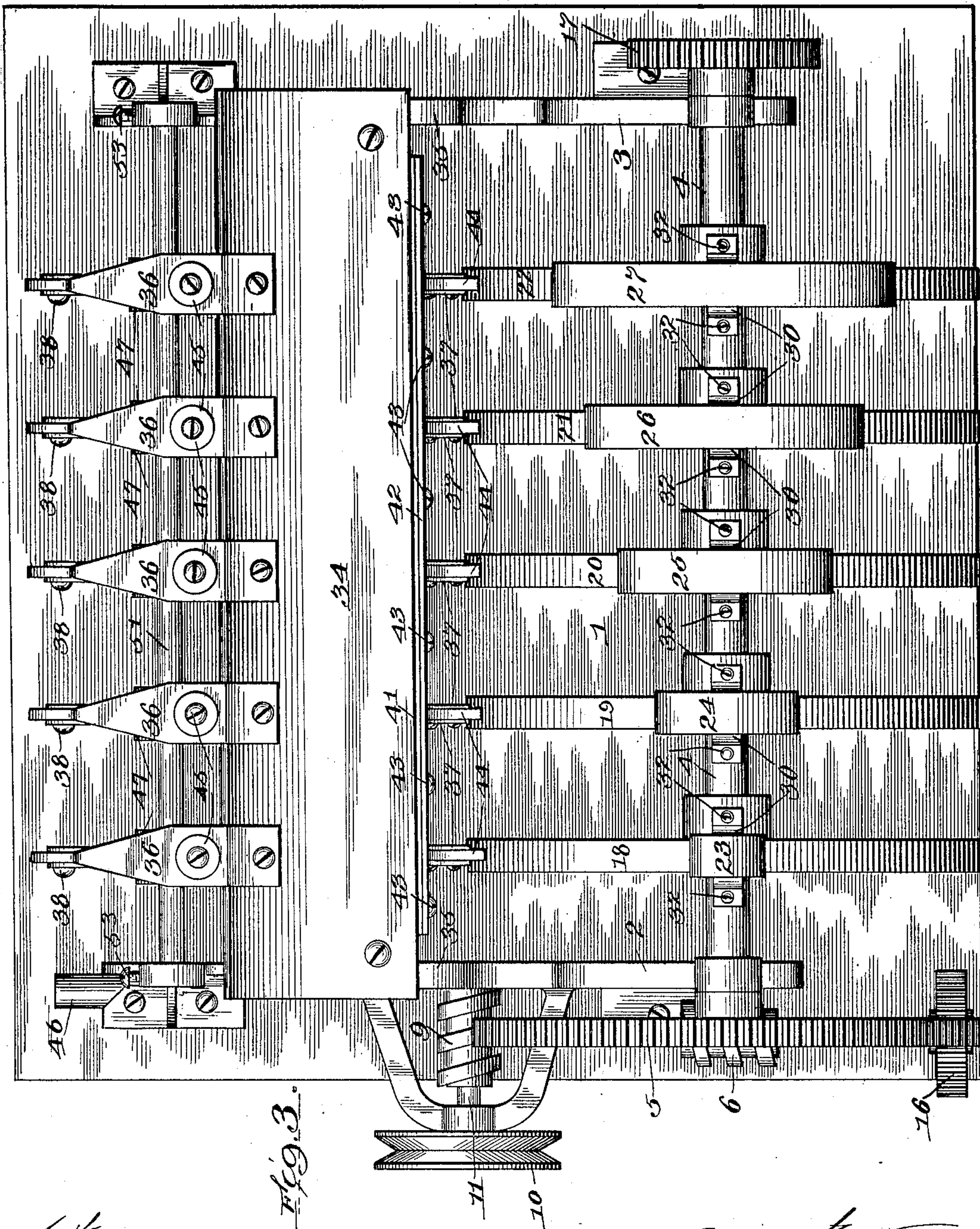
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5 SHEETS—SHEET 3.



Witnesses

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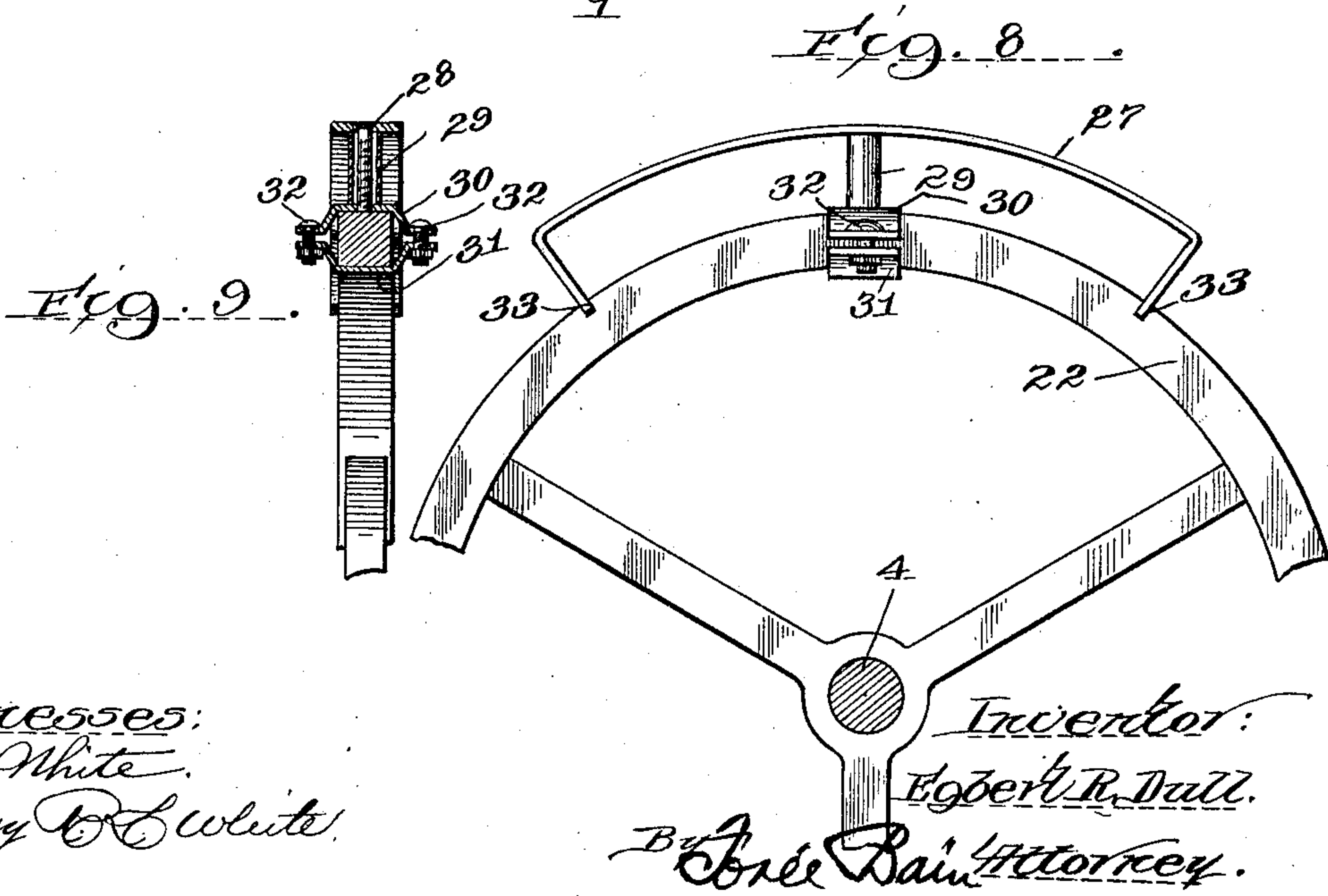
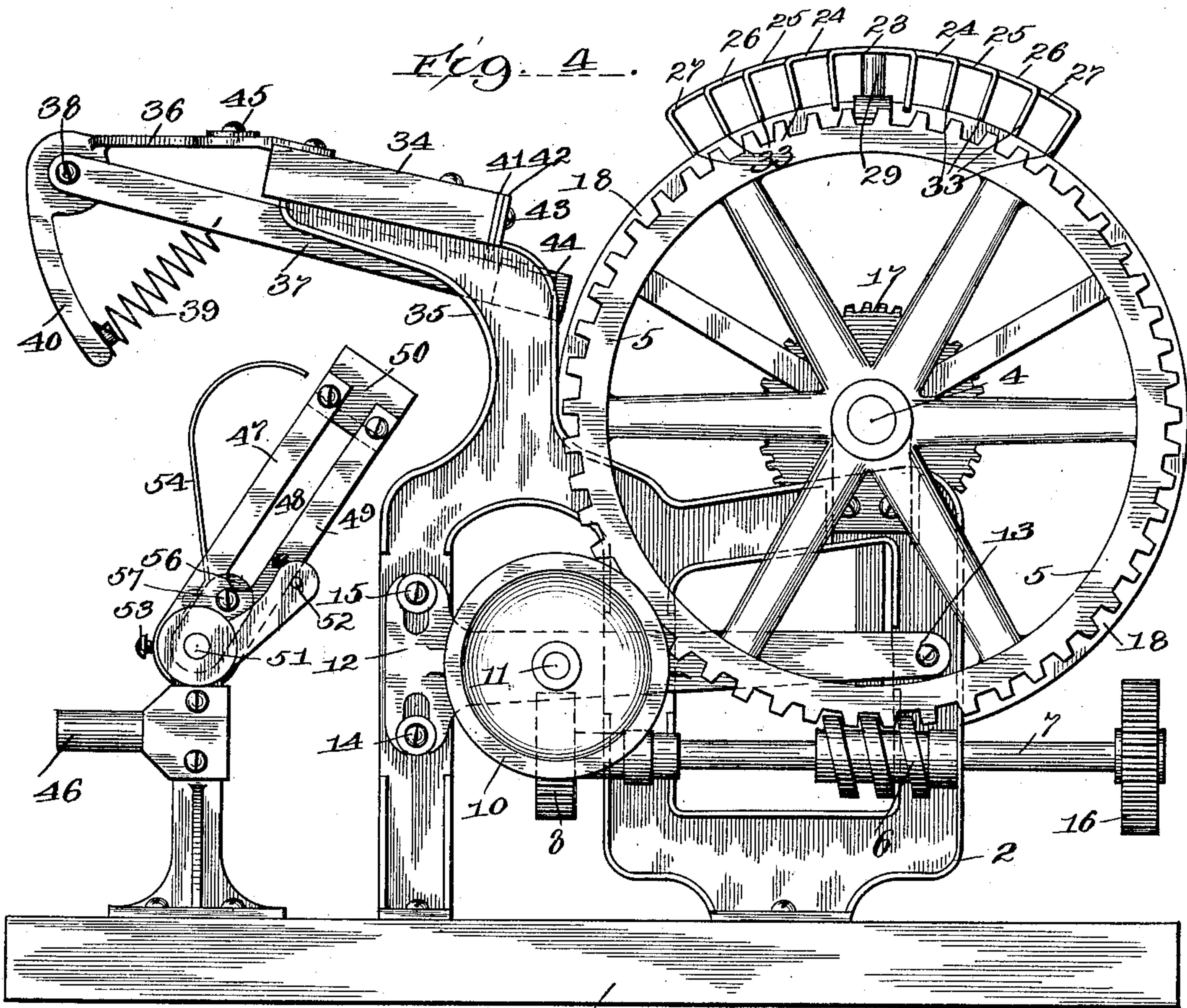
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NO MODEL.

5 SHEETS—SHEET 4.



Witnesses:
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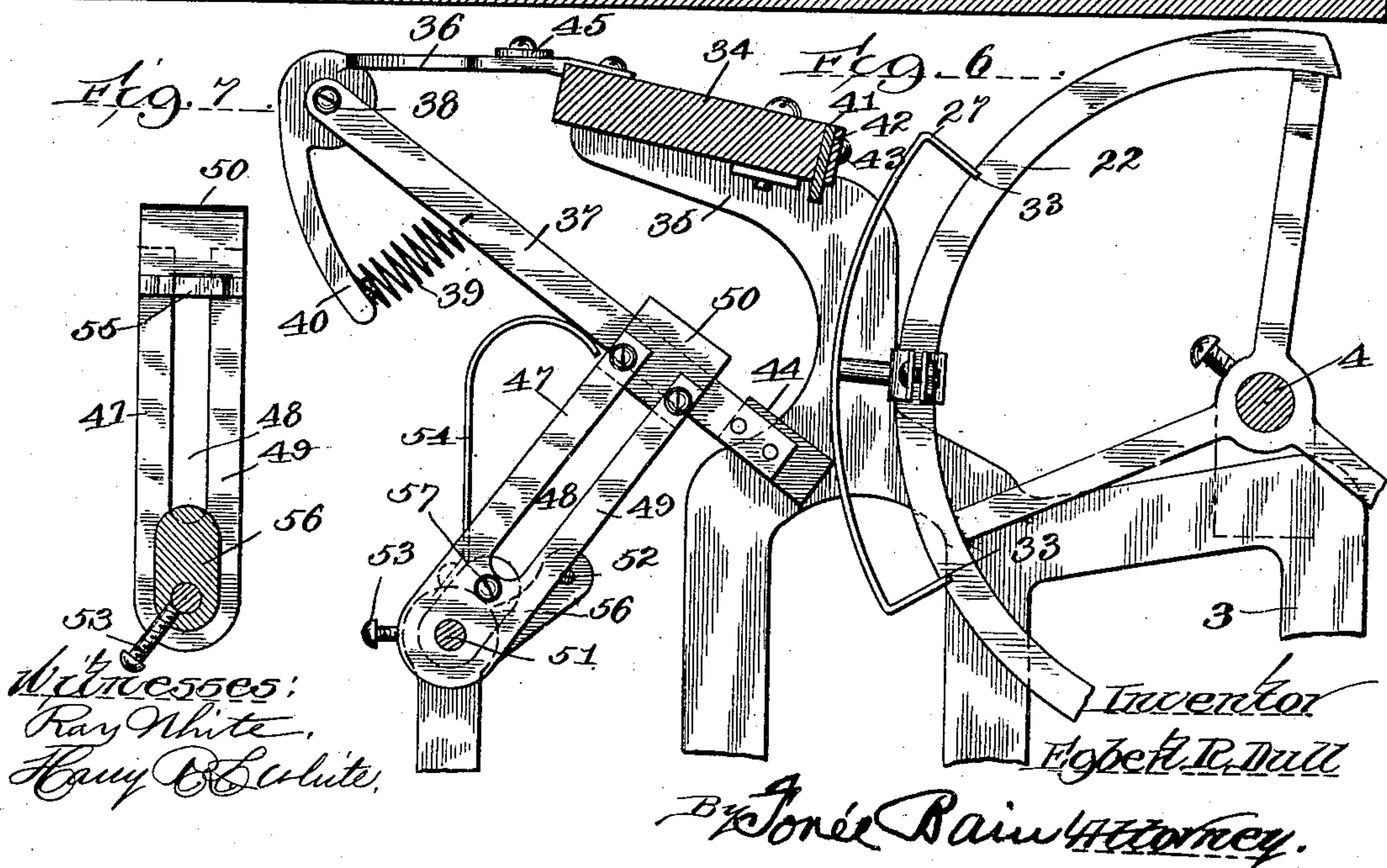
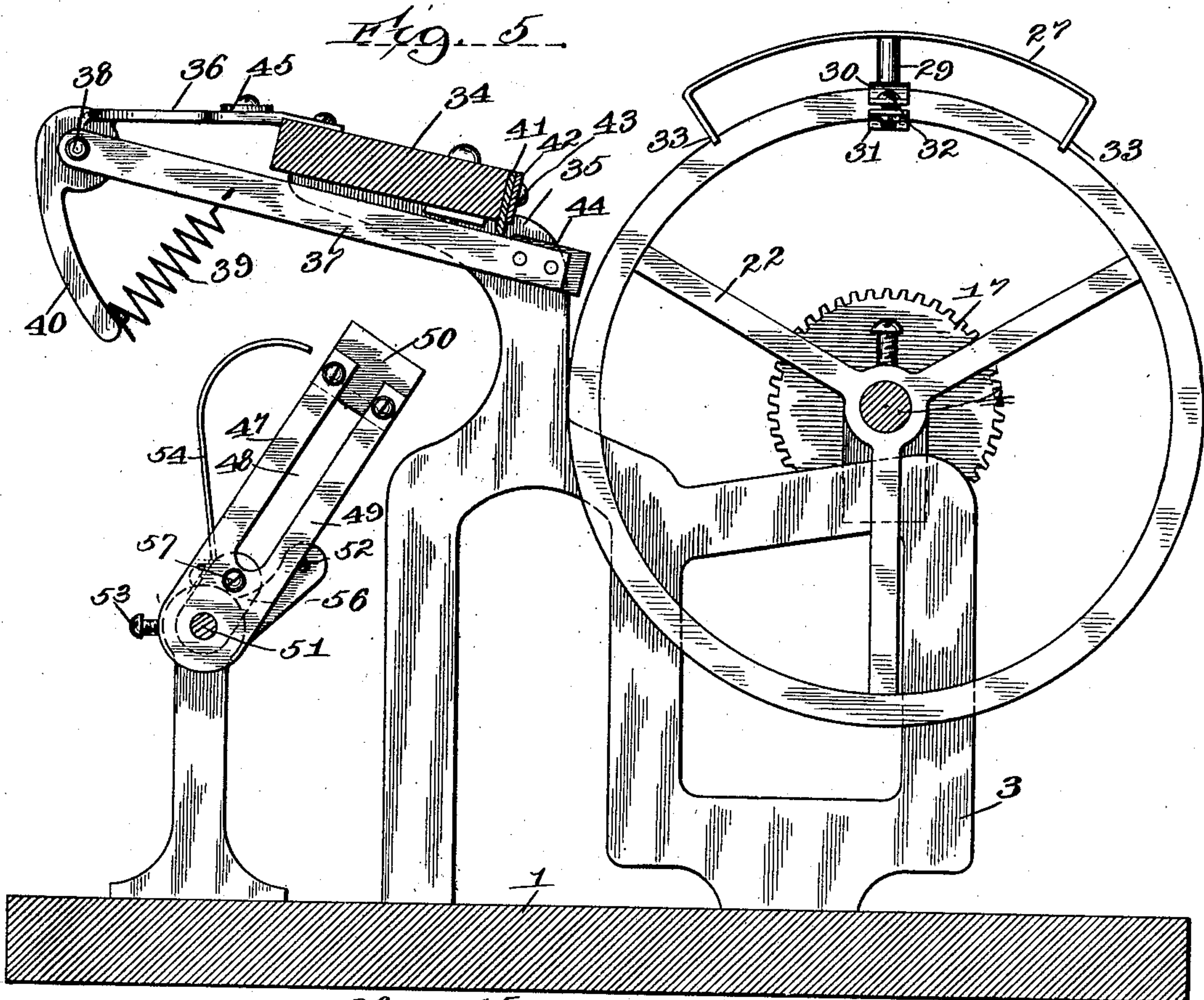
No. 760,387.

PATENTED MAY 17, 1904.

E. R. DULL.
ELECTRIC SWITCH.
APPLICATION FILED AUG. 6, 1901.

NO MODEL.

5 SHEETS—SHEET 5.



UNITED STATES PATENT OFFICE.

EGBERT REYNOLDS DULL, OF CHICAGO, ILLINOIS.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 760,387, dated May 17, 1904.

Application filed August 5, 1901. Serial No. 70,846. (No model.)

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 useful Improvements in 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.

My invention relates to improvements in electric switches.

One of the objects of my invention is to produce a device which shall automatically close an electric switch, retain the said switch closed for a definite period of time, and subsequently open the said switch automatically after the elapse of the said period of time.

My invention has for a further object to provide a machine which closes a series of such switches automatically at such predetermined times as may be desired and which retains each of the said switches closed for a definite period of time, the time at which either or any of the said switches may be closed being variable with reference to the various switches and the time or duration for which said switches are maintained closed being also variable.

A still further object of my invention is to provide a means whereby a series of switches may be automatically closed simultaneously and automatically released or opened dissimultaneously, or whereby a series of switches may be automatically closed at a dissimultaneous time and opened simultaneously, or whereby the said switches may each and every one be opened and closed and maintained closed at and for times differing from that of any of the other switches operated by the said apparatus.

A still further object of my invention is to provide a means whereby a given switch may be automatically closed at a time that may be varied with reference to the other switches with which the said switch is associated and whereby the number of times the said switch may be closed and the length of time that it may be retained closed within a given period may be varied; and a further object of my invention is to provide a device wherein a series

of gang-switches which form terminals for independent circuits may be independently closed, the time during which the various circuits may be energized by the closing of the switches being varied by means of suitable adjustments arranged upon the device, the said switches being positively closed and maintained closed during suitable periods of time and when opened being positively and widely opened, so as to prevent destructive sparking at the terminals of the said switches.

With these and other objects in view my invention consists in certain combinations and arrangements of parts, which will hereinafter be more particularly pointed out and claimed.

In the accompanying drawings, Figure 1 is a side elevation of my automatic switching device. Fig. 2 is a similar view of the opposite side. Fig. 3 is a plan view of the same. Fig. 4 is an end view of the device from the driving end. Fig. 5 is a section taken on lines 5-5 of Fig. 2. Fig. 6 is a broken-away detail showing the switch members in engagement, being placed and held there by means of the lugs fixed to the rotating wheel. Fig. 7 is a section taken on a line midway between the two flexible members of the stationary electric-switch jaws. Fig. 8 is a detail of one of the revolving wheels, showing the lug in position thereon. Fig. 9 is a section through the wheel and lug, showing the means of attaching the lug to the rim of the wheel.

In all of the views the same numerals indicate similar parts.

1 is a base of insulating material, preferably of slate, upon which the device is mounted.

2 and 3 are housings or frames fixed to the said plate and affording bearings for the shaft 4. This shaft is driven by means of the gear-wheel 5, which is fixed thereto and which is rotated by means of the worm 6, carried on the shaft 7. The shaft 7 has bearings upon the frame 2 and is supported thereon, so that the worm 6 meshes into the teeth of the gear-wheel 5. The shaft 7 is rotated by means of the gear 8, which is driven by the worm 9 upon the shaft, with which any suitable means may be employed for rotating said gear. In this instance I have shown a grooved pulley 10. The gearing just described affords a

means for reducing the rotative speed of the shaft 4 from the driving power applied to the wheel 10. In the practical construction of my machine it is advantageous to allow considerable latitude of motion or "backlash" between the teeth upon the gear-wheel 5 and the worm 6 for a reason which will be hereinafter explained.

The shaft 11, upon which the gear-wheel 10 is fixed, is carried upon a frame 12, which is pivoted at a point 13 and is shiftingly attached thereto at points 14 and 15 for the purpose of affording a means for adjusting the relations of the gear-wheel 8 and the worm 9.

I have placed gear-wheels 16 and 17 upon the shafts 7 and 4, respectively, so that both or either of them may be used as a means for transmitting power to other devices than my automatic switching-machine for the purpose of operating other devices or machinery in connection therewith. Instead of using gear-wheels, as shown, other means for transmitting the power may be employed—such as eccentric, crank-arm, or belt—in fact, any means by which power may be transmitted therefrom for the purpose described.

To the shaft 4 a series of any suitable number of wheels 18, 19, 20, 21, and 22, one for each circuit, are fixed, so as to be positively rotated therewith.

In Fig. 3 I have shown the lugs 23, 24, 25, 26, and 27 fixed to the respective gear-wheels. The lugs may be of varying length and made according to my system of multiple construction. It will be noticed that lugs 23 and 24 equal in length lug 25 and that lugs 25 and 23 equal in length lug 26, and so on, thus producing a uniform and definite multiple arrangement of lugs. In Fig. 8 lug 27 is shown attached to the wheel 22. The construction of the lug is shown in section in Fig. 9, in which a screw 28 passes through a thimble 29 into a clip 30. By this means the lug 27 is held in contact with the clip 30, and the clip 30 is held to the clip 31, encircling the rim of the wheel, by means of screws 32. The lugs are guided over the face of the wheel by means of notches cut into each end of the said lug for admitting the face of the wheel and providing projections 33 on either side of the said wheel. By this means the lugs are held in perfect alinement with the wheel. An insulated piece 34 is placed parallel with the shaft 4 upon the arms 35 of the frames 2 and 3. To this piece a series of metallic arms 36 project, to which movable switch-blades 37 are pivoted at points 38. An open helical compression-spring 39 is fixed to a depending arm 40 of the piece 36, which is secured to the arm 37 and holds the arm in the normal position shown in Fig. 5. The arm 37 rests normally upon the soft yielding cushion 41, which is fixed to the piece 34 by means of plate 42 and screws 43. This buffer is adapted to receive the blow of the arms 37 when they return to

the normal position shown in Fig. 5 when released from contact with the lugs upon the revolving wheels. To prevent metallic contact of the lug, of which 27 is a representative, with the switch-arm 37, I fix a plate of insulating material 44 to the free end thereof and allow it to project beyond the said ends. The arm 37 is shown depressed by the lug 27 by its contact with the insulating-plate 44.

45 is an electrical terminal to which each switch is adapted to be connected. As shown, each of the insulated pieces 36 is provided with one of these terminals.

46 is a terminal for a series of coacting gang-switch jaws or blades 48, each of which consists of bifurcated spring ends 47 and 49, fixed to removable jaws 50. The bifurcated spring-blades are also fixed to a separating attaching-lug 56 by means of screw and nut. The lug-piece 56 is adjustably fixed to the stationary rod upon which all of the stationary spring-jawed switches are arranged. A guide-rod 52 affords a means for adjusting the stationary spring-jawed switch members to a uniform position. The screws 53 afford a means for arranging the said stationary switches in a uniform position to which they are adjusted. A curved spring-arm 54 is shown attached to the lug-piece 56 and affords an additional means for conducting the current between the stationary switch 47 and the movable switch-bar 37 when the switch-bar 37 has been depressed into position shown in Fig. 6, and it also affords an additional means for ejecting the switch-bar 37 from contact with the complementary member 47 after the said bar has been released by any one of the lugs, such as 27.

55 is a stop preferably made integral with the jaws 50 for preventing the jaws 50 from coming into too close contact, preventing the entrance of the arm 37 between them when depressed by the lug. This stop may be provided by elongating the attaching-screws that hold the lugs to the spring-arms of the switch.

One use for which my device may be employed consists in automatically opening and closing electric circuits containing incandescent lamps for signs or other display-work, by means of which any of the given circuits which are connected to my device may be automatically closed at predetermined times, for predetermined periods of time, and at times that may be predetermined with reference to closing other such circuit or circuits connected to the same device.

When the wheel 22 is revolved by means of the power applied to the wheel 10, the lug, such as that shown by 27, which is placed thereon, will press the arm 37 into the position shown in Fig. 6 and will hold the arm so compressed in contact with its fellow switch member 47, and thus close the electric circuit connected to the terminals 46 and 45, of which the switch forms a part, during the time that

the lug 27 holds the lever 37 depressed in the manner shown. When the lug 27 passes beyond the insulating contact-piece 44 on the arm 37, the compressed spring 39 will force the arm 37 upwardly and cause it to break contact with its fellow switch member 47. The arm 37 will then strike the yielding buffer 41 and be held out of contact with the member 47 by means of the pressure-spring 39. If any two lugs, such as 23 and 27, are arranged upon different wheels to break contact coincidentally, then the backlash or play between the teeth of the gear-wheel 5 and the worm 6 is utilized to effect this result simultaneously by the fact that should one arm leave the contact with the lug earlier than the other the pressure of the spring 39 upon the first to leave will cause the shaft 4 to be easily forced ahead to the extent of the lost motion between the said gear-teeth and the worm, and thus cause the second arm to leave contact with its respective lug at the same time.

It will be evident from the drawings and the foregoing description that the contact between the switch members 37 and 47 may be effected at any time with respect to the revolution of the several wheels by placing the lugs at any point of their circumference and that such contact may be maintained for any length of time according to the length of the lug employed upon the said wheel. It is also plain that the two elements of any particular switch may be brought into contact and closed more than one time during the revolution of its respective wheel and that it may also be maintained closed at the various times for different periods of time according to the length of the respective lugs employed and affixed to the various parts of the said wheel.

In the manipulation of electric circuits it sometimes becomes necessary to close two or more circuits simultaneously and to hold them so closed for a period of time. Therefore the lugs that are employed for that purpose should be arranged upon their approaching ends in direct line parallel with the axis of the respective wheels, and their receding ends will be governed as to location according to their respective lengths.

My device causes the switches to make as perfect and as sure a contact and to effect as long a break as a hand-operated switch, and it contains all of the elements of safety and advantage that are a part of such switches. It is most excellently adapted for the purpose of manipulating circuits contained in electric signs; but it may be used for many other purposes.

Considerable variation may be made from the construction shown without departing from the spirit and scope of my invention.

Having described my invention, what I claim

as new and useful, and desire to secure by Letters Patent of the United States, is—

1. In an automatic electric switch the combination of a stationary switch member, a movable switch member, a wheel, a series of lugs of multiple relation, adapted to be fixed to said wheel for moving said movable member into contact with said stationary member, and a means for imparting motion to said wheel, substantially as set forth.

2. In an automatic electric switch, a pair of parallel switch-blades, each bifurcated at its outer end, and a contact-shoe carried by the said outer end of each switch-blade and connecting the bifurcated portions thereof.

3. In an automatic electric switch, a switch-blade bifurcated at its contact end, and a removable contact-shoe secured to the bifurcated portions of said switch-blade and connecting the same.

4. In an automatic electric switch a knife switch-blade constituting a male switch member, coacting blades arranged to form a female switch member, and a flat strip forming a removable contact-shoe secured to one of said blades at the point of its contact with a coacting blade.

5. In an automatic electric switch a switch member comprising a separating-lug 56, the blades 48 and 49, and the removable shoe 50, substantially as set forth.

6. In an automatic electric switch, a frame, a conducting-rod, adapted to be included in a circuit, mounted thereon, a gang of switch members mounted on said rod and axially and rotatably movable thereon, set-screws for retaining said switch members in adjusted position on the rod, coacting switch-blades mounted on the frame, and means for moving said blades.

7. In an automatic electric switch a series of independent switch-blades, means for moving said blades, a gang of coacting switch members arranged respectively in the paths of the corresponding blades, a common support for said gang of switch members, and a common guide member for positioning all of the members of said gang relative to their coacting switch-blades.

8. In an automatic electric switch a series of switch members 47, rod 51 upon which said members are supported, a guide 52 for retaining said members in a uniform position, screws 53 for securing said switch members, and terminal 46 for said series of switch members, substantially as set forth.

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,

M. F. ALLEN.