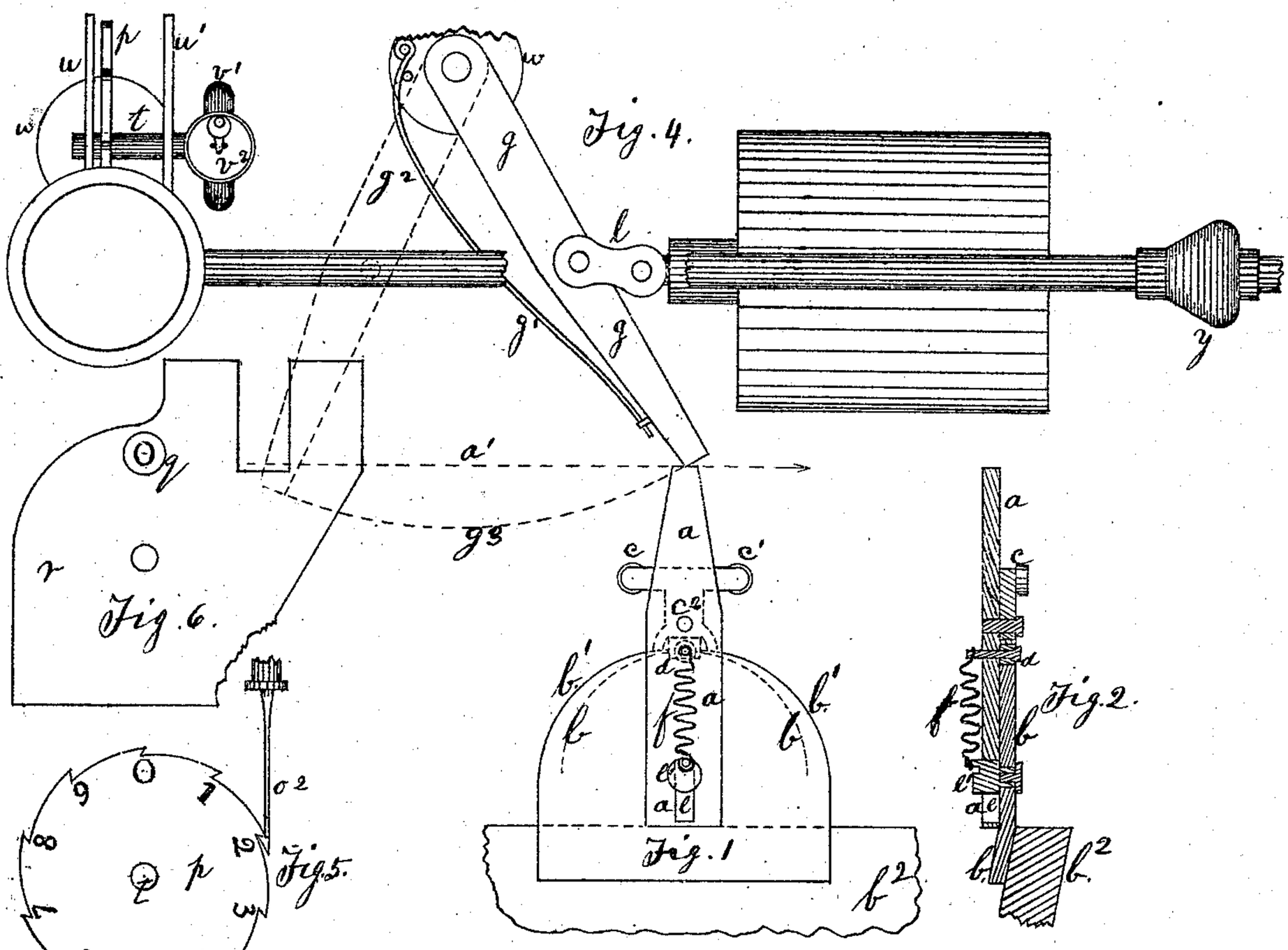
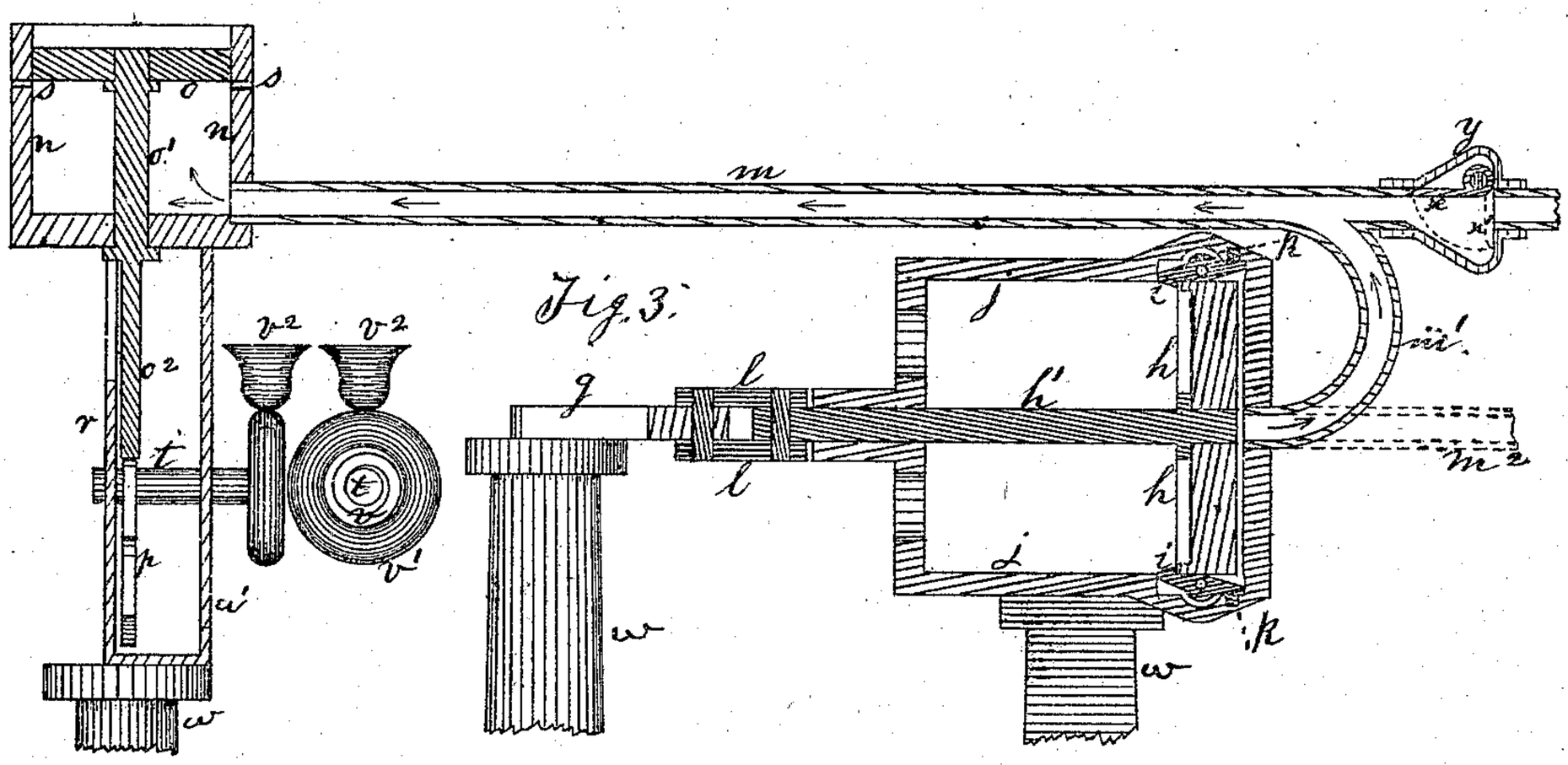
W. WICKERSHAM.

Railroad-Signals.

No, 143,483. Patented Oct. 7, 1873.





Witnesses
A. D. Parker
J. B. Richardson

Inventor
W. Wickersham

UNITED STATES PATENT OFFICE.

WILLIAM WICKERSHAM, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN RAILROAD-SIGNALS.

Specification forming part of Letters Patent No. **143,483**, dated October 7, 1873; application filed September 25, 1872.

To all whom it may concern:

Be it known that I, WILLIAM WICKERSHAM, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Signals for Railroads, of which the following is a specification:

The nature of my invention consists in a series of signal-stations placed along the road, at each of which is a cylinder for the condensation of air, which is operated by an arm extending out from the top of the car or locomotive-cab, (which arm is made to swing round out of the way when passing in at a door,) yet permanent when operating the signal. The air thus compressed is sent through a pipe to the first station, where, by raising a piston, it is made to operate an index-disk, which stands at zero when no train is on the signaled part of the road, but which exhibits figure 1 when the train has passed by the first station; also, brings into visible position figure 2 when the train has passed the second station. The figures 3, 4, 5, &c., to the end of the series, are in turn brought into view as the train progresses over the signaled part of the road, until, when the train has passed the whole series, zero again appears.

This index-disk is operated by a piston-rod, which is raised up by the compressed air formed by the cars as they arrive at each station, yet when it has done its work of presenting another figure to view the air escapes, allowing the piston to fall down ready for another like action.

There is a fly-wheel hung on a spring so as to vibrate similar to the balance-wheel of a watch, attached to the same shaft on which is fastened the index-disk. On this fly-wheel is a bell or flag-staff, to give notice by ringing a bell or waving a flag at railroad-crossings of the approach of a train, so as to avoid the unpleasant scream of the locomotive-whistle.

The first part of my invention relates to the connection between the train and the signal, or the device by which the signal is operated by the train; and consists of a lever so connected with a plate attached to a car or locomotive that when said locomotive is passing through a door the lever will be unlocked and swing round, thereby admitting the locomotive through the door; yet, when the said lever is operating the signal, it will remain locked and permanent and unyielding while doing its work.

The second feature of my invention relates to the manner of compressing air in a cylinder to operate the signal with; and consists of a lever connected with a piston in a cylinder which is moved by a lever or bar attached to the locomotive or car as the train moves along, thereby forcing the piston from one end to the other of the cylinder, and compressing the air therein.

The third feature of my invention relates to the combination of the cylinder No. 1, in which the air is compressed, and a cylinder, No. 2, at another station in the signaled part of the road, with the pipe for the air to pass between them; and consists of the connection of the cylinder in which the air is compressed with a cylinder at the beginning station of the signaled part of the road, and any other desirable station, by a pipe conveying the compressed air from one cylinder to the other, by means of which a piston is raised from one end of the second cylinder to the other end.

The fourth feature of my invention relates to a combination of the piston in the second cylinder and the index-disk, said disk having its edge in the form of a ratchet-gear, and numbers on its face, all covered, but one, at a time; and consists in constructing the piston-rod below the cylinder in the form of a hook, and so arranging it in connection with the index-disk that every time the cylinder is inflated with compressed air, and the piston thereby raised up, the hook on the lower end of the piston-rod will catch on one of the teeth in the edge of the index-disk and turn it round the distance of one tooth, by means of which a different figure on the face of the disk will be presented to view.

The fifth feature of my invention relates to a device by which the piston in the first cylinder is locked, after having compressed the air in the cylinder, and until the compressed air has done its work; and consists of small levers, with hooks on one end, and so arranged that when the piston shall have moved past the hooks the compressed air will force the

other end outward, causing the other ends having the hooks to move inward so far as to secure the piston in its place until the compressed air has done its work and been discharged.

The sixth feature of my invention relates to a device for giving notice at crossings that a train of cars is near at hand; and consists in arranging on the same shaft on which the index-disk is placed a spring, with a small fly-wheel outside of it, to make the motion imparted to the spring continue a sufficient length of time, and all so constructed and arranged that, when the index-disk is turned one tooth by the piston being raised up, it will give a vibratory motion to the spring and the fly-wheel, on which there is a bell or a flag placed to indicate to persons about to cross the road that a train is approaching.

Referring to the drawings, Figure 1 is a plan view of the device attached to the top of the cab or car to operate the signal. Fig. 2 is a vertical section of the same at right angles to the road. Fig. 3 is a vertical section, showing the compressing-cylinder and the receiving or working cylinder, and the pipe conveying the compressed air from the first to the second, showing the signal-bell, denoting at road-crossings an approaching train. Fig. 4 is a top view of the same. Fig. 5 is a side view of the index-disk with its figures, each of which, when at the upper side and visible, indicates the station in the signaled part of the road last passed by the cars. It also shows the lower portion of the piston-rod of the working-cylinder which operates the index-disk. Fig. 6 shows the cover for the index-disk, with a hole at the upper side, through which is seen the figure on the disk only which is in the upper portion. This cover forms also a part of the frame-work of the instrument.

a is the lever, fitted onto the plate *b* on the car-roof or cab b^2 of the locomotive. *c* c^1 are two ends of a lever, turning on its fulcrum or bearing at c^2, fixed in the lever *a*, and having its two feet resting on the outer edge of the plate *b*. There is a projection, *d*, on the under surface of the lever *a* about its middle, as shown in dotted lines in Fig. 1, which projection extends into a notch in the outer edge of the plate *b* in such manner as to hold the lever permanently in its position while this projection is in said notch. The inner end of the lever *a* has a slot, *e*, which is fitted movably into the head of a pin, *e'*, the lower part of said pin being fixed so that it will turn in the plate *b*. There is a spring, *f*, the outer end of which is attached to a pin in the lever *a*, and the inner end to the pin *e'*, the tendency of which is to draw the lever *a* toward the pin *e'*, and to hold the projection *d* in the notch in the edge of the plate *b*, as shown in Fig. 1; and all these parts are so constructed and arranged that, when the locomotive is moving along with the apparatus just described attached, and the outer end of the lever *a* as it moves along the dotted line *a'* strikes against the lever *g*, it will unyieldingly move said lever *g* around in the dotted line g^3 to its position seen in Fig. 4, thereby causing the piston *h* to move from one end of the cylinder *j* to the other, as seen in Fig. 3; yet when this same apparatus attached to the cab b^2 is passing into a door, one of the ends of the lever *c* will strike against the side of the door, the effect of which will be to move the lever *c* round, one of its feet resting on the edge of the plate *b*, and attached to the lever *a* at c^2, and thereby moving the lever *a* endwise, and raising the projection *d* out of its notch in the edge of the plate *b*, enabling said lever *a* to move round so as to clear the side of the doorway, while the locomotive is entering or going out of the door; but it will be seen that the plate *b* widens out somewhat beyond a circle around the pin *e'*, on which the lever hinges, indicated by the dotted line at *b b*. The purpose of this is to bring the lever *a*, when free, back to its first position by the force of the spring *f*, when its projection *d* will again be thrown into its notch in the plate *b* by the same spring force, as seen at Fig. 1. *i i* are two small levers, with hooks on their ends farthest from the end of the cylinder. They are hung and vibrate on pins at their centers, which pins are fastened into the cylinder. The opposite ends from the hooks are about even with the end of the cylinder *j*, and the inner surfaces are, when not working, even with the inner surface of the cylinder; but when the piston is forced to this end of the cylinder and gets past the hooks on these levers *i i*, then the compressed air forces the ends of said levers opposite the hooks outward and the hooks inward sufficient to catch and hold the piston in its position until the compressed air has done its work and been discharged. When this takes place the pressure on the inner surfaces of these levers ceases, and two small springs, *k k*, back of them throw them into their first position again, releasing the piston, which is moved again to its first position by the spring g^1 acting on the lever *g*, which is connected to the piston-rod *h'* by the links *l l*.

When the air is compressed in the cylinder *j j*, as before described, it is forced out through the pipes m^1 *m*, as the arrow-points in said pipes indicate, and passes back to the beginning station of the signaled part of the road into the cylinder *n n*, raising the piston *o* as high as it will go, as seen in Fig. 3, carrying the piston-rod o^1 and the lower extremity of it, o^2, (which is in the form of a hook,) up with it. This hook o^2 catches into one of the teeth in the edge of the index-disk, and thereby turns said disk around the distance of one tooth when the piston *o* is raised from its lower to its upper position, which brings another figure to its upper position, so that it can be seen through the hole *q* in the cover *r r*. When this work is accomplished the compressed air which raised the piston *o* escapes through small apertures at *s s* in the cylinder, and the piston *o* and its rod o^1, by their gravity, fall to the lowest position, the hook o^2 again catching another tooth,

in readiness to turn the index-disk another tooth and bring a higher number on the disk to a visible position when the cars have reached another station. Compressed air at that station again sends said air along this pipe *m*, and again inflates the cylinder *n n*. The index-disk is fastened onto a shaft, *t*, which turns in bearings in the plates *r w'*, which plates also serve as supports to the cylinder *n n*. On this shaft is fastened a spiral spring, *v*, the outer end of which is fastened to the rim of a fly-wheel, v^1, and on the outer edge of this fly-wheel is attached a bell, v^2. The purpose of this is to give notice at road-crossings that a train is approaching, a vibratory motion being given to the fly-wheel and the bell through the spring *v*, when the disk *p* and the shaft *t* are turned by the hook o^2, the different parts of my machine resting on supports *w w*.

As the purpose of my signal is to indicate, at the first of a series of signal-stations on the road, the time that the train is passing each station, it is necessary that the air compressed at each station in its compressing-cylinder *j j* should flow back to the first station through the pipe *m;* and, in order to prevent its flowing the other way, I have placed valves *x* in boxes *y* just forward of the compressing-cylinder at each station, and, if necessary, others are placed in the curved part m^1 leading from the cylinder to the conveying-pipe, to prevent air which is passing in the conveying-pipe from flowing into any of the cylinders which may be open on the way to the first station. The valve *x*, by its gravity, will fall to its position *x'*, as shown in Fig. 3 by the dotted lines. This valve *x* is so constructed and arranged that the current of air will raise it to its upper position, giving the air free passage through when flowing in the right direction—that is, toward the first station—as indicated by the arrow-points; but when the valve is left to the action of its weight it falls down, shutting the passage of air in the opposite direction.

Having described the different parts of my invention and their uses, I will explain the operation of the entire signal.

There may be any number of stations on the signaled part of the road; but I will assume that there are ten, at each of which is a condensing-cylinder, *j j*, in such position to the lever *a* as to be operated by it, as described, thereby sending a current of compressed air back to the first station through the pipe *m*. When the signaled part of the road is clear—that is, has no cars on it—the index-disk will show zero, (0,) as seen in Fig. 6. When a train passes by the first station air is compressed in the cylinder *j j* at that station, and sent along the pipe *m* to the cylinder *n n*, causing the piston *o* to rise up and the hook o^2 to turn the index-disk another tooth, which brings No. 1 opposite to the hole *q* in the cover *r*, and into a visible position. This work being done, the compressed air escapes through the openings *s s*, and the piston *o* and its hook o^2 fall to their lowest position, the hook being below another tooth on the edge of the index-disk *p*, so that another train approaching the first station would be able to see that there was a train ahead on the road between the first and the second stations; but this first train progresses on the road by the second signal-station, where, in like manner as before described, air is compressed in the cylinder *j j* at that station, and sent back to the cylinder *n n* at the first station, turning, as before described, the index-disk, and bringing No. 2 on the disk into a visible position, indicating thereby that the train has passed by the second station, and so on through the whole series of stations, the passage of the train by each signal-station in the series being indicated by the visible number, or the one at the upper position on the index-disk, zero always appearing when the train has passed by all the stations on the signaled part of the road.

In operating the bell-signals to notify the approach of the train at road-crossings the same kind of an apparatus may be used as shown in Fig. 3, except the cylinder *n n* should be ahead of the train instead of being back of it—that is, the pipe m^1, instead of curving round into the pipe *m* and extending to a station already passed by, should extend forward to a station not yet arrived at by the train, operating it in the direction of the dotted lines m^2 to the cylinder *n n;* and, in this way, when a train is approaching a crossing the bells at the crossing will give notice of its approach. A flag may be substituted for the bell; and as the fly-wheel v^1 vibrates a flag may be attached to it, and give the necessary notice by its movement.

The lever *a*, with the arrangement to unlock from the plate *b* and swing round by the ends of the lever *c c* coming against the sides of the door, is a necessity, as the lever *g* cannot approach near enough to the locomotive or cars to be operated by anything permanently fixed on the same, which will pass in and out of the doors when they are required daily to enter, as said lever *g* would strike the workmen, who are constantly liable to be on the freight-cars while in motion.

Having thus described my invention, I will state my claims as follows:

1. The combination of the lever *a* and the lever *c c*, constructed substantially in the manner described, so that the lever *a* will be unlocked from the plate *b* and swing around out of the way when passing through a door, and yet be permanent and fixed when pressure is made against its outer end, substantially as described, and for the purpose set forth.

2. The device for bringing the lever *a* to its central position after it has been moved around to one side, consisting of the inclined edges b^1 b^1 of the plate *b*, combined with the spring *f*, the bearing or pin *e'*, and the slot *e*, as and for the purpose set forth.

3. The levers *i i* with their springs *k k*, in combination with the piston *h*, as and for the purpose set forth.

4. In railroad-signals, the combination of the cylinder *n n*, piston-rod o^1, and hook o^2 with a ratchet-gear, constructed and arranged as described, so that the ratchet-gear will be turned on its axis the distance of one or more teeth each time the cylinder is inflated or filled with compressed air, as and for the purpose set forth.

5. The combination of the ratchet *p* and its shaft *t* with the fly-wheel v^1, having a bell attached thereto, or equivalent device, and its spring *v*, constructed and arranged substantially as described, and for the purpose set forth.

6. The openings *s s* in the cylinder *n n*, allowing the compressed air in said cylinder to escape for the purpose of enabling the piston, its rod, and the hook o^2 to fall to their lowest position, so that the said hook can take another notch in the ratchet-gear *p*, in readiness to raise it on the next inflation of the said cylinder, as and for the purpose set forth.

WILLIAM WICKERSHAM.

Witnesses:
A. D. PARKER,
J. B. RICHARDSON.