No. 813,042. PATENTED FEB. 20, 1906.

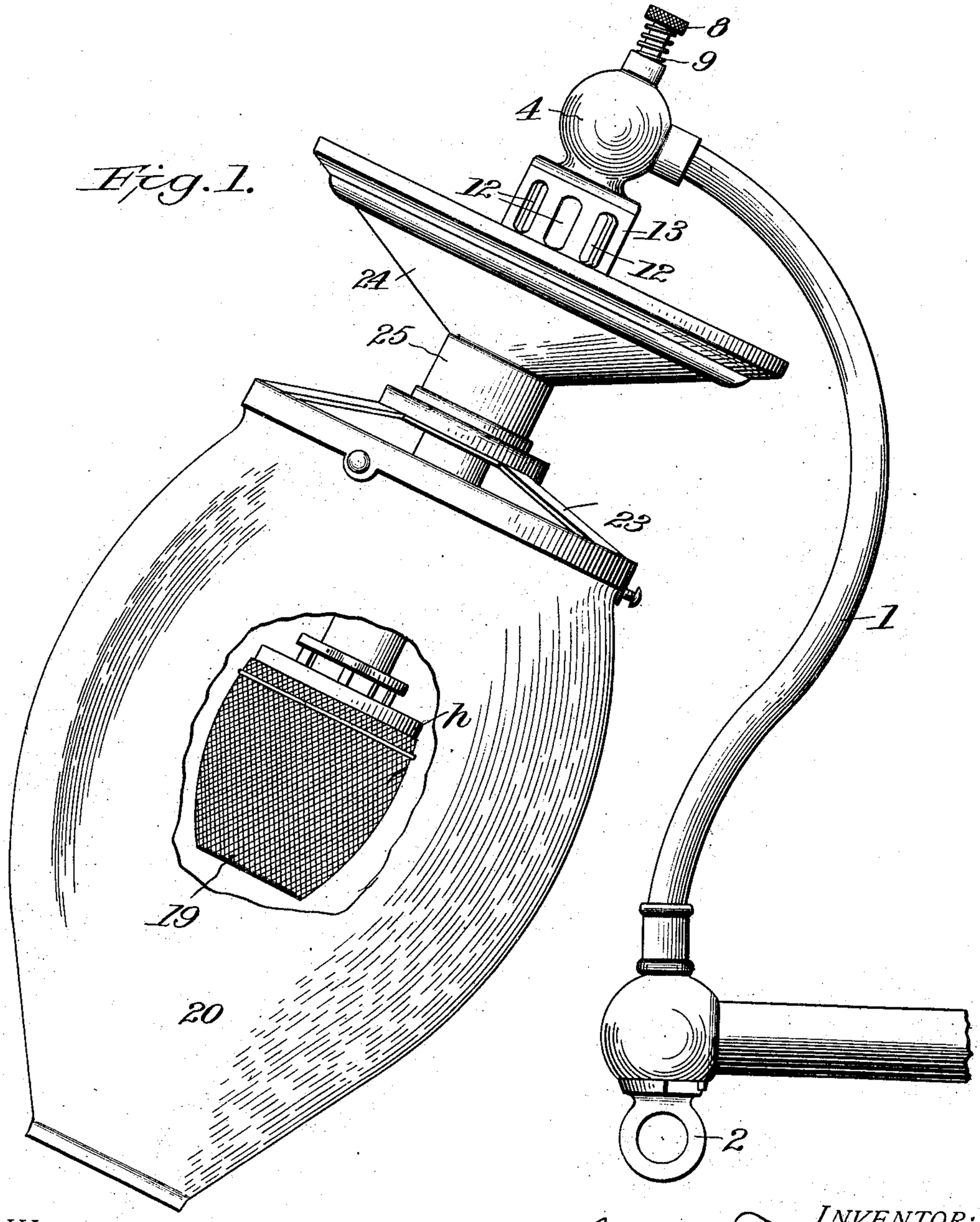
H. FARNOFF.

INVERTED INCANDESCENT GAS BURNER.

APPLICATION FILED AUG. 2, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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INVENTOR:

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2 SHEETS—SHEET 2.

Fig. 2.

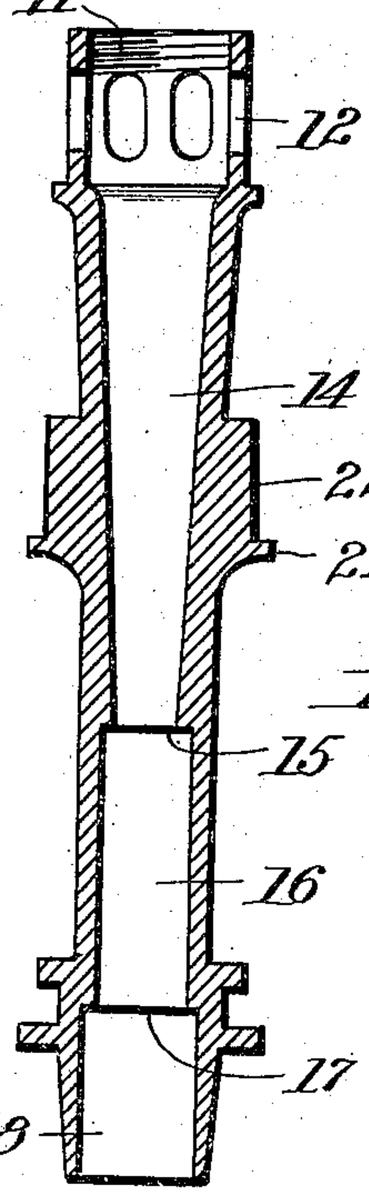


Fig. 3.

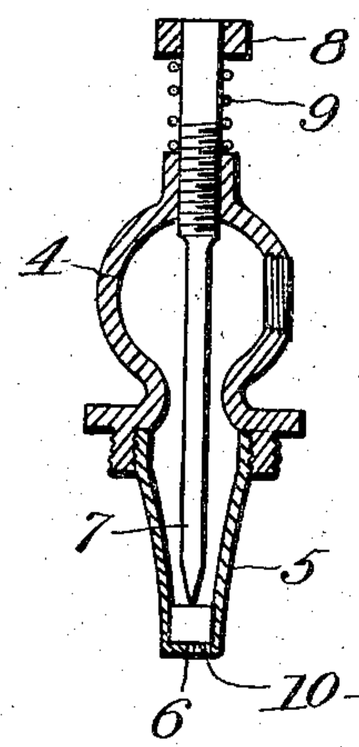


Fig. 6.

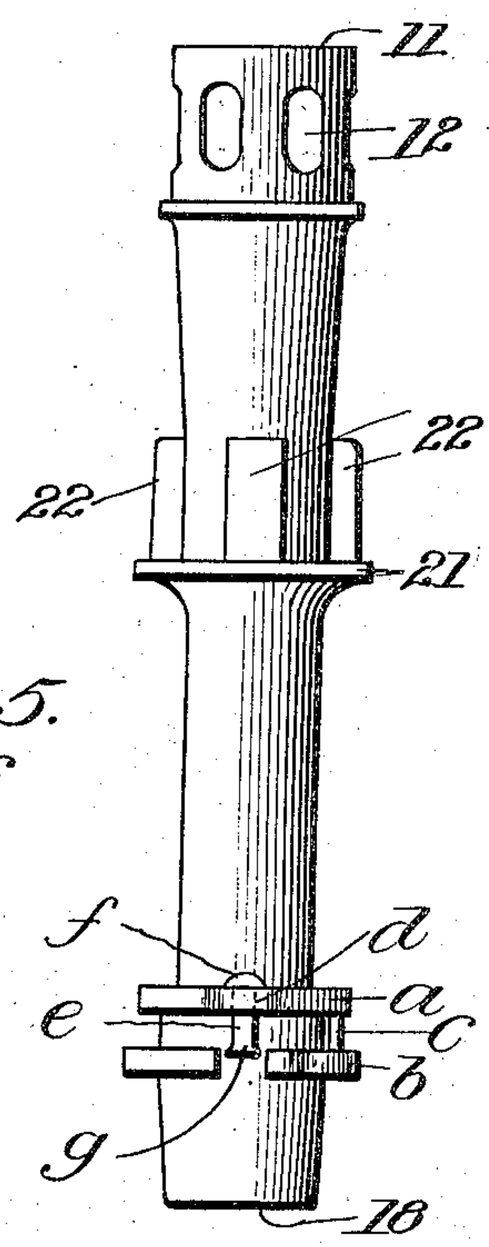


Fig. 4.

Fig. 5.

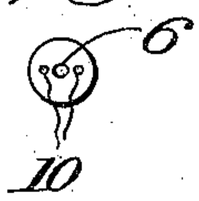


Fig. 8.

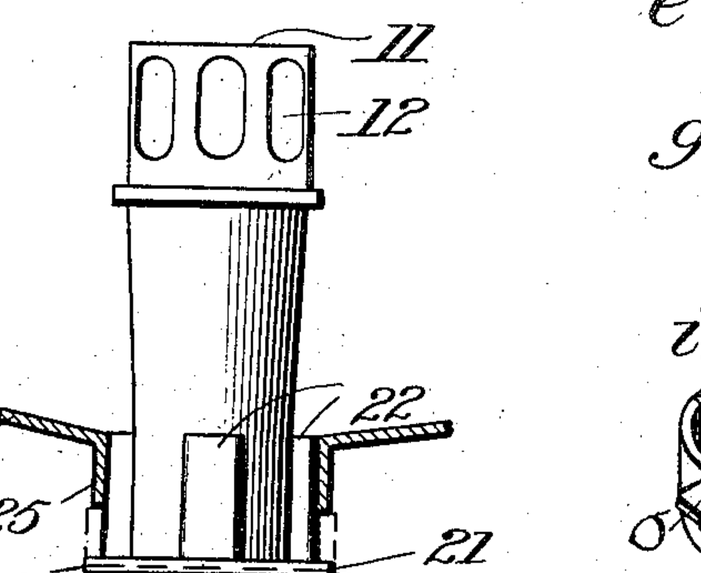


Fig. 7.

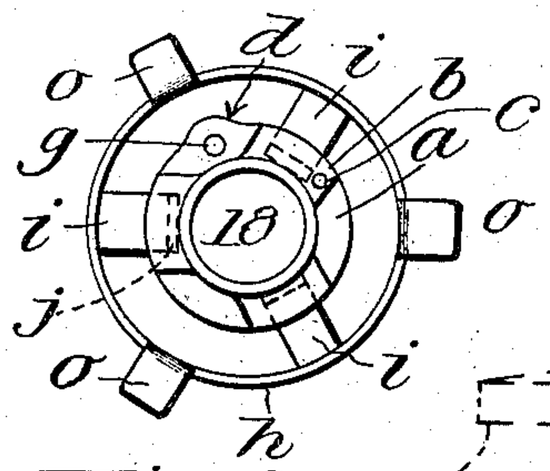
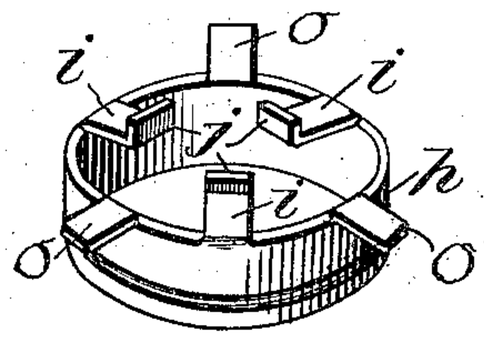


Fig. 9.



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UNITED STATES PATENT OFFICE.

HENRY FARNOFF, OF BUFFALO, NEW YORK.

INVERTED INCANDESCENT GAS-BURNER.

No. 813,042. Specification of Letters Patent. Patented Feb. 20, 1906.

Application filed August 2, 1905. Serial No. 272,390.

To all whom it may concern:

Be it known that I, HENRY FARNOFF, a citizen of the United States, and a resident of Buffalo, Erie county, State of New York, have invented certain new and useful Improvements in Inverted Incandescent Gas-Burners; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, terminating with claims particularly specifying the novelty.

This invention relates to lamps and gas-fittings, and more especially to gas-burners of the incandescent type; and the object of the same is to improve the construction of inverted or angle lights of this character in three essential particulars. The first of these is the Bunsen tube, with its internal and external details. The second is the regulating-valve, with its improved tip, and the third is an automatic safety mantle attachment, which may well be used with a tube of this kind.

Specifically, the invention consists in the points of novelty and improvement in these three particulars, as set forth below and as illustrated in the accompanying drawings, in which—

Figure 1 is a general view of this complete incandescent burner, partly broken away, ready for use. Fig. 2 is a central vertical section of the Bunsen tube. Fig. 3 is a similar section of the regulator-valve. Figs. 4 and 5 are details of the tip of such valve for natural gas and for illuminating-gas, respectively. Fig. 6 is an elevation of the Bunsen tube. Fig. 7 is an end view of the mantle-holder. Fig. 8 is a detail showing a group of burner-nozzles fed by a single Bunsen tube and each provided with my improved automatic safety mantle attachment. Fig. 9 is a perspecive detail of the metal mantle-holder.

Referring to the accompanying drawings, the numeral 1 designates the feed-pipe for natural or artificial gas, and 2 is the cock by which the supply is cut off or turned on. This pipe may be screwed upon the nipple of an ordinary chandelier or side light which will have the cock. The pipe may be bent about as shown, and its upper end is tapped into the side of a valve-chamber 4, (see Fig. 3,) whose lower end is reduced or, by preference, has a removable tapered tip 5, pierced with a central jet-orifice 6, through which the gas is ejected. This orifice is regulated or closed by the point of a needle-valve 7, whose stem is threaded through the top of chamber 4, has a milled head 8 at its upper end, and is surrounded by a coiled expansive spring 9 between said head and chamber to hold the stem frictionally after it has been set. Ordinarily, however, I find after many tests that while a needle-valve regulator with only a central orifice will work on upright burners, where the draft assists, it will not operate successfully on inverted burners, probably because the resistance of the upward draft necessitates such a large orifice that the gas issues in too large a jet to mix thoroughly with the air. I therefore provide in the tip additional orifices 10 out of the center and not regulated or closed by the needle, using one for natural and two for artificial gas, as shown in Figs. 4 and 5, respectively. The gas always issues from these supplemental orifices when the cock is open; but as they are small it is hardly sufficient to feed the light. By regulating the central orifice alone I find I can secure constant pressure, prevent the light from flickering, secure better mixture of the air and gas, and avoid back-flashing and carbonizing when the specially-constructed Bunsen tube described below is used. Said back-flashing is perhaps the greatest objection urged against this type of burners. After long experiment I have discovered that if the Bunsen tube be constructed interiorly, as shown in Fig. 2, back-flashing will be avoided. From the inlet 11 at its upper end adjacent the air-inlet holes 12, which are regulated by a collar 13, as usual, the interior bore of the tube 14 tapers downwardly for something more than half its length. Then it is suddenly enlarged to produce the downwardly-facing angular shoulder 15. Beneath such shoulder it is cylindrical, as at 16. Again, it is further enlarged to produce another downwardly-facing angular shoulder 17, and, finally, it is again cylindrical within the nozzle 18. With a Bunson tube thus constructed it will not be necessary to explain to those familiar with the art what takes place when the air and gas are admitted further than to say that they commingle within the tapering portion of the bore and pass down under considerable pressure and burn with a blue flame where they pass out at the nozzle 18. With a mantle of proper size and shape the air and gas thoroughly mixed will pass from the nozzle downward and strike upon the bottom of the mantle at its center and will then diverge and flow upward along its sides, thus producing incandescence throughout a large portion

of its area. It is well known that in upright incandescent burners the mixed air and gas as it flows from the nozzle assumes a pointed or conical shape, and if the top of the mantle be closed the tip of this cone would strike it at the center, with a tendency to pass through and upward, exactly the reverse of what takes place in an inverted burner; but it is important to note that the use of a Bunsen tube with this interior configuration, combined with the specially-arranged regulating-valve above described, does prevent back-flashing on weak-pressure gases, and when turned down low it prevents back-flashing on all gases. Furthermore, I have found that this shape of Bunsen tube, combined with this regulator-valve, prevents carbonizing, another undesirable condition found in many burners of this type. The mixed air and gas enters the mantle 19, which is thoroughly protected by the globe 20, and the products of combustion rise within the latter. One further point of improvement in the Bunsen tube is afforded by the manner in which this globe and its superimposed deflector are supported without the use of additional and removable elements, as will now be described. At a suitable point on the Bunsen tube there is formed an annular ridge or shoulder 21, and just above it are cast several upright webs or ribs 22, which taper upwardly. In assembling the parts the gallery 23 is first passed downward over the tube from its upper end, wedged upon said ribs and pressed closely down upon the ridge 21, and next the deflector 24 is brought into position in the same way. The deflector has a hub or collar 25, which spaces it from the gallery, and its body is obviously of the proper size and configuration to shed the rising products of combustion away from the air passing into the inlets. Hence the use of these webs or ribs 22 obviates the employment of threads or nuts, which would be expensive and cumbersome.

In Fig. 8 I have shown a group of burner-nozzles fed by a single Bunsen tube. Broadly, this idea is old; but, as indicated in dotted lines, a single globe may surround the group, and hence the same support for the gallery and deflector may be employed, it being only necessary to make the globe of the desired size and shape so as to accommodate the larger volume or space occupied by the mantles.

The other principal feature of my present invention is the mantle attachment, which is perhaps best seen in Figs. 6, 7, and 9. Formed upon the Bunsen tube, as by casing and at a point just above the nozzle 18, are two annular shoulders, the upper one *a* being complete and the lower end *b* being broken or cut away at regular intervals into, say, three sectors, as shown. At one point a pin *c* connects these two shoulders fixedly. At one point above a space in the lower shoulder *b* the upper shoulder *a* projects radially, and a pin fits loosely in an upright hole in this projection *d*. Said pin *e* has a head *f* at its upper end, and its lower end *g* may be upset slightly or even also headed for the purpose of preventing its displacement from proper position, while yet permitting it to have a vertical looseness. When hanging normally in position, this pin stands across the annular groove between the two shoulders. When raised, it clears the same. The mantle 19 is of the usual type, though smaller, and its manner of manufacture is immaterial, excepting that it is by preference sold attached to the metallic or pipe-clay ring *h*. This ring has at its upper end inturned tangs *i*, whose size, position, and number correspond with the spaces in the lower shoulder *b*. If it be of metal, the extreme inner ends *j* of the tangs are upturned to fit the groove between the two shoulders. If it be of clay, the tangs will themselves be sufficiently thick to do so. The ring may also have outturned tangs *o*, by which it can be conveniently supported within the inclosing box, in which the mantle is sold to the consumer. In applying this mantle and ring to my improved burner it is simply brought into position with the tangs surrounding the nozzle 18 and then moved upward. The tangs pass through said spaces in the lower shoulder *b*, and one of them elevates the pin *e*, after which the ring is turned around the nozzle until one tang strikes the fixed pin *c*. Meanwhile the pin *e* drops back to position, and the ring cannot thereafter be removed without first lifting said pin *e*. I consider this form of mantle attachment especially useful in connection with an inverted or angle light of this type. It is only necessary to remove the globe from its gallery, remove the old mantle and ring, and apply the new. In doing so it is not at all necessary that the operator should touch the mantle 19, and only a lifting and a twisting motion upon the ring are necessary. Hence there is the least chance that a delicate mantle will be broken. It will be clear that the same form of mantle attachment can be used in the group arrangement typified in Fig. 8, and, in fact, this mantle attachment can be used on many other kinds of inverted incandescent lights without departing from the spirit of my invention. It should be particularly observed that when the mantle is applied to the nozzle it is automatically locked in place, after which it withstands all vibration and cannot be accidentally knocked out of place when cleaning the globe.

The points of novelty are as follows:

1. In an inverted incandescent gas-burner, the combination with the Bunsen tube having air-inlets, and the mantle; of a valve-chamber screwed into said tube, a removable tapered tip for said chamber within the tube

and extending past said inlets, the end of the tip having a plurality of orifices, a large one in the center and smaller ones at the sides, a gas-feed pipe tapped into the side of the chamber, a needle-valve threaded axially through the top of the chamber and having its point directed into the central of said orifices, a head at its upper end, and a coiled expansive spring upon its stem between said head and the chamber.

2. In an incandescent gas-burner, the combination with the Bunsen tube, and the globe; of a gallery for the globe, an annular shoulder on the tube, and ribs at right angles to and tapering away from said shoulder and adapted to receive the gallery.

3. In an inverted incandescent gas-burner, the combination with the Bunsen tube, the mantle at its lower end, a globe around the latter, a gallery for the globe, and a deflector standing above said gallery; of an annular shoulder on the tube, and upright ribs also on the tube adjacent to and tapering away from said shoulder and adapted to frictionally receive the hubs of the gallery and deflector.

4. In an inverted incandescent gas-burner, the combination with the air and the gas inlets, and the mantle; of a Bunsen tube having its bore tapered downward from the air-inlet for part of its length, a cylindrical nozzle, and an interior annular shoulder between said tapered bore and nozzle and facing toward the latter.

5. An inverted Bunsen burner having its bore tapered downward from the air-inlet for part of its length, and cylindrical for the remainder of its length in a plurality of sizes separated from each other and from the tapered portion by angular annular shoulders facing toward the nozzle.

6. In an inverted incandescent gas-burner, a Bunsen tube having a downwardly-tapering mixing-chamber, a cylindrical nozzle, a cylindrical bore between them, and an interior annular shoulder next the mixing-chamber and facing toward the nozzle.

7. In an inverted incandescent gas-burner, a substantially vertical Bunsen tube whose bore comprises two cylindrical portions of different diameter and a mixing-chamber tapered downward toward the nozzle, all separated from each other by angular annular shoulders.

8. In an incandescent gas-burner, the combination with the nozzle having two exterior annular shoulders with a groove between, the shoulder near the end being cut away at intervals, and a pin movable through the other shoulder opposite one of said intervals; of the mantle, a ring fast therein, and inturned tangs within the ring adapted to said intervals.

9. In an inverted incandescent gas-burner, the combination with the nozzle having exterior annular shoulders with a groove between the lower shoulder being cut away at intervals, a headed pin movable through a hole in the upper shoulder opposite one of said intervals, and another pin fixedly connecting the shoulders; of the mantle, a ring fast therein, and inturned tangs within the ring adapted to pass through said intervals.

10. In an inverted incandescent gas-burner, the combination with the nozzle having exterior shoulders with a groove between, the lower shoulder being cut away at intervals and the upper shoulder having a radial projection above one interval pierced with an upright hole, a pin mounted loosely in said hole and hanging normally across said groove, heads at the extremities of the pin, and a fixed stop between the shoulders at another point; of the mantle, a ring fast therein, and inturned tangs within the ring spaced to enter the intervals and adapted to the height of the groove.

11. In an inverted incandescent gas-burner, the combination with the nozzle having exterior shoulders with a groove between, the lower shoulder being cut away at intervals, a gravity-lock supported by the upper shoulder above one interval and hanging normally across said groove, and a fixed stop between the shoulders at another point; of the mantle, a metallic ring fast therein, inturned tangs at its upper end spaced to enter the intervals and one of them adapted to raise said lock as the ring is applied, and upturned inner extremities on said tangs adapted to fill the height of said groove.

12. In an inverted incandescent gas-burner, the combination with a Bunsen tube having a mixing-chamber tapering downward toward the nozzle and an interior shoulder; of the gas-supply tip having a plurality of orifices, and a needle-valve regulator for one of them.

13. In an inverted incandescent gas-burner, the combination with a Bunsen tube having a mixing-chamber tapering downward toward the nozzle, a cylindrical nozzle and an interior shoulder between them; of the gas-supply tip, and a needle-valve regulator therefor.

14. In an inverted incandescent gas-burner, the combination with a substantially vertical Bunsen tube having downwardly-facing right-angular annular shoulders in its bore, and the air-inlets at its upper end; of the gas-supply tip directed into said upper end, and a needle-valve regulator therefor.

In testimony whereof I have hereunto subscribed my signature this the 27th day of July, A. D. 1905.

HENRY FARNOFF.

Witnesses:
A. THERY BAKER,
ELIZABETH KLEINSTEUBER.