Jan. 3, 1961 H. M. SADWITH 2,966,914

AUTOMATIC CLEANING AND DRYING MACHINE

Filed Nov. 19, 1958 4 Sheets-Sheet 1

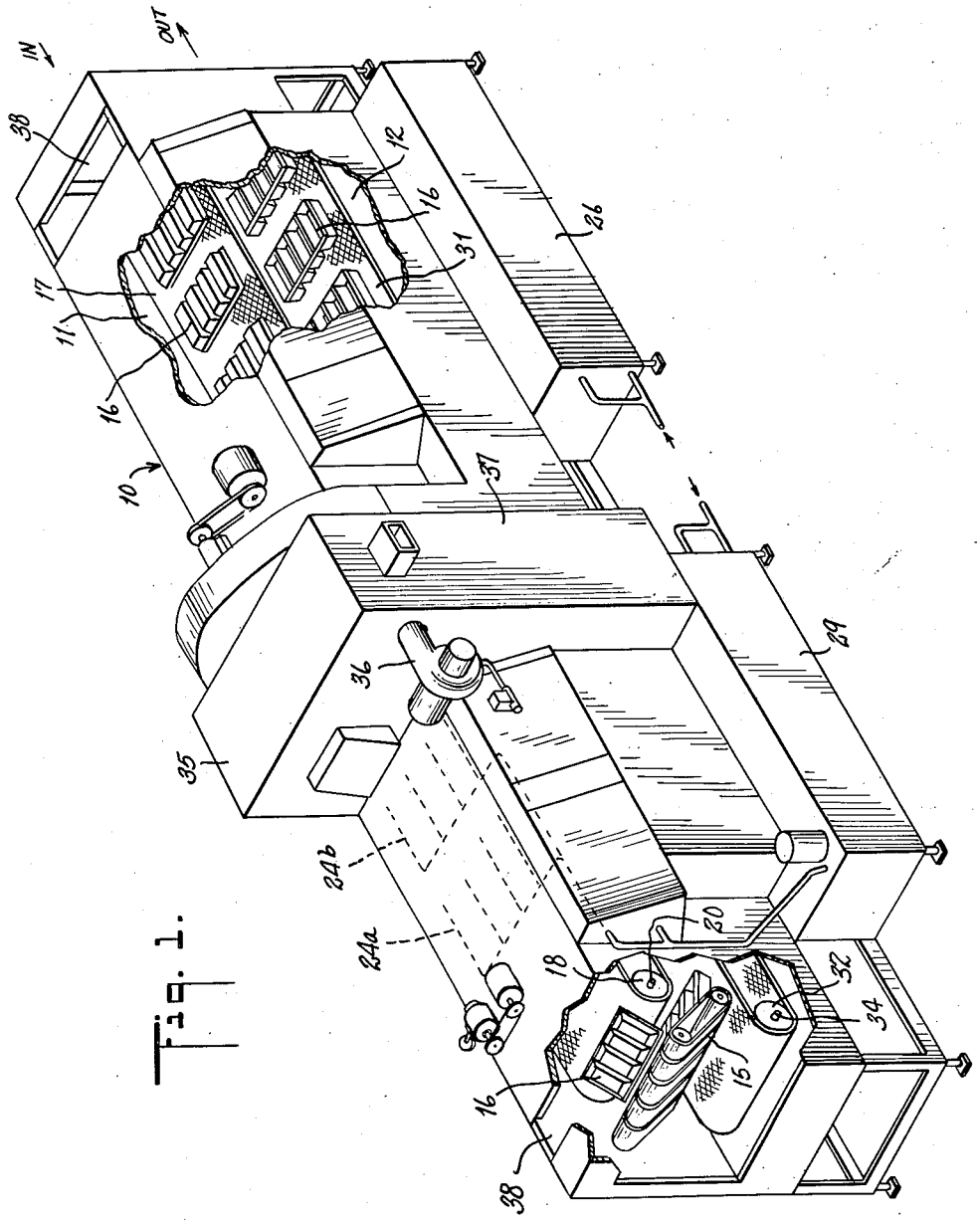


Fig. 1.

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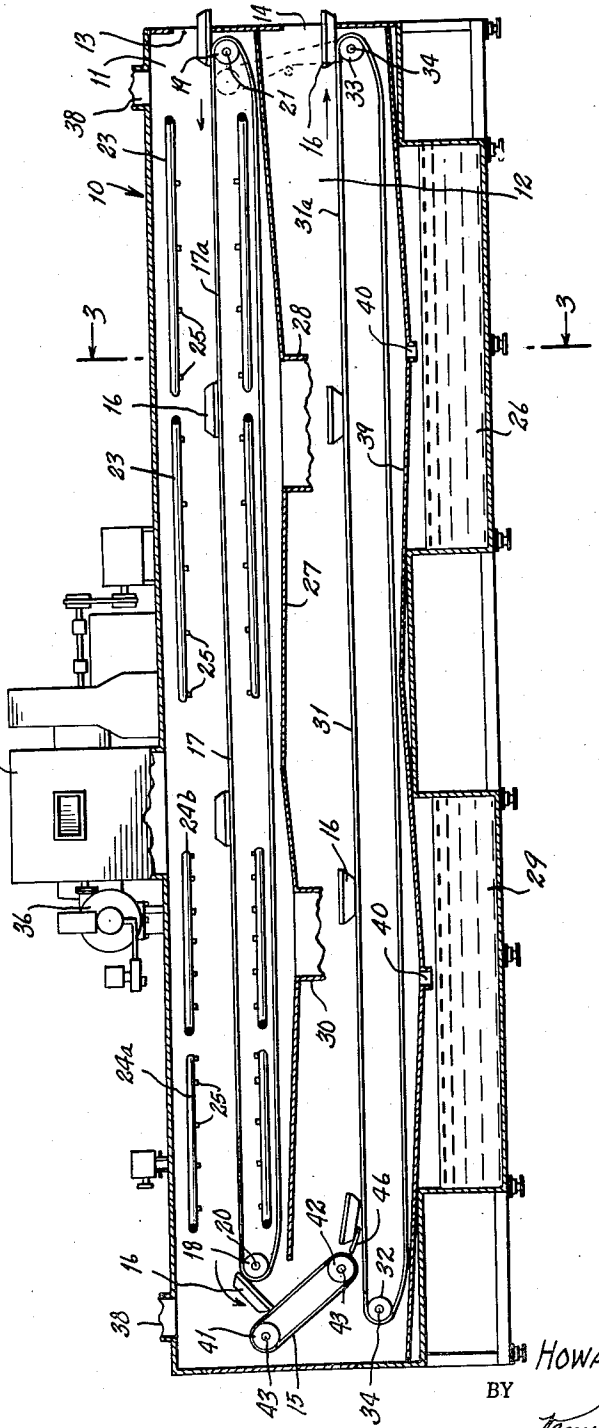
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Fig. 2.



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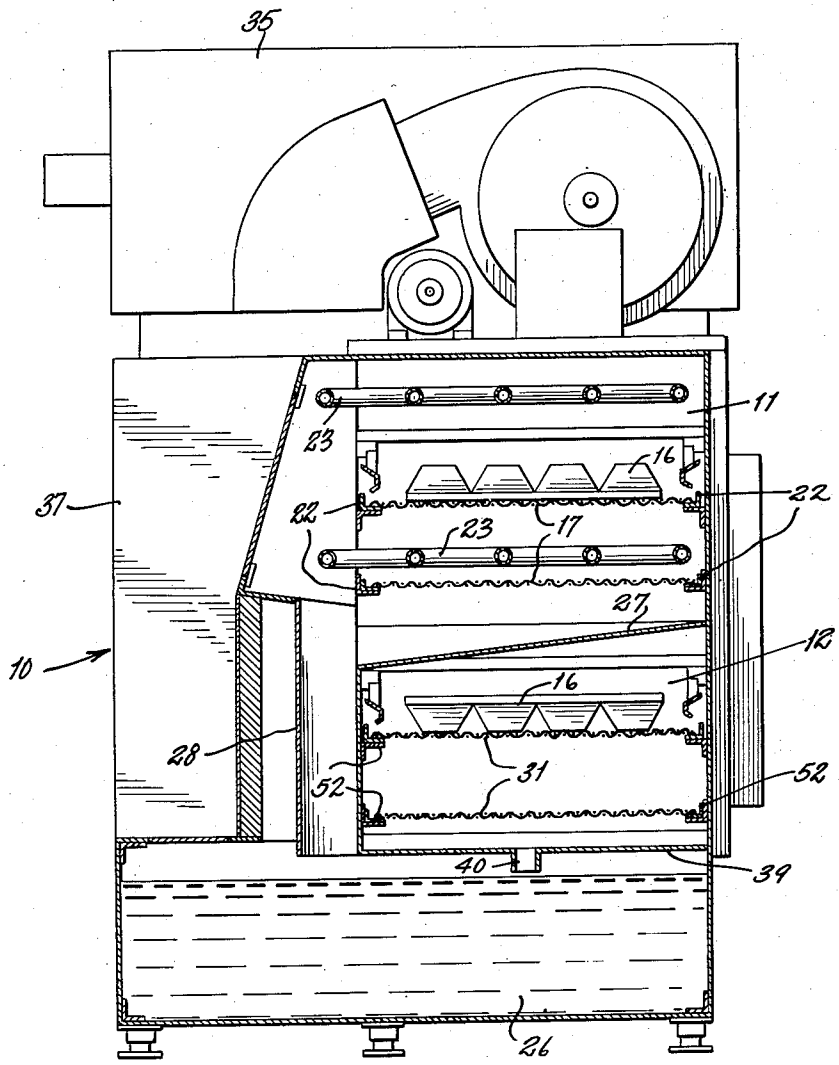
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AUTOMATIC CLEANING AND DRYING MACHINE

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Fig. 3.



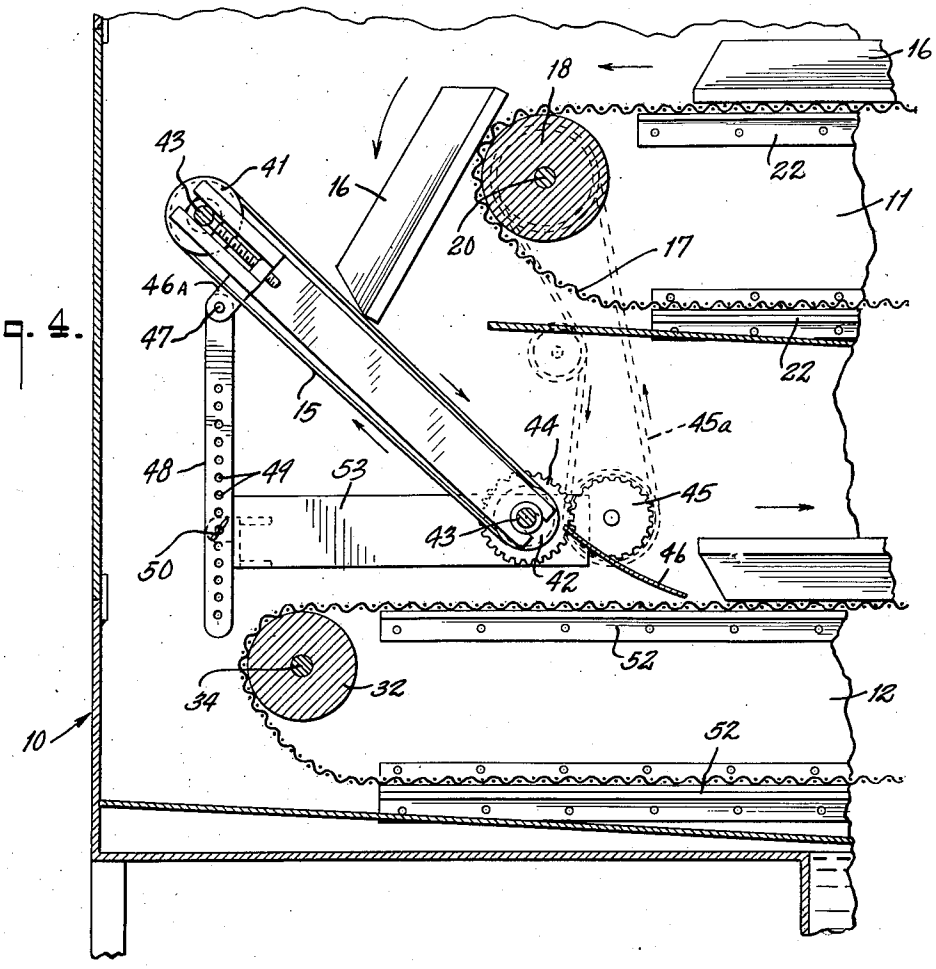
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Fig. 4.



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2,966,914

AUTOMATIC CLEANING AND DRYING MACHINE

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Filed Nov. 19, 1958, Ser. No. 774,949

2 Claims. (Cl. 134—68)

The present invention relates to automatic cleaning and drying machines and more particularly to a machine of this type adapted to automatically convey pans through cleaning and drying stations arranged in tier formation to facilitate installation of the machine in a minimum amount of space.

In many industrial baking plants and other industries using flat or open top pans it is common practice to wash the pans in a tank and then place them in a drying chamber or on a rack until they are ready for use. This type of installation has the disadvantage of requiring a large amount of space and a number of personnel to both clean the pans and remove them from the washing tank to the drying chamber or rack.

In view of the foregoing, it is one object of the present invention to provide a combined cleaning and drying machine in which the cleaning and drying chambers are arranged in tier formation.

Another object of the present invention is to provide a combined cleaning and drying machine in which automatic conveyor means convey the pans through the cleaning and drying chambers.

A further object of the present invention is to provide a combined cleaning and drying machine in which the pans are loaded and unloaded at the same end of the machine.

Still another object of the present invention is to provide a combined cleaning and drying machine with adjustable conveyor means for transferring the pans from the cleaning to the drying chamber.

These and further objects of the invention will appear from the following detailed description to be read in conjunction with the accompanying drawings wherein like components in the several views are identified by the same reference numeral.

In the drawings:

Figure 1 is a perspective view of the machine of the present invention, portions of the outer structure being broken away to illustrate structural details.

Figure 2 is a side elevation of the machine of the present invention in longitudinal section.

Figure 3 is a cross-section taken on the line 3—3 of Figure 2; and

Figure 4 is an enlarged view of the left hand end of Figure 2.

Referring now to the drawings, the numeral **10** designates in general the casing or housing for the machine of the present invention. The casing **10** is divided longitudinally into an upper chamber, designated in general by the numeral **11**, and a lower chamber designated in general by the numeral **12**. One end of the casing **10** is provided with an entrance opening **13** in communication with the upper chamber **11**, and an exit opening **14** in communication with the lower chamber **12**. The end of the casing **10** removed from the entrance **13** and exit openings **14** is provided with an adjustable conveyor designated in general by the numeral **15**. This conveyor serves to transfer the pans **16** from the upper chamber **11** to the lower chamber **12**.

The upper chamber **11** is a cleaning station in which the pans **16** are cleaned or washed while being conveyed longitudinally therethrough in a substantially straight and horizontal path. The pans **16** to be cleaned are conveyed through the upper washing chamber **11** by an endless conveyor chain **17** mounted in the chamber **11**. The conveyor chain **17** may be of link or mesh construction or foraminated sheet metal in order to allow liquid to pass freely therethrough.

The conveyor chain **17** is supported in the upper washing chamber **11** by sprocket wheels **18** and **19** which are mounted at opposite ends of the casing **10** to support the conveyor chain **17** at the end portions. These sprocket wheels **18** and **19** are rotatively mounted on shafts **20** and **21** extending transversely between the sides of the casing **10**. Sprocket wheel **19** is an idler wheel while sprocket wheel **18** is a driven wheel which drives the conveyor chain **17** in the direction indicated by the arrow in Figure 2. The sprocket wheel **18** is driven by a motor which transmits rotary motion to the sprocket wheel **18** by means of a sprocket chain or other conventional means.

The upper run **17*a*** of the conveyor chain **17**, as illustrated in Figure 2, is in registration with the entrance opening **13** in the casing **10**. The pans **16** to be washed may therefore be inserted in the casing **10** through the entrance opening **13** and placed on the conveyor chain **17** to be carried through the various cleaning and rinsing stations in the upper washing chamber **11**. The conveyor chain **17** is in the form of an endless loop and is also supported during its passage through the chamber **11** by the chain guides **22** which are secured to the sides of the casing **10**.

A plurality of headers are mounted in the upper washing chamber **11** for directing washing and rinsing liquid against the pans **16** as they pass through the various stations in the chamber **11**. The headers designated by the number **23** are the wash headers, and the headers designated by the numbers **24*a*** and **24*b*** are the rinse headers. Each of the heads **23**, **24*a*** and **24*b*** have a plurality of nozzles **25** for directing jets of washing and rinsing liquid in opposite directions against the pans **16** as they pass through the upper washing chamber **11**.

The headers **23**, **24*a*** and **24*b*** are divided in pairs arranged above and below the upper run **17*a*** of the conveyor chain **17** to direct jets of fluid against the top and bottom of each pan **16**. Due to the open mesh or foraminated construction of the conveyor **17**, the fluid passes freely therethrough. The wash liquid is stored in the tank **26** and delivered therefrom under pressure to the wash headers **23**. The wash liquid may consist of any desired detergent or other washing liquid and the supply in the tank is preferably automatically controlled and replenished. A transversely inclined drain plate **27** is mounted between the upper chamber **11** and lower chamber **12** and prevents liquid from splashing or draining from the upper to the lower chamber. The drain plate is provided with a spout or opening **28** to carry wash liquid discharged from the headers **23** to the tank **26**.

The rinse headers **24*a*** are connected with a fresh water supply, the fresh water removing all wash liquid from the pans **16**. The rinse headers **24*b***, which immediately precede the headers **24*a***, have rinse liquid delivered thereto under pressure from the tank **29**. The drain plate **27** is provided with a second spout or opening **30** below the headers **24** to carry rinse liquid discharged from these headers to the tank **29**. The tank **29** therefore receives both the fresh water discharged from the headers **24*a*** and the rinse water delivered from the headers **24*b***, and recirculates the rinse water in the tank **29** to the headers **24*b***.

In accordance with the present invention the lower

chamber 12 is a drying station in which the pans 16 are dried while being conveyed longitudinally therethrough in a substantially straight and horizontal path, the direction of movement through the lower chamber 12 being opposite to the direction of movement through the upper chamber 11. The pans 16 are carried through the lower drying chamber 12 by an endless conveyor chain 31 similar in construction to the conveyor 17 mounted in the upper washing chamber 11. The conveyor chain 31 is also preferably of open work construction or foraminated to allow air to pass freely therethrough.

The lower conveyor chain 31 is supported in the lower chamber 12 by sprockets 32 and 33 which are rotatively mounted on shafts 34 extending transversely between the sides of the casing 10. The sprocket 32 is an idler sprocket while the sprocket 33 is a driven sprocket rotating in a direction to drive the conveyor 31 in the direction indicated by the arrow in Figure 2, this direction being opposite to the direction of movement of the upper conveyor 17. The upper conveyor 17 and lower conveyor 31 are preferably driven from the same power source so that they travel at the same speed. As illustrated in Figure 2, the sprocket 33 is driven by the sprocket 19 and if desired the interconnection between the sprockets 19 and 33 may be so varied that the lower conveyor chain 31 travels at the same speed as the upper conveyor chain 17 or at a greater speed.

The upper run 31*a* of the lower conveyor 31, as illustrated in Figure 2, is in registration with the exit opening 14 in the casing 10. It can therefore be seen that the pans 16 may be loaded and unloaded at the same end of the casing 10. The lower conveyor chain 31 is also supported during its passage through the lower drying chamber by angle brackets 52 secured to the sides of the casing 10.

The pans are dried while passing through the lower drying chamber 12 on the lower conveyor 31. In order to facilitate rapid drying, hot air is preferably circulated through the chamber 12. For this purpose a plenum chamber, designated in general by the number 35, is mounted on top of the casing 10. Air is drawn into the chamber 35 by a fan and heated by any conventional means, such for example as by the gas burner 36. The air passes from the chamber 35 through the duct work 37 into the lower drying chamber 12. If desired, openings 38 may be provided in the casing 10 for venting steam from the drying chamber 12. The bottom of the drying chamber is provided with a drain plate 39 to catch any liquid dripping from the pans 16. This drain plate 39 has openings 40 in communication with the tanks 26 and 29 to allow any liquid dripping from the pans 16 to drain into these tanks.

The pans 16 are transferred from the upper conveyor 17 to the lower conveyor 31 by the adjustable turning conveyor 15 mounted at the end of the casing removed from the entrance and exit openings 13 and 14. The turning conveyor 15, unlike the conveyors 17 and 31, is preferably a continuous solid belt with no openings to prevent the pans 16 from slipping through the conveyor 15 or being caught thereon. The turning conveyor 15 is supported by wheels 41 and 42 rotatively mounted on shafts 43 extending transversely between the sides of the casing 10. The wheel 42 is keyed to a sprocket 44 which meshes with sprocket 45 which is driven by sprocket 18 through belt 45*a*. The sizes of the various sprockets are preferably so arranged that the turning conveyor 15 travels approximately twenty-five percent faster than the conveyors 17 and 31. This prevents any jamming of the pans 16 on the turning conveyor 15 and also facilitates rapid transfer of the pans 16 from the conveyor 17 to conveyor 31. Guide plate 46 is provided to direct the pans 16 from the turning conveyor 15 to the lower conveyor 31. The direction of travel of the turning conveyor 15 is indicated by the arrows in Figure 4.

In order to adapt the washer and dryer of the present invention to operate efficiently with different size pans means are provided for varying the angular position of the turning conveyor 15 with respect to the upper and lower conveyors 17 and 31. For this purpose the turning conveyor 15 has attached thereto a bracket 46*a* with a pin 47 to which bar 48 is pivotably connected. The bar 48 has a plurality of spaced holes 49 adapted to receive bolt 50. The bolt 50 is adapted to lock the bar 48 to the flange 53 secured to the casing 10. When it is desired to alter the position of the turning conveyor 15 the bolt 50 is removed and the bar 48 moved vertically until the conveyor 15 is in the desired position. The bolt is then inserted in the appropriate hole 49 in the bar 48 to lock the conveyor 15 in position.

In operation, the pans are inserted through the entrance opening 13 on to the upper conveyor 17 which carries the pans 16 through the various wash and rinse stations in the upper chamber 12. The turning conveyor 15 transfers the pans 16 to the lower conveyor 31 which carries the pans through the lower drying chamber 12 to the exit opening 14. If desired, additional conveyors may be utilized to carry the pans to the entrance opening 13 and away from the exit opening 14.

The turning conveyor 15 both transfers the pans 16 from the conveyor 17 to the conveyor 31, and also rotates the pans through 180 degrees. In this manner, if the open sides of the pans 16 are in registration with the upper conveyor 17, the bottom of the pans 16 will be in registration with the lower conveyor 31. This facilitates draining of any trapped wash fluid from the pans 16 during their travel on the turning conveyor 15.

It is to be understood that although one embodiment of the washing and drying machine of the present invention has been described and illustrated the structure thereof may be modified and varied without departing from the scope of the present invention except as limited by the following claims.

I claim:

1. A pan cleaning and drying machine including two oppositely moving, substantially horizontal and mutually parallel, pan conveyors each having a loading end and a discharge end, said conveyors being positioned one above the other with said upper conveyor's loading end and said lower conveyor's discharge end adjacent to each other and said upper conveyor's discharge end and said lower conveyor's loading end adjacent to each other, a third pan conveyor having a loading portion and a discharge end and positioned with its latter end located to discharge to said lower conveyor's loading end at an obtuse angle therewith and with its loading portion located at an acute angle with respect to said upper conveyor's discharge end and at a level therebelow and substantially in vertical alignment therewith and spaced therefrom to permit pans to span therebetween, means for powering said upper and lower conveyors to cause them to travel towards their respective discharge ends at corresponding pan conveying speeds and for powering said third conveyor to move downwardly towards its discharge end at a speed faster than said conveying speeds, a pan discharging from said upper conveyor's discharge end being free to tip downwardly and span between said upper conveyor's discharge end and said third conveyor's loading portion so that said third conveyor rotates the pan end for end and discharges it to said lower conveyor, means for cleaning inverted pans carried by a portion of said upper conveyor spaced from its discharge end with liquid wetting the pans, and means for drying pans carried by said lower conveyor, whereby the pans may drain themselves empty from said liquid while inverted and be delivered upright and dry by said lower conveyor.

2. A pan cleaning and drying machine including two oppositely moving, substantially horizontal and mutually

parallel, pan conveyors each having a loading end and a discharge end, said conveyors being positioned one above the other with said upper conveyor's loading end and said lower conveyor's discharge end adjacent to each other and said upper conveyor's discharge end and said lower conveyor's loading end adjacent to each other, a third pan conveyor having a loading portion and a discharge end and positioned with its latter end located to discharge to said lower conveyor's loading end at an obtuse angle therewith and with its loading portion located at an acute angle with respect to said upper conveyor's discharge end and at a level therebelow and substantially in vertical alignment therewith and spaced therefrom to permit pans to span therebetween, means for powering said upper and lower conveyors to cause them to travel towards their respective discharge ends at corresponding pan conveying speeds and for powering said third conveyor to move downwardly towards its discharge end at a speed faster than said conveying speeds, a pan discharging from said upper conveyor's discharge end being free to tip downwardly and span between said upper

conveyor's discharge end and said third conveyor's loading portion so that said third conveyor rotates the pan end for end and discharges it to said lower conveyor, means for cleaning inverted pans carried by a portion of said upper conveyor spaced from its discharge end with liquid wetting the pans, and means for drying pans carried by said lower conveyor, whereby the pans may drain themselves empty from said liquid while inverted and be delivered upright and dry by said lower conveyor, said machine having means for varying the spacing between said upper conveyor's discharge end and said third conveyor's loading section as required for differently sized pans to span therebetween.

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