

(No Model.)

M. W. KIDDER.
GAS PRESSURE REGULATOR.

No. 376,313.

Patented Jan. 10, 1888.

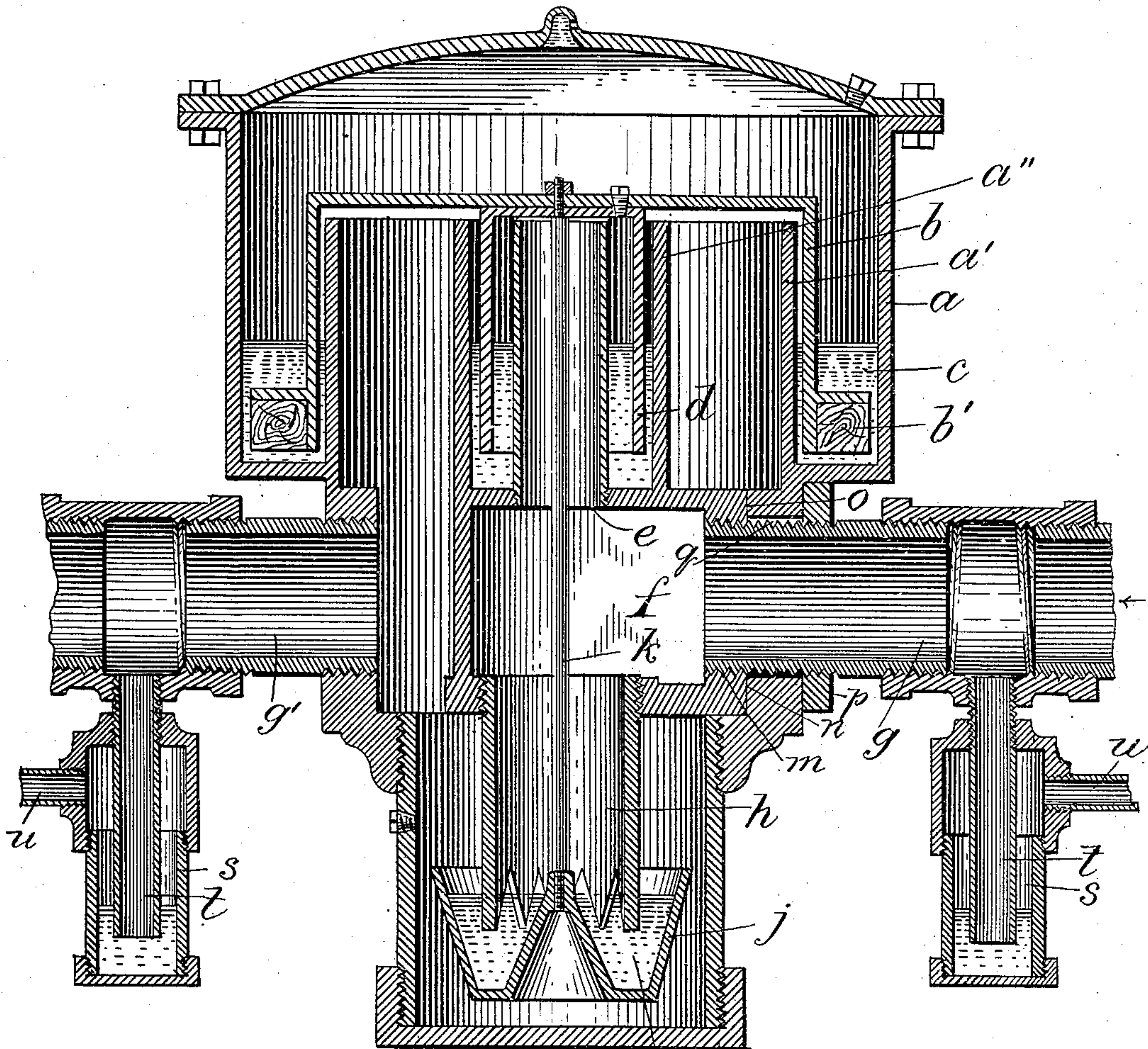


Fig. 1.

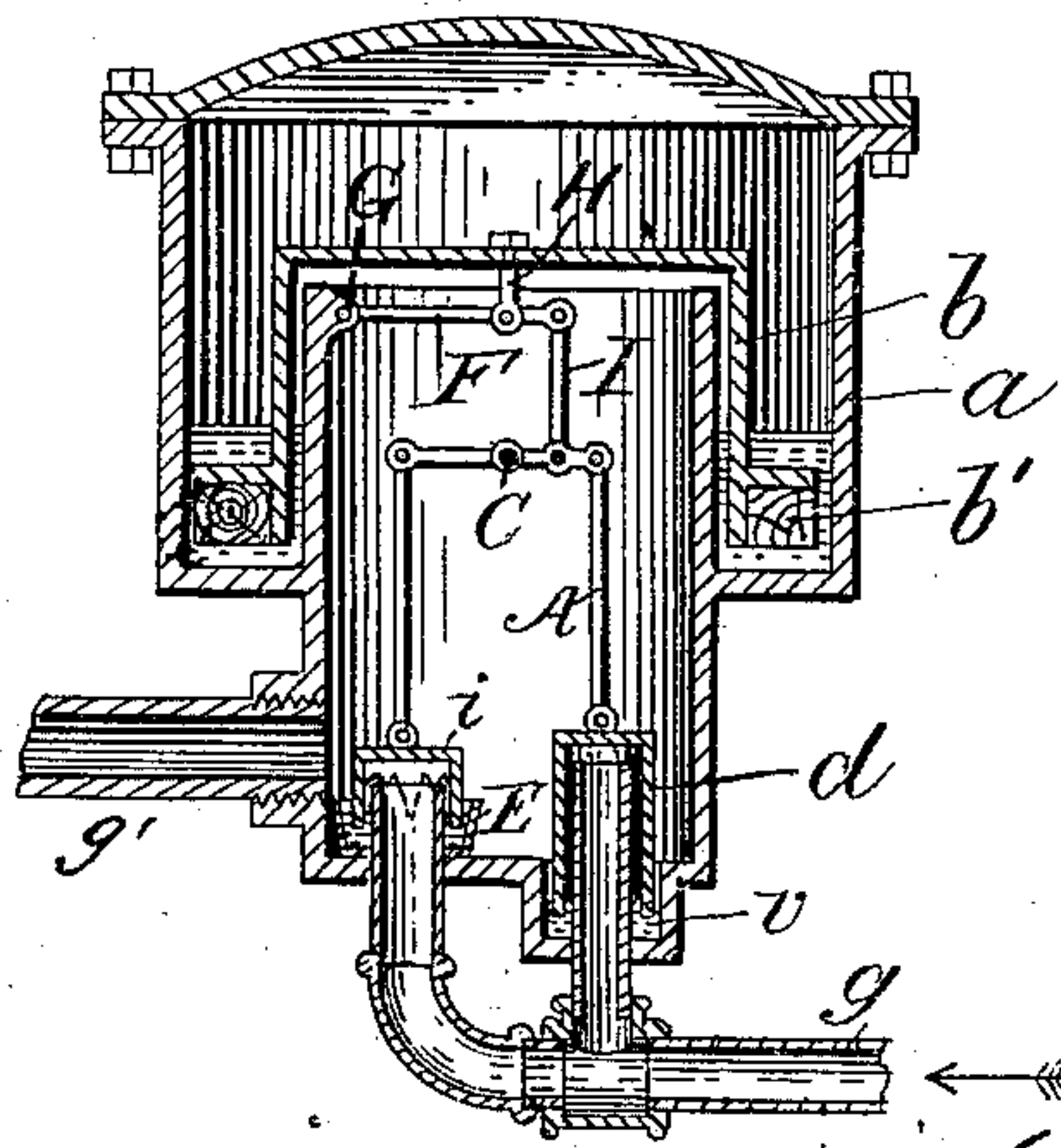


Fig. 2.

WITNESSES
H. Brown.
Richd. H. Jones

INVENTOR
M. W. Kidder
by
N. B. Brown & Co.
Atty.

UNITED STATES PATENT OFFICE.

MOSES W. KIDDER, OF LINCOLN, ASSIGNOR TO PERSON NOYES, OF LOWELL,
MASSACHUSETTS.

GAS-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 376,313, dated January 10, 1888.

Application filed April 30, 1887. Serial No. 536,663. (No model.)

To all whom it may concern:

Be it known that I, MOSES W. KIDDER, of Lincoln, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Gas-Pressure Regulators, of which the following is a specification.

The object of this invention is to provide a gas-pressure regulator adapted to be used with gas containing a large proportion of impurities and calculated to operate under very high pressure, such as natural gas is liable to, in which the pressure of the gas shall be reduced to an economical point, or to such a point that it can be burned at an economical pressure; also, to prevent escape of gas through the regulator by undue and unforeseen pressure, such as natural gas is liable to.

To these ends my invention consists in the several improvements, which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a sectional view of a regulator embodying my improvements. Fig. 2 represents a sectional view of a modification of a somewhat different construction.

The same letters of reference indicate the same parts in both the figures.

In the drawings, *a* represents the casing or chamber which contains the floating gas-holder *b*, the latter being an inverted cylindrical receptacle floating in mercury contained in an annular reservoir, *c*, between the external wall of the casing *a* and an inner cylindrical wall, *a'*, extending upwardly from the bottom of the casing *a*. Within the inner wall, *a'*, is a second cylindrical wall or reservoir, *a''*, having a closed bottom and adapted to contain mercury. Into the inner reservoir, *a''*, projects an inverted cup, *d*, the lower portion of which is immersed in the mercury contained in said inner reservoir, said cup being attached to the gas-holder *b*. A tube, *e*, extends through the inner reservoir, *a''*, and communicates with a chamber, *f*, into which the gas enters from the supplying-pipe or street-main *g*. From said chamber extends downwardly a pipe, *h*, which is affixed to the casing. The lower end of said pipe is provided with serrations, which constitute what

may be termed a "serrated valve-seat," arranged in operative relation to a mercury-valve, *i*, said valve being a mass of mercury held in an annular cup, *j*, which is attached to and supported by a rod, *k*, secured to the gas-holder *b* and passing through the tube *e*, chamber *f*, and pipe *h*. The mercury-valve, therefore, rises and falls with the gas-holder. The serrated valve-seat is partially immersed in the mercury-valve when the gas-holder is depressed to the lowest point, as shown, and the notches or openings in said valve-seat are closed by the mercury more or less as the cup rises and falls.

The inner cup, *d*, and pipe *h* are of the same area in cross-section, so that the gas-pressure on the cup is the same as that on the mercury-valve, and thus variations of pressure in the main pipe are automatically corrected.

The chamber *f* and inner mercury-reservoir, *a''*, are parts of an inner casing, which has a threaded orifice, *m*, into which the threaded supply-pipe *g* is screwed, and an annular flat seat, *n*, surrounding said orifice. The outer casing, *a*, has an unthreaded orifice, *q*, coinciding with the orifice *m*, and a seat, *o*, surrounding the orifice *q* and adapted to fit closely against the seat *n*. A jam-nut, *p*, on the pipe *g* outside of the casing is turned up against said casing and draws the seat *n* closely against the seat *o*, so that a tight joint is formed between said seats, a suitable packing of red lead or other like material being employed.

To make the gas-holder *b* buoyant and counterbalance in a measure the parts supported by it, I provide its lower edge with an enlargement, *b'*, of wood or any material having a less specific gravity than mercury, said enlargement being immersed at all times in the mercury contained in the outer reservoir, *c*.

In using the regulator for natural gas, which is subject to sudden fluctuations of pressure, I provide the supply-pipe or service-main with a safety valve or trap composed of a cup, *s*, having mercury in its lower portion, a pipe, *t*, extending down from the service-main and sealed in said mercury, and an escape-pipe, *u*, leading from the cup above the mercury seal, said pipe extending to any suitable point outside of the building. The service-main *g'* may have a similar safety-trap, as shown.

When the gas-holder is raised by the gas-pressure, it raises the mercury-valve *i* and covers or partially covers the serrated end of the pipe *h*, thus shutting off the gas wholly or in part from the gas-holder *b*. As the pressure in the service-main is reduced the gas-holder descends, opening the serrated end of pipe *h* and allowing more gas to pass. The pressure is thus maintained at a nearly uniform point.

10 The smaller cup or gas-holder *d*, having an area equal to that of the pipe *h*, receives the same pressure upward as that exerted on the mercury-valve downward, so that variations of pressure in the street-main are not felt by the gas-holder.

In the construction shown in Fig. 2 the counterbalancing-cup *d* is sealed by mercury in a cup, *v*, in the bottom of casing *a*, and is suspended by a rod, *A*, from one end of a lever, *B*, which lever is supported by a fixed fulcrum, *C*, attached to the casing *a*. From the opposite end of said lever *B* is suspended a valve, *i*, having a serrated lower edge partly immersed in a mercury-valve seat in a cup, *E*, on the bottom of casing *a*. A lever, *F*, pivoted at one end to a fixed fulcrum, *G*, and connected by a rod, *H*, with the gas-holder *b*, is connected at its opposite end with the lever *B* by a rod, *I*. The cup *d* and valve *i* receive the same gas-pressure from the service-main.

In this construction the pressure under the valve *i* is balanced by the pressure under the cup *d*, so that all variations of pressure in the street-main are automatically compensated for, the result being the same as in the construction shown in Fig. 1.

It will be observed that in either of the constructions herein shown and described the admission of gas to the holder is regulated by a body of mercury and a serrated tube, the end of which projects into the mercury, this arrangement constituting a mercury-valve which is free from the objection to ordinary rigid valves and valve-seats in this class of contrivances—viz., liability of the valve to adhere to its seat, in consequence of the tar or other

gummy matter deposited by the gas on the valve and seat.

I am aware that a mercury-valve is not new in a gas-pressure regulator; but I am the first, so far as I am aware, to combine it with a gas-holder and a compensating-cup. By this combination I obtain a very satisfactory apparatus, which does not require frequent cleaning.

I claim—

1. The combination of the gas-holder *b*, the compensating-cup *d*, the mercury-valve, the levers, fulcrums, and connecting-rods, whereby said valve and cup are connected with each other and with the gas-holder, as set forth.

2. The combination of the gas-holder *b*, the buoyant enlargement *b'* on the lower edge of said holder, the compensating-cup, and the mercury-valve, all arranged and operating substantially as and for the purposes set forth.

3. The combination of a gas-pressure regulator, the inlet-pipe *g*, the outlet-pipe *g'*, the branches *tt* on said pipes, the traps *ss*, receiving the ends of said branches, and pipes *uu*, for the escape of gas forced through said traps, as set forth.

4. The combination, in a gas-pressure regulator, of the exterior casing, *a*, having an unthreaded orifice, *q*, and a seat, *o*, surrounding said orifice, the inner casing having a threaded orifice, *m*, coinciding with the orifice *q*, and surrounded by a seat, *n*, the service main or pipe passed through the orifice *q* and screwed into the orifice *m*, and the lock-nut *p*, screwed upon said main or pipe and bearing on the exterior of the casing *a*, whereby a tight joint is formed between the seats *n* and *o* of the outer and inner casings, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 25th day of April, A. D. 1887.

MOSES W. KIDDER.

Witnesses:

C. F. BROWN,

A. D. HARRISON.