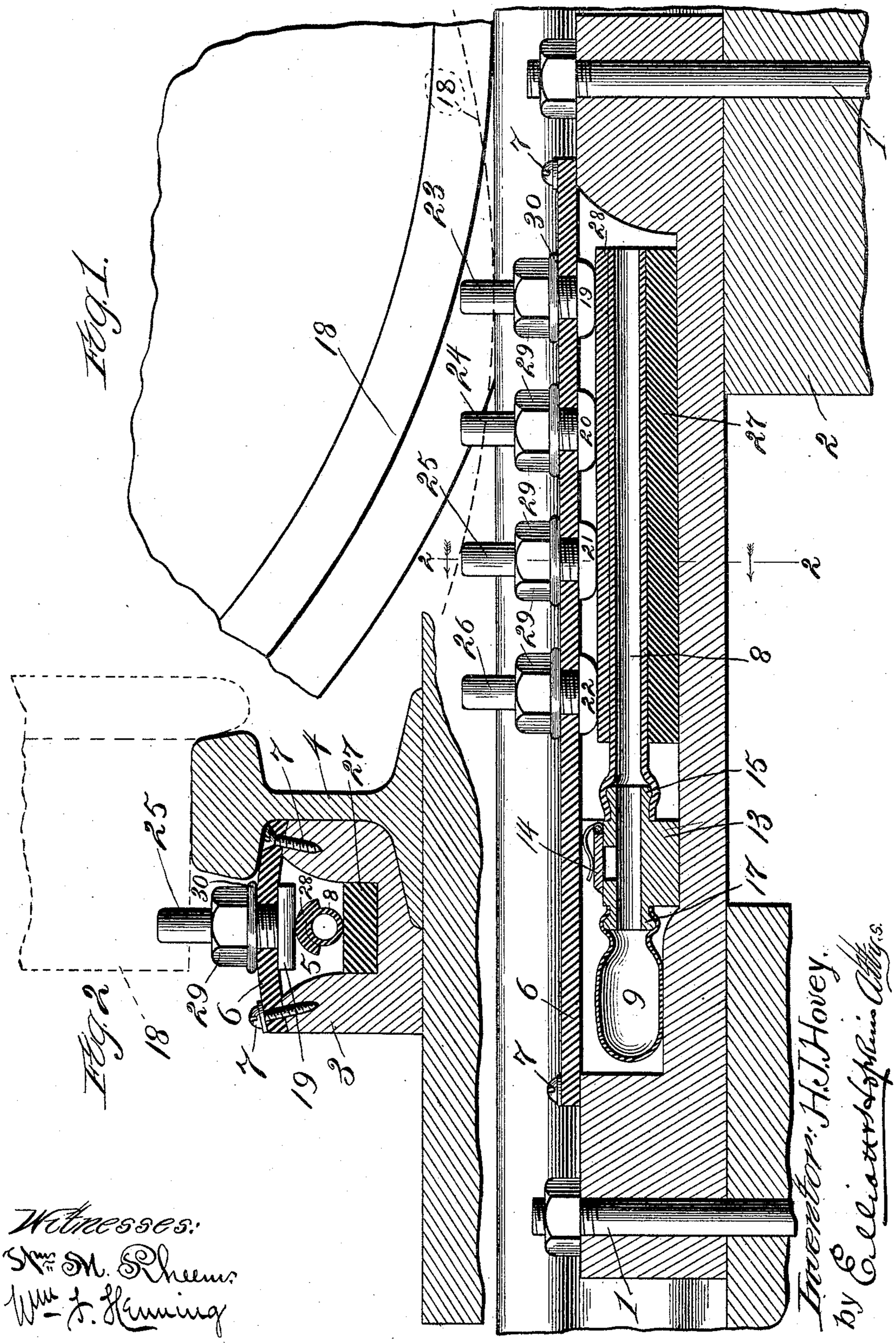
(No Model.) 2 Sheets—Sheet 1.

H. J. HOVEY.

CIRCUIT CLOSER.

No. 528,672. Patented Nov. 6, 1894.



Witnesses:
Wm. M. Rheems
Wm. F. Fleming

(No Model.)

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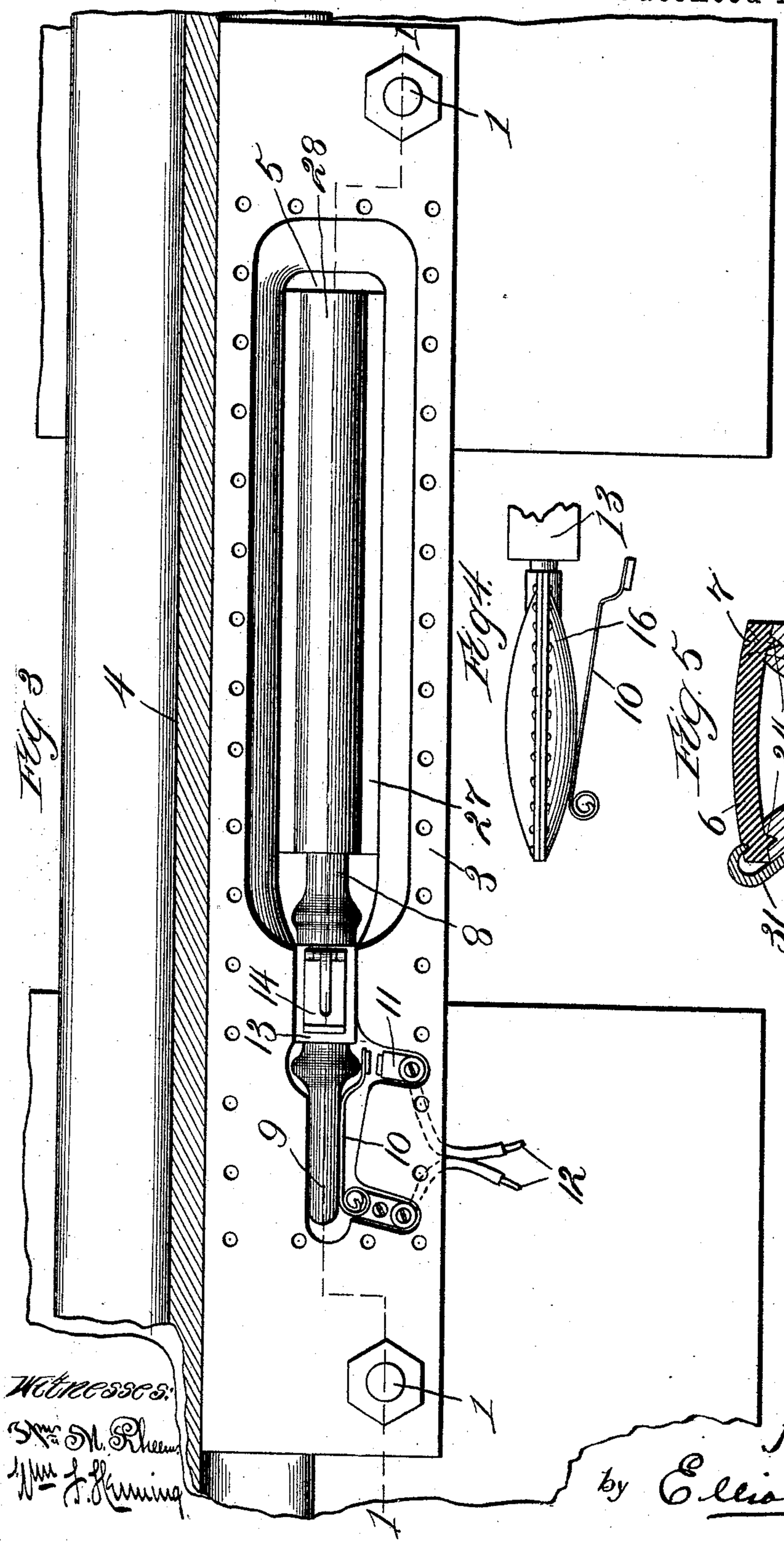

Witnesses:
Wm. M. Rheem
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Inventor:
H. J. Hovey
by Elliott & Hopkins Attys.

UNITED STATES PATENT OFFICE.

HENRY J. HOVEY, OF OAK PARK, ILLINOIS.

CIRCUIT-CLOSER.

SPECIFICATION forming part of Letters Patent No. 528,672, dated November 6, 1894.

Application filed December 26, 1893. Serial No. 494,706. (No model.)

To all whom it may concern:

Be it known that I, HENRY J. HOVEY, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Circuit-Closers, of which the following is a full, clear, and exact specification.

My invention relates more particularly to circuit closers for railway signals, such for instance as block signals or signals employed for giving warning of the approach of a train at stations and crossings. Ordinarily in such systems the signal circuit is closed through the intermediary of a relay which is itself energized by a circuit closed by the track circuit closer which is operated by the moving train, usually by the wheels. After the train passes the station, crossing or other place where the signal is located, it operates a stop instrument which restores the relay to its normal or open position, and it thus remains until the next train reaches and actuates the circuit closer. This system however is not appropriate for a single track road, or a road upon which trains are run in both directions on the same track, because the prior form of circuit closer is such that the train would actuate it and cause the signal to operate after the station or crossing had been passed.

The primary object of my invention therefore is to provide a circuit closer that may be operated to close the circuit by trains passing in one direction only.

Another objection to the prior form of circuit closer is that it is operated by hand-cars, railway velocipedes and other small vehicles as well as by the regular rolling stock; and inasmuch as these small vehicles are frequently passing up and down the road and it is not necessary that any warning be given of their approach or their presence on the rails, this defect of the prior form of circuit closer causes considerable annoyance. Hence another object of my invention is to so construct the circuit closer that it will not be actuated by hand-cars, railway velocipedes and other small vehicles whose approach or presence on the track need not be indicated by signal.

With these ends in view my invention consists in certain features of novelty hereinafter more fully described with reference to the accompanying drawings and particularly pointed out in the claims.

In the said drawings which show a simple embodiment of my invention, Figure 1 is a vertical longitudinal section of my improved circuit closer taken on the line 1—1 Fig. 3, showing a portion of one of the car or locomotive wheels. Fig. 2 is a transverse sectional view of the circuit closer and the rail, showing the relation of these parts, the wheel being indicated in dotted lines. Fig. 3 is a plan view of the circuit closer with the top or cover removed, the rail web being shown in longitudinal section. Fig. 4 is a modified form of expansible chamber hereinafter described, and Fig. 5 is a transverse sectional view of the housing or casing and its cover, showing a modified form of means for holding the cover in place.

Like signs of reference indicate like parts throughout the several views.

In practice I prefer to arrange my circuit closer adjacent to the track rail so as to be operated by the wheels of the rolling stock, this being the usual and most convenient and effective arrangement. The circuit closer comprising my invention is therefore provided as usual with means for receiving the pressure of the wheels and communicating such pressure to the electric contacts or terminals of the line wires which lead to the usual relay or other member of the signal system; but in my invention such means is so constructed and arranged that its movement is effective for closing the contacts together by trains going in one direction only. In accomplishing this difference of operation between my invention and the prior art, I find it advantageous to transmit the pressure of the wheels or the movement of the part depressed by the wheels, to the contacts through the medium of a fluid, preferably air, as the latter is always present and need not be supplied; but it would of course involve no departure from the spirit of my invention to fill the device with any other fluid such as glycerine or oil if deemed desirable for the better preservation of the parts. To this end I employ a compressible or contractible tube or chamber which receives its compression from the said means with which the wheels engage

and which means comprises a number of independently movable members or portions arranged in a series longitudinally of the rail so that by their successive depression they will effect the expulsion of the fluid from or its displacement in the tube or chamber; and this expulsion will be effected whether the said series of depressible members be traversed from right to left or vice versa, but it is evident that since the depressible members act to compress the tube gradually from end to end, the expulsion of the fluid will take place from the one end or the other according to the direction in which the train is traveling. Hence by connecting or providing one end of the tube with a fluid-pressure-actuated device for forcing the electric contacts together, the contacts will be closed by a train going in one direction, but trains passing over the same track in the opposite direction will force the fluid from the tube without affecting the said fluid-pressure-actuated device, and consequently without closing the circuit. These parts are mounted upon and inclosed within a suitable housing or casing to shield them from the water and dirt, which is secured against the outer side of the rail so as to be in the path of the wheel treads, by means of suitable bolts 1, entering the cross-ties 2 as shown more clearly in Figs. 1 and 2. This casing or housing may consist of a box-like portion or block 3 whose inner side and bottom may be given a form complementary to the contour of the rail web 4 and flange as indicated in Fig. 2. This box or block may be composed of any suitable material but preferably of wood, and it is provided with a cavity 5 for the reception of certain parts of the circuit closer hereinafter described, and this chamber is covered by means of a water-tight cover 6 held in place by any suitable means such as the screws 7.

Arranged within the cavity longitudinally of the rail 4 is the compressible or contractible tube or chamber 8 whose one end is connected to the expansible chamber or fluid-pressure-actuated device 9 so arranged that by its expansion it will force the spring contact or terminal 10 against the fixed terminal or contact 11, which contacts are connected with the usual circuit wires 12. Instead of joining the tube 8 directly to the chamber 10 or forming it integrally therewith, I prefer to effect the connection of these parts by means of a box or coupling 13 so that the latter may be provided with an escape or safety valve 14 for preventing the explosion of the chamber 10 in the event the pressure from the tube 8 is too great.

The tube or chamber 8 is preferably composed of elastic india rubber which may be a section of ordinary rubber tubing, as this is cheap and effective and may be readily applied to the neck 15 of the coupling 13, without the employment of screw threads or other such means and will hold itself in place by its own elasticity. The expansible chamber 9 is also preferably composed of rubber for the sake of cheapness and durability and for the further reason that it is found that it holds the contacts closed for a longer period than can be accomplished by means of an ordinary cylinder and piston, or by an expansible chamber such as is shown in Fig. 4 having a flexible diaphragm 16, commonly used as a substitute for rubber bulbs such as the chamber 9, and the ordinary cylinder and piston; but I wish it to be understood nevertheless that the term "expansible chamber" or "fluid-pressure-actuated device" as used herein, has reference to any mechanism which will impart the movement of the fluid in the chamber or tube 8 to the electric contacts for closing them together. When an ordinary rubber bulb like the bulb or chamber 9 is employed it may be attached to the coupling 13 by inserting its open end over the neck 17 in the ordinary manner.

It is of course evident that the tube 8 could not withstand the wear and tear that would be entailed by direct contact with the wheel treads 18, and in order that such tube may receive a gradual compression or contraction from end to end from such wheel treads, I arrange immediately over the tube a number of plungers or individually movable portions 19, 20, 21, 22, which are provided with stems 23, 24, 25, and 26, respectively, projecting slightly above the surface of the rail so that as the wheels roll along the rail they will depress the plungers one after another and in this manner crowd the air or fluid in the tube 8 into the bulb 9, when the train is moving in one direction, and crowd it out of such tube without affecting the bulb 9 when the train is moving in the opposite direction. These stems of the plungers are arranged in a series or row longitudinally of the rail and at such a distance apart that the wheel tread will hold two of them depressed at one time. Thus when the train is traveling toward the left as in Fig. 1 the plunger 19 will be depressed so as to close the tube 8 at that point and confine the fluid or air therein, and before the wheel permits this plunger to rise sufficiently to open the tube, the plunger 20 will have been depressed and this will cause the air or fluid to crowd still farther along the tube toward the bulb 9, and so on until the entire contents of the tube 8 is crowded to the left beyond the last plunger 22; but when the train is traveling to the right as in Fig. 1, it will be seen that the plunger 22 will be the first to be depressed, but without effect on the bulb 9, and the successive depression of the other plungers in the series can only result in forcing the air or fluid to the right in the tube 8, the tube being preferably left open at the end opposite the bulb 9, for permitting the air to escape.

In order that each plunger may be depressed a little farther than is necessary to close the tube 8, so as to afford opportunity for the next succeeding plunger to reach and close the tube before the preceding one permits it to open,

the tube is provided with an elastic or yielding support which preferably consists of a simple block of common rubber or gum elastic 27 to which the tube may be secured in any suitable manner as by means of cement. This block of rubber 27 is made of sufficient width as shown in Fig. 3 to fit the cavity 5 and thus serve the additional purpose of holding the tube in place in the cavity and preventing it being crowded against the sides of the housing by the plungers. In order that the wear of the plungers on the tube 8 may be reduced to the minimum, their edges are rounded as shown more clearly in Fig. 1, so as not to cut the rubber, and the upper side of the tube is provided with an elastic shield 28 which may be cemented or otherwise secured over it, for receiving the impact of the plungers. It will be seen that by the employment of these individual plungers having their stems arranged at intervals apart, the wheel treads of small diameter, such for instance as those employed on hand-cars, railway velocipedes and other small railway vehicles, cannot effect the closure of the electric contacts because such small wheels cannot hold two of the plungers depressed at once in the manner described, and hence cannot crowd the fluid or air in the tube 8 toward the bulb 9 with sufficient pressure to expand the latter. The locomotive drivers however, which are usually from three to seven feet in diameter, will operate my circuit closer without fail.

Inasmuch as the elasticity of the tube 8 is hardly sufficient to return the plungers to their normal or elevated positions it is desirable to provide such plungers with an elastic support in addition to the support afforded by the tube, so that the stems of the plungers will be promptly projected into the path of the wheels. As a simple and effective means of accomplishing this I construct the cover 6 of the housing of elastic rubber so that it will at once serve to exclude dirt and water from the interior of the housing and support the plungers in their normal positions.

A further advantage of supporting the plungers by the elastic cover is that stuffing boxes which would otherwise have to be employed for preventing leakage around the stems of the plungers, may be done away with, and an even more effective and watertight joint produced by simply providing the stems with screw threads and inserting a nut 29 on each above the cover so that the cover may be tightly clamped between the plungers and suitable washers 30 arranged under the nuts.

I prefer to employ the ordinary screws 7 before described for holding the cover in place, but if found desirable for the sake of greater convenience in lifting one side of the cover to inspect the interior mechanism or replace any of the parts, the outer side of the cover may be held in place by an angle iron 31, hook shaped at its upper edge in cross section and impinging the rubber cover, while its lower edge is provided with an angular flange through which any suitable number of screws 32 may be driven into the body of the casing or housing 3, the side of the latter being rabbeted as shown at 33 so that the action of the screws 32 may pull the angle-iron in substantially a downward direction and thus clamp the cover to the body of the housing with great pressure. If desired the upper edges of the housing may be provided with grooves 34 so that the pressure of the screws 7 or the angle-iron 31 may crowd the rubber downward below the surface of the body of the housing into these grooves and thus form a better joint.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A circuit closer for railway signals, having in combination the electric contacts or terminals, a fluid compressor or pump having independently movable plungers adapted to effect the compression of the fluid therein, and means for closing said contacts together by the fluid pressure from said compressor or pump, substantially as set forth.

2. A circuit closer for railway signals, having in combination the electric contacts or terminals, a fluid compressor or pump having independently movable portions adapted to effect the compression of the fluid therein, and said portions being arranged longitudinally of the rail in the path of, so as to be depressed by the wheels, and means for closing said contacts together by the fluid pressure from said compressor or pump, substantially as set forth.

3. A circuit closer, having in combination the electric contacts or terminals, a compressible or contractible chamber arranged lengthwise of the rail, means for contracting said chamber gradually from either end, and means for closing said contacts together by the movement of the contents of said chamber, substantially as set forth.

4. A circuit closer for railway signals having in combination the electric contacts or terminals, a compressible fluid chamber arranged lengthwise of the rail, a fluid pressure actuated device connected to said chamber, for closing said terminals or contacts together, and means for compressing said chamber successively at different intervals in its length, substantially as set forth.

5. A circuit closer for railway signals, having in combination the electric contacts or terminals, a compressible fluid chamber open at one end arranged lengthwise of the rail, a fluid pressure actuated device for closing said contacts or terminals, connected to said chamber at its other end, and means for compressing said chamber from end to end, substantially as set forth.

6. A circuit closer for railway signals having a series of depressible portions adapted by their contemporaneous depression to effect the closure of the contacts, said series be-

ing arranged lengthwise of the rail so as to be struck by the wheel treads, whereby they will be depressed contemporaneously only by wheels exceeding a certain diameter, substantially as set forth.

7. A circuit closer for railway signals, having in combination the electric contacts or terminals, an elastic tube arranged lengthwise of the rail so as to be compressed gradually from end to end by the pressure of the car wheels, and means for imparting the movement of the contents of said tube to the said contacts or terminals for closing them together, substantially as set forth.

8. A circuit closer for railway signals, having in combination the electric contacts or terminals, an elastic tube arranged lengthwise of the rail, a series of cushioned plungers arranged over said tube and adapted to be depressed by the wheels, and means at one end of said tube for imparting the pressure of the contents thereof to said contacts or terminals, substantially as set forth.

9. A circuit closer for railway signals, having in combination the electric contacts or terminals, an elastic tube provided with an elastic support and arranged lengthwise of the rail so as to be compressed by the pressure of the wheels, and means for imparting the pressure of the contents of said tube to said contacts or terminals, substantially as set forth.

10. A circuit closer for railway signals, having in combination the electric contacts or terminals, a compressible chamber, a series of plungers arranged to compress said chamber, an elastic strip by which said plungers are flexibly supported and means for imparting the pressure of the contents of said chamber to said contacts or terminals, substantially as set forth.

11. A circuit closer for railway signals, having in combination the electric contacts or terminals, a fluid compressor having plungers, a housing or casing in which said fluid compressor is arranged, an elastic cover for closing said housing or casing, and also constituting a support for said plungers, and means for closing the contacts by the pressure from said compressor, substantially as set forth.

12. A circuit closer for railway signals, having in combination the electric contacts or terminals, an air compressor for effecting the closure of said contacts, provided with a series of plungers having stems, a housing in which said compressor is incased provided with an elastic cover through which said stems project, and nuts for securing said plungers and cover together, substantially as set forth.

13. A circuit closer for railway signals, having in combination the electric contacts or terminals, an elastic tube open at one end, an expansible bulb connected to the other end of said tube and arranged to expand against one of said contacts for closing them together, and a series of plungers arranged lengthwise of said tube and having portions arranged lengthwise of the line of travel of the train, substantially as set forth.

14. A circuit-closer having in combination the electric contacts or terminals, a series of independently depressible plungers arranged to be depressed by an object moving lengthwise of the series, a deflectable portion arranged under and lengthwise of said series and adapted to be impinged and deflected by said independently depressible plungers, and means at one end of said depressible portion for communicating the movement thereof to said contacts, substantially as set forth.

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Witnesses:
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