

(No Model.)

C. W. HOLTZER.

ELECTRIC GAS LIGHTING APPARATUS.

No. 378,677.

Patented Feb. 28, 1888.

Fig. 1.

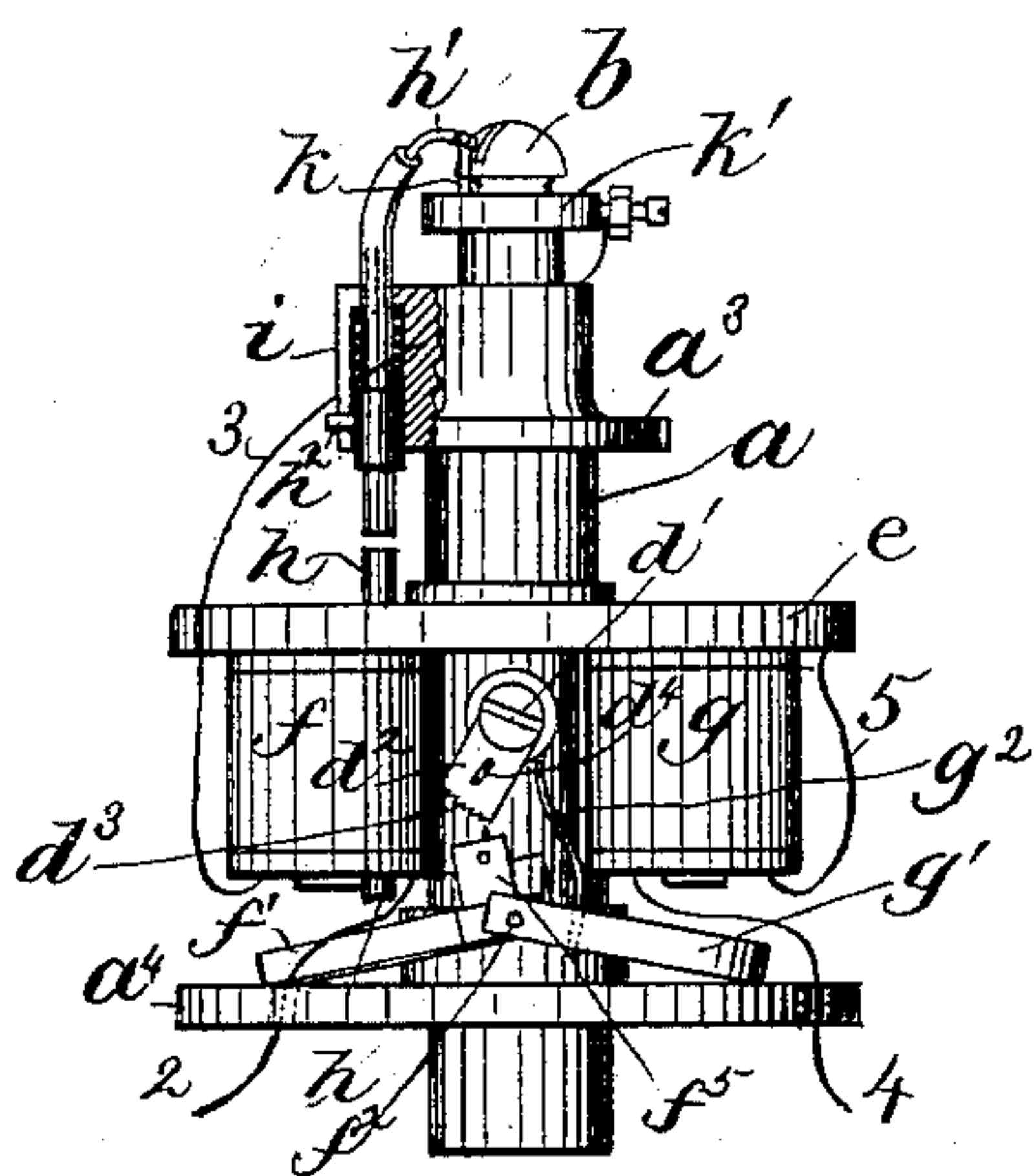


Fig. 2.

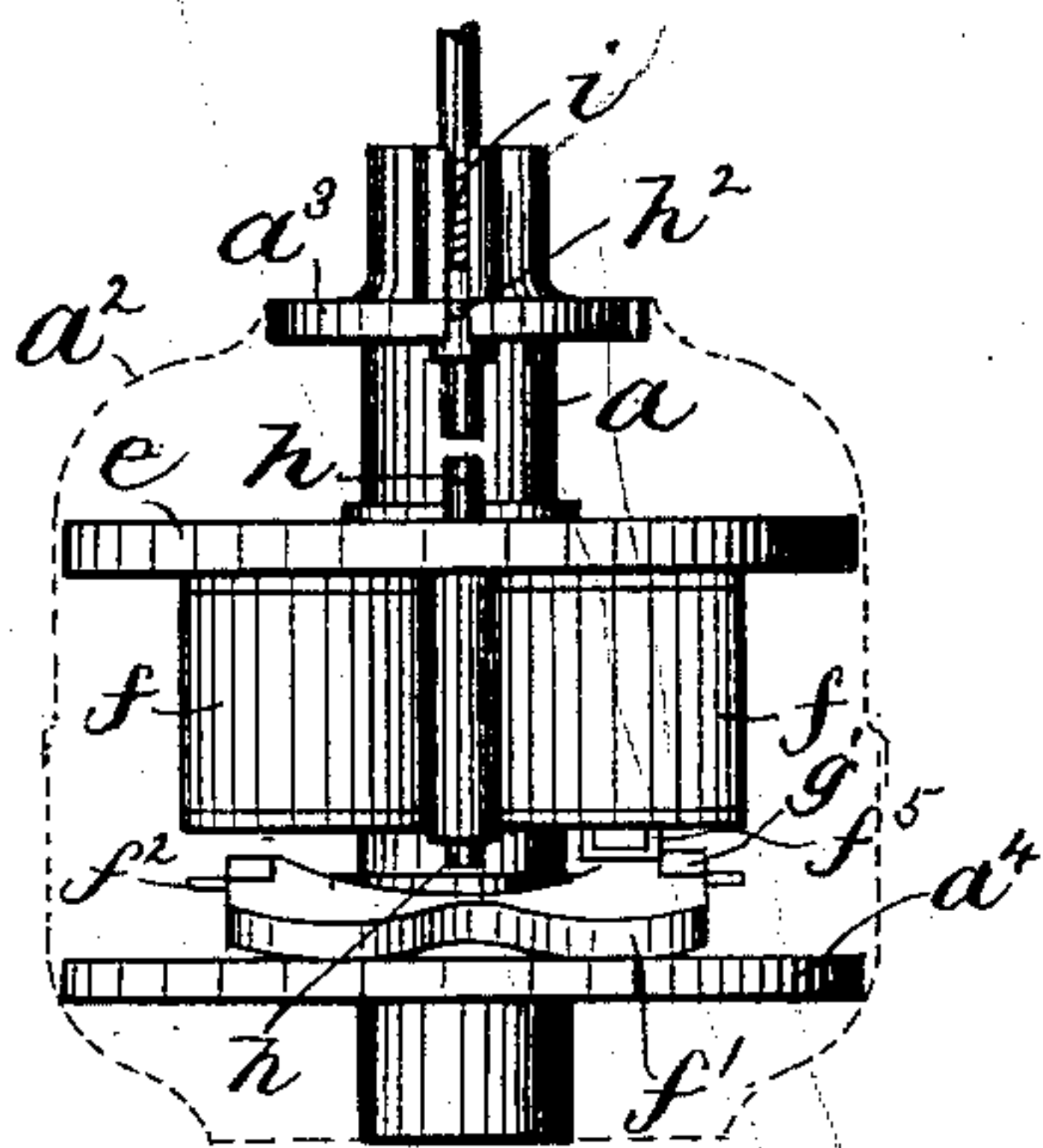


Fig. 3.

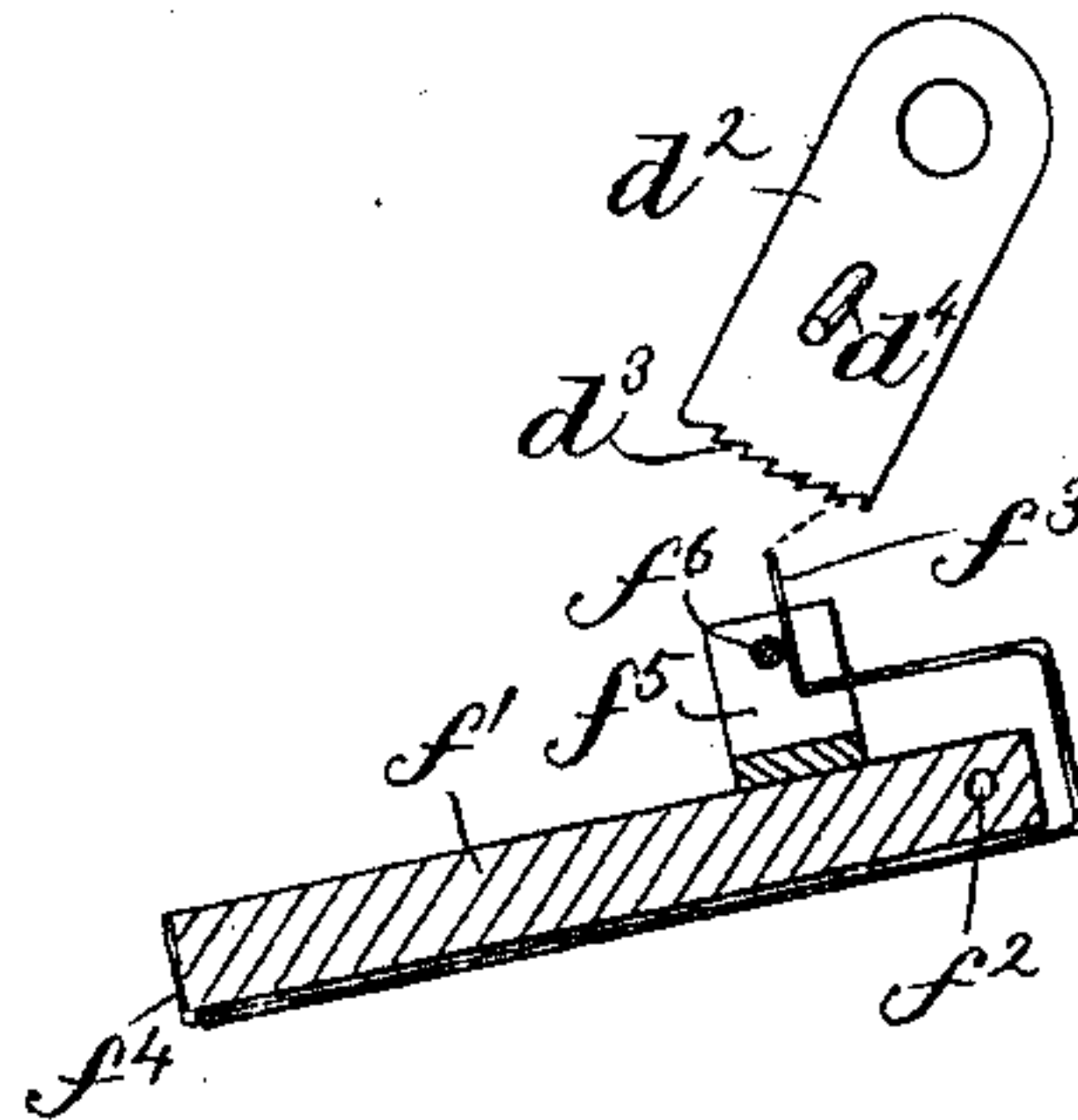
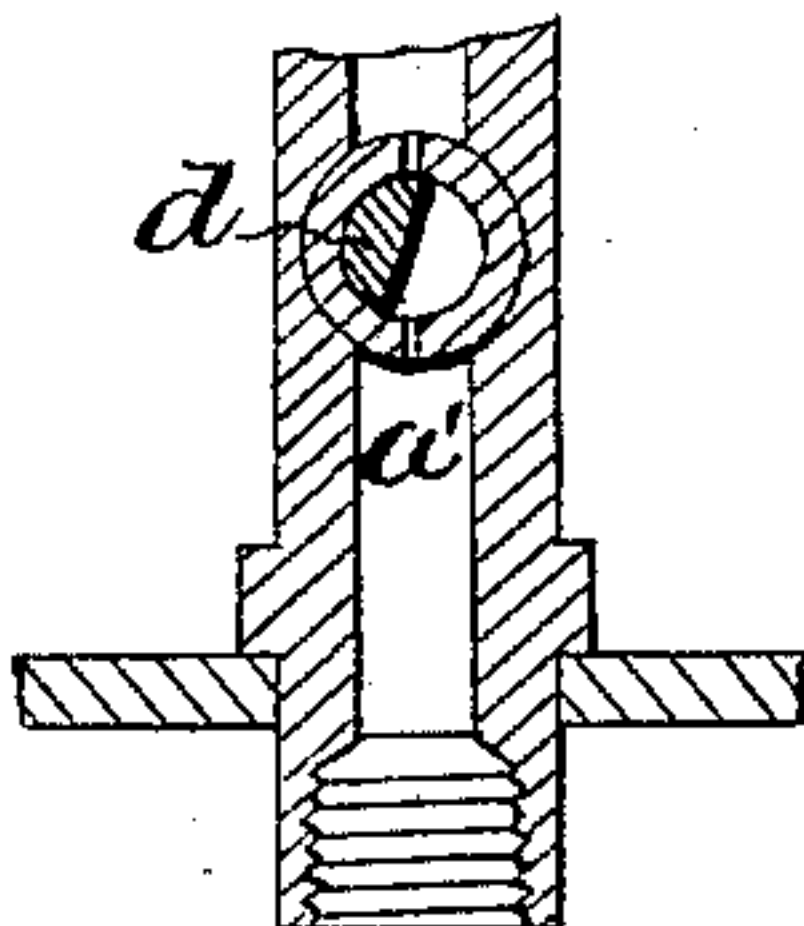


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTRIC GAS-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 378,677, dated February 28, 1888.

Application filed September 9, 1887. Serial No. 249,227. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. HOLTZER, of Brookline, county of Norfolk, State of Massachusetts, have invented an Improvement in Electric Gas-Lighting Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to an electric gas-lighting instrument of that kind in which the gas is automatically turned on and lighted by the action of an electric current which may be applied at any desired point, and is also turned off or extinguished by the action of an electric current which may be applied at a point distant from the burner.

In one class of electric gas-lighters the gas cock or valve has been operated by a single impulse of the armature of an electro-magnet, which armature also operates a vibrating electrode near the burner-tip or gas-orifice, so as to produce a spark and ignite the gas. In this class of apparatus the gas-cock has a very small movement to open and close the gas-passage, and there is difficulty in keeping the valve tight, and if it is sufficiently tight there is danger that the valve will stick.

The object of this invention is to provide means for actuating the gas-valve by which it can be operated with more certainty and a larger resistance to its movement overcome, so that the valve can be kept tight without danger of its sticking and thus failing to operate.

The invention is embodied in an apparatus comprising a gas-cock having an arm provided with a toothed arc or segment and an electro-magnet and armature therefor, provided with a finger or projection that engages the teeth of the said arm and moves it step by step as the said armature vibrates back and forth. Each impulse of the armature thus produces only an extremely small movement of the gas-cock, and a number of such impulses are required to produce the movement which is sufficient to open the valve, and which has heretofore been produced by a single impulse in apparatus most nearly like that of the present invention. Another electro-magnet and armature operates by a single impulse or by a number of impulses, as may be preferred, to

close the gas-cock and thus extinguish the light.

I am aware that gas-lighting apparatus has been made in which the gas-cock is provided with a toothed wheel and operating step by step by a vibrating armature; but in such apparatus as heretofore generally made the movement of the gas-cock is considerable, usually a quarter-turn to open or close, and some means have to be provided for limiting the amount of movement, which is usually done by causing the movement of the gas-cock itself to control the circuit of the magnet or magnets by which it is operated. In the present invention, on the other hand, the gas-cock has only a limited range of movement, and although this movement is produced by a number of impulses there is no occasion to limit the number of impulses of the armature, as after it has moved the gas-cock the proper distance it will no longer engage the operating-arm thereof, and may then continue its vibrations indefinitely without producing further effect on the gas-cock.

Figure 1 is a side elevation of a gas-lighting instrument embodying this invention; Fig. 2, an elevation thereof at right angles to the position shown in Fig. 1; Fig. 3, an enlarged sectional view of the armature and finger or projection that operates the toothed valve-actuating arm, and Fig. 4 a longitudinal section showing the construction of the gas-cock.

The gas-burner tube *a*, provided with the usual tip or orifice, *b*, may be of any suitable or usual construction, having a gas-passage, *a'*, through it, controlled by the valve *d*, (see Fig. 4,) in the usual manner, the said valve being constructed to open and close the said gas-passage by a very small angular movement, as will be readily understood from Fig. 4. The said burner-tube is shown in this instance as provided with an iron disk or plate, *e*, in which are fastened the cores of electro-magnets *f* and *g*, the said plate *e* thus constituting the back-strap or connection for said cores. The said magnets *f* and *g* constitute the lighting and extinguishing magnets, respectively, being connected in separate circuits, so that either one may be placed in circuit, when desired, by a suitable key or push-button, which may be at any desired distance from the burner.

The spindle *d'* of the gas-valve has fixed

upon it an actuating-arm, d^2 , (best shown in Fig. 1,) having a toothed arc, d^3 , which is operated by the armature f' of the magnet f , as will be best understood by reference to Fig. 3.

5 The said armature f' is pivoted at f^2 , and is provided with a projection, f^3 , (shown as a spring,) which is attached at f^4 to the armature f' . The said armature is also provided with a bracket, f^5 , having a supporting-pin, 10 f^6 , against which the spring-finger f^3 rests near its extremity. This support f^6 prevents the projection f^3 from yielding to any great extent in its forward movement toward the teeth of the arm d^2 ; but in the return movement of the armature the entire length of the spring between f^3 and f^4 is free to yield, so that the projection f^3 readily slips back over the teeth of the arm d^2 , and at its next forward movement engages the next tooth, and thus as 15 the said armature f' vibrates back and forth it will produce a number of successive impulses, each of which turns the gas-valve d through an extremely small arc, so that several are required to turn it even the small amount necessary for opening the gas-valve. 25

When the gas-cock is turned far enough, the toothed arm passes beyond the range of the finger f^3 , so that the armature f' may continue its vibration indefinitely without producing 30 any further effect on the gas-cock. By this construction the gas cock may be fitted quite tightly in its socket, and even if it should stick, as happens when the apparatus is not used for some length of time, the number of successive powerful impulses will start and turn it, while if it were so constructed that a single impulse had to produce the entire movement, as is usually the case in apparatus of this general class, the resistance of the gas- 40 cock might be greater than the attraction of the magnet could overcome, and the armature would consequently not make a complete movement and the instrument would not operate at all.

45 The armature f' , near the end of its movement, engages a slide-rod, h , the upper end of which engages and operates a movable electrode, h' , that is normally held by the action of a spring, i , in contact with a co-operating stationary electrode, k , supported on the burner-tube by a collar, k' , that is insulated from said burner, which, as is usually practiced, constitutes the ground or return for the circuits of the magnets f g . When the armature 50 f' nearly reaches the pole of the magnet, it strikes the slide-rod h and lifts the electrode h' off from the electrode k , thus producing a spark, and at the same time interrupting the current through the magnet f , so that the armature falls back and permits the circuit to close again at $h' k$ and produce another forward movement of the armature, when the operation is repeated and the armature thus vibrated in the usual manner, producing a succession of 65 sparks at $h' k$, which ignite the gas as soon as it begins to issue from the burner by the opening of the valve d , caused by the succession of im-

pulses of the finger f^3 , produced by this vibration of the armature f .

The gas-cock may be closed and the light extinguished by the armature g' of the magnet g , which armature is provided with a finger, g^2 , that engages a projection, d^4 , from the arm d^2 , so that the single movement of the said armature closes the valve. 75

If desired, the magnet g and its armature might be constructed to operate the gas-cock with a number of impulses just like the magnet f and its armature f' ; but this will usually not be necessary, as the valve is not likely to stick when the burner is warm, and the operation of closing is usually performed within a comparatively short time—rarely over a few hours—after the valve has been operated to turn on the gas, while the valve may, on the 85 other hand, stay for a long time in the closed position, and thus be likely to adhere to its socket.

The circuits of the magnets are as follows: The circuit that conveys the current for lighting the gas is connected, as shown at 2, with one terminal of the magnet f , the other terminal of which is connected, as shown at 3, with the support k' for the electrode k , from which the circuit is continued to the moving electrode h' when in contact with said electrode k , and by the slide-rod h to the burner and gas-pipe which forms the ground or return. 95

The circuit of the magnet g connects, as shown at 4, with one terminal of the said magnet, the other terminal of which is connected, as shown at 5, with the flange e , and through the metal of the burner with the gas-piping or ground. 100

The armatures f' and g' of the magnets f and g have a common pivot at the middle of the burner, which is a very compact and convenient arrangement; and it will be seen that the power or leverage of the armature f' , acting on the arm d^2 of the valve, is very great, being several times greater than that of the armature g' , acting through the rod g^2 on the projection d^4 , which is much nearer the fulcrum or axis of the arm d' than the toothed arc d^3 . This shows the advantage in power to move the valve gained by the employment of the toothed arc in conjunction with the vibrating armature. 115

The vibrating electrode h' is provided with a pin, h^2 , working in a slot in the socket formed for the said electrode in the burner-tube, which opening prevents the electrode h' from turning, so that it will be disengaged from the co-operating electrode k . 120

The entire operative parts are inclosed in the usual shell or covering, (indicated in dotted lines at a^2 , Fig. 2,) said shell fitting closely around a flange, a^3 , on the upper part of the burner-tube and over the flanges e and a^4 above and below the magnets f g and their co-operating parts. 130

I claim—

1. An electric gas-lighting instrument comprising a burner-tube and gas-cock that con-

controls the passage of gas therethrough, the said gas-cock having a limited range of movement, combined with an actuating-arm connected with said gas-cock, provided with a toothed arc, and an electro-magnet and armature therefor provided with a finger or projection co-operating with the teeth of the said valve-actuating arm, and a vibrating electrode or circuit-breaker in circuit with said magnet, and a second electro-magnet and armature therefor provided with a finger co-operating with a projection on the valve-actuating arm nearer to its pivotal center or axis than the toothed arc, substantially as described.

2. An electric gas-lighting instrument comprising a burner-tube and gas-cock that controls the passage of gas therethrough, the said gas-cock having a limited range of movement, combined with an actuating-arm connected with said gas-cock, provided with a toothed arc, and an electro-magnet and armature therefor provided with a finger or projection co-operating with the teeth of the said valve-actuating arm, and a vibrating electrode or circuit-breaker in circuit with said magnet, and an electro-magnet and its armature co-operating with said valve-actuating arm to close the valve, substantially as described.

3. An electric gas-lighting instrument comprising a burner-tube and gas-cock that con-

controls the passage of gas therethrough, the said gas-cock having a limited range of movement, combined with an actuating-arm connected with said gas-cock, provided with a toothed arc, and an electro-magnet and armature therefor provided with a spring-finger connected with said armature at a distance from the extremity of said spring, that co-operates with the teeth of the valve-actuating arm, and a rest or support for said spring-finger near the said extremity, substantially as and for the purpose described.

4. An electric gas-lighting instrument comprising a burner-tube and gas-cock, and actuating-arm connected with said gas-cock, provided with a toothed arc and projection, combined with two electro-magnets and co-operating armatures therefor pivoted on a common axis at the middle of the burner-tube and provided with projections co-operating with the said valve-actuating arm, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES W. HOLTZER.

Witnesses:

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JAS. J. MALONEY.