

W. M. BULKLEY.

SIGNALING DEVICE FOR CABLE RAILWAYS.

No. 397,335.

Patented Feb. 5, 1889.

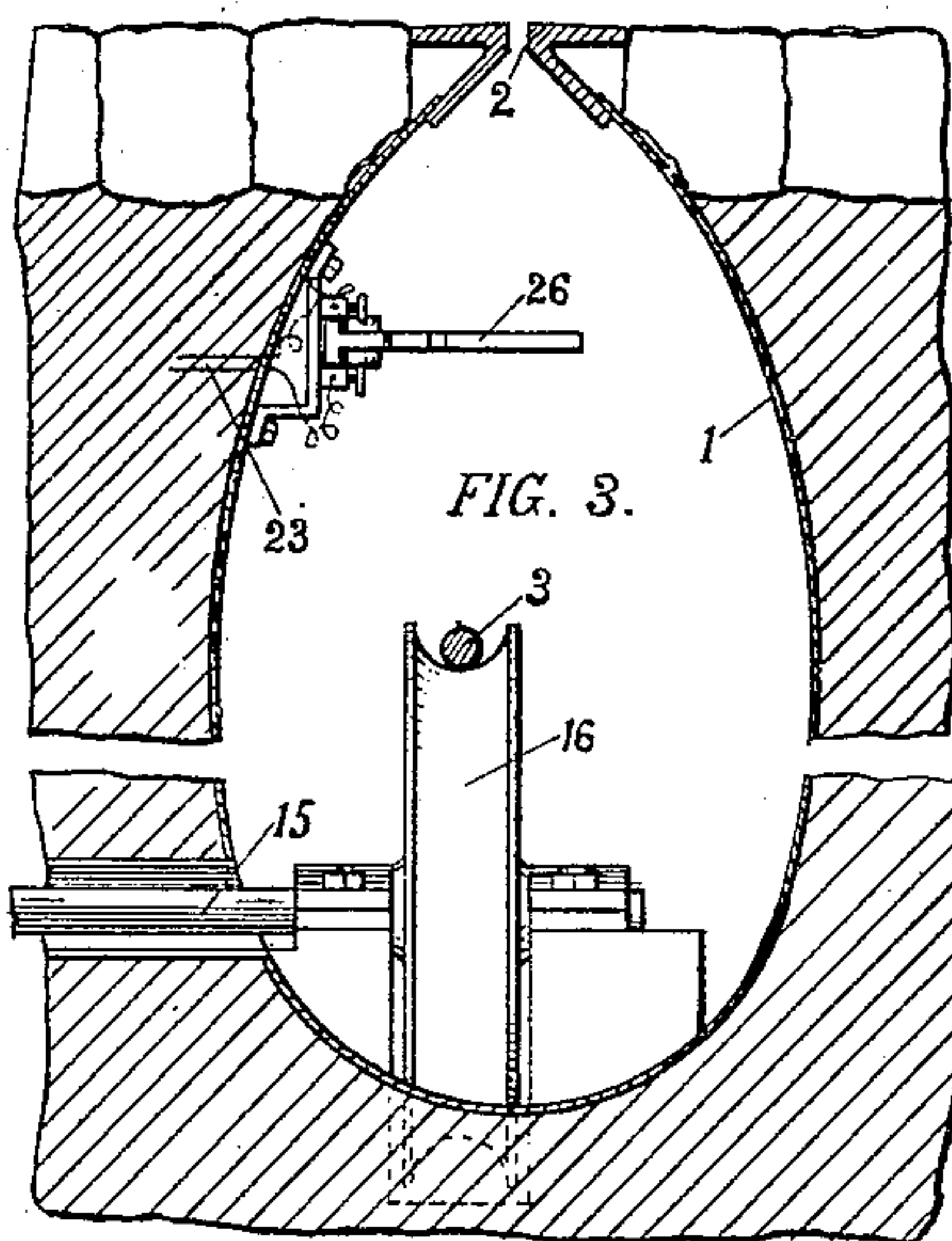
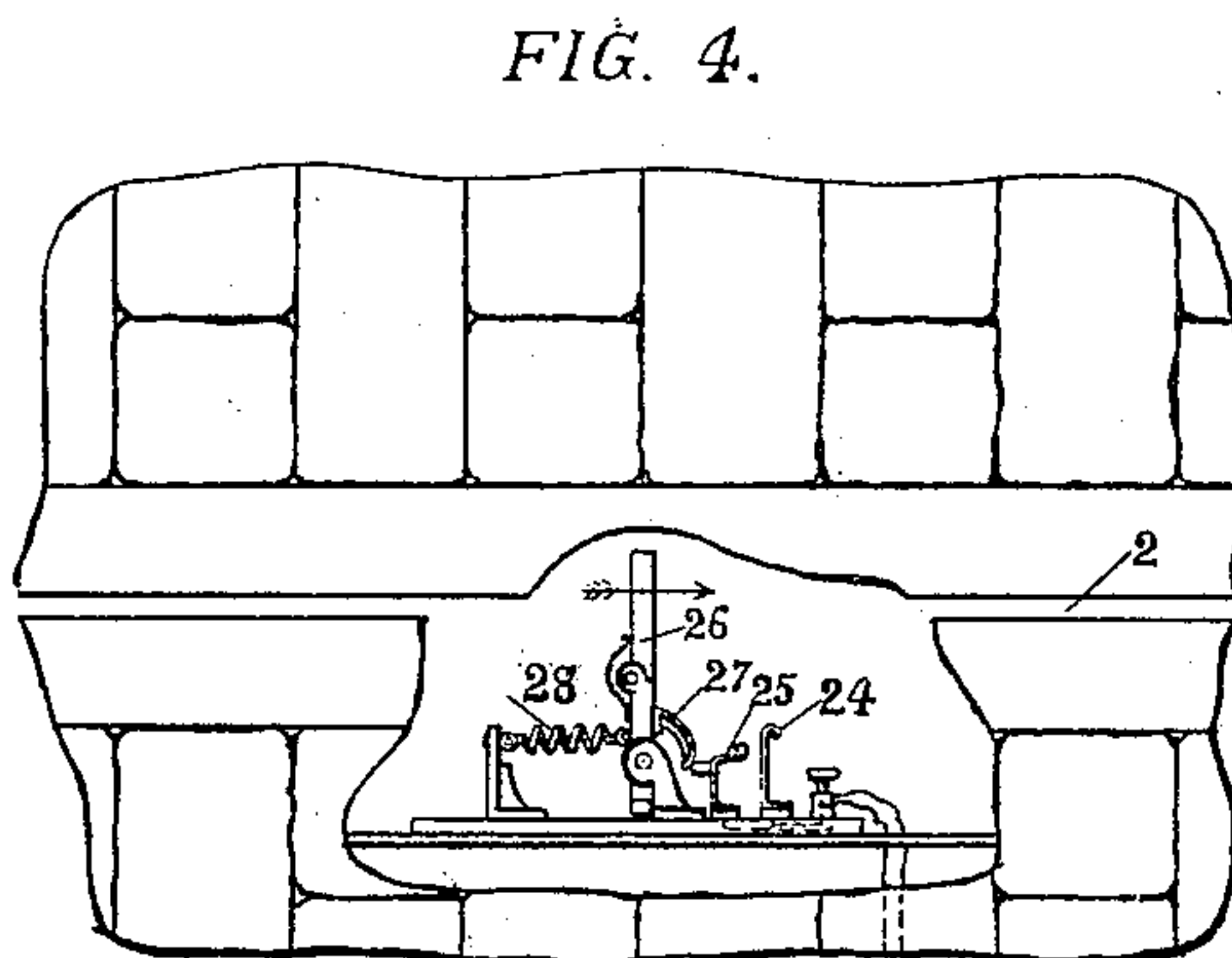
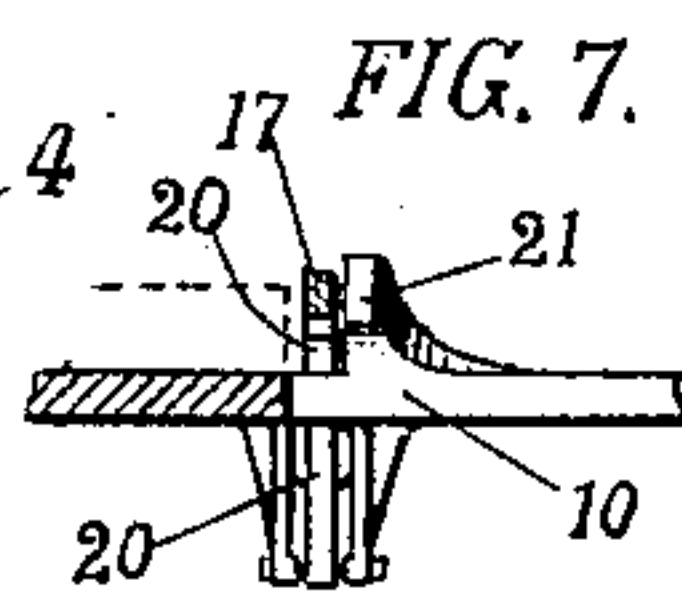
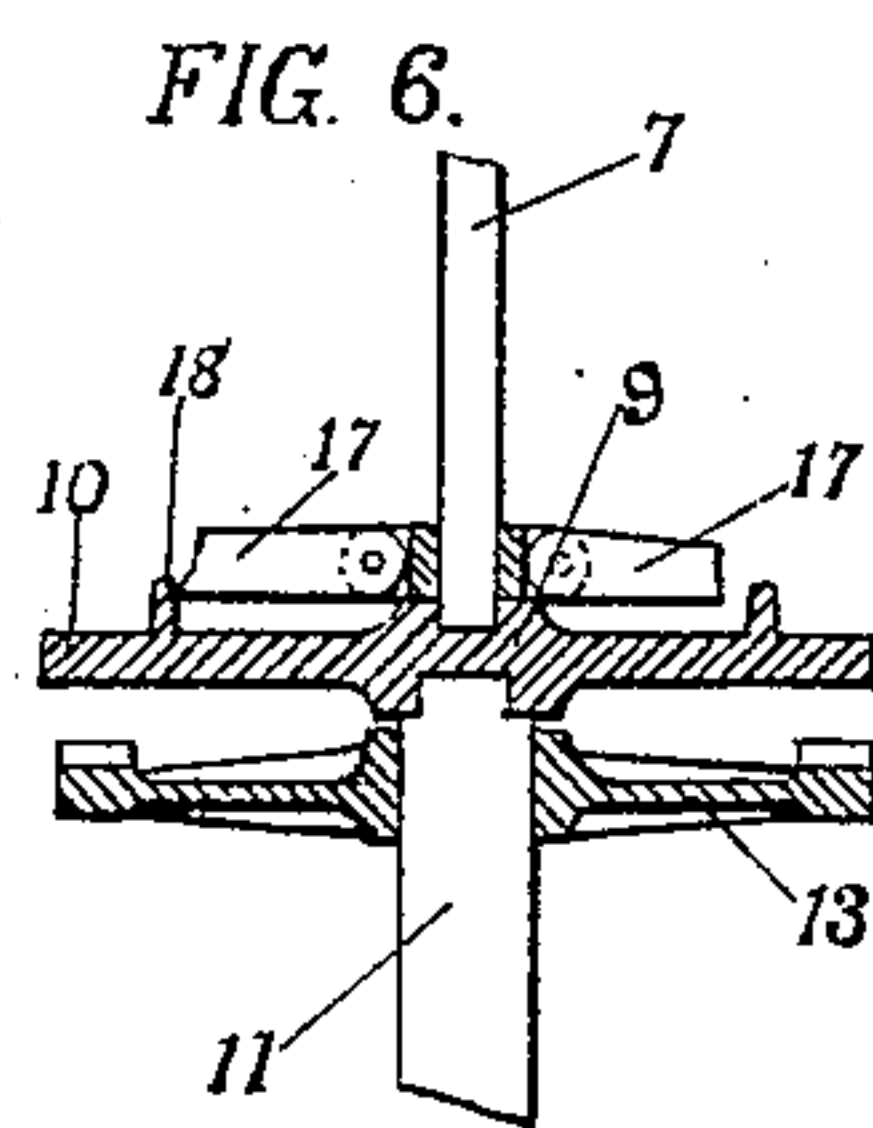
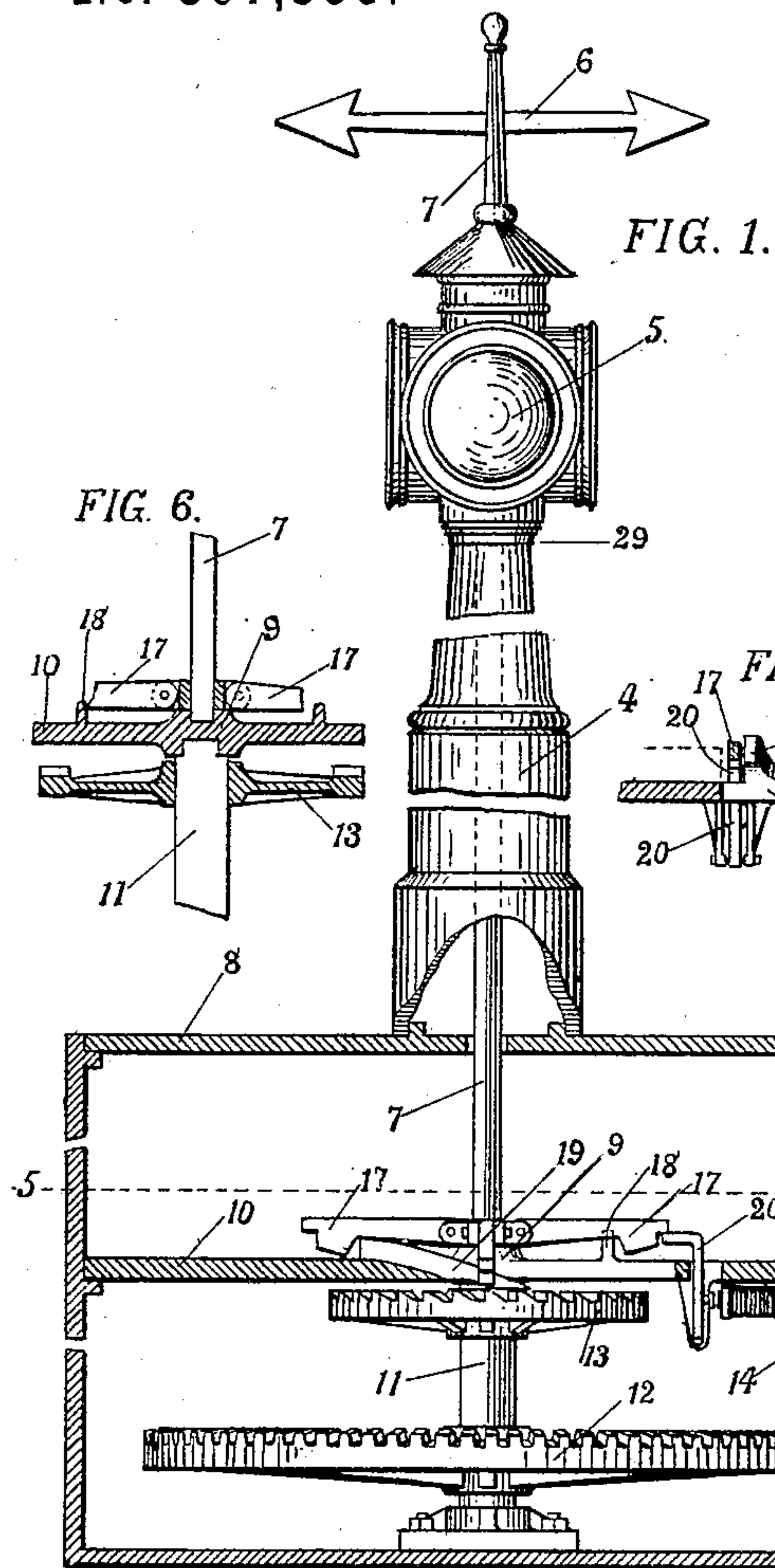
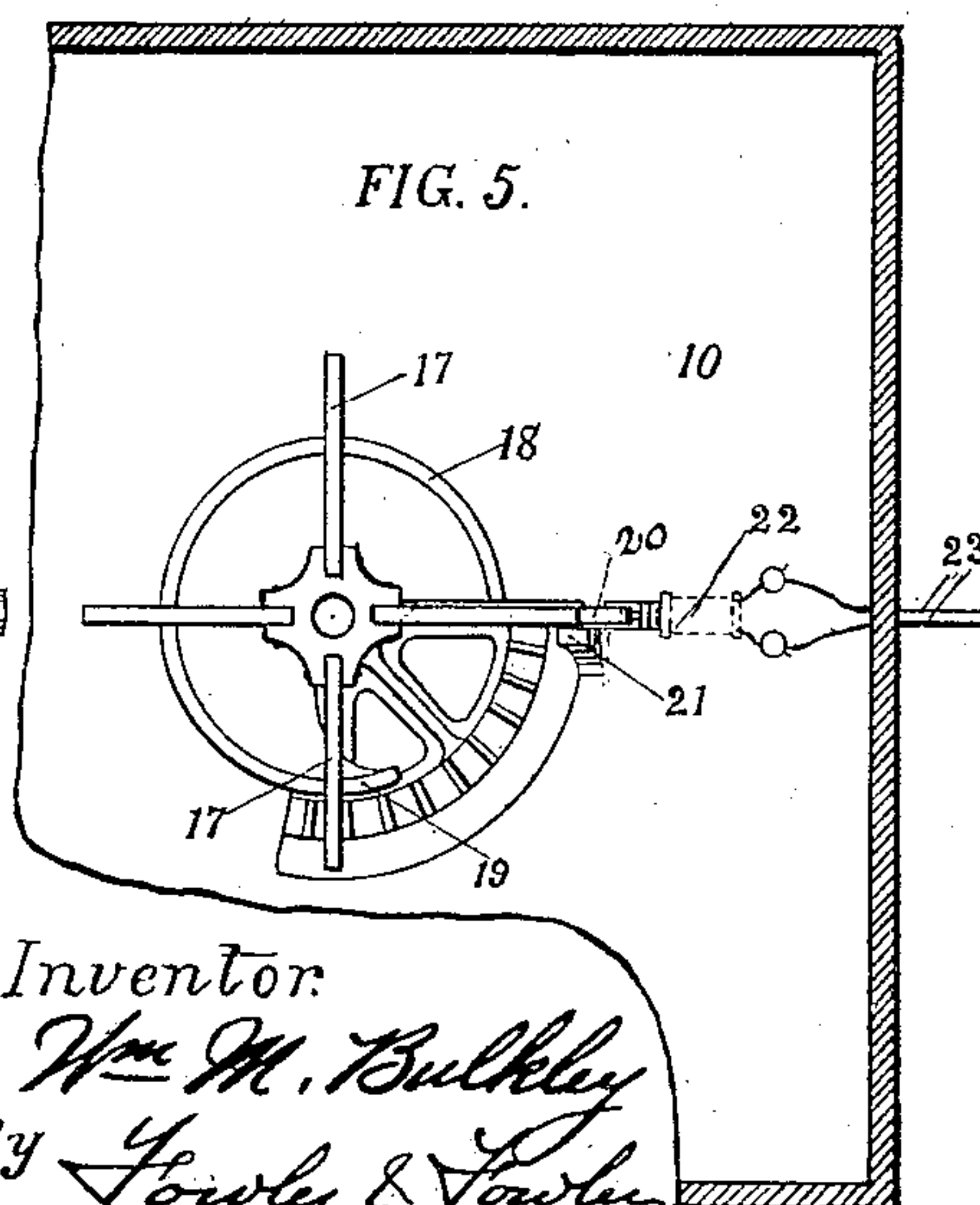
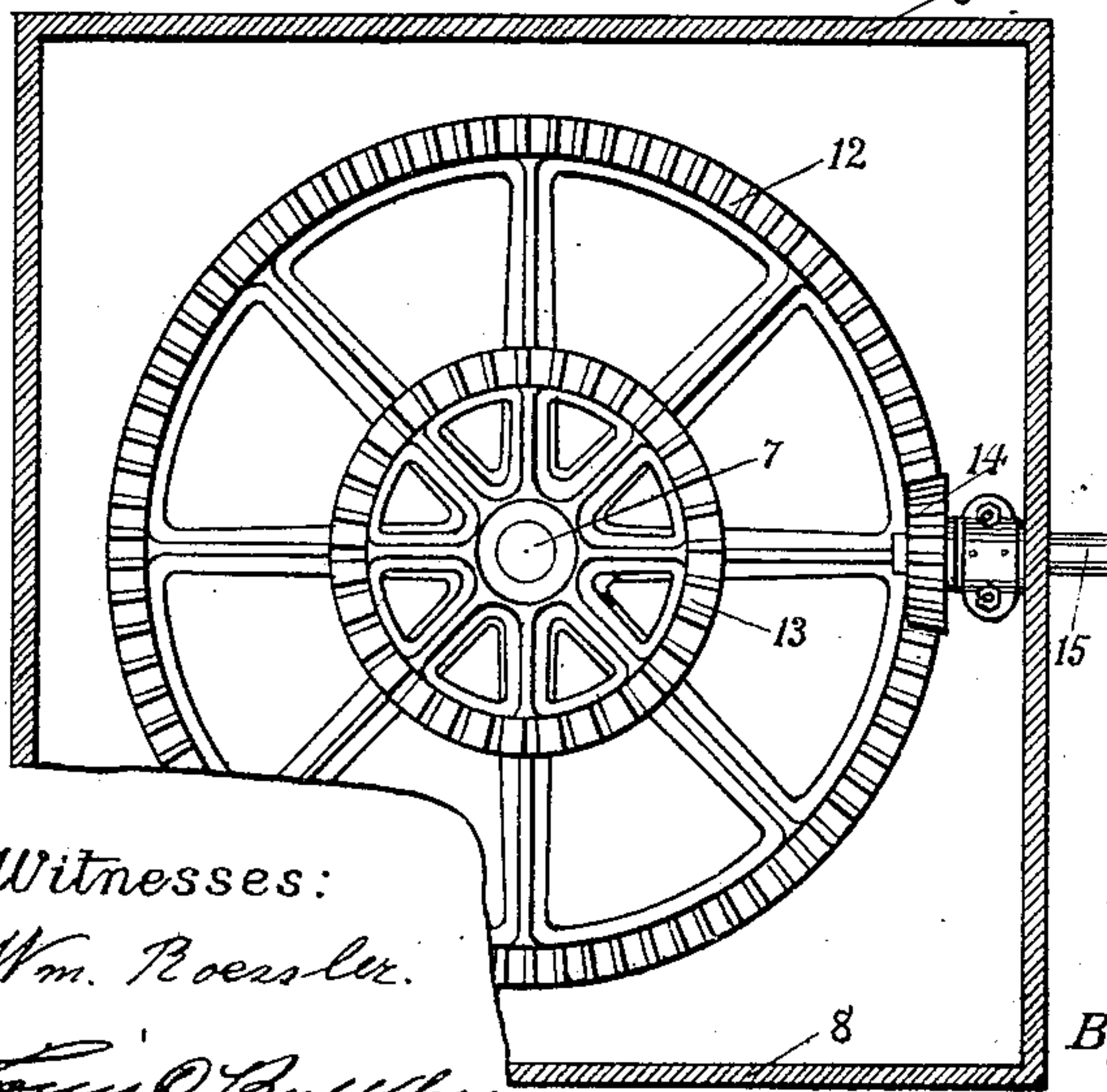


FIG. 2.



Witnesses:

Wm. Boersler.

James O. Bulkley

Inventor

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By Fowler & Fowler  
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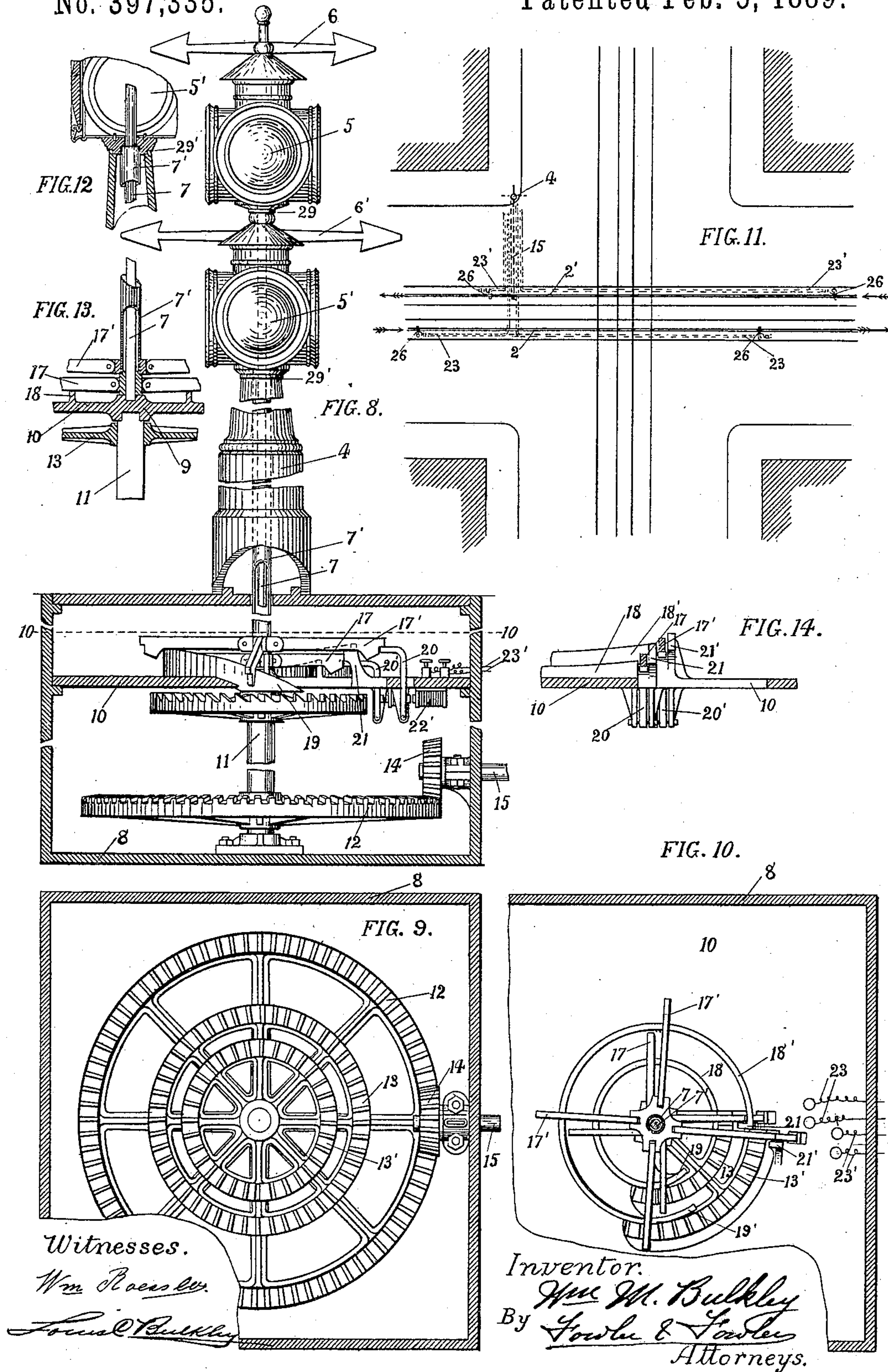


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# UNITED STATES PATENT OFFICE.

WILLIAM M. BULKLEY, OF ST. LOUIS, MISSOURI.

## SIGNALING DEVICE FOR CABLE RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 397,335, dated February 5, 1889.

Application filed March 5, 1888. Serial No. 266,254. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM M. BULKLEY, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Signaling Devices for Cable Railways, of which the following is such a full, clear, and exact description as will enable anyone skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to signaling devices for cable railways when they cross or intercept cable or other railways.

The object of my invention is to give a signal to the intercepting railway when a car upon the railway having the right of way is nearing the cross-tracks, so that the attendant upon the intercepting railway may know whether to proceed and cross the tracks of the main railway.

In the drawings, Figure 1 is an elevation, partly sectioned, of an apparatus embodying one form of my invention. Fig. 2 is a plan view of same with the upper half removed. Fig. 3 is a cross-section through the conduit, showing a body arranged within the path of a passing car. Fig. 4 is a plan view of a portion of the latter, showing the slot in the conduit with a portion of the way removed. Fig. 5 is a plan view of the apparatus shown in Fig. 1, taken on the line 5 5 of said figure. Fig. 6 is a section of a detail showing the mechanism for coupling the signal-giving device with devices rotated by the cable. Fig. 7 is a detail view, partly sectioned, showing how the coupling-pawl is held out of action. Fig. 8 is an elevation, partly sectioned, the same as Fig. 1, but showing a double-signal apparatus, such as would be required with a double-track road. Fig. 9 is a plan view of the same, corresponding with Fig. 2, with the upper part of the mechanism shown in Fig. 8 removed. Fig. 10 is a sectional plan of Fig. 8 on the line 10 10 of said figure. Fig. 11 is a diagrammatic view of my system of signaling at a crossing when applied to a double track. Fig. 12 is a sectional elevation of a detail view. Fig. 13 is a section of a detail corresponding to Fig. 6, showing the means for coupling the two signaling devices with the

mechanism that is controlled by the cable. Fig. 14 is a sectional detail view, corresponding to Fig. 7, of the means for holding the two coupling-pawls out of action.

The same figures of reference indicate the same or corresponding parts throughout the various figures.

1 is the conduit having a slot, 2, therein, and 3 the cable traveling within said conduit.

Having now more particular reference to Sheet 1, 4 is a post arranged at the corner of a crossing and is provided with a rotary lamp, 5, which seats upon the post 4 at a point, 29. The lamp 5 carries an arrow, 6, at the top. The lamp is to be used at night and the arrow during the day. The said lamp 5 is provided with red and white glass to give the required signal, and the direction the arrow 6 is pointed indicates the signal. Passing to the lamp 5 is a vertical shaft, 7, which passes through the hollow post 4 into a box, 8, beneath the sidewalk, and is pivoted at its lower end at a point, 9, supported by a platform, 10, arranged about midway of said box. In the lower half of said box is also a vertical shaft, 11, entirely independent of shaft 7. This shaft 11 is pivoted at the lower side of the box 8 and carries a bevel-wheel, 12, at its lower end and a ratchet-wheel, 13, at its upper end. The bevel-wheel 12 meshes with a second bevel-wheel, 14, of similar diameter, which is arranged upon a shaft, 15, that projects through the conduit and is coupled with the shaft of the cable-supporting wheel 16. A constant rotation is imparted through the instrumentality of the mechanism described to the ratchet-wheel 13. From the vertical shaft 7 extend pawls 17, which are pivoted to a metal piece attached to said vertical shaft 7. The pawls 17 normally rest upon a rim, 18, upon the platform 10. The said rim is not continuous, but terminates in an inclined nose, 19, which projects downward, a quadrant being cut out of the platform 10. The cut-away portion of the platform is of such shape and size only as to allow one of the pawls 17 at a time, when released, to fall on the ratchet-wheel 13 and couple the shaft 11 with the shaft 7. The rim 18 at the other end terminates abruptly at the point where the platform is cut away, and the pawl just beyond



this end of the rim is held up preferably by an armature-lever, 20, arranged adjacent to a stop, 21, which stop is in the path of the pawls. The armature-lever 20 is pivoted beneath the platform 10, between two lugs that extend from same. Beneath said platform, also, is preferably arranged an electro-magnet, 22, which is connected by a circuit, 23, having a source of electrical supply, 24, at any point therein. The circuit 23 passes to two electric terminals, 24 and 25, which are arranged adjacent to a lever, 26, suitably disposed in the conduit in the path of the grip-lever. The lever 26 is provided with a spring-joint, which allows it to be operated when struck in one direction, said spring and joint giving, should the lever be struck in the opposite direction. The lever is also provided with an angular piece, 27, which operates upon the terminal 25. It is further provided with a spring, 28, for holding it in its normal position.

The operation of the above-described mechanism is as follows: A car traveling in the direction of the arrow in Fig. 4 will operate the lever 26 and force the angular piece 27 against the spring-terminal 25, causing it to make contact with the terminal 24, and thus complete the circuit 23 through the electro-magnet 22, which electro-magnet becomes vitalized, attracts the armature-lever 20, and allows the pawl 17 to escape the end thereof and drop down below the stop 21 onto the ratchet-wheel 13, which is constantly rotating. By this means the shaft 7 is coupled to the shaft 11 and the shaft 7 is rotated, thus turning the signal. The shaft 7 rotates but one quarter of a revolution, for as soon as the pawl 17 reaches the nose 19 it is raised thereby, and hence disconnects the shaft 7 from the shaft 11. The former therefore stops rotating, the signal is positioned, and the next pawl, 17, is caught by the stop 21 and is held up by the armature-lever 20, which has fallen away from its electro-magnet by reason of the fact that the car having passed, the circuit 23 is broken and the electro-magnet de-energized. It will be seen, therefore, that a signal is thus given to the cross-road of the approach of a car upon the main road, which has the right of way.

Having now particular reference to Sheet 2, it will be noted that the same disposition of parts is maintained, but that the same have been merely duplicated. In this latter instance two sets of pawls are used, one set being pivotally affixed to the shaft 7, as before, and the other set being affixed to a hollow shaft surrounding the shaft 7, the shaft 7 turning the upper signal, 5 6, and the hollow shaft turning the lower signal. The duplicate parts I have designated by the index or prime 1 throughout the several views of Sheet 2. The pawls 17 17' are set at different angular distances, so that said pawls belonging to the two different signals do not interfere with each other in their operation. The construction of the double-signal apparatus will

be evident from the foregoing description, with the letters of reference marked thereon as I have indicated, without further description.

Referring to Fig. 11, it will be noted that the main railway only controls the signaling device 4. As usual, it is understood that one road in crossing has the right of way, and the same assumption is made in the present case; so that the operator upon the main line looks for no signal, but proceeds independently of the cross-road, the operator upon which latter road cannot proceed until he is assured that the main track is clear for considerable distance above and below the crossing. Normally, therefore, the signal 4 stands as represented in Fig. 11, giving, normally, the cross-road the right of way also. Should, now, a car proceed on the main line in the direction of the arrow from left to right, the lever 26 will be operated and turn the signal 4 in the direction indicated by the dotted line, thus notifying the operator upon the cross-road that a car is nearing the crossing upon the main road. When the car upon the main road proceeds and makes the crossing, it operates the lever 26 upon the other side of said crossing and thereby effects another quarter-turn of the signal, setting it in its normal position, and thus indicates to the cross-road that the road is clear again. A car proceeding in the opposite direction on the main track upon the return-track will operate the lower signal, 5' 6', in the same manner, and thus indicate to the cross-road whether the return-track is also clear, so that the operator on the cross-road before crossing must be assured that both the upper and lower signals are set in a position to indicate that both the direct and return tracks of the main track are clear. The operator on the cross-road must therefore be certain that both signals are in the right direction before he attempts to cross. In fact an audible signal could be used in place of a visual one and accomplish practically the same result. Generally in the operation of a cable railroad where they cross cable or other railroads a flagman is required to stand at the crossing and signal the operator upon the cross-road.

My invention does away with the services of a flagman, is not an expensive apparatus, nor is it in the way in the street any more than an ordinary lamp-post. It is reliable in operation and not likely to get out of order, requires no attention and no additional motive power, excepting, perhaps, a few cells of battery. It will be noted, therefore, that it effects economy. It will be noted, further, that it, being entirely automatic in operation, can be relied on more than a flagman.

Having now fully set forth my invention and described its purpose, operation, and advantages, what I desire to claim and secure by Letters Patent of the United States as my invention is—

1. A signaling device for cable railways,



consisting of a body interposed within the conduit in the path of the travel of the cars, a cross-road, a rotary signal at said cross-road, and electrical connections, whereby when said  
5 body is operated upon by a car a signal is given, for the purpose set forth.

2. A cable-railway system having a signal connected with and operated from one of the cable-pulleys, for the purpose described.

10 3. A signaling device for cable railways at crossings, consisting of a body arranged within the path of the cars, a signal at a crossing, a system of gearing connected with the cable-supporting wheel at said signal, and a coupler controlled by the aforementioned body for  
15 temporarily connecting the signal to the system of gearing to operate said signal.

4. The combination, as hereinbefore set forth, of the signal 5 6, the shaft 7, operating  
20 said signal, the pawls carried thereby, a system of gearing operated by the cable, a body interposed in the path of the cars and within the conduit, and a lever controlled by said body and supporting one of said pawls, as  
25 and for the purpose described.

5. The combination, as hereinbefore set forth, of the signal 5 6, the post 4, the shaft 7, controlling said signal, the box 8 beneath the level of the way, a system of gearing rotated by the cable and within said box, a series of pawls pivotally secured to the signal-shaft 7, the rim 18 upon a platform, 10, within  
30 said box and having a cut-away part, as described, an inclined nose, 19, extending from said rim, the stop 21, an armature-lever, 20, for holding one of said pawls from action, a circuit and source of electrical supply, and a lever arranged in the path of the cars to control said circuit, for the purpose described.

40 6. The combination of a lever in the path of the cars and arranged within the conduit of a cable railway at one side of an intercepting railway, a second lever arranged similar to the first, but upon the opposite side of said  
45 intercepting railway, a rotary signal at the crossing, and electrical connections between the first and second levers and the signaling device, whereby said signal is operated upon the approach and departure of a car.

50 7. The combination of a body arranged

within the path of the cars traveling upon a cable railway and arranged within the conduit at one side of a cross-road, a second body similarly arranged upon the other side of  
55 said cross-road, a return-track having two bodies arranged within the path of the cars and similarly disposed as the foregoing, rotary signaling devices at said crossing, and electrical connections between the aforementioned bodies and the signaling devices, where-  
60 by a signal is given and withdrawn when a car approaches and recedes from the crossing on the main track in either direction.

8. A signaling device for a double-track cable railway, consisting of two signals, substantially as 5 6 and 5' 6', a shaft controlling the former signal, a hollow shaft surrounding the aforesaid shaft and controlling the latter  
65 signal, couplers for connecting either signal to a constantly-rotating gearing controlled by the cable, levers and stops governing said couplers, and bodies arranged within the path of a direct and return track for actuating  
70 said levers.

9. The combination of the signals 5 6 and 5' 6', the shafts 7 and 7', the pawls 17 and 17', pivotally affixed to said shafts, the rims 18 and 18', having downwardly-projecting noses 19 and 19', the ratchets 13 and 13', geared to the cable, armature-levers 20 and 20' and  
80 stops, the electro-magnets, a double track, and circuit-controlling levers arranged within the conduits of said double tracks upon each side of a cross-road near the signaling devices.  
85

10. The combination, with a cable railway and cross-road, of a rotary signal at said cross-road, gearing rotated by the cable, a coupler intermediate of the latter and the signal, and electrical connections on each side of  
90 said cross-road arranged within the path of the cars controlling said coupler, for the purpose described.

In testimony whereof I have hereunto set my hand, this 18th day of February, 1888, in  
95 the presence of the two subscribing witnesses.

WM. M. BULKLEY.

Witnesses:

A. C. FOWLER,

JAS. F. ANDERSON.