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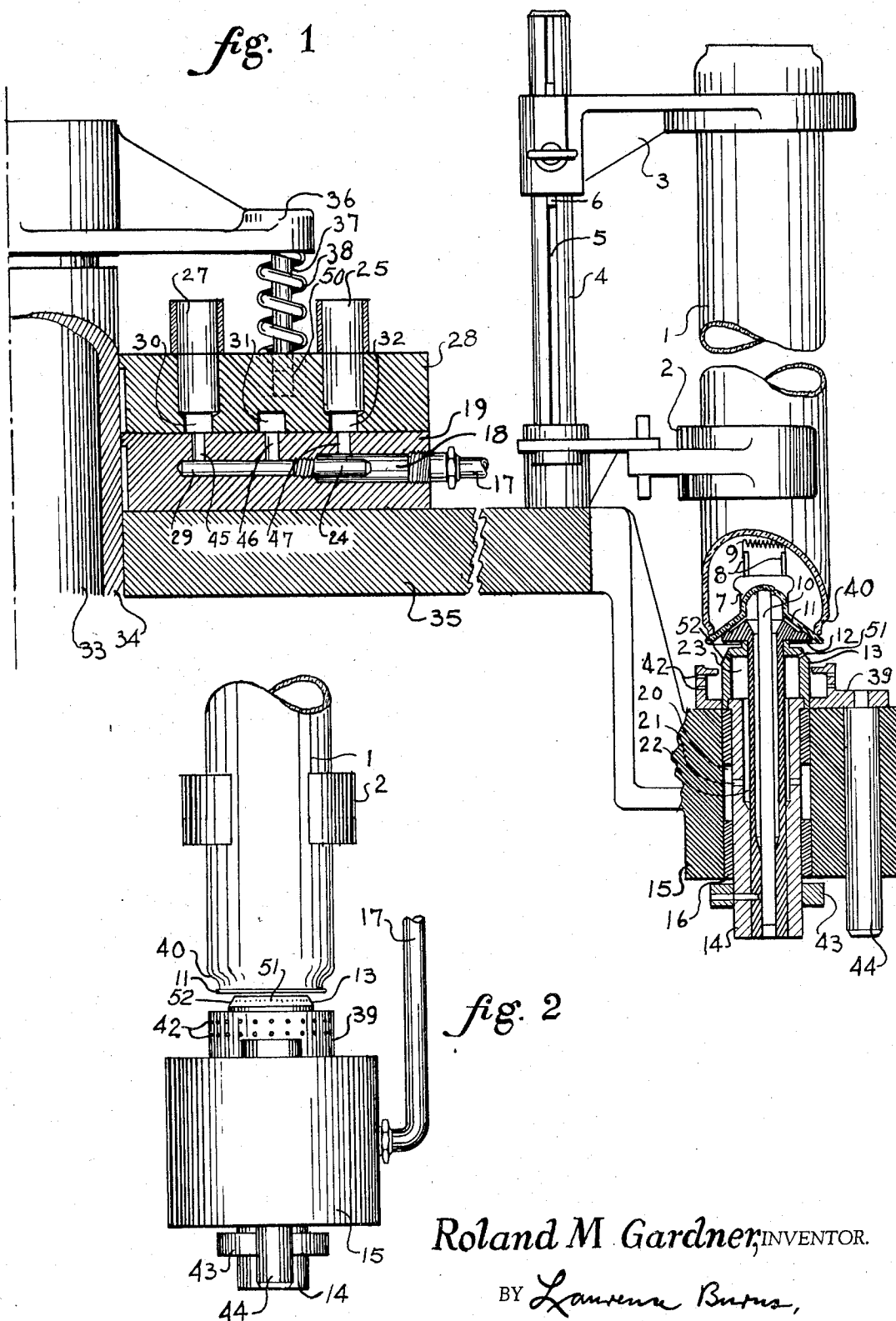
R. M. GARDNER

2,349,822

LAMP SEALING APPARATUS

Filed April 25, 1941

2 Sheets-Sheet 1



Roland M. Gardner, INVENTOR.

BY Lawrence Brous,

ATTORNEY

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2 Sheets-Sheet 2

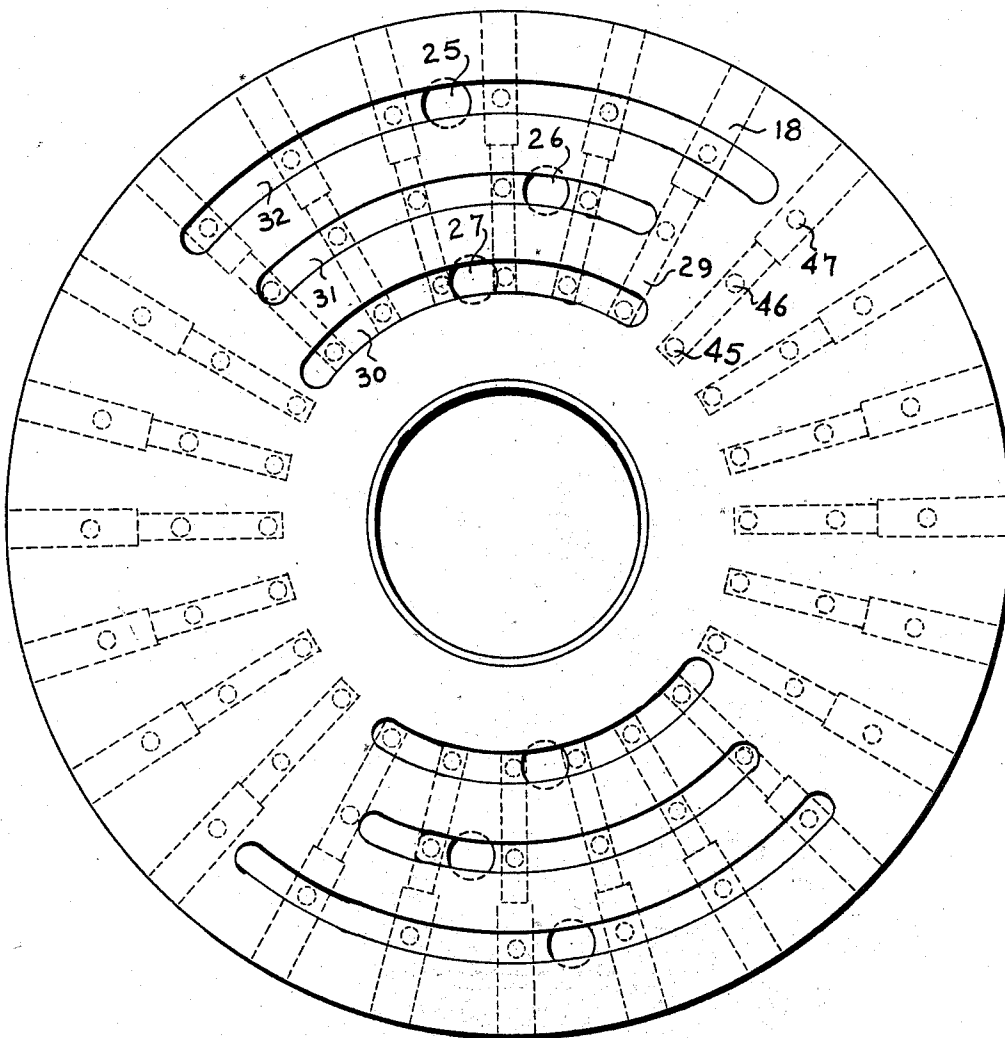


fig. 3

Roland M. Gardner, INVENTOR.

BY Lawrence Burns,

ATTORNEY

UNITED STATES PATENT OFFICE

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LAMP SEALING APPARATUS

Roland M. Gardner, Swampscott, Mass., assignor
to Sylvania Electric Products Inc., a corpora-
tion of Massachusetts

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4 Claims. (Cl. 49—2)

This invention relates to electric lamps and more particularly to apparatus for sealing the ends thereof.

An object of this invention is to provide a means for sealing a mount in the end of tubular glass envelope.

Another object is to provide such a means which will insure the obtaining of a tight, even seal.

A further object is to provide such a means which will employ the use of gas as a means for the attainment thereof.

Further objects, advantages and features will be apparent from the following specification taken in conjunction with the accompanying drawing in which:

Figure 1 is a side elevational view, partly in section, of a portion of the gas sealing machine, showing one of the sealing heads and a portion of the gas mixture valve in section and a portion of the valve holder.

Figure 2 is a front view of one of the sealing heads on the machine.

Figure 3 is a schematic diagram of the gas mixture valve.

In Figure 1, the tubular glass envelope 1 is held by the locking jaw 2 and is aligned with the mount support 12 through the guide 3 which is keyed to the guide shaft 4 through the key way 5 by the key 6. The mount 7 which is to be sealed to the tubular glass envelope 1 is seated on the mount support 12. It is the flare 11 of the mount 7 which is actually sealed to the lipped extremities 40 of the envelope 1. The lead-in wires 8, sealed in the mount 7, project up through the top thereof and support the filamentary electrode 9 therebetween. The exhaust tubulation 10 is sealed in the upper portion of the mount 7 and projects downward through the flare 11.

The lower extremity of the mount support 12 which encloses the tubulation 10 extends down through the burners 13 and is fitted in the gas inlet sleeve 14. This gas inlet sleeve 14 is bushed to the head chair 15 through the bushing 16. This head chair 15 may be one of a series of such chairs mounted on the turn table 35 of a turret machine.

The gas mixture line 17 provides a means for conducting the gas mixture from the mixture chamber 18 in the lower valve plate 19. This line 17 enters the head chair 15 and thus pipes the gas into the chamber 20 in the bushing 16 from whence it flows through the vents 21 in the gas inlet sleeve and the channel 22 into

the combustion chamber 23 of the burner 13. The channel 22 is formed by the inner walls of the gas inlet sleeve 14 and the outer walls of the mount support 12 which is fitted in said inlet sleeve.

The gas mixture formed in the mixture chamber 18 is formed by jetting oxygen and air through the jet 24 into the chamber 18 where it mixes with the gas introduced directly into the chamber. There are 3 supply ports located on top of and extending into the top valve plate 28. They are the gas supply port 25, the oxygen supply port 26 and the air supply port 27. Due to the fact that these ports are located in a staggered relationship to each other, the oxygen supply inlet 26 doesn't show in the section herein depicted. These three ports are connected to sources of gas, oxygen and air respectively.

The air supply port 27 pipes air into the air and oxygen mixture chamber 29 through the connecting chamber 30 in the top valve plate and the connecting chamber 45 in the lower valve plate. A similar piping of oxygen into the air and oxygen mixture chamber 29 is accomplished through the connecting chamber 31 in the top valve plate and connecting chamber 46 in the lower valve plate. Gas is piped from the gas supply port 25 through the connecting chamber 32 in the top valve plate and the connecting chamber 47 in the lower valve plate into the mixture chamber 18. It should be noted that the air and oxygen are mixed together in the chamber 29 and then jetted into the mixture chamber 18 while the gas is introduced directly into the top of the mixture chamber 18. By bringing together the gas, air, and oxygen in this manner, a proper mixture is readily obtained.

The valve consists of a top valve plate 28 and a lower valve plate 19. They are concentric with the two shafts 33 and 34. Shaft 33 is the inner shaft and is fixed while shaft 34 is the outer shaft and is movable about the fixed shaft. The lower valve plate 19 is the movable portion of the valve and is attached to the turn table 35 which moves with the rotatable shaft 34. The top valve plate 28 is the fixed portion of the valve and a bearing contact between the plate 28 and the shaft 34 allows the plate 28 to remain stationary while the shaft 34 moves. The plate 28 remains stationary because it is fixed to the valve holder 36 by means of the pin 37, as explained in more detail below.

To prevent any harmful effects to the valve mechanism assembly or its related parts as a

result of back-firing or some similar phenomena which might take place as a result of improper control being exercised over the flow of the gas, air, and oxygen, a device has been incorporated in this gas sealing machine to obviate this. A valve holder 36, half of which is shown in Figure 1, is fixed to the upper extremity of the fixed inner shaft 33. The other half of the holder extends over on the other side of the shaft 33 in the same manner as shown here. The stud 37 projects down from the outer end of the holder 36 and extends into the recess 50 provided therefor in the top part of the top valve plate 28. This stud extends into the recess 50 with a relatively small tolerance in order that the horizontal alignment of the top valve plate 28 may be maintained. The spring 38 encircles that portion of the stud 37 which does not extend into the recess 50. Thus, if for any reason an explosion should take place by reason of improper control being exercised over the gas, air and oxygen supply, the force exerted thereby would have no harmful effect for it would merely cause the upper valve plate 28 to be lifted upward thus freeing the trapped gases. The spring 38 would be contracted thereby and, as soon as the pressure of the explosion was relieved, it would expand and thus cause the upper valve plate 28 to return to its normal position, properly centered by the stud 37.

The gas mixture emanating from the burner jets 13 may be lit by a pilot light or some other similar means. The flames emanating from the ports 51 in the burners 13 heat the flare 11 of the mount 7 which is to be sealed to the lipped extension 40 of the tubular glass envelope 1. When the glass in the region of the rim of the flare 11 and the lipped extension 40 has been heated to a pliable state, the sealing ring 39 is moved up to press the molten rim of the flare 11 against the lipped extremity 40 of the glass envelope 1, thus forming the seal. The sealing ring 39 may be moved up by a cam or some similar device acting on the sealing ring arm 44 which is attached thereto and which is freely fitted through the head chair 15. The rim of the top surface of this sealing ring 39 projects upward higher than the main portion of the top surface, thus providing a mould within which the seal may be uniformly formed when the ring 39 is moved up in contact with the molten glass. The ventilation ports 42 in the sealing ring 39 serve as a means of insuring the continuous burning of the fire in the burners 13 when the sealing ring moves up to compress the molten glass. Although the top portion 52 of the combustion chamber is bevelled in a manner to provide for the angular disposition of the ports 51 of the burner, with consequent direction of the flow outward and upward from the burner 13 in a direction substantially tangential to the mount support 12, these ventilation ports 42 serve as an additional means for preventing the elevating of the sealing ring 39 from extinguishing the fire in the burner while the ring is compressing the seal and before the ring drops down again.

In the sealing of two vitreous bodies, by mechanical means, "working" of those portions in a pliable state is highly desirable because it is only by working the glass that a well knit seal may be obtained. Thus after the sealing ring 39 has accomplished the compressing of the molten glass and has dropped down to its normal position the gas inlet sleeve 14 and the ele-

ments located therein are moved up to the top of the mount support 12 to work and stretch the seal just formed. This elevation of the gas inlet sleeve assembly may be accomplished through a cam mechanism by causing the lower extension thereof to pass over a slight rise in a track along which said lower extension may be caused to pass. The extent of this elevation may be limited by the sleeve ring 43 attached to the bottom of the gas inlet sleeve 14 below the lower extremity of the head chair 15 through which the sleeve is bushed.

The upward movement of the gas inlet sleeve 14 will carry with it the mount support 12 which is fitted therein and the burner 13 which caps the top thereof. As is shown in this figure, Figure 1, the top of the mount support 12 is semi-conical in contour. Thus when a mount is placed on top of the support and a bulb is located within the jaw 2 and the guide 3, the lipped extremity 40 of the tubular glass envelope 1 in conjunction with the semi-conical mount support will provide an adequate centering of any mount whether it is one with or without an exhaust tube. The lower extremity of the mount support is bored to a smaller diameter than the upper portion, thus further insuring the proper alignment of the mount. The clearance at the lower extremity of the exhaust tube 10 in the bored mount support 12 is so small that it will insure proper horizontal alignment while the "working" or stretching of the seal takes place. This upward movement of the mount support will cause a stretching of the seal which was formed when the sealing ring 39 moved up and pressed together the molten glass at the rim of the flare 11 and the lipped extension 40 on the end of the tubular glass envelope 1.

Figure 2 shows more clearly just how the gas mixture line connects the mixture source in the lower valve plate 19 to the combustion chamber 23 by piping the gas mixture through the head chair 15. It shows the tubular glass envelope 1 which is held in the locking jaw 2, with the mount 7 sealed in at the end thereof. This figure also brings out more clearly the relationship between the sealing ring 39, with the ventilation ports 42 therein, and the burner 13.

Figure 3 is a schematic diagram of the gas mixture valve. As the turntable 35, on which a series of heads similar to that described in Figure 1 are attached, moves through 360° in a series of indexing steps, the movable lower valve plate 19, which is joined to the turntable 35, moves therewith. Each indexed position is represented in this figure by the dotted outline of the internal structure of the movable lower valve plate 19. It shows the air and oxygen mixture chamber 29 and the gas mixture chamber 18 into which the air and oxygen are piped from chamber 29. It also shows the connecting chambers 45, 46 and 47 in the lower valve plate which pipe the air, oxygen, and gas respectively into the mixture chambers 29 and 18. The elongated air, oxygen and gas connecting chambers 30, 31 and 32 respectively, located in the fixed upper valve plate, pipe air, oxygen and gas respectively from the air, oxygen, and gas supply ports 27, 26 and 25 respectively. The gas, air and oxygen are then distributed from these connecting chambers 30, 31 and 32 to their corresponding connecting chambers in the movable lower valve plate as the lower valve plate moves through its indexing cycle. It is advisable to locate the gas, oxygen and air supply ports 25,

26 and 27 as nearly in the longitudinal center of these elongated connecting chambers 30, 31 and 32 in order to insure a more even pressure distribution over the entire chamber area.

As may be noted from the schematic diagram of Figure 3, these three elongated chambers 30, 31 and 32 are not of the same length nor are they aligned with each other to introduce gas, air and oxygen into the mixture chambers in the indexing lower valve plate at the same time. They are disposed in a manner to first introduce gas, then air and finally oxygen and when one of the heads connected to the lower valve plate moves out of the range of these elongated chambers, the oxygen is cut off first, then the gas and finally the air.

As was pointed out above, the internal structure of the lower valve plate shown in phantom represents an indexed position. The first of the ports 45 to 47 to be sequentially brought into register with chambers 30 to 32 is port 47 which is brought into register with the chamber 32 just after it has left one indexed position and is in the process of moving to the next one. A pilot light suitably disposed will give a soft gas fire. As the indexing continues, the air connecting chamber 45 will be brought into register with the elongated air chamber 30 just before the next indexed position is reached. Thus in one indexed step, one of the heads connected to the lower valve plate will move from no registration with these elongated chambers 30, 31 and 32 through a registration with the gas chamber 32 and then a registration with the air chamber, so that the next indexed position will provide a fire of gas and air. When the next indexing step takes place, the head which is now provided with a gas and air fire will be brought in register with the elongated oxygen chamber 31 through the connecting chamber 46 as it is in the process of moving to the next indexed position. Thus the head which has a gas and air fire when it left one indexed position will be provided with a gas, air and oxygen fire when it reaches the next indexed position.

To prevent an explosion or back-firing, it is necessary to disconnect the oxygen first and so this is done on this valve. This valve also provides for the disconnecting of the air last so that the mixture chambers 29 and 18 in the lower valve plate may be cleaned out by a short blast of air therethrough after the oxygen and gas supply has been cut off. The elongated chambers 30, 31, and 32 are designed to do more than just provide for the periodic introduction of gas, air, and oxygen in that order and then the closing off of this supply by cutting off the oxygen first, then the gas, and then the air.

As was pointed out above, the supply ports 25, 26 and 27 are disposed in a manner to be as near the longitudinal center of the elongated chambers 30, 31 and 32 as possible and still not be located directly over an indexed position. Further provision is made for the maintenance of a pressure equilibrium by providing for the same number of positions on the indexing lower valve plate to be in register with their respective supply chambers in the upper valve plate at all times. This may be learned by a closer study of each of the elongated chambers 30, 31 and 32.

As shown in Figure 3, the elongated gas chamber 32 is cut off shortly after the indexing from one position to another starts while it is brought in registration with one of the positions in another head on the lower valve shortly after the

indexing from one position to another starts. Thus as one head is having the gas supply cut off therefrom, at that same instant, another head is brought in register with the other end of the elongated supply chamber. In this way, the same number of positions or parts thereof, are always being fed with gas and a pressure equilibrium is constantly maintained.

The same is true of the oxygen and air supply chambers 31 and 30. Oxygen is introduced into one of the heads in the indexing lower valve as soon as the indexing motion is started. By the same token, the oxygen supply is cut off on the other end of the chamber as soon as the indexing starts. Since one of the heads on the lower valve is not brought in register with the elongated air supply chamber 30 until shortly before an indexing movement has been completed, a head on the other end of the chamber is not cut off until shortly before the indexing movement has been completed.

Thus this machine not only provides a gas, oxygen and air heating means for sealing bulbs at both ends during one cycle of the turntable but the valve employed and herein described is so constructed as to insure a constant pressure at all times in the respective gas, oxygen and air supply chambers. The burner construction and assembly, as may be observed from the above description, enables the reduction to a minimum of the circulation of the products of combustion through the internal area of the bulb during the sealing operation. The peculiar angular disposition of the burners and the particular positions which the two bodies being sealed assume with relation to each other as well as with relation to the burner reduces to a minimum the amount of water vapor which circulates through the bulb. Thus in this respect this sealing apparatus affords a distinct advantage over the type of gas sealing machine generally used.

What I claim is:

1. In apparatus for sealing a mount to an elongated glass bulb, the combination: a support for said mount; a holder for said bulb above and in register with the support for said mount; a burner concentric with said mount support, and immediately below said support; and a sealing ring concentric with and of larger diameter than said burner; said ring being mounted for vertical movement with respect to said burner.

2. Apparatus for sealing a mount to an elongated glass bulb comprising: a turret machine; a plurality of heads on said turret machine, each head comprising a support for said mount, a clamping device for holding said bulb above and in register with the support for said mount, a burner concentric with and immediately below said mount support, and a sealing ring concentric with said burner, and movable in a vertical direction with respect thereto.

3. In apparatus for sealing a mount to an elongated glass bulb, the combination: a frusto-conical mount support; means for holding said bulb above and in register with the support for said mount in a position such that the lipped extremities of one end of said bulb will be seated on the flared portion of said mount but within the rim thereof; a burner having a plurality of ports therein, concentric with and immediately below said mount support, the ports of said burner being angularly disposed in a manner to direct a cone of flame radially outward and upward from the lower extremity of the mount support to the portions of the flare of the mount adjacent the rim

thereof; means through which a supply of gas, air, and oxygen may be introduced into said burner; and a sealing ring concentric with said burner and movable vertically with respect thereto, said ring having a plurality of openings in the walls thereof.

4. In apparatus for sealing a mount to an elongated glass bulb, the combination: a substantially frusto-conical mount support; a holder for said bulb above and in register with said mount sup- 10

port; a burner immediately below and in register with said mount support, said burner having ports therein disposed to direct a cone of flame radially outward and upward in a direction substantially tangential to the perimeter of the base edge of said mount support; and a sealing ring concentric with said burner and movable vertically with respect thereto.

ROLAND M. GARDNER.