No. 638,478.

Patented Dec. 5, 1899.

J. G. SCHREUDER.

SIGNALING APPARATUS.

(Application filed Sept. 1, 1899.)

(No Model.)

4 Sheets—Sheet 1.

FIG. 1.

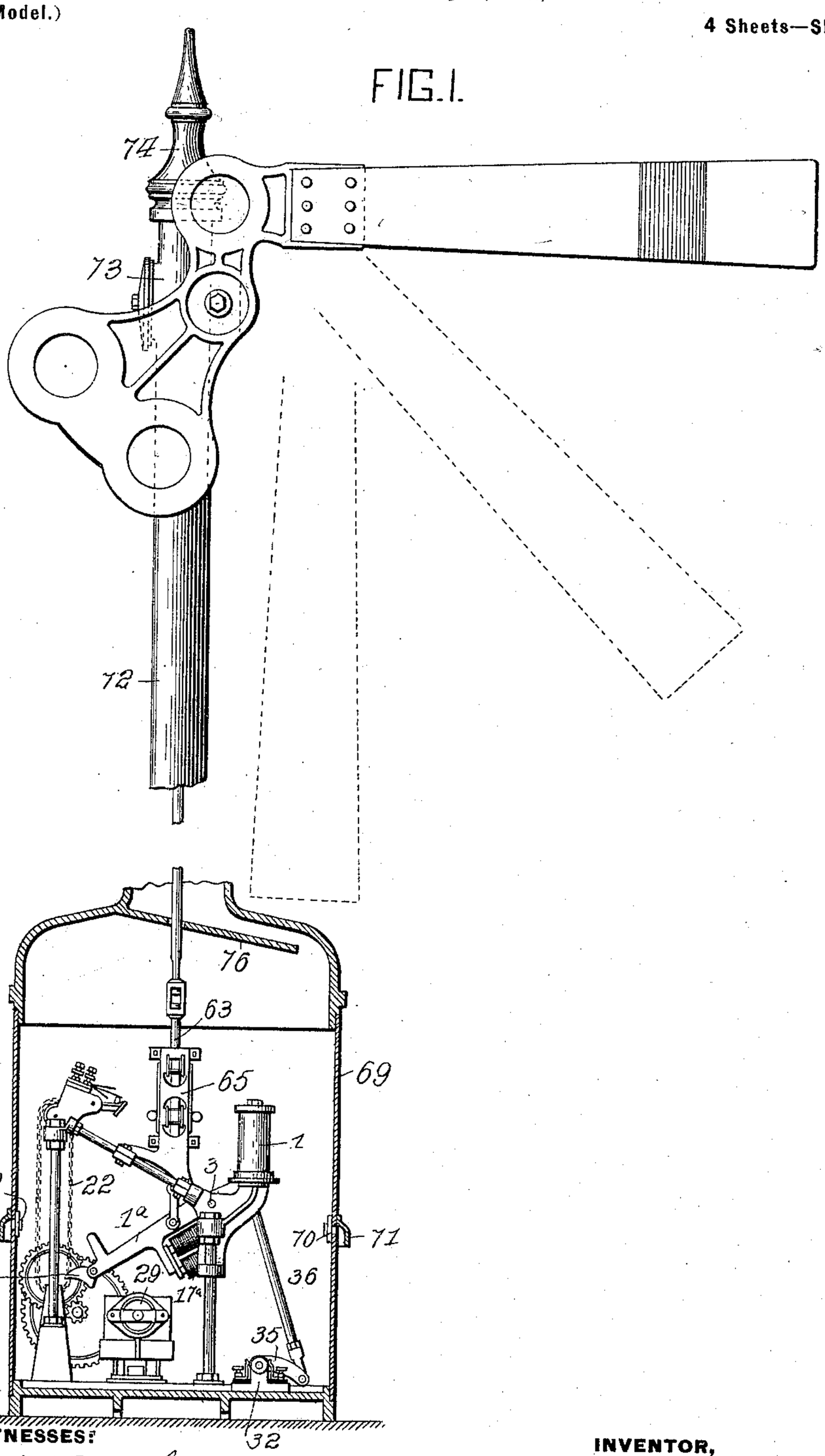

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FIG. 3.

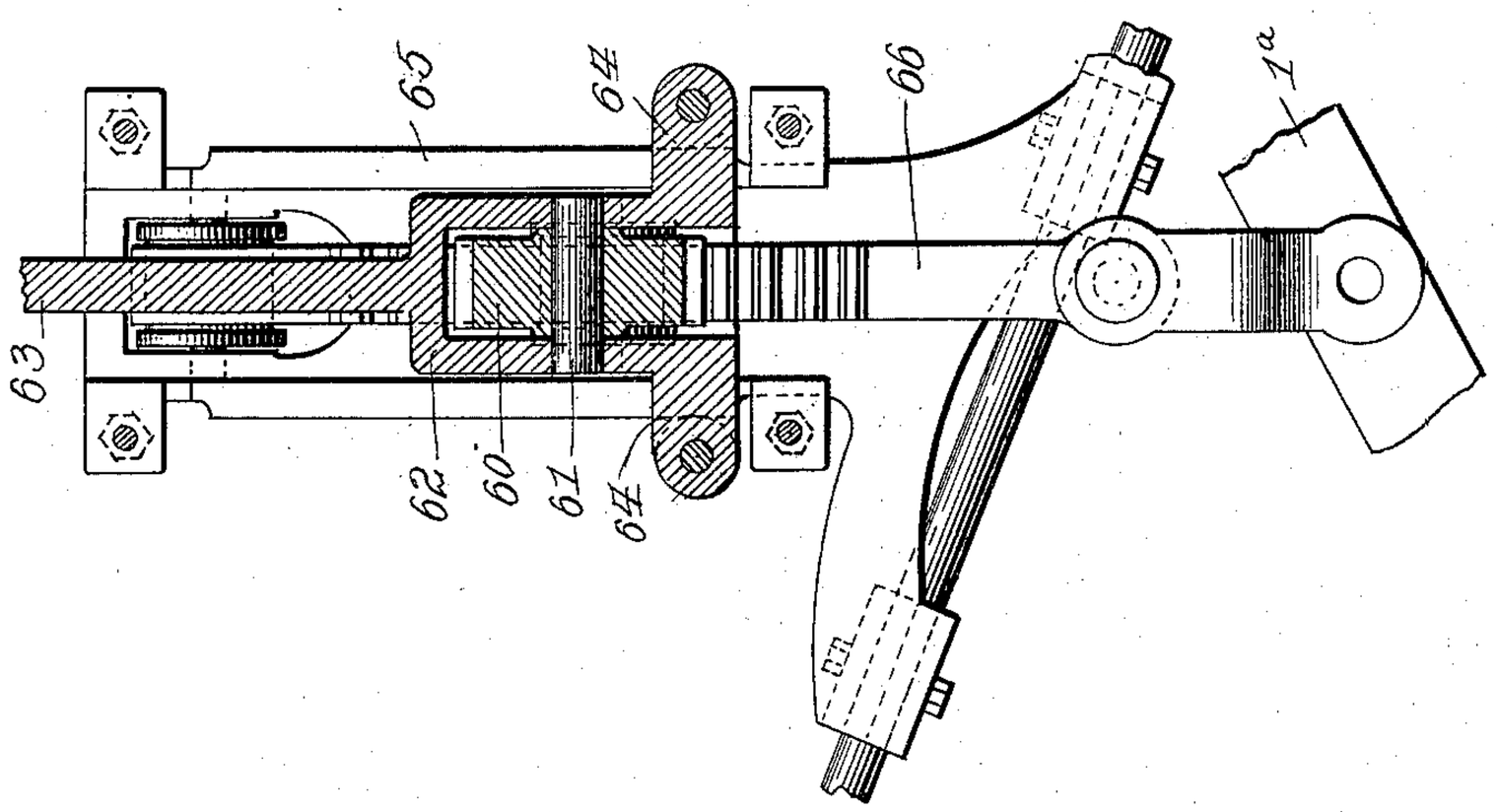

FIG. 2.

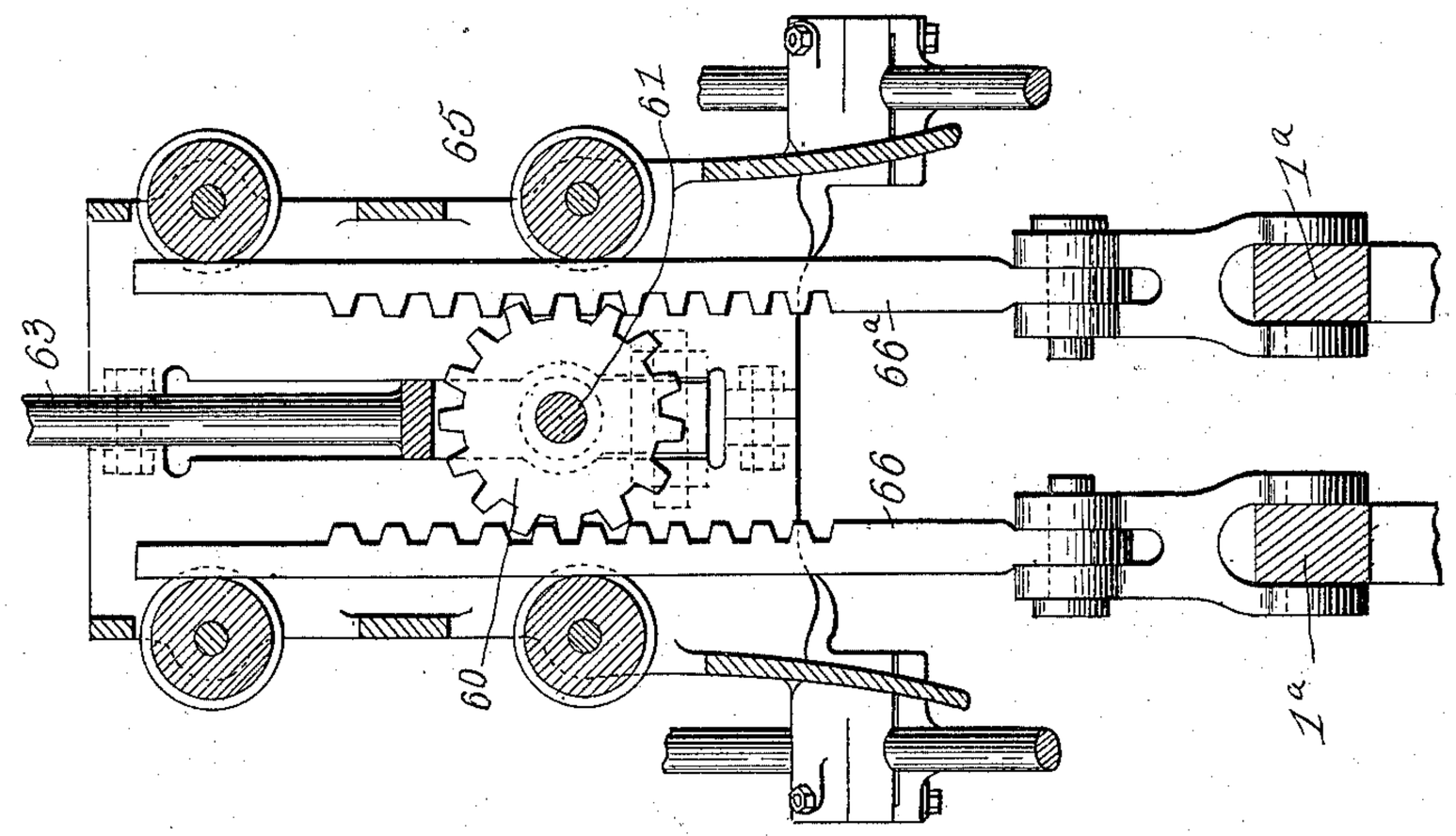

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FIG. 4.

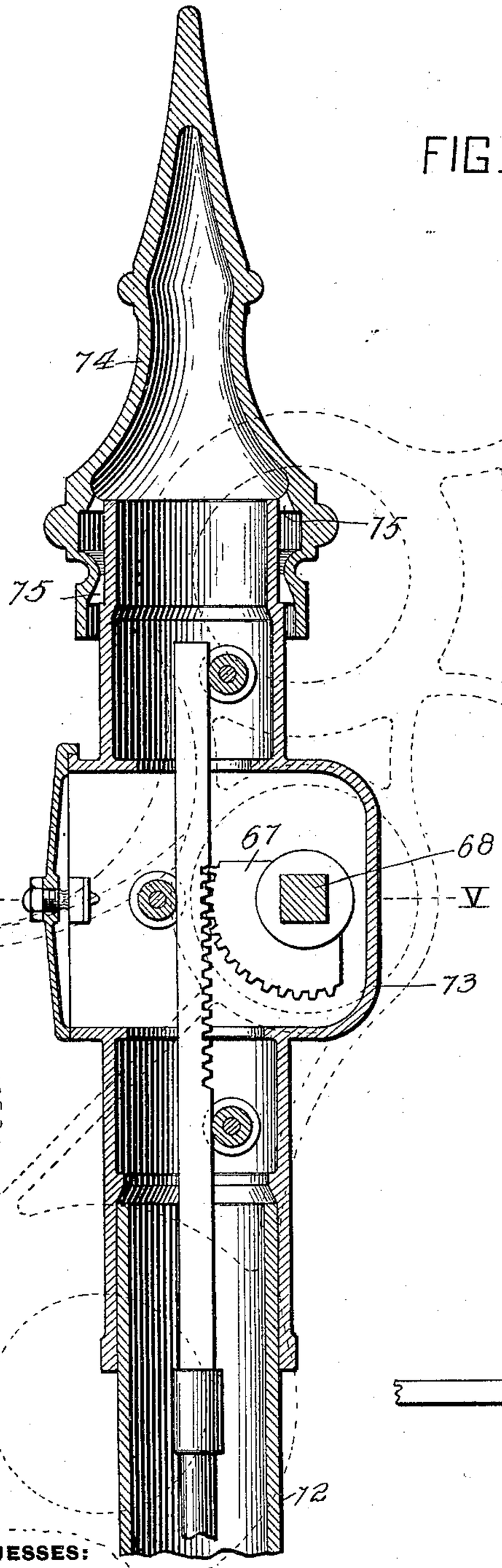

FIG. 5.

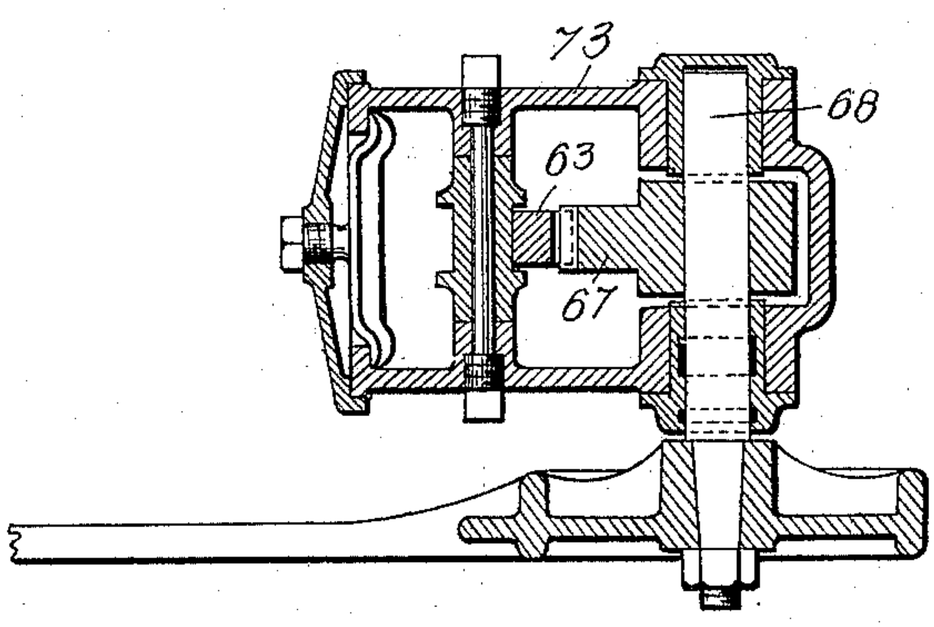

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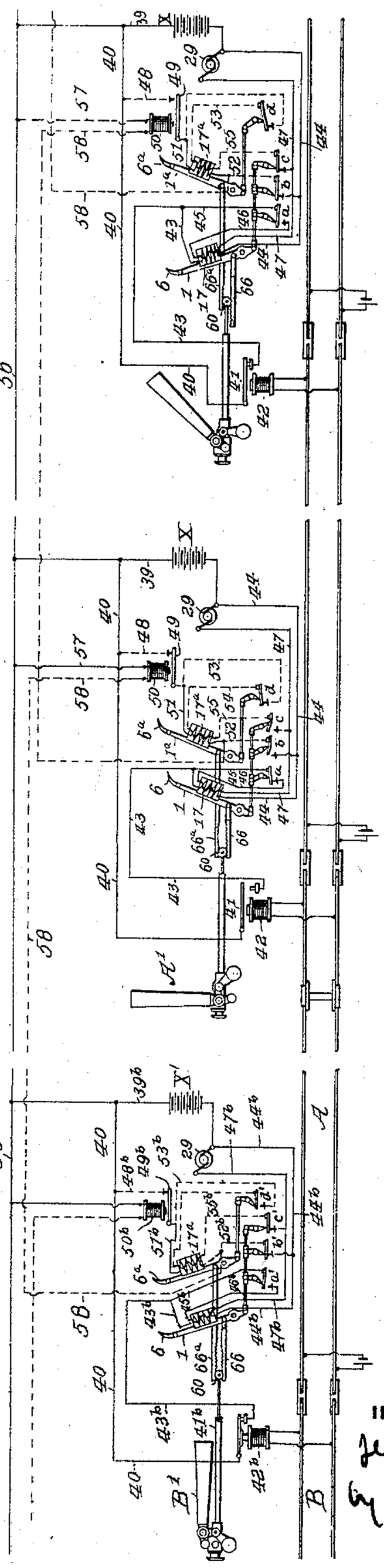
FIG. 6.



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UNITED STATES PATENT OFFICE.

JENS G. SCHREUDER, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH AND SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA.

SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 638,478, dated December 5, 1899.

Application filed September 1, 1899. Serial No. 729,179. (No model.)

To all whom it may concern:

Be it known that I, JENS G. SCHREUDER, a subject of the King of Sweden and Norway, residing at Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Signaling Apparatus, of which improvements the following is a specification.

It has become the practice on most railroads to employ in block-signaling the same signal as the home signal for one block-section and the distant signal for the next succeeding block. This practice requires the employment of suitable mechanism whereby the signal may be shifted from normal to clear and caution positions.

The object of the present invention is to provide for the employment of a mechanism which by a continuous movement in one direction will shift the signal from danger to caution and from caution to clear position and will permit a stoppage of the signal at caution position as it automatically moves from clear position and a continuation of the automatic movement of the signal from caution to danger position.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a view, partly in elevation and partly in section, of an embodiment of my improvement. Figs. 2 and 3 are sectional detail views of a portion of the signal-operating mechanism, the plane of section of Fig. 3 being at right angles to that of Fig. 2. Fig. 4 is a sectional elevation of the upper portion of the signal-post and the connections between the signal-rod and signal. Fig. 5 is a sectional view, the plane of section being indicated by the line V V, Fig. 4, and Fig. 6 is a diagrammatic view, illustrating the circuits.

When employing electrically-operated mechanism for shifting the signal, it is preferred to employ in part the mechanism fully shown and described in Letters Patent No. 611,943, dated October 4, 1898, although other forms of driving or actuating mechanism may be employed. So much of the mechanism of Letters Patent No. 611,943 as is employed in the practice of this invention will be described only generally herein, and reference should be had to said patent for a particular description thereof.

The levers 1 and 1ª are loosely mounted on the shaft 3 and are provided at one end with fingers 6 6ª, which are pivotally connected thereto and are normally held in or approximately in alinement with the levers by means of electromagnets 17 17ª, secured to the levers and operating to hold the fingers in normal position through any suitable connections, preferably those shown and described in said patent. The fingers of these levers when held in alinement with the levers and when the signal is in normal or danger position will project into paths of movement of pins or studs on sprocket-chains 22, which are moved by sprocket-wheels driven by the electric motor 29 through any suitable form or construction of interposed gearing. As the levers are raised by the chains to shift the signal from danger or caution and clear positions the fingers 6 6ª are caught by spring-actuated hooks just as the studs on the chains pass out of engagement with the fingers, so that the levers will be held in their raised position. Fingers 6 6ª are freed to turn on their pivotal connections with the levers by the de-energizing of the magnets 17 17ª. Such movements of the fingers on the levers will release them from the spring-catches and permit them to drop to normal positions.

A pinion 60 is loosely mounted on a pin 61, supported in the ends of a yoke 62, which is connected to the signal-rod 63. This yoke is provided with guide-wings 64, projecting through slots in the sides of the casing 65. In this casing are formed guideways for the rack-bars 66 66ª, engaging opposite sides of the pinion 60 and connected, respectively, to the levers 1 and 1ª. The signal-rod may be operatively connected in any suitable manner to the signal, but the connection shown in Figs. 4 and 5 is preferable. In this construction a series of teeth are formed on the upper portion of the rod, said teeth intermeshing with the toothed segment 67, keyed on the shaft 68, to the outer end of which is secured the signal-blade.

It will be readily understood from the fore-

going that when one of the levers, as 1, is raised the rack-bar 66 will move up, thereby causing the pinion 60 to roll up along the rack-bar 66ª, thereby shifting the signal to caution position. If now the lever 1ª be raised, the pinion 60 will be caused to roll up along the rack-bar 66, thereby shifting the signal to clear position. It is immaterial which lever is operated first, as the operation of either one of the levers will move the signal to "caution." The levers may be operated simultaneously to shift the signal. In such case lifting-studs on the chains 22 22ª are arranged in line with each other, so as to lift both levers simultaneously, provided the magnets 17 17ª for holding the fingers 6 6ª in operative positions are energized.

The make-and-break mechanisms controlling the circuits (hereinafter described) are formed by metal springs secured on the bed 32, but insulated therefrom, and metal strips arranged on rollers formed of insulating material and secured on shafts provided with arms 35, which are connected by rods 36 to the levers 1 and 1ª, so that by the shifting of the levers these make-and-break mechanisms will be opened or closed in due succession, as is particularly described in the patent referred to.

The circuits for controlling and operating the signals and motor are clearly shown in Fig. 6. The circuit for holding the finger 6 of lever 1 of home signal A′ in operative position consists, starting from the battery X, of wires 39 and 40, armature 41 and contact-point of track-relay 42, wire 43, high-resistance coil of magnet 17, and wire 44 to battery. The circuit for shifting the lever 1, so as to clear the signal A′, consists of wires 39 and 40, armature 41 and contact-point of relay 42, wire 43, branch wire 45, make-and-break mechanism *a*, wire 46, low-resistance coil of magnet 17, wire 47, to and through motor 29 to battery. The circuit for holding the finger 6ª of lever 1ª consists of wires 39, 40, and 48, contact-point and armature 49 of relay 50, wire 51, to high-resistance coil of magnet 17ª, wire 52, make-and-break mechanism *b*, and wire 44 to battery. The circuit for shifting the lever 1ª of signal A′ consists of wires 39, 40, and 48, contact-point and armature 49 of relay 50, wires 51 and 53, make-and-break mechanism *d*, wire 54, low-resistance coil of magnet 17ª, wire 55, make-and-break mechanism *c*, wire 47, to and through motor 29 to battery. The circuit for relay 50, starting from battery X′, consists of wire 39ᵇ, common wire 56 to preceding station, wire 57, relay 50, wires 58, make-and-break mechanism *b*′, and wire 44ᵇ to battery.

It will be observed that the magnets 17 and 17ª consist of two coils, one of high resistance and the other of a low resistance, and that the latter is in series with the motor. The function of the low-resistance coils of these magnets is to hold the fingers 6 6ª in operative position while the signals are being shifted to clear position, while the high-resistance coils become operative to hold the fingers in operative position when the motor-circuit is cut out.

In describing the operation of my improved apparatus it will be supposed that a train is on section A and that the succeeding sections B, &c., are clear and that the signals controlling such sections are in corresponding positions, as shown in Fig. 5. By the entrance of the train upon section A track-relay 42 is cut out and its armature will be shifted to break the holding-circuit of magnet 17 of signal A′. On the release of the armature of magnet 17 the finger 6 is free to be turned on its pivot by the weight of signal-lever 1, thereby disengaging the finger from the holding-catch and permitting the lever 1 to drop, the signal A going to caution position. This movement of the signal-lever 1 will operate through the medium of rod 36 and arm 35 to open the make-and-break mechanisms *b* and *c* and to close the make-and-break mechanism *a*. The closing of the make-and-break mechanism *a*, which is in the shifting-circuit of lever 1, is only a preparatory step, as the circuit will remain open until track-relay is energized and shifts armature 41 against its contact-point, said armature and contact-point forming part of the shifting-circuit of lever 1. The opening of make-and-break mechanisms *b* and *c* by the dropping of lever 1 or the movement of signal A′ to caution will break the holding and shifting circuits through magnet 17ª. The deënergizing of magnet 17ª will permit finger 6ª of lever 1ª to free itself from its holding-catch, whereupon the lever 1ª will drop and the signal A will go to "danger." The dropping of the lever 1ª by the movement of the signal to "danger" will close the make-and-break mechanism *d;* but this is merely preparatory, as the shifting and holding circuits for lifting the lever 1ª cannot be completed except by the closing of make-and-break mechanisms *b* and *c*, which can be effected only by the prior lifting of lever 1. As heretofore stated, this lever cannot be lifted while relay 42 is held open by the presence of a train on section A. As the train enters section B the signal B′ will be caused to go to "danger" by the breaking of the circuits controlled by track-relay 42ᵇ. The lever 1 of signal B′ will first drop, and thereby open the make-and-break mechanisms *b*′ and *c*′, whereupon the lever 1ª will also drop, shifting signal B′ to danger. The passage of the train off section A will permit the energizing of relay 42 and the consequent closing of the holding and shifting circuits of lever 1 of signal A′ through magnet 17 and the motor 29, whereby the lever 1 is raised and the signal A′ shifted to caution position. As this lever 1 reaches its up position make-and-break mechanism *a* will be opened and make-and-break mechanisms *b* and *c* will be closed. The opening of make-and-break mechanism *a* will break the shifting-circuit through the motor

and low-resistance coil of magnet 17, but will not affect the circuit through the high-resistance coil of the same magnet. The closing of make-and-break mechanisms *b* and *c* is a second step preparatory to the complete clearing of the signal A′ or to its movement from caution to clear position. In its caution position the signal A′ is an indicator of the position of signal B′ of the next section. As the holding and shifting circuits of the lever 1ª of signal A′ were broken by the opening of the circuit through relay 50 when the make-and-break mechanism *b*′ was opened by the dropping of signal B′ to "danger," the lever 1ª of signal A′ cannot be raised and said signal cleared while signal B′ is at "danger." As soon as the train passes off track-section B and signal B′ is shifted to "caution," thereby closing make-and-break mechanism *b*′, relay 50 will become energized, so as to pull its armature 49 against its contact-point, thereby completing the holding and shifting circuits through magnet 17ª and the motor. As the signal A′ is cleared by the motor make-and-break mechanism *d* is opened, thereby breaking the shifting-circuit through the motor and low-resistance coil of magnet 17ª, but without affecting the holding-circuit through the high-resistance coil of said magnet.

In case a train after passing off section B should back onto said section relay 42ᵇ will be short-circuited and signal B′ go to "danger" through the successive releasing of levers 1 and 1ª of said signal. The dropping of lever 1 of signal B′ will open make-and-break mechanism *b*′, thereby permitting relay 50 to become deënergized and its armature to shift from its contact-point and open the holding and shifting circuits of lever 1ª of signal A′. The dropping of lever 1ª permits signal A′ to go direct to "caution," but no farther, as lever 1 of the signal is not released.

As the accumulation of dust on the parts of the signal-operating mechanism will prevent or retard their operation, and this is especially true in regard to the make-and-break mechanisms, the operating mechanism should be inclosed in a protecting case or shell 69, which should be made as dust-proof as possible. If, however, the case or shell is made so tight as to prevent free circulation of air, the metal parts inside of the case will sweat and the moisture thus collecting on the parts will freeze in freezing weather, and thereby prevent the operation of the mechanism. In order to permit of the circulation of air and the consequent equalization of temperatures inside and outside of the case, openings 70 are formed in the sides of the case or shell and some filtering material, as cotton or fine gauze, is placed in said openings, thereby preventing the entrance of dust, but permitting a free passage of air. To prevent the entrance of moisture in case of driving rains, hoods 71 are formed over the openings 70, as shown in Fig. 1. A pipe or tube 72 is connected to this box, and through this pipe is passed the signal-rod. Near its upper end the pipe or tube is provided with an enlargement 73, inclosing the driving connections between the signal-rod and signal. The upper end of the pipe or tube is closed by a cap 74, fitting over the end thereof. On the inner wall of the cap are formed bearing-rings 75, which are notched for the passage of air. These notches are protected with some filtering material, as cotton or fine gauze, to prevent the entrance of dust. As will be readily understood, the pipe or tube acts as a ventilating-shaft, the air entering through the openings in the case and flowing up through and out of the tube.

In order to protect the mechanism against any dirt or water which might drop down the tube, an inclined protecting-plate 76 is attached to the case or shell directly under the pipe or tube, as shown in Fig. 1.

I claim herein as my invention—

1. In a signaling apparatus, the combination of a signal, mechanism for shifting the signal, and independent connections from the mechanism to the signal, substantially as set forth.

2. In a signaling apparatus, the combination of a signal and operating mechanism whereby the signal is moved successively from danger to caution and clear positions and to permit its movement from clear to caution and from caution to danger positions, substantially as set forth.

3. In a signal apparatus, the combination of a signal, a motor for shifting the signal, two independent connections from the signal to the motor and a track-circuit controlling the motor and the connections from the motor to the signal, substantially as set forth.

4. In a signal apparatus, the combination of an electric motor, a signal, independent electrically-controlled connections from the signal to the motor, two shifting-circuits each including the motor and one of the magnets of the connections between the signal and motor, and a make-and-break mechanism controlling said circuits and controlled by train movements, substantially as set forth.

5. In a signal apparatus, the combination of a motor, a signal, independent electrically-controlled connections from the signal to the motor, two holding-circuits controlling the signal connections, a train-controlled make-and-break mechanism included in said circuits, and a second make-and-break mechanism in one of the circuits controlled by one of the connections from the signal to the motor, substantially as set forth.

6. In a signal apparatus, the combination of an electric motor, a signal, independent electrically-controlled connections from the signal to the motor, two shifting-circuits each including the motor and the magnets of one of the signal connections, make-and-break mechanisms included in said circuits and controlled by connections from the motor to the signal, and a train-controlled make-and-break

mechanism controlling connections, substantially as set forth.

7. In a signal apparatus, the combination of an electric motor, a signal, independent connections from the signal to the motor, magnets having high and low resistance coils controlling said connections, shifting-circuits including the low-resistance coils and the motor, holding-circuits including the high-resistance coils, and a train-controlled make-and-break mechanism controlling said circuits, substantially as set forth.

8. In a signal apparatus, the combination of an electric motor, a signal, independent connections from the signal to the motor, magnets having high and low resistance coils controlling said connections, shifting-circuits including the low-resistance coils and the motor and controlled by the connections from the motor to the signal-holding circuits including the high-resistance coils, the holding-circuit of one signal connection being controlled by the other signal connection and a train-controlled make-and-break mechanism controlling the holding and shifting circuits, substantially as set forth.

9. In a signal apparatus, the combination of two track-circuits, an electric motor, a signal, independent electrically-controlled connections from the signal to the motor, two shifting-circuits each including the motor and the magnets of one of the signal connections, a make-and-break mechanism controlling both circuits and controlled by one track-section and a second make-and-break mechanism in one of the shifting and holding circuits of one of the signal connections, and controlled by the other track-circuit, substantially as set forth.

10. The combination of a signal, a pinion connected to said signal, two movable rack-bars engaging said pinion, and means for shifting the rack-bars, substantially as set forth.

11. The combination of a signal-operating mechanism and a case or shell surrounding such mechanism and inclosing the same with protected openings for the admission of air, substantially as set forth.

12. The combination of a case or shell provided with protected openings, a vertically-arranged tube extending from the top of such case or shell and having protected openings at its top a signal-operating mechanism arranged within the case or shell, a signal movably mounted upon the tube and a connection from the operating mechanism to the signal extending through the tube, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JENS G. SCHREUDER.

Witnesses:
DARWIN S. WOLCOTT,
M. S. MURPHY.