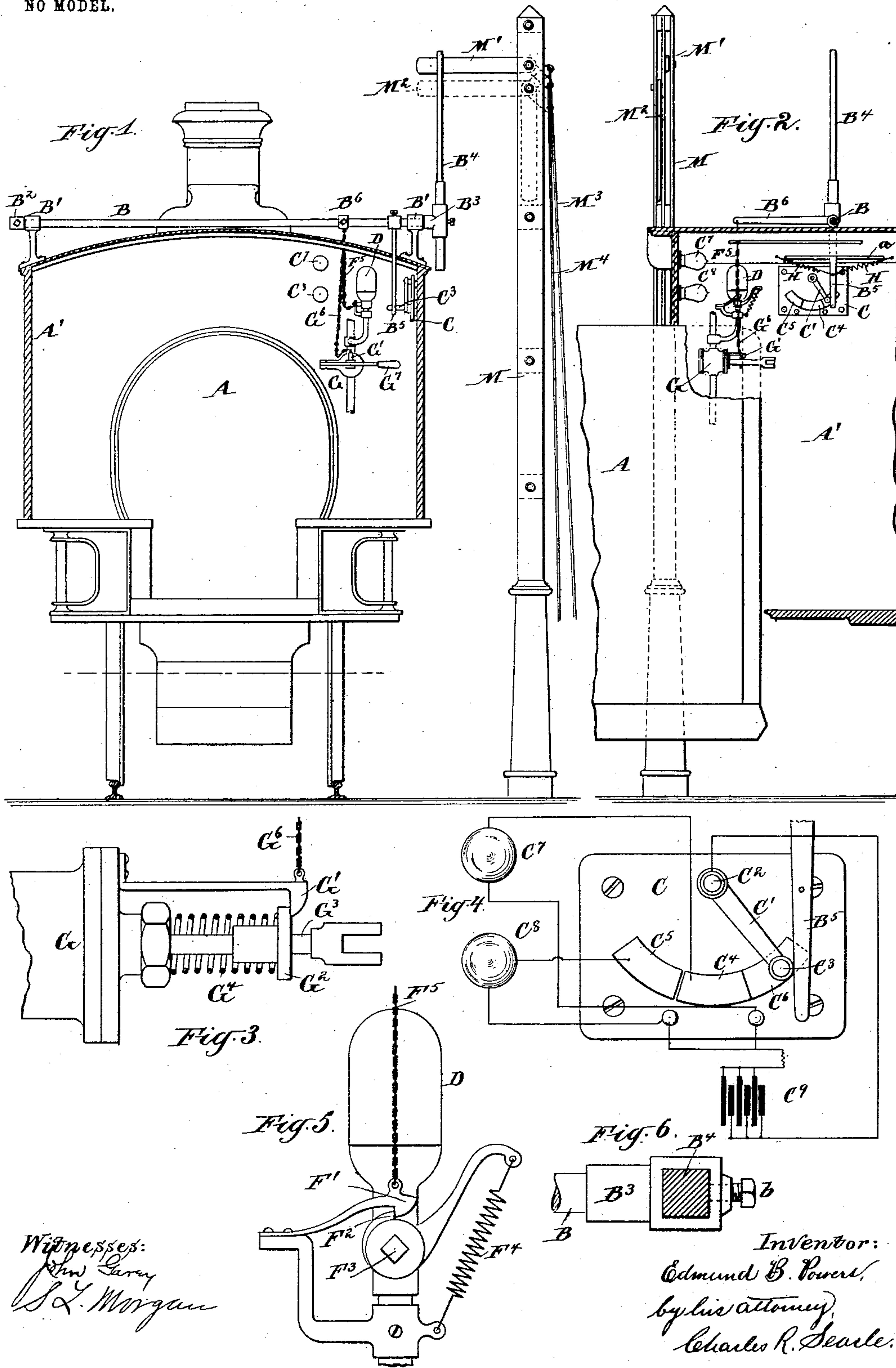


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E. B. POWERS.
SAFETY DEVICE FOR RAILWAY SERVICE.
APPLICATION FILED MAR. 5, 1903.

NO MODEL.



Witnesses:
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UNITED STATES PATENT OFFICE.

EDMUND B. POWERS, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO RAILWAY CAB SIGNAL & EQUIPMENT COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

SAFETY DEVICE FOR RAILWAY SERVICE.

SPECIFICATION forming part of Letters Patent No. 750,781, dated January 26, 1904.

Original application filed April 8, 1902, Serial No. 101,880. Divided and this application filed March 5, 1903. Serial No. 146,266. (No model.)

To all whom it may concern:

Be it known that I, EDMUND B. POWERS, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Safety Devices for Railway Service, of which the following is a specification.

The invention relates to means for automatically displaying signals in the cab of a moving locomotive for the information of the engineer or other occupant of the cab.

The object of the invention is to lessen the danger of collision and other railway accidents by providing means whereby the engineer may be notified by signals within the cab to proceed with caution under certain circumstances and for displaying a danger-signal and also automatically applying the brakes when the conditions are so dangerous as to require an immediate stop.

The signals are operated by vanes analogous to the usual semaphore-arms placed near the track at dangerous points and set by switchmen or other track attendants or otherwise and arranged to be struck by an arm secured to a transversely-arranged shaft carried by the locomotive. The extent of motion imparted to the shaft is governed by the height at which the vane is placed relatively to the height of the arm passing beneath it and correspondingly determines the nature of the signal displayed.

As I have carried out the invention the movement of the arm through a short arc in escaping below a vane displays a green light and actuates a whistle in the cab as cautionary signals, and the movement through a longer arc caused by passing a vane at a lower elevation displays a red light as a danger-signal and automatically applies the air-brakes.

The invention consists in certain novel arrangements of parts and mechanism by which the above-mentioned objects are attained and also in certain details of construction to be hereinafter described.

The accompanying drawings form a part of this specification and show a preferred form of the invention.

Figure 1 is an elevation showing the interior of a locomotive-cab equipped with my invention as seen from the rear and also showing the mast or standard on which are mounted the operating-vanes. Certain details of the locomotive equipment not specifically related to the invention are omitted. Fig. 2 is a corresponding vertical section of a portion of the cab, showing the invention in elevation. The remaining figures are on a larger scale and show portions detached. Fig. 3 is a side elevation showing a preferred means for automatically applying the air-brakes. Fig. 4 is a face view of the automatically-actuated switch for operating the light-signals by electricity and also shows the manner of connecting from a storage battery or other source of electricity. Fig. 5 is a side view of the whistle-signal mechanism. Fig. 6 is a plan view, partly in horizontal section, showing the attachment of the arm to the shaft.

Similar letters of reference indicate the same parts in all the figures.

A is the boiler of a locomotive, which may be of any ordinary or approved type, and A' is the usual cab over the rear portion. The controlling, indicating, and operating equipments (not shown) for the locomotive may be of the usual or any approved construction, as will be understood.

Transversely of the cab, preferably above the roof, extends a shaft B, mounted in supports or bearings B', in which it is free to turn. The overhung ends are provided with collars B² B³, serving to prevent axial movement, one of which, B³, carries an adjustable arm B⁴ at a right angle to the shaft and standing normally in a vertical position near the edge of the roof, adapted when its free end contacts with an obstruction in its path to be deflected out of the vertical and correspondingly partially rotate the shaft B, the extent of the rotation depending on the angle of deflection of the arm in escaping beneath the obstruction.

For the latter I prefer to use a device analogous to a semaphore-signal and consisting of a vertical mast or standard M of suitable height set firmly alongside the track and carrying strong narrow wings or vanes M' M², pivotally mounted in its upper end and adapted to be operated by wires M³ M⁴ or other suitable connections by a switchman or other attendant through any suitable mechanism, either by hand or automatically. One vane, M', is mounted higher than the other, M², or is arranged to maintain a higher position transversely of the path of the arm B⁴ on the moving locomotive, and thus cause the arm to be deflected, but in a lesser degree, in passing beneath it than by the other or lower vane M². Both vanes are adapted to hang idly in pockets in the standard when not required to be set for service and are thus removed from dangerous proximity to passing trains.

On the shaft B, at suitable points, are a lever B⁵ and finger B⁶, adapted to swing through arcs in unison with the arm B⁴. The lever B⁵ extends downwardly through a longitudinal slot *a* in the cab-roof and lies adjacent to a switchboard C, across the face of which it is adapted to sweep.

C' is a switch turning on a center C² and contacting successively with points C⁴ C⁵, arranged in an arc about the center and having a handle C³, by which it may be moved. The switch lies normally on an insulated portion C⁶ of the arc, with the handle C³ in the path of the lever B⁵.

C⁷ and C⁸ are incandescent electric lamps set in the interior of the cab in a location to be plainly seen by the engineer when he is at his post and arranged to be illuminated by a current from a storage battery C⁹, carried on the locomotive and connected, as shown, to the switch C', contact-points C⁴ C⁵, and lamps C⁷ C⁸, as indicated in Fig. 4. C⁷ may be understood as indicating a green light or cautionary signal and C⁸ a red light or danger-signal. The former is connected to the first contact-point C⁴ and the latter to the second or outer point C⁵. Thus arranged the action of the upper vane M' upon the arm B⁴ is to force the lever B⁵ partially across the face of the switchboard, carrying with it the switch C', leaving the latter upon the contact-point C⁴ and showing the cautionary signal or green light to the engineer. The act of passing a standard on which the lower vane M² has been set throws the lever farther and moves the switch to the contact-point C⁵ and displays the red light or danger-signal.

It will be seen that by setting the desired vane located at a point at the commencement of a block or at the approach to a switch or other dangerous portion of the road the corresponding signal, either "caution" or "danger," will be displayed in the cab of any passing locomotive equipped with my invention. In practice I prefer to locate two standards at

suitable distance apart near dangerous points on the road and arrange the first to display the green or cautionary signal and the second to show the red or danger signal.

In the most complete form of the invention two additional signals are employed operated by the finger B⁶, above referred to. The first is a whistle D, actuated by the lesser movement of the arm B⁴ and serving as an additional cautionary signal. It consists of a whistle operated by compressed air and connected to the pressure side of the air-brake system and held in the closed or inoperative condition by a spring-dog F' engaging a detent F² on the whistle valve-stem F³ in opposition to the force of a spring F⁴, tending to turn the stem and admit air under pressure to the whistle-bell. The dog F' is connected by a chain F⁵ or otherwise to the finger B⁶, which lies normally in an approximately horizontal position and when turned by the partial rotation of the shaft pulls upon the chain and releases the valve-stem, thus providing an audible cautionary signal in conjunction with the visual green-light signal. The whistle-signal is reset by forcing the arm F⁶ against the tension of the spring until the detent is again engaged by the spring-dog. Attached to the same finger is a slightly longer chain G⁸, connected at the lower end to a spring-catch G', engaging an annular latch or collar G², arranged to slide on the spindle G³ of the air-brake-operating valve G and subject to the expansive force of a helical spring G⁴, inclosing the spindle and abutting against the stuffing-box or other fixed portion of the valve-casing. While the catch is in engagement with the collar the spring is of no effect, and the spindle may be moved axially by the brake-lever G⁷, as usual, in applying or releasing the air-brakes; but so soon as the arm B⁴ contacts with a low vane M² the increased rise of the finger B⁶ takes up the slack in the chain G⁶ and releases the spring G⁴, which immediately exerts its force to move the air-brake valve in the direction to apply the brakes and bring the train to an immediate stop. The action of the spring G⁴ may be resisted by the engineer through the lever G⁷ if the sudden stop is undesirable; but the pressure exerted by the spring is sufficient to warn the engineer if his hand be on the lever, in connection with the simultaneously-displayed red light, that danger is imminent, and if the brake-lever be free the brakes will be automatically applied.

H H are springs of equal tension, each attached at one end to the lever B⁵ and at the other to convenient points on the cab and serve to maintain the arm B⁴ in the upright position, while allowing it to be deflected in either direction, as required, by the forward or backward movement of the locomotive.

To allow the backward movement without derangement, I prolong the slot *a* on both

sides of the shaft B and also provide a slot through which the finger B⁶ may descend idly.

The arm B⁴ is mounted adjustably in the collar B³ and may be set up or down therein to produce the required degree of deflection in passing beneath the vanes. It is held in place by the set-screw b.

The vanes may be painted green and red, respectively, and serve as additional track-signals for the engineer if they are so situated as to be easily seen. The vanes may be mounted in the standards with provisions for adjusting them vertically, as will be understood.

Importance is attached to the location of the arm B⁴ at the edge of or extending a short distance beyond the cab-roof, for the reason that when so placed it may be operated by vanes not reaching over the roof and therefore not liable to strike projections on the trains and also avoid the danger of accident to trainmen on the roofs of the cars, which is greatly increased by rigid arms or brackets extending across the track near the level of the car-roofs.

By providing both an audible and visible automatic cautionary signal for the engineer the chances of both being unheeded are very remote, and when an immediate stop is necessary to avoid an accident the display of the danger-signal and the effort automatically to apply the brakes cannot occur unnoticed by the engineer unless he be suddenly incapacitated by accident or illness, in which case the brakes will be applied automatically and the train brought to a standstill.

Modifications may be made in the forms and proportions of the parts within wide limits without departing from the principle of the invention or sacrificing its advantages.

Changes in form and arrangement of parts may be resorted to within the scope of the protection prayed, the shaft B may be otherwise located, and the whistle and air-brake locks otherwise operated. It is also evident that a greater number of signals may be operated in the same manner by correspondingly increasing the vanes, &c.

The construction of the electric switch may be varied, as may also the mechanism for operating the whistle and applying the brakes.

All the parts and equipments not specifically described will be understood to be of any ordinary or approved construction and arrangement.

That portion of the invention relating particularly to means for applying the brakes, excepting in so far as it may be understood to be a signal to the engineer, is not specifically claimed in this application, but is made the subject-matter of a separate application filed April 8, 1902, Serial No. 101,880, of which this application is a division.

I claim—

1. In an apparatus of the character set forth, a shaft mounted in the cab, an arm adjustably

secured to the shaft, adapted to be deflected by contact with an obstruction in its path and partially rotate said shaft, connections from the latter to signals within the cab, and a plurality of such obstructions each independent of the other and arranged at different heights to act each independently of the other and adapted to induce correspondingly different degrees of deflection of said arm, and means whereby said differences in deflection actuate correspondingly different signals in said cab through the medium of said shaft.

2. In an apparatus of the character set forth, a shaft mounted in the cab, an arm adjustably secured thereto and adapted to be deflected by contact with an obstruction in its path, two or more signals within said cab, connections from said shaft for actuating said signals successively by differences in the degrees of deflection of said arm, and a plurality of such obstructions each independent of the other and arranged at different heights relatively to said arm on independent pivots on a common support and adapted to induce correspondingly different degrees of deflection of the latter.

3. In an apparatus of the character set forth, a shaft mounted in the cab, an arm secured thereto adapted to be deflected and correspondingly partially rotate said shaft, means extending at right angles from said shaft and at right angles to said arm and connections to actuating means for a plurality of signals within said cab, in combination with a plurality of relatively stationary vanes arranged at different heights relatively to said arm and in the path of the latter, adapted to induce correspondingly different degrees of deflection of said arm, whereby said signals are successively operated.

4. In an apparatus of the character set forth, a shaft extending transversely of the cab, an arm secured to said shaft adapted to be deflected and correspondingly partially rotate said shaft, connections from the latter to actuating means for a plurality of signals within said cab, arranged to be actuated successively by increased degrees of deflection of said arm, and a plurality of independent obstructions on independent pivots and arranged in the path of said arm, and means for varying the height of the arm relatively to said obstructions to induce the desired deflections.

5. The combination with a locomotive-cab, of a shaft mounted therein, an arm secured to said shaft and adapted to partially rotate the latter by the deflection of said arm in contacting with an obstruction in its path, a series of independent obstructions mounted to extend at right angles to said arm in different planes, a lever mounted on said shaft and extending into said cab, said obstructions being mounted on independent pivots, an electric switch operated by the movement of said lever, a lamp-signal within said cab, and a source of electricity and connections therefrom to said switch and

lamp-signal whereby the movement of said lever will luminate said lamp-signal.

6. The combination with a locomotive-cab, of a shaft mounted therein, an arm secured to said shaft and adapted to partially rotate the latter by the deflection of said arm in contacting with an obstruction in its path, a plurality of independent obstructions mounted in different vertical planes to extend into the path of said arm, a lever mounted on said shaft and extending into said cab, said obstructions being mounted on independent pivots, an electric switch having a plurality of contact-points and operated by the movement of said lever, a plurality of lamp-signals within said cab, a source of electricity and connections therefrom to said switch, contact-points and lamp-signals, whereby a movement of said lever in one direction will luminate one of said lamp-signals and a further movement of said lever in the same direction will luminate a second lamp-signal.

7. The combination with a locomotive-cab, of a shaft mounted therein, an arm secured to said shaft and adapted to partially rotate the latter by the deflection of said arm in contacting with an obstruction in its path, a plurality of independent vanes mounted in different vertical planes to extend into the path of said arm, a whistle located in said cab and mechanism for operating it, said obstructions being mounted on independent pivots, and connections from said shaft for actuating such mechanism and sounding said whistle.

8. The combination of a locomotive-cab, a shaft mounted therein, an arm adjustably secured to the shaft at right angles thereto and adapted to partially rotate the latter by the deflection of said arm in contacting with an obstruction in its path, a plurality of independent obstructions mounted in different vertical planes to extend into the path of said arm, a finger carried by said shaft, said obstructions being mounted on independent pivots, a whistle located in said cab and mechanism for operating it, locking means for holding said mechanism in an inoperative condition, and connections from said finger to said locking means whereby a partial revolution of said shaft will release said operating means and sound said whistle.

9. The combination with a locomotive-cab of a shaft extending transversely thereof, an arm secured to the shaft and adapted to partially rotate the latter by the deflection of said arm in contacting with an obstruction in its path, a finger carried by said shaft, a whistle located in said cab and mechanism for operating it, connections from said finger to said mechanism whereby a partial rotation of said shaft in one direction will operate said whistle, a brake-controlling mechanism located in said cab, and connections from said finger to said controlling mechanism, whereby a further rotation of said shaft in the same direction will move

said controlling mechanism in the direction to apply the brake.

10. The combination of a locomotive-cab, a shaft extending transversely thereof, an upwardly-extending arm secured to the shaft and adapted to partially rotate said shaft by the deflection of said arm in contacting with an obstruction in its path, a lever on said shaft, an electric switch operated by the movement of said lever in one direction, an electric lamp illumined by such movement, a second electric lamp illumined by a further movement of said lever and switch in the same direction, a finger on said shaft, a whistle and operating means therefor, connections from said finger to said operating means whereby the partial rotation of said shaft will sound said whistle, a brake-controlling mechanism, means tending to move said controlling mechanism to apply the brake and a restraining means therefor, and connections from said finger to said restraining device, whereby the further rotation of said shaft in the same direction will apply the brake, the said lamps, whistle, and brake-controlling mechanism located within said cab and serving as signals to an occupant thereof.

11. In an apparatus of the character set forth, a standard located near the track, two vanes pivotally mounted therein, one at a higher level than the other, adapted to hang vertically on such standard or to be held extended transversely to the line of said track, in combination with an arm carried on the cab of a locomotive on said track, arranged to strike said vanes and be deflected thereby, a finger also carried by said shaft, and means permitting said finger to descend idly, a signal located in said cab adapted to be operated by the deflection of said arm caused by passing beneath the uppermost of said vanes, and another independent signal located in said cab and adapted to be operated by a further deflection of said arm induced by passing beneath the lowermost of said vanes.

12. An electric switch having two contact-points, a pair of electric lamps, a source of electricity, and connections from the latter to said switch, contact-points and lamps, whereby the movement of said switch to one of said contact-points will illumine one of said lamps and a further movement to the second contact-point will illumine the second lamp, in combination with a lever arranged to strike said switch to cause said movements, and a finger extending from said shaft at an angle to said arm and lever, and an arm connected to said lever and arranged to be deflected by contact with an obstruction in its path, the degree of deflection being determined by the height at which said obstruction is placed, said finger being disposed to operate a plurality of signals, all arranged to serve with a locomotive as herein set forth.

13. The whistle D located in the cab of a

locomotive and having the operating valve-
stem F^3 , the detent F^2 , and spring-dog F' en-
gaging said detent, a chain connected to said
dog near its free end, the arm F^6 on said valve-
5 stem, and spring F^4 tending to move said stem
in the direction to admit pressure to said
whistle when the detent is released, connec-
tions from said chain to an arm on the exte-
rior of said cab arranged to be deflected by
10 contact with an obstruction in its path and
thereby lift said dog and release said detent,

and an obstruction disposed at right angles to
said arm on the cab to deflect the same and to
actuate the arm to elevate said arm.

In testimony that I claim the invention above 15
set forth I affix my signature in presence of
two witnesses.

EDMUND B. POWERS.

Witnesses:

ROBT. CONNOR,
CHARLES R. SEARLE.