F. L. JEFFERIES & W. SPAIN.

APPARATUS FOR DRYING BOTTLES.

APPLICATION FILED JUNE 22, 1917.

1,272,346.

Patented July 9, 1918.

3 SHEETS—SHEET 1.

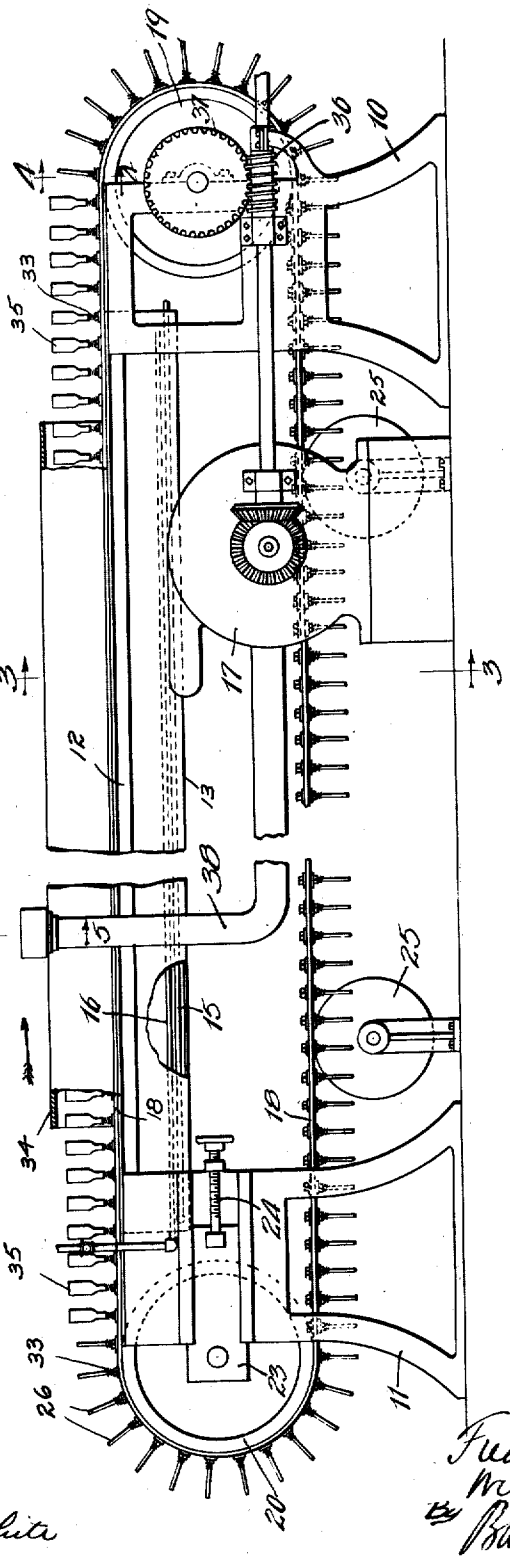


Fig. 1.

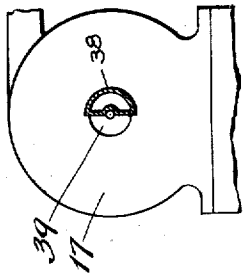


Fig. 2.

Witnesses:
W. P. Kilroy
Harry R. L. White

Inventors
Frederick L. Jefferies
William Spain
By Barnett & Truman
Attys

F. L. JEFFERIES & W. SPAIN.

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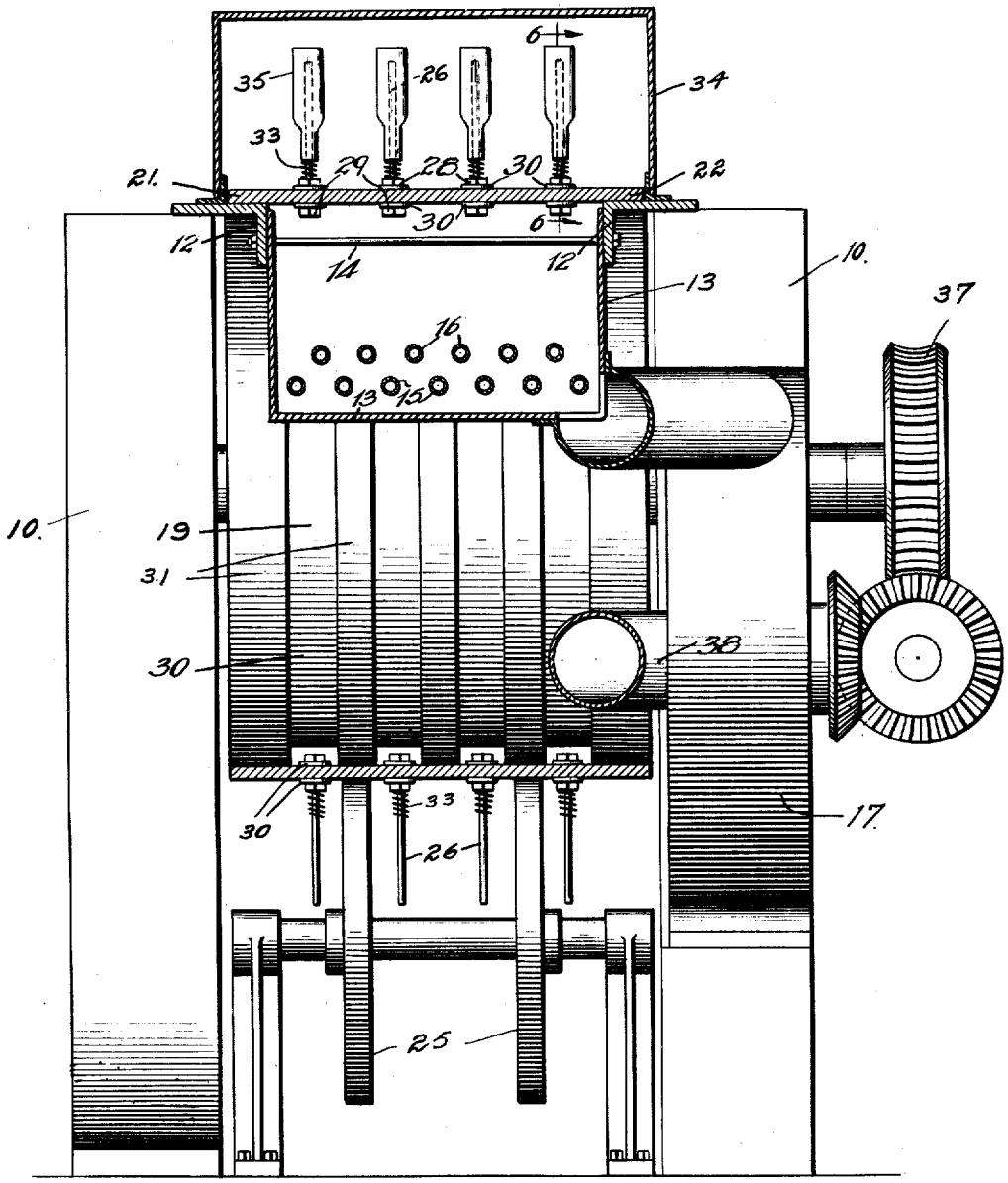
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3 SHEETS—SHEET 2.

Fig. 3.



Witnesses:
W. P. Kilroy
Harry R. Lewis

Inventors.
Fredrick L. Jefferies.
William Spain.
By Barnes, Kinnan & Allds.

F. L. JEFFERIES & W. SPAIN.

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3 SHEETS—SHEET 3.

Fig. 4.

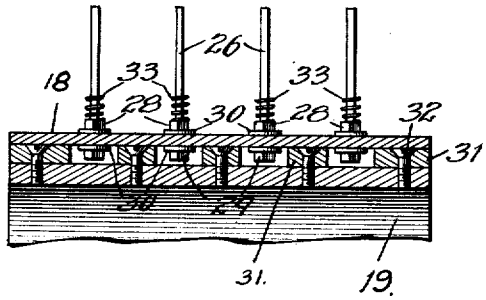


Fig. 6.

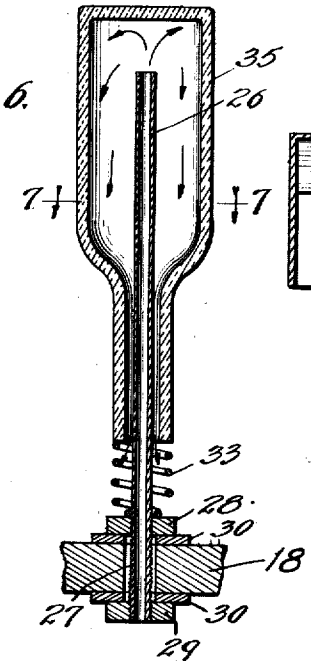


Fig. 5.

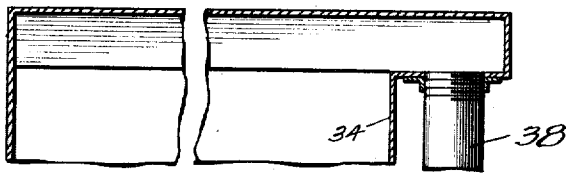
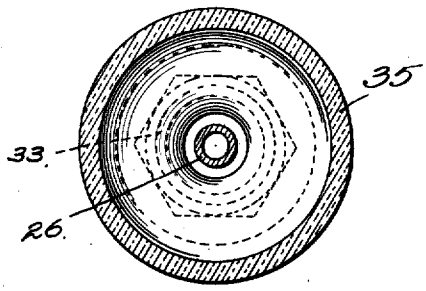


Fig. 7.



Witnesses:
W. P. Kilroy
Harry R. L. White

Inventors.
Fredrick L. Jefferies
William Spain.
By Barnett & Brennan Attys.

UNITED STATES PATENT OFFICE.

FREDRICK L. JEFFERIES AND WILLIAM SPAIN, OF RIVERSIDE, ILLINOIS, ASSIGNORS TO CORN PRODUCTS REFINING COMPANY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR DRYING BOTTLES.

1,272,346. Specification of Letters Patent. Patented July 9, 1918.

Application filed June 22, 1917. Serial No. 176,337.

To all whom it may concern:

Be it known that we, FREDRICK L. JEFFERIES and WILLIAM SPAIN, citizens of the United States, residing at Riverside, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Drying Bottles, of which the following is a specification.

Our invention relates to drying apparatus and particularly to the type of drying apparatus suitable for drying receptacles such as bottles or the like.

The invention has as its primary object the provision of a new and improved apparatus suitable for drying receptacles whereby the drying operation may be performed thoroughly, rapidly and economically. The invention contemplates more particularly an apparatus for drying the interior and exterior surfaces of receptacles having restricted openings such as bottles or the like.

The invention consists of the novel arrangements, constructions and combination of parts hereinafter described and claimed for carrying out the above stated object and such other objects as may appear from the following illustrations and description.

The preferred embodiment of our invention is illustrated in the accompanying drawings, in which like characters of reference designate corresponding parts, and in which—

Figure 1 is a side view, in elevation, of an apparatus constructed in accordance with our invention, certain parts of which are broken away for purposes of clearness.

Fig. 2 is a view, in elevation, of the fan employed in our preferred construction, showing the side opposite to that shown in Fig. 1.

Fig. 3 is a vertical sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is a fragmentary sectional view taken on line 5—5 of Fig. 1.

Fig. 6 is an enlarged sectional view taken on line 6—6 of Fig. 3; and

Fig. 7 is another enlarged section taken on line 7—7 of Fig. 6.

In the drawings we have illustrated our invention in connection with an apparatus suitable for drying bottles. This form of apparatus, however, has been employed merely for the purpose of illustrating one of the principal uses for which our invention is particularly adapted, namely, drying the interior of receptacles having restricted openings such as bottles, and the like. When drying bottles, for example, and particularly bottles intended to be filled with cooking oils, such as corn oil, for example, it is necessary to remove all moisture from the interior of the bottle. Should the bottle not be entirely free from moisture before being filled with oil, the water becomes mixed with the oil in such manner as to give the oil a cloudy and unsightly appearance.

Our preferred manner of drying bottles, so as to avoid the above results, is to introduce heated air into the interior of the bottle so as to expel any excessive amount of water and evaporate the remaining moisture which is not expelled in the above manner. The vapor resulting from such evaporation is forced out of the bottle by the incoming air and thereby prevents any condensation of vapor in the bottle.

While the apparatus illustrated in the drawings embodies our invention in a preferred form, it will be obvious that the structural features may be modified without departure from the invention.

Referring to the drawings, the apparatus is shown as consisting of supports 10 and 11 which are connected together by means of angle irons 12. The depending flanges of these angles serve as a convenient means of supporting an air heating trunk or chamber composed preferably of a sheet metal casing 13 having an open top end having its vertical side walls secured to the aforesaid flanges of the angles 12 in any suitable manner, as, for example, by means of the cross-bars 14. Steam coils 15 and 16 extend lengthwise of the casing and are preferably disposed in staggered relation with respect to each other, so that the air introduced into the casing by means of the fan 17 will be heated rapidly. A belt conveyer 18 extends over drums 19 and 20 and operates across the open top of the air heater so as to provide, in effect, a movable closure for the same. The belt 18 is preferably made of canvas webbing sufficiently stiff and heavy to prevent it from sagging under the weight of the bottles being dried, and the edges 21,

22 preferably rest upon the horizontal flanges of the angles 12. This construction, in addition to preventing any sagging of the belt, also prevents any appreciable escape of heated air around the edges thereof. In order to maintain the belt as tight as may be required, the drum 20 is movably mounted on the support 11 by means of slides 23 which are adjusted by screw bolts 24. 25, 25 designate idle rollers disposed at convenient points beneath the apparatus so as to support the lower strand of the belt 18. Numerals 26 designate a plurality of air pipes which extend through apertures 27 (Fig. 6) in the belt and are secured to the belt by means of nuts 28, 29. Metal washers 30 are interposed between belt 18 and the nuts 28, 29 to stiffen the connections between the pipes and the belt and hold the pipes in perpendicular relation to the belt. In order to provide suitable clearance for the nuts 29, the drums 19 and 20 are provided preferably with leather bands 31, which may be secured thereto by means of screws 32. Coil springs 33 surround the pipes 26 to provide resilient stops for the bottles. This enables the operator to put the bottles over the pipes very rapidly without danger of breaking or chipping the neck of the bottle. The springs, it will also be noted, hold the orifice of the bottles a short distance away from the nuts 28 so as to permit the free escape of the air which is introduced into the interior of the bottles through the pipes 26. A sheet metal housing 34 is secured to the horizontal flanges of the angles 12 and extends over the belt conveyer 18 and upstanding air pipes 26 so as to provide an inclosed passageway through which the bottles 35 are conveyed during the drying operation.

In operation, the conveyer 18 is driven in the direction indicated by the feathered arrow in Fig. 1, by any suitable means such, for example, as the worm 36 and gear 37, which may be operatively connected with any suitable form of motor (not shown). The bottles 35 are put in place over the air pipes 26 and are supported in inverted position by the coil springs 33 in a manner which permits the free discharge of water and air. The bottles are conveyed through the inclosed passageway formed by the housing 34 and removed from the conveyer when they reach the other end of the machine. Air is forced into the casing 13 of the air-heating member by means of the fan 17 and passes over the heating coils 15, 16. The heated air passes from the heater into the interior of the bottles through air pipes 26 so as to remove all moisture from the inner surfaces thereof. The heated air escaping from the bottles as they pass through the inclosed passageway 34 will be somewhat confined within the said passageway and therefore serve to dry the exterior surface of the bottles, and also to keep the bottles warm so as to more effectively dry the inner surfaces thereof, which is the principal function of the machine. 38 designates a suction or air-return pipe leading from one end of the housing 34 (as indicated in Figs. 1 and 5) to the inlet port 39 of the fan 17 (shown best in Fig. 2). By this arrangement circulation of air through the apparatus is established which effects an economy of heat.

As further modifications could obviously be made without departure from our invention, we do not wish to limit the invention to the exact structure shown and described except so far as specific limitations may appear in the appended claims.

We claim:

1. In apparatus for drying receptacles, the combination of a hot air trunk, a conveyer which is movable lengthwise of the trunk and forms the top of the same, and means for holding receptacles in inverted position on said conveyer provided with air ducts for introducing hot air from the trunk into the receptacles.

2. In apparatus for drying receptacles, the combination of a hot air trunk, a conveyer which is movable lengthwise of the trunk and forms the top of the same, means for holding receptacles in inverted position on said conveyer provided with air ducts for introducing hot air from the trunk into the receptacles, and cushioning supports for the necks of the receptacles.

3. In apparatus for drying receptacles, the combination of a receptacle support, a tubular member extending through said support over which a receptacle is adapted to be placed in inverted position, and a coiled spring surrounding the lower end of the tubular member and bearing against said support upon which the receptacle is adapted to rest so that the open end of the same is raised from the support.

4. In apparatus for drying receptacles, the combination with a supporting structure, of an air heater, and a conveyer provided with means for supporting said receptacles in inverted position so that the openings thereof are held out of contact with said conveyer, said supporting means providing air ducts extending into said receptacles and communicating with said air heater.

5. In an apparatus for drying receptacles, the combination with a supporting structure, of an air heater, a fan for introducing air into said heater, a conveyer provided with means for retaining said receptacles in inverted position and adapted to close the upper side of said heater, a housing extending over said conveyer and providing a passage through which said receptacles are conveyed, means permitting the escape of air from said

heater into said passage, and a return pipe leading from said passage to the intake of said fan.

6. In apparatus for drying receptacles, the combination with a supporting structure, of an air heater, a conveyer provided with means having air ducts adapted to retain said receptacles in inverted position, said ducts communicating with said heater so as to introduce heated air into the interior of said receptacles, a housing providing a passage through which said receptacles are conveyed, and means interposed between the open ends of said receptacles and said conveyer to permit air to escape from said receptacles into said passage so as to dry the exterior surfaces of said receptacles.

7. In an apparatus for drying receptacles, the combination with a supporting structure, of an air heater, a conveyer provided with means having air ducts adapted to retain said receptacles in inverted position, said ducts communicating with said heater so as to introduce heated air into the interior of said receptacles, a housing providing a passage through which said receptacles are conveyed, and coiled springs interposed between the open ends of said receptacles and said conveyer so as to permit the heated air to escape from said receptacles.

8. In apparatus for drying receptacles, the combination with a supporting structure, of an air heater, a conveyer for said receptacles provided with means formed with air ducts which extend into the interior of said receptacles and communicate with said air heater, a housing over said conveyer, a fan for forcing air into said heater, and a return pipe leading from said housing to the intake opening of said fan.

9. In apparatus for drying receptacles, the combination with a supporting structure, of a belt conveyer for said receptacles provided with air pipes which extend into the interior of said receptacles and communicate with said air heater, a housing over said conveyer, means for supporting the edges of said belt, a fan for forcing air into said heater having an intake opening to the atmosphere, and a return pipe leading from said housing to the intake opening of said fan which partly covers the same.

10. In apparatus for drying receptacles, the combination with a supporting structure, of an air heater comprising a casing having steam coils arranged therein, an endless belt conveyer adapted to support receptacles and to close the upper side of said casing, and provided with pipes communicating with said air heater and adapted to introduce heated air into said receptacles, and means for taking up the slack in said conveyer, comprising a pulley slidably mounted on said support, and screws adapted to hold the same in any adjusted position.

11. In apparatus for drying bottles, the combination with an air heater, of a conveyer which extends over and forms the top of the heater, and means for supporting and introducing heated air into said bottles, comprising pipes attached to the conveyer, communicating with said heater and extending into the necks of the bottles.

12. In apparatus for drying bottles, the combination with an air heater, of a belt conveyer which extends over and forms the top of the heater, and means for supporting and introducing heated air into said bottles, comprising pipes attached to the conveyer, communicating with said heater and extending into the necks of the bottles.

13. In apparatus for drying bottles, the combination with an air heater, of a belt moving support which extends over and forms the top of the heater, and means thereon for introducing heated air into said bottles, comprising pipes attached to the support, communicating with said heater and extending into the necks of the bottles, and means for holding the bottles out of contact with said belt to a point near the bottom thereof.

14. In apparatus for drying bottles, the combination with an air heater, of a belt conveyer which extends over and forms the top of the heater, and means for supporting and introducing heated air into said bottles, comprising pipes attached to the conveyer, communicating with said heater and extending into the necks of the bottles to a point near the bottom thereof, and coiled springs between the necks of the bottles and the belt for holding the bottles out of contact with said belt.

15. In apparatus for drying receptacles, the combination of a hot air trunk, a conveyer which is movable lengthwise of the trunk and forms the top of the same, means for holding receptacles in inverted position on said conveyer provided with air ducts for introducing hot air from the trunk into the receptacles, and a hood on the trunk extending over said conveyer.

16. In apparatus for drying receptacles, the combination of a hot air trunk, a conveyer which is movable lengthwise of the trunk and forms the top of the same, means for holding receptacles in inverted position on said conveyer provided with air ducts for introducing hot air from the trunk into the receptacles, a hood on the trunk extending over said conveyer, air-heating means arranged in said trunk, and a return pipe from the hood to said trunk.

17. In apparatus for drying receptacles, the combination of a hot air trunk, a conveyer which is movable lengthwise of the trunk and forms the top of the same, and a plurality of tubular members fixed to said conveyer providing means for holding re-

ceptacles in inverted position on the conveyer and for introducing air into the same from said air trunk.

18. In apparatus for drying receptacles, the combination of a hot air trunk, a conveyer which is movable lengthwise of the trunk and forms the top of the same, a plurality of tubular members fixed to said conveyer providing means for holding receptacles in inverted position on the conveyer and for introducing air into the same from said air trunk, and a hood on the trunk extending over said conveyer.

19. In apparatus for drying receptacles, the combination of a hot air trunk, a conveyer which is movable lengthwise of the trunk and forms the top of the same, a plurality of tubular members fixed to said conveyer providing means for holding receptacles in inverted position on the conveyer and for introducing air into the same from said air trunk, and cushioning devices for the necks of the receptacles.

20. In apparatus for drying receptacles, the combination of a conveyer, means providing a passageway through which the conveyer moves, means for supporting receptacles in inverted position on the conveyer, and means for introducing heated air into the receptacle while moving through said passageway.

21. In apparatus for drying receptacles, the combination of an air trunk, a conveyer movable longitudinally of the air trunk, means for introducing heated air into the trunk, and means for supporting receptacles in inverted position on the conveyer so that heated air from the air trunk is introduced into the interior of the same.

22. In apparatus for drying receptacles, the combination of an air trunk, a conveyer movable longitudinally of the air trunk, means for introducing heated air into the trunk, means for supporting receptacles in inverted position on the conveyer so that heated air from the air trunk is introduced into the interior of the same, and a hood which extends over a portion of the trunk and conveyer.

FREDRICK L. JEFFERIES.
WILLIAM SPAIN.