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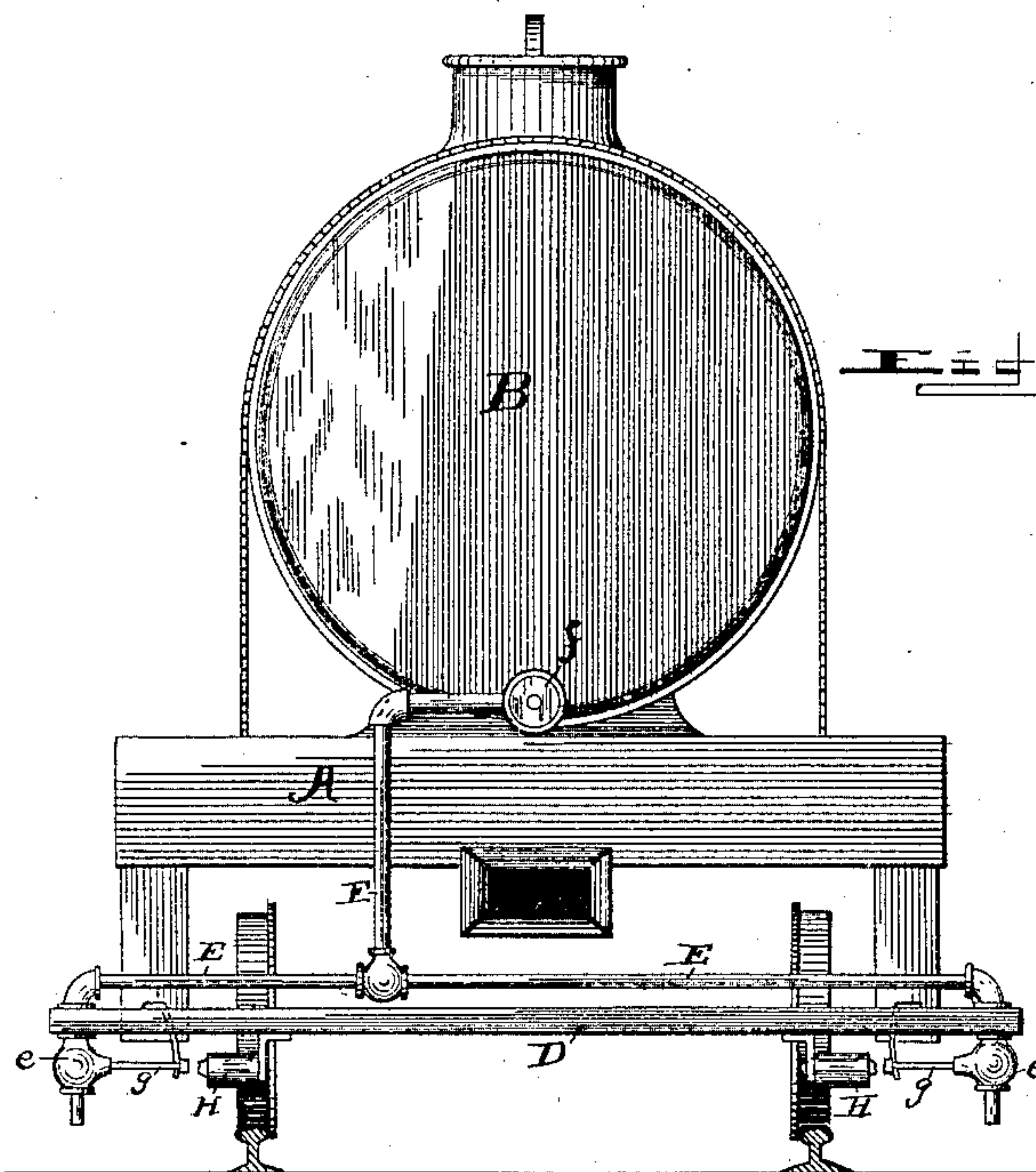
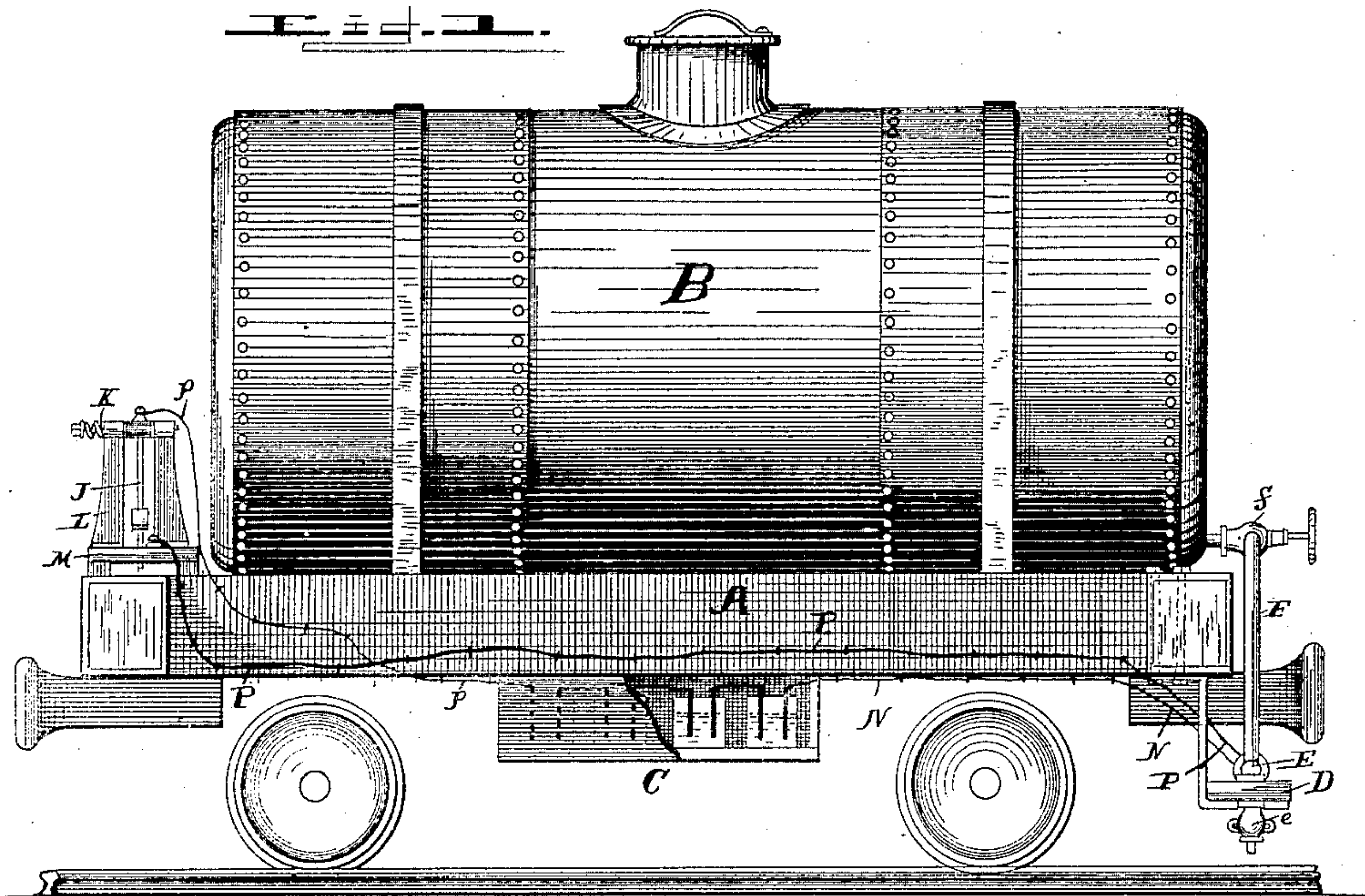
2 Sheets—Sheet 1.

J. B. GLOVER.

APPARATUS FOR DETECTING IRREGULARITIES IN RAILROAD TRACKS.

No. 433,167.

Patented July 29, 1890.



Witnesses
Percy L. Brooks.
Arthur E. Dowell.

Inventor
J. B. Glover

By his Attorney W. Alexander

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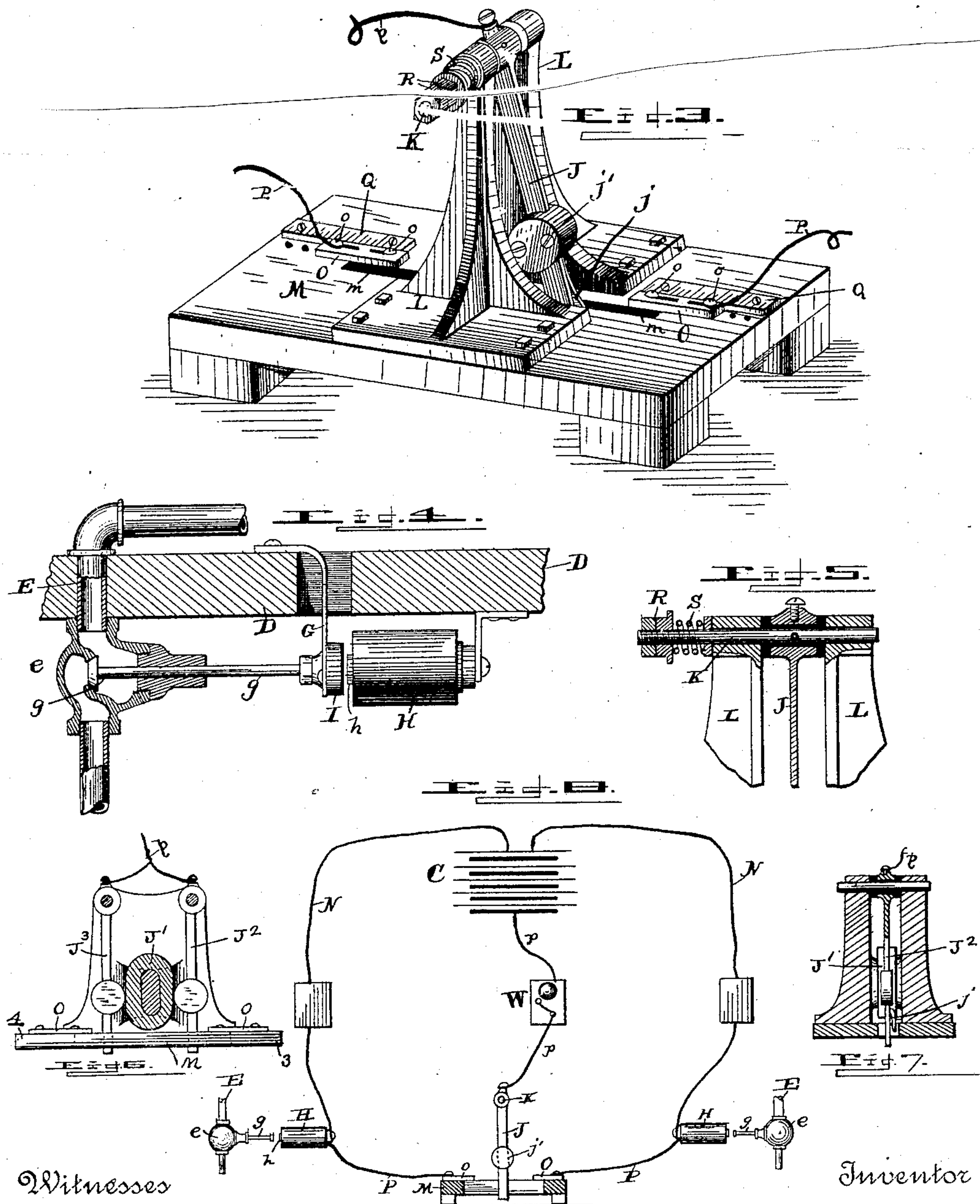
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UNITED STATES PATENT OFFICE.

JAMES BOLAN GLOVER, OF MARIETTA, GEORGIA, ASSIGNOR OF ONE-THIRD
TO JOHN MALLOCH, OF ELDERSLIE, SCOTLAND.

APPARATUS FOR DETECTING IRREGULARITIES IN RAILROAD-TRACKS.

SPECIFICATION forming part of Letters Patent No. 433,167, dated July 29, 1890.

Application filed April 14, 1890. Serial No. 347,782. (No model.)

To all whom it may concern:

Be it known that I, JAMES BOLAN GLOVER, of Marietta, in the county of Cobb and State of Georgia, have invented certain new and
5 useful Improvements in Apparatus for Detecting and Marking Transverse Irregularities in Railroad-Tracks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had
10 to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification, in which—

Figure 1 is a side elevation of a railway-car equipped with my improved devices for
15 ascertaining transverse irregularities of the road-bed or track and for marking defective portions of the track by ejecting colored fluid or other substance thereupon, so that
20 the attention of the track walkers and repairers will be directed thereto. Fig. 2 is a rear end view of the car shown in Fig. 1. Fig. 3 is a perspective view of one form of circuit maker and breaker. Fig. 4 is a detail view
25 of the valve-operating devices enlarged and partly in section. Fig. 5 is a detail sectional view of part of the circuit-maker. Fig. 6 is a side view of an improved form of circuit maker and breaker. Fig. 7 is a vertical transverse sectional view thereof. Fig. 8 is a diagrammatic view illustrating the electrical con-
30 nections of the apparatus.

This invention is an improvement in mechanical devices or apparatus for ascertain-
35 ing transverse irregularities in the road-bed or track of railways and for making a record of or for marking the defective portions of the track, and its special object is to detect transverse irregularities of the track or the
40 variations from a same horizontal plane of the two opposite rails of the track, and where the relative elevation of the two rails is so incorrect as to render the track rough or unsafe to automatically mark the defective portions
45 by ejecting a colored fluid or other substance upon the sleepers at the defective side of the track.

To these ends the invention consists in the combination, with pipes through which col-
50 ored fluid or matter from a proper receptacle can be discharged onto the sides of the road-

bed or ends of the sleepers, of electrically-controlled valves, which are operated automatically to regulate the discharge of fluid, so that it escapes only upon defective por-
55 tions of the track and at the defective side thereof.

The invention further consists in a novel circuit maker and breaker comprising pendulums or a pendulum so mounted as to only
60 vibrate in a plane at right angles and perpendicular to the track, but when oscillated beyond a certain predetermined extent will establish an electrical circuit between a bat-
65 tery and the electrically-controlled valves.

The invention also consists in certain other novel details of construction and arrangement of parts, and all of which will be hereinafter clearly described and claimed.

In the drawings, A designates an ordinary
70 car or four-wheeled truck, the body of which is preferably supported directly upon the axles without intervening of springs, so that it will sway laterally or oscillate with the vertical movements of the axles.

B designates a fluid-holding tank or reservoir mounted thereon.

C designates an electric battery or apparatus for generating currents of electricity, which, as shown, is suspended in a boxing
80 below the car-body.

D designates a horizontal bar suspended from the rear end of the truck and lying transversely of the track, and E designates
85 jet-pipes attached to the outer ends of said bar and communicating by suitable piping F with the tank B, the escape of fluid from the tank being controlled by a valve *f*.

ee are valves in jet-pipes E, of ordinary construction, as shown. They are globe-valves
90 having a conical seat closed by a conical valve on the end of a horizontal stem *g*, the outer end of which is connected to the end of a spring G, attached to bar D, and which forces the stem inward to close the valve. Any other
95 desirable arrangement of springs might be used for closing the valves.

H H designate electro-magnets of ordinary construction respectively suspended from bar D near the valves *ee*, and with their poles *h*
100 adjoining the ends of the valve-stems *g*, and I I are armatures fixed on the ends of stems

g, which are drawn to the poles of the magnets when the latter are energized and consequently pull stems *g* outward and unseat the valves so long as the magnets are energized.

5 The magnets *H* are connected by wires *NN* with the negative pole of the battery *C*, as indicated, and by wires *p p* with a circuit making and breaking device, which is in electrical communication by a wire *P* with the
10 positive pole of the battery and by which an electrical circuit can be established from the battery through either magnet *H*.

The circuit maker and breaker, as shown in Fig. 3, consists of a pendulum or vibrating
15 bar *J*, suspended on a short shaft *K*, journaled in bearings in upper ends of two opposite brackets *LL*, mounted on a base-piece *M*, preferably made of non-conducting material and having a longitudinal slot *m* in it, through
20 which the end of pendulum *J* depends and moves, and at opposite ends of said slot and at one side thereof are metallic pieces *OO*, with which pendulum *J* will contact if sufficiently vibrated. The pendulum *J* is con-
25 nected by wire *P* with the battery *C*, and pieces *O* are respectively connected by wires *p p* with the armatures *H*, so that if the pendulum contacts with either plate an electrical circuit is established through the armature
30 and battery so long as the contact between the pendulum and plate continues. The pendulum is preferably suspended in insulated bearings, so that there is no electrical communication between it and the brackets,
35 and its shaft *K* is extended through one of the bearings and has a coiled spring *S* slipped on it and retained by washers and nuts *R* on the threaded end of shaft *K*, as shown. This spring acts to pull the shaft outward and
40 cause pendulum *J* to bind in its bearings, so that it does not vibrate too freely, and nuts *R* permit the tension of the springs to be regulated.

The circuit maker and breaker shown in
45 Figs. 6 and 7 has two pendulums, and I consider this form preferable to the single pendulum, as it overcomes one difficulty attending the employment of a single pendulum—namely, the momentum of the pendulum after
50 passing over a defective portion of the track and bringing the pendulum to rest after it has made one vibration, which is sufficient to operate the valve-controlling devices and spill the fluid.

55 As shown in Figs. 6 and 7, I use two pendulums *J² J³*—one for each side of the track. These two pendulums swing side by side, and are prevented from striking together by means of an impact-cushion *J'*, which is secured be-
60 tween the brackets and preferably covered with a yielding non-resilient material, or the cushion may be fastened to the base-plate and made of material suitable for absorbing any impact.

65 Referring to Fig. 6, if the side marked 3 should be suddenly lowered, the pendulum *J²* would swing out, make the electrical cir-

cuit, spill the colored liquid, and then return to its original position, striking against and giving up its momentum to the cushion *J'*, so
70 that it is immediately brought to rest instead of making two or three unnecessary vibrations. In the same way the pendulum *J³* will make one vibration if the side 4 be lowered, the pendulum *J²* in the meantime remaining
75 at rest.

j is a metallic spring or brush on the lower end of pendulum *J* and adapted to make contact with plates *O*, and *j'* is a weight adjustably
80 attached to pendulum *J* to regulate its oscillation. Plates *OO* are adjustably attached to base *M* by screws *o*, which pass through slots in plates *O* and engage threaded openings in the base, and thus permit the plates to be set to-
85 ward or from each other, so that a less or greater oscillation of the pendulum will be necessary to establish a circuit, as described.

Q Q are index-plates attached to the base beside plates *A* and having a linear scale on their faces, by which the position of plates *O*
90 relatively to the pendulum, when the latter hangs vertical in relation to the length of the base, is regulated.

The circuit maker and breaker is mounted on the front end of the car with the slot in
95 base *M* transverse thereto, and so that the pendulum will hang in exactly vertical position when the car is on a level piece of track—*i. e.*, where both rails of the track are in the same horizontal plane. The pendulum thus
100 has to swing transversely and vertically to the road-bed and track.

The operation is briefly as follows: The apparatus mounted on the car is carried over
105 the road at a fixed and uniform rate of speed. Owing to the mounting of the pendulum it can only swing in a plane perpendicular to and transversely of the track. Experiment has determined the fact that when so ar-
110 ranged the pendulum or pendulums will remain at rest and perpendicular to the plane of the track so long as the latter is mathematically and practically correct for the speed at which the car is moving, even when rounding
115 curves. When, however, one side or the other of the car is elevated or depressed by irregularities in the track-rails, one pendulum moves by gravity toward the lower side of the car, and if the irregularity of the track-rails is so
120 great as to cause the pendulum to move into contact with one of the plates *O* an electric circuit is established from the battery through one of the electro-magnets, which, as de-
125 scribed, causes the opening of a valve in a pipe leading from the fluid-reservoir on the car, and permits the escape of fluid upon the ends of the cross-ties at that side of the track which is too low. As soon as the pendulum moves back into a vertical position the circuit is broken and the flow of liquid ceases,
130 as the valve is closed by counteracting springs or the action of the escaping fluid there-against.

In practice I do not propose mounting the

apparatus on a separate car, as it can be attached to any ordinary cab or to a road-master's inspection-car preferably, the tank, circuit-maker, valves, and battery being placed where convenient, and connections being made by properly leading the wires, the position of the parts not being material, provided the connections are substantially made, as in diagram Fig. 8, and that the circuit-maker be in advance of the discharge-pipes, as otherwise the motion of the train would cause the valves to pass beyond the proper place to be marked before the fluid would reach the ties.

When attached to an ordinary car, the circuit maker and breaker should be mounted on some portion of the truck, between which and the track there are no springs, or where it will be oscillated by the vibration or oscillation of the axles only. In order to expedite the flow of marking-fluid, the tank may be connected with the air-brake pipes to maintain an air-pressure therein. In some cases the contact maker and breaker might be mounted on a truck or car in advance of that which carries the tank and pipes, if the connections be maintained. An alarm W may be placed in the circuit, so that the operator on the car will know whenever the valves are opened and fluid being ejected, and recording devices of any suitable construction might be interposed between the magnets and battery to indicate the irregularities in the respective lines of rails. Pieces O O being adjustable, it is possible to mark places of only such irregularity as may be determined upon before starting the apparatus over the road. The marks left by the fluid being ejected upon the road-bed are for the information of the trackmen, so that they will work at just those places which most need attention.

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

1. In an apparatus for detecting irregularities in the relative elevations of the rails of a railroad-track, the combination, with a car, of fluid-discharge pipes provided with electrically controlled or operated valves, an electric generator, and a circuit maker and breaker constructed to operate upon the oscillation of the car to control the circuit, and the wire connections between the same, and generator and valves, arranged to operate substantially as specified.

2. A reservoir mounted upon a car or truck and discharge-pipes leading therefrom to opposite sides of the car and provided with electrically-controlled valves, and an electric generator mounted on the car, in combination with a pendulum mounted on a car or truck, so that it must vibrate in a plane transverse to the track or road-bed, and adapted to establish electrical communication through wires leading from the generator to the respective valve-controlling de-

vices when vibrated to predetermined points, substantially as and for the purpose specified.

3. The combination of a reservoir mounted on a car, discharge-pipes leading therefrom to each side of the car and provided with valves having armatures on the ends of their stems, with electro-magnets for controlling said valves, an electric generator and wire connections between the same and magnets, and a circuit maker and breaker constructed to be operated upon the oscillation of the car to control the circuit interposed in the circuits between magnets and generator and adapted to operate substantially as described.

4. The combination of the discharge-pipes having valves and devices for operating the valves by electricity, and an electric generator, with a circuit maker and breaker comprising vibrating pendulums in electrical communication with the generator, and contact-plates connected by wires with the valve-controlling devices, and the wire connections between said devices and the generator, whereby when a pendulum oscillates into contact with one of the plates an electrical circuit is completed between the generator and one of the valve-controlling devices and such valve opened, substantially as described.

5. A circuit maker and breaker consisting of a vertically-suspended oscillating pendulum connected with a generator of electricity, a pair of adjustable contact-plates at opposite sides of the pendulum, and the tension-spring and adjusting-nuts, substantially as described, for controlling the vibrations of the pendulum, for the purpose set forth.

6. The combination of the reservoir, the discharge-pipes, the valves therein, and the electro-magnets for operating said valves, with an electric generator, the wires connecting the same with the magnets, a circuit maker and breaker comprising pendulums mounted to vibrate in a plane vertical and transverse to the track or road-bed, and opposite plates adapted to be contacted by a pendulum when vibrated unduly, and the wire connections between the pendulums and generator and between said plates and magnets, all substantially as specified.

7. The combination, with a car, of the reservoir, the discharge-pipes, the electrically-controlled valves in said pipes, an electric generator, a circuit maker and breaker constructed to operate upon the oscillation of the car, the connections between said generator and valve-operating devices and circuit maker and breaker and between the latter and the valve-operating devices, and an electrical indicator interposed in the circuit, whereby when the electrical circuit is closed one or the other of the valves is opened and the indicator operated also, substantially as described.

8. In a circuit maker and breaker, the combination of the vertical uprights and oscillating pendulums suspended between the uprights and in electrical communication with

a generator, with the impact-cushion, and adjustable contact-plates, all substantially as set forth.

5 9. The herein-described apparatus for detecting irregularities in the elevation of the opposite rails of a railroad-track, comprising a fluid-reservoir mounted on a car and having pipes leading to each side thereof, valves in said pipes having armatures on their stems
10 and springs for closing them, the electro-magnets arranged near the valves and adapted to attract the armatures and open the valves when energized, and an electric generator and connections between the same and mag-
15 nets, with a suspended pendulum having an

electrical connection with the generator and mounted upon a car or truck so that it must oscillate in a plane vertical and transverse to the track or road-bed, the adjustable contact-plates, and the wire connections between the respective plates and magnets, all constructed and arranged to operate substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JAMES BOLAN GLOVER.

Witnesses:

W. B. BRADLEY,
C. B. LACKES.