(No Model.) 3 Sheets—Sheet 1.

B. C. VANDUZEN.

PNEUMATIC SIGNAL FOR RAILROAD CROSSINGS.

No. 342,720. Patented May 25, 1886.

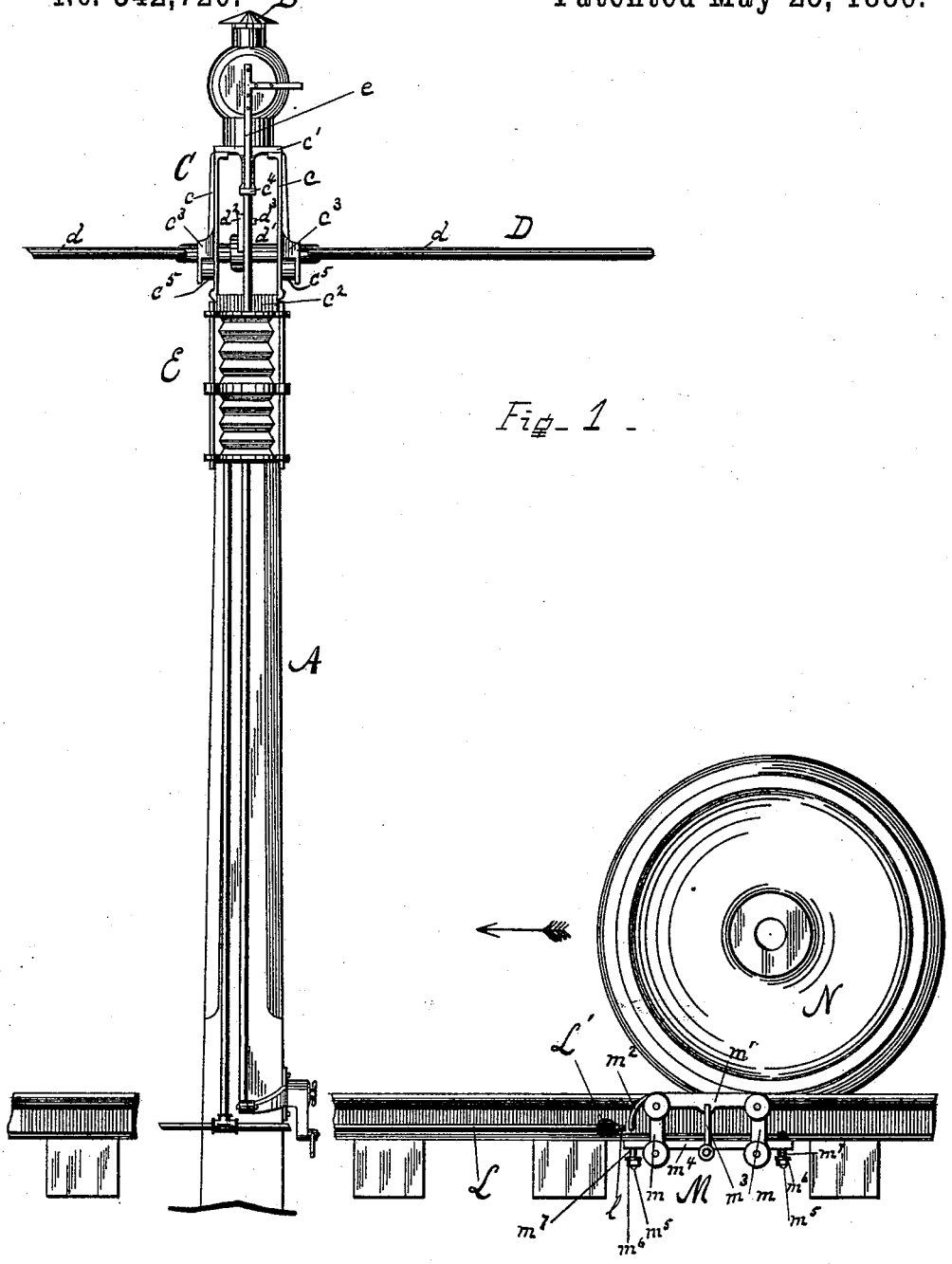

Fig. 1.

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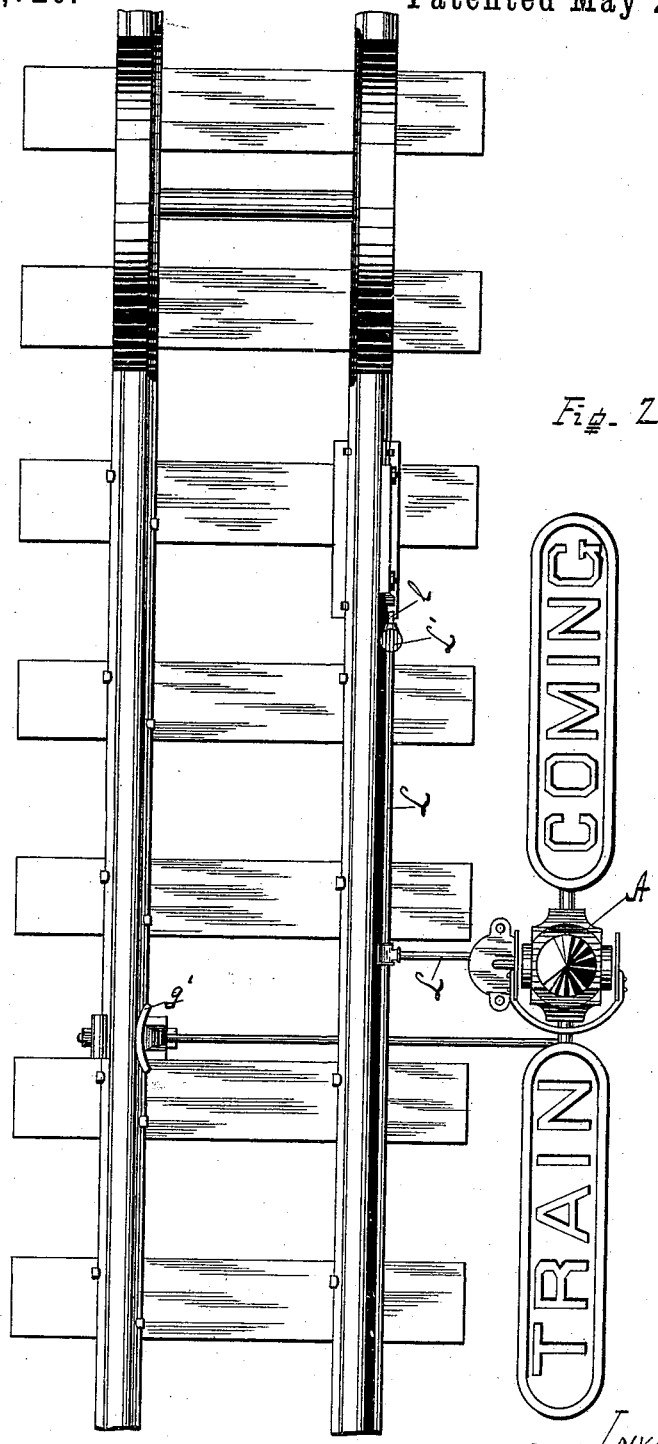

Fig. 2.

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3 Sheets—Sheet 3.

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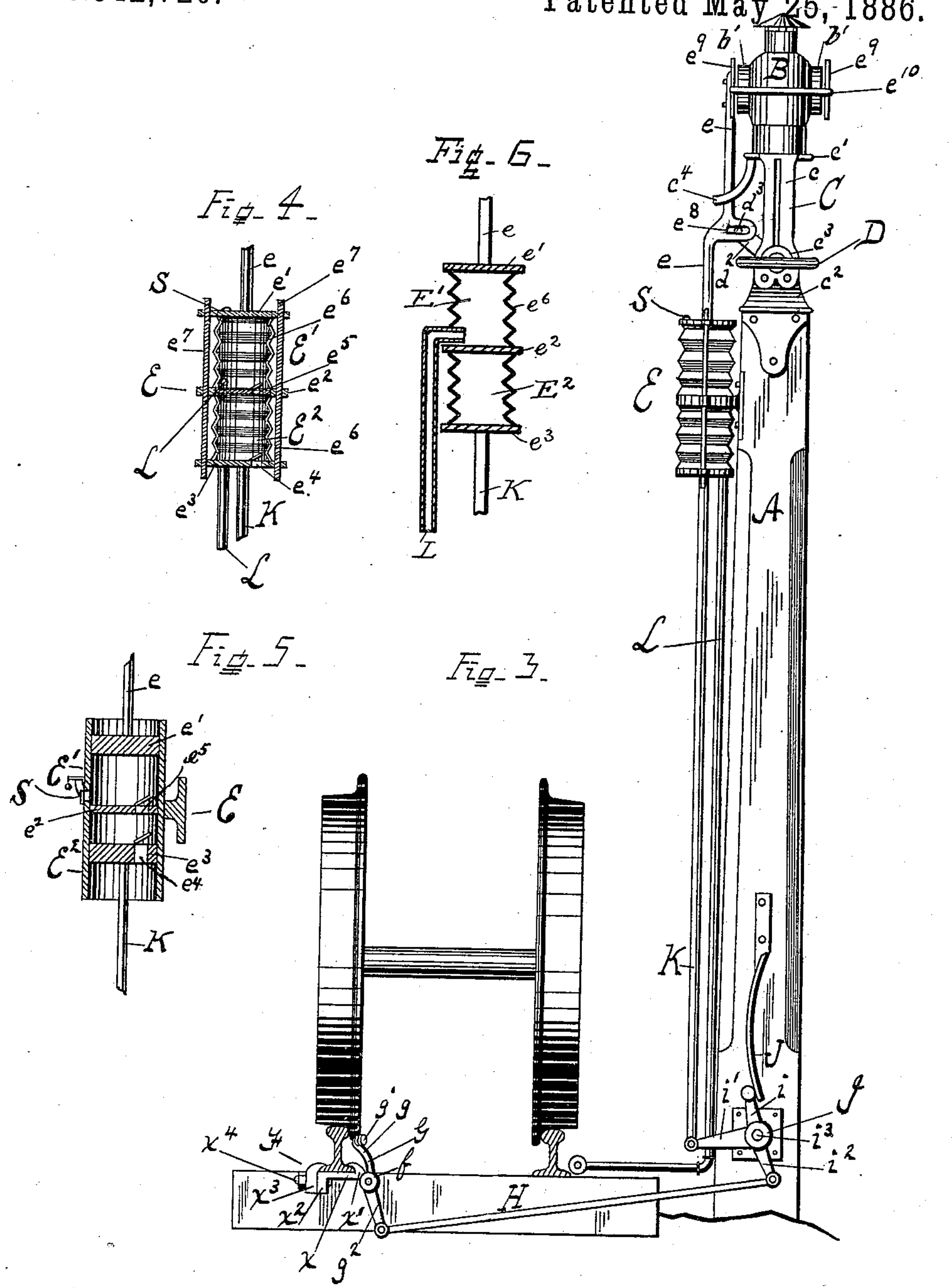

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UNITED STATES PATENT OFFICE.

BENJAMIN C. VANDUZEN, OF WINTON PLACE, OHIO.

PNEUMATIC SIGNAL FOR RAILROAD-CROSSINGS.

SPECIFICATION forming part of Letters Patent No. 342,720, dated May 25, 1886.

Application filed July 28, 1884. Serial No. 138,983. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN C. VANDUZEN, a resident of the town of Winton Place, in Hamilton county and State of Ohio, have invented certain new and useful Improvements in Pneumatic Signals for Railroad-Crossings, of which the following is a specification.

The dangers of railroad-crossings, whether of two railroads crossing one another, or of a railroad crossing a walk for pedestrians, or a road for vehicles drawn by horses, &c., are too well known to need comment. It has long been customary to put up warning-signs at these crossings, but as these signs are permanent they only serve to call attention to the existence of the crossing at the point where they are located, a fact usually well known to the majority of those who have to travel over the crossing. For the important purpose of notifying vehicles and persons of the approach of a train they are useless.

My invention relates to that class of signals which are displayed through the agency of the approaching railroad engine, car, or train.

It has been one of the objects of one feature of my invention to provide an apparatus which, as a train approaches and before it reaches the crossing, will give timely notice of its coming by exhibiting a sign bearing an appropriate warning, and which sign at other times is not displayed. The means whereby the signal is obscured or moved so as not to display a warning when a train is not approaching, are such as enable the train, after having passed the crossing and while departing, to obscure the signal, or cause it to be no longer displayed. These means are also of my invention.

The several features of my invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description.

In the accompanying drawings, Figure 1, Sheet 1, represents a side view of a device illustrating my invention, the sign being hidden and not in view. Fig. 2, Sheet 2, is a plan view of the same device. Fig. 3, Sheet 3, may (with reference to the railroad) be termed an "end view," the view being taken from that end of the track which is at the bottom of Fig. 2, and looking toward that end of the track which is at the top of said Fig. 2, that part of the device for exhibiting the danger-signal which the wheel of the railroad-vehicle acts directly upon being omitted for purposes of perspicuity. Fig. 4, Sheet 3, represents a vertical central section of the pump, taken in a plane at right angles to the length of the track. Fig. 5, Sheet 3, represents another of the various forms in which the pump may be constructed. Fig. 6 is a vertical central section of the device shown in Fig. 4, said section being taken through the pipe L.

By the side of the railroad-track, at a point clearly visible from the crossing road, whether it be a railroad, or a road for vehicles, or a walk for pedestrians, a post, A, is erected. The upper portion of the post is preferably an open frame, C, supporting the sign-board D. The frame C is preferably made of metal, and consists of two sides, c, and a bottom, c^2, and top c', suitably secured together. The bottom c^2 rests upon the top of the post A, which latter may be either of wood or metal. From each of the sides c of the frame a lug, c^3, projects, forming the external support for two rollers, c^5, whose internal support is found in the side c. The upper portion of the rod e is provided with a suitable guide for preventing it moving laterally, and at the same time allowing it to play in the direction of its length. A preferred guide for this purpose is an arm, c^4, which is supported by and projects outwardly from the top of frame C, the upper portion of the rod e passing through said arm.

The sign-board D is preferably as shown—viz., in two lateral balanced halves, d d, connected by a round axle, d', which latter rests upon the four rollers c^5, journaled in the frame C. These rollers are one of the various desirable non-frictional descriptions of journal-bearings which may be employed. The round axle d' turns readily upon these rollers. Other forms of journal-bearings suitably supported may, when desired, be substituted for the rollers. From the axle d' an arm, d^2, projects inwardly. It bears upon its extremity a laterally-projecting pin, d^3, which fits into the slot e^3 of the rod e.

In Fig. 3 is shown a lever, G, having a broad curved head, g', which latter rests against the side of the rail or in close proximity there-

to. In Fig. 2 the top of this curved head is shown. The lever G is pivoted to a suitable support, a preferred kind of such support being a fish-plate, F, which grasps a rail, and has pivoted in its projecting lug f the lever G.

The preferred form of fish-plate is that shown, and consists as follows: x indicates a plate having a hook, x', at one end and a downwardly-extending flange, x^2, at the other end. x^3 indicates a hook whose shank is secured to the flange x^2 by a screw or bolt and nut, x^4, or other suitable clamping device. The lower portion or base of the rail is between these hooks, and the latter are caused to firmly embrace the said base of the rail by means of said screw or bolt and nut, or other clamping device. The lower arm, g^2, of lever G is attached to arm i^2 by means of the connecting-rod H, this connecting-rod being pivoted at one end to arm g^2, and at the other end to arm i^2 of triple-lever I. This rail, which the fish-plate F grasps, is preferably the one farther from the post, for the reason that then, when the lever G is operated by the flange of the wheel of the track-vehicle, the said lever will always pull on the rod H, and thereby avoid the chance of deflecting the latter, as would be the case where said fish-plate grasps the rail nearer to the post. Where the fish-plate grasps the rail nearest to the post, it will be desirable to modify one or more of the levers as to shape and number, or both shape and number, in order to still enable the lever G, when operating the rod H, to pull upon the latter instead of pushing upon it. This triple lever I is fulcrumed at the side of the post A on a pivot-fulcrum, i^3, the latter being suitably supported by the post, as shown. The triple lever I is provided with three arms, i i' i^2. Against the arm i a suitable spring—as, for example, spring J—presses and tends to throw said arm inwardly—that is, toward the track. From the end of the third arm, i', a rod, K, whose lower end is pivoted to said arm i', passes upwardly to the bottom of the pump or bellows E, and is secured to the bottom of the latter. The pump or bellows E has two compartments, E' and E², separated by the diaphragm e^2. The diaphragm e^2 is suitably upheld, preferably as shown, being rigidly secured to the post A, and is the preferred means for holding the pump in position. The upper compartment, E', of the bellows consists of a top, e', and the diaphragm e^2 for a base, connected by some flexible material—as, for example, leather—e^6. The compartment E² has the diaphragm e^2 for its top and e^3 for its bottom, the sides being made of flexible material e^4. There is a valve, e^4, in the bottom e^3, and a valve, e^5, in the diaphragm e^2, both opening upwardly. Guide-rods e^7, or other suitable guides, guide the movements of the top e' and bottom e^3, and compel the said movements to be made in the direction of the length of the bellows. Entering into the compartment E' is a pipe, L, which latter will be more fully described hereinafter. From the top e' of compartment E' a rod, e, projects upwardly, passing, as aforementioned, through the arm c^4 as a guide. The rod e is provided with a slot, e^8, already described.

When it is desired to display at night a warning-signal, a warning-lantern is provided, preferably supported on the frame C, and provided with a glass or glasses, b b, preferably of the bull's-eye pattern. This glass or glasses are of a color which, on the railroad on which they are used, indicate "danger." This color is usually red. As a convenient means of obscuring and uncovering the danger-glasses of the lantern, the rod e carries at the top two blinds, e^9, one of which is connected to it by rod e^{10}. These blinds e^9 cover over the bull's-eyes b, and expose them to view only when the train is approaching, as will be explained further on. The pipe L passes downward along the post A, and then along the track a distance sufficiently far from the post A and crossing to enable the person or vehicle about to cross the track to receive warning of the coming train in time to desist from crossing the railroad. This pipe L terminates in the valve L', which is opened by pressure on a tappet, preferably such as the tappet l. The valve L' closes itself automatically by a suitable spring when the pressure is removed.

A device for enabling this valve L' to be operated by the coming train, railroad engine or car is to be employed, and a preferred form of such device is as follows: Near the end of the pipe L is placed a device, M, preferably consisting of uprights m m, pivoted to horizontal rod m', and plate or piece m^4, the latter being securely fastened by suitable connections to the rail. A tappet, m^2, projects from the device M toward the tappet l, and is preferably secured to the upper horizontal rod, m', and is present for opening the valve L' when the device M is moved in its direction. A suitable spring, m^3, serves to keep the device M upright, and to restore it to its upright position after it has been moved by the vehicle-wheel on the rail. The upper part—namely, the top of rod m' of the device M—projects slightly above the top surface of the rail, and the side of the rod m' lies close up to said rail. The tread of a car-wheel on the rail projects beyond the outside edge of the top of the rail and forces the rod m' forward in the direction in which the arrow points in Fig. 1, and the rod m' in moving forward carries the tappet m^2 against the tappet l, and drives back the latter, by which time the rod m' is as low as the surface of the rail.

To better understand the operation of the apparatus, let us suppose it to be in the position shown in the drawings—that is, the compartment E' is full and the sign-board turned laterally. A train coming reaches the device M several minutes before it reaches the crossing, the time depending upon its rate of speed and the distance at which the device M is placed from the crossing. In the manner al-

ready explained, the first wheel of the train opens the valve L′, and permits the air in the pipe L and compartment E′ to rush out, said air passing out of compartment E′ through pipe L, and thence out of valve L′, said air being forced out by the weight of the structures bearing on the top e'. In this way the arm d^2 is depressed, and the sign-board D is changed instantly from a horizontal to a vertical position, and shows the notice "Train Coming" to any one who may be approaching on the cross-road. At the same time the blinds e^9 are drawn downward, exposing the lights of the lantern, so that either by day or night the warning is given. After the train has reached the crossing, of course no further warning is necessary, and at that time the operation of returning the sign-board D to its horizontal position commences. The flange of one of the first pair of wheels passes between the curved head g' and the edge of the rail, and throws the arm g from the track. This movement, communicated through the levers and arms already described, elevates the bottom e^3 of the compartment E^2 of the bellows, thus forcing some of the air in compartment E^2 through valve e^5 into compartment E′. As soon as the first wheel has passed, the spring J again forces the arm g against the rail, draws down the rod K, and with it the bottom e^3 of the bellows, forcing air to enter the compartment E^2 through the valve e^4. The impingement of the next wheel repeats the operation of the first, and the compartment E′ is pumped full of air, the rod e with its attachments raised, bringing the sign-board D into its horizontal position, and elevating the blinds e^9 over the bull's-eyes or lights b. The signal then indicates no warning, and thus indicates that the crossing is clear, and the signal is ready for the next train.

In order to avoid any chance of the bellows being burst by being pumped too full of air by the repeated pumping into them of air by succeeding wheels of a track-vehicle or train, I provide a safety-valve of a suitable description, preferably such a one as shown in Figs. 3 and 4, consisting of a weighted valve, S, pivoted at one side to the top of piece e' and covering an opening through piece e' into compartment E′. It is easily seen that the pipe L may be made to run in both directions along the track, so that trains coming either way may be signaled, and I propose, where there is travel over one track in opposite directions, to locate by the track one device, as M, with a pipe, L, valve L′, and tappet l at one side of the crossing and at a suitable distance therefrom, and another device, as M, with its pipe L, valve L′, and tappet l at the other side of the crossing and at a suitable distance therefrom. In case of a double track, and travel on one in one direction and travel on the other in an opposite direction, each track would have a device M and valve L′, and tappet, &c., and a pipe, L, and on one track one set of these would be located at one side of the crossing at a distance therefrom, and on the other track another set of these would be located on the other side of the crossing and at a distance therefrom. The pipes L, immediately connected with their respective valves L′, are connected to the vertical pipe L at or in the neighborhood of the post. If the head g' is at both ends curved away from the adjacent rail, a train or car or engine moving along on the track in either direction will cause it to perform the function of pumping air into the bellows and of obscuring the signal or causing the latter to no longer exhibit a notice of danger, and thus one such head g' and its connection will be sufficient for one track on which there is travel in both directions; but where there are two tracks two heads g' and connections with lever or rod K must be present. Should the device M for any reason refuse to move when a wheel impinges against it, I provide a suitable device to prevent its being crushed by the weight of said wheel passing onto it. A preferred form of such device consists in providing the fish or other plate which is connected to the rail and supports the device M, with yielding connections between the plate m^4 and its supports. For example, through each end of the plate m^4 are vertical guide-rods m^5, which allow the plate m^4 vertical play. These guide-rods m^5 are suitably supported, preferably by being bolted or otherwise secured onto the bottom of the rail. On each rod m^5, and between the lower ends, which are provided with a nut or head, m^6, is a spring, m^7, of rubber or metal, preferably a rubber washer, surrounding its rod m^5. On these springs m^7 the plate m^4 rests, and when the device M refuses to be moved forward or backward upon the impingement of the wheel and the wheel mounts rod m', the device M will yield downwardly, compress the springs m^7, and allow the wheel to pass over the device without in anywise injuring it.

For the words "Train Coming" on the board sign, any other word or words, or device, sign, symbol, or character, or word or words combined therewith, as shall give notice of the approach of an engine, car, or train, or that it is dangerous to cross while the signal is displayed, may be employed.

While the bellows described are the preferable form of pump, any other suitable description of pump can be used. Also, instead of a bellows, as E, a pump or pump and bellows can be employed. Thus, in Fig. 5, the walls of compartments E′ and the walls of compartment E^2 are rigid, and in compartment E^2 the end of rod K is connected to a piston, e^3, which carries a valve, e^4, and in compartment E′ the rod e carries a piston, e'. This compartment E′ furthermore has a safety-valve, S, suitably located, preferably placed at the side of the said compartment, as shown. The diaphragm e^2 contains the valve e^5, as heretofore mentioned. When desired, the lower compartment, E^2, may be provided with rigid walls and constructed substantially as shown in Fig. 5,

and the compartment E′ may be made with flexible walls and constructed substantially as shown in Fig. 4; or, when preferred, the compartment E^2 may have flexible walls and be constructed substantially as shown in Fig. 4, and the compartment E′ have rigid walls and be constructed substantially as shown in Fig. 5.

Among the various advantages resulting from the employment of my invention are the following: The signal and the devices for operating it are simple, inexpensive, and not liable to get out of order. The signal is automatic in the sense that it is operated by the approach of the wheels of an approaching engine, car, or train, and operates altogether independent of human agency, and consequently will not fail to act because of the inefficiency or forgetfulness of a track or station hand, as is sometimes the case where the moving of the signal depends upon the action of a person stationed at the crossing for the purpose of actuating it. Furthermore, should the bellows or pipes leak or get out of order in any way, the danger-signal will be exhibited, and thus the signal device will operate to warn, even though it be thus out of order.

While the various portions of my invention are preferably employed together, one or more of said features may be employed without the remainder. In so far as applicable, one or more of said features may be employed in connection with signals and devices for their operation other than those herein specifically described.

What I claim as new and of my invention, and desire to secure by Letters Patent, is—

1. The combination of device M, valve L′, and pipe L, compartment E^2 of pump-signal, and connecting means for enabling the said pump to display the signal, substantially as and for the purposes specified.

2. The combination of pivoted signal-board D and the lever d^2, pin d^3, rod e, receiving said pin d^3, and pneumatic means for reciprocating the rod e through the agency of a passing railroad vehicle or train, substantially as and for the purposes specified.

3. The combination of pivoted signal-board D and lever d^2, rod e, connected to said lever d^2 and carrying the blinds e^3 and lantern, and pneumatic means for operating lever e through the agency of the wheels of a passing railroad vehicle or train, substantially as and for the purposes specified.

4. The railroad sign-board in one position lying horizontal and presenting its edge or non-display sides to view, and journaled on bearings, and provided with lever d^2, having pin d^3 engaging the rod e, in combination with pneumatic means for operating lever e through the agency of a railroad vehicle or train, substantially as and for the purposes specified.

5. The combination of railroad-signal having two halves or pieces, d, united to a central journal, d', journaled upon the non-frictional rollers c^5, each pair of said rollers being supported and journaled in frame C, between a side, c, and the lug c^3, lever d^2, rod e, pump, and means for operating said pump through the agency of the approaching railroad vehicle or train, substantially as and for the purposes specified.

6. The device M, having oscillating uprights m, carrying rod m', spring m^3, and tappet m^2, in combination with valve L′, having tappet l, pipe L, pump, danger-signal, and mechanism for enabling the pump to operate the danger-signal, substantially as and for the purposes specified.

7. The device M, having base m^4, rod m', upright rods m, pivoted at one end to rod m^4, and at their upper end to rod m', spring m^3, and tappet m^2, in combination with valve L′, having tappet l, pipe L, compartment E′ of pump, rod e, lever d^2, and sign-board, substantially as and for the purposes specified.

8. The device M, having oscillatory uprights, rod m', spring m^3, base m^4, resting on the elastic washers or springs m^7, and tappet m^2, valve L′, with tappet l, and air-reservoir or compartment, in combination with mechanism for enabling the exhaustion of the air-reservoir to display the danger-signal, substantially as and for the purposes specified.

9. The curved head g', having lever G, connecting-rod H and rod K, lever intervening between rod K and rod H, and connecting the same, spring J, air-pump, and danger-signal, in combination with means for enabling said air-receiver to operate said danger-signal, substantially as and for the purposes specified.

10. The curved head g', having lever G, and fish-plate, connecting-rod H, and rod K, lever intervening between rod K and rod H and connecting the same, spring J, air-pump, and danger-signal, in combination with means for enabling said air-receiver to operate said danger-signal, substantially as and for the purposes specified.

11. The combination of curved head g', lying close to the inner side of the rail, lever G, pivoted at f, having arm g and arm g^2, rod H, connected pivotally at one end to the free end of lever g^2, triple lever I, pivoted at i^3 and having arm i^2 at its free end connected to the other end of rod H, arm i, having spring J in contact therewith, arm i^2, connected pivotally to rod K, pump, having compartments E′ and E^2, valves, rod e, and danger-signal, and means for enabling rod e to operate said signal, substantially as and for the purposes specified.

12. The combination of bellows or pump E, having compartments E′ and E^2, separated by stationary diaphragm or piece e^2, having valve e^5, the top e' of compartment E′ carrying rod e, and the bottom e^3 of the compartment E^2 having valve e^4, and connected to rod K, pipe L, opening into compartment E′, the upper portion of rod e connected by intervening mechanism with the danger-signal, and the rod K being connected by intervening mechanism with the curved head g', lying

close to the rail, and the pipe L connected to valve L′, with tappet and oscillatory device for operating the valve L′, substantially as and for the purposes specified.

13. The combination of bellows or pump E, having compartments E′ and E² separated by stationary diaphragm or piece e^2, having valve e^5, the top e' of compartment E′ having elastic or folding walls and carrying rod *e*, and the bottom e^3 of the compartment E² having valve e^4, and connected to rod K, pipe L, opening into compartment E′, the compartment E² having elastic or folding walls, the upper portion of rod *e* connected by intervening mechanism with the danger-signal, and the rod K being connected by intervening mechanism with the curved head g', lying close to the rail, and the pipe L connected to valve L′, with tappet and oscillatory device for operating the valve L′, substantially as and for the purposes specified.

14. The pivoted sign-board D, having lever d^2 and pin d^3, and the rod *e*, having slot e^8, receiving pin d^3, guide e^4, and blinds e^9, supported and moved by rod *e*, and lantern, the same being combined substantially as and for the purposes specified.

15. The combination of curved head g', bellows E, pipe L, valve L′, device M, rod *e*, lever d^2, pivoted sign-board and blinds, and lantern, substantially as and for the purposes specified.

16. The combination of head g', lever G, rod H, triple lever I, spring J, rod K, pump E, having compartments E′ E², valves e^4, e^5, and S, pipe L, valve L′, device M, rod *e*, lever d^2, pivoted sign-board and blinds, and lantern, substantially as and for the purposes specified.

17. The combination of fish-plate F, having plate or base *x*, provided with hook x' and flange x^2, and hook x^3, clamp or screw x^4, and lever G, carrying curved head g' and pivoted to said plate *x*, and danger-signal, pump, and connecting and operating mechanism between lever G and the pump, and also between the pump and the signal, substantially as and for the purposes specified.

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Witnesses:
JNO. W. STREHLI,
O. M. HILL.