No. 794,406. PATENTED JULY 11, 1905.

J. HERCZEG.

PROCESS OF HEATING TO INCANDESCENCE REFRACTORY MANTLES.

APPLICATION FILED JUNE 9, 1904.

Fig. 1

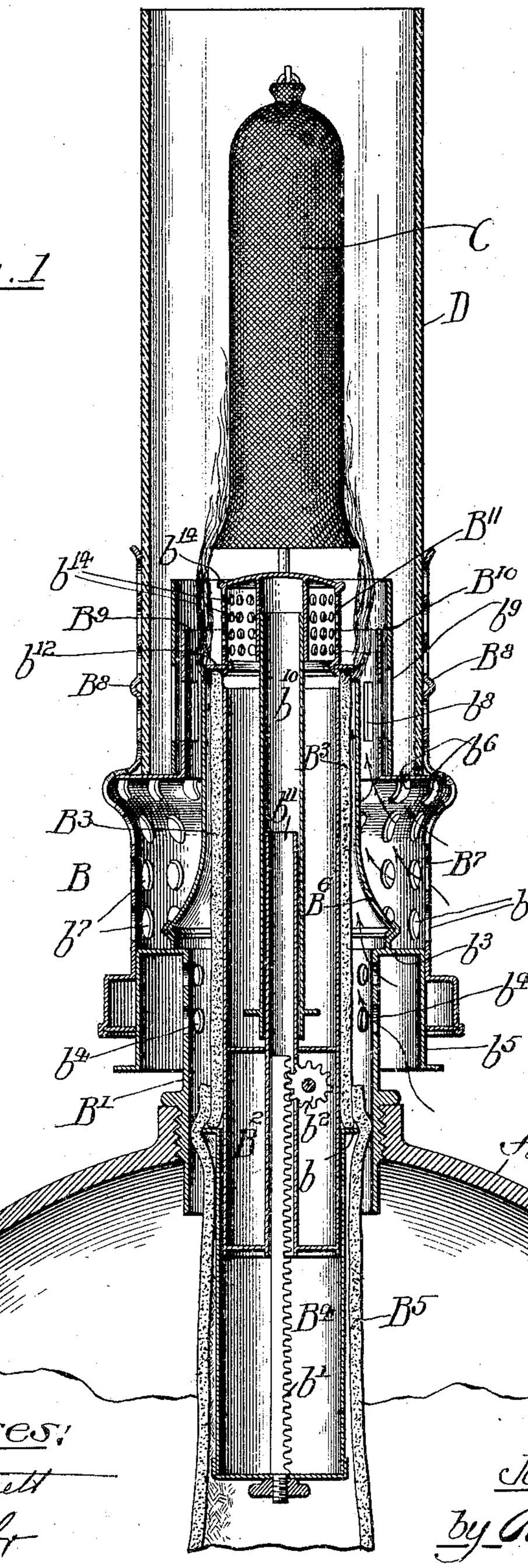
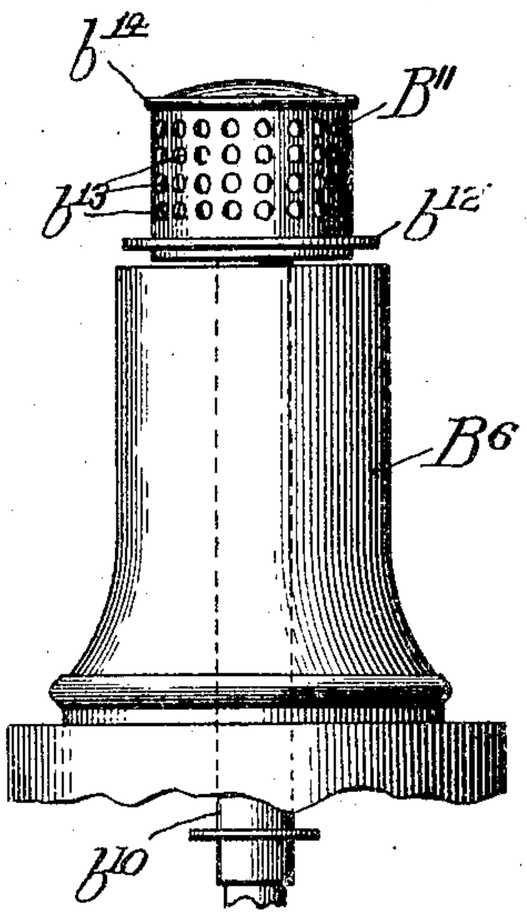


Fig. 2



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UNITED STATES PATENT OFFICE.

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PROCESS OF HEATING TO INCANDESCENCE REFRACTORY MANTLES.

SPECIFICATION forming part of Letters Patent No. 794,406, dated July 11, 1905.

Application filed June 9, 1904. Serial No. 211,869.

To all whom it may concern:

Be it known that I, JOSEPH HERCZEG, a citizen of Austria-Hungary, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Heating to Incandescence Refractory Mantles; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel method of heating to incandescence a tubular reticulated refractory mantle of that kind commonly known as the "Welsbach" mantle, and thereby producing a high-power illuminating-light.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In practicing my novel method to heat to incandescence a mantle of the character set forth a hollow flame is developed around and envelops the mantle and impinges closely against the outer surface thereof. The entire flame passes outside of the mantle and none to the inside thereof. The development of the flame in the manner described may be effected by first producing a flame at the lower end of the mantle by the combustion of a suitable burning mixture and thereafter spreading the flame outwardly in hollow or tubular form around the base of the mantle in a manner to closely envelop and impinge against the outer surface of the mantle as the flame rises upwardly. The tendency of the flame, as is well known, is to assume a pointed or cone shape, and the means for spreading the flame in the manner described is so related to the flame at its place of the initial ignition and to the mantle that the annular flame passes entirely outside of the base of the mantle and none of it enters the mantle. The tendency of the flame to assume a pointed or cone shape has the effect to cause the flame to cling to or tend to press against the exterior surface of the mantle and to thereby heat the filaments of the mantle and produce incandescence thereof. Heretofore it has been the practice in the use of mantles of this kind to direct all or a part of the heating-flame to the interior of the mantle from a point beneath the same, the products of combustion of the flame thus directed to the interior of the mantle passing outwardly therefrom through the interstices of the reticulated mantle and in this manner heating the filaments of the mantle to incandescence. An objection to this mode of heating the mantle is that the unconsumed particles of the burning mixture are carried outwardly into and through the interstices of the mantle, some of said particles lodging in said interstices and in time clogging the same. Such clogging of the mantle results in retarding the passage of the gaseous products of combustion from the inner to the outer side of the mantle, thereby diminishing the heating-flame in the mantle. The deposit of the unconsumed carbon particles on the mantle has also the effect of darkening the mantle and in this manner further reducing its efficiency. Not only is this true, but the supply of oxygen to the flame within the mantle is restricted, owing to the fact that combustion takes place in a limited space, having a necessarily limited space for the entrance of the oxygen to support combustion. By my improved method all of the flame passes entirely outside of and envelops the mantle and impinges against the outer surface thereof and none of the flame or the constituents of the burning mixture pass into the interior of the mantle. The gaseous products of combustion and unconsumed solid particles carried thereby do not pass through the interstices of the reticulated mantle, so that there is no tendency of the unconsumed parts of the burning mixture or soot collecting on the mantle or being deposited in the interstices thereof. Any tendency of the unconsumed particles or soot to cling to the outer surface of the mantle is overcome by reason of the upward passage of the flame about the mantle. The development of the flame around the mantle in the manner described affords a much greater area of flame than occurs when the flame is developed within the mantle. There is therefore a freer and

more intimate admixture of the oxygen of the air with the burning mixture, thereby producing more complete combustion, with the result of a less formation of soot and a more intense heat to produce the desired incandescence of the mantle.

I may employ in the practice of my improved method any of the well-known forms of gaseous burning mixtures and as herein illustrated have shown a burner designed to burn a hydrocarbon vapor produced from petroleum.

The device herein illustrated will now be described and its operation explained with respect to my novel method of heating the mantle; but it will be understood from the description which follows that the burner may be widely varied, while capable of carrying into effect my novel method.

As shown in the drawings, Figure 1 is a central vertical section of a petroleum-burner designed for carrying my novel method into practice. Fig. 2 is a fragmentary view of a portion of the wick-chamber and the flame-spreading device removed from the burner.

In said drawings, A designates the bowl of a petroleum-lamp. B designates as a whole the burner, C a mantle suspended over the burner, and D a chimney supported on the burner and surrounding the mantle and the upper end of the burner.

The burner B is made as follows: B′ designates the tubular base of the burner, which extends into an opening in the top of the bowl and has screw-threaded engagement therewith. B^2 designates a wick-supporting tube which is located with its lower end centrally of the tubular base and extends upwardly therefrom. Said tube B^2 supports a cylindric wick B^3, which closely surrounds the tube. B^4 designates a wick-raising tube that fits around the lower end of the wick-supporting tube and is provided at its upper end with a flange b, on which the lower end of the wick B^3 rests. As herein shown, a supplemental wick B^5 surrounds the lower end of the wick B^3 and extends downwardly into the bowl A. The wick-raising tube B^4 is raised and lowered through the medium of a rack-bar b', attached to the lower end thereof and extending centrally upwardly therethrough, and a pinion b^2, attached to a shaft that extends transversely through the tube and the tubular base. The wick B^3, as herein shown, is a non-combustible wick, it being employed merely to draw by capillary attraction the liquid fuel from the bowl A to the place of ignition. B^6 designates a circular downwardly and outwardly flaring shell which surrounds the wick B^3 and between which and the wick-tube is formed an annular wick-chamber. Said wick-chamber is made of a width somewhat greater than the thickness of the wick, thereby affording outside of the wick an annular passage, upwardly through which air is adapted to pass. The larger lower end of said shell is attached in any suitable manner to a radial annular flange b^3 at the top of the tubular base B′ of the burner. The wick-chamber is supplied with air through a plurality of openings b^4 in the tubular base B′, and the perforated part of the tubular base is surrounded by an air receiving and directing chamber that is formed by an annular flange b^5, extending downwardly from the radial flange b^3 at the top of the tubular base of the burner. B^7 designates an annular outer casing or shell that surrounds said wick-chamber and fits at its lower end on the annular flange b^5 of the tubular base of the burner. Said outer casing B^7 is formed at its upper end to constitute the annular wall of a chimney-gallery B^8, the bottom of which is formed by means of an inwardly-extending annular flange b^6, located at the base of the gallery and supporting the chimney. The said outer casing B^7 is provided with a plurality of air-inlet openings b^7, which admit air to the space between the same and wick-chamber. The air thus introduced around the wick-chamber is directed upwardly to the flame of the burner through three passages, as herein shown, one passage being formed between the wick-chamber and an annular shell B^9, extending upwardly from the chimney-gallery floor, another between said shell B^9 and a like shell B^{10}, surrounding the shell B^9, and the third passage formed between the outer shell B^{10} and the chimney. The air-inlet chamber between the outer shell B^7 and the wick-chamber communicates with the lower end of the inner air-passage, while the latter passage communicates with the two outer passages through openings b^8 b^9 in the shells B^9 B^{10}. The said passages are made of successively-increasing vertical length from the inner to the outer passages, whereby air is delivered at vertically-separated zones to the enveloping flame. B^{11} designates as a whole a spreader-head which is located above the wick-tube and is supported centrally on the upper end of a vertical tube b^{10}, located within the wick-supporting tube and having telescopic engagement at its lower end with a tube b^{11}, which is stationary with the wick-tube. Said tube b^{10} has such close frictional engagement with the tube b^{11} as to hold the spreader-head in any position to which it may be adjusted. With this construction the spreader-head may be adjusted accurately to the wick-chamber and held in such adjusted position. The burner-head is provided near its lower end with an annular horizontal radially-extending spreader-flange b^{12}, which extends over the wick-chamber. Said head is made hollow and is provided in its vertical wall with a plurality of openings b^{13}. The top wall of said spreading-head is made imperforate and preferably extends beyond the vertical wall to constitute an annular spreading bead or rim b^{14}. When the burner is first lighted, the upper end of the wick is

separated from the spreader-flange b^{12} either by turning the wick downwardly or by raising the spreader-head, and the oil is burned in the usual manner of a petroleum-lamp until the parts are sufficiently heated to vaporize the oil. The upper end of the wick is then brought against the spreader-flange, and thereafter the oil-vapor is burned and the parts are maintained sufficiently heated to continue the vaporization of the oil to produce the burning mixture. The air delivered through the openings b^4 to the annular wick-chamber commingles with the vaporized oil to produce a properly-proportioned burning mixture, which is ignited just beneath the outer margin of the spreader-flange b^{12}. By reason of the close fit of the upper end of the wick to the spreader-flange when the burner is in its normal operation the vapor which passes off of the inner side of the wick does not ignite, there being no supply of oxygen to support combustion. The flame produced by the ignition of the mixed vapor and air is spread or deflected outwardly, as indicated in Fig. 1, by the spreader-flange b^{12} and passes upwardly around the lower end of the tubular mantle. Said lower end of the tubular mantle is shown as made flaring or bell-shaped to prevent the narrowing tendency of the flame to collapse the mantle at its lower end. Air is supplied to the said flame through the openings b^7 in the outer casing B^7 and through the triplex annular passages before described and is delivered to the flame from said passages at different vertical heights, as before explained. The portion of the vaporized hydrocarbon that passes into the hollow distributing-head B^{11} issues therefrom through the openings b^{13} in the form of jets, and by reason of the lower pressure on the exterior of said head due to the upward draft caused by the flame the said jets of vapor strike the flame with such force as to aid in the outward deflection of the flame in a manner to carry the same radially beyond the lower margin of the mantle and insure that all the flame and all the burning mixture shall pass entirely outside of the mantle and that none shall enter the interior thereof. It will be observed that the oxygen which feeds the flame is delivered to the exterior of the flame and not to the interior thereof, so that the hottest part of the flame is the inner part thereof or that which impinges directly against the mantle. In this manner a thorough combustion of the burning mixture is insured, while at the same time maintaining the heat of that portion of the flame which directly impinges against the mantle.

As before stated, it is to be understood that my improved method of heating the mantle to produce incandescence may be practiced by burning devices of varying construction and adapted to burn different burning mixtures.

I claim as my invention—

1. The process of producing a light by the use of a thin, reticulated, refractory mantle which consists in developing a hollow flame wholly outside, and in contact with the outer surface of the mantle in a manner to prevent entrance of the flame and constituents of the burning mixture to the interior of the mantle, said hollow flame being exteriorly unconfined and impinged upon throughout its length by a free body of surrounding air.

2. The process of heating to incandescence a tubular, reticulated, refractory mantle which consists in developing a flame beneath the mantle, spreading the flame outwardly and upwardly to cause it to pass wholly outside of and envelop the mantle and impinge against the outer surface thereof.

3. The process of heating to incandescence a tubular, reticulated, refractory mantle which consists in developing a flame wholly outside of and in contact with the outer surface of the mantle, and supplying air to the outer side of the hollow flame at vertically-separated zones.

4. The process of heating to incandescence a tubular, reticulated, refractory mantle which consists in burning a burning mixture beneath the mantle to produce a flame, spreading said flame outwardly and upwardly to constitute a hollow flame which passes wholly outside of and envelops the mantle and impinges against the outer surface thereof and directing some of the burning mixture to the interior of the hollow flame and directing it outwardly against the flame to assist in spreading the latter.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 4th day of June, A. D. 1904.

JOSEPH HERCZEG.

Witnesses:

TAYLOR E. BROWN,

HERBERT A. PARKYN.