

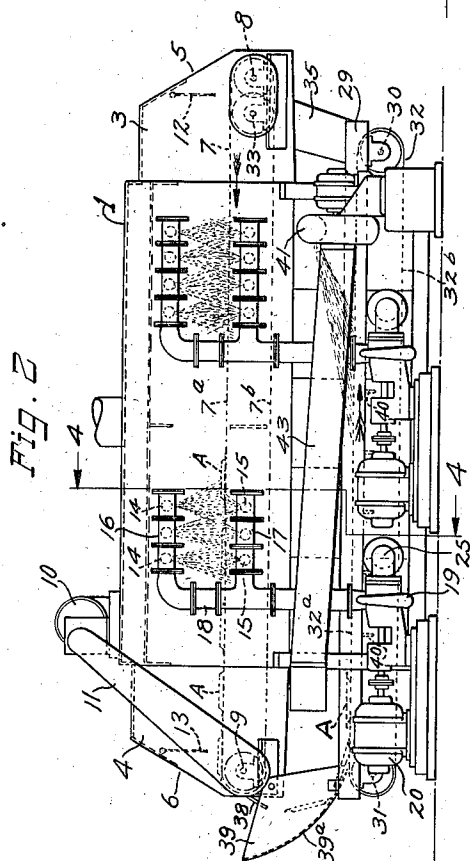
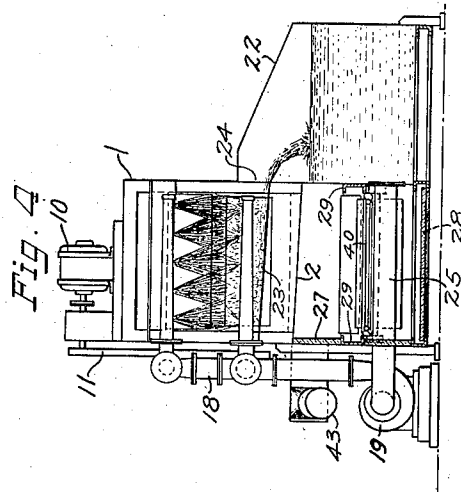
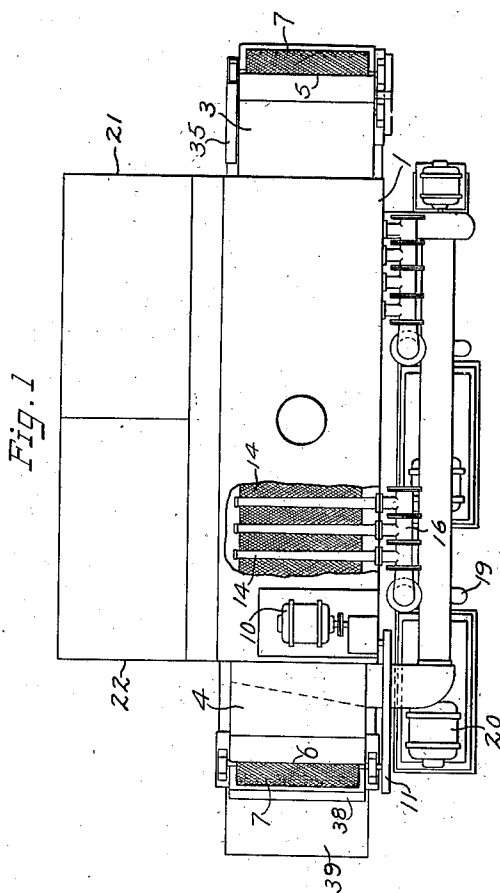
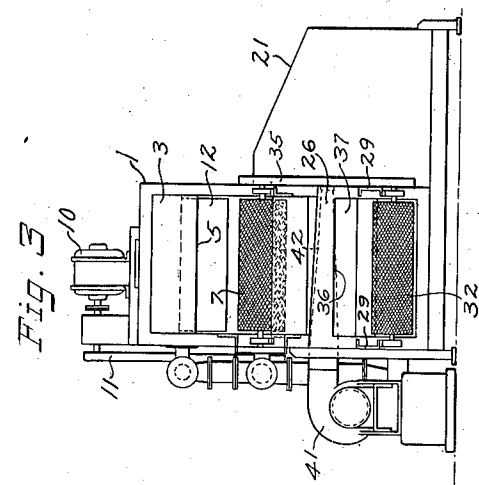
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WASHING AND DRYING MACHINE

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WASHING AND DRYING MACHINE

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The present invention relates particularly to a machine primarily intended and adapted for washing and drying bread pans, pie plates, and similar articles used in bakeries, but it will be understood that the invention is not necessarily so limited.

The principal object of the invention is to provide a combined washing and drying machine having the parts thereof so arranged as to effect a considerable economy of space, to reduce cost of initial construction and of maintenance, and to more efficiently wash and dry the articles. In accordance with the invention, there is a drying zone adjacent the washing zone; and the articles to be washed and dried are first guided and moved through the washing zone in a path which is substantially straight and horizontal and they are thereafter guided and moved in the opposite direction through the drying zone along a second path which is substantially straight and horizontal. Preferably the articles are not only moved along substantially straight paths as stated but their movement along each path is rectilinear, that is, without any turning or tumbling.

A further object of the invention is to provide in conjunction with the two means for guiding and moving the articles through the washing zone and through the drying zone, a means for guiding or transferring the articles from the washing zone to the drying zone and for reversing their positions while they are being so guided or transferred. This reversal serves to free any entrapped liquid and thus facilitates drying.

Other objects of the invention will be apparent from the following specification and claims.

In the accompanying drawing I have shown the embodiment of the invention which I now deem preferable, but it will be understood that the drawing is intended for illustrative purposes only and is not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawing:

Fig. 1 is a plan view of a machine embodying the invention.

Fig. 2 is a side view.

Fig. 3 is a right end view.

Fig. 4 is a transverse vertical sectional view taken along the line 4-4 of Fig. 2.

A machine embodying the invention has a main enclosure or casing within which the washing zone is located. The main enclosure or casing may also enclose the drying zone which is positioned directly below the washing zone. In the drawing

there is shown an enclosure or casing 1 which may consist chiefly of structural steel and sheet metal parts, the casing being generally rectangular in form. The casing has a floor 2. At opposite ends of the casing and near the upper part thereof are two extensions 3 and 4 which communicate with the interior of the main body of the casing. The extension 3 is provided with an entrance opening at 5, and the extension 4 is provided with an exit opening at 6.

The washing zone is located in the upper part of the casing 1 and in the said zone are means for guiding and moving the articles to be washed and dried, the said articles being moved along a path which is substantially straight and horizontal. As shown the guiding and moving means for the articles consists of an endless belt conveyor 7 which extends longitudinally through the casing 1 and through the extensions 3 and 4 thereof. The said endless belt conveyor 7 is of open-work construction in order that liquids may pass freely through it. The belt conveyor 7 is carried by suitable sprockets on transverse shafts 8 and 9 supported in suitable bearings carried by the side walls of the casing extensions 3 and 4. The conveyor is driven in the direction indicated by the arrow in Fig. 2 by means of a motor 10 and a chain 11 engaging suitable sprockets on the motor shaft and on the shaft 9. It will be observed that the upper run 7^a of the conveyor is in register with the openings 5 and 6 and that the conveyor is therefore adapted to carry articles longitudinally through the casing entrance opening 5 to the exit opening 6. Flexible aprons 12 and 13 may be provided adjacent the openings 5 and 6 to prevent the escape of splash and spray.

A suitable means is provided for directing washing liquid against articles being moved through the washing zone. Preferably the said means consists of jet devices adapted for forcibly directing jets of washing liquid in opposite directions against the articles. When an endless belt conveyor of open-work construction is provided, the jet devices are preferably arranged above and below the upper run of the conveyor to direct the jets respectively downward and upward against the articles thereon. These jet devices may be widely varied as to details, but I have shown transverse pipes having jet orifices therein. Preferably, and as shown, there are two separate sets of jet devices, one near the entrance end of the machine, and one near the exit end of the machine. These two sets of devices are, or may be, similar to each other, and a description of one of them will suffice for both.

Referring particularly to the jet devices at the left, that is, those near the exit end of the machine, it will be seen that there are three transverse jet pipes 14, 14 positioned above the upper run 7^a of the conveyor and adapted to direct their jets downward, and three transverse pipes 15, 15 positioned below the upper run 7^a of the conveyor and above the lower run 7^b and adapted to direct their jets upward. The pipes 14, 14 are connected with a manifold 16, and the pipes 15, 15 are connected with a manifold 17. Both manifolds 16 and 17 are connected with a vertical supply pipe 18 to which washing liquid is delivered under pressure by means of a pump 19. The pump is driven by means of a motor 20.

At the side of the main casing 1, opposite the pumps and manifolds, is a liquid supply tank, and preferably this tank is provided with a central partition which provides two separate reservoirs 21 and 22. Preferably there are separate covers for the respective reservoirs.

A transversely inclined apron 23 is provided between the upper and lower runs of the conveyor, this apron serving to receive liquid discharged from the several spray devices and to direct it laterally through suitable openings such as 24 in the casing into the corresponding reservoirs 21 and 22. The floor 2 is also transversely inclined and serves to direct into the reservoirs any liquid dripping from the lower run of the conveyor or otherwise escaping the apron 23. Each pump 19 has its suction pipe 25 connected with the corresponding reservoir so that the washing liquid is withdrawn from the reservoir and supplied to the several jet devices. From the jet devices the washing liquid flows back into the reservoir and is thus recirculated. Two different liquids may be contained in the two reservoirs in accordance with established practice.

In accordance with the principles of the invention the drying chamber is located adjacent the washing chamber, and in the illustrated embodiment the space beneath the casing 1, that is, below the said floor or partition 2, constitutes the drying chamber, this chamber having transverse end walls, the wall at the right end being shown at 26. The drying chamber is closed at the rear by the tank, at the front by insulating panels 27, and at the bottom by insulating panels 28.

Positioned within the drying zone or chamber is a means for guiding and moving the articles along a path which is substantially straight and horizontal, the said articles being moved along the said path in the direction opposite to their direction of movement through the washing zone. The said means for guiding and moving the articles may be varied widely as to details, but one suitable construction is shown in the drawing and this will now be described.

Extending through the drying chamber are two longitudinal structural steel members 29, 29 which are shown as being channel bars. These extend beyond the ends of the casing proper and they serve to support bearings in which are mounted transverse shafts 30 and 31. Mounted on these shafts are suitable sprockets which carry an endless belt conveyor 32. The belt conveyor 32 is driven in the direction indicated by the arrow in Fig. 2, this direction being opposite to the direction of movement of the upper conveyor 7. Preferably, and as shown, the lower conveyor 32 is driven from the upper conveyor 7. As shown, there is a transverse shaft 33 mounted adjacent the shaft 8 and connected therewith by means of gear wheels. Suitable sprocket wheels are pro-

vided on the shafts 33 and 30, and these are connected by means of a drive chain 35. The drying chamber is provided at opposite ends with openings through which the conveyor 32 extends, the discharge opening at the right being shown at 36. Associated with each opening there may be provided a flexible apron 37.

It will be observed that all liquid is retained in the casing 1 by means of the partition or floor 2. This keeps the washing liquid from entering the drying chamber or contacting with the lower conveyor 32. The liquid flowing transversely along the partition enters the tank which is located at one side of the drying zone.

A suitable guiding means is provided for directing articles from the discharge end of the first path of movement through the washing zone to the initial end of the second path of movement through the drying zone. This guiding means can be varied as to details but, as shown, it consists of a plate 38 and a curved sheet metal chute 39. As shown, the chute 39 is pivoted so that it may be raised to permit access to the conveyor 32. The upper end of the chute 39 is adjacent the discharge end of the conveyor 7, and the chute is provided with a curved wall 39^a which receives the articles and directs them onto the upper run 32^a of the conveyor 32.

In order that the articles may be dried while on the conveyor 32 I provide heating devices adjacent the path of the articles while carried by the said conveyor. As shown, I provide a series of electrical heating units 40, 40 which are immediately below the upper run 32^a of the conveyor and above the lower run 32^b. I do not, however, limit myself to electrical heating units and steam pipes or other suitable heating devices may be substituted if desired.

In order to obtain a more effective drying action, I prefer to provide a forced circulation of air through the drying chamber. To this end there is provided a blower 41 having a transverse discharge pipe 42 extending across the drying chamber above the conveyor 32. This pipe 42 has discharge orifices which direct air downward and toward the left, as indicated in Fig. 2. Air is supplied to the blower 41 by means of a pipe 43 which has its intake adjacent the left end of the drying chamber. It will thus be seen that the air in the drying chamber is continually circulated, thus accelerating the drying action.

The articles to be washed and dried are fed into the machine, manually or otherwise, through the entrance opening 5. They are washed as they are carried by the conveyor 7, and they are dried as they are carried in the opposite direction by the conveyor 32. The articles are discharged through the opening 36, and a suitable receptacle can be provided for receiving them, or if desired they can be discharged onto another conveyor (not shown) which will convey them to the place where they are to be re-used.

When the articles are relatively broad and flat, as for instance pie plates, they will be inverted by the plate 38 and the chute 39, particularly the wall 39^a thereof. The result is that in the embodiment shown the position of the articles on the conveyor 32 will be reversed from that which they occupied on the conveyor 7. As illustrated at A, A, the plates are upside down on the conveyor 7 but are right side up on the conveyor 32. This has the advantage that any excess moisture that may have been caught in the rims of the plates or other articles, or which has been other-

wise retained, will be shaken or dumped out during the process of reversal. Thus, the articles reach the drying zone without any excessive amount of moisture thereon.

5 The casing and the drying chamber may be considered as jointly constituting an enclosure within which washing and drying take place. This enclosure has its entrance opening at 5 and its exit opening at 36.

10 It will be observed that with my novel washing and drying machine a considerable economy of floor space is effected, as the drying portion of the machine is vertically beneath the washing portion thereof. Not only is there economy of floor space, but there is also a considerable economy in material and in the cost of manufacture. Furthermore, by reason of the movement of the two conveyors in opposite directions, the articles are fed into the machine and withdrawn at the same end thereof, this arrangement being ordinarily more convenient. As already stated, the articles are reversed in position as they pass from the upper conveyor to the lower conveyor, and this is distinctly advantageous as already explained.

What I claim is:

1. In a washing and drying machine, the combination of a casing, means for guiding and moving articles through the casing along a path which is substantially straight and horizontal, jet devices in the casing adjacent the said path of movement for forcibly directing jets of washing liquid in opposite directions against the said articles as they are moved, a second means positioned beneath the first said article guiding and moving means and adapted for guiding and moving the said articles in the opposite direction along a second path which is substantially straight and horizontal, means for guiding the articles from the discharge end of the first said path to the initial end of the second said path, a partition below the first said path for keeping the washing liquid away from the articles moving along the second said path, a tank at one side of the second said path and below the level of the partition for receiving washing liquid flowing transversely along the partition, a pump for withdrawing liquid from the tank and delivering it to the jets, and heating devices adjacent the second said path to heat and dry the articles as they are moved.

2. In a washing and drying machine, the combination of a casing, a substantially horizontal endless open-work belt conveyor in the casing for moving articles rectilinearly therethrough, jet devices in the casing above and below the upper run of the conveyor for forcibly directing jets of washing liquid downward and upward against articles rectilinearly carried by the said conveyor, a second substantially horizontal endless belt conveyor positioned vertically beneath the first said conveyor and moving in the opposite direction, means for guiding articles from the discharge end of the first conveyor to the initial end of the second conveyor, a partition below the first conveyor and above the second conveyor for keeping the washing liquid away from the second conveyor and from the articles thereon, a tank at one side of the second said conveyor and below the level of the partition for receiving washing liquid flowing transversely along the partition, a pump for withdrawing liquid from the tank and delivering it to the jets, and heating devices adjacent the second con-

veyor to heat and dry the articles as they are rectilinearly carried thereby.

3. In a washing and drying machine, the combination of a casing, means for guiding and moving articles rectilinearly through the casing along a substantially horizontal path, means in the casing adjacent said path of movement for directing washing liquid against the said articles as they are moved, a second means positioned adjacent the first said article guiding and moving means and adapted for guiding and moving the said articles rectilinearly in the opposite direction along a second substantially horizontal path, means for conveying the articles from the discharge end of the first said path to the initial end of the second said path and for inverting each article about a horizontal axis during such conveying so that each is moved along said second path inverted with respect to its position of movement along said first path, and heating devices adjacent the second said path to heat and dry the articles as they are rectilinearly moved.

4. In a washing and drying machine, the combination of a casing, means for guiding and moving articles rectilinearly through the casing along a substantially horizontal path, means in the casing adjacent said path of movement for directing washing liquid against the said articles as they are moved, a second means positioned in substantially vertical alignment with the first said article guiding and moving means and adapted for guiding and moving the said articles rectilinearly in the opposite direction along a second substantially horizontal path, means for guiding the articles from the discharge end of the first said path to the initial end of the second said path and for inverting each article about a horizontal axis during such guiding so that each is moved along said second path inverted with respect to its position of movement along said first path, and heating devices adjacent the second said path to heat and dry the articles as they are rectilinearly moved.

5. In a washing and drying machine, the combination of a casing, means for guiding and moving articles rectilinearly through the casing along a substantially horizontal path, means in the casing adjacent said path of movement for directing washing liquid against the said articles as they are moved, a second means positioned beneath the first said article guiding and moving means and adapted for guiding and moving the said articles rectilinearly in the opposite direction along a second substantially horizontal path, means for guiding the articles from the discharge end of the first said path to the initial end of the second said path and for inverting each article about a horizontal axis during such guiding so that each is moved along said second path inverted with respect to its position of movement along said first path, a partition below the first said path for keeping the washing liquid away from the articles moving along the second said path, and heating devices adjacent the second said path to heat and dry the articles as they are rectilinearly moved.

6. In a washing and drying machine, the combination of a casing, means for guiding and moving articles rectilinearly through the casing along a substantially horizontal path, jet devices in the casing above and below the said path of movement for forcibly directing jets of washing liquid downward and upward against the said articles as they are rectilinearly moved, a second means positioned beneath the first said article

guiding and moving means and adapted for moving the said articles rectilinearly in the opposite direction along a second substantially horizontal path, means for guiding the articles from the discharge end of the first said path to the initial end of the second said path and for inverting each article about a horizontal axis during such guiding so that each is moved along said second path inverted with respect to its position of movement along said first path, a partition below the first said path for keeping the washing liquid away from the articles moving along the second said path, and heating devices adjacent the second said path to heat and dry the articles as they are rectilinearly moved.

7. In a washing and drying machine, the combination of a casing, a substantially horizontal endless open-work belt conveyor in the casing for moving articles rectilinearly therethrough, jet devices in the casing above and below the upper run of the conveyor for forcibly directing jets of washing liquid downward and upward against articles rectilinearly carried by the said conveyor, a second substantially horizontal endless belt conveyor positioned vertically beneath the first said conveyor and moving in the opposite direction, means for guiding the articles from the discharge end of the first conveyor to the initial end of the second conveyor and for inverting each article about a horizontal axis during such guiding so that each is moved along said second path inverted with respect to its position of movement along said first path, a partition below the first conveyor and above the second conveyor for keep-

ing the washing liquid away from the second conveyor and from the articles thereon, and heating devices adjacent the second conveyor to heat and dry the articles as they are rectilinearly carried thereby.

8. In a washing and drying machine, the combination of a casing, a substantially horizontal endless open-work belt conveyor in the casing for moving articles rectilinearly therethrough, jet devices in the casing above and below the upper run of the conveyor for forcibly directing jets of washing liquid downward and upward against articles rectilinearly carried by the said conveyor, a second substantially horizontal endless belt conveyor positioned vertically beneath the first said conveyor and moving in the opposite direction, a chute for receiving the articles as they fall from the first conveyor and for guiding the said articles onto the second conveyor, the said chute having its bottom wall inclined so as to engage the said articles and turn each of them about a horizontal axis to an inverted position during its movement from the first conveyor to the second conveyor so that each is moved along said second path inverted with respect to its position of movement along said first path, a partition below the first conveyor and above the second conveyor for keeping the washing liquid away from the second conveyor and from the articles thereon, and heating devices adjacent the second conveyor to heat and dry the articles as they are rectilinearly carried thereby.

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