(No Model.) 3 Sheets—Sheet 1.

J. BRYAN.

ELECTRICALLY ACTUATED SWITCH.

No. 582,262. Patented May 11, 1897.

FIG. 2.

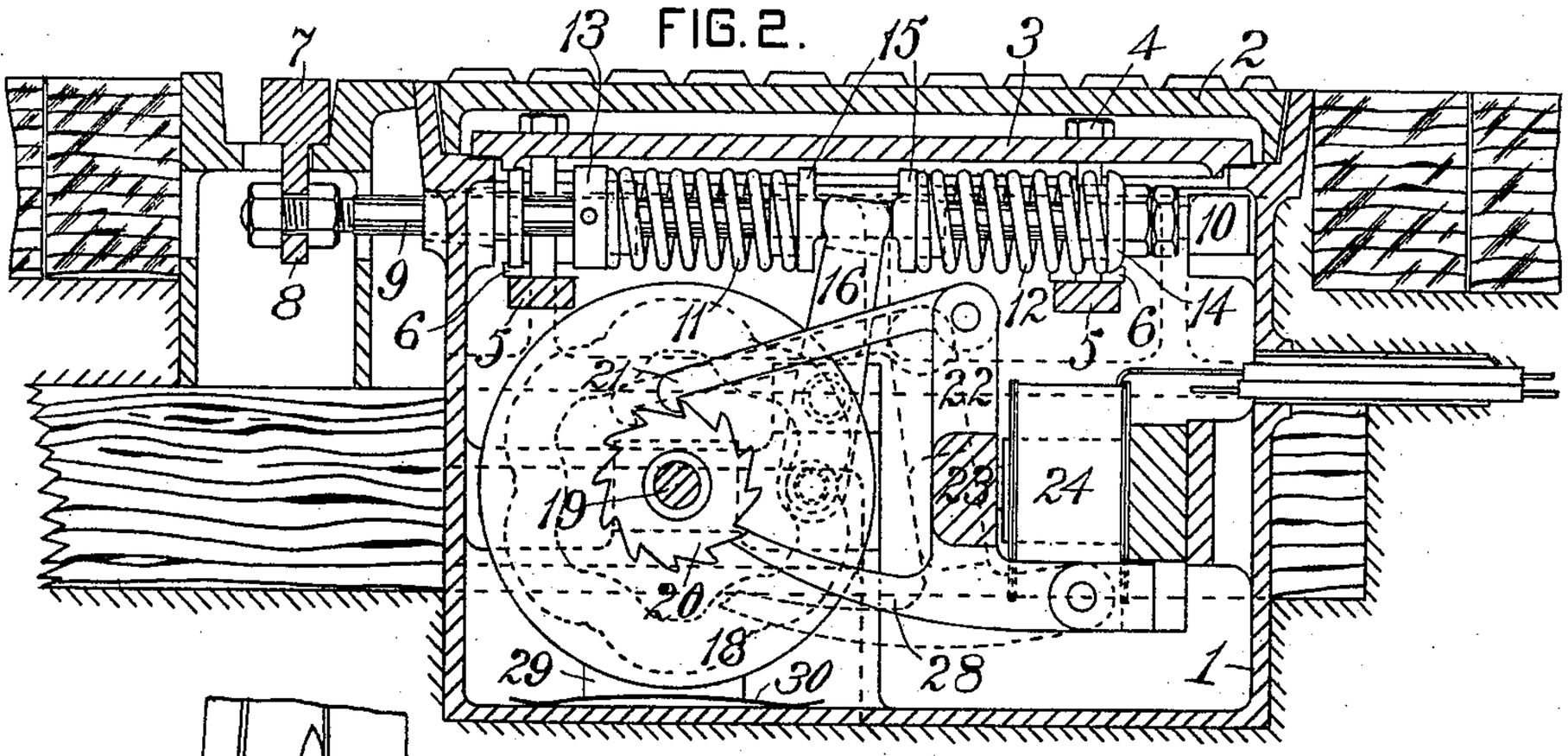

FIG. 1.

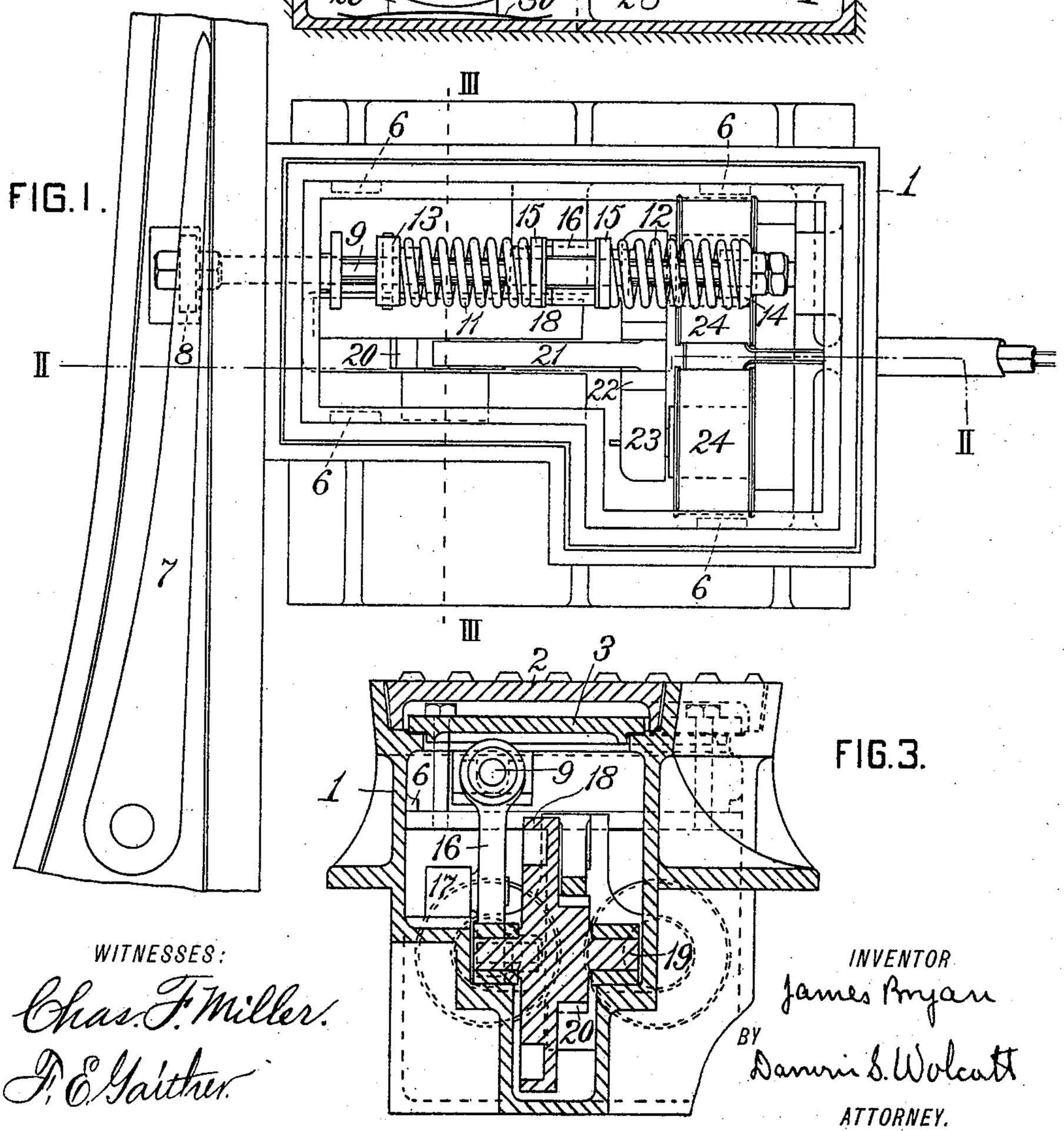

FIG. 3.

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FIG.4.

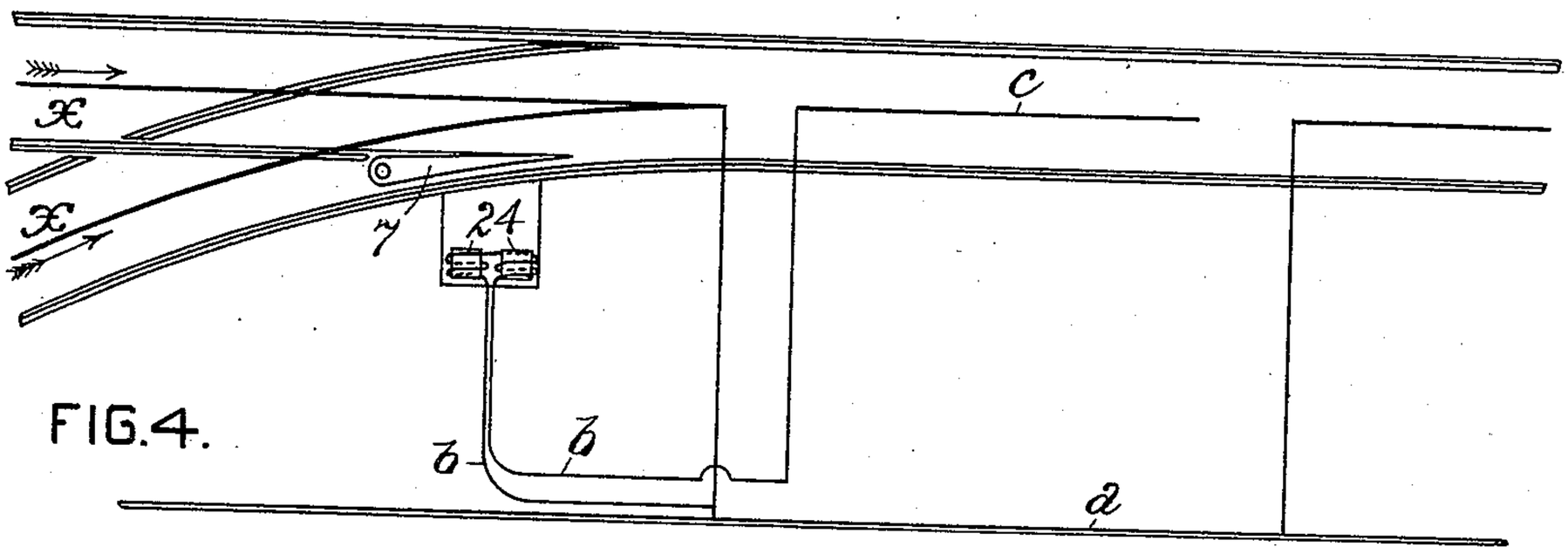


FIG.5.

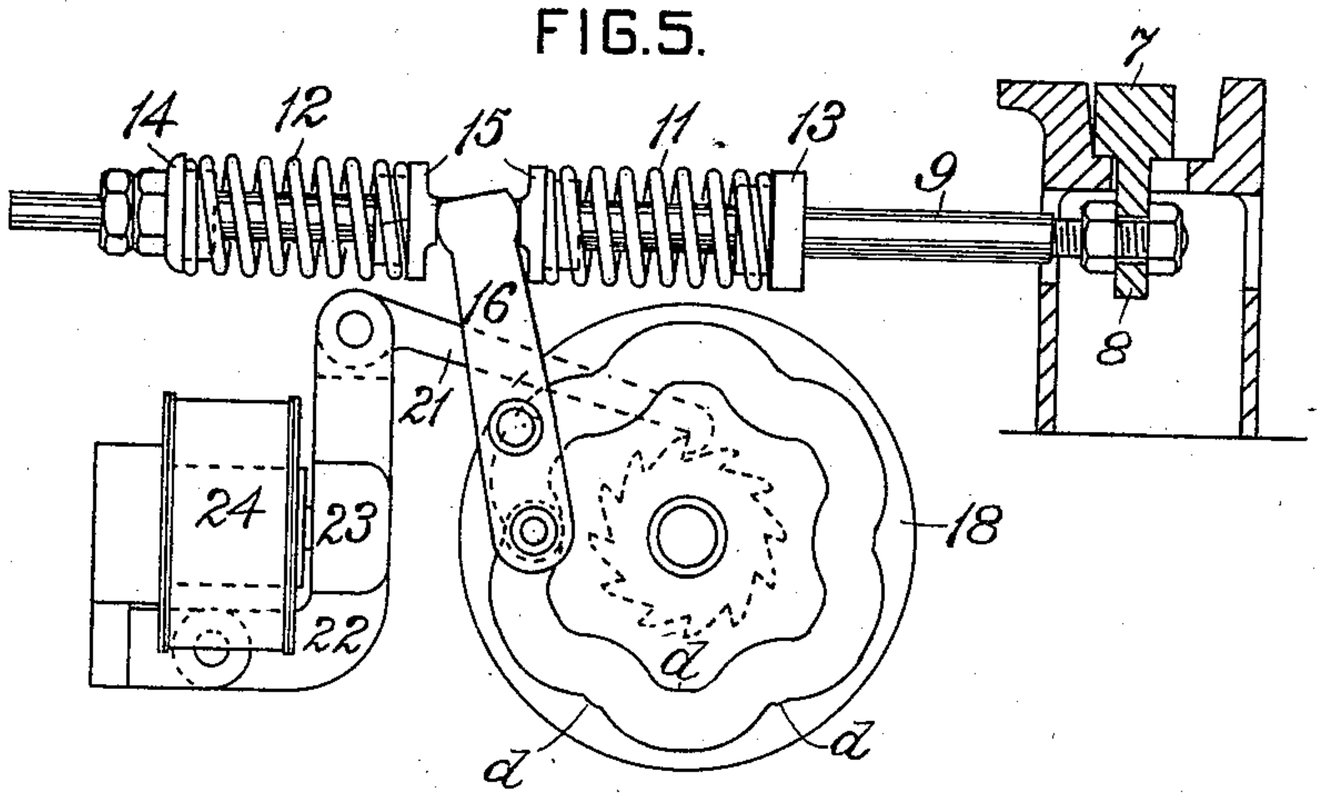
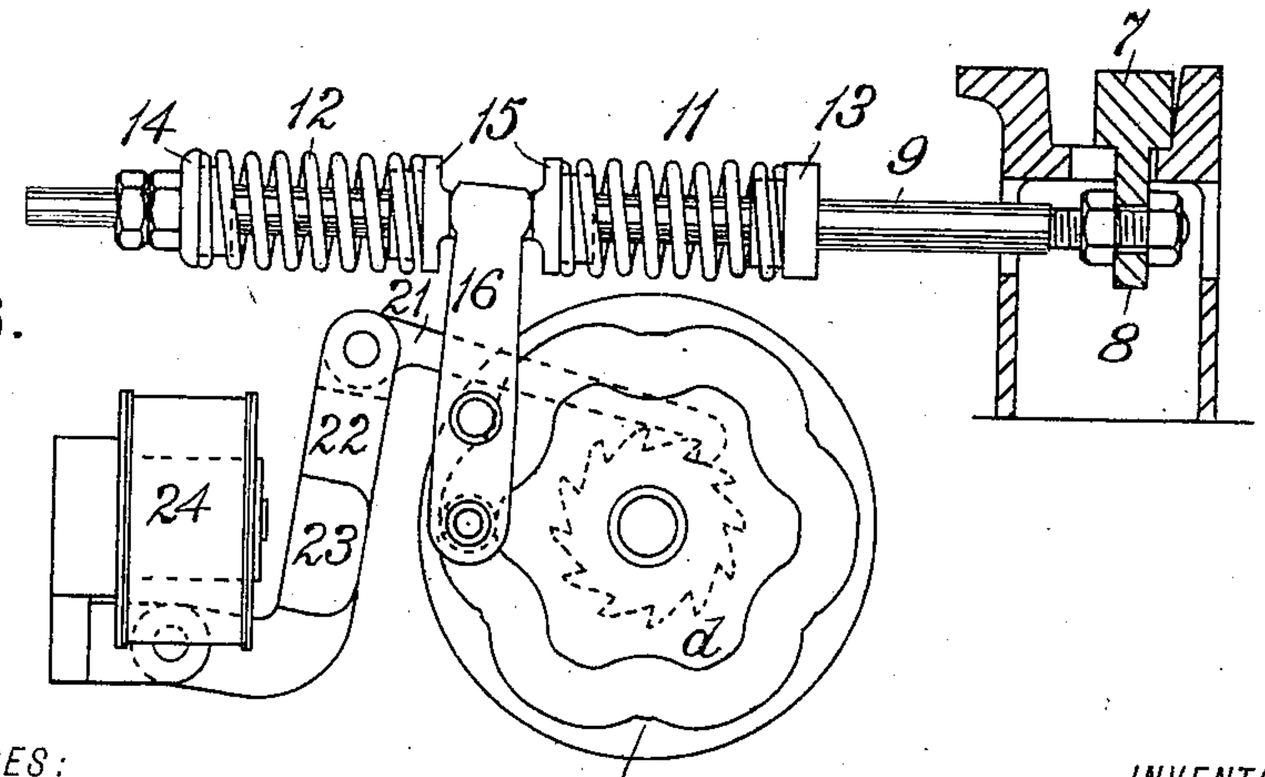


FIG.6.



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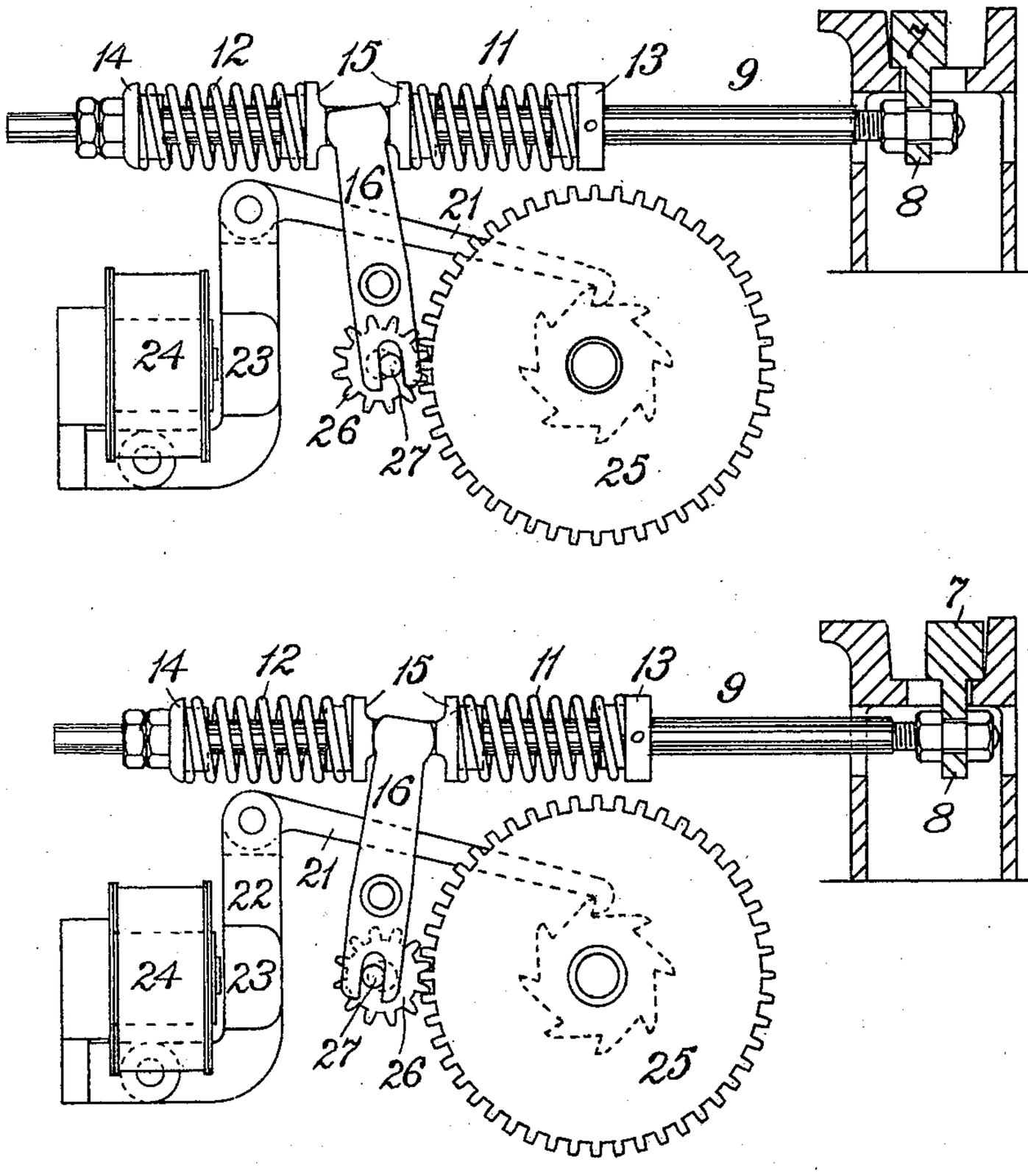

FIG. 7.

FIG. 8.

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UNITED STATES PATENT OFFICE.

JAMES BRYAN, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO WILLIAM MORRIS GREENWOOD, OF ALLEGHENY, PENNSYLVANIA.

ELECTRICALLY-ACTUATED SWITCH.

SPECIFICATION forming part of Letters Patent No. 582,262, dated May 11, 1897.

Application filed August 1, 1896. Serial No. 601,298. (No model.)

To all whom it may concern:

Be it known that I, JAMES BRYAN, a subject of the Queen of Great Britain, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Electrically-Actuated Switches, of which improvements the following is a specification.

The invention described herein relates to certain improvements in electrically-actuated switches for electrically-operated street-cars; and the invention has for its object a construction whereby the movable member of the switch may be actuated by means of the electromagnet excited by the current used for propelling the car, such current being under the control of the motorman, so that the switch may be thrown or not, as desired.

In general terms the invention consists of the construction and combination substantially as hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a plan view of a portion of a switch and my improved operating mechanism, the cover being removed from the shell or case inclosing the latter. Fig. 2 is a sectional elevation of the same, the plane of section being indicated by the line II II, Fig. 1. Fig. 3 is a transverse section, the plane of section being indicated by the line III III, Fig. 1. Fig. 4 is a diagrammatic view illustrating a street-car track with a switch arranged therein and also showing the arrangement of circuits for operating the switch. Fig. 5 is a sectional detail view of a modified form of the operating mechanism, showing the movable member of the switch shifted to the left. Fig. 6 is a similar view showing the position of the switch reversed. Figs. 7 and 8 are views similar to Figs. 5 and 6, illustrating a modified form of the switch-operating mechanism.

In the practice of my invention the operating mechanism is arranged alongside of the track in suitable proximity to the movable member of the switch and is inclosed within a case or shell 1, provided with a main cover 2, which simply rests upon the internal shoulders of the case or shell and whose upper surface is preferably roughened and arranged on a level with the surface of the street. The auxiliary cover 3 is arranged upon a projecting shoulder of the case or shell, suitable packing being interposed between the cover and the shoulder. This auxiliary cover is held in position by means of bolts 4 passing through the cover and through cross-bars 5, which have their ends arranged below suitable lugs 6, formed on the inner walls of the case or shell. The lower ends of the bolts are threaded and adapted to screw into the threaded openings in the cross-bars 5. By this construction the box can be hermetically sealed, so as to prevent the inflow of water.

The movable member 7 of the switch is provided with a downwardly-projecting lug 8, to which is secured one end of a bar 9, passing through an opening formed in one side of the case or shell 1 and supported at its opposite end by a bearing 10. Around the opening in the side of the case or shell are formed bosses which provide a comparatively broad bearing for the rod 9. It is preferred to construct the outer boss in the form of a packing-gland, so as to prevent any water entering the case or shell around the rod. Around the rod 9 are placed two springs 11 and 12, whose outer ends bear against suitable abutments 13 and 14, secured to the rod. The abutment 13 is held in position, preferably, by means of a pin passing through the rod, while the abutment 14 is formed by a washer and suitable jam-nuts, so as to permit of the adjustment of this abutment along the rod to regulate the tension of the spring. Between the inner ends of the springs are arranged bearing-plates 15, and between these bearing-plates projects the upper end of a lever 16. This lever is pivotally mounted on a block 17, formed on or secured to the case or shell in any suitable manner.

The lower end of the lever 16 is provided with an antifriction-roller which projects into a sinuous cam-groove in the disk 18, which is secured on a shaft 19, mounted on suitable bearings in the case or shell. A ratchet-wheel 20 is formed integrally with the disk 18 or may be keyed on the shaft carrying the disk 18. The ratchet-wheel and with it the disk 18 is rotated by means of a pawl 21, pivotally connected to the free end of a lever 22, on which is attached the armature 23 of

the magnets 24. The ratchet-wheel and the sinuous groove in the disk are so proportioned that the movement of rotation imparted to them by the shifting of the lever 22 is sufficient to shift the lever 16 from a low point to an adjacent high point. The lever is made of such a length and has its pivotal point so arranged that the movement imparted to its lower end by the rotation of the disk will shift the movable member 7 of the switch-rail from one position to its opposite position.

It is well understood in the art that the effective pull of a magnet on its armature is approximately inversely proportional to the square of the distance of the armature from the pole of the magnet, and as it is necessary in my improved switch mechanism to have a comparatively long movement of the armature I provide for a comparatively low resistance through the initial movement of the armature by the employment of the springs 11 and 12 upon the rod 9. It will be understood that the first movement of the armature will be resisted only by the springs 11 or 12, and that as the armature approaches the pole of its magnet and its power is thus increased the movable member of the switch will be moved.

In lieu of the construction shown in Figs. 5 and 6 I may employ that shown in Figs. 7 and 8. In this construction a toothed disk 25 is substituted for the disk 18 with a sinuous cam-groove. This toothed disk intermeshes with a pinion 26, provided with an eccentric-pin 27, which engages a slot in the lower end of the lever 16. The throw of this eccentric-pin is sufficient to effect a shifting of the movable member of the switch from one position to the other.

The magnets 24 are included in the circuit of an insulated section of the trolley-wire. This section, as shown in Fig. 4, is connected to the feeder-wire *a* by a branch circuit *b* passing through the magnets and connected to the insulated section *c* of the trolley-wire. Hence it follows that the magnet will remain deënergized until, by the presence of the car on the track beneath the insulated section, an electrical connection is formed between the insulated section *c* and the rails of the track. This insulated section is arranged a short distance in front of the movable switch-point.

In addition to assisting in the initial movement of the lever 16 the springs 11 and 12 permit of the movement of the movable switch-point by the wheels of a car when moving in the direction of the arrow *x* and the immediate return of the switch-rail to its original position as soon as the car has passed beyond the movable member.

In order to prevent an excess of movement of the disk 18 when actuated by the armature, an arm 28 is secured to the lever 23 in such manner that when the armature has been brought up against the poles of its magnet said arm will strike against one of the teeth of the ratchet-wheel and prevent any further movement thereof. As the lever drops back when the magnets are deënergized the arm 28 will drop away from its ratchet-wheel and permit a free movement of the ratchet-wheel.

If preferred, a block 29, attached to a spring 30, which is so secured to the bottom of the case or shell that the block will bear upon the periphery of the disk 18, may be substituted for the arm 28, as shown in Fig. 2, or used in connection therewith.

In order to prevent any shifting of the disk 18 by the lever when one or the other of the springs are compressed by the shifting of the movable point when a car trails through the switch, the apices *d* in the sinuous groove are flattened or slightly recessed, forming seats for the antifriction-roller in the lever, as shown in Fig. 5.

I claim herein as my invention—

1. In a switch-operating mechanism the combination of a movable switch-point, a lever, a cam mechanism for operating said lever, a magnet for operating the cam mechanism, and a yielding connection between the lever and the movable switch-point, substantially as set forth.

2. In a switch-operating mechanism, the combination of a movable switch-point, a rod connected to the switch-point, a lever having a yielding connection to the rod, a cam mechanism for operating the lever, and a magnet for actuating the cam mechanism, substantially as set forth.

3. In a switch-operating mechanism, the combination of a movable switch-point, a lever having a yielding connection to the switch-point, a cam mechanism for shifting the lever, a magnet for operating the cam mechanism, and a brake for controlling the movement of the cam mechanism, substantially as set forth.

4. In a switch-operating mechanism, the combination of a movable switch-point, a rod connected to the switch-point, two springs arranged around the rod and bearing at their outer ends against abutments in the rod, a lever having one end arranged between the inner or adjacent ends of the springs, a cam mechanism for shifting the lever, and a magnet for operating the cam mechanism, substantially as set forth.

5. In a switch-operating mechanism, the combination of a movable switch-point, a lever having a yielding connection to the switch-point, a cam mechanism shifting the lever, a magnet for actuating the cam mechanism, and a brake operated by the magnet for controlling the movement of the cam mechanism, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JAMES BRYAN.

Witnesses:
F. E. GAITHER,
DARWIN S. WOLCOTT.