

(No Model.)

J. H. FRISCHEN.
BLOCK SIGNAL APPARATUS.

No. 505,419.

Patented Sept. 19, 1893.

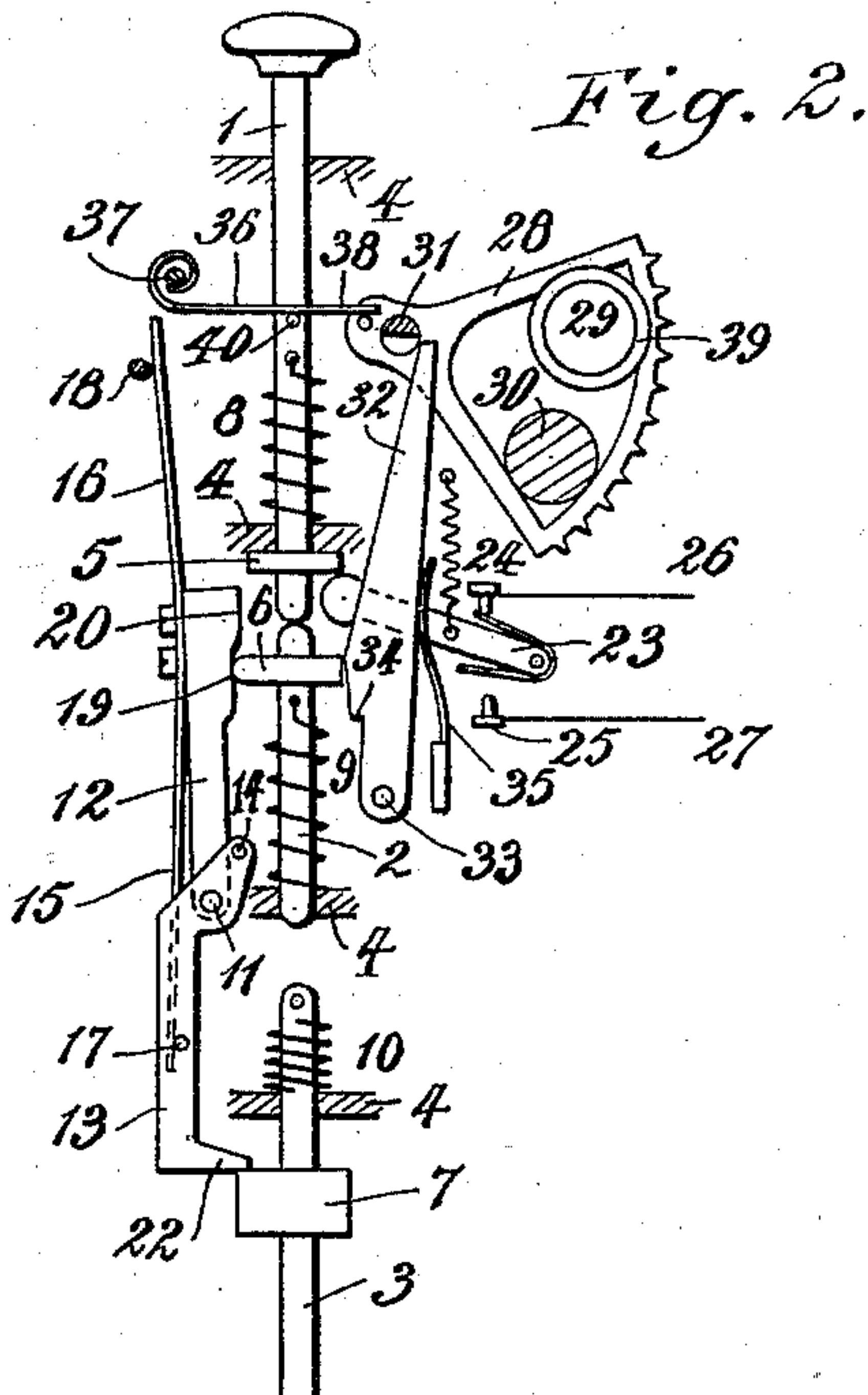
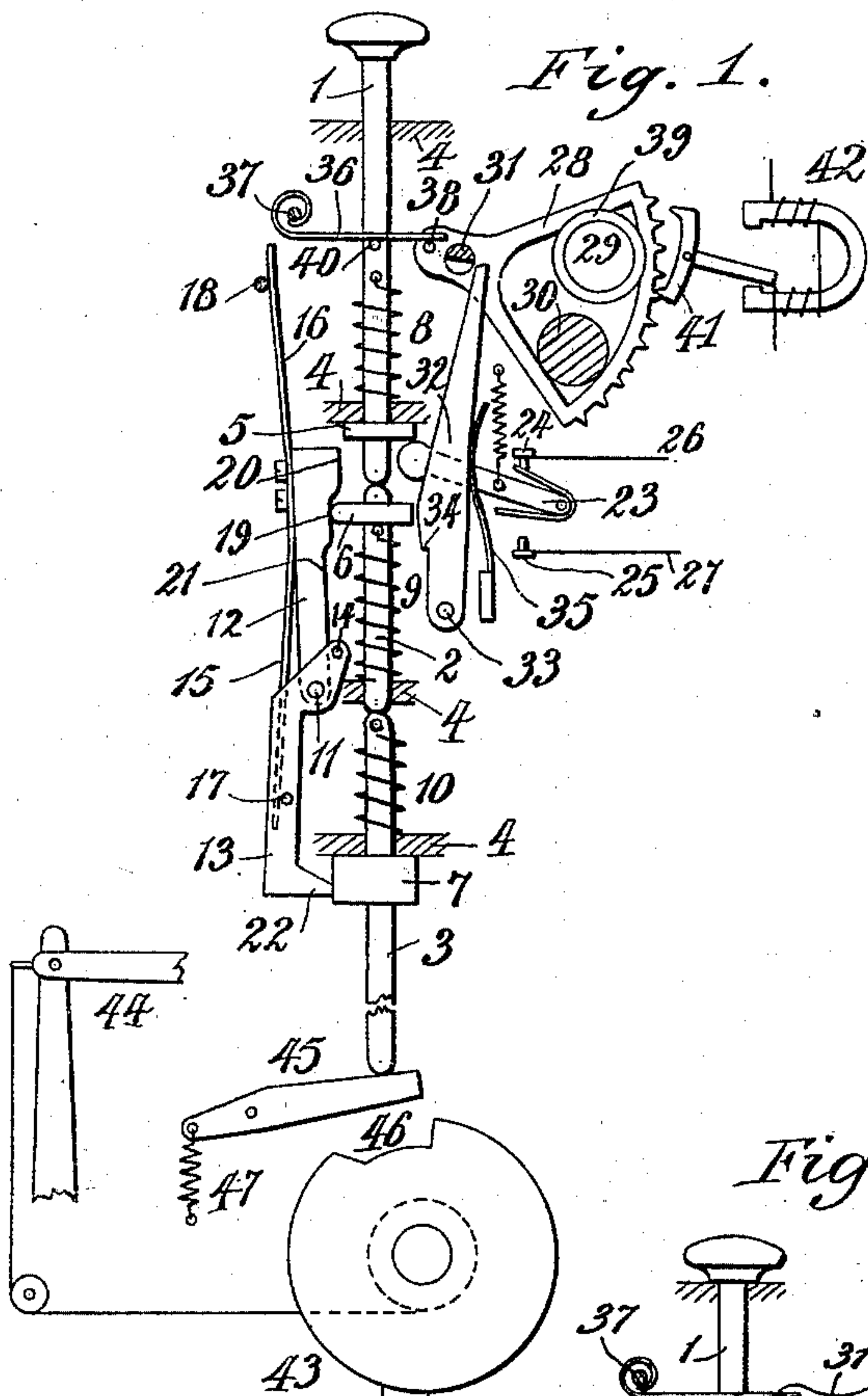


Fig. 3.

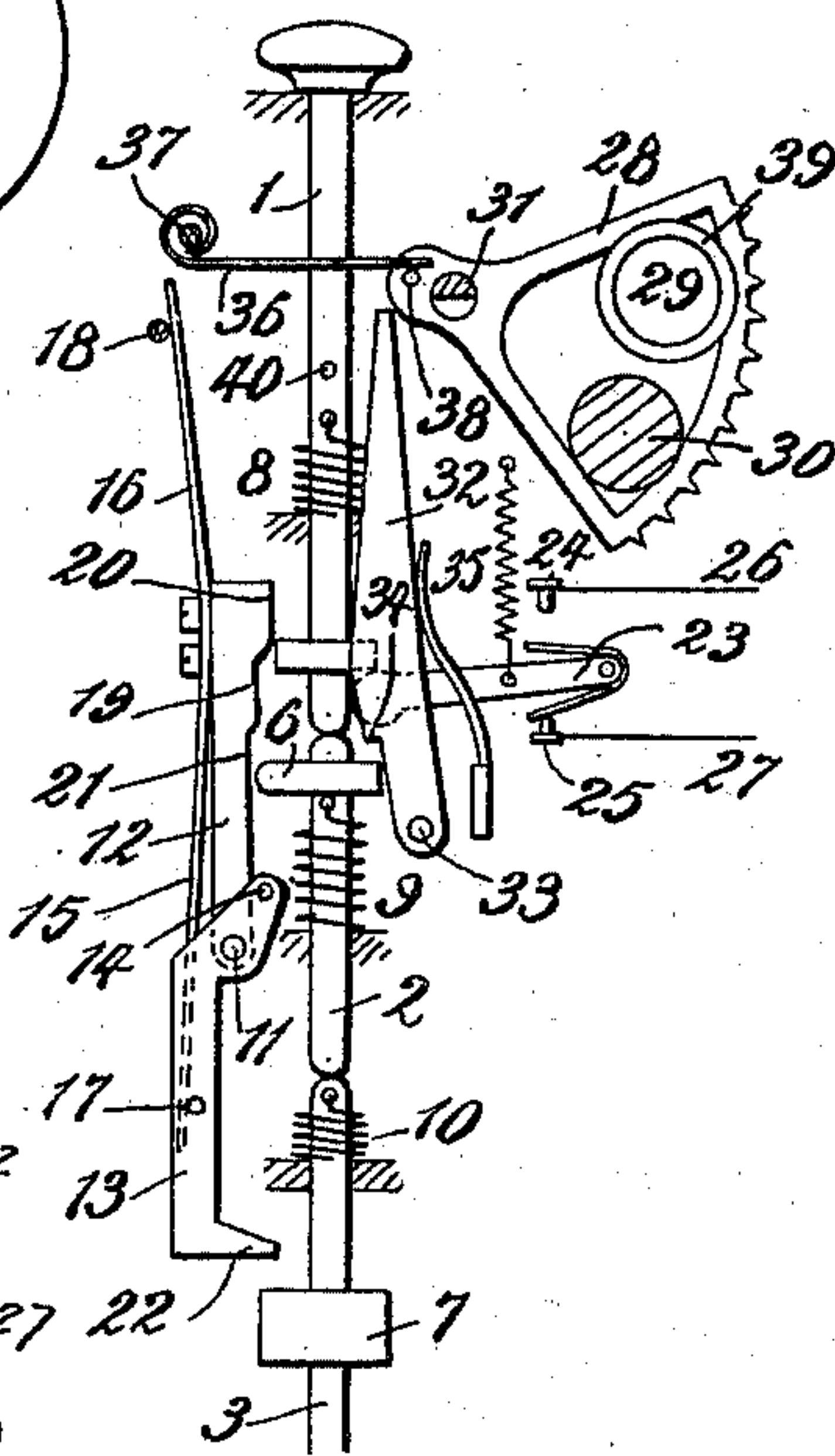


Fig. 4.

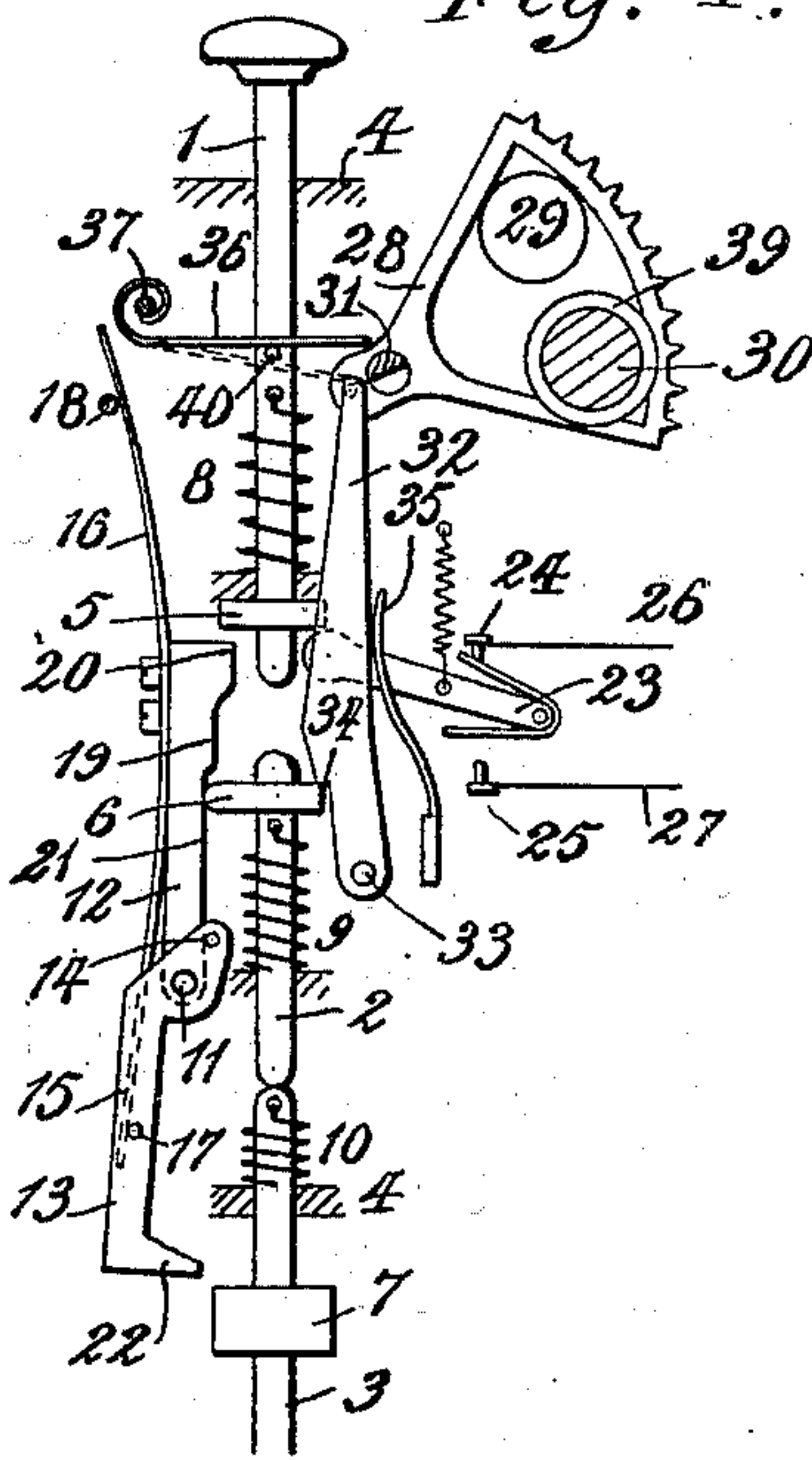
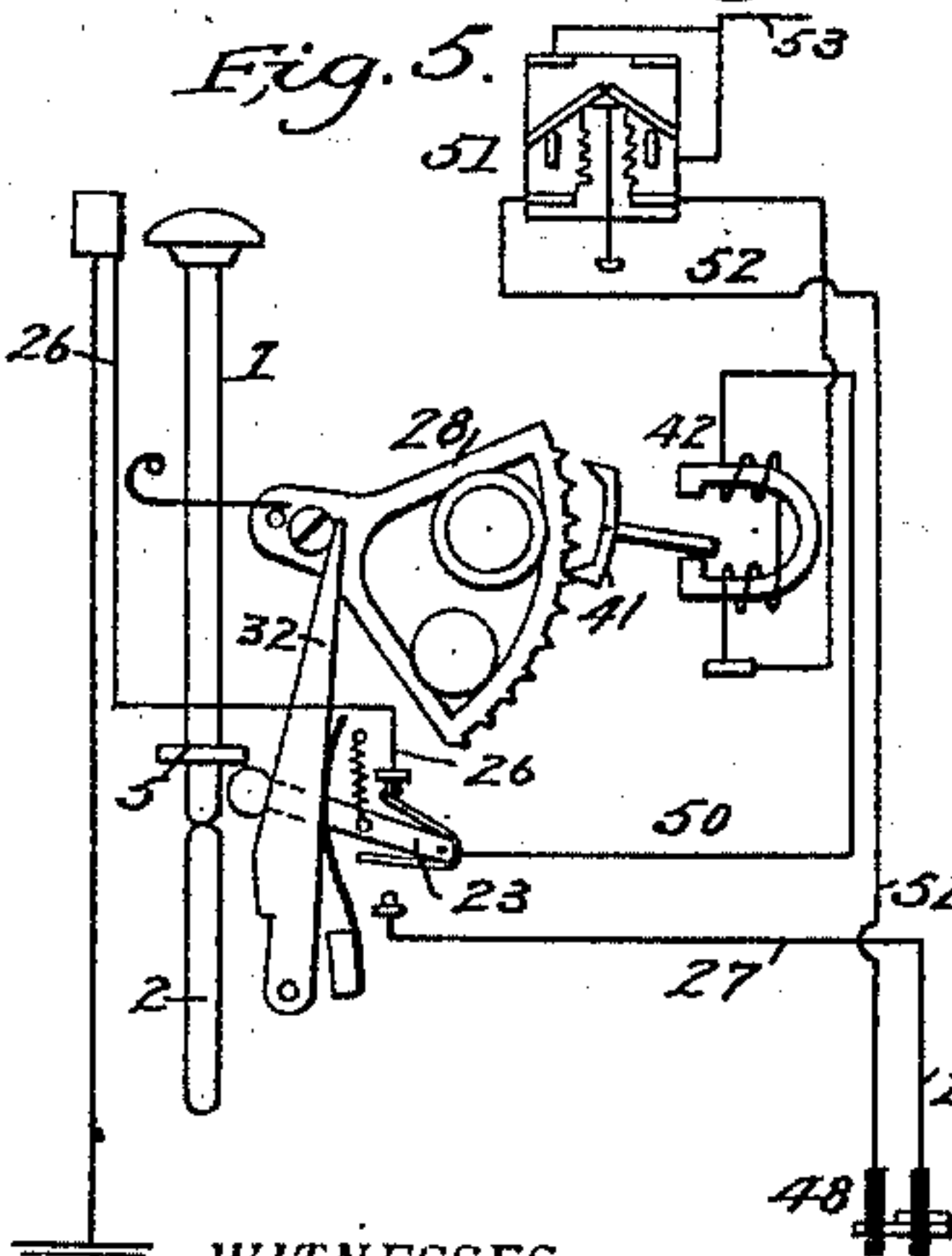


Fig. 5.



WITNESSES:

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JOHANN HEINRICH FRISCHEN, OF BERLIN, GERMANY, ASSIGNOR TO
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BLOCK-SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 505,419, dated September 19, 1893.

Application filed April 13, 1893. Serial No. 470,171. (No model.) Patented in Germany January 22, 1892, No. 65,695.

To all whom it may concern:

Be it known that I, JOHANN HEINRICH FRISCHEN, a subject of the Emperor of Germany, residing at Berlin, Germany, have invented new and useful Improvements in Block-Signal Apparatus, (patented in Germany, No. 65,695, January 22, 1892,) of which the following is a specification.

My invention relates to block signal apparatus adapted to promote safety of travel on railways.

The invention consists in a block signal apparatus comprising a sectional stop rod and mechanically and electrically operative devices combined therewith in a manner allowing one part of the stop rod to be mechanically locked to prevent operation of dependent signal adjusting mechanism while other parts of the rod are operatively available for electric locking of said mechanism and for signaling purposes. The stop rod can be operated but once after the establishment of the electrical blocking or after the mechanical locking of the signal actuating mechanism is exchanged for the electric locking by the block signal apparatus, and prior to electrical unlocking of said mechanism. Various novel details of construction contribute to the efficiency of the apparatus.

The invention will first be described and then will be defined in the claims hereinafter set forth.

Reference is to be had to the accompanying drawings, forming a part of this specification and in which like reference numerals indicate similar parts in all the views.

Figure 1 represents the normal relative positions of the parts of my improved block signal apparatus with an adjacent signal or switch operating lever and its locking pawl. Fig. 2 shows relative positions of the parts of the signal apparatus when the signal or switch lever is mechanically locked by the stop rod. Fig. 3 shows the three part stop rod depressed, with other parts in corresponding positions. Fig. 4 shows the devices after the mechanical locking of the signal lever has been exchanged for the electrical locking thereof; and Fig. 5 is a diagrammatic view of the electric appliances and circuits at one of two connected stations.

What I in general terms call the stop rod of the block signal apparatus, comprises three vertically aligned rod portions more especially designated as the pressure rod 1, the blocking rod 2, and the locking rod 3, which are fitted for endwise movement in any suitable bearings 4, and are provided respectively with collars or enlargements 5, 6 and 7, and are also fitted with springs, preferably spiral springs 8, 9 and 10, which lift the respective sections of the stop rod to normal positions shown in Fig. 1 of the drawings.

To any suitable relatively fixed support, say one of the bearings 4, are fulcrumed by a pin 11, two pawls 12, 13, which together constitute a two-part pawl device. The head of the lower pawl 13, carries a transverse pin or stud 14, which is normally pressed to the adjacent rear face of the pawl 12, by the tail portion 15, of a spring 16, which acts on a pin or stud 17, in the pawl 13. This spring 16, is held to the upper part of the pawl 12, and acts upon a relatively fixed pin or stud 18, to normally force the pawl 12, inward against the collar 6, of the blocking rod 2, said pawl having a stepped face comprising two shoulders 19, 20, and a longer lower inner face portion 21, adapted to the collar 6. The pawl 13, has a foot tappet 22, adapted for action with the collar 7, of the rod 3, to prevent rise of the latter, as hereinafter explained.

A contact lever 23, is suitably fulcrumed to make electrical connection with opposing contacts 24, 25, to which the line wires 26, 27, from the next railway station are held, said lever being normally lifted by a spring to the collar 5, of the pressure rod 1, by which it may at times be operated to control the line circuits of the electric blocking devices. These devices comprise a segmental frame 28, having respective white and red disk signals 29, 30, and fastened to a fulcrum shaft 31, journaled in suitable fixed bearings near the pressure rod 1. The shaft 31, has a semi-circular portion forming a shoulder which is adapted to retain the free end of a stop-lever 32, fulcrumed to a fixed support at 33, and having a shoulder 34, adapted to engage the collar 6, of the blocking rod 2, and prevent rising of this rod when the lever is retained at the shaft 31. A spring 35, normally swings

the lever 32, inward toward the rods 1, 2, and another spring 36, held to a fixed pin or stud 37, normally presses on a pin 38, at the heel of signal frame 28, and tends to swing the frame upward to carry its red or danger disk 30, in front of the aperture 39, of a casing holding the apparatus. A pin 40, may be used in the pressure rod 1, as a support to the spring 35. It will be understood that the collar 5 acts only on the contact lever 23 and has no effect on the lever 32, which is operated by the collar 6 of rod section 2 and the spring 35. The signal frame 28, has marginal teeth engaged by an escapement 41, on the armature of an electro-magnet 42, the coil or coils of which are connected to any suitable manually operated alternate current producing inductor of the usual type not shown, and whereby the armature may be vibrated to actuate the signal frame in the well known manner.

At 43 is shown a hand lever having suitable cord or wire connections to a semaphore signal arm 44, for working the same by hand. A pawl 45, is adapted to be pressed into a recess 46, of the lever by downward movement of the locking rod 3, and a spring 47, normally lifts the pawl when the rod 3, is raised.

The operation is as follows: With the block signal devices in normal positions shown in Fig. 1, of the drawings, the pawl 45, will be pressed into the recess 46, of the signal lever 43, by depression of the locking rod 3, whether such depression be caused by drawing down the rod from beneath or by pressure on the knob of rod 1. When the rod 3, is thus lowered, its collar 7, will pass below the tappet 22, of the pawl 13, whereupon the spring 15, will by pressure on the pawl pin or stud 17, carry the tappet inward to overlies the collar 7, and thereby prevent rising of the rod 3, which thus will prevent upward movement of the pawl 45, and consequently lock the signal lever 43, to prevent change of the semaphore from the "danger" position shown to the "all clear" position until after the pawl 13, is readjusted to allow the locking rod 3, to again be raised by its spring 10, to normal position. When the lever 43, is thus locked by the pawl 45, and locking rod 3, the block signal devices have relative positions shown in Fig. 2, of the drawings. Should the pressure rod 1, have been pushed down to effect the above named locking of the rod 3, by the tappet 22, of the pawl 13, the lever 23, will also have been lowered by the collar 5, of rod 1, and the blocking rod 2, will also have been lowered. As the rod 2, is moved downward its collar 6, will bear on the face or shoulder 19, of the pawl 12, to hold this pawl outward a sufficient time to permit the collar 5, of the pressure rod 1, to pass below the top of the pawl 12, and along its face 20, while full downward movement is given by pressure on the rod 1. A downward movement of the rod 1, will, by depressing the lever 23, to the contact 25, close electrical circuit through the

wire 27 for signaling to the next station on the line of railway and as the lever 23, is raised by its spring, electric circuit through the wire 26, will be established for special signaling or other purposes. After the locking rod 3, is detained by the pawl 13, the pressure rod 1, and with it the blocking rod 2, and contact lever 23, may be depressed repeatedly and be lifted by their springs without unlocking the rod 3, or releasing the signal lever 43, and so long as the electrical inductor which energizes the magnet 42, is not worked. The tension or lifting effect of the springs 16, 47 on the stop rod section 3, together with the friction of the rod collar 7 on the pawl tappet 22, prevents escape of the pawl from the rod during depression of the parts 1, 2, 23, for signaling purposes. If however, this inductor be operated and the magnet be energized after the rod 1, is depressed and while it is held down and while the parts have positions shown in Fig. 3, of the drawings, the escapement armature 41, will be vibrated by the magnet and will permit the spring 36, by pressure on the pin 38, of the signal frame 28, to swing the frame upward and carry the solid part or shoulder of the shaft 31, behind the top of the stop lever 32, which had been carried inward by its spring 35, until its shoulder 34, overlies the collar 6, of the blocking rod 2. When the pressure rod 1, is again released and is raised by its spring 8, the parts will have relative positions shown in Fig. 4, of the drawings. In these positions the shoulder 34, of the lever 32, of the electrical blocking apparatus locks both the blocking rod 2, and the signal lever locking rod 3, while the mechanical locking of the rod 3, by the tappet 22, of pawl 13, is broken or released; in other words, the mechanical locking of the signal lever 43, by means of the pawl 13, and which had been effected automatically and without electrical means, is exchanged for the electrical locking by the shoulder 34, of the lever 32, and this lever can be released from the stop shoulder of the shaft 31, only by electrical means, or by the operation of the signal frame 28, by the vibrating armature escapement 41, to carry said frame from the position shown in Fig. 4, when the "danger" disk 30, is shown to the safety position shown in Figs. 1, 2, 3, when the "all clear" disk 29, is shown. The shaft 31, turns with the frame 28, thereby bringing the cut away portion of the shaft into position to allow the lever 32, to escape to the right hand as it is swung over by the lifting of the rods 2, 3, by their springs 9, 10, which have greater tension than the spring 35, of the lever 32. The mechanical release or unlocking of the rod 3, is permitted when the collar 6, of the descending blocking rod 2, passes downward from the shoulder 19, and opposite the face 21, of the pawl 12, thereby allowing the spring 16, to force said pawl 12, inward as it turns on its pivot 11, and thereby also causing said pawl 12, by pressure on the pin or stud 14,

of the pawl 13, to swing the tappet 22, outward clear of the collar 7, of the locking rod 3, to allow said rod to be raised again by its spring 10, as soon as the electric locking by the lever 32, is released by operation of the electric blocking devices as above explained. It will be noticed that during the electrical locking indicated in Fig. 4, of the drawings and while the mechanical lock is released, and the face 21, of pawl 13, rests against the collar 6, of the blocking rod 2, the top of said pawl 12, underlies the collar 5, of the raised pressure rod 1, and therefore said rod 1, cannot be again pressed down until after the electrical blocking apparatus is actuated, and the rod 2, in rising against the shoulder 19, of the pawl 12, again pushes the face 20, of said pawl out clear of the collar 5, of the pressure rod 1, it being understood that the face 21, of the pawl 12, will remain in contact with the collar 6, of the rising rod 2, long enough to permit the collar 7, of the rising rod 3, to pass in front of the extremity of the tappet 22, of the pawl 13, while all the parts are again assuming normal positions shown in Fig. 1, of the drawings, and the lever 43, is again freed from its pawl 45, and may be turned to set the signal to "all clear" position. All is now ready for the next mechanical locking of the signal lever 43, (which may also operate a rail switch) by downward movement of the locking rod 3, after the signal has been readjusted to "danger" position by operation of the lever.

The diagram Fig. 5 shows two sections 1, 2 of the stop rod, the lever 32, the signal frame 28, the oscillating armature 41, the magnet 42, and wires 26 and 27. The wire 27 leads to the electrical inductor 48, and the wire 26 leads to an alarm bell or signal device 49, from which a wire goes to ground. A wire 50 passes from the metallic fulcrum contact of the lever 23 to the wire coil of magnet 42, the other end of which coil is wired to a signal bell switch or key device 51, from the contacts of which one wire 52 goes to the inductor, while the line wire 53 passes from the signal or key device 51 to the next station on the line of railway. At this station the above-named circuit connections and appliances are duplicated to allow necessary mutual control and operation of the stop rod and signal mechanism.

I claim as my invention—

1. A block signal apparatus, comprising a stop rod, formed of three independently movable aligned parts placed end to end, and mechanically and electrically operative latch devices, substantially as described, whereby the lower part of the stop rod may be mechanically locked to prevent operation of dependent signal adjusting mechanism while the other parts of the rod operatively control and are controlled by the electrical latch devices, as herein set forth.

2. A block signal apparatus, comprising a stop rod formed of three independently mov-

able aligned parts placed end to end, and mechanically and electrically operative latch devices and electrical signaling devices, substantially as described, whereby the lower part of the stop rod may be mechanically locked to prevent operation of dependent signal adjusting mechanism, while the two upper parts of the rod control and are controlled by the electrical latch and signaling devices, as herein set forth.

3. A block signal apparatus, comprising a three-part stop rod each part having a collar, a two part spring actuated pawl having one fulcrum and a stop pin and adapted to the stop rod, a stop lever adapted to detain parts of the stop rod, a pivoted signal frame adapted to detain the stop lever, and electro magnetic devices operating or permitting operation of said signal frame, substantially as described.

4. A block signal apparatus, comprising a three-part stop rod each part having a collar, a two-part spring actuated pawl adapted to the stop rod, a stop lever adapted to detain parts of the stop rod, a pivoted signal frame adapted to detain the stop lever, electro magnetic devices operating or permitting operation of said signal frame, and a line wire contact lever operative from the stop rod, substantially as described.

5. A block signal apparatus, comprising a stop rod, formed of three independently movable aligned parts placed end to end, a signal operating lever adapted to be locked by or through agency of the stop rod, and mechanically and electrically operative latch devices to which the stop rod sections are adapted, substantially as described.

6. A block signal apparatus, comprising a three-part stop rod, each part having a collar, a two-part spring actuated pawl adapted to upper and lower parts of the stop rod, a stop lever adapted to detain parts of the stop rod, a signal operating lever adapted to be locked by or through agency of the stop rod, a pivoted signal frame adapted to detain the stop lever, and electro magnetic devices operating or permitting operation of said signal frame, substantially as described.

7. A block signal apparatus, comprising a three-part stop rod, each part having a collar, a two-part spring actuated pawl adapted to upper and lower parts of the stop rod, a stop lever adapted to detain parts of the stop rod, a signal operating lever adapted to be locked by or through agency of the stop rod, a pivoted signal frame adapted to detain the stop lever, electro magnetic devices operating or permitting operation of said signal frame, and a line wire contact lever operative from the stop rod, substantially as described.

8. In block signal apparatus, the combination with the three-part stop rod 1, 2, 3, having collars 5, 6, 7, and springs 8, 9, 10, of a pawl 12, 13, fulcrumed at 11, and having springs 15, 16, said part 12, having faces or shoulders 19, 20, 21, and the part 13, having a

stop pin 14, and tappet 22; said stop rod portion 3, adapted to lock dependent operating devices, substantially as described.

9. In block signal apparatus, the combination with the three-part stop rod 1, 2, 3, having collars 5, 6, 7, and springs 8, 9, 10, of a pawl 12, 13, fulcrumed at 11, and having springs 15, 16, said part 12, having faces or shoulders 19, 20, 21, and the part 13, having a stop pin 14, and tappet 22; a spring pressed stop lever 32, having a shoulder 34, a signal frame 28, on a shouldered fulcrum 31, adapted to detain the lever 32, and mechanical and electrical devices actuating the signal frame, substantially as described.

10. In block signal apparatus, the combination with the three-part stop rod 1, 2, 3, having collars 5, 6, 7, and springs 8, 9, 10, of a pawl 12, 13, fulcrumed at 11, and having springs 15, 16, said part 12, having faces or shoulders 19, 20, 21, and the part 13, having a stop pin 14 and tappet 22; a spring pressed stop lever 32, having a shoulder 34, a signal frame 28, on a shouldered fulcrum 31, adapted to detain the lever 32, a spring 36, normally lifting the signal frame, and an electro magnet 42, having an escapement armature 41, engaging the signal frame, substantially as described.

11. In block signal apparatus, the combination with the three-part stop rod 1, 2, 3, having collars 5, 6, 7, and springs 8, 9, 10, of a

pawl 12, 13, fulcrumed at 11, and having springs 15, 16, said part 12, having faces or shoulders 19, 20, 21, and the part 13, having a stop pin 14, and tappet 22; a spring pressed stop lever 32, having a shoulder 34, a signal frame 28, on a shouldered fulcrum 31, adapted to detain the lever 32, mechanical and electrical devices actuating the signal frame, and a line wire contact lever operative from the stop rod, substantially as described.

12. In block signal apparatus, the combination with the three-part stop rod 1, 2, 3, having collars 5, 6, 7, and springs 8, 9, 10, of a pawl 12, 13, fulcrumed at 11, and having springs 15, 16, said part 12, having faces or shoulders 19, 20, 21, and the part 13, having a stop pin 14, and tappet 22; a spring pressed stop lever 32, having a shoulder 34, a signal frame 28, on a shouldered fulcrum 31, adapted to detain the lever 32, a spring 36, normally lifting the signal frame, an electro magnet 42, having an escapement armature 41, engaging the signal frame, and a line wire contact lever 23, operative from the stop rod, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHANN HEINRICH FRISCHEN.

Witnesses:

MAX WAGNER,

GEO. H. BENJAMIN.