W. J. COOK.

ELECTRIC RAILWAY SIGNALING APPARATUS.

APPLICATION FILED JULY 13, 1908.

939,984.

Patented Nov. 16, 1909.

3 SHEETS—SHEET 1.

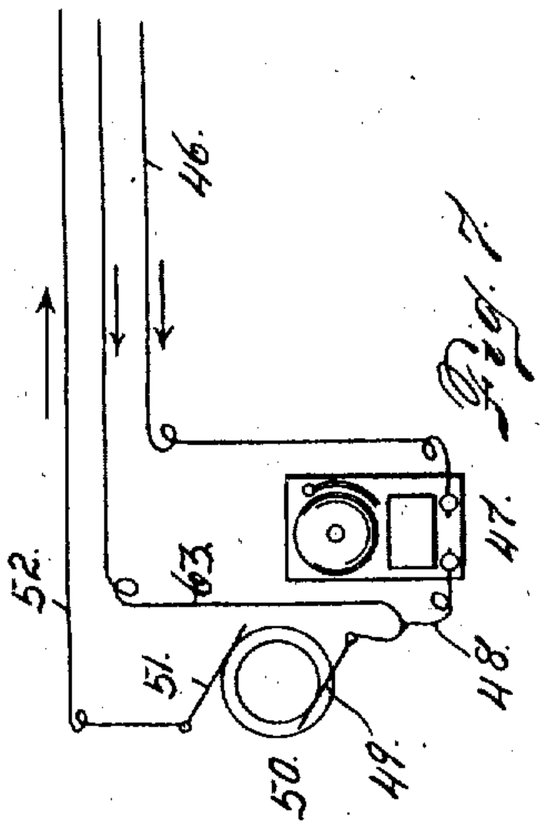

Fig. 3.

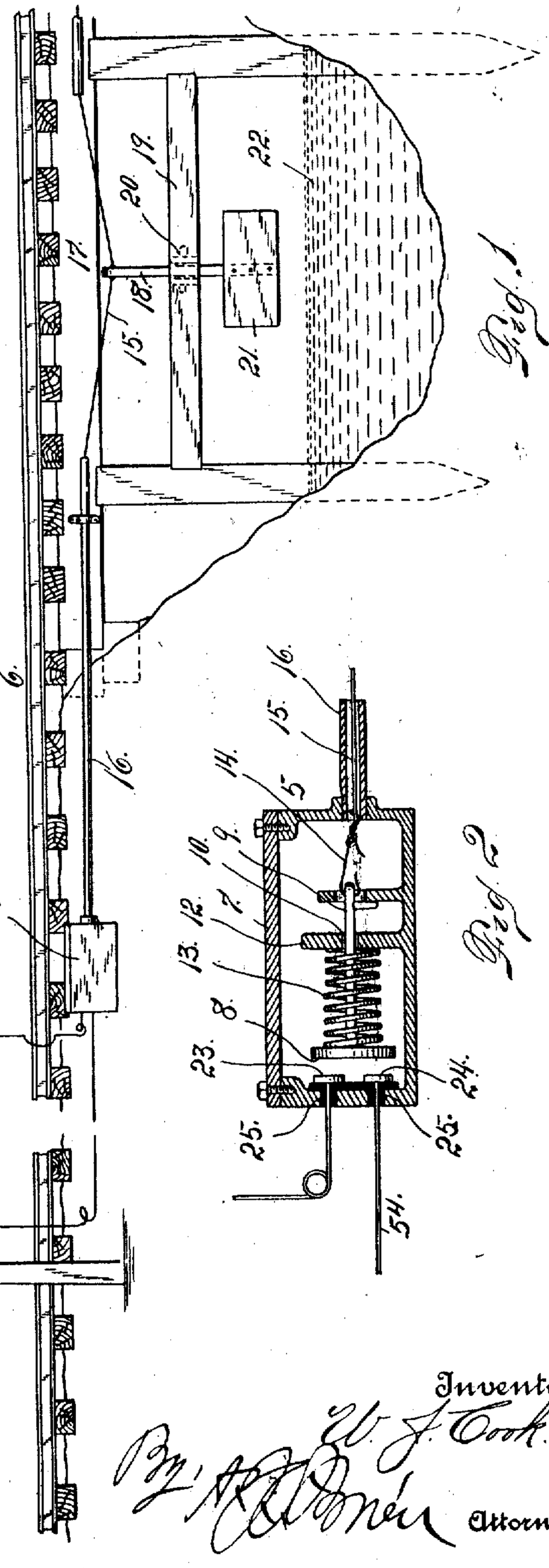

Fig. 1.

Fig. 2.

Witnesses

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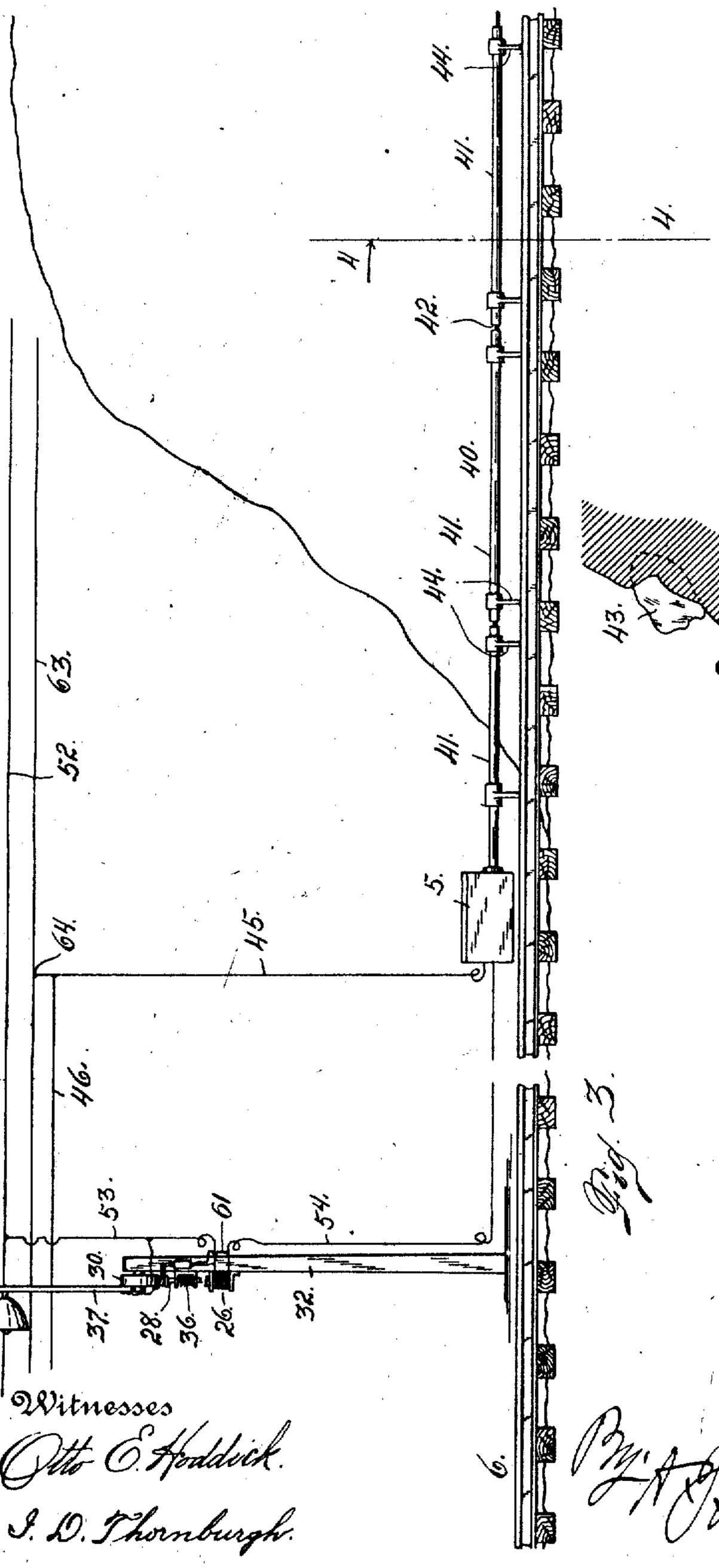

Fig. 3.

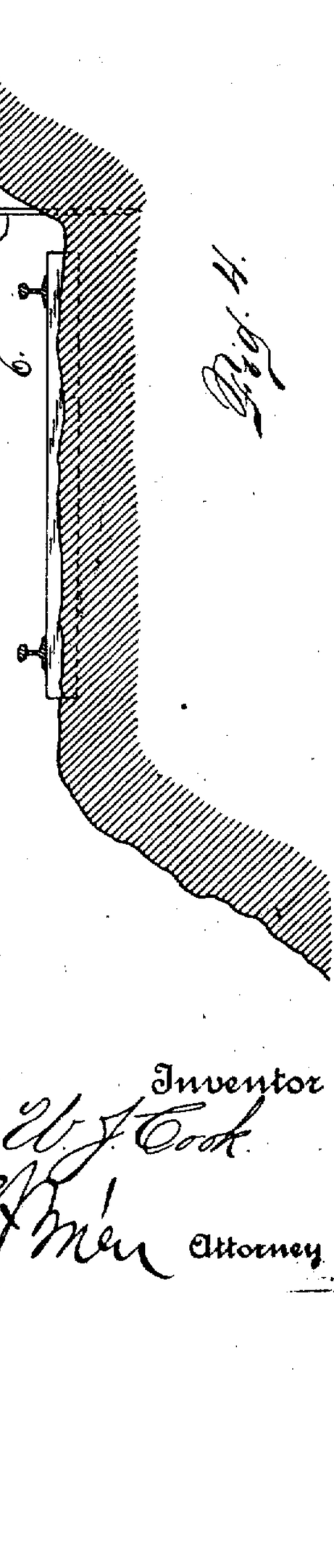

Fig. 4.

Witnesses

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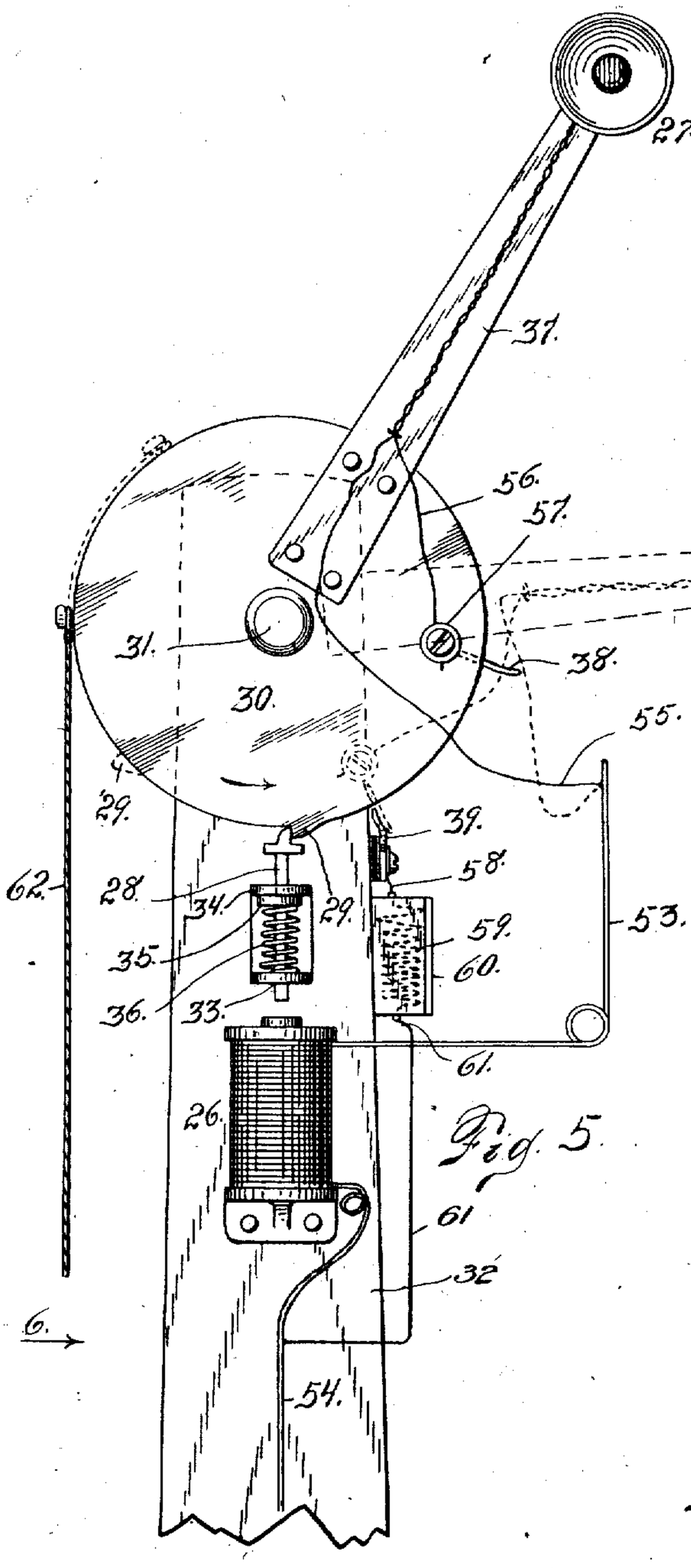

Fig. 5.

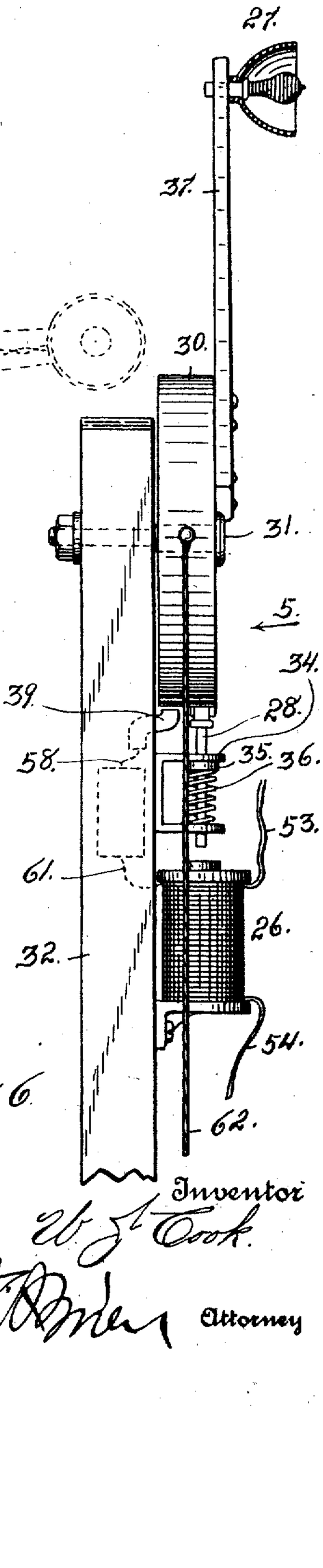

Fig. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

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ELECTRIC RAILWAY SIGNALING APPARATUS.

939,984. Specification of Letters Patent. Patented Nov. 16, 1909.

Application filed July 13, 1908. Serial No. 443,320.

To all whom it may concern:

Be it known that I, WILLIAM J. COOK, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Electrical Railway Signaling Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in electrical railway signaling apparatus, my object being to provide means whereby in the event of an injury to the track such as would ordinarily result in an accident, trains may be notified in time to avert the difficulty. My improved construction is especially adapted to warn trains in case of an injury to a culvert or bridge due to high water or the burning of the bridge. Provision is also made for warning trains in the event of the rolling of rocks or the accumulation of debris of any kind upon the track due to slides in mountainous districts whether of snow or other material. My apparatus includes an electrical circuit which is closed by the breaking of a device which is connected by means of a rod or wire with an element which is sufficiently disturbed by the injury to or the accumulation of material upon the track, to break the said device, resulting in the release of a spring-actuated part which when the said device is broken moves into engagement with two contacts which are bridged thereby thus closing a circuit through an electromagnet, which acts to release a signal allowing the latter to assume the danger position. Provision is also made for simultaneously closing a light circuit whereby a lamp connected with the signaling arm is lighted.

Having briefly outlined my improved construction, I will proceed to describe the same in detail reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a view illustrating my improved apparatus shown in connection with a bridge or culvert together with means for operating the signal in the event that the water rises to a dangerous position. Fig. 2 is a sectional view taken through a box in which the spring-actuated circuit-closing device is located. This box also conceals the contacts which are bridged by the said device when released, the parts being shown on a larger scale. Fig. 3 is a view similar to Fig. 1, illustrating, however, the application of the apparatus to a line of track in a mountainous district where the track is liable to be obstructed by the sliding of material from the mountain side to the track. Fig. 4 is a section taken on the line 4—4 Fig. 3. Fig. 5 is a detail view illustrating the signaling mechanism shown on a larger scale. This view is obtained by looking in the direction of arrow 5 Fig. 6. Fig. 6 is a view looking in the direction of arrow 6 Fig. 5. Fig. 7 is a fragmentary view illustrating an electrical generator and an audible signal located in the circuit of the generator, the latter supplying the current for the signaling device. The construction shown in this view may be said to be broken away from the left hand extremity of the construction shown in Figs. 1 and 3.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a box or other suitable receptacle arranged in suitable proximity to a line of track 6. Within this box which is provided with a removable cover 7, is concealed a disk 8 composed of conducting material, the said disk being connected with a stem 9 which passes through an opening 10 formed in a lug or partition 12 projecting from the bottom of the box. Between this lug and the disk and surrounding the stem 9 is a coil spring 13. The extremity of the stem 9 remote from the disk, protrudes beyond the lug 12 and with it is connected a relatively fragile or breakable device 14. The opposite extremity of this breakable device is connected with a wire or cable 15 passing through a tube 16 arranged along the track (see Fig. 1) and terminating at a bridge or culvert 17 over which the track passes. It will be understood that there should be one of these boxes 5 at each extremity of the bridge or that these boxes and their attachments should be located on opposite sides of the bridge, culvert or other

danger point. Hence it may be assumed that the flexible device 15, is connected with two breakable devices 14, one being located in a box 5 on each side of the danger point. At the bridge, still referring to Fig. 1, the tubular protection or sheath 16 ceases and the flexible device 15 is exposed and to it is connected, as shown in the drawing, the upper extremity of a lever 18 fulcrumed on a cross beam 19 as shown at 20. To the lower extremity of this lever is attached a blade 21 so arranged that when the water 22 rises to a dangerous height, it will act upon this plate and operate the lever sufficiently to disrupt the breakable device 14. The pull on the flexible device due to its connection with the lever 18, is sufficient to place the spring 13 under tension. As soon as the flexible device is broken, the recoil of the spring 13 acting on the disk 8 will cause the latter to move into engagement with two separated contacts 23 and 24 located within the box 5 but insulated therefrom as shown at 25. This movement of the disk closes an electrical circuit in which is located an electro-magnet 26 and an electric lamp 27. The magnet being energized by the closing of the circuit, acts upon a spring-actuated latch 28 which normally engages a tooth 29 formed on the periphery of a disk 30 pivoted at 31 on a post 32. This latch passes through two lugs 33 and 34 and is provided with a stop collar 35 which is engaged by one extremity of a coil spring 36, the opposite extremity of the spring bearing against the lower lug 33. The magnetic force incident to the energizing of the magnet 26, acts on this latch to move the same downwardly whereby the latch is disengaged from the tooth 29, allowing the disk 30 to make a partial rotation whereby a signaling arm 37 connected therewith, is allowed to move downwardly to the dotted line position (see Fig. 5). By virtue of this movement of the disk, a contact spring 38 is brought into engagement with a contact 39 whereby the electrical circuit is closed through the lamp 27. The engagement of the contacts 38 and 39 also limits the further movement of the disk and the signaling arm. The position of the signaling arm when the disk is locked by the latch 28, is illustrated in Figs. 5 and 6.

In the form of construction shown in Figs. 3 and 4, the device 15 passes through a tube 40 preferably composed of a number of sections 41 which are separated as shown at 42 to facilitate the collapse of the tube for the purpose of acting on the cable or other suitable device 15 whereby the fragile member 14 is broken. It is evident that if a rock 43 or other object or mass of material of sufficient magnitude to obstruct the track, should fall upon this tube 40, the same would collapse resulting in sufficient pull upon the inclosed wire or cable 15, to break the device 14 and release the spring-actuated disk 8 whereby the circuit is closed to the signaling devices the same as when the other form of construction is employed.

Attention is called to the fact that the tube 40 is arranged along the track on the side which is exposed to rocks or other objects which may roll down from the mountain side and have a tendency to obstruct the track. This structure 40 is located in the path of the rock or other object as it moves downwardly to the track and consequently must be crushed. As shown in the drawing the tube sections 41 are mounted on supports 44 arranged in suitable proximity to the track 6 on the danger side.

Assuming that the disk 8 is in engagement with the two contacts 23 and 24, if we start from one of these contacts the path of the current may be traced as follows: From the contact 23 through a conductor 45 to a conductor 46 and thence through the latter (see Fig. 7) to a bell 47 and thence through a conductor 48 to a pole 49 of an electrical generator 50. The current passes from the opposite pole 51 of this generator to a line feed wire 52 which may extend along the track any desired distance and with which any desired number of signaling devices may be connected in multiple arc or otherwise as may be desired. From this feed wire 52 a conductor 53 leads to one terminal of the coil of the electro-magnet 6. From the opposite terminal of this coil leads a conductor 54 to the contact 24 from which the current passes through the disk 8 to the contact 23 completing the circuit.

From the conductor 53, leads a conductor 55 (see Fig. 5) to the lamp 27 mounted on the signaling arm 37. From this lamp a conductor 56 leads to the contact 38 secured to the disk 30 by a screw 57. Assuming that the contact 38 is in engagement with the contact 39 (see dotted lines in Fig. 5), the course of the current will be from the contact 38 through the contact 39, thence through a conductor 58 to a resistance coil 59 located in a box 60 mounted on the post 32 and thence through a conductor 61 to the conductor 53.

Connected with the periphery of the disk 30, is a rope or pull cord 62 which is used to operate the disk 30 for the purpose of setting the signaling arm in the position for use or that indicated in full lines in Figs. 5 and 6, after the disk has moved to the signaling position or that shown by full lines in Fig. 5. In moving the disk sufficiently to raise the signaling arm to the position when set for signaling purposes or that shown by full lines in Figs. 5 and 6, the tooth 29 which will be in the position indicated by dotted lines in Fig. 5, will move

past the latch in the direction of the arrow in Fig. 5, and the latch will spring upwardly behind the tooth 6 locking the disk in the aforesaid position.

From the foregoing description the use and operation of my improved signaling apparatus will be readily understood.

Assuming that the wire or cable 15 has been subjected to sufficient strain to disrupt the breakable device 14, the disk 8 will spring into engagement with the contacts 23 and 24, completing the circuit through the magnet 26, which being energized acts on the latch 28 which is composed of magnetic material, to draw the latter downwardly whereby it is disengaged from the tooth 29, thus allowing the disk to move sufficiently to throw the signaling arm into the dotted line position in Fig. 5 whereby the contacts 38 and 39 are brought into engagement, thus closing the circuit through the lamp 27. At the same time the circuit is completed through the bell 47 which may be located at a station along the track or in any desired location. It may be assumed that a bell 27 and the electrical generator 50, are located at stations installed at suitable intervals along the track. By virtue of this construction and arrangement, agents at these stations will be notified of the danger as well as the train men. It will be understood that the signaling devices are located on opposite sides of all danger points so that trains approaching these points from either direction will be notified. The conductor 45 is connected with a feed wire 63 as shown at 64. The feed wires 52 and 63 are connected with the opposite poles of the generator 50, and may extend any desired distance along the track, the signaling devices being supplied therefrom by multiple arc connections or otherwise as may be desired.

Having thus described my invention, what I claim is:

1. In apparatus of the class described, the combination of signaling mechanism comprising a movable signal having a tendency to assume the danger position, a latch for locking the signal in such a position that it indicates no danger, an electromagnet which when energized will act on the latch to release the signal and allow it to assume the danger position, a circuit make-and-break device, a breakable device connected with the circuit make-and-break device and normally holding the same in the open circuit position, and means connected with the breakable device and leading to a danger point, the said means being arranged to be acted on by track disturbances sufficiently to disrupt the breakable device and allow the circuit make-and-break device to move to a position to close the circuit of the said magnet.

2. In electric railway signaling apparatus, the combination of a movable signal, a latch for normally locking the signal in a position to indicate no danger, an electromagnet which when energized acts to release the locking device and allow the signal to move to the danger position, a circuit in which said magnet is located, a breakable device, a circuit make-and-break device with which the breakable device is connected, whereby the circuit make-and-break device is held in the open circuit position, means connected with the breakable device and leading to a danger point along the track, and so arranged that a strain upon said device will disrupt the same and allow the circuit make-and-break device to move to the circuit closing position.

3. In apparatus of the class described, the combination of signaling mechanism comprising a disk mounted to rotate and provided with a signaling arm whose normal tendency is to assume the danger position, a latch for locking the disk in such a position that the signaling arm indicates no danger, an electromagnet which when energized will act on the latch to release the disk and allow the signaling arm to assume the danger position, a circuit make-and-break device, a breakable device connected with the circuit make-and-break device and normally holding the same in the open circuit position, and means connected with the breakable device and leading to a danger point, the said means being arranged to be acted on by track disturbances, sufficiently to disrupt the breakable device and allow the circuit make-and-break device to move to the circuit-closing position, substantially as described.

4. In electrical signaling apparatus, the combination of a movable signal, a latch for locking the signal in the position to indicate no danger, an electro-magnet so arranged that when energized it acts on the locking device to release the signal and allow the same to move to the danger position, a circuit in which the said magnet is located, a spring-actuated circuit make-and-break device, and a breakable device connected to hold the make-and-break device in the open circuit position, and means connected with the breakable device and extending to a point of danger along the track whereby as the breakable device is disrupted, the circuit make-and-break device will move to close the circuit through the electro-magnet, substantially as described.

5. In electrical railway signaling apparatus, the combination of a movable signal, a latch for normally locking the signal in the position to indicate no danger, an electro-magnet which when energized acts to release the locking device and allow the same to move to the danger position, a circuit in

which said magnet is located, a breakable device, a circuit make-and-break device with which the breakable device is connected whereby the circuit make-and-break device is held in the open circuit position, means connected with the breakable device and leading to a danger point along the track and so arranged that a strain upon said device will disrupt the breakable device and allow the circuit make-and-break device to move to the circuit closing position, an electric lamp mounted on the movable signal, a circuit in which said lamp is located, and means for closing said circuit as the signal moves to the danger position, substantially as described.

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

WILLIAM J. COOK.

Witnesses:

A. J. O'BRIEN,

DENA NELSON.