J. N. CHAMBERLAIN.

Pressure Governing Gas-Burner.

No. 209,021. Patented Oct. 15, 1878.

Fig 1

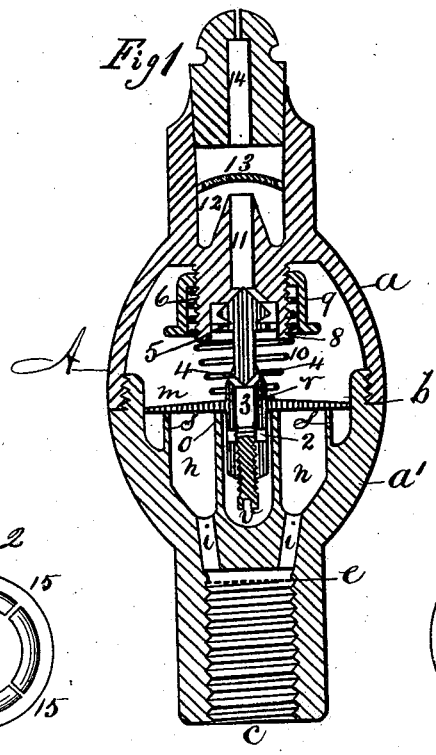


Fig 2

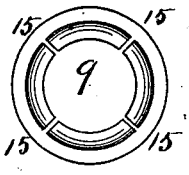


Fig 3

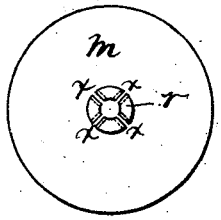
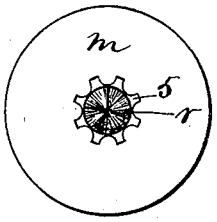


Fig 4



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IMPROVEMENT IN PRESSURE-GOVERNING GAS-BURNERS.

Specification forming part of Letters Patent No. **209,021**, dated October 15, 1878; application filed February 27, 1878.

To all whom it may concern:

Be it known that I, JOHN N. CHAMBERLAIN, of Springfield, county of Hampden, and State of Massachusetts, have invented certain new and useful Improvements in Pressure-Governing Gas-Burners, which improvements are fully set forth in the annexed specification and in the accompanying drawing.

My improved burner belongs to that class of burners which are provided with a movable valve in the interior, operated by the variable gas-pressure on the mains to deliver or burn nearly the same number of cubic feet per hour, whether the pressure be more or less, within ordinary limits.

In the drawings, which consist of four figures, Figure 1 is a vertical section of my burner complete. Fig. 2 is a plane view of a spring-adjusting nut. Fig. 3 is a view of the bottom of the disk and valve-stem. Fig. 4 is a top view of the valve-stem and collar.

A is the shell of the burner, divided transversely into two sections, *a* and *a'*, screwed together at *b*. *c* is the inlet to the burner. *i i* are two gas-passages. *e* is a gauze screen below the gas-passages *i i*. *n* is a receiving-chamber in the lower half of the burner. *o* is a tube-shaped socket in the center of chamber *n*. *s* is a lip formed on and around the interior of chamber *n*. *m* is a metallic disk. *r* is a hollow valve-stem, fixed in disk *m*. *v* is a regulating-screw in valve-stem *r*. 2 are gas-passages through the sides of valve-stem *r*, leading to a central gasway, 3, therein. 4 are outlet-gasways from gasway 3. 5 is a notched collar surrounding valve-stem *r*, a little below its top. 8 is a downwardly-projecting tube in the upper half, *a*, of the burner, on the outside of which is cut a screw-thread. 9 is an inverted cup-shaped nut, slotted from its top down, screwing onto tube 8, so fitted that an annular space, 6, is formed between them. 10 is a spiral spring. 11 is a gasway, its lower inlet end of a conical shape. 12 is a socket formed around the tube to gasway 11. 13 is a convex metallic shield, with a notched border, and 14 is the burner-tip.

Burners of this class have heretofore been made with flexible diaphragms, secured by their borders between portions of the burner-case; but such a construction requires that the diaphragms should be of some more flexible material than metal, such as rubber, leather, or oiled silk, and these materials become so much changed by long exposure to the action of gas that diaphragms made from them become inoperative.

To avoid the above-named inconvenient results, and with a view to securing the advantages pertaining to the diaphragm system, movable valves have been attached to thin inverted cups, which were fitted over hollow posts inside the burner-case, arranged to be lifted and dropped by variable gas-pressure; but the extent of frictional surface in these, and the liability to obstruction from the deposit of impurities in the gas, make such devices impracticable.

Other burners have been made with a gas-holder-shaped cup, carrying a valve, said cup operating in a cup of glycerine inside the burner; but this latter description of burner is liable to derangement from a deterioration of the quality of the glycerine, or its partial evaporation by long exposure to the action of gas; or, by some over-pressure of gas on the burner, the glycerine becomes displaced, and the burner ceases to operate to govern the flame, as it was intended to do, under varying pressures.

The object of my invention is to provide a gas-burner that shall obviate the above-named objections, by so constructing it that all the advantages of the diaphragm system may be enjoyed, and but few, if any, of its inconveniences encountered.

To accomplish this result, I attach my governing valve-stem *r* to a disk, *m*, which is made very nearly the same diameter as the interior of the section *a'* of the burner-case, and quite thin at its border, but not intended to prevent a certain flow of gas up around its border between the latter and the inner surface of section *a'*. Said disk is made of such thickness that its weight, including the valve-stem, which it carries, and its area, shall be proportional to the minimum pressure of gas in which it must operate, and lifts freely in, and by the upward flow of gas through, the burner, and falls when the pressure of the gas diminishes. The partial flow of gas around its border serves to prevent the deposit of

any dust at that point, and its operation is impeded by little, if any, frictional resistance.

The valve-stem *r* is fixed in disk *m*, and has a gasway, 3, drilled from its lower end up above the top of disk *m*. The lower end of said gasway is tapped to receive a regulating-screw, *v*, and said tapped portion has slots *x* cut therein.

Screw *v* is made slightly larger than the hole it screws into; but the slots *x* permit the portions of valve-stem *r* surrounding screw *v* to spring out as screw *v* is screwed into the stem, and the said spring action prevents said screw from being easily displaced when once set. Just under disk *m* are drilled in valve-stem *r*, from its outside, gas-passages 2, leading into gasway 3. By screwing screw *v* far enough up into valve-stem *r* its upper end partially closes gas-passages 2, and by this means the quantity of gas flowing through valve-stem *r* and out through gasways 4, above disk *m*, can be regulated, and the small flow of gas up around the border of disk *m*, and that passing through valve-stem *r*, combined, can be regulated by the means just described, so that the burner will consume as little as may be desired, or the full capacity of tip 14.

I construct my burner with the socket *o* therein, in which the lower end of valve-stem *r* operates, so that the action of the gas-pressure shall operate to lift the disk before it finds free passage through the valve-stem, the main flow of gas being up to the edge of socket *o*, thence over it and through the above-named gas-ways, through the valve-stem, into the chamber above the disk *m*.

The lip *s*, in section *a'*, is so formed that its edge is quite level with the top of socket *o*, and disk *m* is ground to a fit against the upper edges of lip *s* and socket *o*. Lip *s* is formed with a thin edge, so that no dirt may lodge thereon and prevent disk *m* from lying tightly against it.

Above disk *m* is a spiral spring, 10, arranged to force disk *m* down against socket *o* and lip *s* when the pressure on the gas-mains is reduced below a given point, and so totally extinguish the light. The notched collar 5, surrounding valve-stem *r*, has a diameter very nearly equal to the interior of inverted tube 8, and, while valve-stem *r* is by tube 8 guided vertically in its movements, the notches around its border permit the necessary flow of gas up by said collar.

The upper end of valve-stem *r* is cone-shaped, and when disk *m* is pressed upward by the gas said cone-shaped end approaches the lower end of gasway 11, and so enlarges or reduces the opening at the inlet end of said gasway, according to the pressure of the gas below disk *m*. Nut 9, having slots 15 sawed therein, so that it has a spring action against tube 8 to keep it in place and prevent it from turning, between which and tube 8 is an annular space, 6, is so arranged that one end of spiral spring 10 may enter and remain in said annular space, and nut 9 may be adjusted up and down, to cause said spiral spring to bear with more or less force upon disk *m*, according to the reduced pressure under which it may be desired that the light shall be extinguished, as heretofore explained.

Socket 12, surrounding the exit end of the upper gasway, 11, is provided for the purpose of catching any slight drip which may result from the contact of cool gas with the heated tip of the burner, and said drip is prevented from dropping into gasway 11 by convex shield 13, which has notches cut around its border to let the gas pass. Said shield also operates as a deflector and spreader of the gas-current, throwing it against the upper heated sides of the burner-case, and so serving in a measure to rarefy the gas before it is consumed, thus improving its quality for advantageous combustion; but said socket and shield devices are well known, and I do not claim them as new.

My improved burner, as just described, is a self-extinguishing one under a gas-pressure reduced to a predetermined degree, but continues to burn while a certain pressure is maintained. These functions of the burner are secured mainly by the combined operations of the lip *s*, disk *m*, spiral spring 10, and nut 9, in the following manner, viz: As above set forth, disk *m*, with valve-stem *r*, is lifted up by the gas-pressure, so that said disk does not touch the edges of lip *s* and tube *o*, and the bearing force of spiral spring 10 is so graduated as to bear upon the top of disk *m* with a force less than the lifting power of the maximum gas-pressure; but as soon as there is a reduction of gas-pressure below the weight power of said spiral spring the latter forces the disk *m* down against the edges of lip *s* and tube *o*, and the gas in chamber *n* can neither flow up around the border of disk *m*, nor over the top and into tube *o*, and thence through the valve-stem *r*, and consequently the light is extinguished.

I also employ the same combination of operating parts as above described, excepting lip *s*, when I make burners to be used in a horizontal position, as upon gas-fixtures for lighting billiard-tables, &c.; and in the latter case spring 10 is used, because with the burner in that position the disk and valve-stem cannot recede by gravitation.

When I make my improved burner for ordinary use, not as a self-extinguisher, but arranged so as to consume as nearly as possible a stated number of cubic feet of gas per hour under varying pressures, I omit from it nut 9, spiral spring 10, and lip *s* below disk *m*. Thus arranged, there is an unobstructed limited flow of gas up around the border of disk *m* from chamber *n*, and a main flow-passage through valve-stem *r*, as above set forth, and the operation of the said disk and valve by the gas-pressure to enlarge or reduce the gas-passage leading into gasway 11 is the same as hereinbefore set forth.

A great advantage which my burner pos-

sesses over others lies in the employment of disk *m*, carrying the valve-stem *r*, which has as nearly as possible a frictionless action in the upwardly-moving volume of gas. The area of surface presented by said disk to be operated upon by the passing gas, causes it to be suspended, as it were, in the gas-flow when the burner is lighted, and the greater the gas pressure below the disk, the nearer closed will be the inlet to the gasway 11, thus preventing an increase of flame and of gas consumption when the pressure is increased, and when the normal gas-pressure is reduced the flow becomes less rapid and the disk and valve recede slightly from said gasway 11, and so an equal light is maintained by a more voluminous but less rapid flow of gas.

I employ in the inlet *c* of the burner a wire-gauze screen, *e*, to prevent any dusty foreign substance from entering the burner.

What I claim as my invention is—

1. In a gas-burner, the freely-acting disk *m* and valve-stem *r*, operating in and surrounded by a flowing volume of gas by varying pressures, substantially as and for the purpose set forth.

2. The combination, with inlet *c*, chamber *n*, socket *o*, and disk *m*, of the gauze screen *e*, substantially as and for the purpose set forth.

3. The combination of disk *m*, valve-stem *r*, screw *v*, lip *s*, socket *o*, gas-passages 2, gasways 3 and 4, and section *a'* of the burner-case, substantially as and for the purpose set forth.

4. The combination of section *a'* of the burner-case, socket *o*, valve-stem *r*, screw *v*, disk *m*, and gasways 2, 3, and 4, substantially as and for the purpose set forth.

5. The combination of sections *a* and *a'* of the burner-case, of socket *o*, lip *s*, valve-stem *r*, screw *v*, gasways 2 3 4, spiral spring 10, nut 9, with its slots 15, and tube 8, substantially as and for the purpose set forth.

6. The combination, with valve-stem *r*, of notched collar 5 and tube 8, substantially as set forth, and for the purpose specified.

7. The combination of gasway 11, with its lower cone-shaped inlet end, of valve-stem *r*, terminating in a cone-shaped valve at its upper end, and disk *m*, substantially as and for the purpose set forth.

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Witnesses:
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