Aug. 26, 1930. M. P. WETMORE 1,774,161

COMBINED OVEN AND CARRIER FOR THE TREATMENT OF BOTTLES

Filed July 30, 1927 2 Sheets-Sheet 1

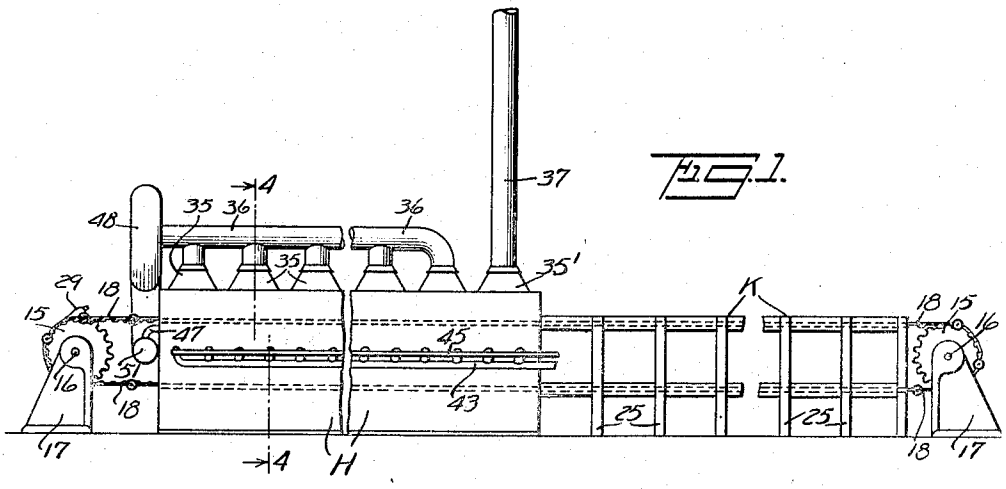


FIG. 1.

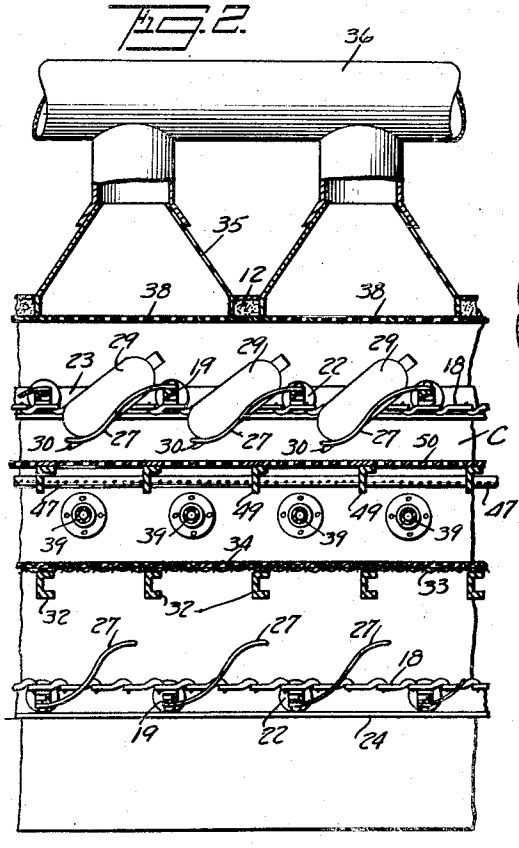


FIG. 2.

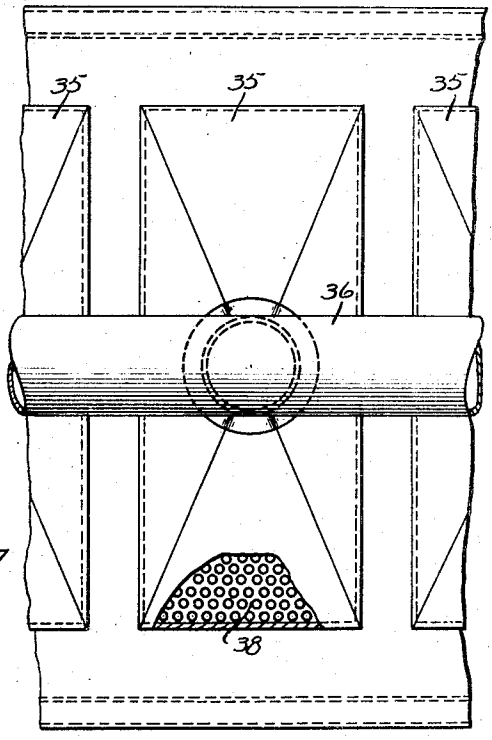


FIG. 3.

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FIG. 4.

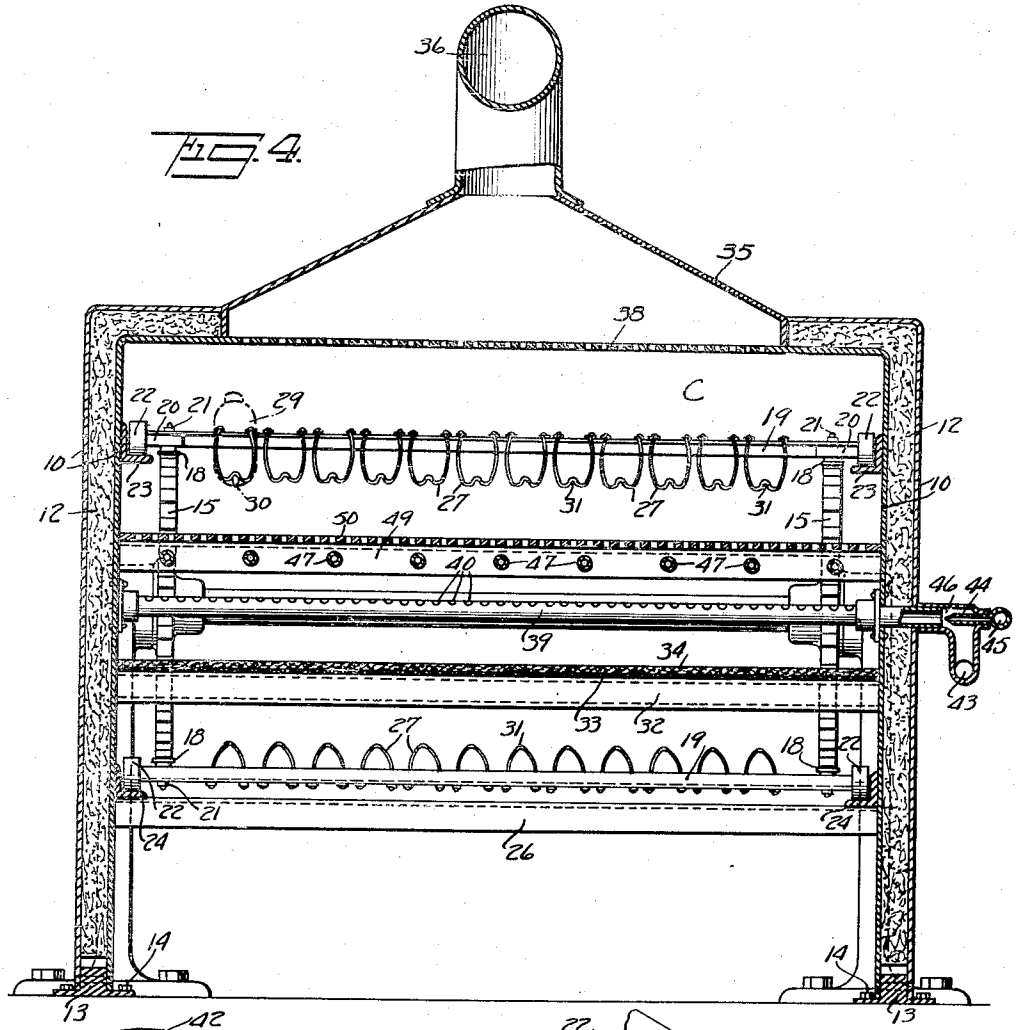


FIG. 7.

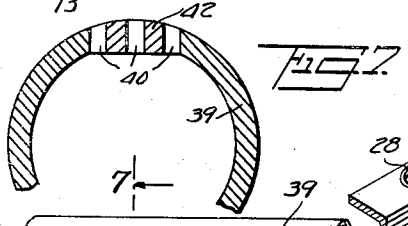


FIG. 6.

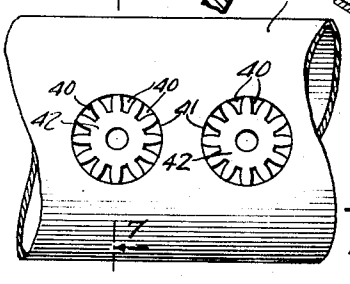
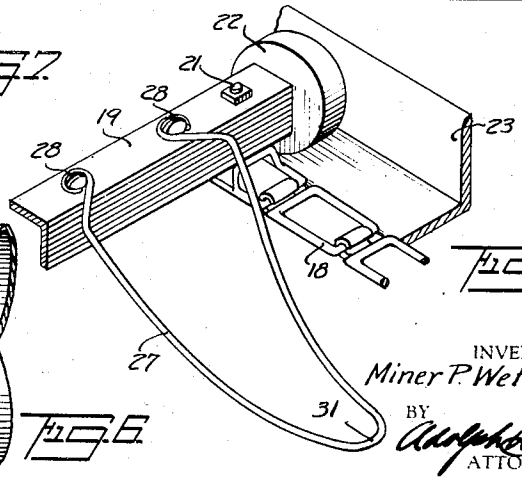


FIG. 5.



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UNITED STATES PATENT OFFICE

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COMBINED OVEN AND CARRIER FOR THE TREATMENT OF BOTTLES

Application filed July 30, 1927. Serial No. 209,608.

This invention relates to apparatus particularly useful in the treatment of double-walled vacuum bottles after the glass walls of the vacuum chamber have been silvered. In the manufacture of these bottles, one method of silvering consists in precipitating metallic silver from a solution, and the silver coating must then be set or fixed by subjecting the bottle to heat for a requisite period.

It is the specific object of my invention to provide a combined bottle carrier and oven for efficiently handling a large number of bottles at a time. The bottles pass through an oven where currents of heated air circulate around them as they are slowly carried forward. By the time the bottles emerge from the oven, the silver coating is permanently set. The bottle carrier is of such length that, after leaving the oven, the bottles move forward while exposed to the cooling action of the free air, so that they can be removed by hand at the discharging end of the apparatus. The operation of the machine is continuous, requiring only the loading of fresh bottles at one end and the removal of the treated bottles at the other end.

The novel features and practical advantages of my invention will be understood from a detailed description of the accompanying drawings, which illustrate a machine of actual construction and one that has been successfully operated in a commercial way. In these drawings—

Fig. 1 shows a side elevation of the machine, with sections broken away for lack of space;

Fig. 2 is an interior view, in longitudinal cross-section, of a portion of the machine;

Fig. 3 represents a fragmentary plan view of the machine, partly broken away to show interior parts;

Fig. 4 is a transverse cross-section of Fig. 1, approximately on the broken line 4—4;

Fig. 5 is a fragmentary detail view of the bottle carrier;

Fig. 6 is a greatly enlarged view of a portion of the novel gas burner pipe which I have used in the oven; and

Fig. 7 is a view on section line 7—7 of Fig. 6.

Referring to Fig. 1, the apparatus consists of a heating section or oven H and a cooling section K. The side walls of the oven, which is open at the ends, are built up of sheet metal plates 10 supported in spaced relation and heat-insulated by a filling 12 of asbestos fiber, or other material suitable for that purpose. The oven structure as a whole is supported on rails 13 secured to the floor by bolts 14. The rails 13 are preferably so constructed as to allow for expansion of the oven walls under the action of heat.

At each end of the machine is mounted a pair of sprocket wheels 15 journalled at 16 in bearing frames 17. In Fig 1, the loading end of the machine is at the left and the discharging end at the right. The sprocket wheels 15 are connected by a pair of endless chains 18, which are here shown as link belts, but any practical form of driving chain or belt may be used. The chains 18 are connected by a plurality of transverse bars 19, which may conveniently be made of angle iron. Each bar 19 is provided at its ends with blocks 20 (see Fig. 4) secured by bolts 21, which may also act as fastening devices for the driving chains 18. The blocks 20 carry shaft extensions on which rollers 22 are mounted. These rollers are arranged to travel over upper tracks 23 and lower tracks 24, as best shown in Fig. 4. These tracks or rails may simply consist of angle irons. Outside the oven H, the carrier tracks 23 and 24 are supported on uprights 25, and within the oven these tracks are supported against the inner side walls. It is convenient to provide cross-pieces 26 for supporting the lower rails 24.

The transverse bars 19 are spaced equidistantly and carry a plurality of bottle-supporting members 27, which are so shaped as to receive bottles and securely hold them in position as they travel from one end of the machine to the other. The supports 27 are preferably shaped each from a single piece of wire, the ends of

which are secured to the bar 19 by screws or bolts 28, as clearly shown in Fig. 5. The bottles 29 held on the supports 27 are of the double-walled vacuum type, and they are therefore provided at the base with a tubular extension 30 through which the bottles are exhausted. These tubular extensions, which are left open at this stage of the process, engage the tips 31 of the supports 27 to prevent the bottles from falling off. It is only necessary to place the bottles properly on their supports and they are automatically retained in secure position during their travel.

The oven H is provided with a plurality of cross-arms 32 on which is laid a wire screen 33, and over this screen is placed an asbestos sheet 34 which forms the bottom of the heat chamber C. The top of the oven is provided with a plurality of sheet metal hoods 35, which are connected with a common pipe 36, except that the last hood 35′ is preferably (but not essentially) connected with a draft chimney 37. The top of heat chamber C is formed by perforated sheet metal plates 38, through which heated air passes into the hoods 35.

Heat is supplied to the oven by a plurality of burner pipes 39 supported transversely in the oven at suitable distances apart. I have provided novel means for producing the burner openings 40 in pipes 39. I simply bore holes 41 in the pipe, and into each hole is tightly fitted a toothed wheel 42. These wheels are cut from a pinion shaft and forced into the holes 41, where they are securely held by friction. I have found by actual tests that this method of forming the burner holes gives excellent results. This form of burner is not only efficient, but very easy and cheap to make. The burner pipes 39 connect with a fuel supply pipe 43. At the intake end of each burner 39 is an air nozzle 44 connected with an air pipe 45, or otherwise open to the air. As the gas or other fuel passes under pressure from pipe 43 through the restricted passage 46, it draws air through the nozzle 44 to form a combustible mixture.

Above the burner pipes 39 are supported a number of perforated pipes 47, which run longitudinally through the oven and to which air is supplied under pressure by a blower 48. The pipes 47 are supported by cross-bars 49 on which rests a perforated metal sheet 50, which allows free passage of the heated air and also acts to radiate heat, thereby helping to make the temperatures uniform throughout the oven. The front ends of the heater pipes 47 connect with a transverse manifold 51, which is in direct communication with the outlet or pressure end of blower 48. The inlet or suction end of the blower is connected with pipe 36. As the construction and operation of blowers is well understood, I need not go into details on this point.

The operation of the blower 48 forces a continuous stream of air under pressure through pipes 47, and as the air streams out of these pipes it is heated by the burners 39. The action of the blower not only forces air through pipes 47, but it also creates a suction or underpressure in pipe 36, so that heated air is drawn upwardly out of the heating chamber C through the hoods 35 into pipe 36, whence the blower sends the air again through pipes 47. In this way a constant circulation of heated air is provided in chamber C, so that the bottles passing through the oven are subjected to a practically uniform heat. The heated air currents in passing upwardly through chamber C circulate freely around the bottles and even pass into the silvered vacuum chambers through the open extensions 30. The bottles are thus fully exposed to the heat to effect the required setting or fixing of the silver coating. The circulation of air in the oven is increased or facilitated by the draft chimney 37.

In the machine that I have actually constructed and operated, there are sixteen hoods in the oven which holds 700 bottles at a time. It takes each row of bottles about forty minutes to pass through the oven chamber, and they remain about twenty minutes on section K to cool off, so that they can be easily handled at the unloading end. The sprocket wheels 15 are operated by any suitable driving connections at a speed that will allow the bottles to travel very slowly through the oven. It goes without saying that I give these data merely by way of illustration, and not as limitations of my invention. Also, it is evident that certain features of my invention are not limited to the treatment of bottles of the double-walled vacuum type, although it is especially (but not exclusively) adapted to that purpose.

Although I have shown and described a specific construction, I want it understood that my invention is not limited to any structural details unless expressly included in the claims. It is to be expected that changes and modifications will occur to those who undertake to build machines in accordance with my invention without departing from the scope of the following claims.

I claim as my invention:

1. An oven having closed heat-insulated sides and a closed heat-insulated bottom, the ends of the oven being open, means for passing upwardly moving air currents through said oven, said means including air pipes mounted in the oven, burners arranged in the oven between said bottom and said air pipes, a perforated metal plate supported in

the oven above said air pipes for facilitating the uniform distribution of heat in the heat-insulated chamber of the oven, and a carrier for conveying bottles through the oven above said perforated sheet.

2. The combination of a carrier for supporting double-walled vacuum bottles having each an open tubular extension which communicates with the vacuum chamber, the bottles being so supported that the extensions point downwardly, an oven through which the bottles on said carrier are conveyed, a closed heat-insulated bottom for said oven, burners arranged in said oven above said bottom, and means for maintaining upwardly moving currents of heated air in said oven, these heated air currents passing freely around the bottles and through said extensions into the vacuum chambers.

3. The combination of an oven having a closed bottom, air-inlet pipes arranged in the oven above said bottom, an air return pipe connecting with the top of said oven at a plurality of points, a blower for forcing air through said inlet pipes into the oven, said return pipe being connected to the suction end of said blower so that an upward circulation of air is maintained in the oven, means arranged in the oven above said bottom and below said inlet pipes for heating the air, a perforated metal sheet supported in the oven above said inlet pipes, and a carrier for conveying bottles through the oven above said perforated sheet.

4. In an oven construction, a heat chamber having heat-insulated side walls and open ends, a wire sheet supported between said side walls, an asbestos sheet resting on said wire sheet to form the bottom of said chamber, a plurality of hoods at the top of said chamber, a pipe connecting said hoods, air-inlet pipes supported lengthwise in said oven, a blower for forcing air through said inlet pipes into the heat chamber, said hood pipe being connected with the suction end of said blower so that an upward circulation of air is maintained in the chamber, a plurality of burner pipes mounted in said chamber below said air-inlet pipes for heating the air, and means for conveying bottles through said chamber, the bottles being so supported on said carrying means that they are freely exposed to the heated air currents.

5. In an oven construction, a heat chamber having heat-insulated side walls and open ends, a wire sheet supported between said side walls, an asbestos sheet resting on said wire sheet to form the bottom of said chamber, a plurality of hoods at the top of said chamber, a pipe connecting said hoods, air-inlet pipes supported lengthwise in said oven, a blower for forcing air through said inlet pipes into the heat chamber, said hood pipe being connected with the suction end of said blower so that an upward circulation of air is maintained in the chamber, a plurality of burner pipes mounted transversely in said chamber below said air-inlet pipes for heating the air, a perforated metal sheet supported in said chamber above said inlet pipes, and means for conveying bottles through said chamber above said perforated metal sheet, the bottles being so supported on said conveying means that they are freely exposed to the heated air currents.

6. An oven having side walls, cross bars supported by and between said side walls, air pipes supported by said cross bars for distributing currents of air in the oven, a perforated metal plate supported on said cross bars, and means for heating the air currents in the oven, said plate facilitating the uniform distribution of heat in the oven.

7. An oven having heat-insulated sides and a closed heat-insulated bottom, said sides comprising sheet metal plates, said oven being open at the ends, means for passing air currents through the oven, spaced burner pipes arranged transversely in the oven above the heat-insulated bottom for heating the air currents, means on the side plates of said oven for supporting the ends of said pipes, and a carrier for conveying bottles through the oven in a path above said burners, the bottles on said carrier being freely exposed to the heated air currents.

8. An oven having sides and a closed bottom, the ends of said oven being open, said sides comprising heat-insulated sheets of metal, a pair of upper rails secured to the side plates of the oven above said bottom, a pair of lower rails carried by said side plates below the closed bottom, said pairs of rails extending longitudinally of the oven in substantially parallel arrangement, an endless carrier supported on said pairs of rails for supporting double-walled vacuum bottles, driving means for moving said carrier lengthwise through the oven, a plurality of air-inlet pipes supported lengthwise in the oven below the upper pair of rails, an air return pipe connecting with the top of the oven at a plurality of points, a blower for forcing air through said inlet pipes into the oven, said return pipe being connected with the suction end of said blower so that a circulation of air is maintained in the oven, and burner pipes arranged transversely in the oven below the inlet pipes for heating the air.

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