No. 707,651. Patented Aug. 26, 1902.

R. W. SEYER & F. PRATT.

FLUID PRESSURE REGULATOR.

(Application filed Nov. 27, 1901.)

(No Model.)

Fig. 1.

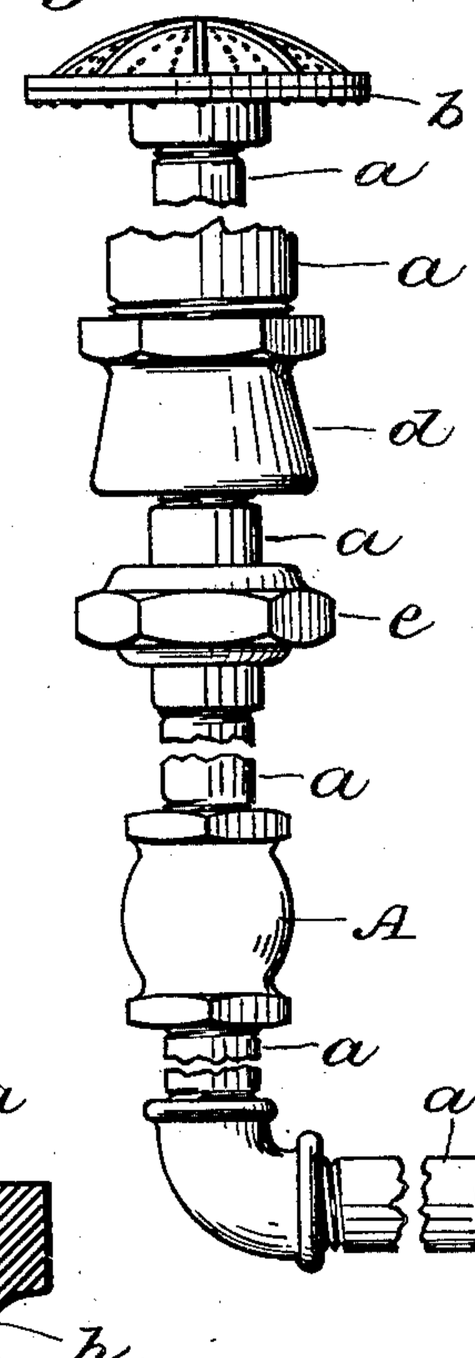


Fig. 2.

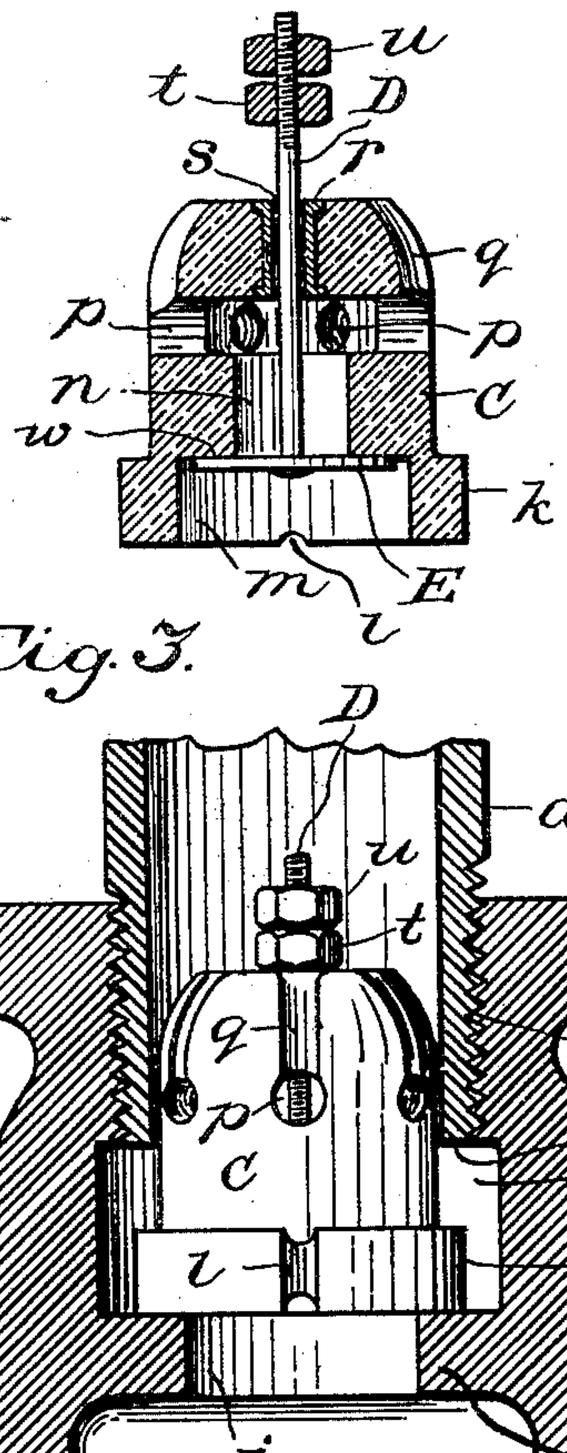


Fig. 3.

Fig. 4.

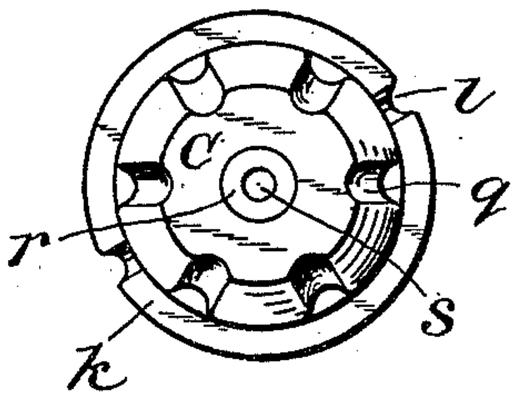
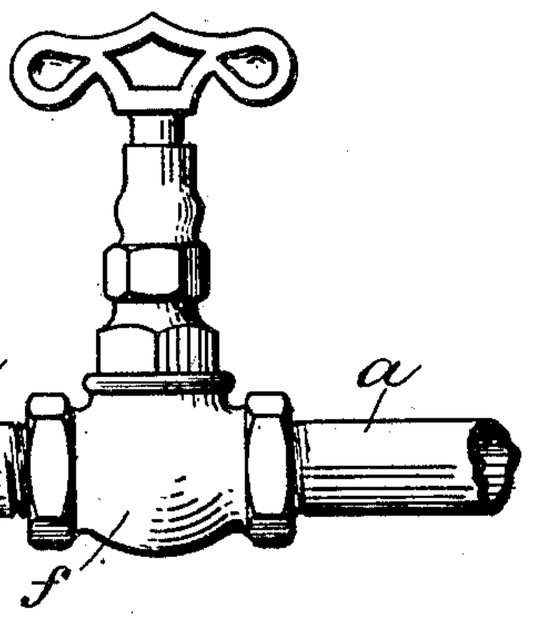
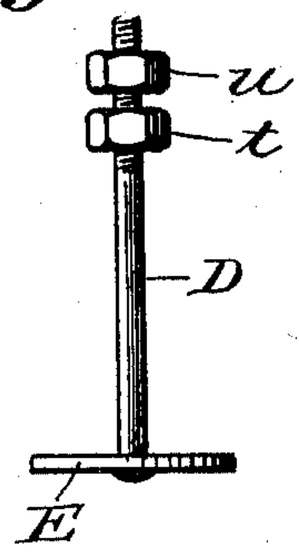


Fig. 5.





WITNESSES:

L. H. Sickels.

F. P. Mertz.

INVENTORS:

Rob't W. Seyer,

Frank Pratt,

BY E. P. Silvius,

ATTORNEY.

UNITED STATES PATENT OFFICE.

ROBERT W. SEYER AND FRANK PRATT, OF INDIANAPOLIS, INDIANA.

FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 707,651, dated August 26, 1902.

Application filed November 27, 1901. Serial No. 83,826. (No model.)

To all whom it may concern:

Be it known that we, ROBERT W. SEYER and FRANK PRATT, citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Fluid-Pressure Regulators, of which the following is a specification.

The invention relates to automatic regulators that are designed to be used in pipe-lines in which fluid passes under varying pressures, and it has particular reference to the regulation of the flow of natural gas in the distributing-pipes leading to the gas-burners commonly used, the object being to provide a simple, cheap, and reliable regulator that may be employed in lines where the gas has a low pressure in the day-time and an increased pressure during nights to avoid the danger of conflagrations due to overheating of stoves or furnaces when the pressure increases to a degree above that at which the stop-cock may have been adjusted to insure safety, the usual practice being to permit fires to burn continually. In this practice it has been necessary to readjust the stop-cock or valve each evening and morning on account of there being more day than night consumers, resulting in fluctuations of pressure. In many cases the pressure may increase during the absence of attendants or after they may have retired for the night, thus increasing the danger, and our aim is to obviate these difficulties.

The above-mentioned objects and others not hereinbefore referred to are fully attained in the invention herein described and disclosed in the drawings forming part of this specification, reference being had to the several figures and the reference characters indicating corresponding parts in the various views.

Referring to the drawings, Figure 1 illustrates in fragmentary elevation so much of a gas-pipe line as has connection with our invention, a gas-burner and fragment of connecting-pipe being shown on a reduced scale in operative relation to the other parts; Fig. 2, a central vertical sectional view showing the main and secondary valves or principal operative elements, which will be more particularly described hereinafter; Fig. 3, a central vertical sectional view of the regulator as a whole, the movable or operative valves or parts within the case being shown in elevation; Fig. 4, a top plan view of the main valve, and Fig. 5 a view in elevation of the secondary valve and its stem.

In the drawings, *a* represents the distributing-pipe; *b*, a suitable burner at which the gas flowing from the pipe is to be consumed; *d*, a gas and air mixer; *e*, a pipe-union; *f*, a stop-valve in common use for stopping the flow of gas and for manually regulating the flow when the gas may have been thereby permitted to flow; and A represents the case and main body portion of the regulator, which may be connected in the pipe-line *a* at any suitable point.

It being desired that the gas be delivered to the burner at all times at a uniform volume and pressure without requiring further adjustment of the stop-valve after it may have been fully opened, we provide in the case of the regulator a main valve, in which is mounted a secondary valve of suitable construction, so designed that both valves may and the secondary valve shall permit the full flow of gas when its pressure and velocity is low in degree and so that when the pressure increases slightly the secondary valve will close and a further increase of pressure nearly close the main valve, the latter being so designed as to permit an arbitrarily-limited flow of gas after being in closed position, so that no danger may arise by reason of an abnormally-high pressure of gas while permitting the burner to receive approximately the proper amount of gas to maintain a low rate of combustion and provide a fair amount of heat for night-time comfort and convenience.

Specifically the case A of the regulator may be made in any suitable hollow form, having the ends at its orifices designed to be connected, as by threads *h*, to the pipes with which it may be used, and it has an internal stop member B, formed as an annular rib extending from the wall of the case toward the axis of the bore *i*. This stop may be variously formed, however, without altering its func-

tions, provided that the upper face thereof may be capable of use as an imperfect or rough seat for the main valve. Above the stop B is a chamber *j*, somewhat greater in diameter than the bore *i*.

The main valve C is preferably composed of material having comparatively little weight—such as cork, rubber, or the like substance, or aluminium—and it is substantially circular, the lower end thereof having an external flange *k*, which is designed to operate in the chamber *j*. In some cases the flange *k* has a small leakage-groove *l* to permit the gas to pass around the main valve; but this may not always be desirable, depending upon the character of the finishing-work in construction. Within the lower end is a valve-chamber *m*, at the upper end of which is a valve-seat *w*, preferably rough cast, so that there may be a slight leakage of gas. Above the chamber *m* is a smaller chamber *n*, the upper part of which is connected by lateral ducts *p*, and grooves *q* extend upwardly from the outer orifices of the ducts in the outer side of the main valve, the top of the main valve having a central aperture *s*, in which preferably is a bushing *r*. The case A has a suitable stop to limit the upward movement of the main valve, and such stop may be most cheaply provided by utilizing the inserted end *v* of the pipe *a*, against which the flange *k* may bear.

The secondary valve E is preferably made in the form of a metallic disk, having a guide-stem D, the stem extending through the chamber *n* and the aperture *s*, while the valve is situated in the chamber *m*. The upper part of the stem D usually has a stop-nut *t* and a locking-nut *u*; but the upper end of the stem may be simply upset to form a head for preventing the withdrawal of the stem D and the valve E from the main valve.

In the finishing of the parts accurate machine-work is unnecessary. The main valve C may be slightly flexible, and the lower end thereof, as well as the top of the flange *k*, need not have true surfaces; but if true valve-seats are made then the leakage-groove will be required.

In practical use suppose that the stop-valve *f* be opened at a time when the gas is under low pressure, the valve C having previously fallen upon the stop member B and the valve E descended from its seat *w*, so that there would be a clear passage for the gas in economical and safe quantity around the valve E through the chambers *m* and *n* and thence through the ducts *p* and pipe *a* to the burner, the proper proportions being calculated when forming the passages. Should the gas-pressure increase, so that a possibly dangerous heat might result, the valve E will be forced up against its seat by reason of the increased velocity of the flow of gas, the valve and its stem being extremely light in weight. The passage being now nearly closed, the gas must pass under the main valve C, over the stop member B, and around the outside of the upper portion of the valve C in small volume or through the groove *l*, if one be provided. If the pressure further increase, the valve C will be "flirted" or pushed up, so that the flange *k* will engage the stop-face *v*, and then the gas must slowly flow over the rough surfaces of the flange and its stop member or through the groove *l*, if there be one, the quantity of gas thus flowing being sufficient for economical and safe use. In most cases the valve C will rise soon after the closing of the valve E. Should the valve *f* be opened during high pressure, the automatic valves will immediately operate as above described. If the valve *f* be closed, the automatic valves will descend until arrested by their stop members.

Having thus described our invention, what we claim as new is—

1. A fluid-pressure regulator including a hollow case having a chamber and opposing stop members, a main valve having a valve-seat therein and a passage-way therethrough and operating between the opposing stop members, and a secondary valve mounted in the main valve below the seat therein.

2. A fluid-pressure regulator including a hollow case, a main valve in the case composed of flexible material having a passage-way therethrough and a valve-seat, a secondary valve mounted in the main valve opposite the valve-seat, and stop members limiting the movements of the valves.

3. A fluid-pressure regulator including a case, a flanged main valve mounted in the case and adapted to permit the passage of fluid under low pressure and to be actuated by increased pressure, a stop member in the path of the valve-flange adapted to be engaged thereby whereby the flow of fluid may be limited, a passage-way through the main valve, and a secondary valve mounted in the main valve opposite the inlet-orifice of the passage-way.

4. In a fluid-pressure regulator, the combination of the case having the internal annular stop member, the opposing stop member, a main valve seated against the annular stop member and adapted to be moved against the opposing stop member, a passage-way through the main valve, a secondary valve carried by the main valve opposite the inlet-orifice of the passage-way, a stem attached to the secondary valve and extending through the passage-way, a stop member attached to the stem, and a duct extending from the passage-way to the exterior of the main valve.

5. In a fluid-pressure regulator, the combination of the hollow case, the main valve having the valve-chamber in the lower part thereof and the smaller chamber above the valve-chamber, the annular external flange

on said valve, the passage-way through said valve, the secondary valve mounted in said valve-chamber, the valve-stem, the stop member on said stem, and the stop members limiting the movements of said main valve whereby when engaged by said flange the flow of the fluid through the case shall be limited.

In testimony whereof we affix our signatures in presence of two witnesses.

ROBERT W. SEYER.
FRANK PRATT.

Witnesses:
E. T. SILVIUS,
WM. H. PAYNE.