A. C. LIVERMORE.

DASH POT.

APPLICATION FILED JUNE 13, 1911.

1,039,555.

Patented Sept. 24, 1912.

2 SHEETS—SHEET 2.

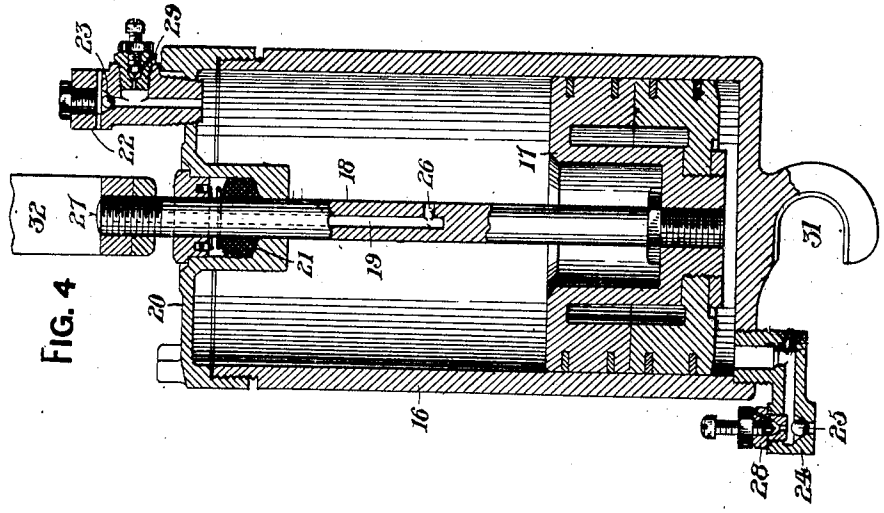

FIG. 4

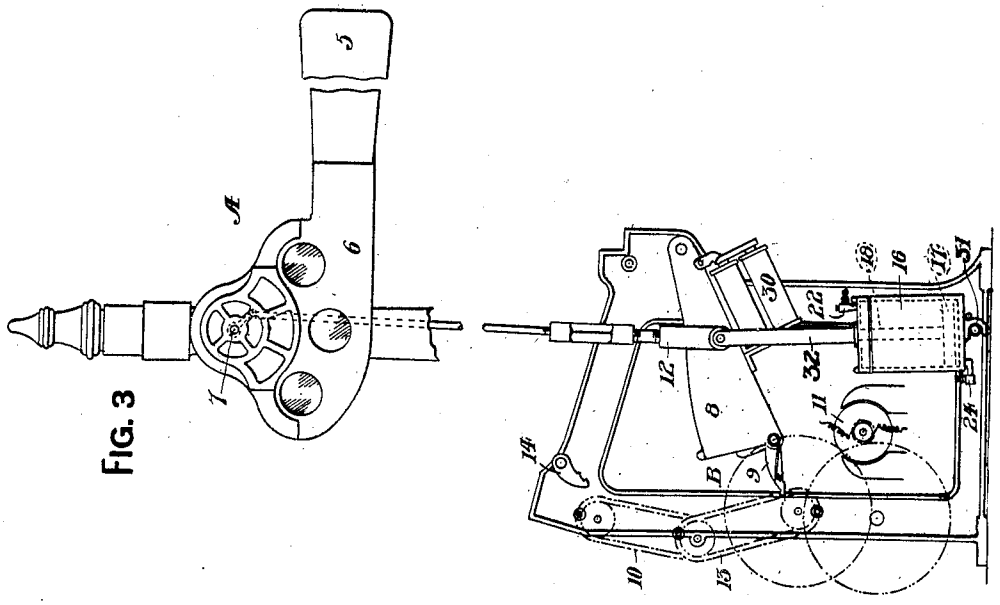

FIG. 3

WITNESSES:

J. P. Appleman,

A. L. Vencill

INVENTOR.

Arthur C. Livermore

BY

Geo. E. Lemmon.

His ATTORNEY.

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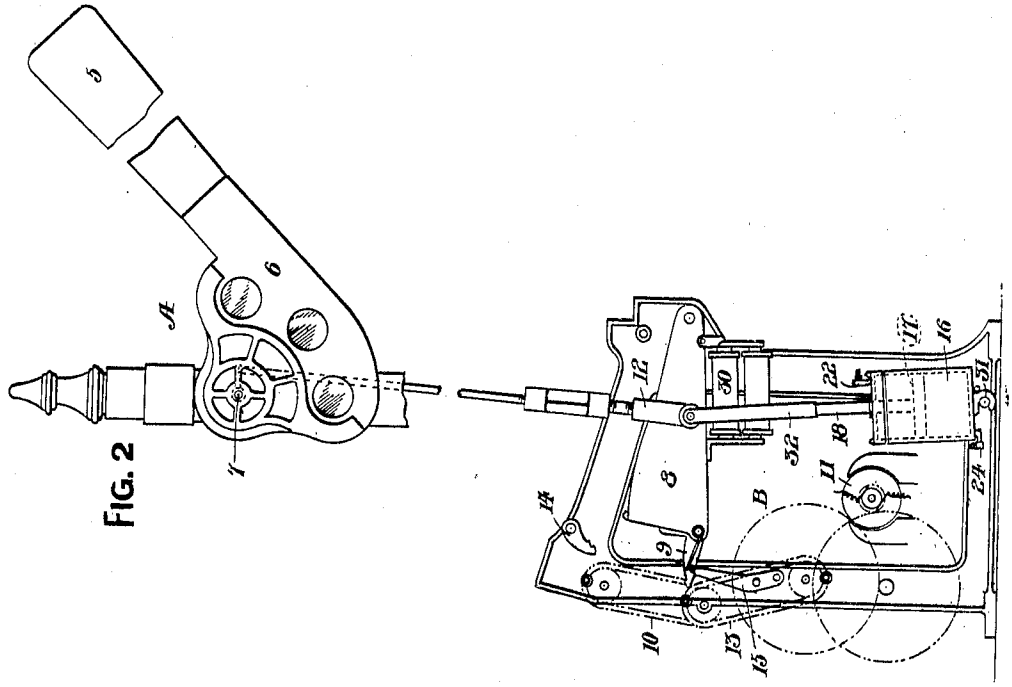

FIG. 2

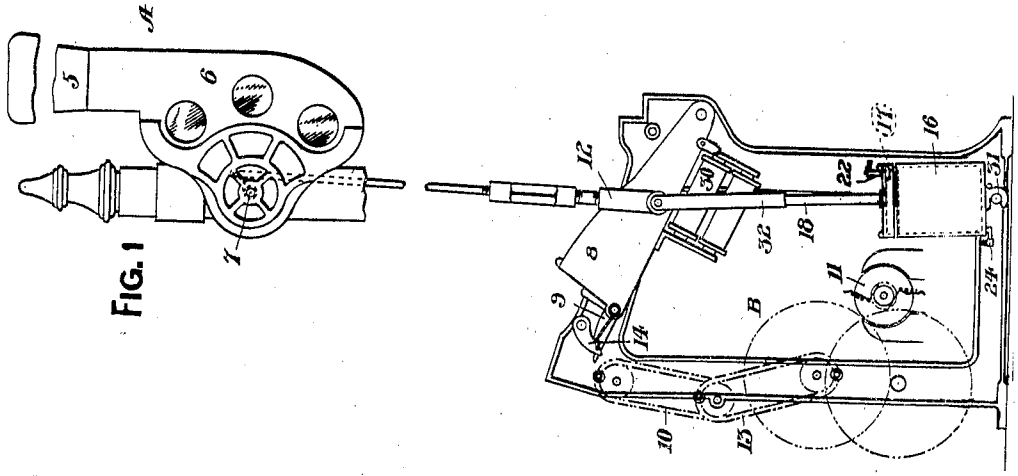

FIG. 1

WITNESSES:

J. P. Appleman,

A. L. Venicill

INVENTOR.

Arthur C. Livermore

BY

Geo. E. Crouse.

ATTORNEY.

UNITED STATES PATENT OFFICE.

ARTHUR C. LIVERMORE, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DASH-POT.

1,039,555. Specification of Letters Patent. Patented Sept. 24, 1912.

Application filed June 13, 1911. Serial No. 632,831.

To all whom it may concern:

Be it known that I, ARTHUR C. LIVERMORE, a citizen of the United States, residing at Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Dash-Pots, of which the following is a specification.

My invention relates to buffing devices for railway signals, and particularly to air buffers for railway signals of the semaphore type having a plurality of positions of indication.

I will describe one form of air buffer embodying my invention, and then point out the novel features thereof in claims.

In the accompanying drawings, Figures 1, 2 and 3 are views showing a semaphore signal in three different positions of indication, and showing a buffing device embodying my invention with its parts in the three corresponding positions. Fig. 4 is a vertical sectional view showing in detail the form of buffing device illustrated in Figs. 1, 2 and 3.

Similar reference characters refer to similar parts throughout the several views.

Referring to Figs. 1, 2 and 3 of the accompanying drawings, A designates a railway semaphore signal, and B a mechanism for moving it. The semaphore signal comprises as usual a blade 5 and a spectacle casting 6. The semaphore is suitably fixed on a shaft 7, and when free to move always assumes a horizontal position of the blade under the influence of gravity on the blade and on the spectacle casting. In the drawings I have shown the semaphore as being adapted for movement from its horizontal position upwardly to two other positions of indication, but it may equally well be adapted for movement from its horizontal position downwardly to other positions of indication. These arrangements are well understood by those skilled in the art and involve merely mechanical changes which need not be explained herein. The operating mechanism B as here shown comprises an arm 8 pivoted at one end and provided at its other end with a fork 9 pivoted to the arm and adapted to be held rigid with the arm by means of an electromagnet 30, and suitable apparatus carried by the arm. 10 and 13 designate chains driven by a motor 11, which chains are provided with projections arranged to engage the fork 9 to raise the arm. Stationary supports 14 and 15 are also provided to engage with the fork to hold the arm in the positions to which it has been moved. The arm 8 is connected with the semaphore by means of a rod 12 and a suitable crank secured to the semaphore shaft 7. An operating mechanism of the general type such as I have herein shown is shown and described in United States Letters Patent No. 611943 issued on October 4, 1898, to J. G. Schreuder. It is understood, however, that I do not wish to limit myself to any specific type of operating mechanism.

As here shown the semaphore A is moved by the mechanism B from the horizontal position, (usually the "danger" position) to an inclined position (usually the "caution" position) and to a substantially vertical position (usually the "clear" position). During the return movements of the semaphore, it is desirable that the momentum of the parts should be checked before they reach the positions corresponding to the inclined and horizontal positions of the semaphore. This I accomplish by means of a buffing device embodying my invention, one form of which I will now describe.

A buffing device embodying my invention comprises but one cylinder and but one piston having relative movements, and this buffing device serves to cushion the moving parts as they approach both the inclined and horizontal positions of the semaphore. As the parts approach the inclined position, the piston is substantially midway of its stroke through the cylinder, hence the compression of the air in the cylinder by the piston might not at this point be sufficient to effectively cushion the movement of the parts. To secure the desired cushioning effect at the inclined position, I so arrange the buffer as to permit the piston to create a partial vacuum behind itself during that portion of its stroke corresponding to the movement of the semaphore from vertical to inclined positions. By means of this partial vacuum or by means of the partial vacuum combined with the compression of the air on the other side of the piston, I effectively cushion the moving parts as they

approach the inclined position of the semaphore. During the movement of the semaphore from the inclined to the horizontal position, the piston is approaching one end of the cylinder, and the partial vacuum behind the piston is not usually necessary during this portion of the stroke, for the reason that the parts can then be effectively cushioned by the compression of air in front of the piston. I therefore preferably provide means for opening the portion of the cylinder behind the piston to atmosphere after the piston has passed the point corresponding to the inclined position of the semaphore.

I will now describe in detail one form of air buffer embodying my invention.

Referring to all of the views, 16 designates a cylinder and 17 a piston movable therein. As here shown, the cylinder is pivotally mounted on the frame of the mechanism at 31 and the piston is operatively connected with the arm 8 by means of a piston rod 18 and a yoke 32. It is understood, however, that this arrangement may equally well be reversed, the piston being fixed and the cylinder being operatively connected with the arm 8. The cylinder is closed at both ends, being provided at its upper end with a head 20 which carries a stuffing box 21 through which passes the piston rod 18.

22 designates a check valve at the upper end of the cylinder, here shown as comprising a ball 23 resting in a suitable conical seat. This valve permits the air to be freely driven out of the upper part of the cylinder during the upward movement of the piston, but prevents the flow of air into the upper part of the cylinder during the downward movement of the piston. Adjacent the lower end of the cylinder is a similar check valve 24 here shown as comprising a ball 25 which permits air to flow freely into the lower portion of the cylinder during the upward movement of the piston, but which prevents the outflow of the air under compression in the lower portion of the cylinder during the downward movement of the piston.

28 designates an adjustable relief valve by means of which the outflow of air from the lower portion of the cylinder during the downward or compression stroke may be regulated to avoid complete stoppage of the moving parts and yet to provide the desired cushioning effect. If desirable, a similar adjustable valve 29 may be provided at the upper end of the cylinder to permit a limited influx of air during the downward or suction stroke of the piston, although the leakage of air through the stuffing box will usually render this relief valve unnecessary.

It will be clear that with a buffing device as thus far described, the pressure of the air in the cylinder above the piston will be reduced below atmospheric pressure as soon as the piston begins its downward movement, and that this pressure will constantly become lower as the piston moves farther away from the upper head. The first part of the movement of the semaphore from its vertical position will therefore be comparatively rapid, but the momentum of the parts will be checked by the partial vacuum above the piston as the semaphore approaches its inclined position, thereby providing the desired cushioning effect at this point. The cushioning effect is assisted, as hereinbefore mentioned, by the compression of air ahead of the piston.

If no means were provided for relieving the partial vacuum behind the piston after the semaphore has reached the inclined position, it is evident that the entire movement from the inclined to the horizontal position would be extremely slow. It is desirable however, that the early part of this movement should be rapid, and that the momentum of the moving parts should be checked only as the semaphore approaches its horizontal position. In order to relieve the partial vacuum I preferably provide a rod secured to the piston and passing out through a stuffing box in one end of the cylinder, which rod is provided with air passages so arranged as to connect the end of the cylinder in which the partial vacuum exists with the atmosphere during the movement of the semaphore between its inclined and horizontal positions. As shown in Fig. 4 I employ the piston rod 18 for this purpose, although I do not wish to be limited to the use of the piston rod, for the reason that any suitable rod connected with the piston may be employed equally well. As here shown, the piston rod 18 is provided with a longitudinal passage 19 which communicates with the atmosphere at 27 where the piston rod unites with the yoke 32.

26 designates a transverse opening through the wall of the rod 18 communicating with the passage 19. This transverse opening is so located as to be within the cylinder while the semaphore is between its horizontal and inclined positions, but to be opposite the stuffing box 21 or in the outside air while the semaphore is between its inclined and vertical positions.

It will be evident from the foregoing explanation that after the semaphore has reached the inclined position on its movement toward horizontal the end of the cylinder in which the partial vacuum exists is opened to atmosphere and that from the inclined to the horizontal position the cushioning effect is obtained solely by the compression of air ahead of the piston.

Although I have herein shown and described only one form of air buffer embody-

ing my invention, it is understood that various modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. A buffing device comprising a cylinder and a piston having relative movement, the said movement in one direction being retarded throughout an entire stroke by the compression of air on one side of the piston and through a portion of the said stroke by a partial vacuum created on the other side of the piston by the said movement.

2. A buffing device comprising a cylinder and a piston having relative movement, the said movement in one direction being retarded throughout the stroke by the compression of air on one side of the piston and through a portion of the stroke by the partial vacuum created on the other side of the piston by the said movement, and means for relieving the partial vacuum during the remainder of the said stroke.

3. A buffing device comprising a cylinder and a piston having relative movements, the cylinder being closed at both ends to permit the relative movement to create a partial vacuum on one side of the piston during a portion of a stroke and a compression of air on the other side of the piston during the entire stroke, and means for opening the cylinder on the vacuum side of the piston to atmosphere after the said portion of the said stroke has been completed.

4. A buffing device comprising a cylinder and a piston having relative movements, the cylinder being closed at both ends to permit the relative movement in one direction to create a partial vacuum on one side of the piston during a portion of a stroke and a compression of air on the other side of the piston during the entire stroke, means for opening the cylinder on the vacuum side of the piston to atmosphere after the said portion of the said stroke has been completed, and check valves in each end of the cylinder to permit a free relative movement in the opposite direction.

5. A buffing device comprising a cylinder and a piston having relative movements, the cylinder being closed at both ends to permit the relative movement in one direction to create a partial vacuum on one side of the piston during a portion of a stroke and a compression of air on the other side of the piston during the entire stroke, means for opening the cylinder on the vacuum side of the piston to atmosphere after the said portion of the said stroke has been completed, and a release valve in the cylinder on the compression side of the piston to permit a slow outflow of air during the movement in the said direction.

6. A buffing device comprising a cylinder and a piston having relative movements, the cylinder being closed at both ends to permit the relative movement in one direction to create a partial vacuum on one side of the piston during a portion of a stroke and a compression of air on the other side of the piston during the entire stroke, means for opening the cylinder on the vacuum side of the piston to atmosphere after the said portion of the said stroke has been completed, and a release valve in the cylinder on the vacuum side of the piston to permit a slow inflow of air during the movement in the said direction.

7. A buffing device comprising a cylinder and a piston having relative movements, the cylinder being closed at both ends, a rod connected with the piston and passing through one end of the cylinder, a longitudinal passage in said rod open to atmosphere at all times, and an opening through the wall of the rod communicating with the passage and located to be outside of the cylinder during a portion of the relative movement and inside of the cylinder during the remainder of the movement.

8. A buffing device comprising a cylinder and a piston having relative movements, the cylinder being closed at one end, a rod connected with the piston and passing through the closed end of the cylinder, a longitudinal passage through said rod open to atmosphere at all times, and an opening through the wall of the rod communicating with the said passage and located to be within the closed end of the cylinder during a portion of the relative movement and outside of the said closed end during the remainder of the relative movement.

9. A buffing device comprising a cylinder and a piston having relative movement, the cylinder being closed at both ends, a rod connected with the piston and passing through one end of the cylinder, and a passage through the rod one end of which is open to the atmosphere at all times and the other end of which is within the cylinder during a portion of the relative movement and without the cylinder during the remainder of the relative movement.

10. A buffing device comprising a cylinder and a piston having relative movement, the cylinder being closed at both ends to cushion the relative movement during a portion of a stroke by a partial vacuum and during the entire stroke by compression.

11. A buffing device comprising a cylinder and a piston having relative movement, the said relative movement in one direction being retarded throughout the entire stroke by compression on one side of the piston, and through substantially the first half of said stroke by the partial vacuum created on the other side of the piston by the said move-

ment, and means for relieving said partial vacuum during substantially the last half of said stroke.

12. A buffing device comprising a cylinder and a piston having relative movement, the said relative movement in one direction being retarded throughout the entire stroke by compression on one side of the piston, and through substantially the first half of said stroke by the partial vacuum created on the other side of the piston by the said movement, and means for opening the vacuum side of the cylinder to atmosphere during substantially the last half of said stroke.

13. A buffing device comprising a cylinder and a piston having relative movement, the cylinder being closed at one end, a rod connected with the piston and passing through the closed end, the relative movement in one direction being retarded through a portion of the stroke by the partial vacuum created between the piston and the closed end by such relative movement, and means comprised in said rod for relieving the said partial vacuum during the remainder of the said stroke.

14. A buffing device comprising a cylinder and a piston having relative movement, the cylinder being closed at one end, a rod connected with the piston and passing through the closed end, the relative movement in one direction being retarded through a portion of the stroke by the partial vacuum created between the piston and the closed end by such relative movement, and means comprised in said rod for opening the said closed end of the cylinder to atmosphere during the remainder of the stroke.

15. A buffing device comprising a cylinder and a piston having relative movement, the cylinder being closed at both ends, a rod connected with the piston and passing through one of the said closed ends, the relative movement in one direction being retarded throughout the entire stroke by the compression on one side of the piston and through the first portion of said stroke by the partial vacuum created on the other side of the piston by the said relative movement, and means comprised in the said rod for relieving the partial vacuum during the remainder of the said stroke.

16. A buffing device comprising a cylinder and a piston having relative movement, the cylinder being closed at both ends, the said movement in one direction being retarded throughout the entire stroke by the compression on one side of the piston and through a portion of the said stroke by the partial vacuum created on the other side of the piston by the said movement, and means for opening the cylinder on the vacuum side of the piston to atmosphere during the remainder of the said stroke.

17. In combination, a movable device adapted to move from one position to a second position and to continue the movement in the same direction from said second position to a third position, a buffing device for cushioning the movement as the said movable device approaches the said second position and the said third position, said buffing device comprising a cylinder and a piston having relative movement one of which is connected with the movable device, the said relative movement being cushioned throughout the entire stroke of the movable device by the compression on one side of the piston and through the portion of the stroke of the movable device from the first to the second position by the partial vacuum created on the other side of the piston by the said relative movement, and means for relieving the partial vacuum during the movement from the second to the third position.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR C. LIVERMORE.

Witnesses:
A. L. VENCILL,
P. F. WILLARD.