

March 24, 1953

J. HOAR, JR

2,632,588

COUNTING AND PACKAGING APPARATUS

Filed Jan. 30, 1952

4 Sheets-Sheet 1

FIG. 6

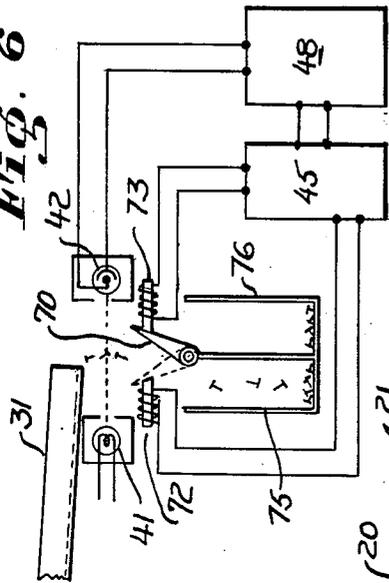
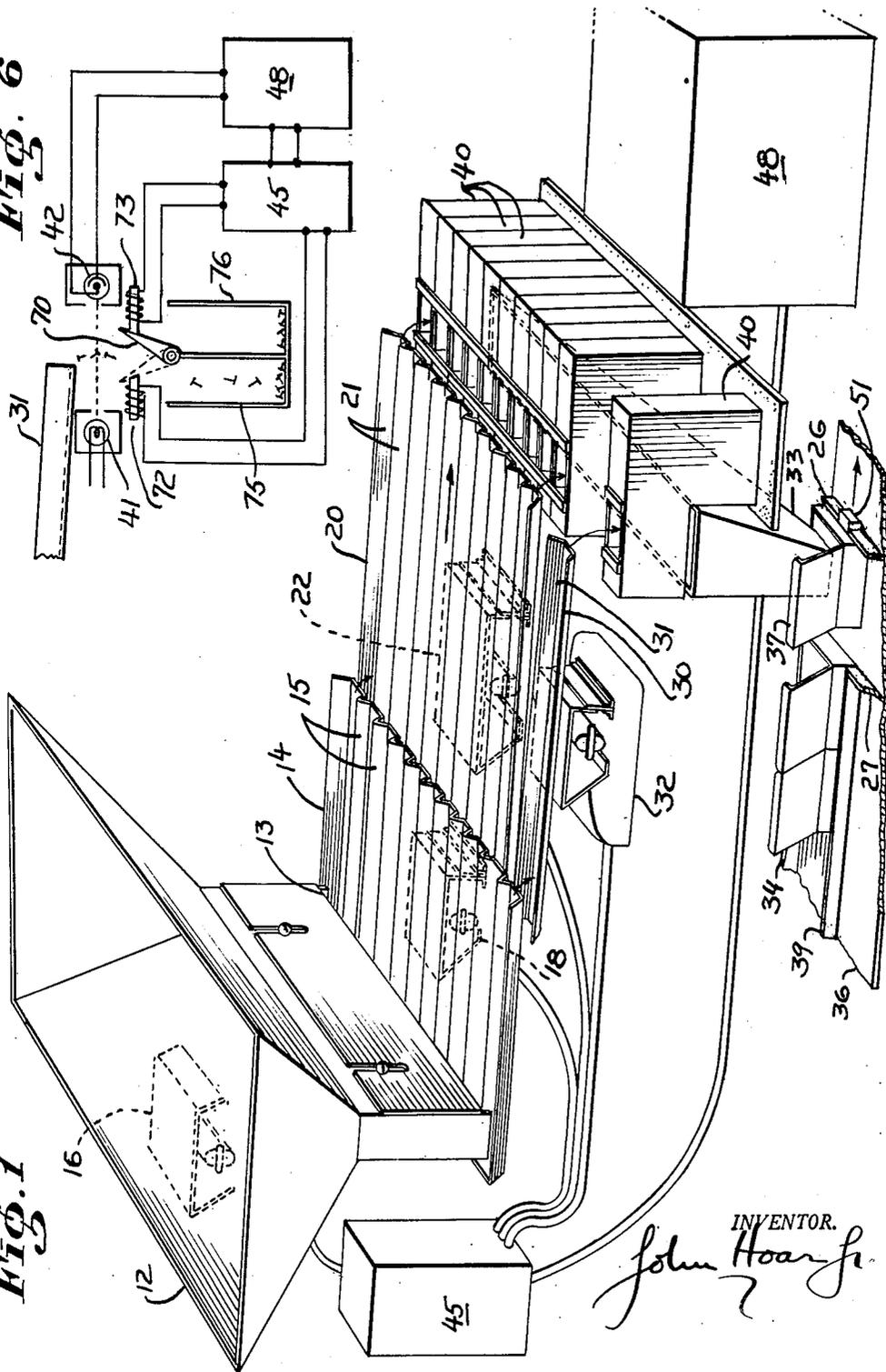


FIG. 1



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Fig 2

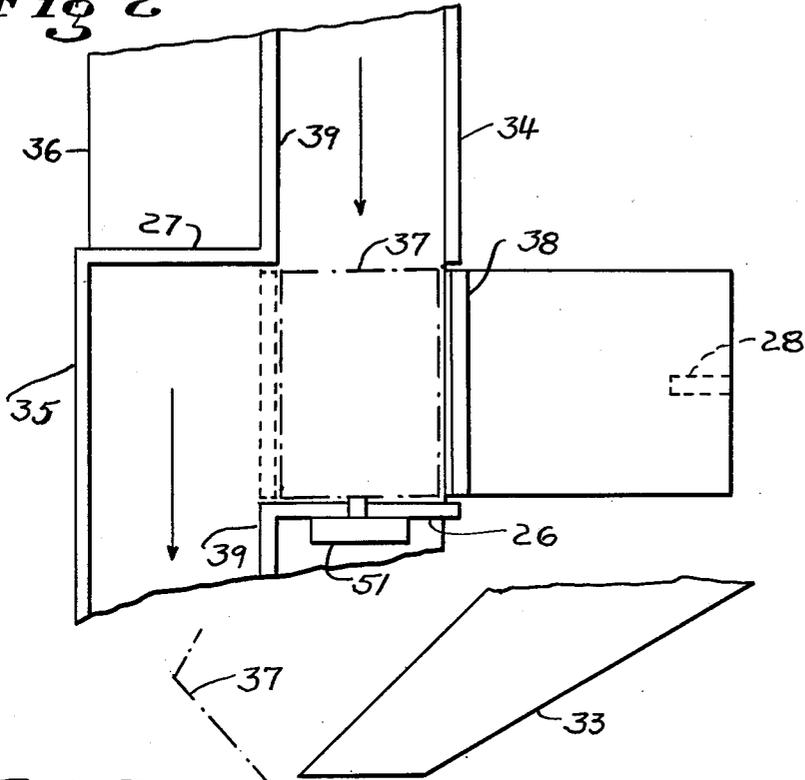
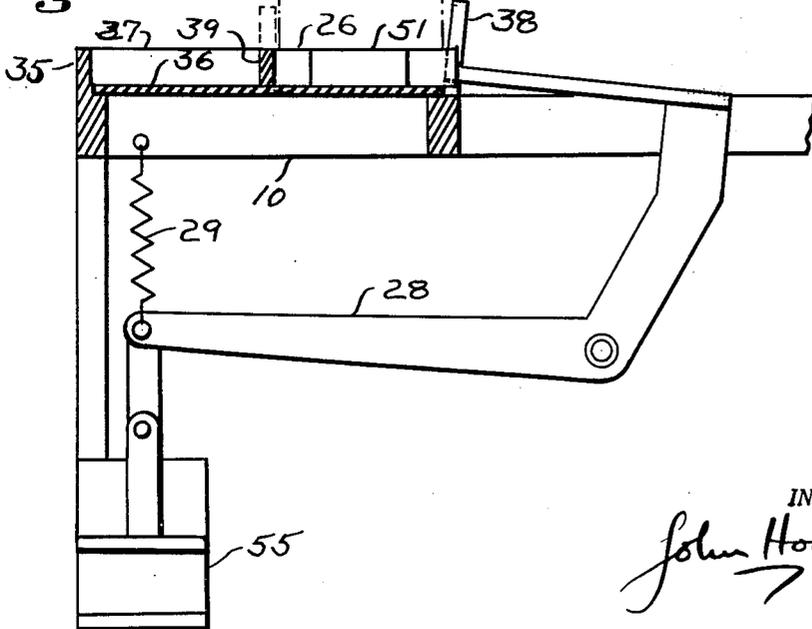


Fig 3



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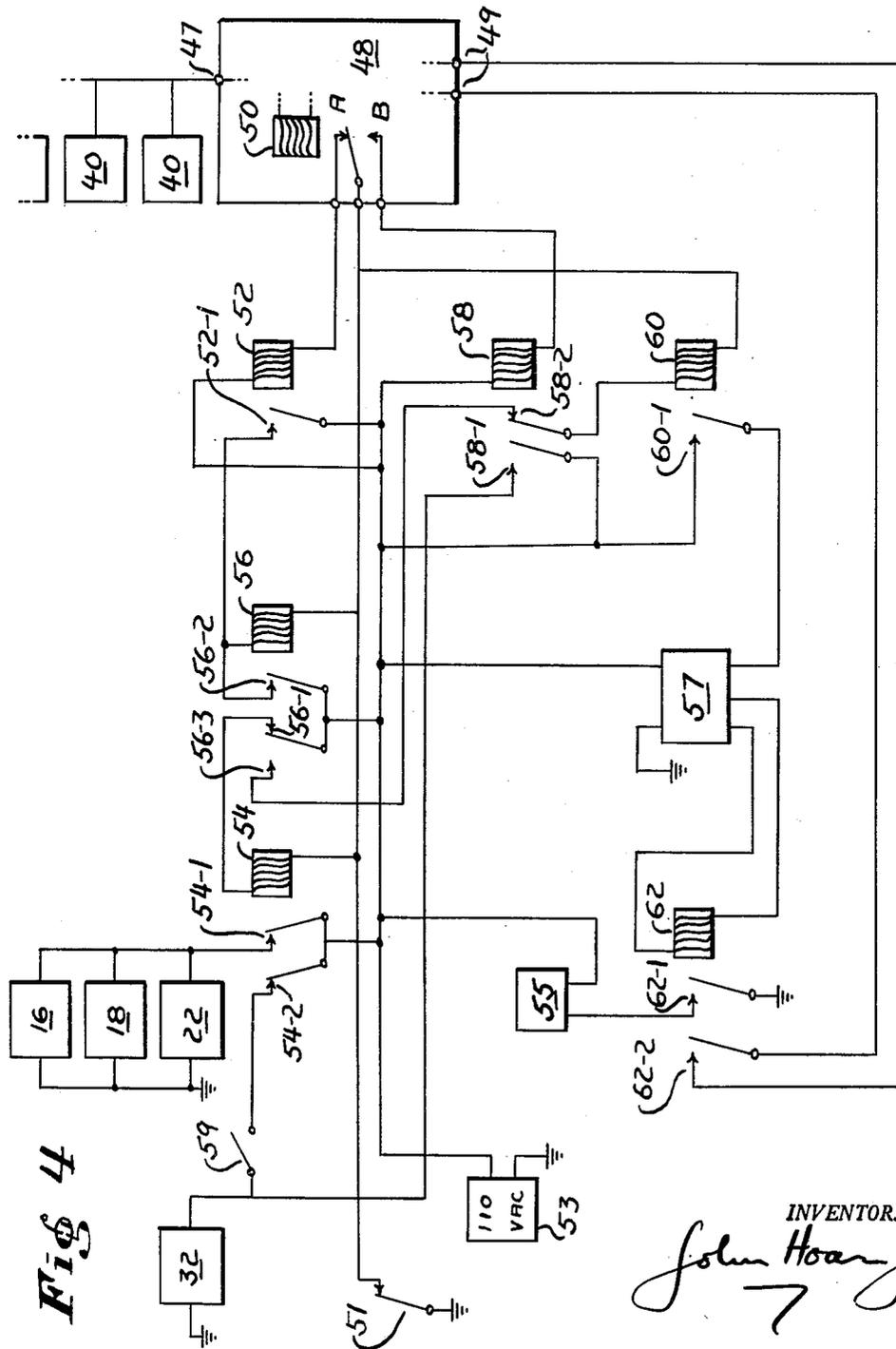
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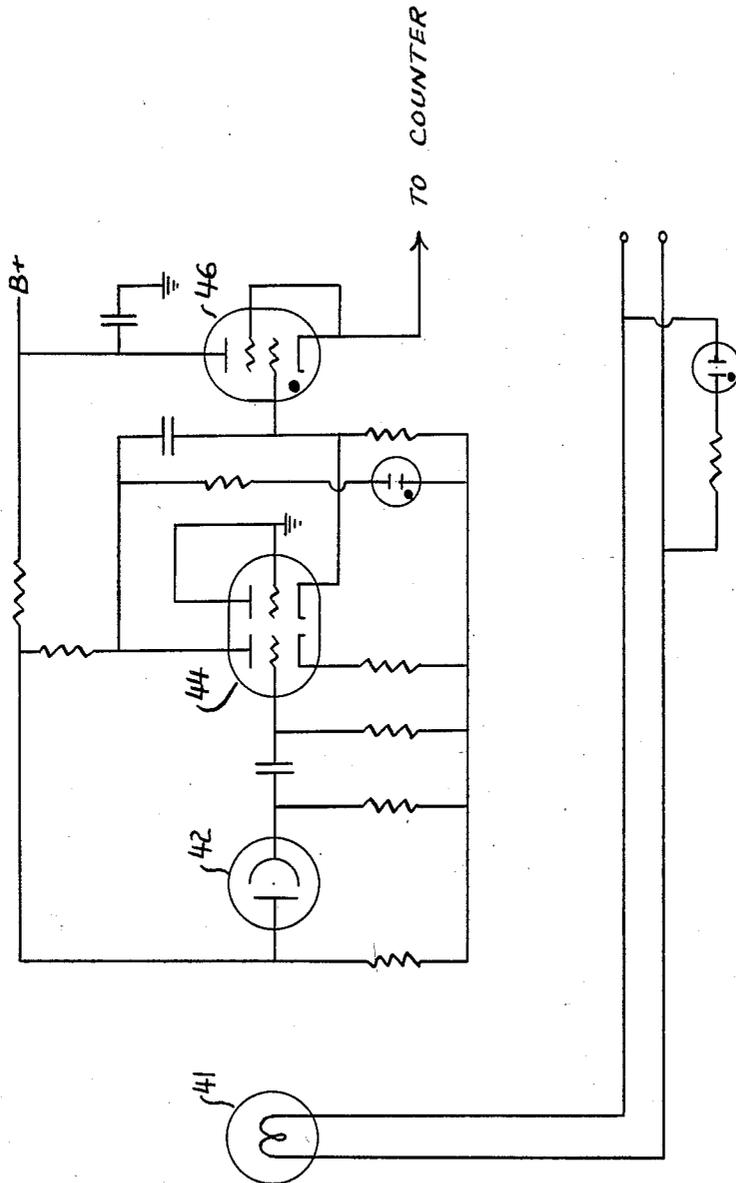


Fig 5

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UNITED STATES PATENT OFFICE

2,632,588

COUNTING AND PACKAGING APPARATUS

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Application January 30, 1952, Serial No. 268,980

10 Claims. (Cl. 226—2)

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This invention relates to a counting and packaging apparatus and more particularly to an apparatus for the high speed automatic counting of small objects, such as screws, tacks, nails, and the like, into predetermined grouped quantities for packaging.

It is common practice for many manufacturers of small inexpensive products to package such products in predetermined quantities such as a dozen, a hundred, and so forth to a package. Such products are counted either by hand, by weight, or, in the case of a few types of objects of regular configuration, such as pills, by known automatic machinery; usually employing photocells as devices for sensing the presence of an object to be counted. Many types of such objects, however, in particular screws, tacks, nails and like objects of irregular configuration, cannot be packaged at high speed on known packaging machinery and hence such objects must be packaged either by hand or by weight. Packaging by weight is quite inaccurate and thus overweighting is resorted to in order to pack at least the required number of objects in a package. Normally, this results in substantial overage. Hand packaging is unduly expensive as well as inaccurate, and for various reasons generally results in an overage.

Accordingly, it is an object of the present invention to produce an object counting machine preferably using photocells or other electrical sensing devices which will enable small, irregular objects, such as screws, tacks, nails and the like, as well as regular objects, to be counted at high speed into predetermined grouped quantities for packaging.

It is a further object of the invention to produce a packaging apparatus by means of which such predetermined grouped quantities may be automatically packaged in suitable containers.

It is a feature of the invention that it is adapted to count and package an extraordinary large variety of irregular as well as regular objects into accurately predetermined quantities, thus to a large extent eliminating overages and resulting in substantial savings to the manufacturer or packer.

For the purpose of explaining a preferred embodiment of my invention, reference is made to the following drawings in which:

Fig. 1 is a diagrammatic view of the counting and packaging apparatus of my invention;

Fig. 2 is an enlarged plan view of certain portions of the apparatus of Fig. 1;

Fig. 3 is an enlarged elevational view of the portions of the apparatus of Fig. 2;

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Fig. 4 is a circuit diagram of a suitable control circuit for use in the apparatus of my invention;

Fig. 5 is a circuit diagram of a suitable photocell sensing circuit for use in the apparatus of my invention; and

Fig. 6 is a diagrammatic view of a modified embodiment of a portion of the apparatus of my invention.

Referring to the drawings, the apparatus of my invention for counting into predetermined grouped quantities and packaging small, irregular objects such as screws, tacks, nails and like objects, as well as regular objects, includes mounted on frame 10 of the apparatus a hopper 12 for receiving a large quantity of the objects to be counted, such objects being referred to herein as screws. The hopper 12 may be of any suitable shape and size depending upon the type of objects and the quantities into which they are to be counted, and has a relatively long and narrow bottom opening 13. Immediately beneath the transversely extended bottom opening 13 of said hopper is a hopper tray 14 having a downwardly sloping surface with a number of troughs 15 therein, each of such troughs being positioned to receive screws from the bottom opening 13 of the hopper 12, such opening hence distributing said screws into all of said troughs. The hopper 12 and tray 14 are each equipped with suitable vibrators, hopper vibrator 16 and tray vibrator 18, for feeding the screws from the hopper 12 onto the hopper troughs 15 and advancing them downwardly along the sloping surface of the hopper tray 14, the troughs in such tray tending to form the screws into single lines within each of the troughs 15. Below the lower end of the tray 14 are positioned two separate adjacent feeding trays to receive screws from the troughs 15 of hopper tray 14, a bulk feeding tray 20 having a plurality of troughs 21, say ten in number, therein and a dribble feeding tray 30 having a much smaller number of troughs, preferably but a single trough 31. Each of the trays slopes downwardly from the hopper tray 14 and have vibrators for advancing screws along the troughs 21 and 31 in single lines, a bulk feed vibrator 22 for advancing screws along the relatively large number of bulk feeding troughs 21 and a dribble feed vibrator 32 for advancing screws along dribble feeding trough 31. The adjacent feeding trays 20 and 30 preferably together have the same number of troughs as does hopper tray 14, thus maintaining the lines of screws established by troughs 15 of hopper tray 14 and serving to advance them along troughs 21 and 31 in single file. As the screws pass from

the end of each of said eleven troughs, they fall downwardly past suitable sensing devices 49 arranged below each of said troughs, said sensing devices being connected to a predetermined counter device 48, thus providing means for counting the screws, as hereinafter more fully explained.

According to my invention, the large number of paths or channels available for bulk feeding provide a suitably rapid advance of irregular objects, such as, for example, screws, which cannot be rapidly advanced in a single line, and such rate of advance is limited only by the number of troughs used. Yet, by stopping the movement of the screws along all but a few of the paths or channels, that is, few relative to the total number of channels, during the final stages of the count, the passage of such screws from the end of such few channels, or preferably a single channel—dribble trough 31—past the sensing devices 49 may be determined with great accuracy. The predetermined counter device 48 is organized and arranged to generate suitable signals for operating control means to stop the advance of screws, first along the bulk channels and then along the dribble channels to complete a cycle, all as hereinafter more fully explained, thus providing, for the first time, a counting and packaging apparatus capable of handling both irregular and regular objects with the requisite speed as well as accuracy.

In order to assemble the screws into groups after they have been counted into predetermined quantities by means of the sensing devices and counting means, I provide a steeply downwardly sloping collecting trough 33 extending transversely beneath and spaced from the ends of troughs 21 and 31 for collecting screws advanced from said troughs and delivering them to a receiving package or box 37 in filling position on a continuously driven conveyor belt 36, such collecting trough preferably having its lower end beneath the end of dribble feeding trough 31 to reduce the time necessary for a screw to pass from dribble trough 31 to box 37. As best shown in Figs. 2 and 3, the continuously operated belt 36 is preferably somewhat wider than twice the width of a box 37, and has edge guides, inner edge guide 34 and outer edge guide 35, and central guide 39, the latter being interrupted at the filling position. A transverse stop member 26 is provided at the output side of said filling position between said central guide 39 and inner edge guide 34 to stop and position a box 37 in filling position. A transverse guide 27 may be provided at the input side of said filling position between central guide 39 and outer edge guide 35 to aid in guiding a box 37. A box switch 51 is mounted on said transverse stop 26 adjacent a box 37 in filling position adapted to be closed only when a box 37 is maintained in filling position. A solenoid actuated discharge kicker is provided adjacent the conveyor belt to move a box 37 from filling position on the first half side portion—the loading portion—of belt 36 to the second half side portion—the discharge portion—of said belt, such kicker preferably having an arm 38 connected to solenoid 55 by a bell crank 28 mounted on the frame of the apparatus below belt 36, said arm being arranged to lie alongside a box 37 in filling position, as shown in Figs. 2 and 3. Thus, when the kicker is actuated by its solenoid 55, arm 38 moves box 37 transversely of belt 36 along transverse stop 26 to the second side portion of belt 36 to allow the belt 36 to move said box for-

ward past said stop 26. Upon the kicker arm's return, a spring 29 connected between bell crank 28 and the frame of the apparatus is provided to return the solenoid 55 to non-energized position, and a new box will be moved to filling position against said stop 26 by the belt 36, the energized position of said arm 38 being shown in dotted position in Figs. 2 and 3. Said belt 36, arm 38 and stop 26 hence constitute a positioning means both for maintaining the box 37 in filling position and for removing it when filled to allow another box to be moved into filling position and be there maintained until filled.

In order to control the above described apparatus automatically to count a predetermined number of screws into a box 37, I have provided, as mentioned above, at the lower end of each one of the bulk feeding troughs 21 and dribble feeding troughs 31 in the space between said troughs and collecting trough 33, a sensing means 40 arranged to indicate the presence of a screw passing from the end of a trough and falling downwardly to the collecting trough 33. A photoelectric sensing means, for example, may be arranged in a known manner to produce a signal pulse for operating a multiple channel predetermined electronic counter 48 of the type shown and described by John T. Potter in his U. S. Patents Nos. 2,538,122 and 2,574,283. A suitable circuit for operating such a counter by means of a photocell sensing means, generally indicated as 40, is shown in Fig. 4, and in general includes a light source 41 and a photocell 42, the output signal from said photocell being generated by the passage of a screw between the light source 41 and photocell 42 to interrupt the light falling on said photocell. Said output signal is fed to a suitable amplifier including twin triode 44, and the resulting amplified signal fed to a thyatron 46 to provide a pulse for actuating counter 48. A number of other types of sensing devices as known to the art may be used to indicate the presence of a screw exposed to said means, for example, microswitches or other impact devices may be used, as well as magnetic devices.

The multiple channel predetermined electronic counter 48 is arranged simultaneously to count pulses from a number of sources, in this instance from the eleven photocell circuit thyratrons 44, and upon reaching one or more predetermined counts, generate a signal pulse. In my novel apparatus, the signal pulse from counter 48 initially controls a single pole double throw relay 50 having an "A" and a "B" position, the counter relay remaining on "A" position until a predetermined sub-total is reached, next switching to the "B" position until a predetermined total count is reached, and then switching back to the "A" position and resetting to begin a new count.

The predetermined counter 48 is operatively connected by its input terminal 47 to the ten bulk feed photocell sensing devices 40 to count the advance of each screw from the bulk feeding troughs 22 and to the single dribble feed photocell sensing device 40 to count the advance of each screw from the dribble feeding trough 31—so that it will count the total of the screws passing all of said sensing devices. In my preferred arrangement, the counter 48 is arranged to operate control means to stop the feed of screws along the troughs 21 and 31, such control means including a novel relay means generally designated as 45 as well as the vibrators 22, 16, 18 and 31, the relay means 45 operating the bulk feed vibrator 22, as well as hopper vibrator 16

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and hopper tray vibrator 18 until a predetermined number of screws less than the desired predetermined quantity have passed the bulk photocell sensing devices 40. The bulk tray vibrator 22 as well as hopper vibrator 16 and hopper tray vibrator 18 are then stopped by counter 48, acting through relay means 45 and the dribble tray vibrator 32 is operated until the exact predetermined total quantity of screws have been counted. There is generally an overage in the number of screws advanced by the high speed bulk counter troughs 21 due to the relatively large number thereof, however by stopping the bulk troughs 21 at a subtotal count and allowing the dribble trough 31 to feed screws past the dribble count photocell device 40, a highly accurate predetermined total may be obtained without sacrificing speed of counting except in the last stage of the counting cycle. It is, however, essential that the kicker arm 38 not be actuated immediately upon the counter 48 reaching total count, but rather after a suitable time interval has elapsed to allow the last screw to fall from the dribble feed trough 31 and slide along collecting trough 33 into package 37. Kicker arm 38 is then actuated to move the full package 37 sideways so that it may be moved by the continuously moving belt 36 past transverse stop 26 simultaneously opening box switch 51. The retraction of arm 38 allows a new box to move into filling position where it is held by the transverse stop 26 closing box switch 51 in readiness for a new cycle. It is preferable that the dribble trough 31 be directly above the lower end of collecting trough 33 as close to the receiving package as possible to reduce the time delay necessary to complete the filling of a package 37.

The time delay between cycles, due to the time required for a screw to pass from the sensing means to the receiving box 37, may be reduced by the interval of time necessary for a screw to slide along collecting trough 33 by the use of the modified arrangement diagrammatically shown in Fig. 6 wherein a deflecting vane 70 is operated by electromagnets 72 and 73 to deflect screws falling from the troughs 21 and 31 on alternate counting cycles into either collecting trough 75 or 76, each of said collecting troughs, for example, being led to a box on a conveyor belt as shown in Fig. 1. With such arrangement, a relatively short time delay, that necessary for a screw to pass from means 40 to vane 70 is still required, however, the greater part of the time delay has thus been eliminated to speed up the counting operation.

My novel control device, the circuit of which is best shown in Fig. 4, includes a relay circuit 45 which provides for operation of the bulk vibrator 22, as well as hopper vibrator 16 and hopper tray vibrator 18, on the "A" position of the predetermined counter relay 50 and for stopping said vibrators and operating the dribble vibrator 32 alone on the "B" position of said relay, followed by actuation of the kicker arm 38 shortly after the completion of the total count, it being essential to delay the actuation of the kicker for a sufficient interval of time to allow the last screw counted by the dribble counting photocell 40 to travel from said photocell to the box 37 before the box is removed by the kicker arm as heretofore pointed out. The predetermined counter relay 50 is of the single pole double throw type, the common terminal thereof being connected through box switch 51 to the grounded side of a 110 v. A. C. supply 53. The other two

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terminals herein designated "A" and "B" operate the bulk vibrators including vibrators 16, 18 and 22 and the dribble vibrator 32 respectively, the kicker solenoid 55 being actuated through time delay switch 57 at a predetermined interval after counter relay 50 has moved from position "B" to position "A," said relay serving to connect the vibrators and time delay switch 57, by means of various relays, to the source 53 of 110 v. A. C.

At the beginning of a counting cycle, the counter relay 50 is in position A, thus—assuming box switch 51 closed by a box 37—closing the circuit through the winding of single pole single throw normally closed relay 52, and through the winding of double pole double throw normally open relay 54, the circuit to said winding being completed through normally closed contact 56—1 of relay 56. Current thus flows from the 110 v. A. C. supply 53 through the closed contact 54—1 of relay 54 to operate the bulk vibrator 22 as well as hopper vibrator 16 and hopper tray vibrator 18. If desired, selector switch 59 may be closed so that dribble vibrator 32 will also be connected to the 110 v. A. C. supply 53 and operated with the bulk and hopper vibrators during the bulk feed portion of the cycle.

Upon completion of the bulk count by counter 48 a first signal is generated, switching relay 50 from position "A" to position "B," cutting off the current flow through the windings of relays 52 and 54, thus stopping the bulk as well as hopper vibrators and energizing the windings of relays 56 and 58. Dribble vibrator 32 is thus connected to the 110 v. A. C. source 53 through the closing of normally open contact 58—1 of relay 58. Contact 56—2 of relay 56 also closes, providing an additional path of energization current to the winding of said relay 56.

As soon as the predetermined total count has been reached, a second signal is generated by counter 48, switching the relay 50 to terminal A, cutting off the current through relay 58 and stopping dribble vibrator 32. Since contact 56—2 remains closed, the winding of relay 56 remains energized even though contact 51—1 of relay 52 opens due to energization of the winding of relay 52. Kicker relay 60 is thus energized since it is connected to the 110 v. A. C. supply 53 through normally closed contact 58—2 and contact 56—3. Energization of kicker relay 60 starts operation of time delay switch 57, the period of delay of said switch being long enough to permit the passage of a screw from a position in the beam of dribble count photocell device 40 to a position in box 37 before said box is moved from filling position by kicker arm 38. At the end of such delay, switch 57 energizes the winding of relay 62 completing the circuit through kicker solenoid 55 by contact 62—1 to remove box 37 from filling position, also opening box switch 51. Contact 62—2 also connects the reset terminals 49 on counter 48 to reset said counter for a new counting cycle.

The opening of box switch 51 breaks the circuit through all of said relays since it is in the common grounded line to said relays so that the relay switch contacts return to their normal positions, thus cutting off box solenoid 55 so that the kicker arm 38 returns to its normal position, allowing an empty box to be moved into position by continuously moving belt 36 and close box switch 51 again. Upon closing of the box switch 51, the counter relay 50 being on "A" position will operate the bulk and hopper vibrators to begin a new cycle.

In operation, assuming a box is to be filled with twenty-five screws, the predetermined counter 48 is arranged to bulk count a total of, for instance, twenty screws and then stop bulk vibrator 22, as well as vibrators 16 and 18. Due to the large number of troughs 21 in bulk feeding tray 20 there will usually be a bulk count overage of, for example, two screws rather than the desired twenty. However, the predetermined counter operates the dribble vibrator 32 which feeds screws slowly from the dribble trough 31 past the dribble counting photocell device 40 until the three screws necessary to make up the predetermined quantity of twenty-five have passed from the end of dribble trough 31, the predetermined counter then stopping the vibrator 32, and, after a suitable time delay, operating kicker arm 38 to move a filled box sideways along stop 25 and thus allow belt 36 to remove said filled box and to move an empty box into filling position. Since but a single trough is used for the dribble counter, high accuracy is possible and there is little chance of overage.

With the modified construction as shown in Fig. 6, the electromagnets 72 and 73 will be operated through a time delay switch similar to that shown in Fig. 4 alternately to direct the predetermined quantity into collecting troughs 75 and 76 so that alternate groups will be collected by each of said troughs. The kickers associated with each of said troughs 75 and 76 may then, for example, be operated at any suitable time during or at the end of the following cycle.

Thus it will be seen that by providing a large number of the bulk troughs and a much smaller number of dribble troughs, preferably a single dribble trough, I am able to count objects into predetermined grouped quantities at high speed even though the objects to be counted move relatively slowly along a single trough and yet, at the same time, be able to count such objects with high accuracy by stopping the bulk feeding means prior to the time the predetermined total has passed from the bulk feeding means, and then dribble feeding the remaining objects necessary to make up the predetermined quantity.

Various modifications, not herein set forth, within the spirit of my invention and the scope of the appended claims will occur to those skilled in the art.

I claim:

1. A counting and packaging apparatus for counting small objects into predetermined quantities, comprising object collecting means, a plurality of channels each adapted to feed objects to said collecting means, each of said channels having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of said channels upon generation of said first signal by said predetermined counter means, and to stop the feed of said objects to said collecting means from all of said channels upon generation of said second signal by said predetermined counter means.

2. A counting and packaging apparatus for counting small objects into predetermined quantities, comprising object collecting means, a plurality of channels each adapted to feed objects to said collecting means, each of said channels having sensing means adapted to sense the passage of an object from said channel to said collecting means, channel supply means for distributing said objects into all of said channels, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of said channels upon generation of said first signal by said predetermined counter means, and to stop the feed of said objects to said collecting means from all of said channels upon generation of said second signal by said predetermined counter means.

3. A counting and packaging apparatus for counting small objects into predetermined quantities, comprising object collecting means, a plurality of troughs each adapted to feed objects to said collecting means, each of said troughs having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of said troughs upon generation of said first signal by said predetermined counter means, and to stop the feed of said objects to said collecting means from all of said troughs upon generation of said second signal by said predetermined counter means, said control means including vibrator means adapted to vibrate said troughs to feed said objects in response to said signals from said predetermined counter means.

4. A counting and packaging apparatus for counting small objects into predetermined quantities, comprising object collecting means, a plurality of troughs each adapted to feed objects to said collecting means, each of said troughs having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of said troughs upon generation of said first signal by said predetermined counter means, and to stop the feed of said objects to said collecting means from all of said troughs upon genera-

tion of said second signal by said predetermined counter means, said control means including vibrator means adapted to feed said objects and relay means for operating said vibrator means in response to said signals from said predetermined counter means.

5. A counting and packaging apparatus for counting and collecting small objects into predetermined quantities, comprising object collecting means adapted to deposit collected objects in a receiving package in filling position, positioning means for maintaining said receiving package in filling position, a plurality of channels each adapted to feed objects to said collecting means each of said channels having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of channels upon generation of said first signal by said predetermined counter means, to stop the feed of said objects to said collecting means from all of said channels upon generation of said second signal by said predetermined counter means and to actuate said positioning means to move said receiving package from filling position after a predetermined time delay to allow all of said predetermined quantity of objects to pass to said receiving package.

6. A counting and packaging apparatus for counting and collecting small objects into predetermined quantities, comprising object collecting means adapted to deposit collected objects in a receiving package in filling position, discharge means for moving said receiving package from filling position, a plurality of channels each adapted to feed objects to said collecting means, each of said channels having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of channels upon generation of said first signal by said predetermined counter means, to stop the feed of said objects to said collecting means from all of said channels upon generation of said second signal by said predetermined counter means and to actuate said discharge means to move said receiving package from filling position after a predetermined time delay to allow all of said predetermined quantity of objects to pass to said receiving package.

7. A counting and packaging apparatus for counting and collecting small objects into predetermined quantities, comprising object collecting means adapted to deposit collected objects in a receiving package in filling position, dis-

charge means for moving said receiving package from filling position, a plurality of channels each adapted to feed objects to said collecting means, each of said channels having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means and said receiving package, said means being arranged to operate when a receiving package is in filling position to stop the feed of said objects to said collecting means from all but a relatively small number of channels upon generation of said first signal by said predetermined counter means, to stop the feed of said objects to said collecting means from all of said channels upon generation of said second signal by said predetermined counter means and to actuate said discharge means to move said receiving package from filling position after a predetermined time delay to allow all of said predetermined quantity of objects to pass to said receiving package, said control means including switch means adapted to be actuated by a package in receiving position.

8. A counting and packaging apparatus for counting and collecting small objects into predetermined quantities comprising object collecting means adapted to deposit collected objects in a receiving package in filling position, continuously operating conveyor means for moving said receiving package to filling position, discharge means for moving said receiving package from filling position, a plurality of channels each adapted to feed objects to said collecting means, each of said channels having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of said channels upon generation of said first signal by said predetermined counter means, to stop the feed of said objects into collecting means from all of said channels upon generation of said second signal by said predetermined counter means and to actuate said discharge means to move said receiving package from filling position after a predetermined time delay to allow all of said predetermined quantity of objects to pass to said receiving package.

9. A counting and packaging apparatus for counting and collecting small objects into predetermined quantities comprising object collecting means adapted to deposit collected objects in a receiving package in filling position, continuously operating conveyor means for moving said receiving package to filling position on a first side portion thereof, discharge means for moving said receiving package from filling posi-

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tion transversely of said conveyor means to a second side portion thereof, a plurality of channels each adapted to feed objects to said collecting means each of said channels having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of said channels upon generation of said first signal by said predetermined counter means, to stop the feed of said objects into collecting means from all of said channels upon generation of said second signal by said predetermined counter means and to actuate said discharge means to move said receiving package transversely of said conveyor means from filling position after a predetermined time delay to allow all of said predetermined quantity of objects to pass to said receiving package.

10. A counting and packaging apparatus for counting and collecting small objects into predetermined quantities comprising object collecting means adapted to deposit collected objects in a receiving package in filling position, continuously operating conveyor means for moving said receiving package to and from said filling position, discharge means for moving said re-

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ceiving package from filling position transversely of said conveyor means to a second side portion thereof, stop means adapted to maintain a receiving package in filling position on said conveyor means, a plurality of channels each adapted to feed objects to said collecting means each of said channels having sensing means adapted to sense the passage of an object from said channel to said collecting means, predetermined counter means operatively connected to said sensing means to count said objects when exposed to said sensing means, said predetermined counter means being organized and arranged to generate a first signal at the completion of a count less than a predetermined total, and a second signal at the completion of said predetermined total, and control means actuated by said predetermined counter means arranged to stop the feed of said objects to said collecting means from all but a relatively small number of said channels upon generation of said first signal by said predetermined counter means, to stop the feed of said objects into collecting means from all of said channels upon generation of said second signal by said predetermined counter means and to actuate said discharge means to move said receiving package transversely of said conveyor means past said stop means from filling position to said second side portion of said conveyor means after a predetermined time delay to allow all of said predetermined quantity of objects to pass to said receiving package.

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No references cited.