

E. E. BEAN.
Electric Gas-Lighting Apparatus.

No. 149,561.

Patented April 14, 1874.

Fig. 1.

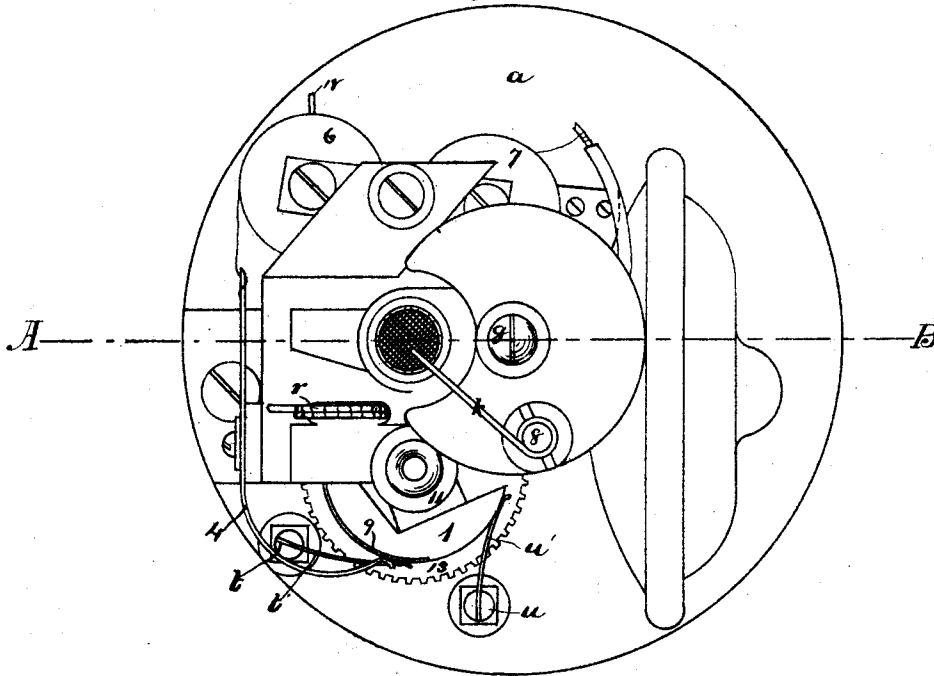
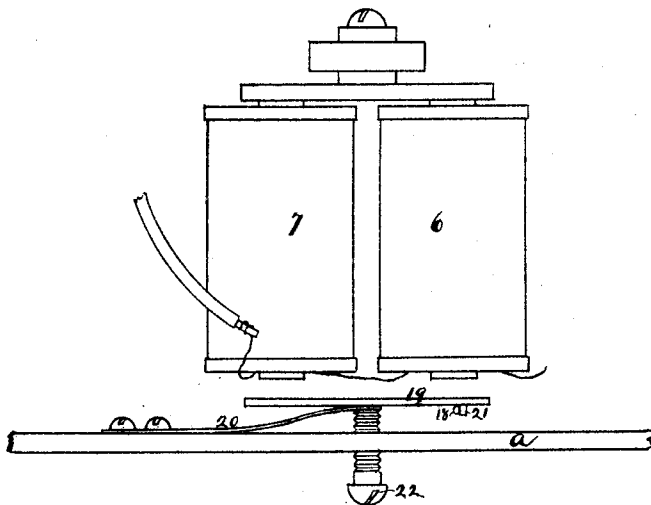


Fig. 5.



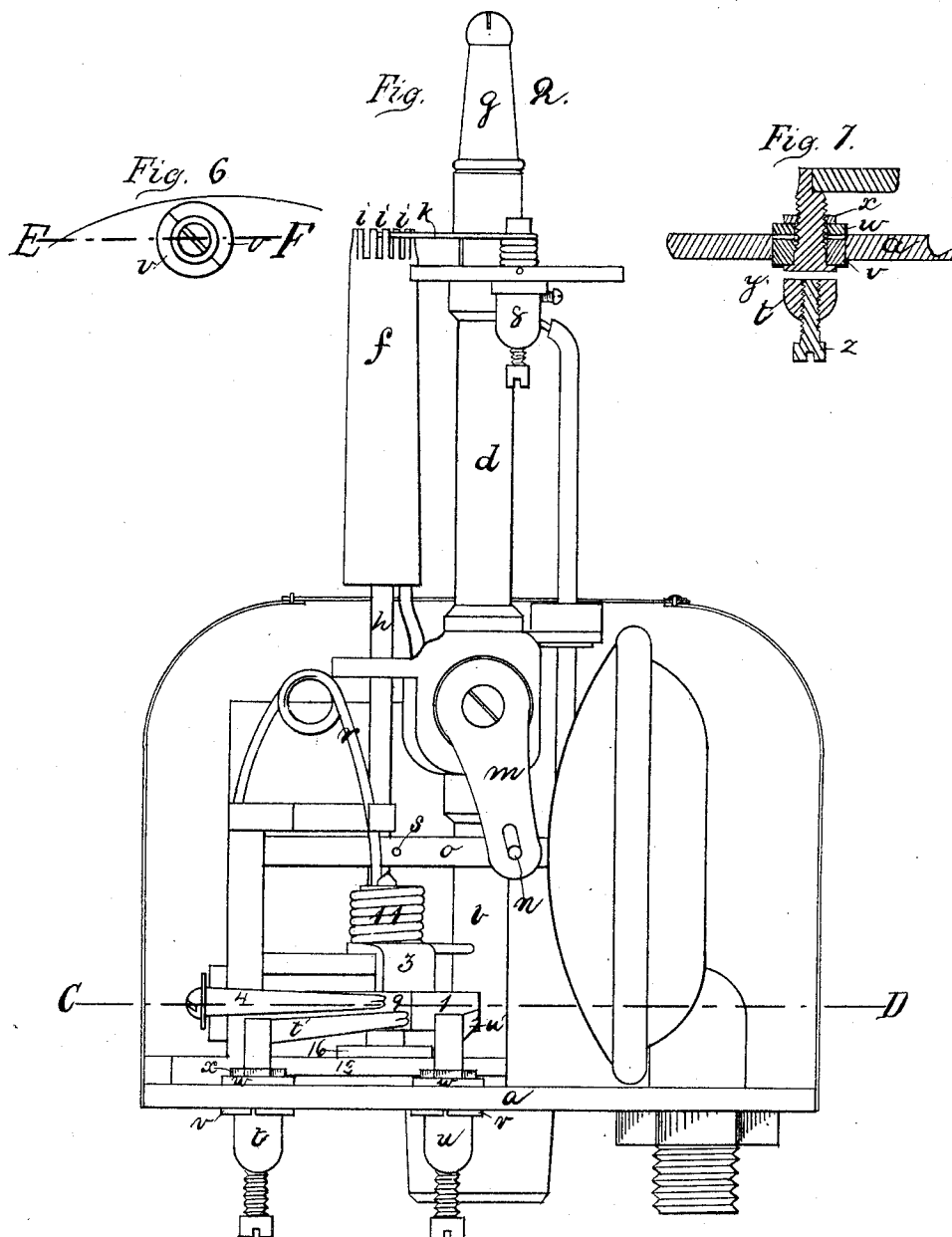
Witnesses.
John R. Heard.
Frances Gardner

Inventor.
Edwin E. Bean.
by Alban Andriewatz

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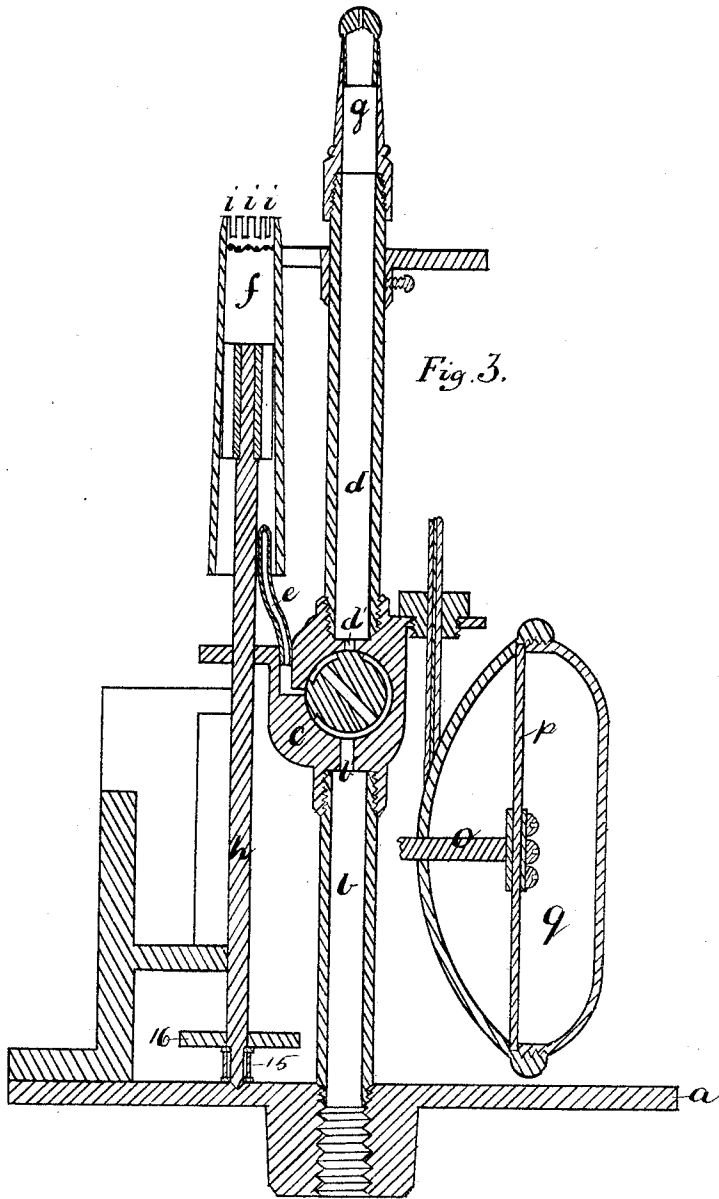
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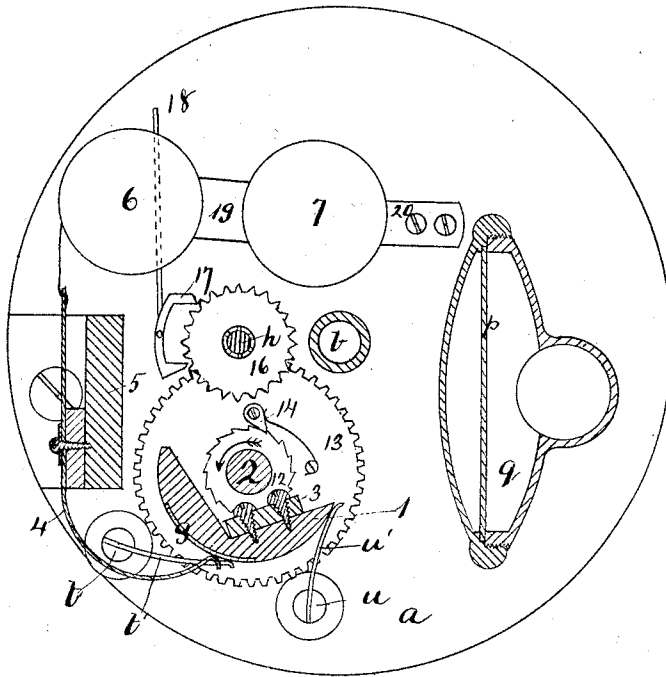
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Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE

EDWIN E. BEAN, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ELECTRIC GAS-LIGHTING APPARATUS.

Specification forming part of Letters Patent No. **149,561**, dated April 14, 1874; application filed June 6, 1873.

To all whom it may concern:

Be it known that I, EDWIN E. BEAN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic and Electric Gas-Lighting Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements on the patent granted to Frank Bean, October 18, 1870, for pneumatic and electric gas-lighting apparatus; and consists in the employment of a Bunsen burner and a three-way cock, for the purpose of mixing a small quantity of gas with atmospheric air, that is ignited by electric sparks from the battery. The blaze from the Bunsen burner ignites the gas issuing from the ordinary gas-burner, and as soon as the latter is lighted the gas is cut off from the Bunsen burner by means of a spring operating the lever of the three-way cock. The cock is operated by means of compressed or rarefied air acting upon an elastic diaphragm, to which is attached a rod connected to the lever for the gas-cock. The said rod also winds up a coiled spring, by which and a suitable mechanism the Bunsen burner is set in a rotary motion as soon as the electric current is allowed to pass to the apparatus. An electro-magnet attracts a piece of iron provided with a stopper for the pendulum as soon as the electric current passes through the electro-magnet, and thus instantly liberates the pendulum and allows the Bunsen burner to revolve. The current of electricity is conducted to each apparatus and cut off therefrom by means of a movable rubber disk provided with a metal plate on a part of its circumference, and metallic conducting-springs held in contact thereto. The said metallic springs are attached to insulated posts that are insulated from the frame by means of hard-rubber disks made in halves so as to be attached easily to the posts. The whole of the apparatus is inclosed in a metal covering, provided at the top with two semi-circular covers or plates that can be swung

on pivots when the covering is to be removed; as will now be more fully shown and described.

On the drawing, Figure 1 represents a ground plan. Fig. 2 represents a front elevation. Fig. 3 represents a longitudinal section on the line A B, shown in Fig. 1. Fig. 4 represents a cross-section on the line C D, shown in Fig. 2. Fig. 5 represents a rear view of the electro-magnet and escapement. Fig. 6 represents a ground plan of one of the insulated posts; and Fig. 7 represents a longitudinal section on the line E F, shown in Fig. 6.

Similar letters refer to similar parts wherever they occur on the different parts of the drawing.

a is the frame or plate on which the whole of the apparatus is resting and secured. *b* is the gas-pipe, and *c* is a three-way cock, provided with an inlet, *b'*, outlet *d'*, and an additional small outlet, *e*, for the Bunsen burner *f*. On the top of the cock *c* is the usual gas-pipe *d*, with its burner, *g*, secured in the ordinary way. The Bunsen burner *f* consists of a metallic cylinder open in both ends and secured in a suitable manner to a spindle, *h*, that is set in a rotary motion whenever the gas is to be lighted. The cylinder *f* is corrugated in its upper end with teeth *i i i*, as shown, that are kept in contact with the electric pole *k*. When the current of electricity is allowed to pass to the pole *k*, and the burner *f* is rotated at the same time, the gas is instantly ignited from the electric sparks issuing between the pole *k* and teeth *i i i* on the cylinder *f*. The gas is conveyed to the cylinder *f* from the small tube *e*, and as soon as the gas is forced up through the cylinder *f* it draws with it a quantity of atmospheric air, that mixes with the gas, and thus facilitates the ignition by the electric sparks. The plug *l* in the cock *c* is provided with a slotted lever, *m*, that is operated by means of the pin *n*, attached to the rod *o*. The rod *o* is attached to the flexible diaphragm *p*, that is operated by means of compressed air conveyed in suitable pipes to the chamber *q*. The plug *l* is made with a hole through the center, and provided on its circumference with two cut-offs for the respective openings *d'* and *e*, in such a manner that the gas escapes through both openings *d'* and

e when the cock is opened to its full extent; but when the cock is turned back a little, which is automatically accomplished by means of the spring *r* acting on the stud *s* attached to the rod *o*, as soon as the gas from the burner *g* is ignited from the flame from the Bunsen burner *f*. The posts *t* and *u* are attached to the wires that convey the electric current to and from the apparatus, the post *t* being the one through which the current is conveyed to the apparatus, and the post *u* is the one through which the current is conveyed from the apparatus after the burner is lighted. The posts *t* and *u* are insulated from the plate *a* in a manner as fully shown in Figs. 6 and 7. The said posts are put through the frame *a* from the upper side thereof, and provided with an annular collar just below the plate *a*, as shown, between which and the under side of the plate *a* is placed a disk of hard rubber made in two halves, as shown at *v v* in Figs. 6 and 7. The semicircular disks *v v* are made to rest in an annular recess on the under side of the plate *a*, as shown in Fig. 7. A second hard-rubber disk, *w*, surrounds the post *t* on the upper side of the plate *a*, and the post is firmly secured to the plate *a* by means of a nut, *x*, screwed over the upper end of the said post. A hole is made through the lower part of the post *t* for the wire *y*, through which the electricity is conveyed to the apparatus. The said wire is held in place by a set-screw, *z*, in the usual manner. To the upper ends of the posts *t u* are attached metallic springs *t'* *u'*, that are pressed gently against the circumference of the segmental hard-rubber disk 1, that is secured to the shaft 2 by means of a suitable brace or frame, 3, as shown in Figs. 2 and 4. A third metallic spring-conductor, 4, attached to and insulated from the metallic frame 5, is also made to press gently on the circumference of the rubber disk 1. The rear end of the spring 4 is connected to the electro-magnet 6, that is connected to another similar electro-magnet, 7, from which the wire is connected to the upper post 8, with its metallic pole *k*, as shown in Fig. 2. To the face of the rubber disk 1 is attached a metallic plate, 9, in such a manner that, when the disk 1 is in a position as represented in Fig. 4, the electricity conveyed to the post *t* passes to the metallic plate 9, and from it returns to the spring 4, electro-magnets 6 7, upper post 8, and pole *k*, where the sparks pass to the teeth on the cylinder *j*, when the gas is ignited, as heretofore has been described. Then the disk 1 is swung to the right so far that the spring 4 does not rest on the metallic plate 9, in which case the springs *t'* and *u'* are made to rest on the said metallic plate, so that the electric current that is conveyed to the post *t* does not pass through the apparatus, but passes to the plate 9, and is conducted therefrom to the spring *u'* and to the post *u*, where the current passes on to the next lamp-post, provided with a similar apparatus, and so on in succession. The segmental disk 1 is op-

erated by means of compressed air and electricity, in the following manner: The rod *o*, which is operated by compressed air acting on the diaphragm *p*, is provided on its under side with a small pin, 10, that acts upon and winds up the coiled spring 11, that is attached with its lower end to the brace 3; the brace 3 is secured to the shaft 2, and is also secured to the hard-rubber disk 1, as shown in Fig. 4. In one piece with the shaft 2 is made a ratchet-wheel, 12, as shown, or it may be secured in a suitable manner to the said shaft 2. The spur-gear 13 is made to revolve loosely around the lower end of the shaft 2, or the shaft 2 may be turned in one direction without carrying the wheel 13 with it; but when the shaft 2 is moved in a direction as shown by the arrow on Fig. 4, the pawl 14, (operated by a suitable spring,) attached to the wheel 13, locks the ratchet-wheel 12 and spur-wheel 13 together. A small pinion, 15, on the lower end of the shaft *h*, engages with the spur-wheel 13. (Shown in Fig. 3.) To the shaft *h* is also secured an escapement-wheel, 16, that engages with the escapement 17, provided with a suitable pendulum, 18, as shown in Fig. 4. The pendulum 18 is prevented from vibrating, when the current of electricity does not pass through the apparatus, by means of a metal plate, 19, secured to the frame *a* by means of an elastic spring, 20, as shown in Fig. 5. On the under side of the plate 19 is a small pin, 21, attached, whereby the pendulum 18 is kept stationary when the plate 19 is in a position as shown in Fig. 5. But as soon as the electric current is allowed to pass through the electro-magnet 6 7, it attracts the plate 19 against the under side of the said electro-magnet 6 7, whereby the pin 21 releases its hold on the pendulum 18, which is then allowed to play freely. The proper position of the plate 19 can be adjusted by means of the set-screw 22, or its equivalent, as shown in Fig. 5.

From the above will be seen that as the compressed air is first allowed to operate the disk *p* and rod *o*, before the current of electricity passes to the burner, the spring 11 is wound up, and the disk 1 moved to its proper place at the same time as the gas is turned on, so as to escape freely to the burners *f* and *g*. As soon as the current of electricity is conveyed to the apparatus, the plate 19 is drawn up to the electro-magnet 6 7, whereby the pendulum 18 is set free, and the Bunsen burner *f* set in a rotary motion around its axis. The sparks that then issue from the pole *k* to the teeth *i i* ignite the gas from the burner *f*, which, being ignited, ignites the gas escaping from the burner *g*, as heretofore described. As soon as the burner *g* is lighted, the gas is shut off from the burner *f* by means of the spring *r* acting upon the pin *s*, attached to the rod *o*, that operates the lever *m*, and the disk 1 is moved automatically in such a manner that the electric current from *t* is prevented from passing through the apparatus, but passes directly to

post *u*, and from it to the next lamp-post, where the same operation is performed, and so on through the whole series of lamp-posts that are to be lighted by this my improved electro and pneumatic apparatus. When the lamps are to be extinguished, all that is necessary to do is to rarefy the air in the chambers *g*, which may be done by means of an ordinary air-pump, or any other suitable vacuum apparatus, causing the diaphragm *p* to move the rod *o* and lever *m* to a position as shown in Fig. 2, when the gas is instantly shut off at once from all the burners.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. In combination with the burner *g* and revolving Bunsen burner *f*, the three-way cock *l*, operated by compressed air acting on the flexible diaphragm *p*, the rod *o*, and lever *m*, as and for the purpose set forth.

2. The arrangement for automatically shutting off the gas from the burner *f*, consisting in the spring *r*, rod *o*, pin *s*, and lever *m* on

the plug *l*, in a manner as herein shown and described.

3. The mechanism for operating the Bunsen burner *f*, consisting of the spring 11, shaft 2, ratchet 12, pawl 14, wheel 13, and pinion 15, attached to the shaft *h*, or their equivalents, as and for the purpose set forth.

4. The combination of the escapement 16 17, lever 18, electro-magnets 6 7, metallic plate 19, with its spring 20, and projection 21, or their equivalents, as and for the purpose set forth.

5. In combination with the metallic conductors 4 *t* *u'*, the movable rubber disk 1, with its metallic disk 9, operated by compressed air acting on the diaphragm *p*, rod *o*, and coiled spring 11, as herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 28th day of March, 1873.

EDWIN E. BEAN.

Witnesses:

ALBAN ANDRÉN,
JOHN R. HEARD.