(No Model.)

# F. H. SEARLES.

## FLUID PRESSURE REDUCER.

No. 552,264. Patented Dec. 31, 1895.

Fig. 3.

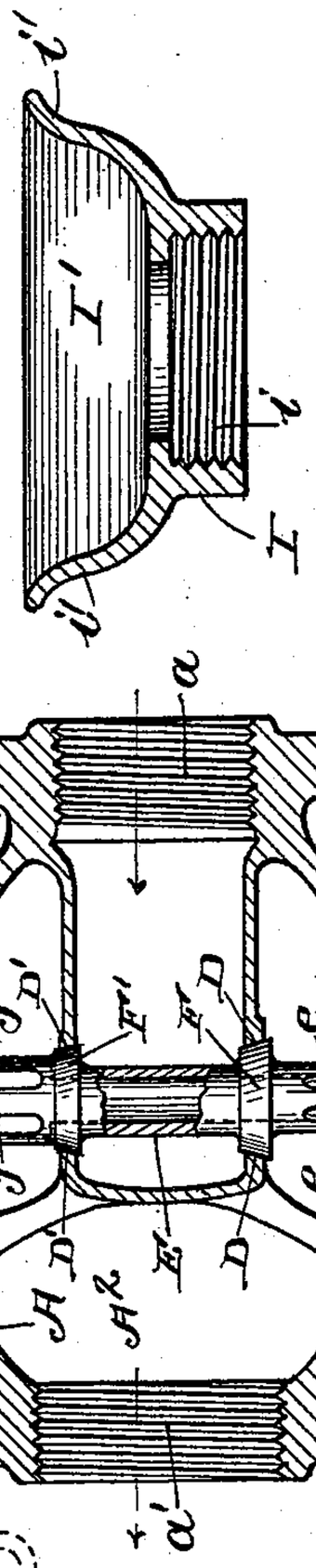



Fig. 2.

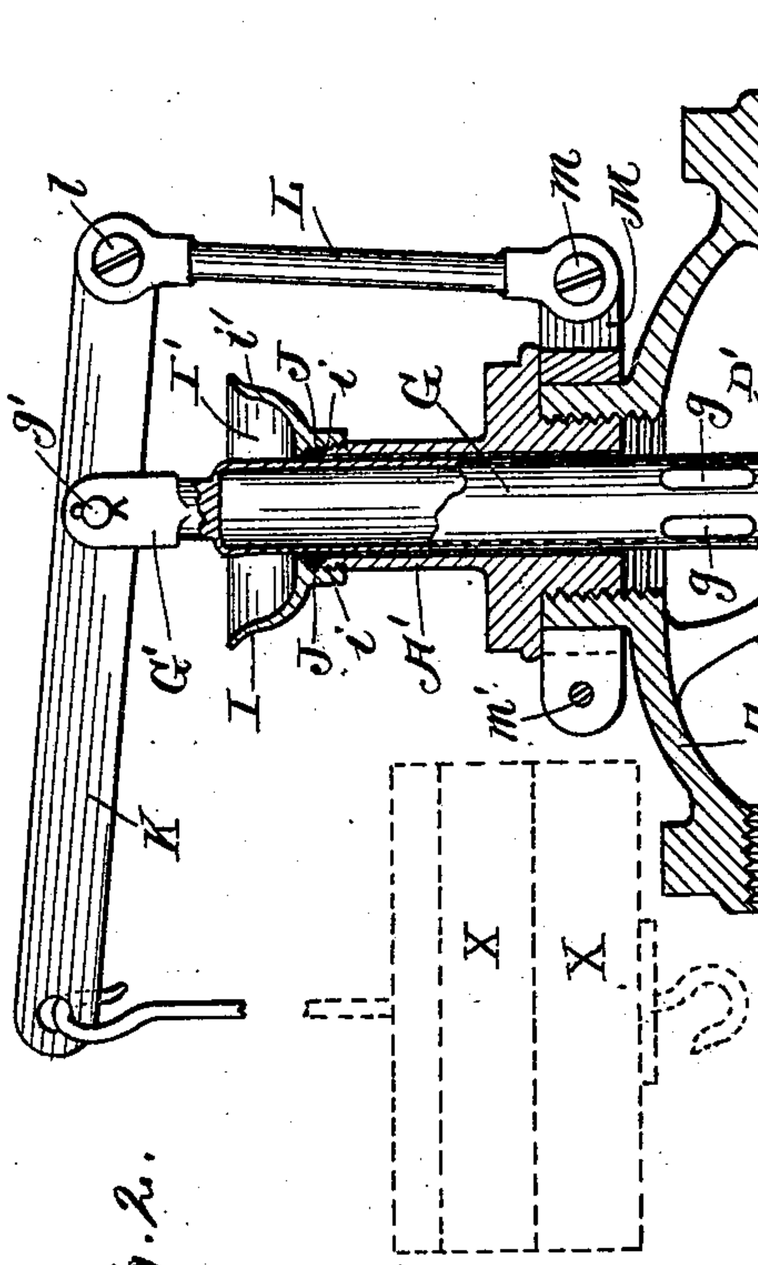
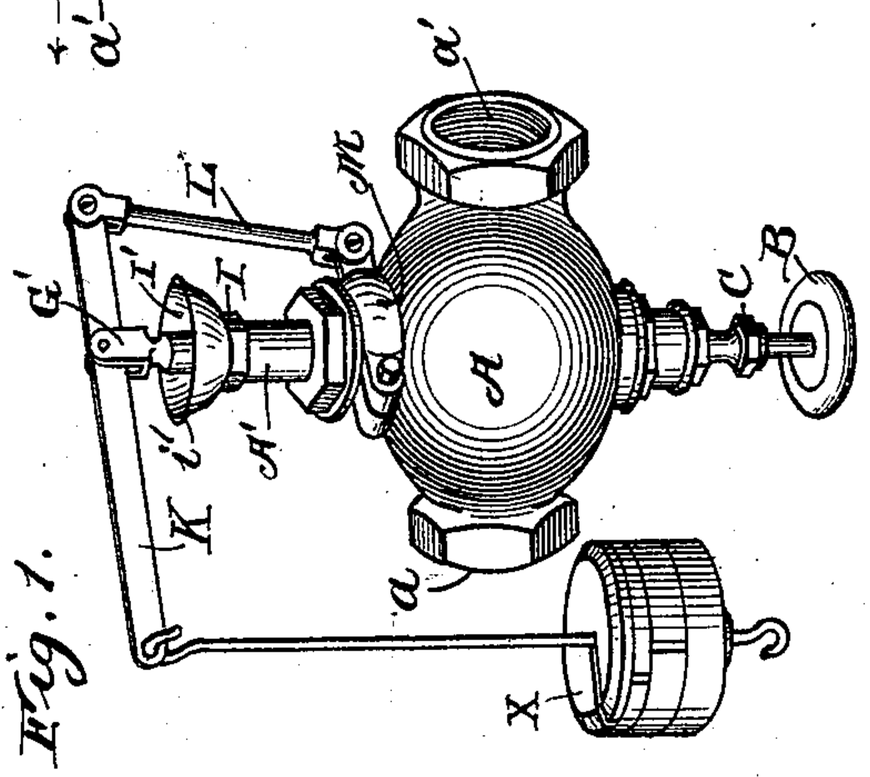



Fig. 1.




Witnesses:
R. J. Jacker.
Charles P. Monash

Inventor:
Fred H. Searles,
By Charles Turner Brown
Atty

# UNITED STATES PATENT OFFICE.

FRED H. SEARLES, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE VAN AUKEN STEAM SPECIALTY COMPANY, OF SAME PLACE.

## FLUID-PRESSURE REDUCER.

SPECIFICATION forming part of Letters Patent No. 552,264, dated December 31, 1895.

Application filed February 2, 1895. Serial No. 537,103. (No model.)

*To all whom it may concern:*

Be it known that I, FRED H. SEARLES, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pressure-Reducers for Steam, Air, and Gas Pipes, as well as Conduits for Liquids, of which the following is a specification.

The invention relates to the class of devices termed "pressure-reducers," or "pressure-regulators," designed to be interposed between the supply and delivery or using mains of a steam plant, of a compressed-air apparatus, or of a gas apparatus, and by means of which any desired pressure of steam, air or gas, respectively, is uniformly maintained in the using-mains, such uniform pressure being less than the pressure in the producing apparatus.

In the drawings accompanying and forming a part of this specification, Figure 1 is a perspective view of a pressure-reducer embodying the invention; Fig. 2, a vertical cross-section thereof, and Fig. 3 a cross-section of a combined stuffing-box and water-of-condensation receptacle.

A letter of reference applied to a given part is employed to designate such part throughout the several figures of the drawings, wherever the same appears.

A is the shell or casing of the pressure-reducer. *a* is the inlet thereof and *a'* the outlet.

A' is a tube or cylinder, open at both ends thereof, secured in shell A and communicating at its lower end with chamber $A^2$ in such shell. Chamber $A^2$ is on the outlet side of the shell A. $a^2$ is a well in chamber $A^2$.

B is a hand-wheel and *b* is the stem thereof.

*b' b'* are screw-threads on stem *b*, by means of which the stem is adjustably secured in place. By means of hand-wheel B the valve of this pressure-reducer can be closed and thereby steam shut off from the outlet side thereof, as will be hereinafter more fully described.

C is a stuffing-box through which the stem *b* extends, and C' is the packing of such stuffing-box.

D D' are valve-seats.

E is a hollow valve-stem having openings or holes *e e* therein.

F F' are valves rigidly secured on stem E, such valves respectively fitting the seats D D'.

It will be observed that the valve-seats D D' are flaring, (so that they may be properly ground,) as well as are the valves F F', respectively, and hence, the valve-stem being inserted from the lower side of the shell A before the stuffing-box C is secured in place, in the assembling of the several parts constituting the pressure-reducer, the larger diameter of the valve F' (being the upper one of the two valves F F') cannot be greater than the smaller diameter of the valve-seat D.

G is a cylinder closed at its upper end, mounted on valve F', and rigidly secured thereto, (or to the upper end of stem E.)

*g g* are openings in cylinder G. It thus occurs that the contents of chamber $A^2$ extend through holes or openings *e e* and hollow stem E into cylinder G, and also through holes or openings *g g* into such cylinder.

H is a piston secured rigidly to stem E, in such position as to be at all times in well $a^2$.

*h* is a spring-ring on piston H.

The well $a^2$ forms a collector of the water of condensation, if any there be, in chamber $A^2$, and in practice I find there is sufficient water of condensation in such well so that the well and the piston therein constitute a very effective dash-pot, preventing chattering in the working of the pressure-reducer. Any water of condensation in the well $a^2$ when the piston H is forced down thereinto can escape therefrom through the hollow stem E and holes *e e* into chamber $A^2$.

I is a nut having screw-threads *i i* therein fitting over corresponding screw-threads at the upper end of cylinder A', and I' is a receptacle for water of condensation formed by the escape of steam from chamber $A^2$ between the cylinder G and the walls of such cylinder A'. Receptacle I' is formed by the rim *i'* around the nut I. The water of condensation in receptacle I' forms a water-packing tending to prevent the escape of steam from chamber $A^2$ between cylinder G and cylinder A'. In addition to such water-packing I construct the nut I so that it forms a stuffing-box, and J is additional packing contained in such stuffing-box. By this construction I obviate

the necessity of forcing the packing J against cylinder G so firmly or close as to cause frictional resistance to the longitudinal movement of such cylinder, as any steam escaping through the stuffing-box formed by the nut I will form water of condensation in the receptacle I′ and prevent any excessive escape of such steam.

When the stem *b* hereinbefore described is forced by the turning of hand-wheel B in one direction against the lower end of piston H, and such piston, together with stem E, is thereby raised to close the valves F F′ on their respective seats D D′, none of the contents of the supply apparatus can pass or extend from inlet *a* into chamber $A^2$. The pressure-reducer then constitutes in effect a simple double-balanced globe-valve. When the stem *b* is retracted from stem E, by turning hand-wheel B in the opposite direction to that last above referred to, the pressure of the contents of inlet *a* on valves F F′ is substantially equal, because of the smaller diameter of valve-seat D being the same as the larger diameter of valve-seat D′ and there being only flare enough to such valve-seats to enable a properly-ground joint to be made between such valve-seats and the valves F F′ fitting thereinto, respectively. The weight of the stem E, valves F F′, cylinder G and piston H will then tend to open such valves F F′ from their respective seats. Steam passing through such valves and seats and into chamber $A^2$ will extend through holes or openings *e e* and hollow stem E, and also through holes or openings *g g*, into the cylinder G and will tend to raise the cylinder. The raising of the cylinder will close the valves F F′ secured thereto as hereinbefore described.

To enable one to maintain the desired pressure of steam in chamber $A^2$ and outlet *a′*, (and a greater pressure than will occur before the cylinder will be raised and valves closed, as last above described,) the cylinder G is weighted—that is, held down with suitable force by the weights X X, (indicated by dotted lines,) suspended from lever K. Lever K is fulcrumed on link L by pivot *l* and is connected to cylinder G by pivots *g′* in standards G′ G′, secured on the top of cylinder G. Link L is pivoted at its lower end on adjustable ring-standard M by pivot *m*. *m′* is a set-screw or tightening-screw by means of which standard M is firmly secured in position after adjustment.

It is to be observed that the stem E, valves F F′, cylinder G and piston H, being all rigidly secured together and longitudinally movable, are also rotatable in the shell A. Hence the standard M may be turned on shell A so that lever K, link L and weights X X are in any desired position relative to the line of pipe in which the pressure-reducer is interposed, and that then the ring-standard M can be firmly secured in place. This construction I find to be of great practical use and advantage, as I am often thereby enabled to place the pressure-reducer in position without cutting timbers or other woodwork, where otherwise (that is, without the adjustment thus afforded) the cutting of timbers or other woodwork would be necessary.

The number of weights X X is changed to correspond with the change of pressure desired in the chamber $A^2$ and outlet *a′*.

It will be observed that the reason for making the stem E hollow from the openings *e e* therein to the top thereof is that the water of condensation formed under the cylinder G may readily extend through such stem and into the well $a^2$, as well as for the obtaining of a passage-way for steam from chamber $A^2$ to underneath the cylinder G, and that the reason for making such stem hollow from the passage-ways *e e* to the end of the stem in the well $a^2$ is, principally, that the water of condensation in such well may escape therefrom when the piston H is forced down by the movement of the valve. It follows that the passage-way in the stem E from the openings *e e* to the top of the stem may be omitted, if desired, as the water of condensation in or under the cylinder will run out therefrom into the chamber $A^2$ even if such passage-way be omitted through the stem; but the passage-way in the stem from the openings *e e* to the end of the stem in the well cannot be omitted. It will also be noticed that stem *b*, by means of hand-wheel B, can be adjusted so that the longitudinal movement of the stem E and valves F F′ is limited to any desired extent. The valves F F′ of course are allowed sufficient movement off their respective seats to maintain a sufficient supply of steam in the outlet *a′* and chamber $A^2$.

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

1. In a pressure reducer, the combination of a chamber having an inlet and an outlet, a double seated valve interposed in the inlet, an upright cylinder communicating with the chamber, a cylinder closed at the upper end connected to the valve, such cylinder having openings thereinto and being longitudinally movable in the upright cylinder and with the upper end thereof exposed to atmospheric pressure, and means for applying a determined pressure on the longitudinally movable cylinder tending to open the valve; substantially as described.

2. In a pressure reducer the combination of a chamber having an inlet and an outlet, a double seated valve mounted on a hollow stem interposed in the inlet, openings from the chamber to the passage way in the hollow stem, an upright cylinder communicating with the chamber, a cylinder closed at its upper end connected to the valve, such cylinder having openings thereinto and being longitudinally movable in the upright cylinder and with the upper end thereof exposed to atmospheric pressure, and means for applying a determined pressure on the longitudinally

movable cylinder tending to open the valve; substantially as described.

3. In a pressure reducer the combination of a chamber having an inlet and an outlet, a double seated valve mounted on a hollow stem interposed in the inlet, openings from the chamber to the passage way in the hollow stem, an upright cylinder communicating with the chamber, a cylinder closed at its upper end connected to the valve, such cylinder having openings thereinto from the chamber and being longitudinally movable in the upright cylinder, means for applying a determined pressure on the longitudinally movable cylinder tending to open the valve, a well in the chamber, and a piston on the hollow stem moving longitudinally in the well by corresponding movement of the valve and stem; substantially as described.

4. In a pressure reducer the combination of a chamber having an inlet and an outlet, a double seated valve interposed in the inlet, an upright cylinder communicating with the chamber, a cylinder closed at its upper end connected to the valve, such closed cylinder having openings thereinto from the chamber, means for applying a determined pressure to the closed cylinder tending to open the valve, and a stuffing box on the upper end of the upright cylinder consisting of an ordinary packing device and a rim forming a receptacle for water of condensation disposed to form a water packing to the closed cylinder above the ordinary packing referred to; substantially as described.

5. In a pressure reducer the combination of a chamber having an inlet and an outlet, a double seated valve mounted on a hollow stem interposed in the inlet, openings from the chamber to the passage way in the hollow stem, an upright cylinder communicating with the chamber, a cylinder closed at its upper end connected to the valve, such closed cylinder having openings thereinto from the chamber and being longitudinally movable in the cylinder, means for applying a determined pressure on the closed cylinder tending to open the valve, a well in the chamber, a piston on the hollow stem moving longitudinally in the well by corresponding movement of the valve and stem, and a stuffing box on the upper end of the cylinder consisting of an ordinary packing device and a receptacle thereover for the water of condensation, such receptacle so disposed that the water of condensation therein forms a water packing above the ordinary packing referred to, substantially as described.

6. In a pressure reducer the combination of a piston longitudinally movable in and extending above an upright cylinder communicating with the chamber of such pressure reducer, and a stuffing box on the upper end of the cylinder consisting of an ordinary packing device and a receptacle thereover for water of condensation, such receptacle so disposed that the water of condensation therein forms a water packing to the piston above the ordinary packing referred to; substantially as described.

7. In a pressure reducer the combination of a piston longitudinally movable in and extending above an upright cylinder, such cylinder communicating with the chamber of the pressure reducer, a ring standard surrounding the cylinder near the base thereof and adjustable on the shell of the machine, means for securing the ring standard in position when adjusted, a lever connected to the ring standard by an intervening link, and to the piston by a pivotal connection, and weights suspended on the lever; whereby such lever, link, and ring standard can be adjusted in reference to the axial line of the pipe in which the pressure reducer is interposed; substantially as described.

8. In a pressure reducer, the combination of a chamber having an inlet and an outlet and an upright cylinder communicating with the chamber, of a valve interposed in the inlet, a cylinder closed at its upper end mounted on the valve, such closed cylinder having openings thereinto and being longitudinally movable in the upright cylinder, a ring standard surrounding the upright cylinder near the base thereof and adjustable on the shell of the machine, means for securing the standard in position when adjusted, a lever fulcrumed to the ring standard and connected to the closed cylinder, and means for forcing the lever against the closed cylinder, thereby tending to open the valve interposed in the inlet; substantially as described.

FRED H. SEARLES.

In presence of—
ALX. SCHLOESSENBERG,
CHARLES TURNER BROWN.