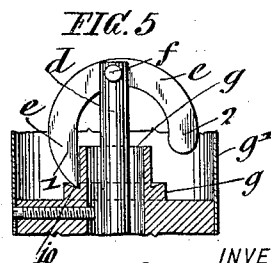
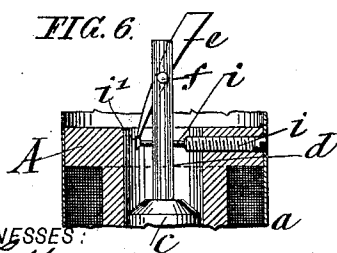
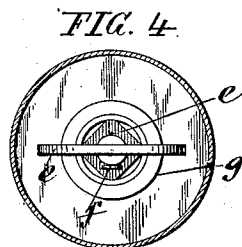
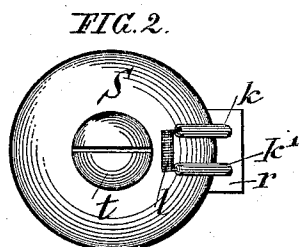
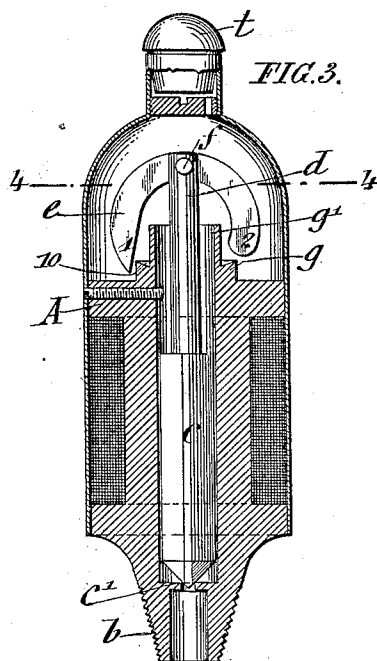
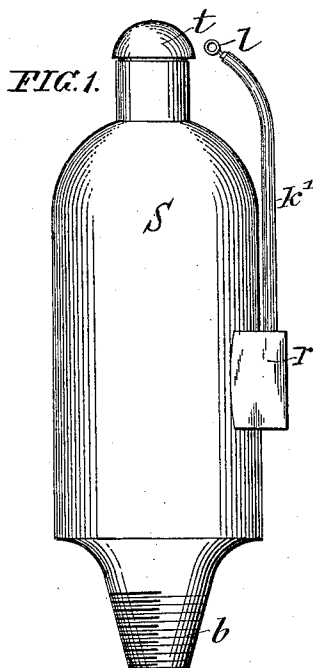


(No Model.)

J. T. ARMSTRONG & A. ORLING.
ELECTRIC GAS LIGHTER.

No. 577,279.

Patented Feb. 16, 1897.



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UNITED STATES PATENT OFFICE.

JAMES TARBOTTON ARMSTRONG AND AXEL ORLING, OF LONDON, ENGLAND.

ELECTRIC GAS-LIGHTER.

SPECIFICATION forming part of Letters Patent No. 577,279, dated February 16, 1897.

Application filed November 19, 1896. Serial No. 612,695. (No model.)

To all whom it may concern:

Be it known that we, JAMES TARBOTTON ARMSTRONG and AXEL ORLING, of 64 Aldersgate Street, in the city of London, in the Kingdom of England, have invented certain new and useful Improvements in Electric Gas Lighters and Extinguishers, of which the following is a specification.

This invention relates to electrically-operated gas-lighters in which a solenoid or electromagnet is utilized to lift a soft-iron valve contained within it when the said solenoid or electromagnet is energized by the passage of a current. Included in the circuit containing this solenoid or electromagnet is a suitable resistance situated near the burner, which the said current heats sufficiently to enable it to ignite the gas when the circuit is established.

Our improvements refer to the means of regulating the opening and closing of the gas-valve, which is effected by applying a permanent magnet to an extension-rod or spindle of brass or other non-magnetic material attached to the valve. This permanent magnet is so applied to the said spindle as to be attracted or repelled, if a bar-magnet is used, or in the case of one of horseshoe pattern moved to the right or left, according to the direction of the current in the circuit and the consequent polarity of the surrounding electromagnet or solenoid. This permanent magnet is adapted to engage a suitable seat or support on said solenoid or electromagnet when the permanent magnet is moved in one direction so as to prevent it from falling back to its seat with the valve and its spindle when the circuit is interrupted, but when said permanent magnet is caused to move in the opposite direction by virtue of the reversal of the direction of the current and the consequent change of polarity in the solenoid or electromagnet the valve is allowed to drop down on its seat as its permanent magnet having been deflected so as to clear all obstruction to its descent.

In the accompanying drawings, Figure 1 represents a side elevation of our improved electric gas lighter and extinguisher. Fig. 2 is a plan view of the same; Fig. 3, a vertical central section; Fig. 4, a horizontal section on line 4 4, Fig. 3. Fig. 5 is a detail elevation showing the permanent magnet in

its second or lifting position, and Fig. 6 is a vertical central section of a modified construction of our improved electric gas lighter and extinguisher.

Similar letters and figures of reference indicate corresponding parts.

Referring to the drawings, A is a solenoid or electromagnet the coil of which is wound with insulated wire and which has a threaded socket *b* and an axial bore for receiving a soft-iron core, which forms the gas-supply valve *c*. This valve is provided at its upper end with a spindle *d*, the recessed upper end of which receives a permanent magnet *e*, that is pivoted so as to be capable of swinging on the pivot *f*.

The magnet *e* is made curved or V-shaped and has a longer tapering pole 1 and a shorter rounded-off pole 2, the longer pole 1 engaging when attracted to the depressed rim 10 of a guide-piece *g*, so as to support the valve *c* in raised position away from its seat when the current passes through the coil of the solenoid in one direction, while when the direction of the said current is reversed the shorter pole 2 of the magnet *e* is attracted, while the end of the long pole 1 engages the outer edge of the guide-piece *g'*, so that the valve can descend and cut off the supply of gas. The body of the valve *c* is made either of square shape, so as to provide spaces at each of its four sides provided with longitudinal grooves, or made smaller in diameter than the interior bore of the solenoid, so as to permit the gas to pass freely to the burner when the valve is lifted. The current is supplied to the coil of the solenoid by means of suitable binding-screws, by which the current enters and leaves the coil of the solenoid. After having passed through the coil the current flows through the insulated conductor *k*, the helical resistance *l*, and along a second insulated conductor *k'*, the resistance *l* being heated by the current so as to light the gas. The conductors *k k'* are supported on an insulated piece *r*, while an air-tight shell or cover *s* incloses all the working parts of the gas lighter and extinguisher, said shell serving for conducting the gas to the burner *t*.

In practice the coil *a* is wound in such a direction that the upper end of the soft-iron core or valve *c* receives an opposite polarity to the lower end of the permanent magnet *e*.

when the current enters through one of the binding-screws. The result is that when the circuit is established and the current passes in this direction the soft-iron core or valve is drawn in upward direction until inclosed by the greatest possible number of lines of force, so that owing to the opposite polarities of the adjacent poles of the core or valve *c* and the permanent magnet *e* mutual attraction takes place, so as to cause the longer end of the magnet to drop in and engage the inclined rim 10 and lock thereby the core or valve *c* into raised position and prevent it from returning back to its seat *c'* in the threaded socket *b* when the circuit is broken. On the other hand, when the circuit is established in the opposite direction the polarity of the soft-iron core or valve *c* is reversed, while that of the longer end of the permanent magnet remains the same as before, which owing to the adjacent poles being of the same polarities mutual repulsion takes place between them and causes the shorter end of the magnet *e* by virtue of this force to be attracted and the longer end to be moved outwardly, so as to clear the rim and permit the core or valve *c* to drop back on its seat *c'* and cut off the supply of gas. In place of the solenoid a horseshoe magnet may be used, between the poles of which a permanent magnet is vibrated.

In Fig. 6 a modified construction is shown in which the permanent magnet *e* is in the nature of a straight slightly-curved bar, the upper end of which is made heavier than its lower end, said lower end being adapted to engage a pin *i*, having a conical enlargement or head *i'*, which is adapted to engage the lower end of the permanent magnet *e* when the valve *c* is open. The valve *c* is thereby supported in raised or open position and prevented from being returned to its seat, the distance at which the valve is supported from its seat being governed by the distance of the head *i'* from the spindle *d*. As the pin *i* is located within the recessed upper end of the spindle *d* it also prevents the core or valve from turning on its axis or being lifted too high when the solenoid or electromagnet is energized. The permanent magnet *e* produces, when the current passes through the coil of the solenoid or electromagnet in one direction, the raising of the valve and the locking of the same in raised position by the action of the permanent magnet on the headed pin *i*, so that the valve is prevented from falling back on its seat when the circuit is interrupted. When, however, the direction of the current is reversed, the permanent magnet is caused to move in the opposite direction by the consequent change of polarity which takes place in the solenoid or electromagnet, so that the valve is permitted to drop back to its seat, as the permanent magnet has been deflected from the head *i'*, so as to clear all obstructions to its descent. The supply of gas is thereby automatically cut off, while in both cases the re-

sistance *l* is heated to incandescence by the current, so as to light the gas supplied through the open valve. In practice a two-way switch, a duplicate push-button, or any other suitable means may be employed for controlling the direction of the current when the circuit is closed, so as to light the burner or extinguish the same, as required.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In an electric gas lighter and extinguisher, the combination, with an electromagnet or solenoid, of an armature or core adapted to be lifted by said solenoid or electromagnet, which core forms the gas-controlling valve, a permanent magnet that is pivotally applied to a spindle on said core or valve, and means for retaining the permanent magnet and the valve in lifted position when the circuit is broken for supplying the gas, or releasing said magnet by reversing the direction of the current in said direction so as to permit the valve to drop back to its seat for cutting off the supply of gas when the circuit is again broken, substantially as set forth.

2. In an electric gas lighter and extinguisher, the combination, with an electromagnet or solenoid, of an armature or core adapted to form a gas-controlling valve, a gas-supply socket, having a seat for said valve, a permanent magnet pivotally applied to a spindle on said core or valve, and means for engaging the permanent magnet and the valve in raised position when the current in the circuit has a given direction and retaining said valve in raised position when the circuit is broken, or releasing said valve when the direction of the current in the said circuit is reversed so as to return it to its seat and effect the cutting off of the gas-supply when the circuit is again broken, substantially as set forth.

3. In an electric gas lighter and extinguisher, the combination of an electromagnet or solenoid, an armature or core adapted to form a gas-controlling valve, a permanent magnet pivotally applied to a spindle on said core or valve, a resistance in the circuit of the coil of the electromagnet or solenoid arranged close to the burner, and means for engaging the permanent magnet when the current in the circuit has a given direction and retaining said valve in raised position when the circuit is broken or releasing said valve when the direction of the current is reversed so as to return the valve to its seat when the circuit is again broken, substantially as set forth.

In testimony that we claim the foregoing as our invention we have signed our names in presence of two subscribing witnesses.

JAMES TARBOTTON ARMSTRONG.
AXEL ORLING.

Witnesses:

ETHEL GRANT,
ARTHUR RYAN.