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C. LENZ

2,304,834

COATING APPARATUS

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Fig. 1.

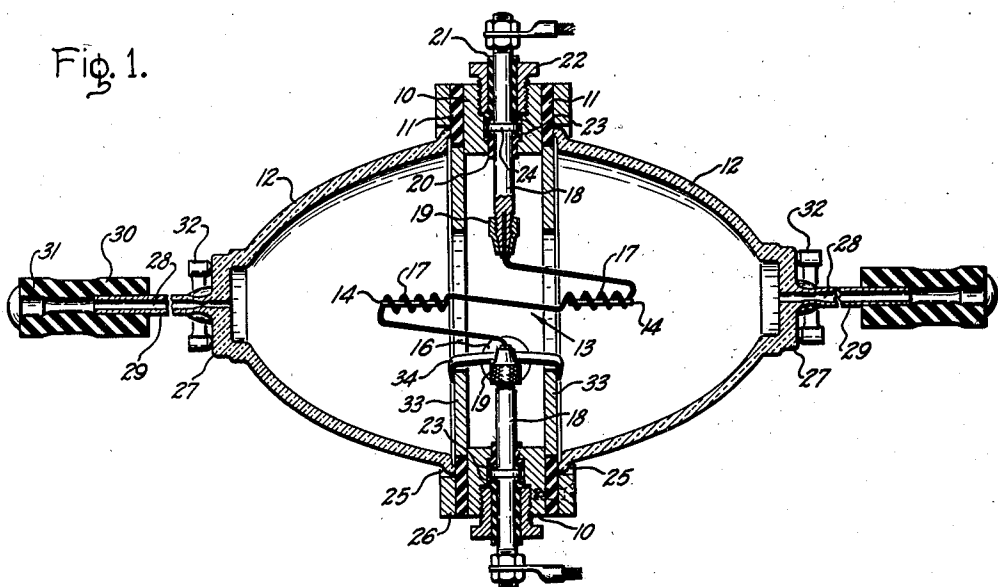


Fig. 2.

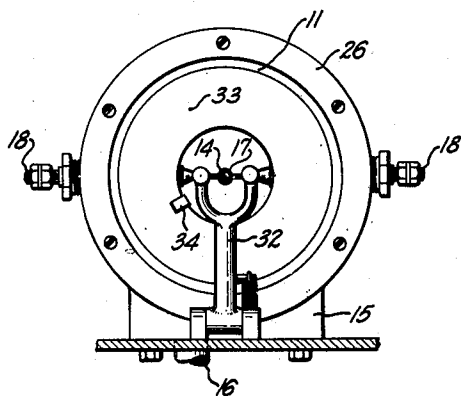
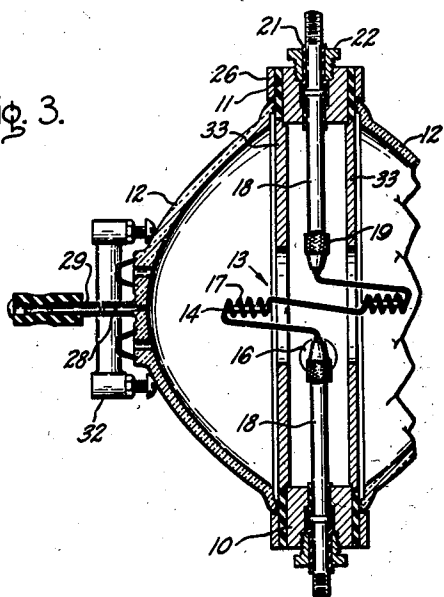


Fig. 3.



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UNITED STATES PATENT OFFICE

2,304,834

COATING APPARATUS

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Application February 14, 1940, Serial No. 318,963

2 Claims. (Cl. 91—12.2)

My invention relates to an apparatus for depositing reflecting coatings uniformly on the inner surfaces of concave or cup-shaped base members or bodies.

The apparatus comprising my invention will be described herein in connection with the application of light-reflecting coatings to the concave reflector sections or members of electric lamps of the type disclosed in United States Patent 2,148,314 to D. K. Wright, in which said reflector section or member is part of the sealed enclosure surrounding the filamentary light source. The reflecting coating has been deposited on such concave members by resting the rim of the member on a gasket mounted on a suitable support, exhausting the air from the member, and then heating a quantity of the reflecting material to vaporize it and cause it to condense on the interior surface of the member. In the development of high production equipment for this purpose, heads for holding the concave members have been designed which are suitable for an indexing type machine, one such head construction being that disclosed in application Serial No. 318,962, of even date, Strickland et al. The head of this machine accommodates two members which are mounted on opposite sides of the head and face each other, and provides a single heater for vaporizing the reflecting coating. It is one of the objects of my invention to provide an improved head of this type for causing a uniform and satisfactory deposition of the reflecting material. Other features and advantages of the apparatus comprising my invention will appear from the following detailed description and the accompanying drawing of species thereof.

In the drawing, Fig. 1 is a sectional view of apparatus comprising my invention along a horizontal plane with the concave members or bodies for receiving the reflecting coating in place therein; Fig. 2 is a side elevation of said apparatus; and Fig. 3 is a corresponding sectional view of a modification of my apparatus for coating differently shaped bodies.

In both species shown, the apparatus comprises a head 10 in the form of a ring having rubber gaskets 11 on opposite faces thereof against which the rims of the glass cups 12 are seated. The head carries a heater 13 for vaporizing strips 14 of the coating material. The said head 10 is provided with an extended flat portion 15 which permits the apparatus to be mounted on a table or indexing turret and is provided with a passage 16 which allows the enclosure formed by the head and the cups 12 to be evacuated.

The manner of operation first requires the bodies 14 of the coating material to be inserted in the heater 13. This operation consists, in this particular instance, in inserting relatively long narrow strips of aluminum in the two separate coil portions 17 of the heater 13 on opposite sides of the head 10. The said coil portions 17 are part of the single tungsten wire making up said heater 13. Each of the strips 14 provides sufficient coating material for a single cup 12. In each instance, the heater coil 17 must bear a definite relation to the associated cup 12, and it is located on a central axis through the head 10 and extends outwardly from one face thereof from substantially the outermost surface of the gasket 11.

Since the heater 13 is subject to wear and is likely to be injured in use, it is attached to the supporting rods 18—18 by easily separated attachment means. Such means comprises the opening in the split ends of the rods 18—18 which accommodate the ends of the heater 13, and the conical caps 19 which cause said ends of the rods 18—18 to be drawn down to grip said ends of the heater 13. The rods 18—18 are also used to carry the electrical energy to the heaters and are therefore mounted in the insulating bushing 20 and 21 in the head 10 and threaded sleeve 22 respectively. Rubber washers 23 on opposite sides of the flange 24 on each rod 18 are compressed by pressure of the sleeve 22 so that they seal said rod 18 air-tight in the head 10.

The cups 12 are now inserted in the apparatus by an operator who guides the rim 25 of each cup through the opening formed by the ring 26 so that it seats against the rubber gasket 11 in a position definitely locating said cup 12 with relation to the associated heater coil 17. In both instances shown, the cups 12 are types used for incandescent lamps of the type disclosed in the patent to D. K. Wright referred to above, those shown in Fig. 1 having an embossment 27 for metal terminal elements and basing purposes, and those shown in Fig. 3 being somewhat more shallow and almost double the diameter of the former. Both cups 12 are completely sealed except for a passage 28 extending through a tube 29 attached thereto which permits the lamp to be exhausted and gas filled at some other stage in its manufacture and another duty of the operator is to close off said passage 28. A convenient method of sealing the passage 28 is to force the rubber tube 30, already stopped by the plug 31, over the end of the exhaust tube 29. Some means such

as the movable holder 32 is preferably provided to keep the cups 12 in position in the apparatus.

The interior of the head 10 and the cups 12 can now be evacuated as they together form a sealed enclosure or chamber. The evacuation takes place through means (not shown) connected to the passage 16 in the ring-shaped body 10 and is preferably carried on until the interior pressure is between 25 and 10 microns of mercury. In the course of the evacuation cycle, it may be desirable to flush and exhaust the interior of the cups 12 repeatedly to assist in clearing contamination therefrom.

To facilitate the thorough removal of the contamination from all parts of each cup 12 and particularly about the rim portion thereof, the opening or chamber formed by the interior of the head 10 is partially closed off by the annular partition or baffle 33 which fits loosely in the opening on the face of the head 10 formed by the gasket 11. A spring clip 34 located in the central opening in the partitions 33 provided for the heater 13 draws them toward each other so that they are kept in place. The function of these partitions 33 is not only to assist in the proper evacuation of the cups 12 but also to confine the vapor of the coating material as much as possible to the interior of the particular cup 12 in which it is vaporized so that it does not deposit on the opposite cup 12 and is distributed more uniformly and satisfactorily over the adjacent surface of the near cup 12. I have found that when such partitions 33 are not provided, the coating material traveling from one cup 12 to the other passes through the space containing the greatest contamination and is apt to leave an uneven and discolored deposit on the latter cup. Because of the particular shape of the rim 25 of the cup 12 and the location of the outer face of the partition 33 which is aligned with the endmost portion of the heat coil 17, the coating material does not tend to deposit on said rim 25 or the gasket 11. Following the interval of operation of the heaters in which the coating material (aluminum, in this instance) is vaporized and deposits on the cups 12, air is admitted into the apparatus and the holders 32 are pulled back, releasing the cups 12.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. Apparatus for coating surfaces by thermal evaporation comprising a ring-shaped head member having a sealing gasket at each side thereof, means for supporting a pair of cup-shaped bodies in opposed relationship with their mouths pressed against the said gaskets, said head member having an exhaust opening through the wall thereof between its sides for evacuation of the chamber formed by said head and cup-shaped bodies, a pair of electrical heating elements each having associated therewith a quantity of coating metal, said heating elements being supported by said head and located respectively in the space enclosed by each of said cup-shaped bodies so as to vaporize the coating metal and deposit it on the inner surface of the cup-shaped body surrounded thereby, and shield means arranged within said head in position to intercept at least a substantial part of the metal vaporized from one of said heating elements and directed toward the cup-shaped body surrounding the other heating element.

2. Apparatus for coating surfaces by thermal evaporation comprising a ring-shaped head member having a sealing gasket at each side thereof, means for supporting a pair of cup-shaped bodies in opposed relationship with their mouths pressed against the said gaskets, said head member having an exhaust opening through the wall thereof between its sides for evacuation of the chamber formed by said head and cup-shaped bodies, a pair of electrical heating elements each having associated therewith a quantity of coating metal, said heating elements being supported by said head and located respectively in the space enclosed by each of said cup-shaped bodies so as to vaporize the coating metal and deposit it on the inner surface of the cup-shaped body surrounded thereby, and shield means comprising a pair of annular baffle rings located at the interior of said ring-shaped head on opposite sides of the exhaust opening therein to intercept metal vaporized from one of said heating elements and directed toward the cup-shaped body surrounding the other heating element.

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