

April 28, 1964

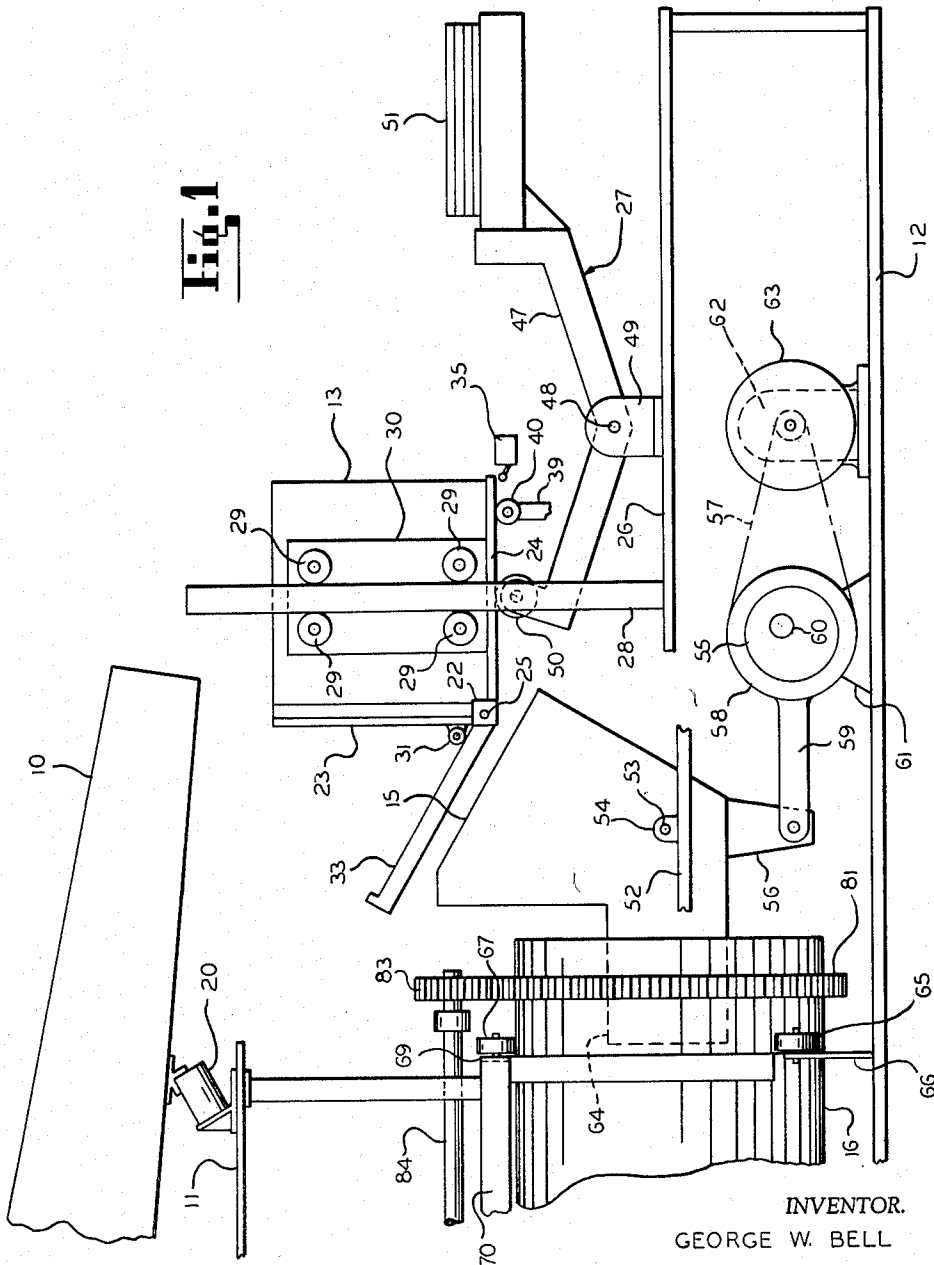
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3,131,090

TUMBLING DRUM FOR COATING NAILS HAVING A WEIGHING FEEDER

Filed June 11, 1958

5 Sheets-Sheet 1



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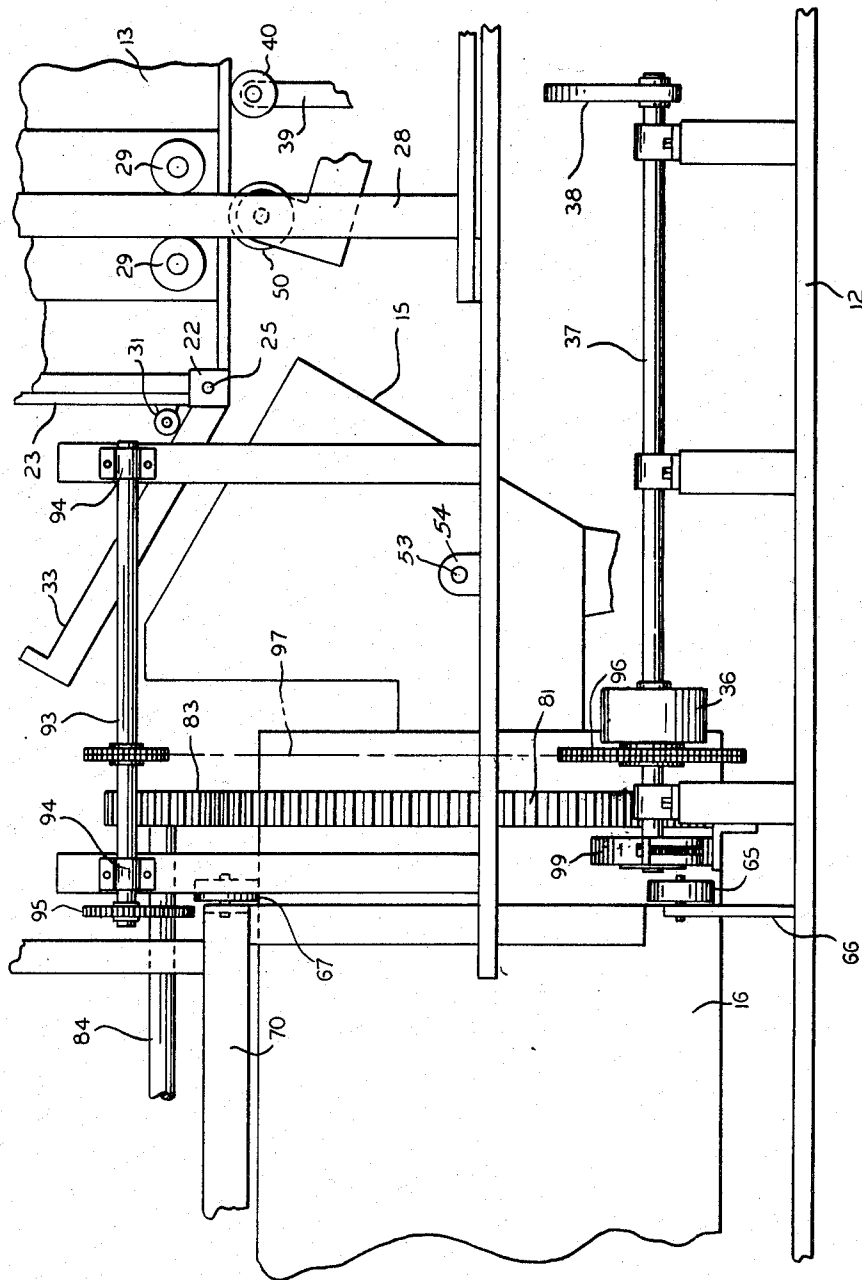
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5 Sheets-Sheet 2



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TUMBLING DRUM FOR COATING NAILS HAVING A WEIGHING FEEDER

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5 Sheets-Sheet 3

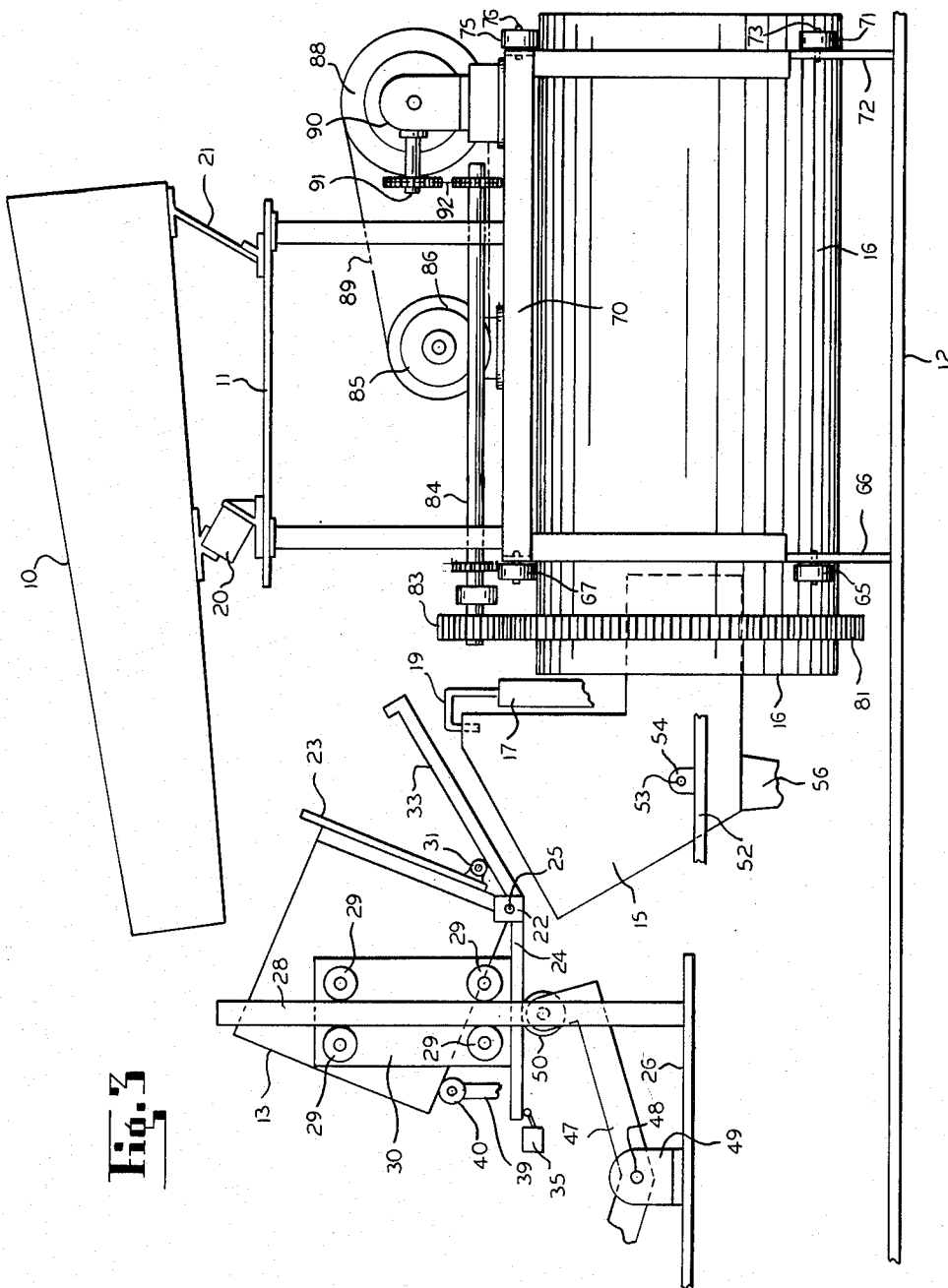


Fig. 3

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5 Sheets-Sheet 4

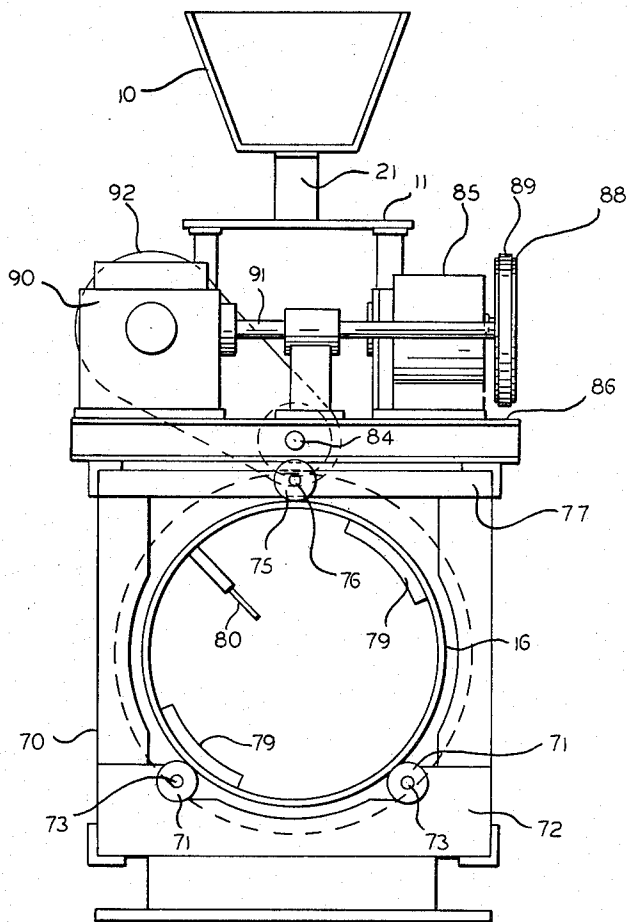


Fig. 4

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5 Sheets-Sheet 5

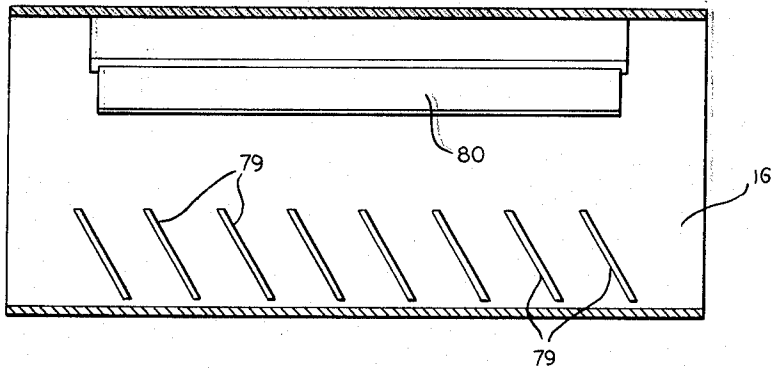


Fig. 5

Fig. 7

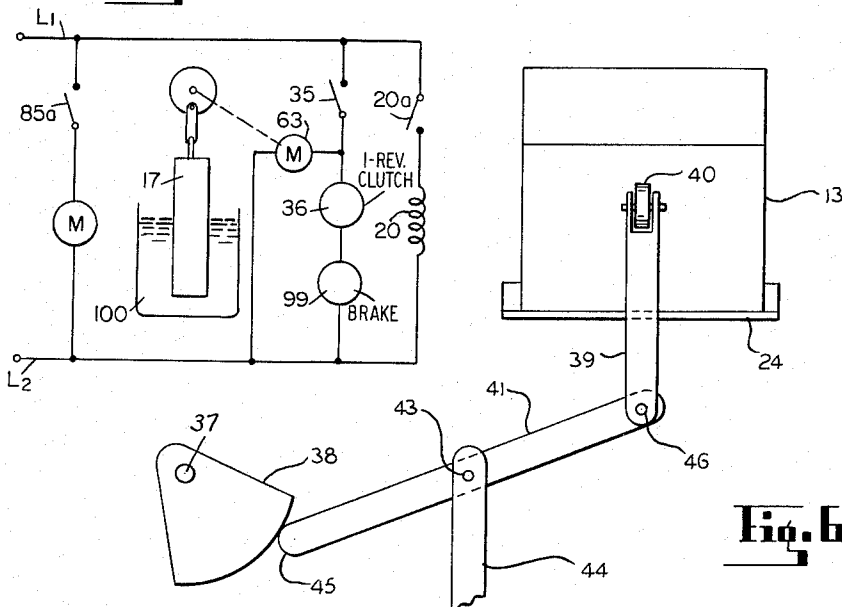


Fig. 6

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TUMBLING DRUM FOR COATING NAILS HAVING A WEIGHING FEEDER

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4 Claims. (Cl. 113-9)

This invention relates to improvements in apparatus for coating nails and the like.

A principal object of the invention is to provide a simple and improved apparatus for coating nails and the like arranged with a view toward thoroughness in coating and simplicity and efficiency in operation.

Another object of the invention is to provide an automatic nail coating apparatus, automatically weighing the nails for coating, shaking a given weight of nails and applying a coating compound thereto and then tumbling the nails to complete the coating by commingling the coated nails with each other.

A still further object of the invention is to provide a nail coating apparatus so arranged as to feed the nails directly from a cleaning device or the like for weighing and to automatically weigh and discharge the nails for shaking, in which the coating compound is applied during shaking of the nails, and the nails are then tumbled and dropped on each other to complete the coating operation by commingling the coated nails with each other.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawing wherein:

FIGURE 1 is a partial diagrammatic view in side elevation of a nail coating apparatus constructed in accordance with the invention;

FIGURE 2 is a fragmentary view in side elevation of the apparatus shown in FIGURE 1, but showing certain of the drive mechanisms for the apparatus;

FIGURE 3 is a fragmentary side elevational view of the apparatus, looking at the apparatus from the opposite side thereof from FIGURE 1 and showing the weigh box moving to an open position;

FIGURE 4 is an end view of the apparatus, looking at the apparatus toward the discharge end thereof;

FIGURE 5 is a cross-sectional view taken through the tumbling drum;

FIGURE 6 is a fragmentary view showing the weigh box in a tilted position for discharging nails therefrom and illustrating the mechanism for tilting the weigh box; and

FIGURE 7 is a diagrammatic view diagrammatically illustrating the control circuit for the apparatus.

In the embodiment of the invention illustrated in the drawings, I have shown a feeder trough 10, which may be a vibrating feeder trough and may receive nails directly from a nail cleaning apparatus or the like and convey the nails for weighing and coating. As herein shown, the vibrating trough 10 is mounted on the platform 11 of a main frame 12 of the machine and has a discharge end in cascade relation with respect to a tilt weigh box 13, operating on principles similar to those shown and described in my application Serial No. 685,860, filed September 24, 1957, now U.S. Patent No. 3,027,954.

The tilt weigh box 13 in turn discharges a given weight of nails into an oscillatable hopper 15 for shaking the nails as a coating compound is supplied thereto and discharging the shaken partially coated nails to a tumbling drum 16, tumbling the nails and progressing the nails toward the discharge end thereof and completing the coating operation by commingling the nails with each other as they are lifted and dropped in the tumbling drum.

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A pump 17 connected with a source of supply of coating compound has a spout 19 leading therefrom in discharge relation with respect to the hopper 15 for discharging a measured quantity of coating compound into the hopper 15 as the measured quantity of nails is discharged into said hopper. The pump 17 may be of any well known form operating in timed relation with respect to the discharge of nails into the hopper 15.

The vibrating chute 10 may be of a well known form and is shown in FIGURES 1 and 3 as being mounted on the platform 11 on a vibrating means 20, which may be an electromagnetic vibrator of a well known form, so not herein shown or described further. The vibrating trough 10 is mounted at its rear end on an inclined flexible leg 21, mounted on the platform 11 and forming a support for said trough.

The weigh box 13 is shown as being a rectangular box, closed at its bottom and having an open top in material receiving relation with respect to the discharge end of the vibrating trough 10, and having a vertically movable front door 23 slidably guided between the side walls of the weigh box and opening to accommodate the nails to be discharged from the weigh box as the weigh box is tilted as a given weight of nails is discharged thereinto.

The weigh box 13 is pivotally mounted on a carriage 24 on pivot pins 25 extending inwardly from lugs 22 at the forward end of said carriage and mounted in the side walls of the weigh box.

The door 23 is provided with rollers 31 at opposite sides of the lower end thereof, engageable with inclined runways on cam bars 33 extending forwardly from the carriage 24 from positions adjacent the pivot pins 25 and inclined upwardly with respect thereto, for raising the door 23 upon forward tilting movement of the weigh box 13, as shown and described in my aforementioned application, Serial No. 635,860, filed September 24, 1957, now U.S. Patent No. 3,027,954.

The carriage 24 is guided for free vertical movement along parallel spaced vertically extending guide rails 28 extending upwardly from a platform 26, spaced above the bottom of the main frame 12 and suitably mounted thereon. The carriage 24 has an open bottom portion as in my aforementioned prior application, and has parallel upright side plates 30 extending upwardly therefrom along the inner sides of the guide bars 28. Laterally spaced anti-friction rollers 29 are mounted adjacent the upper and lower ends of the side plates 30 for rolling engagement with opposite sides of the guide rails 28, for guiding the carriage 24 for vertical movement along said guide rails. The carriage 24 is supported in an elevated position by a weighing device 27 of the counterbalanced type, as shown in my aforementioned prior application, and is lowered as the nails filling the box 27 overbalance a counterweight 51, to instigate the operation of mechanism for tilting said weigh box, as will hereinafter more clearly appear as the specification proceeds.

The weigh box 13 is tilted and the door 23 is opened, to discharge the weighed nails from said weigh box by operation of a vertically guided pusher arm 39, suitably guided in the main frame 12 for vertical movement with respect thereto and having a roller 40 at its upper end adapted to extend through the open bottom portion of the carriage 24 and engage the bottom of the weigh box 13 and tilt said weigh box, as the weigh box is filled with a given weight of nails. This will also effect opening of the door 23 by movement of the rollers 31 along the cam rails 33.

The pusher arm 39 is vertically moved to tilt the weigh box 13 under the control of a limit switch 35, closed by downward movement of the carriage 24, as the weigh box is filled with a given weight of nails. The means for rais-

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ing the pusher arm 39 includes a cam 38 on a shaft 37, suitably journaled in a main frame 12 and driven through a one revolution clutch 36. The one revolution clutch 36 may be an electrically energizable clutch of any well known form and drives the shaft 37 for one revolution upon energization of said clutch, as is well known to those skilled in the art, so only herein shown in a diagrammatic form. The cam 38 engages a follower end 45 of a lever arm 41, pivoted intermediate its ends on an upright support 44, on a pivot pin 43. The opposite end of the lever arm 41 from the cam 38 is pivotally connected with the lower end of the pusher arm 39, as by a pivot pin 46. The cam 38 will thus move the pusher arm 39 upwardly as its lobe engages the follower end 45 and will accommodate the pusher arm 39 to move downwardly by gravity as the follower end 45 moves along the low portion of the cam.

Referring now to FIGURE 1 and the means for automatically weighing the nails deposited in the weigh box 13, the weighing mechanism 27 is a counterweight or balanced beam type of weighing mechanism and comprises a rockable weigh beam 47 pivotally mounted intermediate its ends in a bearing support 49 extending upwardly from the platform 26. A shaft 48 mounted at its ends on the support 49 forms a mounting for said weigh beam on an anti-friction bearing (not shown), mounted on said shaft. A roller 50 is shown as being mounted on the forward end of the weigh beam 47 for engaging the underside of the carriage 24, adjacent the center thereof. The counterweight 51 is shown as being mounted on the opposite end of the weigh beam 47 from the roller 50 for balancing the carriage 24 and weigh box 13 in the elevated position shown in FIGURE 1, and accommodating lowering movement of the carriage 24 and weigh box 13 to effect operation of the limit switch 35 and tilting of said weigh box to the position shown in FIGURE 3, as a given weight of nails is deposited in said weigh box, as shown and described in my aforementioned application Serial No. 685,860, now U.S. Patent No. 3,027,954.

The hopper 15 is shown in FIGURE 1 as being rockingly mounted on side frame members 52 of the main frame 12 on pivot pins 53, extending laterally from opposite sides thereof and journaled in bearing blocks 54 mounted on said side frame members. The hopper 15 is rocked about the pivot pins 53 to shake the nails deposited therein by operation of an eccentric 55 on a transverse shaft 60, journaled in bearing supports 61 and rotatably driven by a speed reducer 62, through a chain and sprocket drive 57. The speed reducer 62 is driven from a main motor 63 and is of a type in which the motor and speed reducer are a unit, as is well known to the art. The motor 63 may be energized upon closing of the limit switch 35. The shaking connection from the eccentric 55 to the hopper 15 includes an eccentric strap 58 journaled on the eccentric 55 and having a link or arm 59 extending therefrom, pivotally connected at its forward end to a tongue 56 depending from the hopper 15.

The hopper 15 also has a discharge spout 64 extending within said tumbling drum 16, for discharging the tumbled nails therein.

The tumbling drum 16 is shown as being cradled in the main frame 12 at its forward end on rollers 65, rotatably mounted on bearing supports 66 projecting upwardly from the base for said main frame. A roller 67 mounted in an end frame member 69 for a cradle 70 for the tumbling drum 16, rotatably engages said tumbling drum to retain said tumbling drum from vertical movement with respect to the rollers 65, to rotate in a true circle. The rear end portion of the tumbling drum 16 is mounted on rollers 71 supported in a transverse end frame member 72 of the cradle 70 on shafts 73 (FIGURE 4). A roller 75 mounted on a shaft 76, supported in an upwardly spaced transverse frame member 77 of the cradle 70 is provided to engage the periphery of the tumbling drum 16 and retain said tumbling drum to the rollers 71.

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The tumbling drum 16 is shown in FIGURES 4 and 5 as having spiral vanes 79 spaced along the inner periphery thereof in diametrically opposed relation with respect to each other, for progressing the nails from the receiving to the discharge end of said tumbling drum while being tumbled therein. A divider 80 disposed between the vanes 79 and extending radially inwardly from the inner periphery of the tumbling drum is provided to lift the nails during rotation of the drum, and accommodate the nails to drop to the bottom of the drum, to assume efficient commingling of the nails during rotation of the drum.

The tumbling drum 16 is rotatably driven by a ring gear 81, mounted on the outer periphery of said tumbling drum, adjacent the receiving end thereof. The ring gear 81 is meshed with and driven from a pinion 83 on the forward end of a longitudinal shaft 84 journaled on the top of the cradle 70 and extending therealong.

The shaft 84 is driven from a motor 85, shown in FIGURE 4 as being mounted on a platform 86 extending along the top of the carriage or cradle 70. The motor 85 is shown in FIGURE 7 as being connected across main line conductors L₁, L₂ and as being energized under the control of a switch 85a and may operate continuously as long as the apparatus is in operation, and has a pulley 86 thereon, driving a spaced pulley 88 through a belt drive 89. The pulley 86 may be a variable speed pulley of the Reeves type to vary the speed of rotation of the drum 16 in accordance with the sizes of nails to be coated. The pulley 88 drives a speed reducer 90 through a transverse shaft 91. The speed reducer 90 in turn drives the shaft 84 through a chain and sprocket drive 92.

The shaft 84 also serves as a drive shaft for driving the one revolution clutch 36 and cam 38. As herein shown, a parallel shaft 93 is mounted on the frame 12 in journal boxes 94, and is driven from the shaft 84 through a chain and sprocket drive 95.

The one revolution clutch 36 and shaft 37 are driven from a sprocket 96 coaxial with and freely rotatable about the shaft 37. The sprocket 96 is in turn driven from the shaft 93 through a drive chain 97. The sprocket 96 is suitably journaled on the shaft 37 and is connected with the driving member of the one revolution clutch 36 for continuously driving said driving member as long as the sprocket is rotated. A brake 99 is provided to hold the shaft 37 from rotation as the one revolution clutch 36 completes its one revolution. The brake 99 may be a magnetic or solenoid controlled brake, operated under the control of the limit switch 35. The brake 99 may be connected in series with the one revolution clutch 36 and is applied as the one revolution clutch 36 completes its one revolution and is released as the one revolution clutch 36 is engaged as the carriage 24 drops, upon the depositing of a given weight of nails therein, to close the limit switch 35, as shown and described in my aforementioned application Serial No. 685,860, now U.S. Patent No. 3,027,954, so not described further herein.

The pump 17, supplying coating compound through the spout 19 may be a piston type pump inserted in a barrel or container 100 for the coating compound and ejecting a measured quantity of the coating compound from the container 100 and is positioned on the opposite side of the apparatus from the drive shaft 63. The pump 17 is diagrammatically shown in FIGURE 7 and may be operated either by a unitary or separate motor under the control of the limit switch 35, to dispense a measured volume of coating compound into the hopper 15 as a measured weight of nails is dumped therein by the tilt weigh box 13. The coating compound may be of various types commonly used for coating nails to inhibit rusting thereof, so need not be described in detail.

In operation of the device, the nails are fed directly from a cleaner or the like (not shown) into the vibrating chute 10, which is operable under the control of a

switch 20a to progress the nails into the weigh box 13. As the weigh box 13 becomes filled with a given weight of nails which may be a weight of 50 pounds the weigh box and the carriage 24 will move downwardly against the weight of the counterweight 51 of the weighing device 27. The limit switch 35 will then be engaged by the carriage. This will close said limit switch and complete an energizing circuit to the one revolution clutch 36. During this time, the motor 85, will be energized to effect rotation of the tumbling drum 16. The motor 85 will also be energized to effect shaking of the hopper 15.

As the weigh box 13 is lowered by the weight of the nails deposited in said weigh box and the limit switch is tripped by lowering movement of said weigh box the one revolution clutch 36 will be energized and the brake 99 will be released. This will effect, rotatable movement of the cam 38 for one revolution to operate the pusher bar 39 to tilt the weigh box 13 toward the hopper 15. Tilting movement of the weigh box 13 will cause the rollers 31 to ride upwardly along the cam bars 33 and lift the front door 23 to effect the direct discharge of the nails into the shaking weigh hopper 15.

As the nails are being discharged into the weigh hopper 15 the motor 63 will be energized under the control of the limit switch 35 to reciprocally drive the hopper 15. The motor 63 may also operate, the pump 17 deliver a measured quantity of coating compound into the hopper 15, for mixture with the nails in said hopper as they are discharged therefrom into the tumbling drum 16. Tumbling of the nails in the tumbling drum will effect commingling of the nails with the coating compound and with each other and progress the nails toward the discharge end of the drum by the action of the vanes 79 thereof. During the tumbling operation, the nails are lifted by the radial plate 80 and dropped down onto the bottom of the drum to further commingle the nails, and assure a uniform coating thereof during travel along said tumbling drum.

From the tumbling drum the nails may be weighed and boxed, as disclosed in my aforementioned application Serial No. 685,860, now U.S. Patent No. 3,027,954.

It will be apparent from the foregoing that various modifications and variations in the present invention may be effected without departing from the spirit and scope of the novel concepts thereof.

I claim as my invention:

1. In a nail coating apparatus, a main frame, a feeder trough mounted on said main frame, a weigh box mounted on said main frame in material receiving relation with respect to said feeder trough, a weigh beam balancing said weigh box and accommodating lowering movement thereof upon the feeding of a given weight of nails to said weigh box, means for tilting said weigh box to deliver a given weight of nails, a hopper pivotally mounted on said main frame in material receiving relation with respect to said weigh box for movement about an axis extending transversely of said main frame, a motor, means driven by said motor for oscillatably rocking said hopper, a tumbling drum rotatable about an axis extending longitudinally of said main frame and having a receiving end adjacent said hopper and an opposite discharge end, said hopper having a discharge spout extending within the receiving end of said tumbling drum and said tumbling drum having a lifting divider therein and extending therealong for lifting the nails deposited in said tumbling drum and accommodating the nails to drop onto said drum to effect a thorough commingling thereof, means for feeding a measured quantity of coating compound to said hopper as the nails are discharged therein, a second motor, means driven by said second motor for rotatably driving said tumbling drum and tilting said weigh box to discharge a measured quantity of nails into said hopper, and a switch operated by said weigh box upon lowering movement of said weigh box effected by the deposit of a given weight

of nails therein for effecting the operation of said second motor to drive said tumbling drum and tilt said weigh box.

2. In a nail coating apparatus, a main frame, a feeder trough mounted on said main frame, a weigh box mounted on said main frame in material receiving relation with respect to said feeder trough, a weigh beam supporting said weigh box in an elevated position with respect to said main frame and accommodating lowering movement thereof upon the deposit of a given weight of nails therein, means for tilting said weigh box to deliver a measured quantity of nails upon lowering movement thereof and the deposit of a given weight of nails therein, a hopper rockingly mounted on said main frame in material receiving relation with respect to said weigh box for movement about a horizontal axis extending transversely of said main frame, means operable upon lowering movement of said weigh box and tilting movement thereof for oscillatably rocking said hopper, a pump for delivering a coating compound to said hopper upon the delivery of a measured weight of nails thereto, a tumbling drum rotatably mounted on said main frame for movement about an axis extending longitudinally thereof and having a receiving end adjacent said hopper and an opposite discharge end, said hopper having a discharge spout extending within the receiving end of said tumbling drum, said tumbling drum having spiral vanes therein extending thereabout for a portion of the circumference thereof for progressing the nails toward the discharge end of said tumbling drum and having a lifting divider therein spaced circumferentially from said spiral vanes for lifting the nails deposited in said tumbling drum and accommodating the nails to drop to the bottom thereof during rotation of said drum to effect a thorough commingling of the nails with coating compound in said drum, carried therein from said hopper, a motor, means driven by said motor for rotatably driving said tumbling drum and tilting said weigh box to discharge a measured quantity of nails into said hopper, and switch means controlling operation of said motor and closed to energize said motor by lowering movement of said weigh box by the deposit of a given weight of nails therein.

3. In a nail coating apparatus, a rotatable tumbling drum, an oscillatably movable hopper having a discharge spout extending within said tumbling drum, a weigh box for weighing and supplying a predetermined quantity of nails to said hopper, a pump in material discharge relation with said hopper for supplying a uniform quantity of coating compound to said hopper, means for oscillatably driving said hopper to progress the nails and coating compound therein to said tumbling drum, and means for rotatably driving said tumbling drum to tumble and coat the nails therein and to progress the nails for packaging.

4. In a nail coating apparatus, a main frame, a weigh box mounted on said main frame, a tumbling drum mounted on said main frame for rotation about an axis extending longitudinally of said main frame and inclined downwardly from the receiving to the discharge end of said tumbling drum, a hopper mounted on said main frame for oscillatable movement with respect thereto and having a discharge spout extending within the receiving end of said tumbling drum for supplying nails to said tumbling drum, means for tilting said weigh box to deliver a measured quantity of nails to said hopper, a pump for supplying a measured quantity of coating compound to said hopper, means for oscillatably driving said hopper to discharge the nails and coating compound therein into said tumbling drum, and other means for rotatably driving said tumbling drum and tilting said weigh box to discharge a measured quantity of nails into said hopper controlled by the supply of a predetermined weight of nails to said weigh box.

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