

(No Model.)

J. H. FRISCHEN.

SWITCH AND SIGNAL SETTING AND LOCKING APPARATUS.

No. 497,716.

Patented May 16, 1893.

Fig. 1.

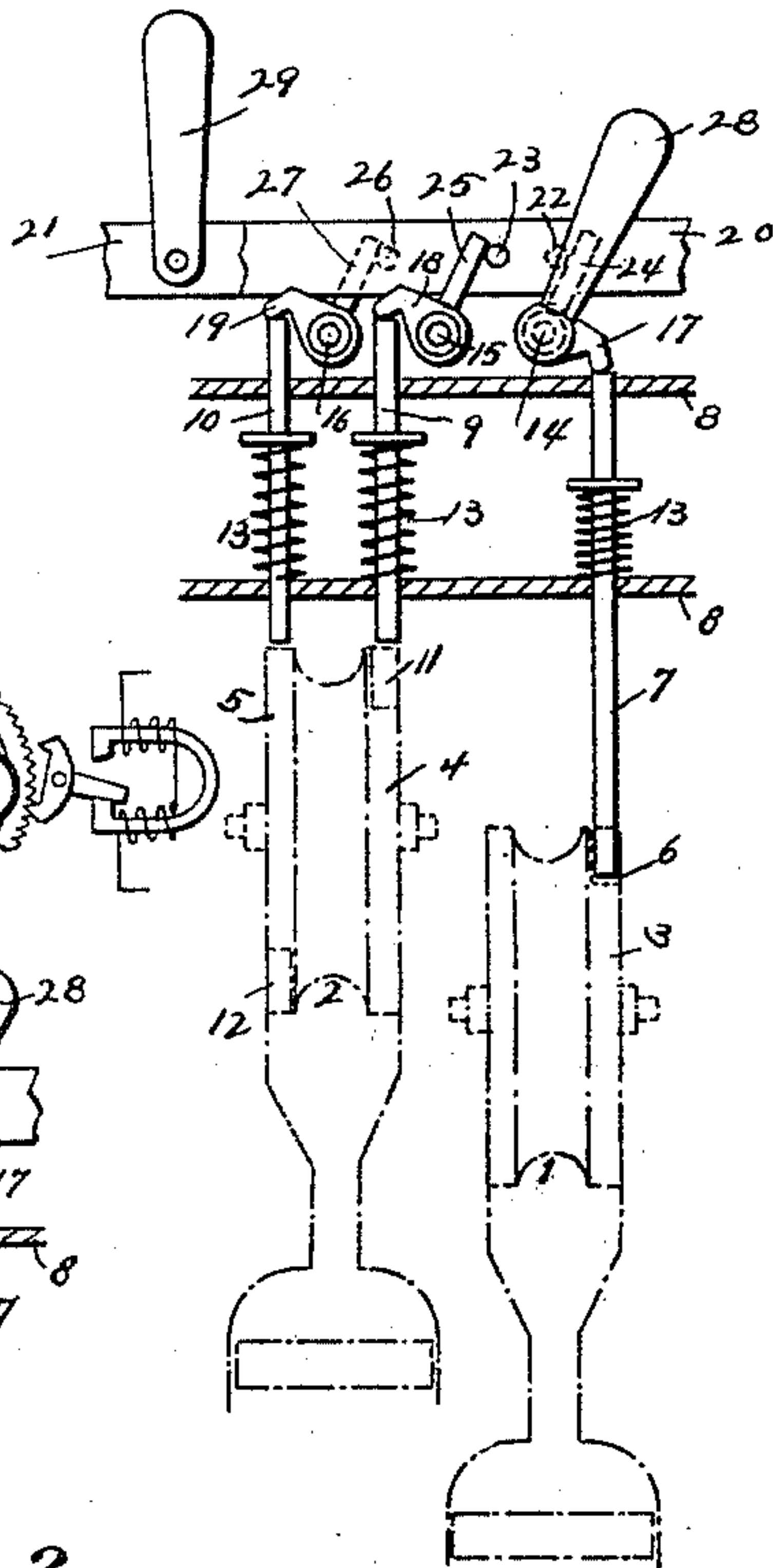


Fig. 3.

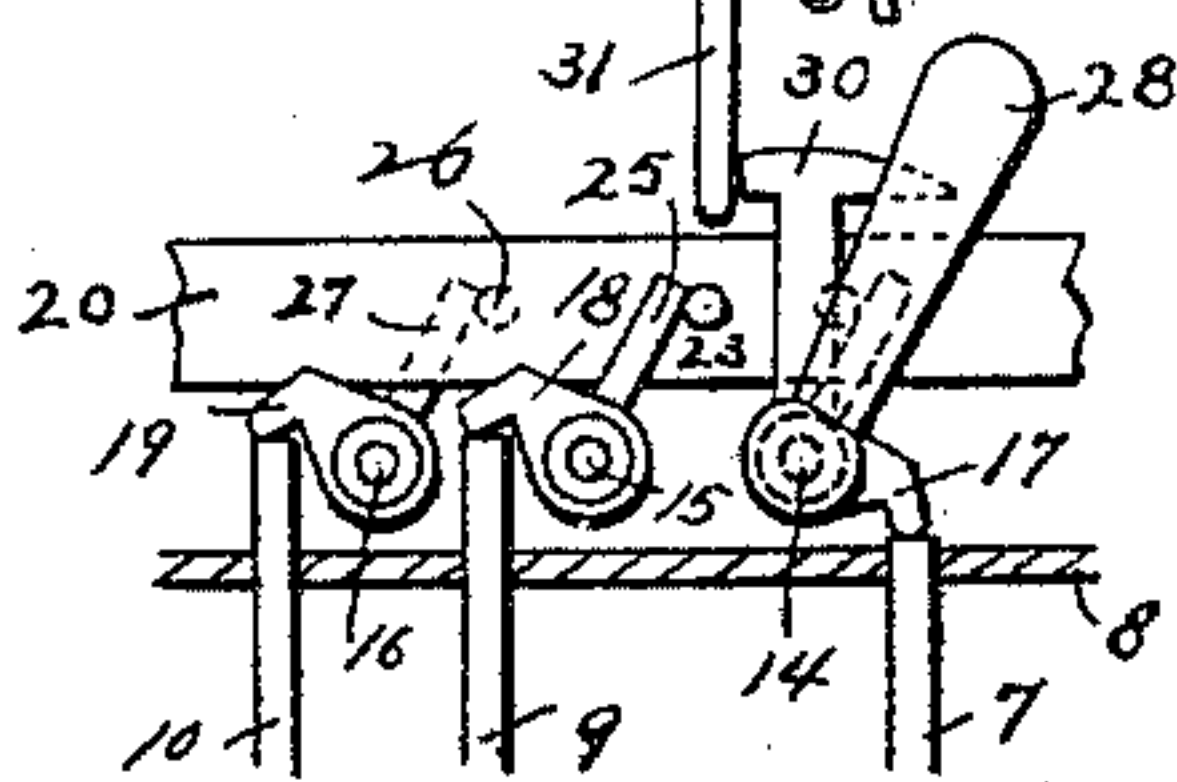


Fig. 4.

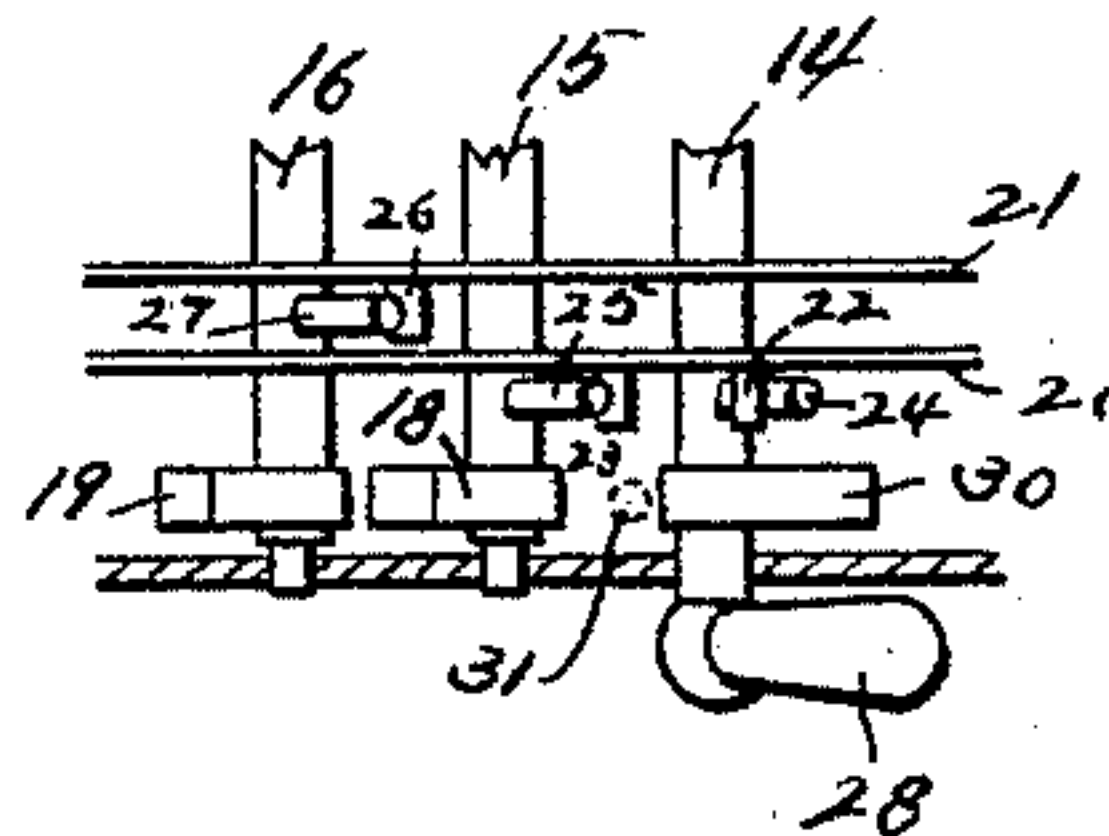


Fig. 2.

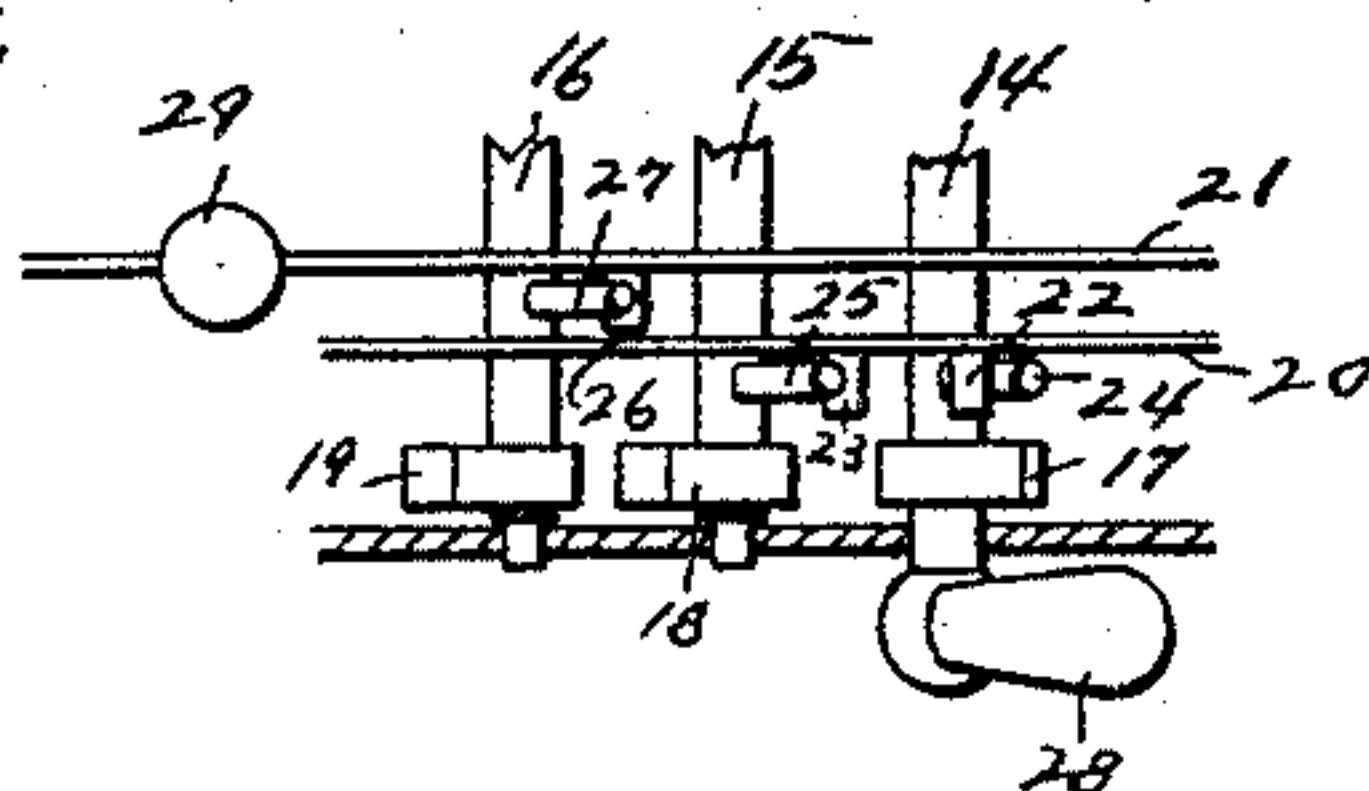


Fig. 5.

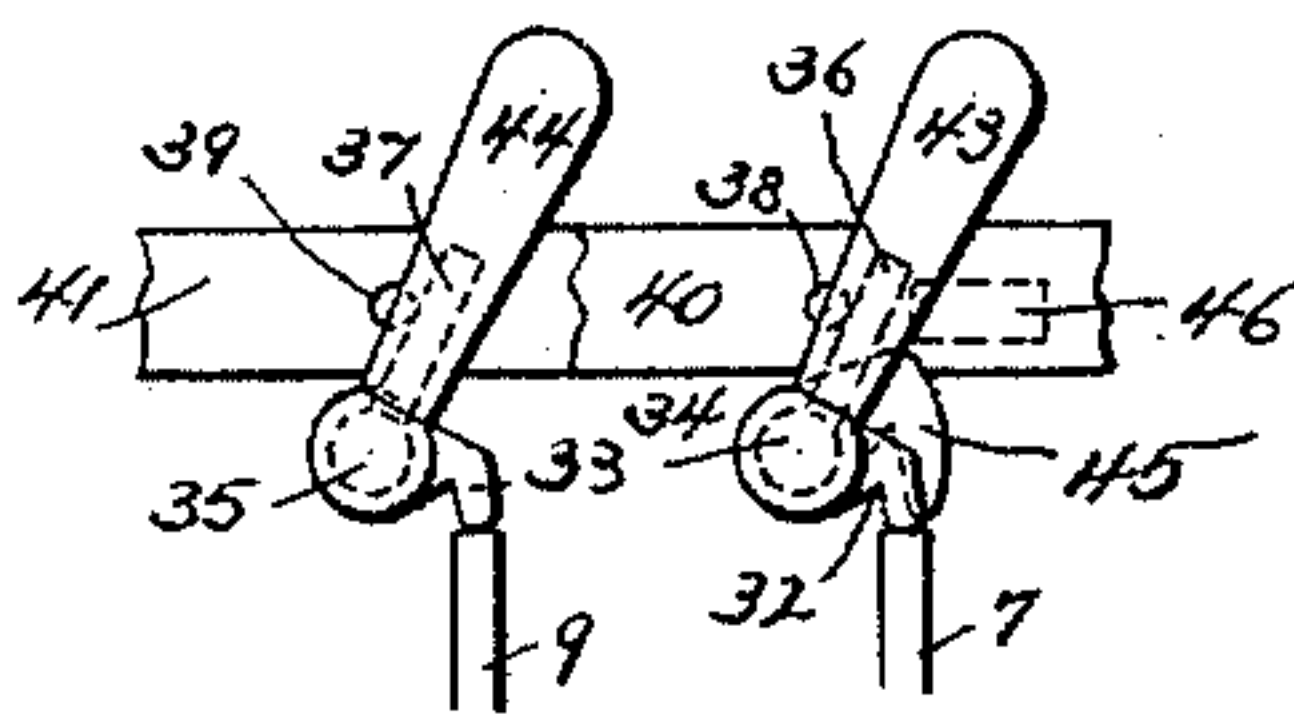
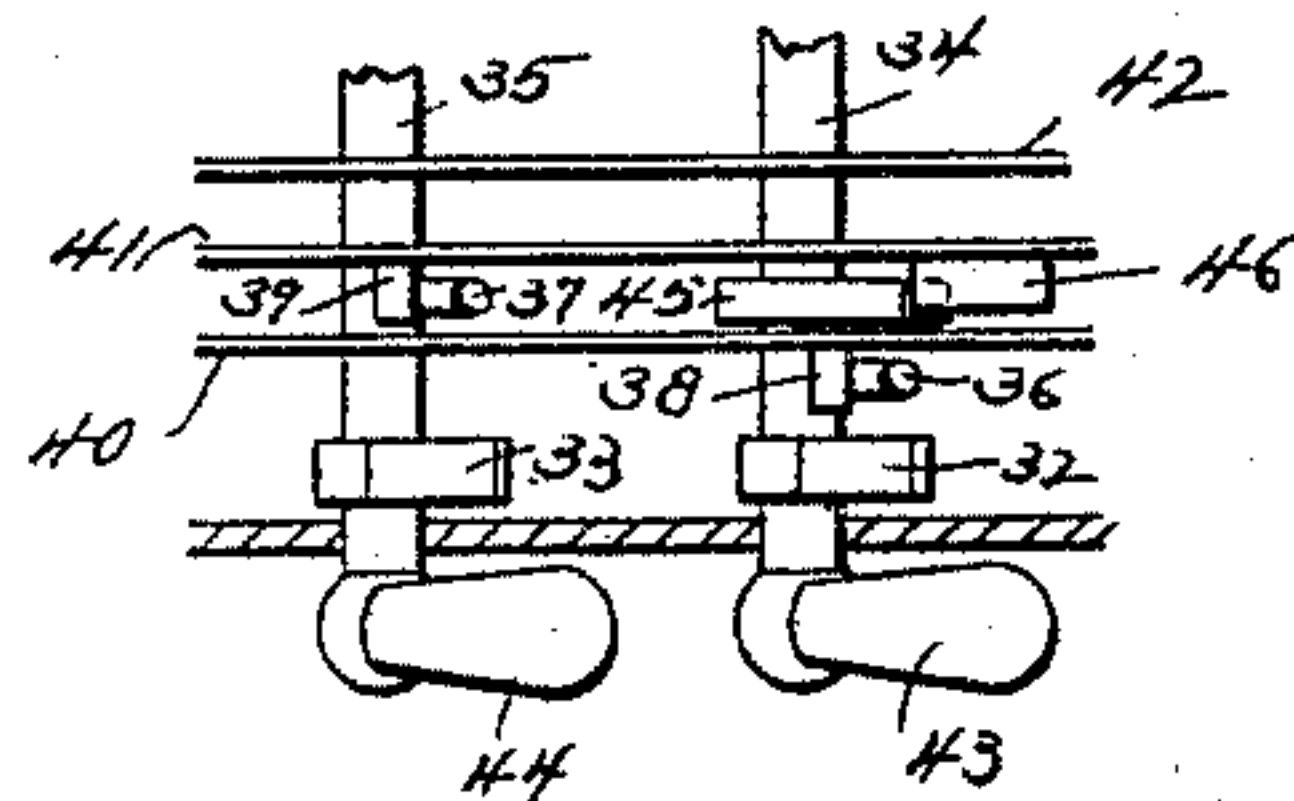


Fig. 6.



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# UNITED STATES PATENT OFFICE.

JOHANN HEINRICH FRISCHEN, OF BERLIN, GERMANY, ASSIGNOR TO SIEMENS & HALSKE, OF SAME PLACE.

## SWITCH AND SIGNAL SETTING AND LOCKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 497,716, dated May 16, 1893.

Application filed March 13, 1893. Serial No. 465,749. (No model.) Patented in Germany May 12, 1880, No. 13,017; in Austria-Hungary July 15, 1880, No. 24,411 and No. 30,505; in Belgium August 13, 1880, No. 52,301, and in France August 18, 1880, No. 138,321.

*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 Switch and Signal Setting and Locking Apparatus, (for which I have obtained the following Letters Patent: in France, No. 138,321, dated August 18, 1880; in Germany, No. 13,017, dated May 12, 1880; in Austria-Hungary, No. 24,411 and No. 30,505, dated July 15, 1880, and in Belgium, No. 52,301, dated August 13, 1880,) of which the following is a specification.

My invention has for its object to promote the safety of travel by giving an improved control of the switch and signal devices of railway tracks.

The invention consists in the use of one or more movable locking bars relatively to adjustable stop rods which engage the switch and signal actuating mechanisms, and with intermediate operating mechanism, whereby a proper adjustment of a switch is necessary before the corresponding correct signal can be given.

The invention also includes the interposition of an electric block system stop or blocking rod in the switch and signal operating devices to prevent certain adjustments of said devices until the blocking rod indicates a clear track ahead.

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

Reference is to be had to the accompanying drawings forming a part of this specification; and in which the same numerals indicate like parts in the several views.

Figure 1, is a detail front sectional view of one pair of switch and signal levers at a central station with their corresponding stop rod and bar devices, and Fig. 2, is a plan view thereof. Fig. 3, is a detail front view illustrating the interposition of the electric block signal locking rod, and Fig. 4, is a partial plan view thereof. Fig. 5, is a detail front view illustrating a stop device interposed directly between one of the signal lever shafts and the adjacent sliding bar, and Fig. 6, is a plan view thereof.

It will be understood that the drawings illustrate but one pair of switch and signal operating levers and their stop devices located at a central station or lookout tower, which may have any required number of such levers and devices to accommodate the number of railway tracks and their switches at the approaches to a railway station or depot or other place.

In Figs. 1 and 2 of the drawings the numeral 1 indicates the signal lever, and 2, the switch lever, both of which are shown with cylindrical heads which have flat peripheral or face portions 3, on the lever 1, and 4 and 5, on the lever 2. A radial recess 6, at the face 3 of the signal lever 1, is adapted to receive a stop rod 7, sustained in suitable bearings 8, 8, which also guide other stop rods 9, 10, which are adapted respectively to enter recesses 11, 12 formed in the faces 4, 5, of the switch lever 2. Each of these rods 7, 9, 10, has a shoulder against which a spring 13 expands to normally raise the rod. The levers 1, and 2, are supported in suitable bearings by shafts or axles located at the center of their heads and have radial handles by which they may be operated. Above the lever stop rods, are journaled a series of transverse shafts 14, 15, 16, which respectively carry tappets 17, 18, 19, adapted to lower the stop rods into the recesses of the levers. Preferably above the shafts 14, 15, 16, are arranged to slide endwise in any suitable bearings or guides, a pair of bars 20 and 21. The bar 20 carries two pins 22, 23, adapted for engagement by pins or fingers 24, 25 on the shafts 14, 15, respectively, and the bar 21, carries a like fixed pin 26, engaged by a pin or finger 27 on the third shaft 16. The shaft 14 has a handle 28, by which it may be turned axially, and the bar 21 has a handle 29, by which it may be moved lengthwise independently of the other sliding bar 20. The pin 22 on bar 20 lies in front of the finger 24 on shaft 14, and the pin 23 on bar 20 lies behind or relatively at the opposite side of the finger 25 on the shaft 15, and the pin 26 on the bar 21 lies in front of the finger 27 on the shaft 16.

The operation is as follows: When the signal lever 1 is adjusted with its recess 6, op-



posite the stop rod 7, the spring 13 on the rod 9, and which has greater tension or force than the spring on the rod 7, will, by lifting the rod 9 against the tappet 18 of the shaft 15, turn said shaft, and thereby cause its finger 25 to act on pin 23 of bar 20 to slide the latter toward the right hand, whereby the pin 22 on the bar 20 will, by action on the finger 24, of shaft 14, cause the tappet 17 to depress the rod 7 into the recess 6, as shown in Fig. 1 of the drawings, this being the normal adjustment of the lever 1, which then holds its connected signal at "stop" or "danger," indicating that the switch controlled by the lever 2 is open to a side track. Should the switch be afterward closed or adjusted to leave the main line clear, the recess 11 of the switch lever 2 will then be opposite the rod 9, and then, and only at this time, the handle 28 can be moved over toward the left hand to lift the rod 7 from the recess 6 of the lever 1, to allow the latter to be turned partly, say half way, around to set the signal to "all clear" and allowing trains on the main line rails to proceed safely past the switch. As the handle 28 is thus swung toward the left hand, the finger 24 on the shaft 14 will act on pin 22 of bar 20 to move the latter to the left hand, and thereby cause the pin 23 of bar 20 to push over the finger 25 of shaft 15 and rock the latter and its tappet 18, and thereby carry the rod 9 into the opposing recess 11 of the switch lever 2 to lock the latter against movement and prevent opening of the switch. After the half turn of lever 1 to set the "all clear" signal, and in fact after any turning movement of said lever which will carry its one and only recess 6, out of line with the raised rod 7, the latter will simply ride on the periphery 3 of the lever, and then will prevent return or right hand movement of the handle 28 and the rod 9 cannot then be raised from the one and only recess 11 in the face or rim 4 of the switch lever 2, as the relative arrangement of the parts 18, 15, 25, 23, 20, 22, 24, 14 and 17, will prevent such movement. It will be understood that immediately after the lever 2 is turned to the position shown in Fig. 1 of the drawings and in so doing has closed the switch, the handle 28 is moved to the left hand to lock rod 9 into lever recess 11, and that after or during this movement of the handle, which has raised the tappet 17 of the shaft 14, the rod 7 is left free and is lifted by its spring 13 from the recess 6 of lever 1, to allow the latter to be operated for setting the "all clear" signal for the main line. When the "all clear" signal is thus set and the rod 9 is necessarily at this time locked in the recess 11 of lever 2, to prevent opening of the switch by said lever, the one and only recess 12 in the rim or face 5 of said lever will be out of line with the rod 10, which by bearing on the lever face 5 will prevent movement of the tappet 19, shaft 16, finger 27, pin 26, and consequently the bar 21 cannot be moved to the left hand; but when the lever

2 is turned half-way around from the position shown in Fig. 1 of the drawings, to open the switch after the lever 1 has been turned to display the "danger" signal or semaphore, the recess 12 of lever 2 will be opposite the rod 10, whereupon the bar 21 may be moved to the left hand and independently of the other bar 20 and its connections, to cause the pin 26 to turn the finger 27, shaft 16, and tappet 19, and thereby force the rod 10 into the recess 12 of the lever 2. This bar 21 is to be connected in any suitable manner, such as by wires or chains, to a preliminary or other special and distant signal, to give timely notice in advance, that the switch is open. The rod 10 must, of course, be lifted by the spring 13 from the recess 12 of the lever 2 after the bar 21 has been given a reverse movement to the right hand, before the "danger" signal can be changed to "all clear," by operating the lever 1 after the lever 2 has been actuated to close the switch, and thereby bring its recess 11 opposite the rod 9, to allow unlocking of the rod 7 from the recess 6 of lever 1.

It is manifest that with the dependent lever and locking rods 7, 9, an intermediate tappet, finger, pin and sliding bar connections above described, the switch cannot be opened to break continuity of the main line rails without first setting the signal by lever 1 to "danger," and that the "all clear" or "safety" signal will necessarily be displayed only when the switch is closed and the main line rails are continuous. It is also evident that by means of the independent sliding bar 21, locking rod 10, and intermediate tappet, finger and pin mechanism, a distant preliminary or special "danger" signal may be displayed when the switch is open, and will be hidden when the switch is closed.

Figs. 3 and 4 of the drawings, in addition to the rods 7, 9, 10, the shafts 14, 15, 16, and the sliding bars 20, 21, show an arm 30 fixed to the shaft 14, carrying the handle 28, and so located relatively to a vertically movable rod 31, which I term the "blocking rod" of an electric block system apparatus, that when the rod 31 is lowered in front of the arm 30, the lever 28 on the shaft 14 cannot be moved to the left hand, and consequently the signal levers 1, 2 cannot be adjusted to allow the "all clear" signal to be displayed by operation of lever 1, until after the "block" of track in advance of the switch is cleared of all trains, and this condition of the track is attested by the lifting of the rod 31 above the arm 30. It will also be seen that the blocking rod 31 cannot be lowered in front of the arm 30, to "block" the track section until after the lever 28 has been turned to the right hand to enter the rod 7 into the recess 6 of the signal lever 1, and thereby hold the signal actuated by said lever at "danger." It is not necessary to fully illustrate an electric blocking apparatus in order to have the operation of the blocking rod 31 fully understood by those skilled in the art, as the oper-



ation of vertically or endwise movable locking or setting rods in apparatus of this character is well known, but in the present invention I have combined such a blocking rod with dependent switch and signal locking devices in a novel manner, making the proper setting of the switch, the display of the proper signal therefor, and the safety "blocking" of the track all mutually dependent upon each other.

In Figs. 5 and 6 of the drawings, I show a modification, whereby the movement of one shaft or part of the switch and signal locking devices may be made dependent upon the movement of another part thereof. We will suppose that the vertical rods shown are those 7 and 9 of the first described devices, and that they are adapted for depression by tappets 32, 33 on shafts 34, 35, having fingers 36, 37, respectively, which act on pins 38, 39 in two sliding bars 40, 41, which are in front of a third bar 42, shown merely to illustrate how these bars may be arranged in series one behind the other. The shafts 34, 35 have their own separate handle levers 43, 44, to turn them in one direction, for depressing the rods 7, 9 by the tappets 32, 33, while by turning the handles in the other direction the bars 40, 41 will be moved endwise by the fingers 36, 37, pressing the pins 38, 39, respectively. On the shaft 34, is fixed a stop plate 45 having a rounded outer edge, and the sliding bar 41 carries a stop lug 46, shown dotted in Fig. 5. It is obvious, that if the handle 43 be thrown over to the left hand, the pin 36 of shaft 34 will press pin 38 and move the bar 40 to the left, and the stop plate 45 on the shaft 34 will also move upward, so that its convex face which then passes in front of the lug 46, will prevent endwise movement of the bar 41, which carries said lug, until the lever 43 is restored to its original position shown in the drawings; and, on the other hand, if the handle 44 be first moved to the left hand, it will, by the pins 37, 39, carry the bar 41 to the left, and the lug 46 on this bar will then overlies the plate 45 and will prevent movement of the shaft 34 by its handle 43, until handle 44 and bar 41 are restored to original positions.

In practice, there will be as many duplications of the above described switch and signal operating and locking devices as the number of switches and necessary signals therefor may require. In some instances, I operate several sliding bars, like the one 20, from one handle lever located on one of the transverse shafts of the apparatus. The bodily turning levers 1, 2, having recesses 6, 11, 12, adapted to receive stop or locking rods 7, 9, 10, respectively, may be substituted by any other devices having recesses receiving the rods or stops locking with the rods and operative to adjust the switch and signal devices, substantially in the manner herein described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In railway switch and signal setting and

locking apparatus, the combination, with levers or devices actuating a switch and a signal therefor, of rods adapted to stop or latch said devices, shafts actuating the stop rods and one or more bars movable by or from the shafts, substantially as described, whereby display of the signal is mutually dependent upon proper adjustment of the switch, as herein set forth.

2. In railway switch and signal setting and locking apparatus, the combination, with levers or devices actuating a switch and a signal therefor, of spring actuated rods adapted to stop or latch said devices, shafts engaging said stop rods and provided with fingers, and one or more bars having pins next the shaft fingers, substantially as described, whereby the spring actuated rods may be locked with the switch and signal mechanism only when or as proper signals are shown, as herein set forth.

3. In railway switch and signal setting and locking apparatus, the combination, with levers or devices actuating a switch and a signal therefor, of spring actuated rods adapted to stop or latch said devices, the spring moving the stop rod of the switch lever or device being the stronger, and the signal operating lever or device being normally locked by its stop rod when the "danger" signal is shown; shafts engaging the stop rods and provided with fingers, and one or more bars having pins next the shaft fingers, substantially as described for the purposes set forth.

4. In railway switch and signal setting and locking apparatus, the combination, with a switch and a signal operating device, of three stop or locking rods, one adapted to the signal operating device, and the other two adapted to the switch operating device; two mutually dependent stop rods engaging the switch and signal operating devices, and a third stop rod also engaging the switch operating device; three shafts adapted to actuate the respective stop rods, a movable bar having two pins engaged by fingers on the actuating shafts of the two first named stop rods, and a second independently movable bar having a pin engaged by a finger on the actuating shaft of the third stop rod, substantially as described, whereby the setting of the ordinary switch signal is mutually dependent on the correct setting of the switch, and whereby also the independent bar may be operated to set a second special signal when the switch is open, as herein set forth.

5. In railway switch and signal setting and locking apparatus, the combination, with switch and signal setting and locking mechanism comprising setting levers or devices for the switch and signal, stop or latch rods engaging said devices, shafts actuating said rods, and one or more bars movable by or from the shafts to assure mutually correct adjustment of the switch and signal, of an interposed electric block system blocking rod, and a finger or stop on one of the shafts



adapted thereto, substantially as described, whereby the blocking rod may prevent and permit operation of the switch and signal devices, as herein set forth.

5 6. The combination with the signal and switch levers 1, 2, having recesses 6, 11, respectively, of stop rods 7, 9, shafts 14, 15, having tappets 17, 18, and also provided with fingers 24, 25; and a bar 20, having pins 22,  
10 23, substantially as described.

7. The combination with the signal and switch levers 1, 2, having recesses 6, 11, of stop rods 7, 9, having springs 13 of unequal tension; shafts 14, 15, having tappets 17, 18  
15 and also provided with fingers 24, 25; and a bar 20 having pins 22, 23, substantially as described.

8. The combination with the signal and switch levers 1, 2, having recesses 6, 11, 12, of  
20 stop rods 7, 9, 10, shafts 14, 15, 16 actuating the stop rods and having fingers 24, 25, 26; a bar 20 having pins 22, 23, and a bar 21 having a pin 26, substantially as described, for the purposes set forth.

25 9. The combination with the signal and switch operating levers having recesses 6, 11, stop rods 7, 9, shafts 14, 15 having fingers 24,

25, a bar 20 having pins 22, 23; an arm 30 on one of the shafts, and an electric block system blocking rod 31 interposed next said  
30 arm, substantially as described, for the purposes set forth.

10. The combination with the signal and switch operating levers 1, 2, having recesses 6, 11, 12, of stop rods 7, 9, 10, shafts 14, 15, 16 having fingers 24, 25, 26, a bar 20 having  
35 pins 22, 23, a bar 21 having pin 26, an arm 30 on the shaft 14, and an electric block system blocking rod 31 interposed next said arm, substantially as described, for the pur-  
40 poses set forth.

11. The combination with the stop rods 7, 9, and shafts 34, 35 having fingers 36, 37, of a bar 40 having a pin 38, and a bar 41 having  
45 a pin 39, said shaft 34 and bar 41 having respectively the stops 45, 46, substantially as described, for the purposes set forth.

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

JOHANN HEINRICH FRISCHEN.

Witnesses:

MAX WAGNER,  
FRANZ SCHMIDT.