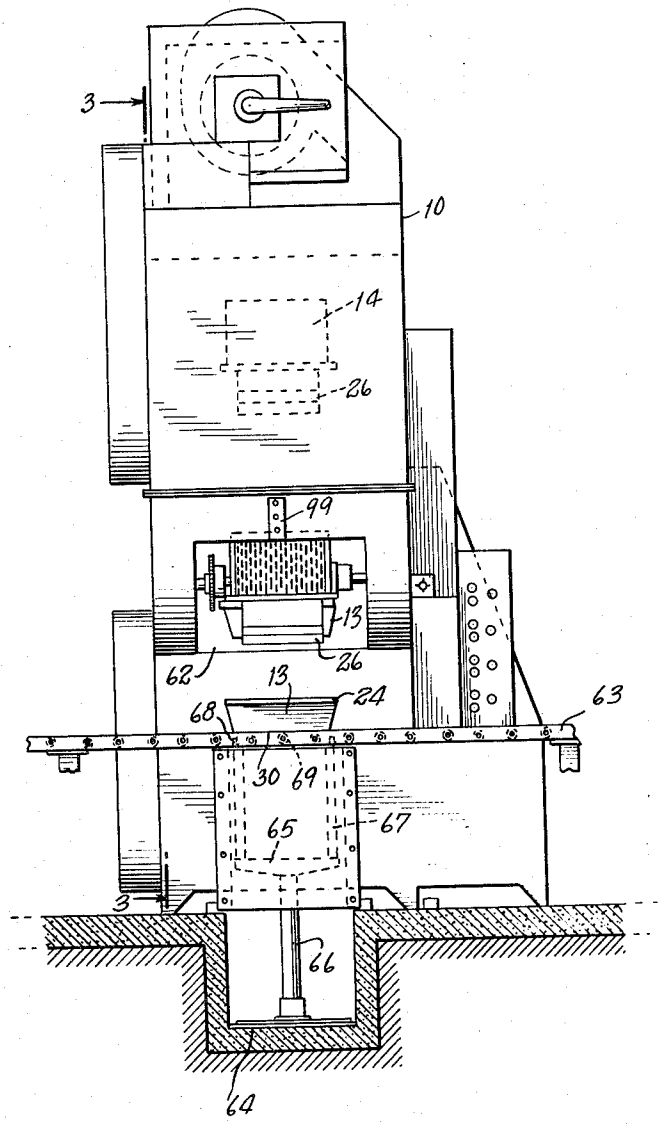
July 5, 1960 H. M. SADWITH 2,943,424

AUTOMATIC CLEANING MACHINE

Filed June 30, 1958 7 Sheets-Sheet 1

Fig. 1.



INVENTOR.
HOWARD M. SADWITH

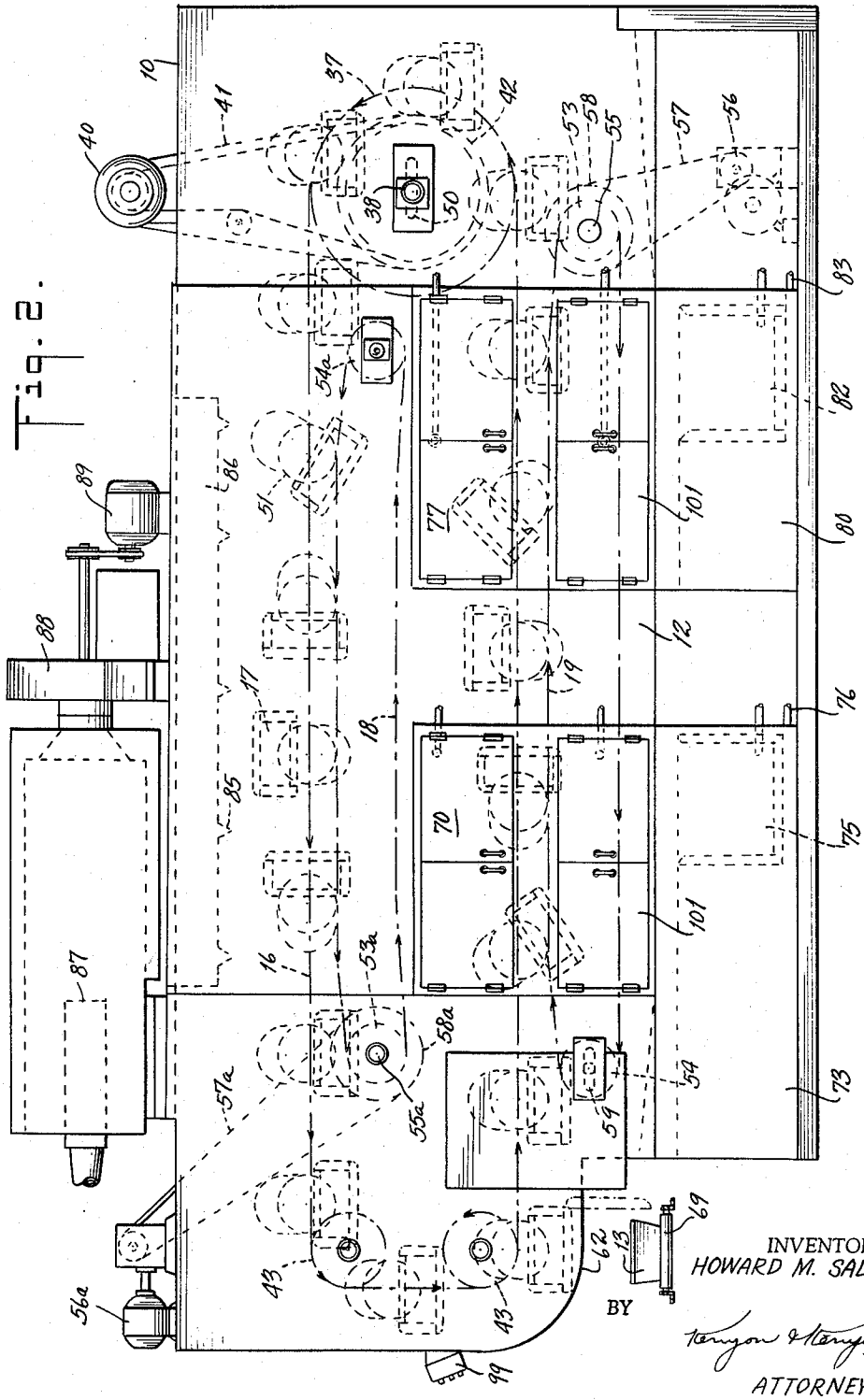
BY Kenyon & Kenyon
ATTORNEYS

July 5, 1960 H. M. SADWITH 2,943,424

AUTOMATIC CLEANING MACHINE

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Fig. 2.



INVENTOR.
HOWARD M. SADWITH

BY

Kenyon & Kenyon

ATTORNEYS

July 5, 1960 H. M. SADWITH 2,943,424

AUTOMATIC CLEANING MACHINE

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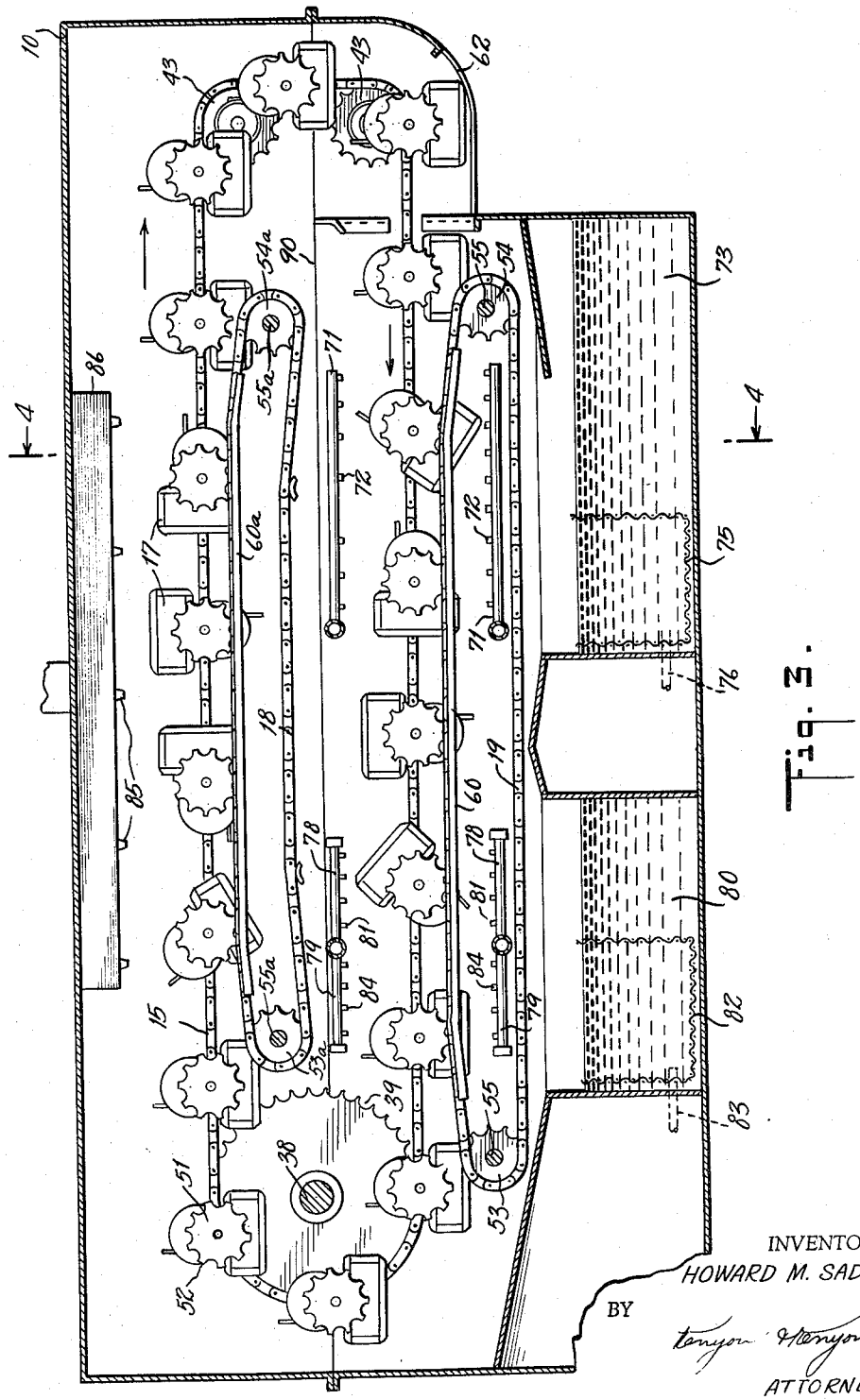


Fig. 3.

INVENTOR.
HOWARD M. SADWITH

BY

Tanyon & Tanyon

ATTORNEYS

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AUTOMATIC CLEANING MACHINE

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Fig. 4.

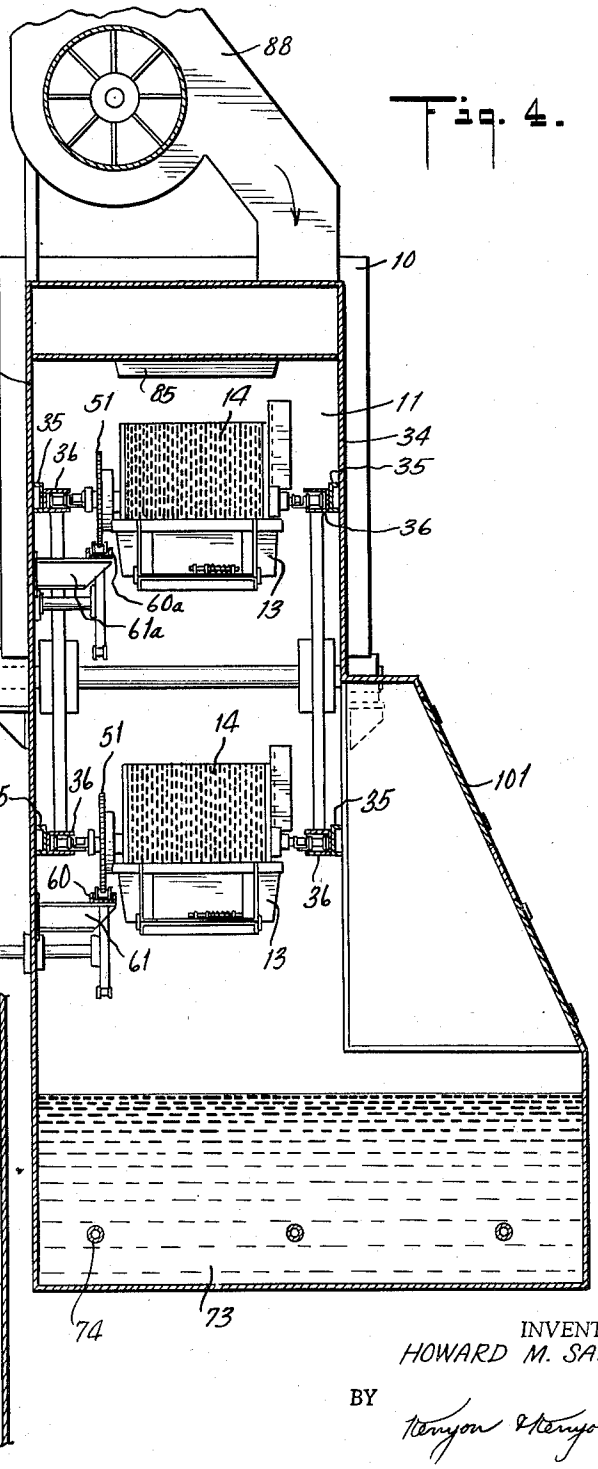


Fig. 5.

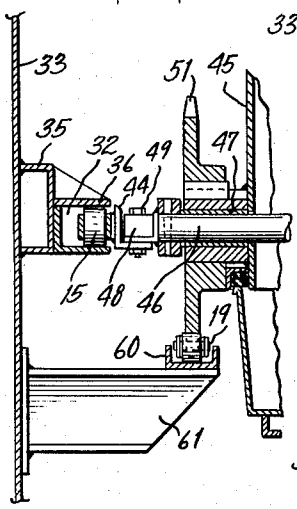
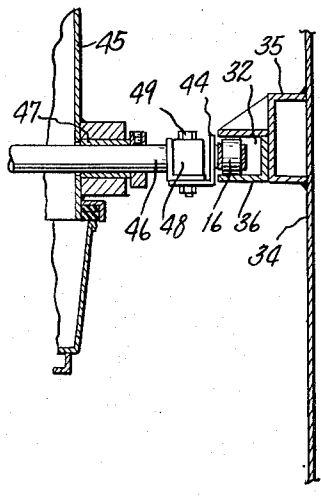


Fig. 6.



INVENTOR.
HOWARD M. SADWITH

BY Kenyon & Kenyon

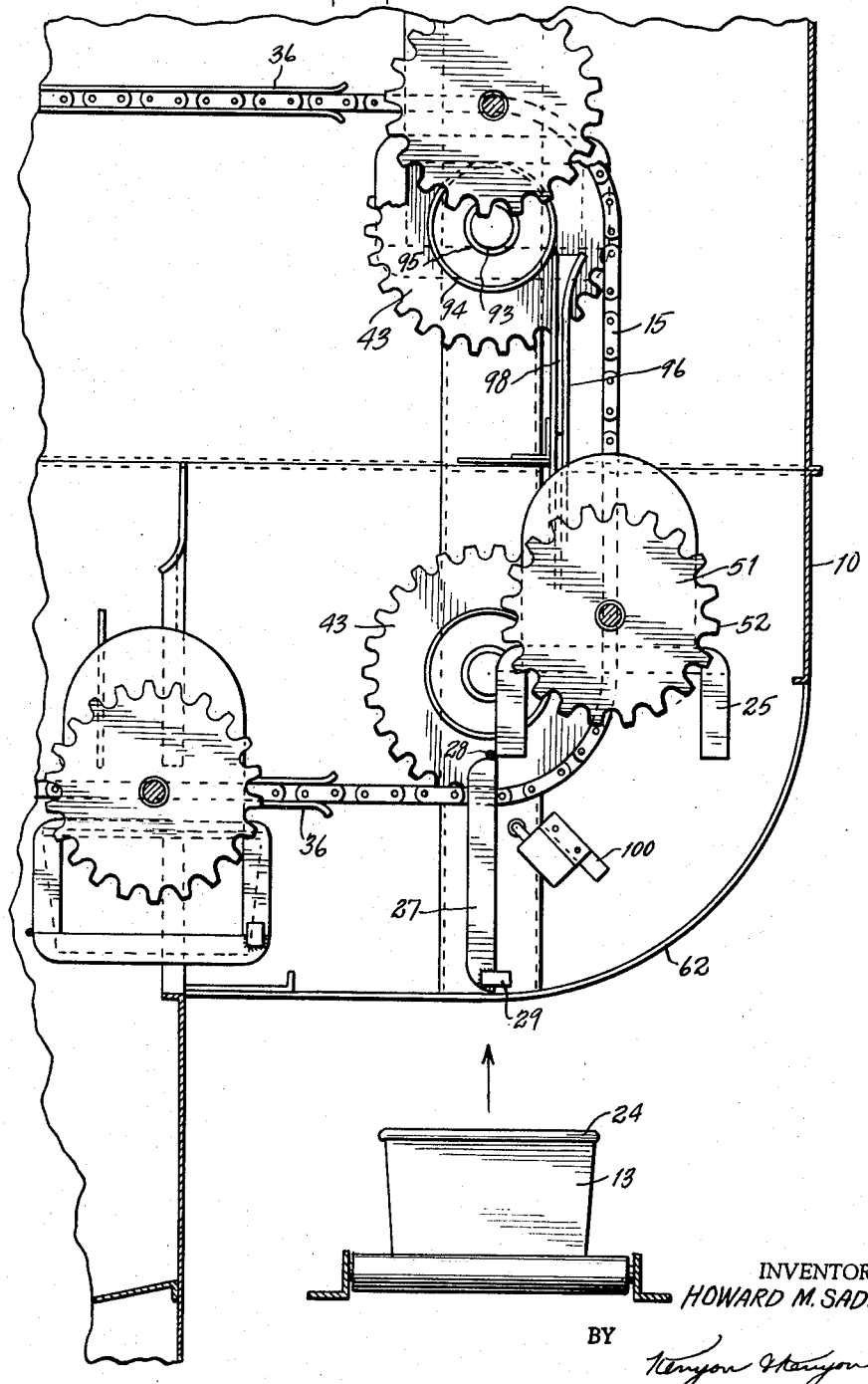
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AUTOMATIC CLEANING MACHINE

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Fig. 7.



INVENTOR.
HOWARD M. SADWITH

BY

Kenyon & Kenyon

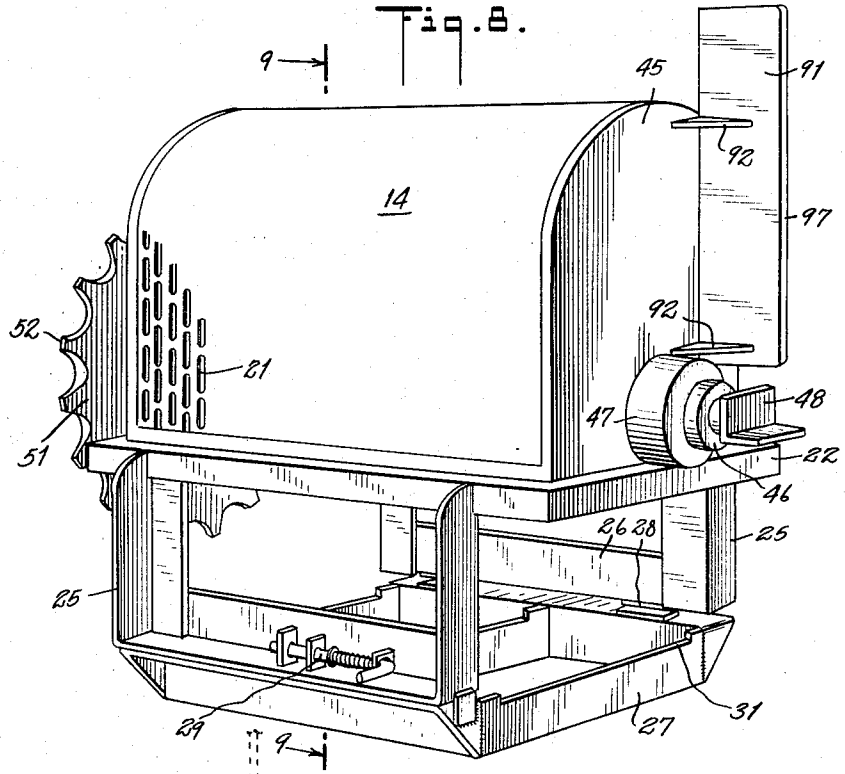
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AUTOMATIC CLEANING MACHINE

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Fig. 8.



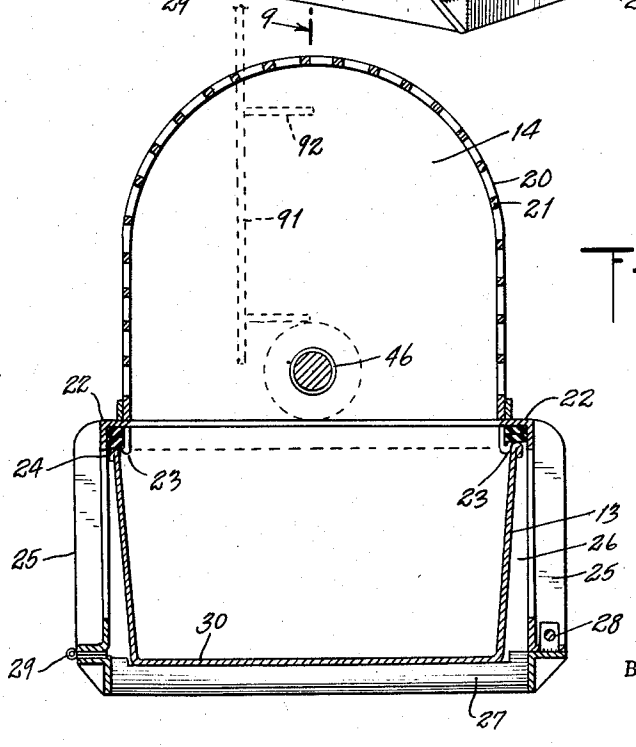


Fig. 9.

INVENTOR.
HOWARD M. SADWITH

BY Kenyon & Kenyon

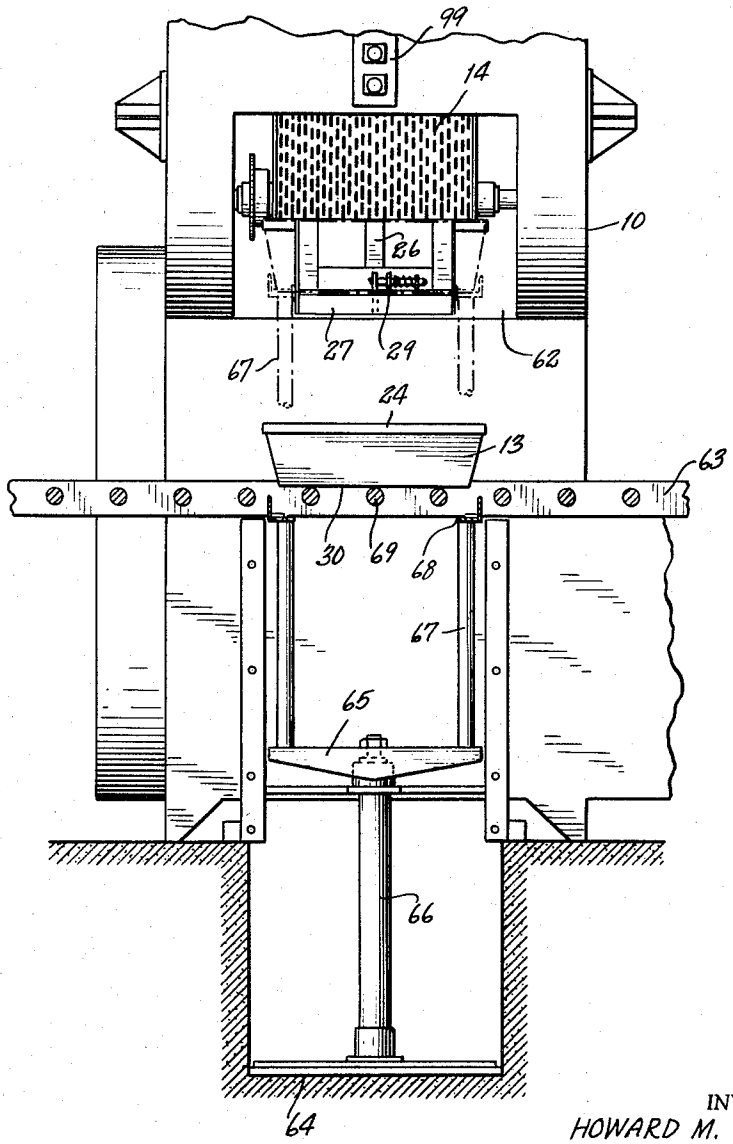
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July 5, 1960 H. M. SADWITH 2,943,424

AUTOMATIC CLEANING MACHINE

Filed June 30, 1958 7 Sheets-Sheet 7

Fig. 10.



INVENTOR.
HOWARD M. SADWITH

BY Kenyon & Kenyon

ATTORNEYS

United States Patent Office

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2,943,424

AUTOMATIC CLEANING MACHINE

Howard M. Sadwith, 982 Madison Ave., Plainfield, N.J.

Filed June 30, 1958, Ser. No. 745,565

13 Claims. (Cl. 51—164)

This invention relates to a cleaning machine for automatically cleaning or washing parts that are normally collected in tote pans. This machine cleans or washes the tote pans simultaneously with the parts in the tote pans.

Tote pans are of generally standardized dimensions and are used to collect parts delivered by automatic screw machines and the like. The parts are more or less covered by the lubricant or cooling liquid used by such machines and therefore they must be cleaned or washed. The pans must be cleaned or washed because they accumulate the liquid from the parts.

It has been the usual practice to clean or wash these type of parts by transferring them from the tote pans to a rotary drum. The tote pans are washed separately from the industrial parts. These are tedious and expensive operations.

One of the objects of the present invention is to provide a cleaning machine which cleans or washes the tote pans and parts simultaneously. This reduces handling and speeds the work.

Another object is to provide an automatic machine by which the tote pans and parts are received dirty and discharged clean at the same location. This provides greater convenience and makes efficient plant layout designing easier.

Briefly stated the objects of the present invention are accomplished by providing a cleaning machine which is enclosed by a casing, a portion of the interior of which is subdivided into two chambers disposed one on top of the other. The lower chamber has disposed therein at spaced positions a plurality of washing and rinsing stations, while the upper chamber is a drying station, the drying being accomplished such for example as by the circulation of hot air. A plurality of foraminated baskets are disposed within the casing and supported at spaced positions between conveyor sprocket chains adapted to convey the baskets through the two chambers. The tote pans with the parts therein are adapted to be connected to the baskets releasably but in such manner as to complete the enclosure of the baskets to thereby entrap the parts in the enclosure defined cooperatively by the basket and tote pan. A driven chain is positioned within each chamber to engage and rotate sprocket wheels attached to each basket and thus rotate each basket and pan during their passage through the various work stations in each chamber to thereby agitate and tumble the parts therein. After the baskets and pans, which together form a barrel, pass through the upper and lower chambers means are provided for restraining rotational movement of these barrels and for positioning them for release and discharge of the cleaned tote pans with the latter upright and for receipt of the next or dirty tote pan and parts to be cleaned. An elevator is provided for automatically raising and lowering the tote pans into and out of engagement with the basket.

In the drawings:

Figure 1 is an elevation of the loading and unloading end of the machine providing this example.

Figure 2 is an elevation showing what is the right hand side of the machine when looking at Figure 1.

Figure 3 is a cross section taken on the line 3—3 of Figure 1.

Figure 4 is a cross section taken on the line 4—4 of Figure 3.

Figure 5 is a detailed and sectional enlargement of a portion of Figure 4.

Figure 6 is a view similar to Figure 5 but illustrates another portion.

Figure 7 is an enlargement of a major portion of the right hand side of Figure 3.

Figure 8 is a perspective view of details.

Figure 9 is a cross section taken on the line 9—9 of Figure 8.

Figure 10 is an enlarged scale elevation of details shown only in broken lines in Figure 1.

Referring now to the drawings, the casing or housing is designated generally by the numeral **10**. The machine is a self-contained unit adapted to sequentially convey the articles and pans to be cleaned through various work stations disposed at spaced intervals in the casing.

A portion of the interior of the casing **10** intermediate the ends thereof is divided into two chambers disposed one on top of the other. The upper chamber, designated generally by the numeral **11**, is a drying chamber, while the lower chamber, designated generally by the numeral **12** is subdivided into various washing and rinsing stations. The articles to be cleaned and the tote pans **13** in which they are stored, and which are also to be cleaned, are carried through the machine in the drums or baskets **14**. During the passage of a basket **14** through the machine a tote pan **13** is secured to the basket in such manner as to be in effect an integral part thereof and thereby complete the enclosure of the basket. In this manner the articles in the tote pan **13** are confined within the enclosure or barrel defined by the basket and the tote pan. A plurality of baskets **14** are disposed within the casing **10** and are pivotably supported at spaced intervals between main conveyor chains **15** and **16**. The main conveyor chains **15** and **16** carry the baskets **14** through the chambers **11** and **12** in a manner to be presently described.

The basket **14** when combined with a tote pan **13** defines a barrel like enclosure and any reference hereinafter to the combination of a basket **14** and tote pan **13** shall be identified as a barrel **17**. During the passage of the barrels **17** through the machine the barrels are rotated in order to agitate the articles enclosed therein. This rotation of the barrels **17** and consequent agitation of the articles therein insures thorough cleaning and removal of all foreign substances from all portions of the articles. The barrels **17** are rotated during their passage through the chambers **11** and **12** by means of endless auxiliary conveyors **18** and **19** in a manner to be presently described.

The covering **20** of the baskets **14** is foraminated to permit the flow of washing liquid therethrough. The size of the foraminations **21** must of necessity be smaller than the size of the smallest article to be cleaned in order to prevent escape of the article through the foraminations. The open portion of the basket **14** has disposed thereabout a lip **22** which may be secured to the basket **14** or formed integrally therewith. This open portion faces downwardly during the pan loading and unloading. The lip **22** is a generally U-shaped member and has inset therein a resilient gasket **23**, such for example as sponge rubber. The lip **22** is adapted to receive the rim **24** defining the opening in the tote pan **13**.

A plurality of braces 25 are attached to the lip 22 and extend perpendicularly therefrom to form an extension of the basket 14. These braces 25 define a framework, designated generally by the numeral 26, which serves to guide the tote pan 13 into engagement with the basket 14. The portion of the framework 26 removed from the lip 22 is provided with a hinged gate 27 which is pivotably attached to the framework 26 by hinges 28. The gate 27 is held in a closed position by a latch mechanism designated generally by the numeral 29. When a tote pan 13 is in position in the framework 26 the gate 27 serves to support the tote pan and to urge the rim 24 of the tote pan into sealing engagement with the gasket 23 inset in the lip 22 of the basket 14. The inner surface of the gate 27 which supports the bottom 30 of the tote pan 13 may be provided with a plurality of stepped or indented portions 31 in order to accommodate tote pans of various sizes and widths.

Other arrangements for detachably fastening the pans and basket to each other may be substituted. The one disclosed has worked satisfactorily and is considered to be novel.

When a tote pan 13 is to be secured to a basket 14 the latch 29 is opened thereby allowing the gate 27 to swing to a vertical position. The tote pan 13 is then inserted through the opening provided and moved vertically upward within the framework 26 untitl the rim 24 of the tote pan 13 abuts against the gasket 23. The gate 27 is then swung to a closed position at which time the portions 31 on the gate 27 engage the bottom 30 of the tote pan 13 and forces the rim 24 of the tote pan into sealable engagement with the gasket 23.

The barrels 17 are conveyed through the machine by means of the conveyor chains 15 and 16 which are disposed in parallel relation on each side of the casing 10 with the barrels 17 supported and carried therebetween. Each main conveyor chain is in the form of an endless loop and is adapted to travel in chain guides designated generally by the numeral 32, which are secured to the back wall 33 and front wall 34 of the casing 10. The guides 32 include a mounting channel 35 which is secured to the casing 10 by its legs and has attached to the outside of its web a channel assembly 36. The chains 15 and 16 pass through the channel assemblies 36 which thereby acts as guide members for the conveyor chains.

Disposed at one end of the casing 10 are sprocket wheels 37 which are rotatably mounted on a shaft 38 attached to and extending horizontally from the back 33 and front 34 of the casing 10. The sprockets 39 on the sprocket wheels 37 engage the conveyor chains 15 and 16 and thereby drive them. The sprocket wheels 37 also act to loop the chains to make them endless. The sprocket wheels 37 are driven by means of a motor 40 which transmits rotary motion to the sprocket wheels 37 by means of sprocket chains 41 which engage sprocket wheels 42 on the shaft 38. The sprocket wheels 42 are connected to the shaft 38 to turn the latter. Disposed at the end of the casing 10 removed from the sprocket wheels 37 are free wheeling sprocket wheels 43. These free wheeling sprocket wheels 43 serve the dual purpose of supporting the main conveyor chains 15 and 16 and also function as guides to respectively alter the direction of travel of the main conveyor chains by about 90 degrees. The motor 40 drives both main conveyor chains 15 and 16 thereby assuring that they both travel at the same speed.

The manner in which the baskets 14 are supported between and carried by the main conveyor chains 15 and 16 is illustrated in Figures 4, 5 and 6. The main conveyor chains have attached thereto at spaced intervals blocks 44. These blocks 44 are disposed at the same spaced intervals on each main conveyor chain such that a block on main conveyor chain 15 is always diametrically opposite a similar block on main conveyor chain 16. Each basket 14 has disposed therein and extending

axially from both ends 45 thereof an axle 46 which is rotatably supported in bushings 47 secured to the ends 45 of the basket 14 and extending axially therefrom. Each basket 14 is therefore pivotable with respect to its associated axle 46 and may be rotated thereabout.

Attached to both ends of the axle 46 extending axially from the basket 14 are angle brackets 48 which mesh with the blocks 44 attached to the main conveyor chains 15 and 16. The angle brackets 48 may be secured to the blocks 44 in any conventional manner, such for example as by a bolt 49 which is adapted to pass through both block 44 and angle bracket 48. The basket 14 is therefore both pivotably supported between and carried by the main conveyor chains 15 and 16. This support is such that the baskets 14 may be pivoted or rotated with respect to the main conveyor chains. In order to permit adjustment of the tension of the main conveyor chains 15 and 16 and in order to take up any slack therein the shafts 38 on which the sprocket wheels 37 are rotatably mounted are supported in a slotted opening 50. In this manner the shafts 38 can be displaced to the desired position and thereby take up any slack in the main conveyor chains 15 and 16.

As heretofore described, it is desirable that the parts entrapped in the barrels 17 be agitated or tumbled during the movement of the barrels through the casing 10. This is desirable in order to assure thorough cleansing and drying of these parts during passage through the various washing and drying chambers. This agitation of the parts in the barrels 17 is provided by independent means which rotate the barrels during their passage through the chambers 11 and 12 in the casing 10. For this purpose a gear 51 is connected to the bushing 47 on one end of the axle 46 extending from the basket 14 such that the rotation of the gear 51 will effect rotation of the basket 14. This gear 51 is disposed between the bracket 48 attached to the end of the axle 46 and the end 45 of the basket 14. As illustrated in Figure 4 only one gear 51 is associated with each basket 14. This is due to the fact that the gear 51 serves only to rotate or agitate the basket 14 and does not function in any manner to support or convey the basket.

The gears 51 are rotated during engagement with auxiliary conveyor chains 18 and 19. These auxiliary conveyor chains are of the same type as the main conveyor chains 15 and 16 and are adapted to mesh with the teeth 52 on the gears 51 and thereby transmit rotary motion to the gears 51. As illustrated in Figures 2 and 3 two auxiliary conveyor chains 18 and 19 are mounted in the casing 10 and are disposed in vertical alignment. The auxiliary conveyor 19 rotates the baskets 14 during their passage through the various washing and rinsing operations in lower chamber 12, while the other auxiliary conveyor 18 rotates the baskets 14 during their passage through the upper drying chamber 11. As illustrated, the baskets 14 are rotated only while in these respective chambers and not while passing from one to the other.

The lower auxiliary conveyor chain 19 is supported by the sprocket wheels 53 and 54. These sprocket wheels are rotatably mounted on shafts 55 attached to the back 33 of the casing 10 and extending perpendicularly inwardly therefrom. The sprocket wheel 54 is an idler wheel while the sprocket wheel 53 is driven by the motor 56 by means of a belt 57 which engages the sprocket wheel 58 attached to and forming an axial extension of the shaft 55. The shaft 55 of idler sprocket wheel 54 is mounted in a slotted opening 59 which permits relative displacement of the shaft 55 to thereby adjust the tension of the auxiliary conveyor chain 19 and to take up any slack therein. The auxiliary conveyor chain 19 travels in the channeled portion of the guides 60 attached to the bracket 61 attached to and extending from the back 33 of the casing 10. The purpose of providing a guideway 60 in which the auxiliary conveyor chain 19 travels is to facilitate engagement between the gears 51 on the

baskets 14 and the auxiliary conveyor chain 19. The auxiliary conveyor chain 19 engages the gears 51 on the basket 14 prior to the entrance of the baskets into the lower chamber 12 and rotates the baskets during their passage through the various washing and rinsing stations therein. The auxiliary conveyor chain 19 is disengaged from the gear 51 on each basket 14 when the basket leaves the lower chamber 12 and before its direction of motion is reversed by sprockets 37.

The auxiliary conveyor chain 18 is identical to the auxiliary conveyor chain 19 and parts similar to those associated with the auxiliary conveyor chain 19 have been designated by the same reference numerals with the subscript "*a*." This auxiliary conveyor chain 18 rotates the baskets 14 as they enter and during their passage through the upper drying chamber 11. The baskets 14 are disengaged from the auxiliary conveyor chain 18 when they leave the upper chamber 11.

The tote pans 13 are inserted in the casing 10 for engagement with the baskets 14 through an opening or loading station 62 provided in one end of the casing 10. The tote pans 13 may be loaded manually by opening the latch 29 thereby allowing the gate 27 to pivot to a vertical position thereby freeing and permitting removal of the tote pan from the basket. The tote pan 11 with the parts to be cleaned therein is then positioned in the manner described and the gate swung to a closed position.

In the preferred form of the invention the tote pans 13 are loaded and unloaded semi-automatically. A conveyor 63 is positioned adjacent the casing 10 and conveys dirty tote pans to the loading station 62 and carrys the cleaned tote pans away. An elevator structure, designated generally by the numeral 64, automatically raises the tote pans 13 into engagement with the baskets 14 and lowers the cleaned tote pans after disengagement from the basket 14. This elevator 64 is positioned below the loading station 62 in the casing 10 and raises and lowers the tote pans. The elevator structure 64 consists of a platform 65 which is vertically movable by the piston 66. This piston 66 may be activated by compressed air or other conventional means. The platform 65 is generally rectangular and has secured to the opposite sides thereof and extending perpendicularly upwardly therefrom interspaced walls 67 which have attached to the ends thereof angle brackets 68. These angle brackets 68 engage the corners of the bottom 30 of the tote pans 13 and thereby support and carry the tote pans. The walls 67 are of such size and shape as to readily pass between the rollers 69 upon which the tote pans rest before and after leaving the conveyor belt 63.

In operation when a basket 14 with its associated tote pan 13 is adjacent to the loading station 62 in the casing 10 the motion of the chains 15 and 16 is stopped. The elevator 64 is then activated and moves in a vertically upward direction until the brackets 68 on the ends of the walls 67 engage the bottom 30 of the tote pan 13. As illustrated in Figures 8 and 10 the supporting framework 26 and its associated gate 27 which maintain the tote pan in sealable engagement with the basket 14 is of such size as to permit the walls 67 to pass thereby and engage the extremities of the bottom 30 of the tote pan. When the brackets 68 on the walls 67 are so engaged with the tote pan the latch 29 is opened permitting the gate 27 to swing to its open position. At this point the tote pan 13 is supported solely by the walls 67 of the elevator structure 64. The elevator is then energized to move vertically downward until the tote pan 13 abuts against and rests on the rollers 69. The elevator continues its downward descent until the brackets 68 on the end of the walls 67 are clear of the rollers 69.

The cleaned tote pan 13 and the cleaned parts therein are then carried away by the conveyor 63 and the next tote pan to be cleaned with its parts therein is positioned on the rollers 69 beneath the loading station 62. An appropriate guide means (not shown) may be provided to assist the operator in correctly positioning the tote pan underneath the loading station in the casing 10. The elevator structure is then energized and ascends carrying the tote pan 13 with it until it is in sealable engagement with the basket 14. The gate 27 is then swung to a closed position, the elevator structure energized to descend, and the drive means for the machine energized to move the next barrel 17 into position to be unloaded.

The interior of the machine as previously described contains upper and lower chambers 11 and 12. The upper chamber 11 is the drying chamber while the lower chamber 12 is subdivided into various washing and rinsing stations. The basket 14 after having a dirty tote pan 13 secured thereto passes first into a washing station designated generally by the numeral 70. The barrel 17 upon its entry into the lower chamber 12, and during its passage thereto, is continually rotated. The washing station 70 has mounted therein upper and lower spray headers 71 provided with a number of spaced nozzles 72 through which the washing liquid is sprayed. This washing liquid may consist of water to which a detergent has been added or any conventional washing fluid. It is desirable to provide upper and lower headers in the washing station so that as the barrels are being rotated the parts therein are constantly subjected to a spray of washing liquid. The washing liquid is stored in a tank 73 and is pumped therefrom to the two headers 71 so that the washing liquid is discharged under pressure through the nozzles 72. The liquid in the washing tank may be heated by the steam coils 74 or other means to maintain the washing liquid at the desired temperature. The washing liquid after discharge through the nozzles 72 falls by gravity to the bottom of the washing station 70 and is carried by appropriate drains (not shown) to the tank 73. The tank may be provided with a screen or strainer 75 to remove any foreign matter from the liquid therein before it is pumped to the headers 71. It can therefore be seen that the washing liquid is continually recirculated and appropriate means may be provided for replenishing the supply of washing liquid to maintain a desired level in the tank. The gravity drain 76 is provided at the bottom of the tank for cleansing purposes. Devices of this kind usually have an overflow connection to remove surface scum and the like and for safety. Such a connection is used by this invention but it is not illustrated because it may be the conventional arrangement.

After leaving the washing station 70 the barrels 17 next enter the rinse station 77. The barrels are continuously rotated during their passage through this station. The rinse station 77 is provided with two pairs of headers 78 79 with each pair consisting of two headers, one mounted at the top and the other mounted at the bottom of the rinse station. The first pair of headers 78 is supplied with liquid which is pumped from the tank 80. This tank 80 is initially filled with fresh water which is recirculated, the water draining from the rinse station back into the tank 80. This tank is similar to the tank provided for the washing station 70. The water from this tank is pumped to the headers 78 and discharged through the nozzles 81 on these headers. The tank 80 is also provided with a strainer or screen 82, and a gravity drain 83. The purpose of this rinsing operation is to remove the majority of detergent or other cleansing fluid from the tote pan and associated parts carried in the barrel 17.

The second pair of headers 79 in the rinse station 77 are positioned immediately following the first pair of headers 78 in this station and are adapted to spray clean tap water through the nozzles 84 associated with these headers. The water discharged from the second pair of headers 79 falls by gravity to the bottom of the rinse station and is carried from there back to the tank 80. The purpose of this second rinse is to remove all detergent

or other washing fluid from the tote pan and the parts entrapped in the barrel 17.

When the barrels 17 leave the rinse station 77 they are disengaged from the auxiliary conveyor chain 19 and carried to the upper or drying chamber 11 positioned above the lower or washing and rinsing chamber 12. When the barrels 17 enter the upper chamber 11 they are engaged by the auxiliary conveyor chain 18 and continually rotated during their passage through this chamber. The drying is accomplished by means of circulating hot air which is discharged from the jets 85 in the header 86 extending approximately the length of the drying chamber 11. The air may be heated for example by the gas burner 87 and circulated by means of the blower 88 driven by the motor 89. In order to prevent liquid from being splashed or sprayed from the lower chamber 12 into the upper chamber 11, these chambers are preferably separated by baffles or a plate designated generally by the numeral 90. An exhaust (not shown) is preferably provided for venting the lower and upper chambers as required. The tanks 73 and 80 are provided with access doors 10 to permit access to these tanks for cleaning purposes.

When the barrels 17 leave the drying chamber 11 they are disengaged from the auxiliary conveyor chain 19 and carried by the main conveyor chains 15 and 16 to the loading station 62 in the casing 10. As illustrated in Figure 7 in order to properly unload and load the tote pans 13 it is essential that each barrel 17 when it is adjacent the loading station 62 be in a vertical position, i.e., with the tote pan 13 being positioned vertically below the basket 14. This positioning is essential in order to permit the brackets 68 on the walls 67 of the elevator 64 to correctly engage the bottom 30 of tote pans 13. It often happens however that when a barrel 17 is disengaged from the auxiliary conveyor chain 18 it will continue to oscillate and therefore not approach the loading station in a stationary vertical position. For this reason the end 45 of the basket 14 opposite the end on which the gear 51 is mounted has attached thereto a plate 91. This plate 91 is mounted in such manner as to extend perpendicularly from the end of the basket 14 transversely to its pivoting center and laterally offset therefrom. This plate 91 has attached thereto and extending perpendicularly therefrom two interspaced gusset plates 92 for reinforcement. The sprocket wheel 43, which is the turning and supporting sprocket which immediately follows the disengagement of the barrel from the auxiliary conveyor chain 18, has mounted on its shaft 93 and extending axially therefrom a turning pipe 94. The pipe 94 is journaled concentrically to bearing 95 which rotatively mounts the shaft 93. As the barrel 17 approaches the sprocket 43 the plate 92 will engage the periphery of the turning pipe 94 and rotate the barrel until it assumes a vertical position.

The barrel 17 is assured of being vertically positioned as it passes the sprocket 43 and is carried vertically downward by the main conveyor chains 15 and 16 to the loading station 62. The barrel at this point however may to some extent still be rocking or oscillating while it is desired that it be in a stationary vertical position when it is adjacent the loading station. In order to assure that the barrel assumes this position a U-shaped bracket 96 is secured to the back 33 of the casing 10 mounting the sprocket 43, and to the turning pipe 94. This U-shaped bracket 96 is positioned such that after the plates 92 have engaged the turning pipe 94 and pivoted the barrel to assume a vertical position the edge 97 of the plate 91 is received in the channeled portion 98 or opening of the U-shaped bracket 96. This U-shaped bracket 96 is elongated and extends approximately to the loading station 62. Due to the engagement of the plate 91 with the U-shaped bracket 96 the barrel is maintained in an absolutely vertical position during its descent to the loading station. When the drive mechanism of the machine is deactivated to position a barrel above the loading station 62 the barrel is in a stationary vertical position and adapted to permit engagement of the brackets 68 on the walls 67 of the elevator 64 with the extremities of the bottom 30 of the tote pan 13.

The machine is provided with a control panel 99 mounted on the exterior of the casing 10 adjacent the loading station 62 and within convenient reach of the person operating the machine. It is desirable that this control panel be provided with means for individually controlling the drive mechanisms for the main conveyors 15 and 16 and for the auxiliary conveyor chains 18 and 19. When it is desired to operate the machine the operator first disengages the latch 29 thereby permitting the gate 27 to pivot to a vertical position. The tote pan 13 is then positioned on the rollers 69 above the elevator 64 and the drive means for the elevator is activated to lift the tote pan 13 into sealable engagement with the basket 14. The gate 27 is then swung to a closed position and the elevator is lowered to its original position ready to receive another tote pan. It is desirable that the elevator be provided with a limit switch (not shown) which is contacted only when the elevator is in its lowermost position. This limit switch will prevent activation of any of the other controls unless the elevator is in its fully depressed position.

When the tote pan is in position on the basket and the elevator fully lowered a main control button can be pushed which activates the various drive mechanisms. The main conveyor chains 15 and 16 will then carry the barrel and associated tote pan through the casing 10 and at appropriate times the barrel will be rotated by the auxiliary conveyors 18 and 19. When the barrel is in position adjacent the loading station 62 it contacts a limit switch 100 which deenergizes the various drive mechanisms. The limit switch assures the correct positioning of a barrel opposite the loading station 62, this positioning being such as to align the tote pan 13 for proper engagement with the brackets 68 on the walls 67 of the elevator 64. When the cleaned tote pan with its associated parts has been removed and a dirty tote pan placed in position the start button is pushed which again activates the various drive mechanisms. When the next barrel contacts the limit switch 100 the drive mechanism is again deenergized with the barrel again being properly aligned in position.

What has been described is an automatic cleaning machine which permits simultaneous cleaning and drying not only of tote pans but also of the industrial parts stored therein. In the operation of the machine it has been found that for maximum results the speed of the main conveyor chains 15 and 16 should be adjusted such that they travel at approximately 8 feet per minute. With this speed for the main conveyor chains it has also been found that optimum results can be achieved if the auxiliary conveyor chains 18 and 19 are adjusted to rotate the barrels at 5 revolutions per minute. With these various adjustments it has been found that the machine of the present invention is capable of cleaning one tote pan with its associated parts every 30 seconds depending on the skill of the operator. The machine of the present invention is also economical to operate and requires only one operator since the tote pans are loaded and unloaded at the same point. The machine can also be made completely automatic in operation if desired.

I claim:

1. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a pair of conveyor means displaced in parallel relation, a plurality of work stations displaced at spaced positions along said conveyor means, a series of container assemblies pivotally mounted between said conveyor means at spaced positions thereon and conveyed thereby succes-

sively through said work stations, each assembly including a foraminated basket portion and a frame portion adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, said barrels being carried by said conveyor means through said work stations to effect the desired cleaning operations.

2. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a pair of endless main chains displaced in parallel relation, means simultaneously to drive said chains whereby said chains are caused to travel in a cyclical path, a plurality of work stations displaced at spaced positions along said chain path, a series of container assemblies pivotally mounted between said chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, said barrels being conveyed by said chains through said work stations to effect the desired cleaning operations.

3. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a pair of endless main chains displaced in parallel relation, means simultaneously to drive said chains whereby said chains are caused to travel in a cyclical path, a plurality of work stations displaced at spaced positions along said chain path, a series of container assemblies pivotally mounted between said chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion adapted to receive to tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, said barrels being conveyed by said chains through said work stations to effect the desired cleaning operations, and means to effect rotation of said barrels as they are conveyed through said stations.

4. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a pair of endless main chains displaced in parallel relation, means simultaneously to drive said chains whereby said chains are caused to travel in a cyclical path, a plurality of work stations displaced at spaced positions along said chain path, a series of container assemblies pivotally mounted between said chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, an auxiliary endless chain arranged for movement in a cyclical path which intercepts said work stations, means to drive said auxiliary chain with a speed which is at variance with the speed of movement of said main chains through said stations, and means effecting engagement between said barrels and said auxiliary chain when said barrels pass through said stations to cause rotation of said barrels at a rate determined by said variance in chain speeds, said barrels being conveyed by said main chains through said work stations to effect the desired cleaning operations and being rotated by engagement with said auxiliary chain while passing through said stations to agitate the parts therein.

5. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a casing divided into lower and upper compartments, a plurality of work stations displaced at spaced positions within said compartments, a pair of endless chains displaced in parallel relation within said casing, means simultaneously to drive said main chains whereby said main chains are caused to travel in a cyclical path which intercepts said work stations, a series of container assemblies pivotally mounted between said chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion adapted to receive a tote span to combine with said basket portion so as to define a barrel entrapping the parts within said pan, said barrels being conveyed by said chains through said work stations to effect the desired cleaning operations.

6. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a casing divided into lower and upper compartments, a plurality of work stations displaced at spaced positions within said compartments, a pair of endless main chains displaced in parallel relation within said casing, means simultaneously to drive said main chains whereby said main chains are caused to travel in a cyclical path which intercepts said work stations, a series of container assemblies pivotally mounted between said main chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, an auxiliary endless chain in each of said compartments and arranged for movement in its associated compartment in a cyclical path which intercepts the work stations therein, means to drive said auxiliary chains at a speed which is at variance with the speed of movement of said main chains through said stations, and means effecting engagement between said barrels and said auxiliary chain when said barrels pass through said stations to cause rotation of said barrels at a rate determined by said variance in chain speeds, said barrels being conveyed by said main chains through said work stations to effect the desired cleaning operations and being rotated by engagement with said auxiliary chains while passing through said stations to agitate the parts therein.

7. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a pair of endless chains displaced in parallel relation, means simultaneously to drive said chains whereby said chains are caused to travel in a cyclical path, a plurality of work stations displaced at spaced positions along said chain path, a series of container assemblies pivotally mounted between said chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion extending therefrom and adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, the end of said frame portion removed from said basket portion having a gate pivotably attached thereto and adapted when closed to bear against the bottom of said tote pan within said frame portion to thereby maintain said tote pan in engagement with said basket portion, said barrels being conveyed by said chains through said work stations to effect the desired cleaning operations.

8. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a pair of endless chains displaced in parallel relation, means simultaneously to drive said chains whereby said chains are caused to travel in a cyclical path, a plurality of work stations displaced at spaced positions along said chain path, a series of container assemblies pivotally mounted between said chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket

portion and a frame portion extending therefrom and adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, the end of said frame portion removed from said basket portion having a gate pivotably attached thereto and adapted when closed to bear against the bottom of said tote pan within said frame portion to thereby maintain said tote pan in engagement with said basket portion, said barrels being conveyed by said chains through said work stations to effect the desired cleaning operations, and means to effect rotation of said barrels as they are conveyed through said work stations.

9. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a casing divided into lower and upper compartments, a plurality of work stations displaced at spaced positions within said compartments, a pair of endless main chains displaced in parallel relation within said casing, means simultaneously to drive said main chains whereby said main chains are caused to travel in a cyclical path which intercepts said work stations, a series of container assemblies pivotally mounted between said chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion extending therefrom and adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, the end of said frame portion removed from said basket portion having a gate pivotably attached thereto and adapted when closed to bear against the bottom of said tote pan within said frame portion to thereby maintain said tote pan in engagement with said basket portion, an auxiliary endless chain in each of said compartments and arranged for movement in its associated compartment in a cyclical path which intercepts the work stations therein, means to drive said auxiliary chains at a speed which is at variance with the speed of movement of said main chains through said stations, and means effecting engagement between said barrels and said auxiliary chains when said barrels pass through said stations to cause rotation of said barrels at a rate determined by said variance in chain speeds, said barrels being conveyed by said main chains through said work stations to effect the desired cleaning operations and being rotated by engagement with said auxiliary chains while passing through said stations to agitate the parts therein.

10. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a casing divided into lower and upper compartments, a plurality of work stations displaced at spaced positions within said compartments, a pair of endless main chains displaced in parallel relation within said casing, means simultaneously to drive said main chains whereby said main chains are caused to travel in a cyclical path which intercepts said work stations, a series of container assemblies pivotally mounted between said chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, an auxiliary endless chain in each of said compartments and arranged for movement in its associated compartment in a cyclical path which intercepts the work stations therein, means to drive said auxiliary chains at a speed which is at variance with the speed of movement of said main chains through said stations, and means effecting engagement between said barrels and said auxiliary chains when said barrels pass through said stations to cause rotation of said barrels at a rate determined by said variance in chain speeds, said barrels being conveyed by said main chains through said work stations to effect the desired cleaning operations and being rotated by engagement with said auxiliary chains while passing through said stations to agitate the parts therein, guide means within said casing removed from said work stations, and means effecting engagement between said barrels and said guide means after said barrels have passed through said stations to restrain rotation of barrels and to position said barrels for removal of the tote pan combined therewith.

11. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a casing divided into lower and upper compartments, a plurality of work stations displaced at spaced positions within said compartments, a pair of endless main chains displaced in parallel relation within said casing, means simultaneously to drive said main chains whereby said main chains are caused to travel in a cyclical path which intercepts said work stations, a series of container assemblies pivotally mounted between said main chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion extending therefrom and adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, the end of said frame portion removed from said basket portion having a gate pivotally attached thereto and adapted when closed to bear against the bottom of said tote pan within said frame portion to thereby maintain said tote pan in engagement with said basket portion, an auxiliary endless chain in each of said compartments and arranged for movement in its associated compartment in a cyclical path which intercepts the work stations therein, means to drive said auxiliary chains at a speed which is at variance with the speed of movement of said main chains through said station, means effecting engagement between said barrels and said auxiliary chain when said barrels pass through said stations to cause rotation of said barrels at a rate determined by said variance in chain speeds, said barrels being conveyed by said main chains through said work stations to effect the desired cleaning operations and being rotated by engagement with said auxiliary chains while passing through said stations to agitate the parts therein, guide means within said casing removed from said work stations, and means effecting engagement between said barrels and said guide means after said barrels have passed through said stations to restrain rotation of said barrels and to position said barrels for removal of the tote pan combined therewith.

12. An automatic cleaning machine for removing oil, grease or like impurities from open tote pans and from industrial parts carried therein, said machine comprising a casing divided into lower and upper compartments, a plurality of work stations displaced at spaced positions within said compartments, a pair of endless main chains displaced in parallel relation within said casing, means simultaneously to drive said main chains whereby said main chains are caused to travel in a cyclical path which intercepts such work stations, a series of container assemblies pivotally mounted between said main chains at spaced positions thereon and conveyed thereby successively through said work stations, each assembly including a foraminated basket portion and a frame portion extending therefrom and adapted to receive a tote pan to combine with said basket portion so as to define a barrel entrapping the parts within said pan, the end of said frame portion removed from said basket portion having a gate pivotably attached thereto and adapted when closed to bear against the bottom of said tote pan within said frame portion to thereby maintain said tote pan in engagement with said basket portion, an auxiliary endless chain in each of said compartments and arranged for movement in its associated compartment in a cyclical path which intercepts the work stations therein, means to drive said auxiliary chains at a speed which is at vari-

ance with the speed of movement of said main chains through said stations, a sprocket on each of said barrels adapted to engage said auxiliary chains when said barrels pass through said stations to cause rotation of said barrels at a rate determined by said variance in chain speeds, said barrels being conveyed by said main chains through said work stations to effect the desired cleaning operations and being rotated by engagement with said auxiliary chains while passing through said stations to agitate the parts therein, guide means within said casing removed from said work stations, and means effecting engagement between said barrels and guide means after said barrels have passed through said stations to restrain rotation of barrels and to position said barrels for removal of the tote pan combined therewith.

13. An apparatus for oscillating and cleaning parts,

including a tote pan adapted to collect the parts to be cleaned and thereby itself requiring cleaning, a tumbling drum having a foraminated basket portion and an opening contoured to fit with the rim of said pan, means for detachably securing said pan to said drum with said pan's rim fitted to said opening, and means for rotating said drum so that the parts in said pan are tumbled free from said pan to facilitate cleaning of both said parts and said pan.

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