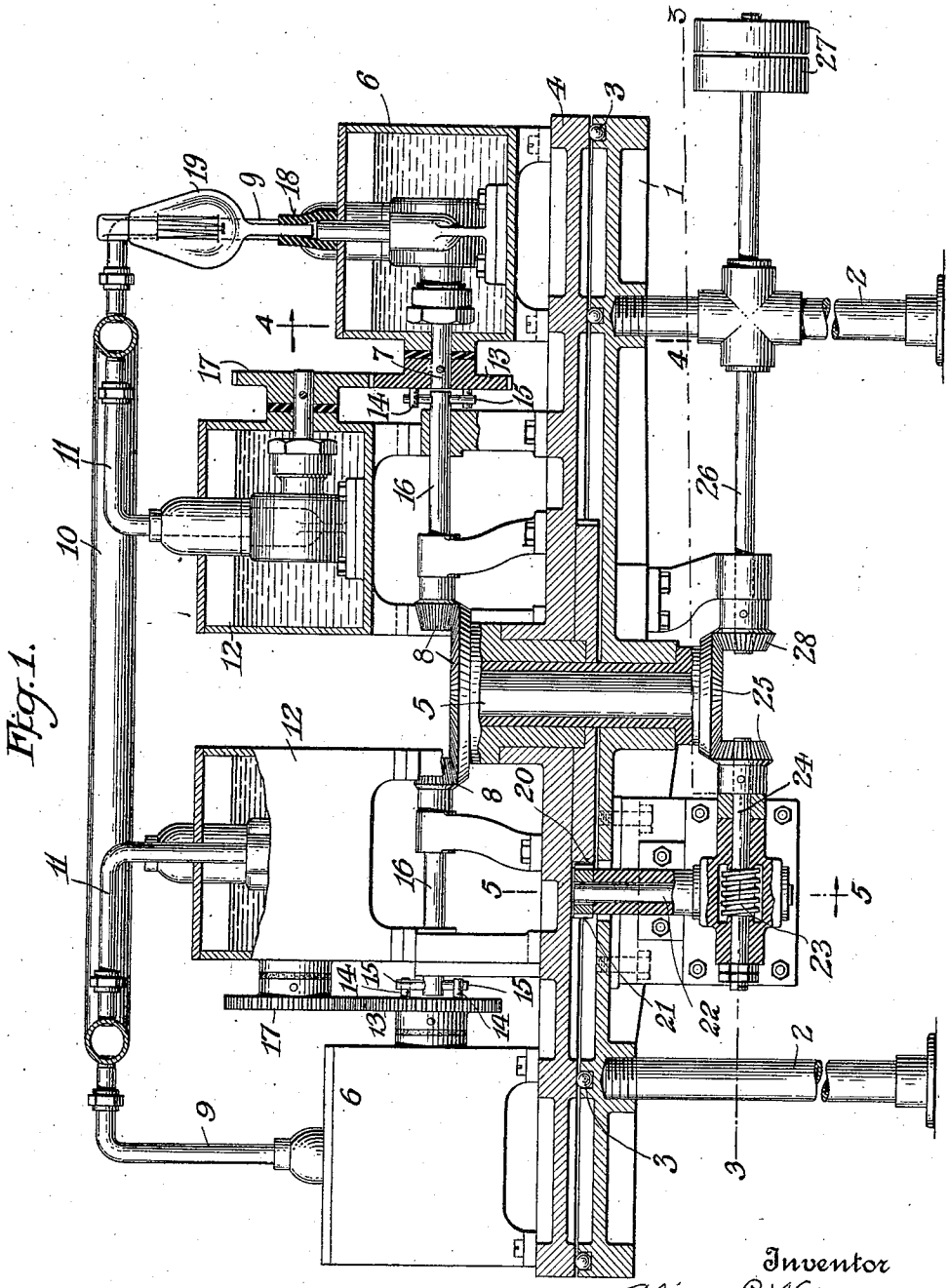
Feb. 20, 1923. 1,445,811

M. P. WETMORE

APPARATUS FOR EXHAUSTING INCANDESCENT ELECTRIC LAMPS AND SIMILAR ARTICLES

Filed Nov. 5, 1918 3 sheets-sheet 1

Fig. 1.



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Filed Nov. 5, 1918 3 sheets-sheet 2

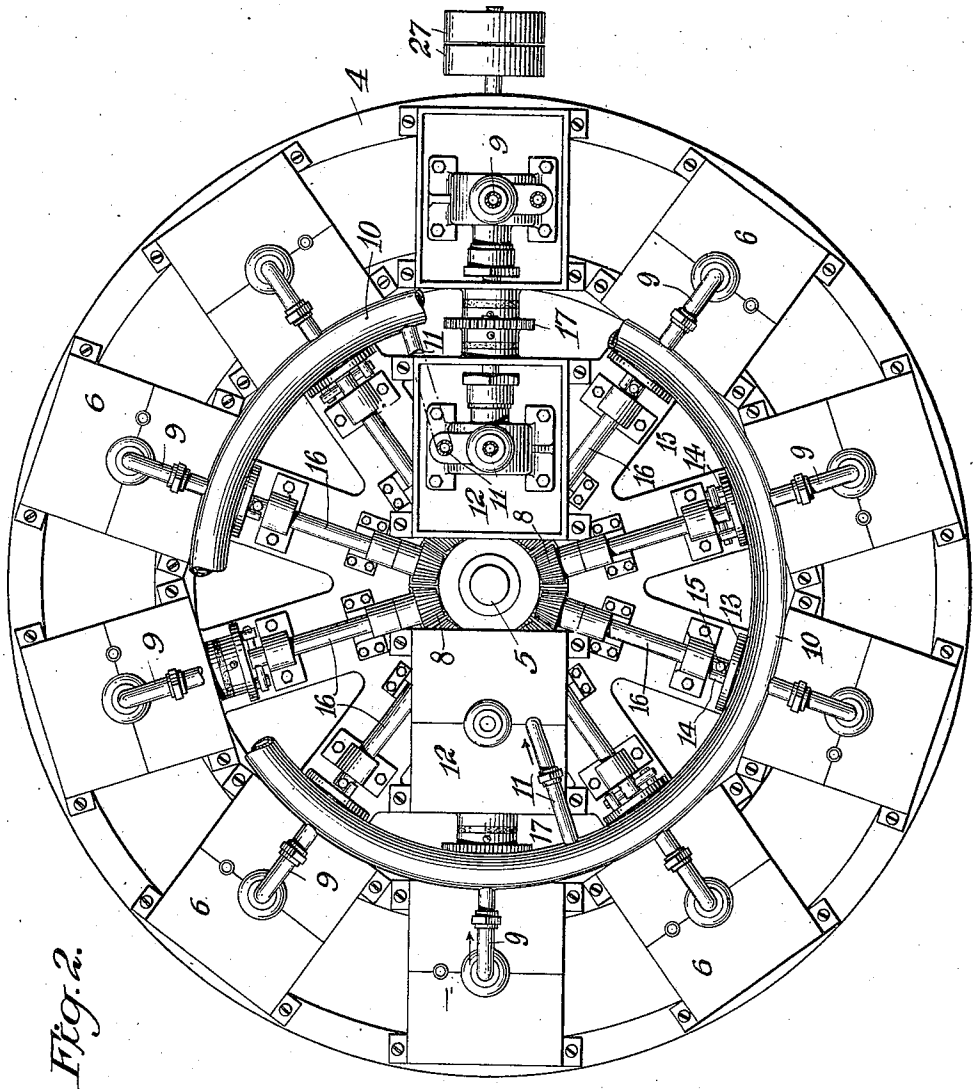


Fig. 2.

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Filed Nov. 5, 1918 3 sheets-sheet 3

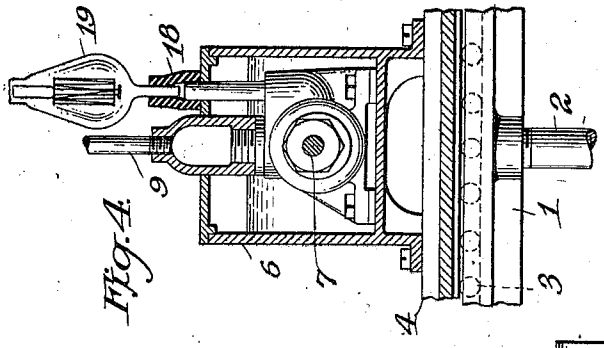


Fig. 4.

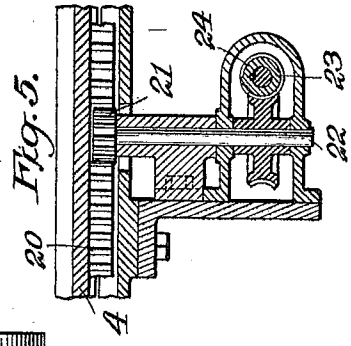


Fig. 5.

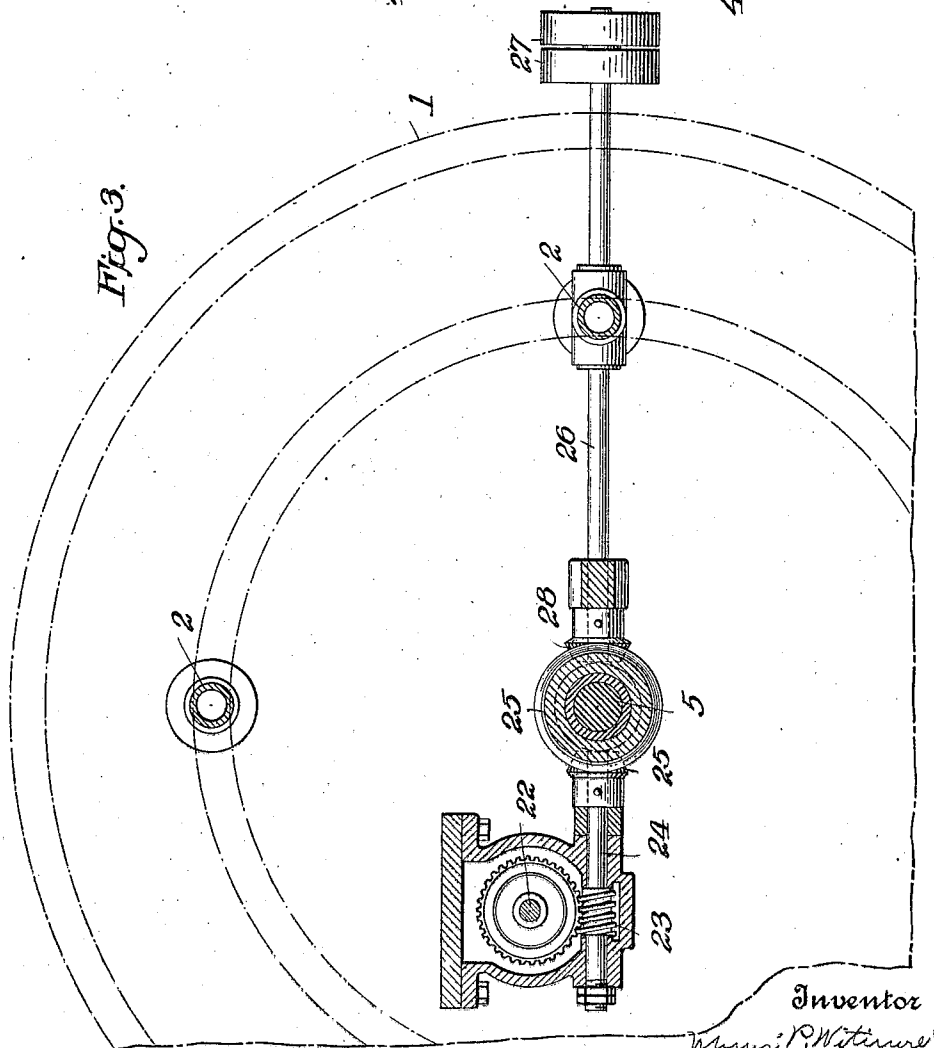


Fig. 3.

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Patented Feb. 20, 1923. 1,445,811

UNITED STATES PATENT OFFICE.

MINER P. WETMORE, OF NEWARK, NEW JERSEY, ASSIGNOR TO HYGRADE ENGINEERING CO. INC., A CORPORATION OF NEW JERSEY.

APPARATUS FOR EXHAUSTING INCANDESCENT ELECTRIC LAMPS AND SIMILAR ARTICLES.

Application filed November 5, 1913. Serial No. 261,287.

To all whom it may concern:

Be it known that I, MINER P. WETMORE, a citizen of the United States of America, residing at Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Apparatus for Exhausting Incandescent Electric Lamps and Similar Articles, of which the following is a specification.

My invention relates generally to apparatus for exhausting or evacuating the contents of air-tight vessels, but is herein described and shown in the particular embodiment designed for use in exhausting incandescent electric lamp bulbs.

The development of the rotary air pump working under an oil seal has reached a state of efficiency such that a pump will exhaust the air from a standard electric lamp bulb in a few minutes. These pumps are small and light and I have found that a series of them can be mounted on a slowly rotating table which will bring the lamps attached to the pumps in succession within the reach of a stationary operator, so that, if the pumps are operated simultaneously with the rotation of the table, a lamp bulb inserted in the receiving socket of the particular pump before the operator at any time will have been exhausted and ready for sealing off by the time the table has made one complete rotation and brought the lamp back to the operator for sealing off. The best form of apparatus at present known to me embodying the above suggested invention is illustrated in the accompanying three sheets of drawings in which:

Fig. 1 is a vertical, axial section of the apparatus taken through the axes of the principal driving shafts, with parts broken away.

Fig. 2 is a plan view.

Fig. 3 is a horizontal section taken on the broken line 3—3 of Fig. 1, looking downward, with the table indicated in outline broken away.

Fig. 4 is a partial detail vertical section on line 4—4 of Fig. 1, and

Fig. 5 is a detail vertical section on line 5—5 of Fig. 1.

Throughout the drawings like reference characters indicate like parts.

1, is the supporting bed, resting on legs 2, 2, and provided with circular ball races 3, 3, for ball bearings on which rest the rotary table 4. This table is centered by vertical shaft 5, passing through and journalled in both the table and the bed.

On the table are mounted a series of rotary, oil-sealed air pumps 6, 6, of a standard construction which are so geared as to be driven from centering shaft 5. Preferably I arrange them with their shafts 7, 7, radially of the table so they can conveniently be connected through bevel gearing 8, to shaft 5. For most efficient operation I place as many as possible of these pumps around the periphery of the table, and connect their discharge orifices by pipes 9, 9, to a common exhaust pipe 10, which, in turn is connected by pipes 11, 11, to one or more "backing-up" pumps 12, 12, which may be made of larger size than the primary pumps 6, 6, as indicated in Fig. 1.

For convenience in removing and replacing the pumps I prefer to employ an axially separable connection or clutch in each pump driving gearing, such as the double crank disc 13, on pump shaft 7, carrying crank pins 14, 14, which are in the path of cross pin 15, carried by shaft 16, journalled in bearings on the table and carrying one element of bevel gearing 8, on its other end.

The backing up pumps 12, 12, are driven from the nearest primary pump as by tooth gearing 17, from the crank discs 13.

18, is the usual short section of stiff rubber tubing mounted on the suction nipple of each pump and adapted to receive, and make air tight connection with, the tube of a tubulated lamp bulb 19.

For rotating the table slowly I prefer to employ a horizontal gear 20, on the under side of the table meshing with pinion 21, on short, vertical jack shaft 22, journalled in the bed 1. This shaft is driven by any convenient further reduced-speed gearing from centering shaft 5. I have shown a worm gearing 23, from horizontal jack shaft 24, which is driven by bevel gearing 25, from shaft 5.

The above described interconnected system of gearing may be driven by main driving shaft 26, journalled on the bed 1, and supporting leg 2, and equipped with fast-and-loose pulley 27, and bevel pinion 28.

In operation, the operator sits near the

edge of the table within reach of pulley 27. On shifting the belt (not shown) to the fast pulley, the drive shaft 26, begins to revolve at a high rate of speed, which is transmitted with a certain reduction to the shafts of the air pumps 6, and 12. This motion is also transmitted, after much reduction by worm gearing 23, and pinion and gear 20, 21, to the table 4, which is thereupon slowly rotated, carrying with it the pumps mounted on it. The operator sticks the tube of the lamp bulb in the rubber 18, of each pump 6, as it comes within his reach, and by the time the last pump has been so equipped, the one first so equipped comes into reach again. During the rotation of the table the pumps have been exhausting this lamp so that by the time it comes again in reach, the vacuum is complete and the operator seals it off, removes from the rubber the stub end of the tube, and inserts the tube of another lamp bulb in it. He then seals off the lamp from the next approaching pump and so on.

The function of the backing-up pump 12, is of course, the creation of a considerable vacuum at the exhaust ports of the primary pumps, and thereby take a portion of load off the primary pumps and their seals.

If any one of the pumps begins to work badly, it can be unscrewed from the table and another substituted in a few moments, the driving connection being automatically broken and reestablished by the movement of the pump without attention from the operator. Each pump 6, is a standard unit mounted on a base by which it may be quickly screwed or otherwise fastened to the table 4, in a predetermined position for engagement of the driving clutches, or as quickly removed and disengaged.

The main advantage of my invention arises from the combination of the benefits of a direct connection from pump to lamp, which avoids leakage (heretofore realized only in single pump operation), with the saving of time resulting from operating a travelling bank of pumps by one operator, so that the highest possible rate of output of exhausted lamps by one operator is realized without producing any poor-vacuum lamps, such as would occur if there were shifting connections and valves inserted between the pumps and the exhaust heads.

The apparatus is also usable with standard pumps so that it fits perfectly into existing manufacturing conditions.

Having described my invention, I claim:

The combination of a rotatable circular table, a series of air pumps mounted on said table in a circle near the edge thereof, each said pump being provided with a socket connected to its inlet port adapted to connect with a bulb to be exhausted, a backing pump also mounted on the same table inside the first mentioned circle of pumps and having its inlet connected directly to the outlets of said first mentioned series of pumps, mechanism for rotating said table slowly, and gearing from said mechanism for simultaneously driving all said pumps at proper speed when said table is rotated.

MINER P. WETMORE.

Witnesses:
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