

(No Model.)

J. H. FRISCHEN.
BLOCK SIGNAL APPARATUS.

2 Sheets—Sheet 1.

No. 505,420.

Patented Sept. 19, 1893.

Fig. 1.

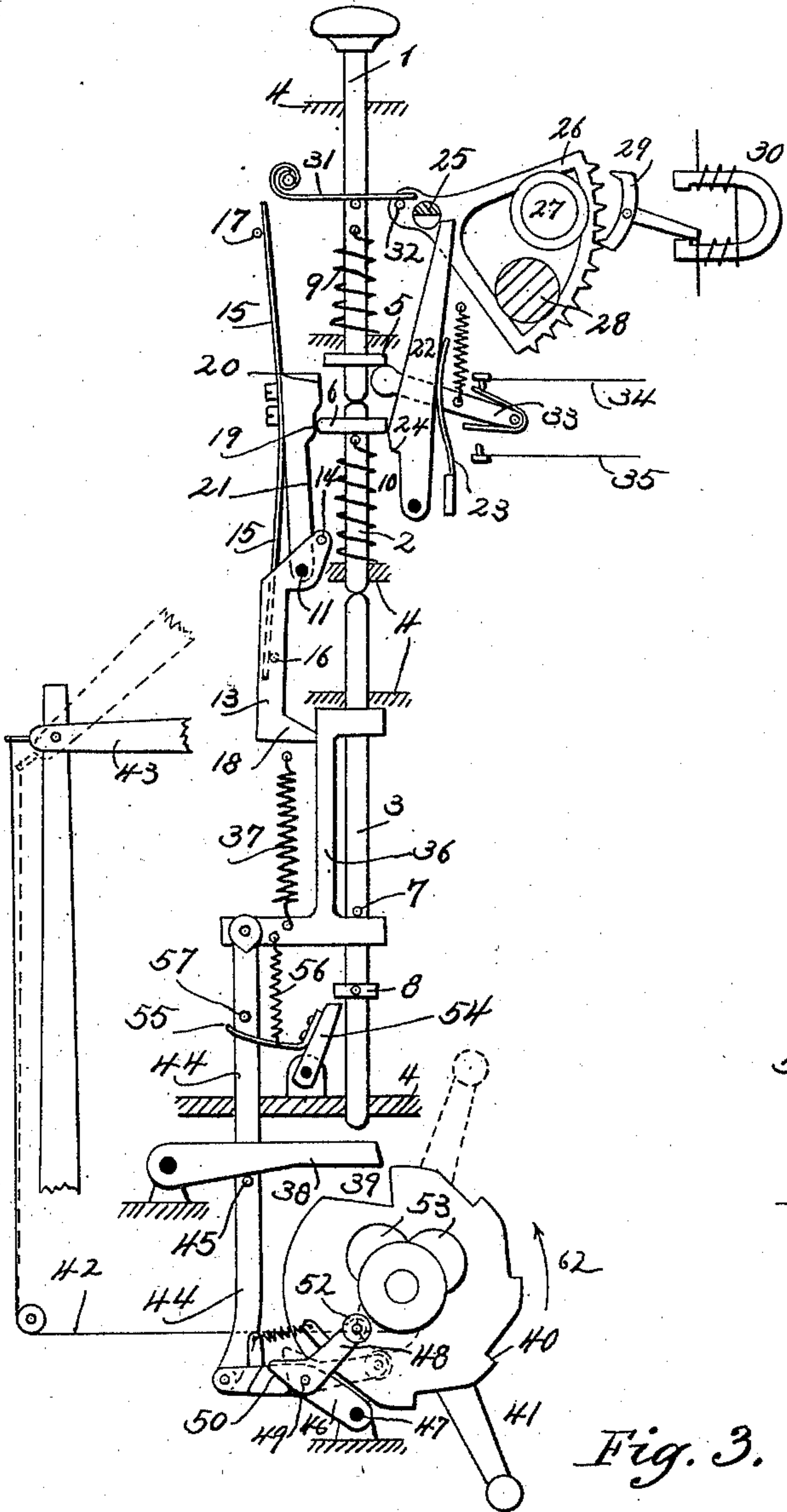


Fig. 2.

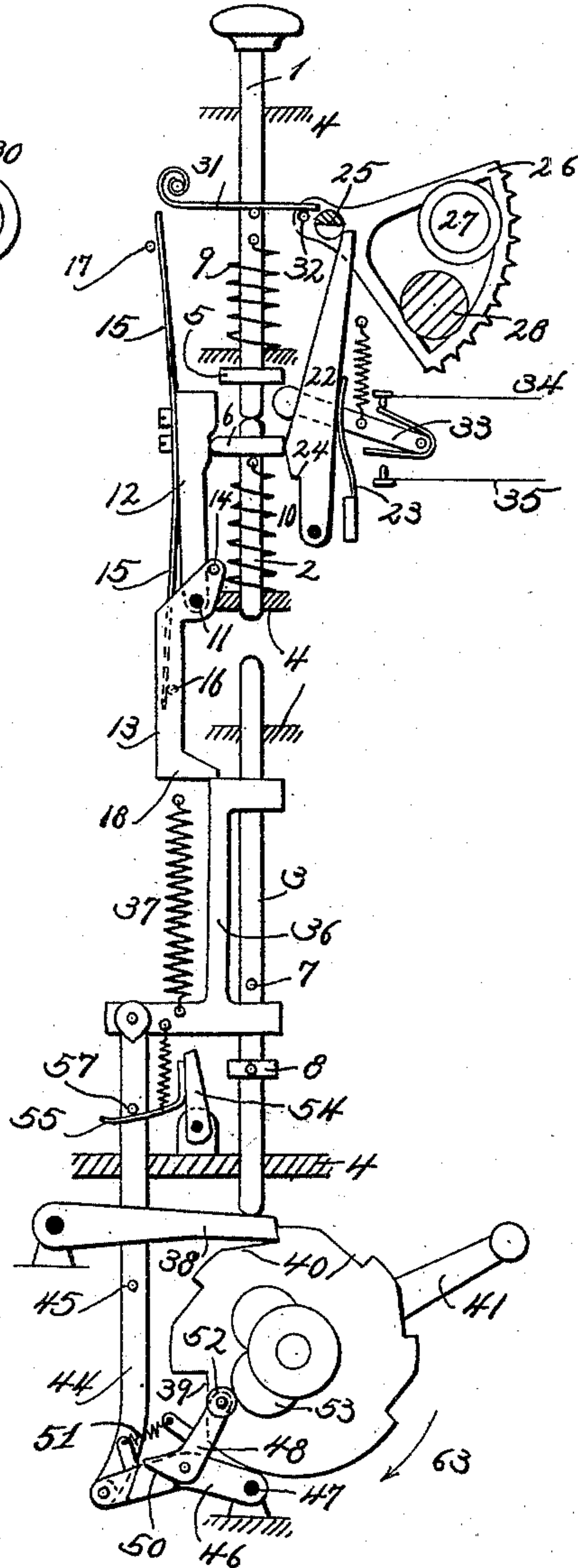
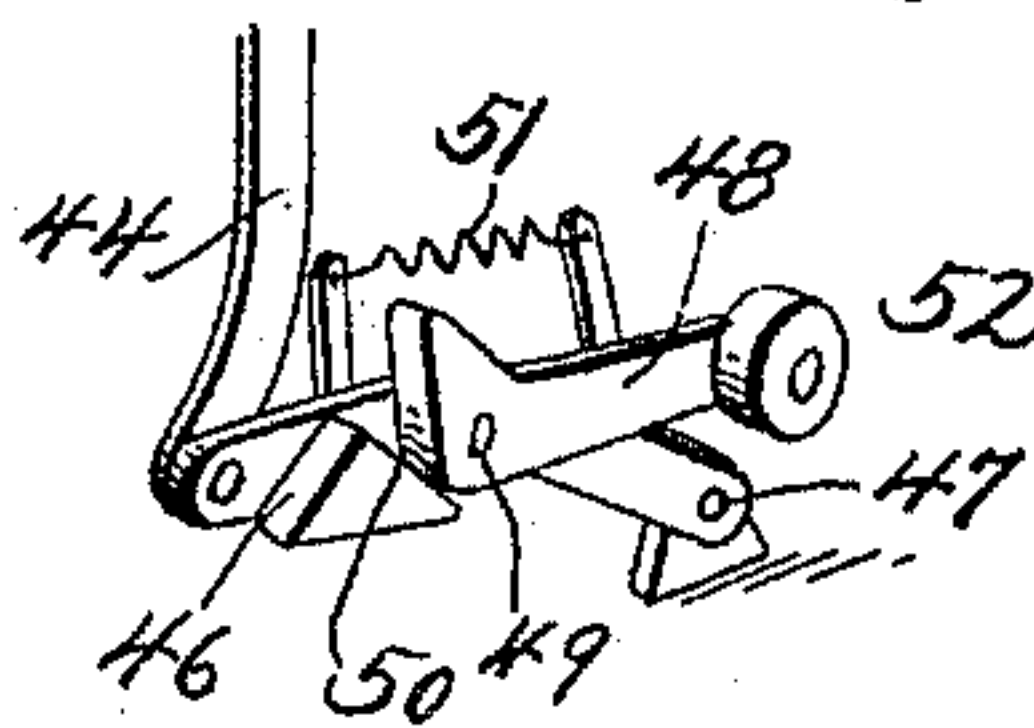


Fig. 3.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

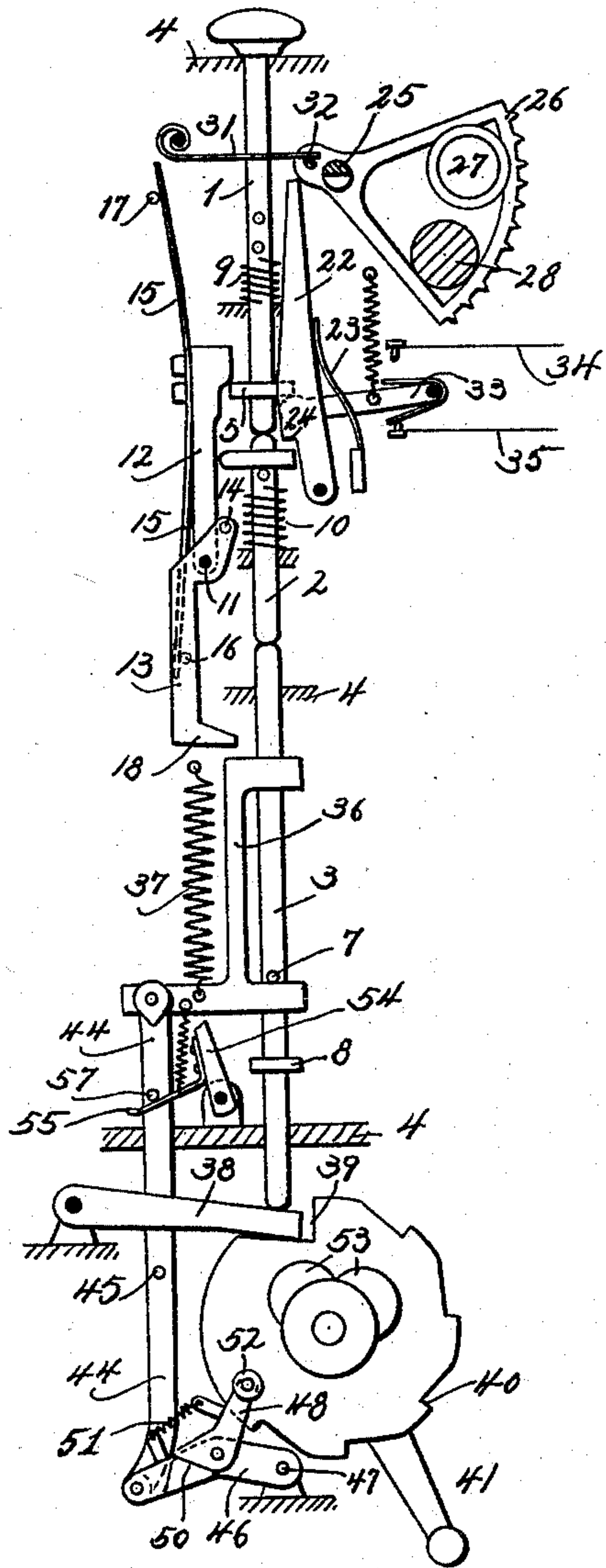


Fig. 5.

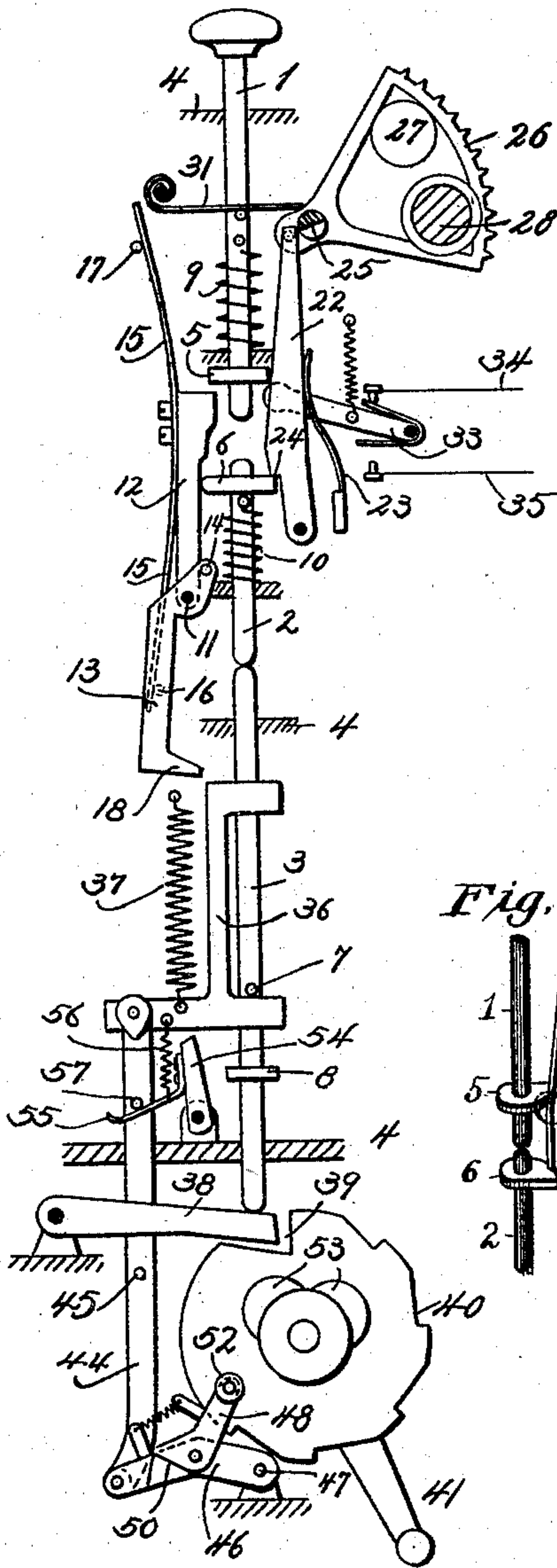


Fig. 7.

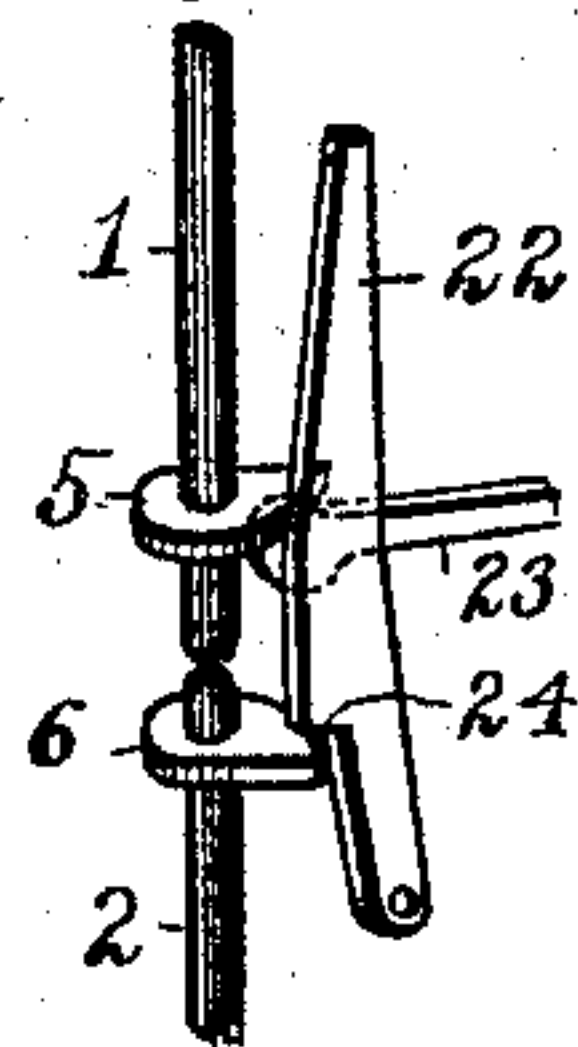
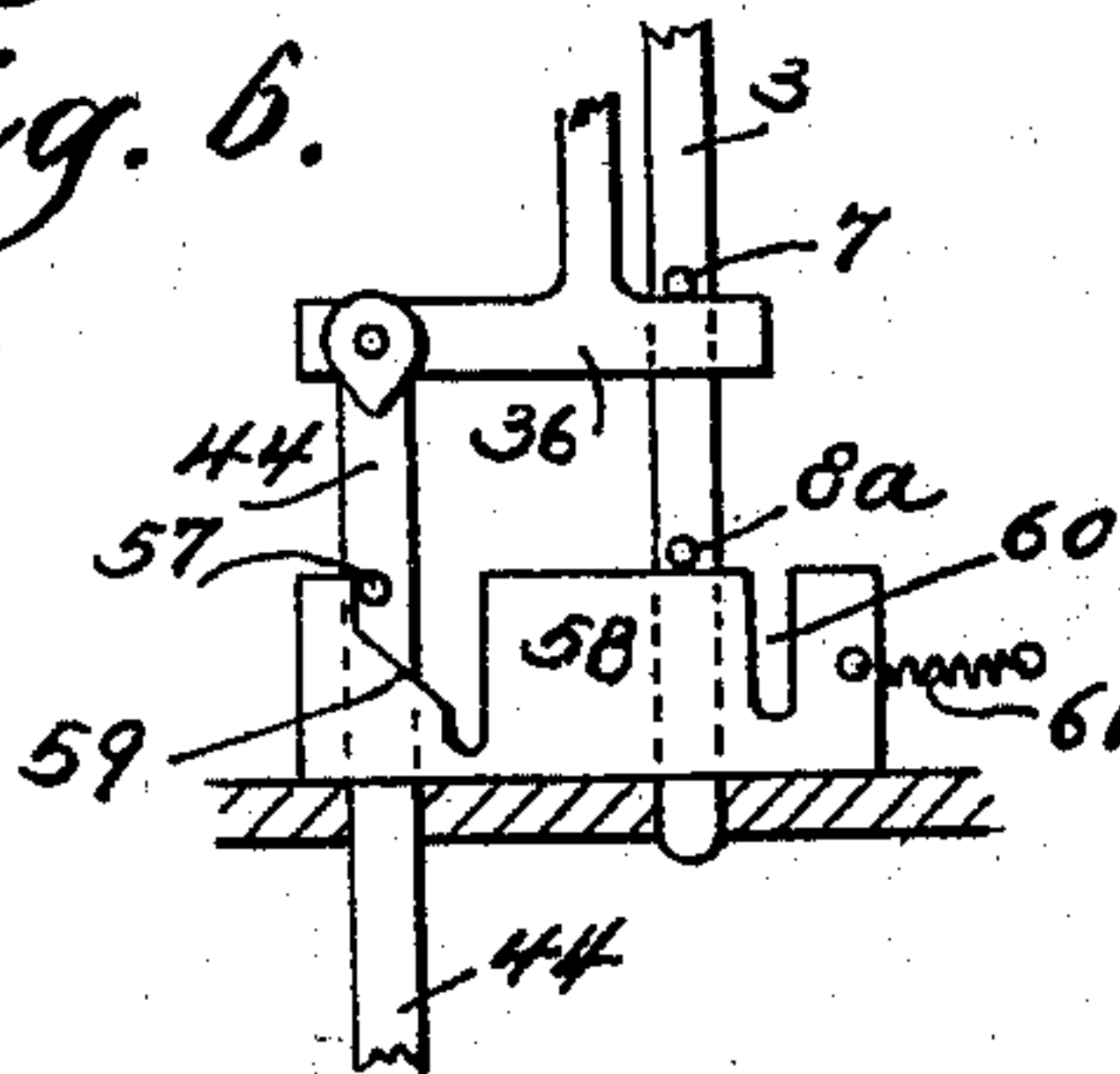


Fig. 6.



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BLOCK-SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 505,420, dated September 19, 1893.

Application filed May 18, 1893. Serial No. 474,673. (No model.)

To all whom it may concern:

Be it known that I, JOHANN HEINRICH FRISCHEN, a subject of the King of Prussia, German Emperor, residing at the city of Berlin, Kingdom of Prussia, German Empire, have invented new and useful Improvements in Block-Signal Apparatus, of which the following is a specification.

This invention relates to block signal apparatus for railways and has for its object to improve the construction and operation of devices of like general character shown in my recent application for a patent, Serial No. 470,171, filed April 13, 1893. In the prior construction above named, an unintentional depression of the block key or stop rod after release of the electrical lock of the signal operating lever would cause an undesired mechanical locking of the lever and prevent necessary operation thereof. Furthermore, the attendant has no proof that the lever has been operated after electrical release or unlocking of the mechanism.

It is the object of the present invention to obviate the above named disadvantages, while at the same time providing for automatic locking of the lever by its own movement and compelling the lever to be operated once and but once between the time the electrical locking is released, and the change from the mechanical to the electrical locking is effected.

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

Reference is to be had to the accompanying drawings forming part of this specification, and in which similar numerals refer to like parts in the several views.

Figure 1 is a side elevation of the improved block signal apparatus as it appears immediately after the electrical release or unlocking. Fig. 2 shows the mechanism in positions taken while the signal lever is being returned to "danger" or stop position, and illustrates also the mechanical locking of the devices. Fig. 3 is a detail perspective view of the two-part lower pull rod lever and a portion of said rod. Fig. 4 shows the stop rod depressed and the signal lever locked. Fig. 5 shows the signal lever electrically locked. Fig. 6 is a detail view of a modified detent for

the sectional stop rod, and Fig. 7, is a detail perspective view illustrating the arrangement of the collars on two upper sections of the stop rod, relatively to contact and signal frame levers of the apparatus.

As in my prior application aforesaid, the stop rod comprises three aligned portions, or a pressure rod 1, a blocking rod 2 and a locking rod 3; the latter however not having the rigid collar or shoulder heretofore used near its upper end. These rods slide in suitable bearings 4, and the rod 1 has a collar or shoulder 5; the rod 2 has a collar or shoulder 6, while the rod 3 has a pin or shoulder 7 and a lower collar or shoulder 8 acting relatively to a sliding stirrup fitted on the rod and a detent preventing depression of the entire stop rod, as hereinafter more fully explained. Springs 9, 10 on the rods 1, 2 normally lift them. A pin 11 is the fulcrum of a two-part pawl or latch comprising pawls 12, 13, the latter having a transverse pin 14 at times acting on the pawl 12, while both pawls are influenced by a spring 15 which is fastened to the pawl 12, and at its lower end bears on a pin 16 of the pawl 13, and its upper end bears on a fixed pin or stop 17. Said pawl 13 has a toe or tappet 18 which at times prevents upward movement of the stop rod section 3 and the sliding stirrup thereon. As in the prior construction, the upper pawl 12 has a series of inner shoulders or stepped faces 19, 20, 21, indicated only in Fig. 1 of the drawings, with which the stop rod collars 5, 6 at times co-operate in adjusting the parts. A trip lever 22 normally pressed toward the stop rod by a spring 23 has a shoulder 24 adapted to catch over the collar 6 of the rod section 2, to effect electrical locking of the apparatus as hereinafter more fully explained, and by means of the shoulder 25 of the shaft of the block signal frame 26 catching behind the upper end or tail of the lever. This frame carries white and red signal disks 27, 28, which indicate "all clear" and "danger," respectively. An escapement device 29 engaging peripheral teeth on the frame 26 controls rocking movements of the frame accordingly as the adjacent magnet 30 is energized by any approved inductor, not necessary to show or describe. A spring 31 acts on a pin 32 in the signal frame, to swing the frame upward to

display the danger signal as the energized escapement armature permits. A lever 33, normally raised by a spring and operative by the stop rod collar 5, is adapted to opposing
5 contacts to which are connected line circuit wires 34, 35, leading to and from the next station on the line of railway.

Fig. 7 of the drawings, shows that the collars 5, 6, of the stop rod sections 1, 2, are ar-
10 ranged to act independently on their adjacent levers. The collar 5, when stop rod section 1 is lowered depresses the contact lever 33, and has no effect on the signal frame lever 22, while the collar 6, when stop rod section
15 2 is lowered, engages the shoulder 24 of lever 22 and has no effect on the lever 33.

The chief novel features of the present invention will now be described as follows: The stirrup 36, above referred to, is fitted
20 loosely by its two end portions upon the lower section 3 of the stop rod, and is normally raised against the pin or shoulder 7 of the rod, to lift the latter by means of a spring 37. The lower bearing of the stirrup is between the
25 shoulders 7, 8 of the locking rod 3, and the foot of this rod is adapted to press a gravitating pawl 38 into either a deep notch 39 or into any one of a series of shallow notches 40 formed in the periphery of the head of the
30 lever 41, from which suitable pull wires or chains 42 lead to a semaphore signal 43 for operating the same.

To the stirrup 36 is coupled the upper end of a draft rod 44 which has a pin or shoulder
35 45 adapted to lift the pawl 38 from the lever notches. At its lower end the rod 44 is pivotally connected to the main part 46 of a duplex lever, which is fulcrumed at 47 to a fixed support and has an auxiliary trip lever 48
40 which is fulcrumed at 49 to the main lever portion 46, and is adapted to stop against a shoulder 50 thereof and to which shoulder the trip lever is normally held by a spring 51 connected to the two parts of the lever. The
45 trip lever 48 carries at its outer end an anti-friction roller 52, which is acted upon by crescent shaped projections 53, or one of them, as the lever is operated.

I provide a detent which at times prevents
50 depression of the stop rod. This detent co-operates with the stirrup 36, and may consist of a pawl 54 having a tail piece 55, and coupled by a spring 56 to the stirrup; this spring acting normally to throw the pawl under the
55 collar or shoulder 8 as the stirrup is lifted, while a pin or shoulder 57 on the draft rod 44 will, as this rod is lowered, strike the tail piece and remove the pawl from beneath the stop rod shoulder to permit depression of the rod.
60 Fig. 6 of the drawings shows another stop rod detent which may be used, and consisting of a reciprocating plate 58 which has a recess provided with an inclined wall 59, against which the pin 57 of the draft rod 44 strikes as
65 the latter is lowered to cause the plate to move over, until a slot 60 in it registers with a pin 8^a on the section 3 of the stop rod, thereby al-

lowing depression of the rod. A spring 61 normally draws the plate over as the rods 44, 3 are raised, to carry the upper edge of the
70 plate beneath the pin 8^a, and prevent lowering of the stop rod.

The operation is as follows: If the parts are adjusted as shown in Fig. 5 of the draw-
75 ings, with the lever 22 held by the shoulder 25 of the signal frame shaft, so as to cause the lever shoulder 24 to lock over the stop rod collar 6, the mechanical locking of the signal lever 41 previously effected by the overlapping of the stirrup 36 by the tappet 18
80 of the pawl 13 is exchanged for the electrical locking by the shoulder 24 of lever 22, and the signal lever can only be released electrically or by the energizing of the magnet 30 by means of an electric current transmitted
85 or controlled from the next station ahead of the train, or at the forward end of the "block" of track and after the train reaches said station, and whereby the danger signal 28, which had been displayed at the station next
90 behind the moving train will be changed to show the white or safety signal 27, permitting the following train to enter the block; such change of the signal being effected by oscillation of the armature 29 of the ener-
95 gized magnet which rocks the signal frame downward or allows it to fall to bring the all clear white signal to view. As the shaft of the signal frame is turned sufficiently to allow the lever 22 to escape past the shaft shoulder
100 25, the springs 10, 37 will raise the parts 2, 36, 3, 44, 46, 48, and the mechanism will then take normal relative positions shown in Fig. 1 of the drawings, the pin 45 of rod 44 then hav-
105 ing raised the pawl 38 from the deep notch 39 of the signal lever 41, thus unlocking it and the spring 56 then having swung the pawl 54 over beneath the collar 8 of stop rod section 3, thereby preventing depression of the entire
110 stop rod and the line contact lever 33. As the stirrup 36 cannot be lowered by depression of the stop rod 1, 2, 3 until after the pawl or detent 54 is removed from beneath the shoulder 8 of the rod, and as this detent can only be re-
115 moved by the drawing down of the rod 44 by the agency of the signal lever, it is obvious that the lever must first be operated; hence, if after the change of the signal to white or "all clear" by the electrical unlocking from a dis-
120 tant station, the operator cannot press down the stop rod, it is notice to him that his signal lever 41 has not been used. It is his duty, however, after electric changing of the signal to "all clear" to actuate the lever 41, or to swing it upward in direction of the arrow 62
125 in Fig. 1 of the drawings, to carry the connected semaphore from the "danger" position shown in full lines to the "all clear" position shown by dotted lines to correspond with the white disk of the block signal frame.
130 As the attendant thus swings the lever upward in direction of arrow 62, the first projection 53 of this lever will strike the roller 52 of the auxiliary lever 48 and will swing

the latter downward on its fulcrum 49, as indicated by dotted lines in Fig. 1, and away from the shoulder 50 of the lever 46, which is coupled to the draft rod 44; hence on this upward stroke of the lever 41 the auxiliary lever 48 will alone be actuated, and the lever 46 and draft rod 44 will remain at rest, and at the extreme limit of the upward movement of the lever 41, indicated by dotted lines in Fig. 1, the auxiliary lever will have resumed its normal position against the shoulder 50 of lever 46, and its roller 52 will rest between the two projections 53, 53 of the signal lever. If now, at proper subsequent time, and when or after the next train has entered the "block" of track, the lever 41 be turned from the uppermost position toward the lowermost position, and as indicated by the arrow 63 in Fig. 2 of the drawings, the lever projection 53 will act in reverse direction on the roller 52 of the auxiliary lever 48, and the latter by bearing on the shoulder 50 of lever 46 will force both levers 48, 46 downward together on the fulcrum 47 as a center of motion, thereby drawing down the rod 44 and causing its pin 57 by action on the tailpiece 55, to swing the pawl 54 outward from under the shoulder 8 of the stop rod 3, which being no longer supported falls upon the pawl 38 and holds it to the shallower recesses 40 of the head of lever 41; and as the rod 44 receives its maximum downward movement from the lever 46 and carries the stirrup 36 down with it and below the tappet 18 of pawl 12, 13, this tappet will be carried by the pawl spring 15 inward to overlie the top of the stirrup and prevent rising of it, and thus causing the mechanical locking of the signal lever by the pawl 38 in the shallow lever recesses 40, and preventing a second use of the lever for setting the semaphore to "all clear" while allowing the lever 41 to be turned fully downward in direction of arrow 63 to the position shown in Figs. 1, 4 and 5 of the drawings, when the deepest notch 39 of the lever will face the pawl which then may drop into said notch. Fig. 2 of the drawings shows relative positions of the mechanism during the first part of the downward movement of the lever 41, and immediately after fall of the released rod 3 upon the pawl 38 and after the aforesaid mechanical locking of the signal lever is effected. During the mechanical locking of the lever 41 by the pawl tappet 18, the sections 1, 2 of the stop rod may be depressed to actuate the contact lever 33 for electric signaling or calls between two stations of the railway, but so long as the lever is not turned fully down to the position shown in Figs. 1, 2 and 5 of the drawings, or while the shallow lever notches 40 face the pawl 38, the stop rod sections 1, 2 cannot be depressed far enough to exchange the mechanical locking of the signal operating lever 41 for the electrical locking thereof; but when the lever 41 is turned fully downward to set the semaphore to "danger" and the deep notch 39 of the said lever is presented

to the pawl 38, and if then the stop rod 1, 2, 3, be fully depressed, as shown in Fig. 4 of the drawings and the electrical inductor be simultaneously operated, the full descent of the rod collar 6 will allow the spring actuated pawl to adjust itself as shown in Fig. 5, or with its tappet 18 out of the path of the stirrup 36, to allow the latter to subsequently rise fully, and the spring 23 will carry the lever 22 inward and the lever shoulder 24 will overlie the collar 6, and as the magnet 30 is energized by the inductor, the signal frame 26 will be swung upward by the oscillating armature 29 until the red or danger disk 28 comes to view and the shoulder 25 of the signal frame shaft is turned behind the lever 22, thereby preventing escape of its shoulder 24 from above the collar 6 of the stop rod, and when the pressure on the section 1 of said rod is relaxed said section 1 will alone rise under action of its spring 9, and as the collar 5 of said rod section 1 passes the upper face or shoulder 19 of the pawl 12, said pawl will spring inward at the top to underlie said collar 5 and prevent depression of the rod section 1 and the line contact lever 33. The prior mechanical locking of the signal lever 41 by the tappet 18 of the pawl 13, causing the draft rod pin 45 to remain down and allowing the pawl 38 to lock into the notch 39 of the signal lever, has thus been exchanged for the electrical locking by engagement of the shoulder 24 of lever 22 with the collar 6 of the blocking rod 2 and the entire mechanism then has relative positions shown in Fig. 5 of the drawings, and the signal lever 41 can then be unlocked only by electrical means or by a current transmitted from the next station ahead, which by energizing the magnet 30 will oscillate armature 29 and allow the lever 22 to escape past the shoulder 25 of the signal frame shaft, thereby releasing the blocking rod 2 and allowing the spring 37 to lift the stirrup 36 on the locking rod 3, and restoring the parts to normal positions shown in Fig. 1 of the drawings. The operation of the modified plate detent 58 relatively to the stop rod, when said detent is used instead of the pawl device 54, 55, 56, will be sufficiently understood from the aforesaid description. The lever 41 may be connected to a railway rail switch to operate the latter subject to the modifying action of the stop and locking mechanism hereinbefore described.

Having thus described my invention, I claim—

1. In block signal apparatus, the combination, with a signal lever, a pawl adapted to lock the lever and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, and a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, substantially as described.

2. In block signal apparatus, the combina-

tion, with a signal lever, a pawl adapted to lock the lever and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, and a spring actuated two-part pawl adapted to mechanically lock the stirrup and signal lever, substantially as described.

3. In block signal apparatus, the combination, with a signal lever, a pawl adapted to lock the lever and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, and a detent for the stop rod removable therefrom by the draft rod, substantially as described.

4. In block signal apparatus, the combination, with a signal lever, a pawl adapted to lock the lever and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, and a two-part lever device coupled to the draft rod and operative to depress said rod on movement of the signal lever in one direction, substantially as described.

5. In block signal apparatus, the combination, with a signal lever, a pawl adapted to lock the lever, and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a detent for the stop rod removable therefrom by the draft rod, and a two-part lever device coupled to the draft rod and operative to depress said rod on movement of the signal lever in one direction, substantially as described.

6. In block signal apparatus, the combination, with a signal lever having one deep and other shallower notches, a pawl adapted to lock into said notches and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever and a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, substantially as described.

7. In block signal apparatus, the combination, with a signal lever having one deep and other shallower notches, a pawl adapted to lock into said notches and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, and a spring actuated two-part pawl adapted to mechanically lock the stirrup and signal lever, substantially as described.

8. In block signal apparatus, the combination, with a signal lever having one deep and other shallower notches, a pawl adapted to lock into said notches and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, and a detent for the stop rod removable therefrom by the draft rod, substantially as described.

9. In block signal apparatus, the combination, with a signal lever having one deep and other shallower notches, a pawl adapted to lock into said notches and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever and a two part lever device coupled to the draft rod and operative to depress said rod on movement of the signal lever in one direction, substantially as described.

10. In block signal apparatus, the combination, with a signal lever having one deep and other shallower notches, a pawl adapted to lock into said notches and a stop rod locking the pawl, of a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a detent for the stop rod removable therefrom by the draft rod, and a two part lever device, coupled to the draft rod and operative to depress said rod on movement of the signal lever in one direction, substantially as described.

11. In block signal apparatus, the combination with a signal lever, a pawl adapted to lock the lever, a sectional stop rod locking the pawl, a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, a two part pawl adapted to lock and release the stirrup, a trip lever adapted to lock and release parts of the stop rod, and a rocking electrically operative signal frame adapted to detain the trip lever and exchange the mechanical locking of the stop rod and signal lever by the two part pawl for the electrical locking of said stop rod by the trip lever and signal frame, substantially as described.

12. In block signal apparatus, the combination, with a signal lever, a pawl adapted to lock the lever, a sectional stop rod locking the pawl, a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, a detent for the stop rod removable therefrom by the draft rod, a two part pawl adapted to lock and release the stirrup, a trip lever adapted to lock and release parts of the stop rod and a rock-

ing electrically operative signal frame adapted to detain the trip lever and exchange the mechanical locking of the stop rod and signal lever for the electrical locking thereof, substantially as described.

13. In block signal apparatus, the combination, with a signal lever, a pawl adapted to lock the lever, a sectional stop rod locking the pawl, a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a two part lever device coupled to the draft rod and operative to depress said draft rod on movement of the signal lever in one direction, a detent for the stop rod removable therefrom by the draft rod, a two part pawl adapted to lock and release the stirrup, a trip lever adapted to lock and release parts of the stop rod and a rocking electrically operative signal frame adapted to detain the trip lever and exchange the mechanical locking of the stop rod and signal lever for the electrical locking thereof, substantially as described.

14. In block signal apparatus, the combination, with a signal lever having one deep and other shallower notches, a pawl adapted to lock into said notches, a sectional stop rod locking the pawl, a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a two part lever device coupled to the draft rod and operative to depress said draft rod on movement of the signal lever in one direction, a detent for the stop rod removable therefrom by the draft rod, a two part pawl adapted to lock and release the stirrup, a trip lever adapted to lock and release parts of the stop rod, and a rocking electrically operative signal frame adapted to detain the trip lever and exchange the mechanical locking of the stop rod and signal lever for the electrical locking thereof, substantially as described.

15. In block signal apparatus, the combination, with a signal lever, a pawl adapted to lock the lever, a sectional stop rod locking the pawl, a stirrup movable on the stop rod, a draft rod coupled to the stirrup and adapted to disengage the pawl from the signal lever, a device connected to the draft rod and operative by the signal lever for depressing the draft rod and stirrup, a two part pawl adapted to lock and release the stirrup, a trip lever adapted to lock and release parts of the stop rod, a line wire contact lever operative by the stop rod, and a rocking electrically operative signal frame adapted to detain the trip lever and exchange the mechanical lever of the stop rod and signal lever for the electrical locking thereof, substantially as described.

16. The combination, with the signal lever 41 having notch 39 and one or more projections 53, a pawl 38, adapted to said notch, a stop rod section 3, having pin 7, a stirrup 36,

loose on rod 3, a spring 37, lifting the stirrup, a draft rod 44, coupled to the stirrup and having a pin 45, and a duplex lever device 46, 50, 48, 51, coupled to the draft rod and operative by the signal lever, substantially as described.

17. The combination, with a signal lever 41, having notches 39, 40, and one or more projections 53, a pawl 38, a stop rod section 3, having pin 7, a stirrup 36, a spring 37 therefor, a rod 44, having a pin 45, and a duplex lever device 46, 50, 48, 51, substantially as described.

18. The combination, with the signal lever 41, having notch 39, and one or more projections 53, a pawl 38, a stop rod section 3, having pin 7 and shoulder 8, a stirrup 36, a spring 37 therefor, a rod 44 having pins 45, 57, a duplex lever 46, 50, 48, 51, and a stop rod detent 54, 55, 56, substantially as described.

19. The combination, with the signal lever 41, having notches 39, 40, and one or more projections 53, a pawl 38, a stop rod section 3, having pin 7 and shoulder 8, a stirrup 36, a spring 37 therefor, a rod 44, having pins 45, 57, a duplex lever device 46, 50, 48, 51, and a detent 54, 55, 56, adapted to the stop rod shoulder 8 and draft rod pin 57, substantially as described.

20. The combination, with the signal lever 41, having notch 39, and one or more projections 53, a pawl 38, adapted to said notch, a stop rod comprising sections 1, 2, 3, having projections 5, 6, 7, 8, springs 9, 10, lifting rod sections 1, 2, a two part pawl 12, 13, 14, 15, 16, a trip lever 22, a rocking electrically operative signal frame 26, 27, 28, adapted to retain lever 22, a stirrup 36, on the rod 3, a spring 37, lifting the stirrup, a lever device 46, 50, 48, 51, next the lever 41, a draft rod connecting the parts 36, 46, and provided with pins 45, 57, and a detent 54, 55, 56, for the stop rod, substantially as described.

21. The combination, with the signal lever 41, having notch 39, and one or more projections 53, a pawl 38, adapted to said notch, a stop rod comprising sections 1, 2, 3, having projections 5, 6, 7, 8, springs 9, 10, lifting rod sections 1, 2, a two part pawl 12, 13, 14, 15, 16, a trip lever 22, a rocking electrically operative signal frame 26, 27, 28, adapted to retain lever 22, a stirrup 36, on the rod 3, a spring 37, lifting the stirrup, a lever device 46, 50, 48, 51, next the lever 41, a draft rod connecting the parts 36, 46, and provided with pins 45, 57, a detent 54, 55, 56, for the stop rod, and a line wire contact lever 33, substantially as described.

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

JOHANN HEINRICH FRISCHEN.

Witnesses:

MAX WAGNER,
MAX PIEPER.