V. C. J. NIGHTINGALL.

GAS LIGHTING AND EXTINGUISHING APPARATUS.

APPLICATION FILED JUNE 8, 1909.

940,610. Patented Nov. 16, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

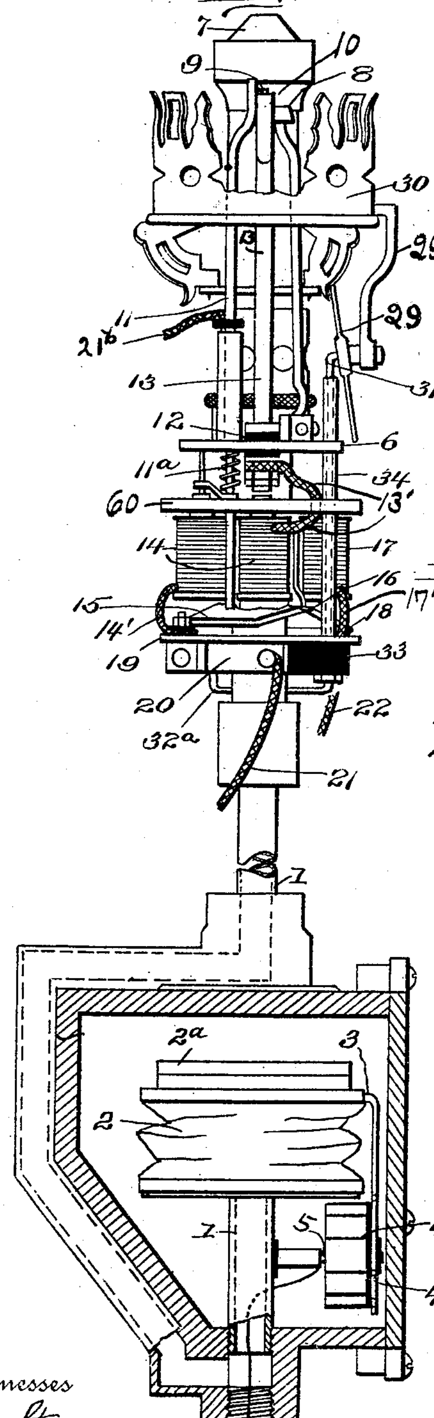


Fig. 2.

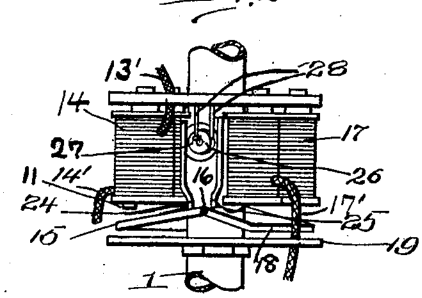


Fig. 4.

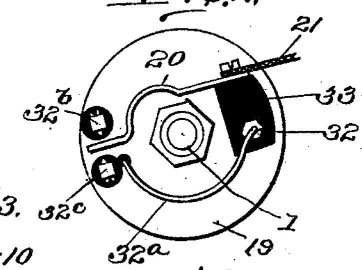


Fig. 3.

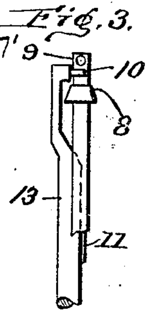


Fig. 6.

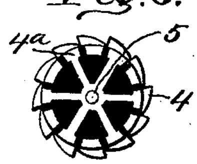
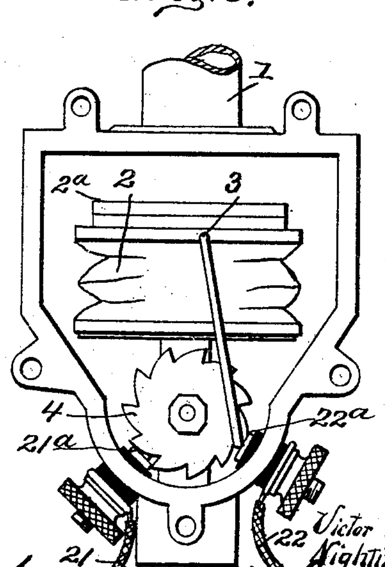


Fig. 5.



Witnesses

J. Strauss

T. H. Anson

Victor C.J. Nightingall

By Mason Fenwick & Lawrence

Attorneys

V. C. J. NIGHTINGALL.

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2 SHEETS—SHEET 2.

Fig. 7.

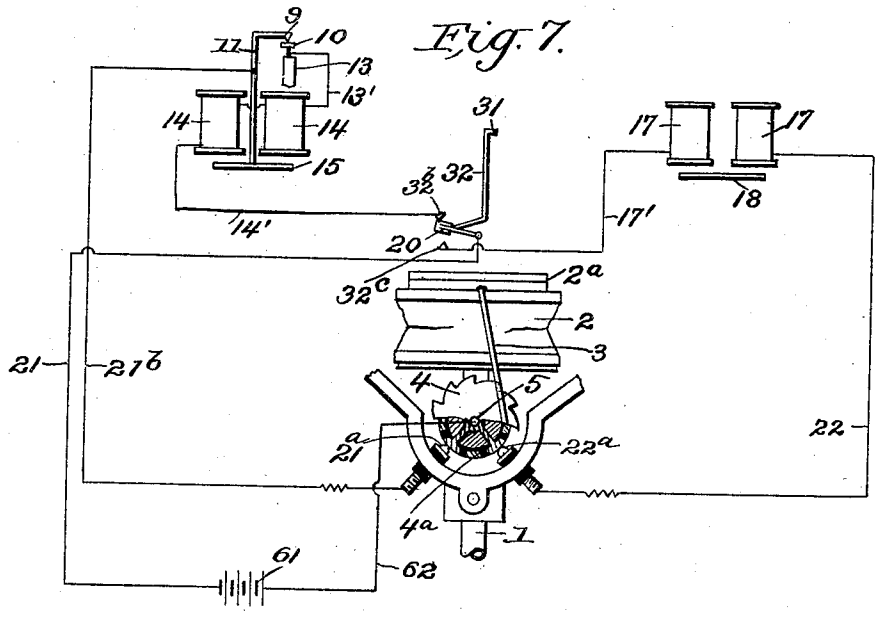


Fig. 8.

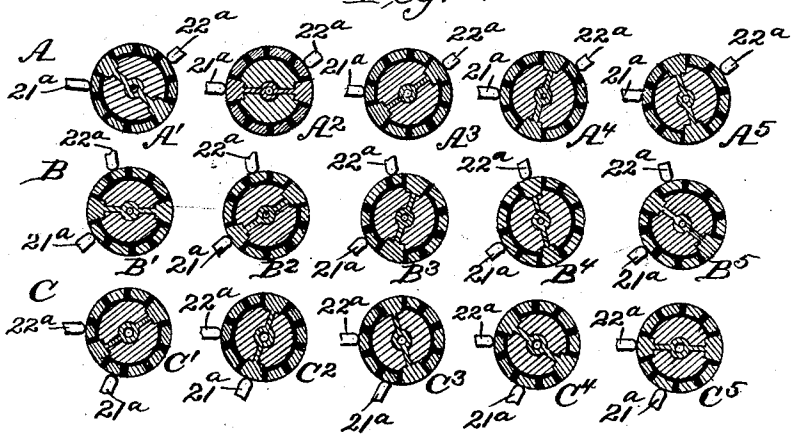
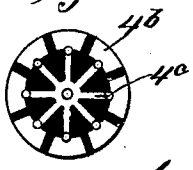


Fig. 9.



Witnesses

A. Strauss

H. C. Fenton

Inventor

Victor C. J. Nightingall

By Mason Fenwick & Lawrence

Attorneys

UNITED STATES PATENT OFFICE.

VICTOR CHARLES JOHN NIGHTINGALL, OF MELBOURNE, VICTORIA, AUSTRALIA, ASSIGNOR TO THE NIGHTINGALL GAS CONTROL COMPANY LIMITED, OF MELBOURNE, AUSTRALIA.

GAS LIGHTING AND EXTINGUISHING APPARATUS.

940,610. Specification of Letters Patent. Patented Nov. 16, 1909.

Application filed June 8, 1909. Serial No. 500,984.

To all whom it may concern:

Be it known that I, VICTOR CHARLES JOHN NIGHTINGALL, a citizen of the Commonwealth of Australia, residing at 369 Collins street, Melbourne, in the State of Victoria and said Commonwealth, have invented new and useful Improvements in Gas Lighting and Extinguishing Apparatus, of which the following is a specification.

This invention relates to gas lighting and extinguishing apparatus.

Hitherto the contrivances that have been suggested for turning on and extinguishing street and other gas lamps from a distance have not been satisfactory. Where pilot lights are used there is always a danger of the pilot being accidentally blown out or otherwise extinguished with the result that the lamp could not be lighted automatically when required, besides which the gas used by a number of pilot burners amounts to a considerable item. Certain other devices for lighting and extinguishing street and other gas lamps from a distance involve the use of an expensive system of wiring, it being necessary to lay leads from the central station to each of the gas lamps to be controlled.

The present apparatus has been devised in order to remedy these defects by providing an installation which will not be expensive in first cost and which will be simple and reliable in operation.

In order that this invention may be readily understood it will be described by reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of the improved apparatus fitted to an ordinary gas supply pipe and burner, and Fig. 2 is an elevation showing the mechanism used for controlling the gas supply valve. Fig. 3 is a detail view showing the arrangement of certain sparking contact pieces hereinafter described. Fig. 4 is a plan of the underside of the control for the gas supply. Fig. 5 is a front elevation of the lower portion of the apparatus illustrated in Fig. 1. Fig. 6 is a view of a revolving segmental switch hereinafter described. Fig. 7 illustrates the electrical connections. Fig. 8 is a view illustrating diagrammatically the action of the revolving segmental switch used where three lamps or sets of lamps require to be independently controlled. Fig. 9 is a view showing a modified form of revolving segmental switch.

The same letters and figures of reference indicate the same or corresponding parts in all the figures.

According to this invention the gas supply pipe 1 is fitted with an expanding chamber 2, the upper portion of which carries weights 2^a for the purpose of returning it to its normal position when the gas returns to its normal pressure. By adjusting these weights the pressure at which the apparatus will operate can be determined. A swinging arm 3 depends from the moving part of the expanding chamber 2 and is bent inwardly at its lower end to engage with a notched or toothed wheel 4 upon which is formed the revolving segmental switch 4^a hereinafter described. This member 4^a is mounted at its center upon a suitable spindle 5.

In order to bring the apparatus into a compact form and yet allow sufficient clearance for the chamber 2 to expand, the supply duct may be carried around the casing in which the chamber 2 is inclosed as shown in Fig. 1. The supply pipe is fitted at its upper end with a suitable gas burner 7. A supporting platform 6 is mounted immediately under the burner 7 which is provided with a pilot tube 8 leading from the main gas supply pipe 1. A pair of contact pieces 9, and 10 are arranged a little above the pilot burner 8. One of these contact pieces is a fixture and the other is mounted upon a vertically sliding rod 11. The rod 13 carrying the fixed contact piece is insulated from the main frame as indicated at 12. Rod 13 is in electrical connection with a pair of electro magnets 14 depending from a support 60 a short distance below the platform 6. The armature 15 of the magnets 14 is pivotally mounted upon a pin 16 or other support and bears against the underside of the vertically sliding rod 11. This sliding rod 11 is provided with a spring 11^a which tends to return it to its normal position after it has been raised by the armature 15. Another pair of magnets 17 depend from the support

60 carrying the magnets 14, and their armature 18 is also pivotally mounted upon the pin 16.

A supporting platform 19 may be attached to the supply pipe 1 a short distance below the electro magnets 14, and 17 upon which the armatures 15 and 18 rest when the apparatus is in its normal condition.

The electro magnets 14 are in electrical communication with the contact rod 13 by means of wire 13′ and with one terminal 32^b of a two-way switch 20 by means of wire 14′. The other pair of magnets 17 are in electrical communication through wire 17′ with the opposite terminal 32^c of the movable member of the two-way switch 20 and with the brush 22^a of the member 4^a. The opposite brush 21^a of the member 4^a is electrically connected by the wire 21^b with rod 11. Wire 21 connects with the battery 61 and switch 20.

The armatures 15 and 18 of the respective magnets 14 and 17 are fitted with upwardly projecting arms 24, and 25 the projecting arm 24 being adapted to open the gas supply valve 26 and the arm 25 to close it by bearing against a projection 27 on said valve 26. Stop pieces 28 depend from the supporting platform carrying the magnets and serve as stops to limit the movement of the valve 26.

The switch 20 is controlled by shaft 32 passing through a sleeve 34, such shaft having an arm 31 connected with its upper end against which an expanding capsule 29 is arranged to bear. Capsule 29 is mounted on a bracket 29′ connected with the burner 30. The burner when heated by the flame will communicate heat to capsule 29 causing the latter to expand and to move the arm 31 and therefore the vertical shaft 32. Shaft 32 carries a spring arm 32^a at its lower end and the member 20 constituting the switch proper which operates with member 32 but is insulated therefrom as indicated at 33. Switch 20 is brought into contact with terminal 32^b or 32^c as the case may be by the expansion or contraction of capsule 29 and the consequent partial rotation of vertical shaft 32.

The member 4^a is constructed with any desired number of segments suitably insulated from each other. A pair of brushes 21^a 22^a are arranged to bear against these segments when the member 4^a is turned around into certain positions by the action of the expanding chamber 2 and the swinging arm 3.

In its simplest form where the lamp is merely required to be turned on and off by the alternate raising and lowering of pressure of the gas supply the alternate segments are in electrical communication with the central spindle as illustrated in Fig. 6, and the brushes are so arranged that each time the pressure is raised first one brush and then the other will be put in circuit thus conveying the current to the turning on magnets 14 and the turning off magnets 17 alternately.

In operation when it is desired to light the lamp an extra pressure of gas is supplied through the supply pipe so as to inflate the expanding chamber 2. The swinging arm 3 revolves the member 4^a one notch making contact with the brush 21^a communicating through the wire 21^b with the contacts 9 and 10, contact support 13, magnets 14, then through the terminal 32^b and the movable member of switch 20 to the battery. This action sends the electric current from the battery around the magnets 14 which attract the armature 15 whose upwardly projecting arm pushes the valve projection 27 over to the opposite side and opens the gas supply valve 26 which allows the gas to circulate through the burner 7 and pilot tube 8. Immediately the magnets 14 attract the armature 15 this latter pushes up the sliding rod 11 which carries the contact 9 and thus breaks the circuit. The spring 11^a then returns said sliding rod and the circuit is again completed. This make and break action is continued and the sparks from the contacts 9, and 10 light the pilot which in turn lights the gas burner. After the gas has been burning a little time it heats the expanding capsule 29 which throws the movable member of the switch 20 over to the opposite terminal 32^c by means of the downwardly extending rock shaft 32. This action breaks the electric circuit passing around the magnets 14 and therefore stops the make and break ignition gear. By this action wire 17′ is placed in connection with wire 21.

When it is desired to turn the light out an extra pressure of gas is again supplied through the pipe 1 so as to again inflate the expanding chamber 2 the swinging arm 3 of which on rising revolves the member 4^a the distance of another notch. This action brings an insulated section of the commutator opposite the brush 21^a and puts the brush 22^a and magnets 17 in electrical communication with the battery. This action sends an electric current around the magnets 17 thereby attracting the armature 18 whose projecting arm 25 (see Fig. 2) pushes the valve projection 27 over to the other side and closes the gas valve 26 thus turning off the gas supply. The current continues to flow through the magnets 17 until the member 29 contracts owing to the absence of heat from the extinguished burner. This allows the two-way switch 20 to again assume the original turning on position in contact with the terminal 32^b of the wire leading to the turning on magnets 14. The parts are then

in position ready to turn on and ignite the gas immediately the pressure has been raised so as to turn the commutator 4^a another notch, that is so as to complete the circuit through the two-way switch and turning on magnets 14.

From the above description it will be seen that the apparatus for each gas lamp is self contained and does not require separate wire or leads to be run to each burner from a central station neither does it require the use of continuously burning pilot lights.

In some cases it is desirable to provide for the turning on and off of a lamp or a set of lamps independently of other lamps. For instance in the case of gas works supplying different municipalities or districts it may be desired to light and turn off the lamps in one district at different times to the lamps in another district or districts, and yet the whole of the lamps supplied by the works require to be controlled from the same source. This can be effected by merely altering the arrangement of the segments in the commutators. For instance, the revolving segmental switch may be constructed as illustrated in Fig. 9 so that any number of its segments may be electrically connected with the central boss by the insertion of a plug between segments 4^b and the adjacent arm of the spider or other similar device 4^c.

Fig. 8 illustrates a series of segmental switches and the relative positions of the brushes and the segments of the switches which are in electrical connection with the battery. This arrangement would be used where three different lamps or sets of lamps are to be turned on and off at different times. The several series of lamps are indicated by the letters A, B and C. In this instance the switches would be made with ten segments two of which as shown would be in electrical contact with the central spindle of the commutator while the remaining eight would be blanks. The brushes 21^a, 22^a connected with the turning on and turning off magnets 14 and 17 respectively are arranged in different positions around the switch so that they will be put in circuit at different periods in the rotation of the switch according to the different times or order in which the lamps are to be lighted or extinguished. In the insance shown the three switches when in the positions shown at A^1, B^1, C^1, Fig. 8, are all out of action that is the brushes in each case are bearing against a blank segment of the switch.

If the pressure in the main is raised the three switches would be turned around one-tenth of a revolution. This would bring them into the positions shown in A^2, B^2, C^2 with the result that all the turning on and lighting brushes 21^a will be put in circuit through a live segment of the switch consequently the electric circuit will be completed through the turning on and ignition magnets 14 of each lamp and they will be lighted simultaneously. The first lamp which is to be turned out is in the instance shown the lamp or set of lamps A. By again raising the pressure in the gas main the switches are turned around another segment into the positions shown at A^3, B^3, C^3. The effect of this movement will be as shown to bring a live segment of the switch connected with lamps of series A in contact with the turning off brush 22^a thus extinguishing those lamps without having any effect on the others because in their case another blank segment is moved into contact with their turning off brushes as shown at B^3, C^3. The first lamp with any others in which the switches and brushes are arranged in the same relative positions will now be turned off while the other sets of lamps will continue to be alight. The next rise in pressure will bring the three switches or sets of switches into the positions shown at A^4, B^4, C^4 when the turning off brush 22^a of the second lamp will be put into circuit as shown in B^4 and consequently that lamp and any other having similar arrangements of brushes and switches will be turned off. In a similar manner the next rise in pressure will turn off the third lamp as shown at C^5 without producing any effect upon the previously turned out lamps. The next rise of pressure in the instance shown is merely a dummy movement and simply brings blank segments of the switches opposite both brushes as indicated at A^1, B^1, C^1, when the parts are in position ready to again repeat the operation of turning on all the lamps. This dummy movement provides for instances where it is necessary to increase the pressure in the mains during the day without lighting up the lamps, that is, it allows the mechanism to work without operating the lighting or extinguishing gear. This specially provides for cases where an auxiliary gasometer is filled from a central supply gasometer.

It will be readily understood that by increasing the number of segments in the switch and by arranging the brushes in different relative positions therewith any desired combination of results can be obtained.

Any particular lamp can be set so that it will be lighted or extinguished at any particular time by altering the position of its brushes or by placing a different segment in contact with the central spindle. For this purpose the switches can be made with removable connecting pieces for making connection between the segments and the spindle or other main electrical connection, consequently in the event of say another suburb

being added or connected to a gas generating installation the only alteration which would require to be made in the different gas igniting and extinguishing apparatus throughout the suburb would be the attachment of a different connecting piece to the switch or switches of the burners and as the expense in material and labor of doing this would be exceedingly small one of the chief drawbacks to the existing contrivances would be done away with.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a gas lighting apparatus, a plurality of revolving segmental switches, means for operating the switches simultaneously with the variation of the gas pressure, and means connected at certain segments of the switches and electrically operated for supplying gas to certain burners exclusively of the others upon a given number of variations of pressure and for supplying the remaining burners upon a subsequent number of variations of pressure.

2. In a gas lighting apparatus, a plurality of segmental switches, a pressure operated device for moving all of the switches at the same time, and means connected with certain segments of the switch and electrically operated for supplying gas to certain of the burners exclusively of the others upon a given number of variations of pressure and for supplying the remaining burners upon a subsequent number of variations of pressure.

3. In a gas lighting apparatus, a pressure controlled device, means electrically operated for controlling the supply of gas to the burners, a revolving segmental switch, a toothed wheel rigidly secured to said switch, and an arm engaging the toothed wheel and having connection with said pressure device whereby motion is transmitted from said pressure device to said toothed wheel for moving said switch.

4. In a gas lighting apparatus, a pressure operated member, a valve controlling the supply of gas to the burner, means for controlling said valve, said means being electrically operated, a revolving segmental switch, contact means bearing against said switch, a toothed wheel carried by said switch, and an arm connected to said pressure operated member and engaging said wheel for moving said wheel when moved by said pressure operated member.

5. In a gas lighting apparatus, a pressure operated bellows, means whereby said bellows may be operated only at a predetermined pressure, a revolving segmental switch, contact brushes bearing against the segmental switch, a toothed wheel carried by the switch, means contacting with the teeth of said wheel and of said bellows for conveying motion from said bellows to said wheel, and electro-magnets connected with the contact brushes and arranged to control the gas supply to the burners.

6. In a gas lighting apparatus, a pressure operated bellows, a weight placed on said bellows for regulating the amount of pressure necessary to expand the same, a valve controlling the supply of gas to the burner, electrical means for controlling said valve, a segmental switch for controlling said electrical means, a toothed wheel secured to said segmental switch, means secured to said bellows and loosely engaging said toothed wheel for imparting a step by step movement to the switch as said bellows is operated.

7. In a gas lighting apparatus, a pressure operated device, a valve for controlling the supply of gas to the burner, a plurality of electro-magnets, armatures for said magnets, a device connecting the armatures with the valve, an igniting device operated by one of the armatures, a revolving segmental switch, brushes arranged to bear against said switch, each of said brushes arranged to be placed in circuit with one of the magnets, a heat controlled device governing the circuits between the magnets and the brushes, a toothed wheel carried by the segmental switch, and an arm connecting the pressure controlled device with the teeth of the wheel for imparting motion to such wheel.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

VICTOR CHARLES JOHN NIGHTINGALL.

Witnesses:

PERCY HEDGES,

ANNIA EDWARDS.