

(No Model.)

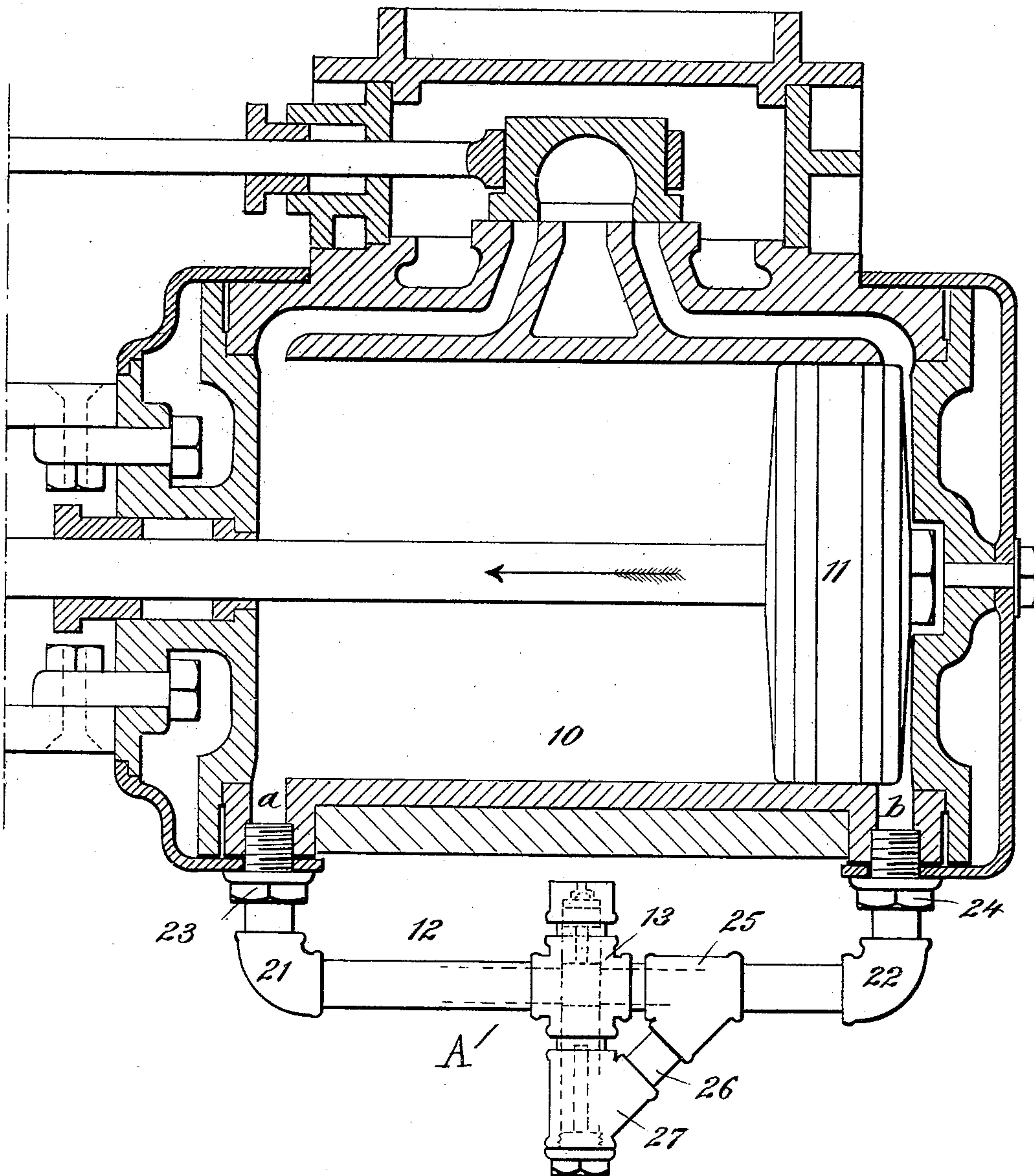
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E. LESLIE.  
EQUALIZER.

No. 434,795.

Patented Aug. 19, 1890.

*Fig. 1.*



WITNESSES:

*Donn Twitchell*  
*C. Sedgwick*

INVENTOR:

*E. Leslie*

BY

*Munn & Co.*

ATTORNEYS.

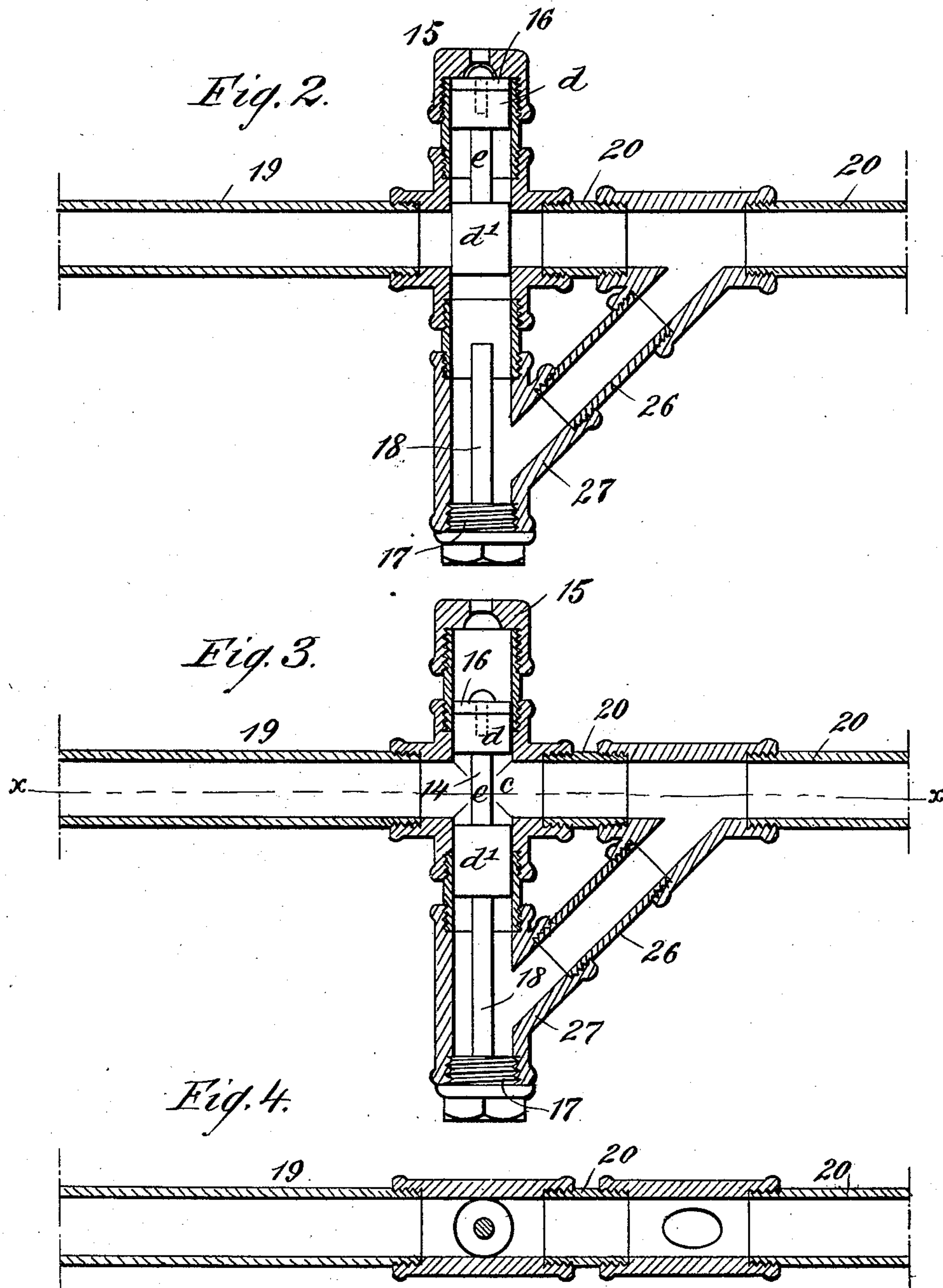
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# UNITED STATES PATENT OFFICE.

EDWARD LESLIE, OF ORANGEVILLE, ONTARIO, CANADA, ASSIGNOR TO THE  
LESLIE BROTHERS MANUFACTURING COMPANY, OF PATERSON, NEW  
JERSEY.

## EQUALIZER.

SPECIFICATION forming part of Letters Patent No. 434,795, dated August 19, 1890.

Application filed July 22, 1889. Serial No. 318,324. (No model.)

### *To all whom it may concern:*

Be it known that I, EDWARD LESLIE, of Orangeville, in the county of Dufferin, Province of Ontario and Dominion of Canada, have  
5 invented a new and Improved Equalizer, of which the following is a full, clear, and exact description.

In order to economize steam in the running of locomotive-engines, the throttle is usually  
10 closed on downgrades, but this closing of the throttle causes the piston to act as an air-pump and brings about a heavy suction upon the valve, thus drawing the valve hard down upon its seat, and causing an undue amount  
15 of friction between the valve and its seat, the friction and consequent wear upon the parts being increased by the cinders and grit drawn in through the exhaust-port.

One of the special advantages of this invention consists in the relief from cutting the  
20 center of the valve in a concave or like form. This cutting takes place principally in the middle of the seat by reason of the fact that when the engine is running without steam  
25 the piston acts as an air-pump, and during a part of the stroke in each direction the piston holds or hugs the valve in forcible contact with its seat by suction, thus making the valve at such time press upon and cut the seat.  
30 This cutting action takes place whenever the valve is in such a position that the suction produced by the movement of the piston can force the valve upon its seat. From the time the piston begins to exert pressure upon the  
35 valve, the suction increases until the valve begins to open communication with the exhaust-port. Consequently the valve-face is cut in a concave or like form, and this cutting is aided by the cinders sucked in from  
40 the smoke-stack. It is to overcome this objection and to provide for the easy running of the valve upon its seat when the throttle is closed that I have designed the attachment forming the subject-matter of this application,  
45 the invention consisting in the construction and arrangement of parts, as will be hereinafter fully explained, and specifically pointed out in the claims.

Reference is to be had to the accompanying  
50 drawings, forming a part of this specification,

in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a central longitudinal sectional view of a cylinder, representing the same as  
55 it appears when provided with my equalizing attachment. Fig. 2 is a central longitudinal sectional view of the central portion of the equalizer, the parts being represented as they appear when the throttle is open. Fig. 3 is a  
60 similar view, the parts, however, being represented as they appear when the throttle is closed; and Fig. 4 is a sectional plan view, the view being taken on line *xx* of Fig. 3.

In the drawings, 10 represents a cylinder  
65 and 11 the piston therein. In connection with the cylinder I arrange an attachment 12, which in the drawings is shown as it would appear if made up of a number of pipes and couplings; but I desire it to be distinctly under-  
70 stood that the main body of the attachment might be made from a single casting.

In the specific construction illustrated in the drawings the cylinder is tapped at the  
75 points *a* and *b* near each end, and the ports so formed by tapping the cylinder are connected by a system of pipes and coupling-pieces, which in their entirety are designated by the letter A, as clearly represented in the  
80 drawings.

In the central coupling-piece 13, I form a valve-chamber *c*, and in the chamber so formed I mount a double valve 14, such valve consisting of plugs *d* and *d'*, that are connected by a stem *e*. One end of the valve-chamber  
85 *c* is partially closed by an apertured cap 15, and the plug *d* is provided with a packing 16, which at times closes the aperture in the cap 15, as will be hereinafter explained. The other end of the chamber *c* is closed by a plug or  
90 cap 17, which carries an inwardly-extending stem 18, said stem acting to limit the motion of the valve.

To the central coupling-piece 13 are connected pipes or tubes 19 and 20, said pipes or  
95 tubes leading, respectively, to elbows 21 and 22, which elbows are placed in communication with the ports *a* and *b* by means of taps 23 and 24. The pipe or tube 20 is provided with a Y-coupling 25, which coupling, by means of  
100



a tube 26, is placed in communication with a corresponding coupling 27, the bore of which communicates directly with the valve-chamber *c*. The bore of the tube 26 is, by preference, made much smaller than the bores of the tubes 19 and 20.

In operation when the throttle is opened the pressure of the steam within the cylinder will be transmitted through the ports *a* and *b* to bear upon the under sides of the plugs *d* and *d'*, the pressure transmitted through the port *a* bearing upon the under side of the plug *d*, and the pressure through the port *b* passing through the tubes 20 and 26 to a point beneath the plug *d'*, so that immediately upon the opening of the throttle the valve 14 will be carried from the position in which it is shown in Fig. 3 to the position in which it is shown in Fig. 2, and while the plug *d* is in the position in which it is shown in the said Fig. 2 all communication between the two ends of the cylinder by way of the equalizer will be cut off; but immediately upon the closing of the throttle the suction produced by the reciprocation of the piston will draw down first upon the plug *d'* and then upon both plugs until the valve is moved to the position in which it is shown in Fig. 3, air passing inward into the valve-chamber above the plug *d* through the perforation in the cap 15, and after the valve has been moved to the said position free communication will be established between the two ends of the cylinder, and the steam or air that is in advance of the piston will be carried down through the port *a* or *b*, whichever port may be in advance of the piston, through the main bore of the equalizer to the rear of the piston. In other words, if the piston, being in the position in which it is shown in Fig. 1, starts in the direction of the arrow shown in connection therewith, the steam in advance of the piston will be drawn through the port *a*, through the equalizer, and through the port *b* to the opposite end of the piston, and as the piston starts upon its return movement, the steam, at this time combined with air that

has passed into the cylinder, will be drawn out of the cylinder by way of the port *b* through the equalizer, and again into the cylinder by way of the port *a*, this movement or its reverse being repeated for every reciprocation of the piston, the movement of the air and steam being brought about by the suction caused by the reciprocation of the piston.

From the above description it follows that after the cylinder has been once filled with air, such air is forced forward and backward through the equalizer, and no undue suction is brought to bear upon the valve, and the cylinder and the steam-box are not cooled off rapidly, as is the case when a fresh supply of cool air is drawn in and forced out at every reciprocation of the piston.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An equalizer comprising a tube or casting formed with a bore and arranged for connection with both ends of a cylinder and provided with a valve-chamber, an automatic valve arranged within the chamber, and an auxiliary tube leading from the valve-chamber to the main tube, substantially as described.

2. An equalizer comprising a main tube or casting arranged for connection with both ends of a cylinder and provided with a valve-chamber, an automatic valve arranged within the chamber, a stop arranged in connection with the valve, and an auxiliary tube leading from the valve-chamber to the main bore, substantially as described.

3. The combination, in an equalizer, with a main tube or casting arranged for communication with both ends of a cylinder and provided with a valve-chamber and with an auxiliary passage leading from the said valve-chamber to the main bore, of a valve consisting of two plugs, substantially as described.

EDWARD LESLIE.

Witnesses:

EDWARD KENT, Jr.,  
C. SEDGWICK.