(No Model.)

W. C. BECKWITH.

RAILROAD SIGNAL.

No. 299,101. Patented May 27, 1884.

Fig. 1.

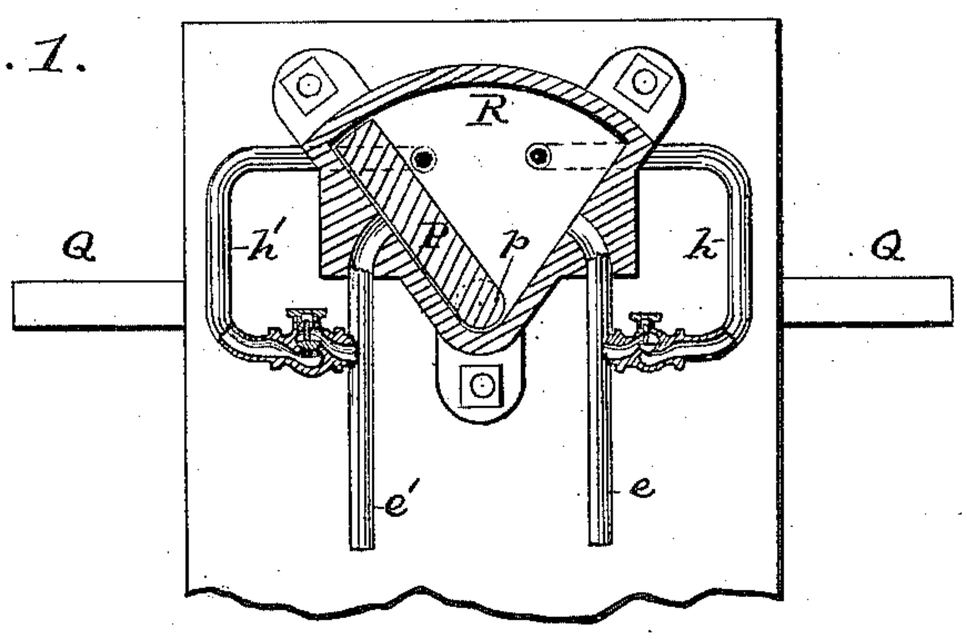


Fig. 2.

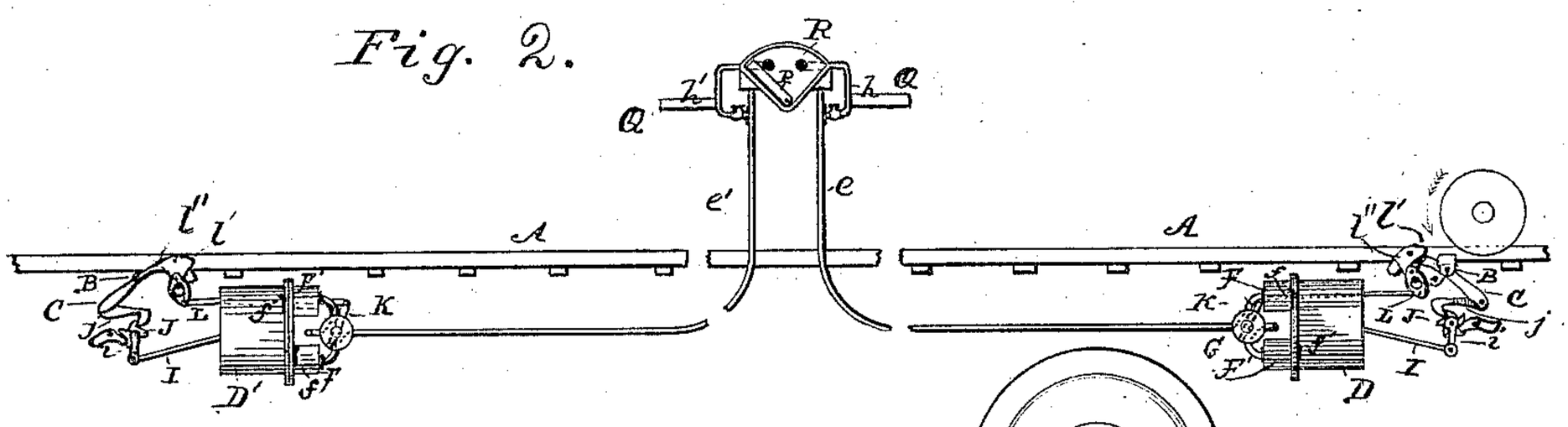
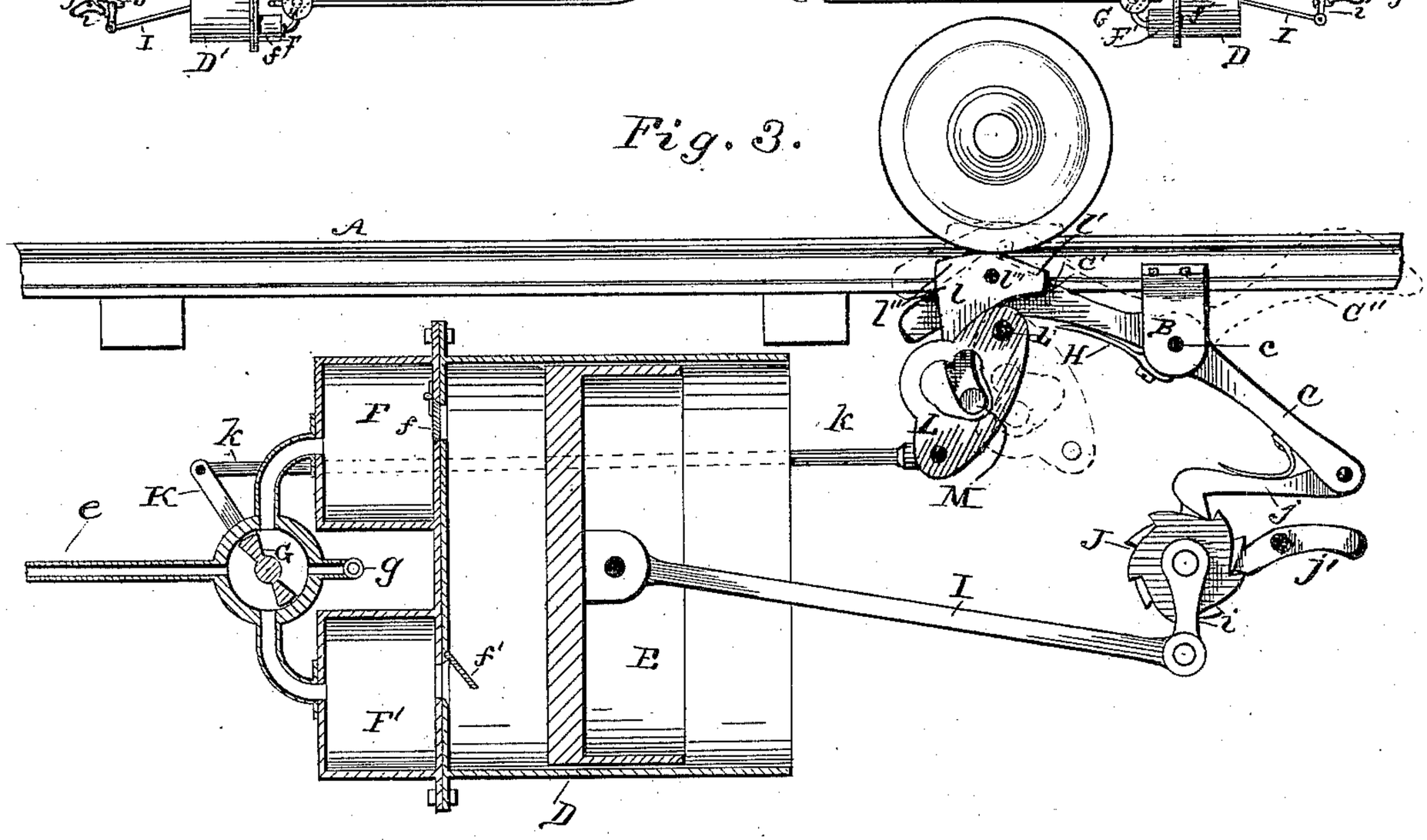


Fig. 3.



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RAILROAD-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 299,101, dated May 27, 1884.

Application filed February 8, 1883. (No model.)

To all whom it may concern:

Be it known that I, WALTER C. BECKWITH, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Railroad-Signals, of which the following is a specification.

My invention relates to improvements in that class of railroad-signals which are actuated by the wheels of an approaching train to give the signal, and by the departure thereof to withdraw the signal; and it consists in the construction and combination of parts hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section, part in elevation, representing the signal and that portion of the operating mechanism immediately connected with it. Fig. 2 is a side elevation of two portions of the same railroad, showing the operation of my signal mechanism located at the ends of the signal-section reduced in size and brought near together to show them both in one view. Fig. 3 is a detail view of one of the air-pumps and its operating mechanism.

A represents a rail of the road, and B a clamp secured thereto, supporting a pin, *c*, on which the main operating-lever C oscillates.

Q represents the signal, which may be of any style; but for the purpose of this specification it is shown as a vane attached to a horizontal shaft, *p*, to oscillate therewith one-quarter of a circle. When the vane Q is horizontal, as here delineated, the signal is withdrawn. When it is set vertical, the signal is given or displayed. The shaft *p* enters an air-chamber, R, and serves as the axis of the piston P, which is caused to oscillate either by pressure or suction of air through pipes *e e'*. These pipes enter the piston-chamber at the terminus of the piston-stroke at each end of its stroke; but they are each supplied with a branch, *h* and *h'*, respectively, which branches enter the chamber at points on its side, which points are in front of the piston when the piston is at either end. Each of these branches is supplied with a check-valve, which is faced in the direction to resist the passage of air through it to chamber R, but to allow air to be freely drawn therefrom through it by suction in the opposite direction. Air coming into chamber R through pipe *e'* will set the the signal, or air drawn out of the chamber through pipe *e* will set it, while air pressed in from pipe *e* or air drawn out by pipe *e'* will withdraw the signal. The pipes *e e'* connect with air-pumps D D', respectively, located on the road at points from which the signal is to be worked by passing trains, which points are the ends of the guarded section; and there may be two signals—one located near each pump—in which case one of the pipes—say *e*—would lead to one pump, another pipe would connect the signal-chambers, and a third pipe, corresponding to *e'*, would connect the second signal-chamber with the other pump.

The pumps are duplicates of each other, or would be if both pumps stood in the same relation to their operating-levers. As shown, the positions of valves *f f'* are reversed in the two pumps; but the details are essentially the same, so that the details of both are shown in Fig. 3.

D represents the cylinder of the pump; E, the piston. Here shown as of the bucket-plunger pattern.

F is a compression-chamber for storing air when the pump is worked more rapidly than the air can be pressed along the pipe *e*, serving to store the air suddenly received, and give it out gradually through the pipe.

f is a check-valve, which permits air to pass from the pump into the chamber F, but not the other way.

F' is an exhaust-chamber for the purpose of furnishing to the pump a large amount of air when the pump is rapidly worked by long express-trains, such quick action of the pump requiring air faster than the friction of a long pipe, *e*, will permit it to pass, the vacuum-chamber being more leisurely filled by air drawn from the pipe. These vacuum and compression chambers serve as equalizers. *f'* is a check-valve, which permits air to be drawn through it into the pump D, but not to go outward through it. G is the valve of a four-way cock. It has a rocking motion of one-

quarter revolution. When turned one way, it connects the vacuum-chamber F′, as shown in Fig. 3, with the main pipe *e*, and at the same time turns the discharge from compression-chamber F, through outlet *g*, into open air, and when valve G is turned the other way chamber F is connected with pipe *e* and chamber F′ with outer air. The piston E is operated by the action of the train-wheels upon lever C. Every wheel which passes presses the upper arm, C′, of lever C down, and a spring, H, raises it up again immediately after the wheel passes; or I may use instead of the spring H an arm, (shown in dotted lines C″ on the opposite side of the center *c*,) to be acted on by the wheel to raise arm C′. The lever C may be connected to the oscillating piston-rod I, to operate the piston directly; but as it is thought that such connection might work the pump more rapidly than is required, I have shown one means of reducing the speed of the piston by changing its relation to the lever C, as follows:

J is a ratchet-wheel provided with a crank, *i*, on which the piston-rod I is hung. *j* is a pawl hung upon the lever C, to engage the teeth of ratchet-wheel J, so that the oscillations of lever C cause wheel J to revolve in one direction. *j′* is a detent adapted to engage the teeth of wheel J, permitting it to revolve freely one way, but preventing any motion of said wheel the other way. Each revolution of said wheel J and its crank *i* causes one outward and inward movement of the piston, thus either forcing air into the pipe *e* or drawing air therefrom, as the valve G may be set one way or the other. This valve is actuated as follows: The central stem of valve G, extending outward through the valve-chest, is provided at its outer end with a lever, K, which is connected by a rod, *k*, with a loop-shaped lever, L, which is pivoted at L′ to some fixture in the road. *l* is a latch pivoted at *l‴* to the arm C′ of lever C, and provided at its lower end with a stud, M, which plays freely in the loop of the lever L when arm C′ is pressed down and up by passing wheels. The first wheel which enters the guarded section from the right presses arm *l′* down. The stud M, being now in the upper end of loop L, swings said loop to the left, and by means of rod *k* and lever K sets valve G so that the pump shall act through pipe *e* on the signal-piston by suction to set the signal, and at the same time discharge the air drawn into the pump at *f′* into the open air through *f* F *g*. The same wheel, after pressing arm *l′* down to the face of arm C′, then presses said arm C′ down and operates the pump. The arm *l′* being now pressed down flush with arm C′, the succeeding wheels will not operate it, but will operate the lever C to work the pump, so the pump will continue to work on the signal-piston by suction by all wheels coming from the right.

The operation is as follows: Fig. 2 shows the guarded section and all parts of my device in their normal position of rest, the signal down and the levers at both ends of the section ready to receive an impetus to raise it, as left by a train passing off at the right. Suppose a train comes on at the right, arm *l′* will first be struck by the car-wheel and be pressed down, swinging lower end of latch *l* to the left, and with it loop L, operating rod *k* and lever K to turn valve G, so that any action of pump D will operate by suction to raise the signal Q to "danger." The wheel at the next instant bears down arm C′, causing lever C to so operate the pump, as described. Suction through pipe *e* draws air from chamber R through either outlet *h* or *e* and brings over piston P. When the piston passes the outlet *h*, the signal is raised, and any further action of pump D draws air around the piston by pipe *h*. This air must be supplied to the chamber by pipe *e′*, so that other signals anywhere thereon may be operated in the same manner as signal Q; and as one pump acts to set the signal by pressure, while the other acts to set the signal by suction, the air to supply pipe *e′*, when the pump D is sucking, comes into pump D′ through its opening *g*, the same as though valve G were reversed in Fig. 3, and the air entering at *g* passes through chamber F′, through valves *f′* and *f* and chamber F, into the pipe. Now, when the train, in passing off the section at the left, strikes arm *l′*, it sets the valve of pump D′ to act on the signal by suction, thus lowering it. If another train now comes on at the right, it finds the first arm, *l′*, already depressed. Therefore the valve operated thereby is set so that the pump D will again raise the signal, and in passing off the section the train finds the arm and the valve set so that its action on pump D′ again lowers the signal, and so on with any number of trains coming from the right. In all cases where trains succeed each other in the same direction, as just stated, the succeeding train will find the valve G, at the opposite end of the section entered upon, set to prevent the passage of air in the required direction to permit piston P to move freely; yet the piston will be readily operated, since either suction or compression on one side of the piston meets no similar pressure on the other side, and the elasticity of air in the pipe at said other side compensates for the movement of the piston. When the train ceases to act on the pump at the entering end of the section, it leaves the pump-valve set against reaction of the air, so that the signal cannot be returned thereby; but when the train passes off the section it liberates the pressure in the pipe by operating the pump at that end of the section. Now, a train coming from the left depresses arm *l″*, setting the valve of the pump D′ to act by pressure to raise the signal. Then in passing off at the right it depresses that arm *l″* to set pump D to operate by pressure to lower the signal, and any number of trains following from the left will find the valves of

both pumps ready to produce the same effect. The arms l' and l'', either one being pressed down by the first wheel, will not be acted on by any following wheels from the same direction, and its valve stays set until the opposite arm is pressed down by an oppositely-moving train, thus changing the valve and the action of the pump. The clamp B is secured directly to the rail to support the lever C by its fulcrum-pin c in a fixed relation to the rail, whether the same be pressed down by the weight of a heavy engine, or in its normal position.

By the use of my invention the setting and withdrawing of signals are wholly automatic.

I do not confine myself to any particular style of air-pumps, as it is evident that other pumps than those shown will accomplish the same result when operated by the mechanism described.

The characteristic of the operation of piston P is that pressure from pipe e' turns it to the right to set the danger-signal, and suction through pipe e does the same thing, and vice versa, and it makes no difference how the latch l stands, a train approaching from either way will set the signal. If a train coming from the right were to find the end l' of latch l already down, its valve would be set right for use, and if the end l' were up, the first wheel would depress it and it would be set right for use by that same wheel. This method of actuating the pumps and the signal may be adapted to any style or system of signaling. For double-track use, where signaling to the rear only is required, a signal may be placed at each pump, and the pumps located, say, one mile apart; then the guarded sections would be one mile long each. The pipe-connections would be made, as described, so that in entering each section the train would set the danger-signal for that section and drop or conceal the signal one mile to its rear, thus showing a following train what sections are clear and what occupied. If used on a single track, the pipes may be arranged to raise danger-signals at each end of the section entered upon; or each set of connecting-pipes may be allowed to pass the first signal each way and be connected with the next signal, so that trains may be kept a full section away from the section occupied.

I hereby reserve the right to make application at a future time for a patent on a double-ended lever similar to the lever C with the arm C′ and the arm shown in dotted lines at C″, said arms being adapted to be pressed down alternately by any number of wheels in succession coming from either way.

What I claim as my invention, and wish to secure by Letters Patent, is—

1. The combination, with the chamber R, the reciprocating piston P, the signal-vane Q, operated thereby, and the main pipes $e\,e'$, entering the chamber at the ends of the stroke of the piston P, of the branch run-around pipes $h\,h'$, each provided with a check-valve preventing the passage of air through it into the chamber R, but permitting its passage from said chamber, substantially as specified, whereby air moving in the main pipes may first operate the piston P, and then pass around it through the chamber R, to operate other pistons and signals, as described.

2. A lever pivoted to some fixed object on a railroad, having an arm shaped to be depressed by trains passing either way to actuate a pump, in combination with a two-armed latch pivoted to said lever to project its arms alternately beyond the sides of the lever, substantially as shown and described, whereby a passing train will first actuate the latch, and then operate the lever, and whereby the depressing of either end of the latch raises the other end, for the purpose specified.

3. The lever-arm C′, pivoted to some fixed object on a railroad, the latch l, pivoted on said lever and having a stud, M, in combination with the lever L, having a loop-shaped aperture in it, substantially as described, whereby said latch will operate said lever when said stud is in the upper part of the loop, but will not operate the same when in the lower part thereof, nor when playing vertically therein.

4. The latch l, pivoted to the lever-arm C′, and having two arms, l' and l'', and a stud, M, in combination with the loop-shaped lever L, connecting-rod k, and lever K, as shown and described.

5. The combination, with the chamber D, of the air-compression chamber F, the check-valve f, the exhaust-chamber F′, the check-valve f', and the four-way valve G, as shown and described.

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Witnesses:
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SOLON C. KEMON.