June 1, 1954 M. GRAVES 2,679,789

STACK TRANSFER MACHINE

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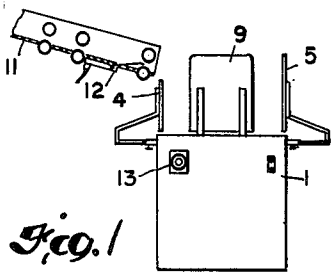
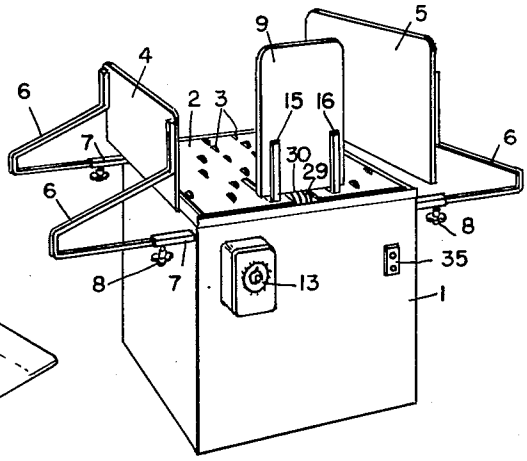


Fig. 1

Fig. 2



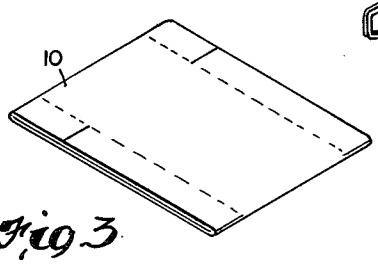


Fig. 3

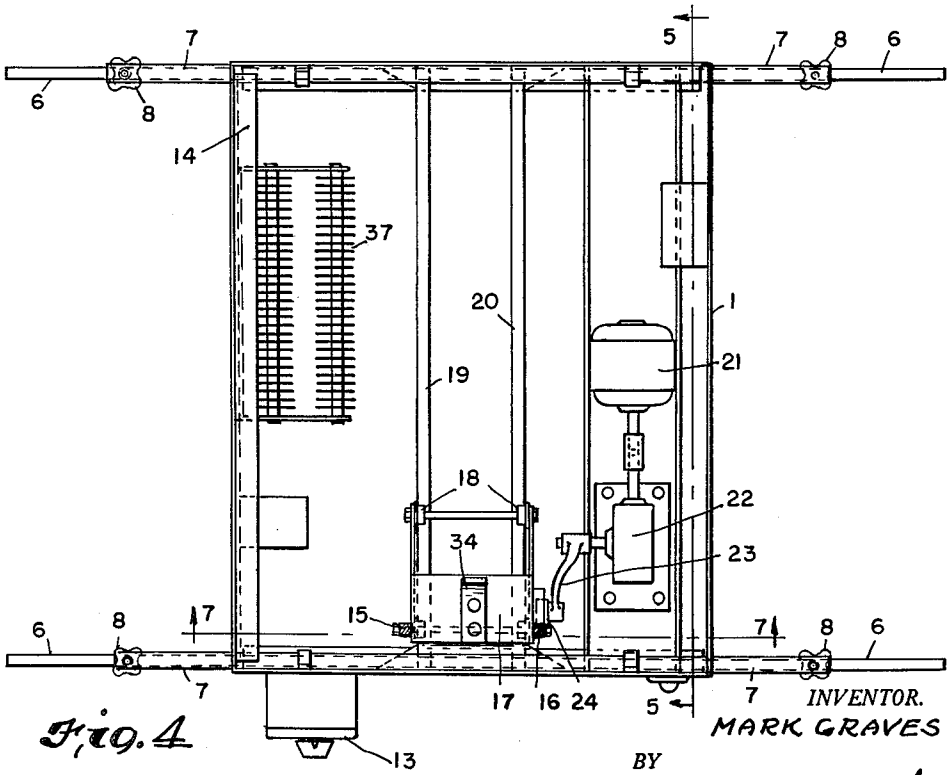


Fig. 4

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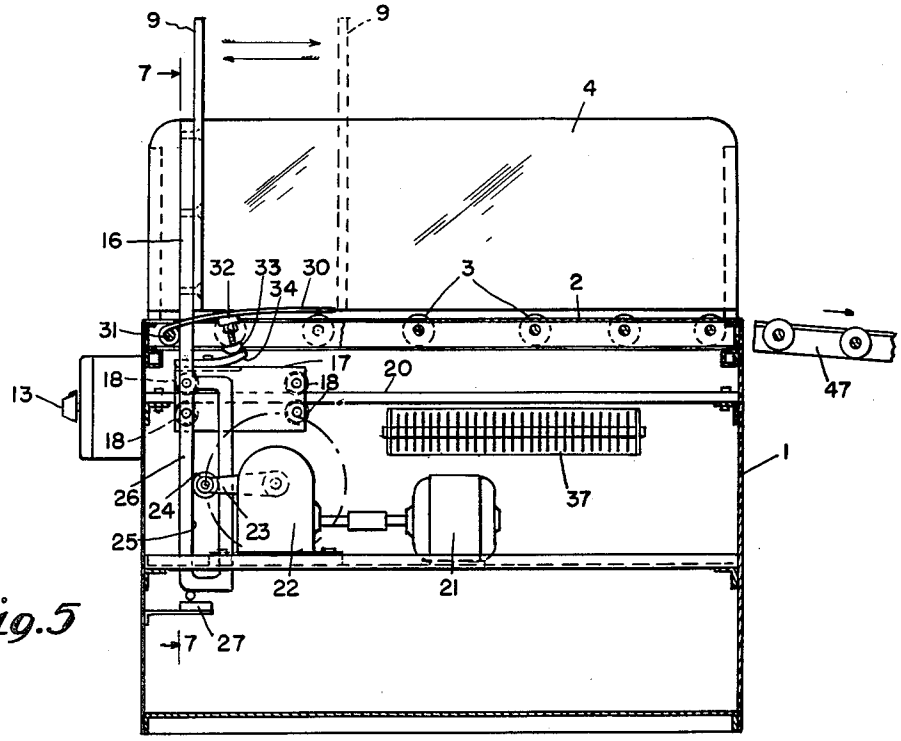


Fig. 5

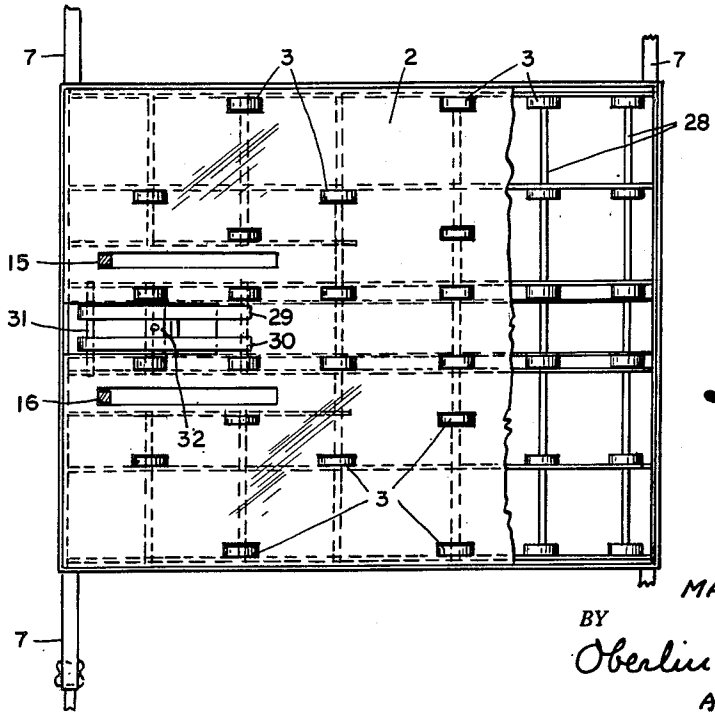


Fig. 6

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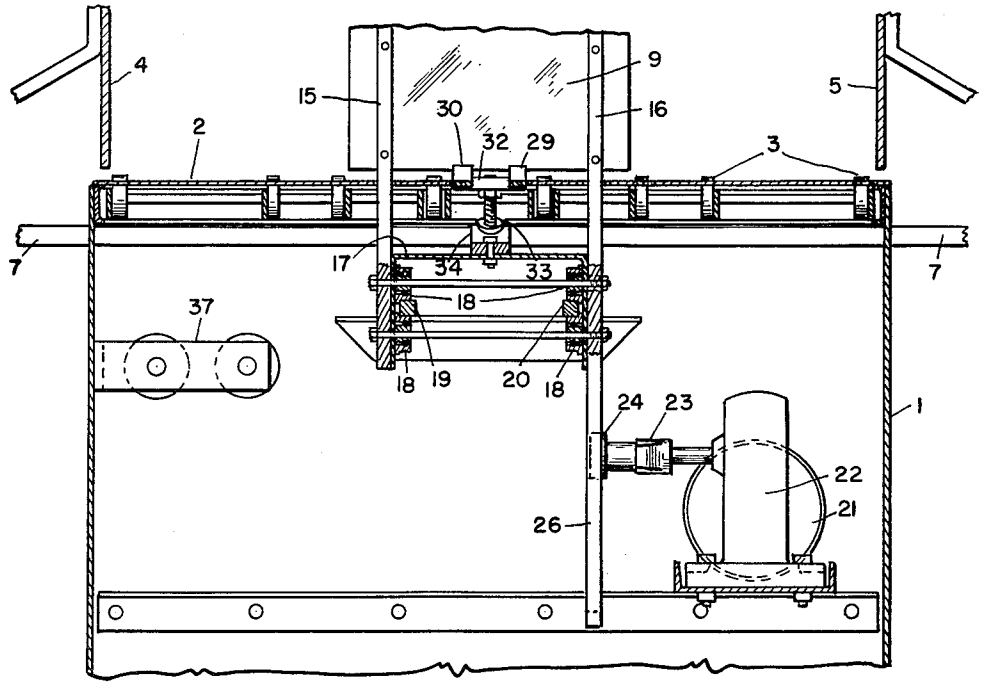


Fig. 7

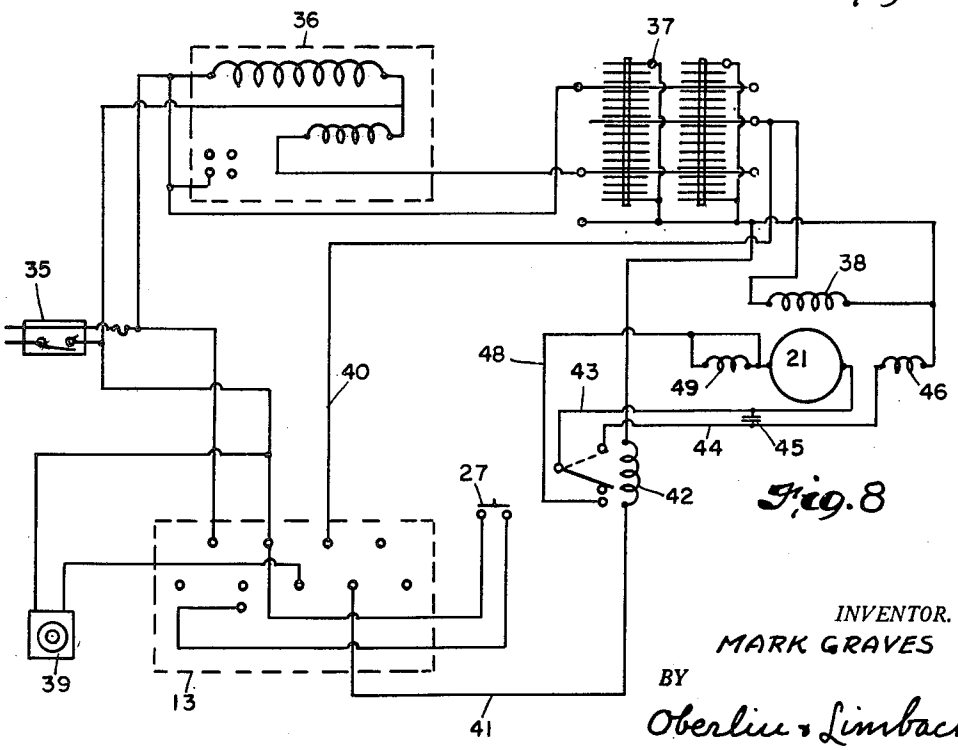


Fig. 8

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Patented June 1, 1954 2,679,789

UNITED STATES PATENT OFFICE

2,679,789

STACK TRANSFER MACHINE

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Application November 16, 1948, Serial No. 60,260

4 Claims. (Cl. 93—93)

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This invention relates as indicated to a stack transfer machine and more particularly to a machine adapted to receive and accumulate a predetermined number of objects such as folded corrugated cardboard containers or the like and periodically to deliver such accumulated stack of objects laterally thereof.

The modern carton folding and stapling machines have now been developed to such a state of efficiency that they produce the final cartons in flat folded condition at a very high rate of speed. It is ordinarily desired to accumulate such folded cartons as they are produced until a stack containing a desired number has been made, whereupon such stack may be tied into a bundle and delivered to a conveyor. Or such stack may be removed without first bundling the same.

The folded cartons are produced at such a rapid rate that it is necessary to displace the accumulated stack very rapidly in order that the receiving table may be cleared and prepared to receive the next cartons coming from the carton folding and stapling machine. In view of such rapid production and low cost of the individual articles, it is likewise desirable that the counting, stacking and delivery mechanism be wholly automatic in operation.

It is therefore a primary object of my invention to provide stack transfer mechanism adapted to receive and stack any desired number of objects such as folded corrugated containers or the like and periodically automatically to deliver the accumulated stack laterally thereof without in any way interrupting the flow of such containers from the machine producing the same.

It is another object of my invention to provide such device which will be portable and adapted to be quickly set up for operation in combination with any machine adapted to deliver such objects thereto.

Still another object is to provide such device which will be exceedingly rapid in operation.

A further object is to provide a device of the type indicated on which the articles will be stacked in uniform vertical alignment and such stack then transferred laterally as a unit.

Other objects of my invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but

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a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is an end elevational view of my machine showing the position of the latter relative to conveyor means adapted to deliver folded cartons thereto in rapid sequence;

Fig. 2 is a perspective view of the machine of my invention on a somewhat enlarged scale;

Fig. 3 is a perspective view of a folded carton illustrating the type of object my new machine is particularly adapted to handle;

Fig. 4 is a top plan view of my machine on a somewhat larger scale with the cover plate and upper parts removed to disclose the inner mechanism;

Fig. 5 is a vertical sectional view taken along the line 5—5 on Fig. 4;

Fig. 6 is a top plan view showing the cover plate and antifriction stack supporting means;

Fig. 7 is a vertical sectional view taken along the line 7—7 on Figs. 4 and 5; and

Fig. 8 is an electric wiring diagram showing the arrangement of the electric control means.

Referring now more particularly to said drawing and especially Figs. 1 and 2 thereof, the form of device there illustrated embodying my invention comprises a base or housing 1 containing the operating mechanism and supporting a cover plate or table 2 through which a plurality of rollers 3 project. Side gauging or register plates 4 and 5 are respectively supported by rebent rods 6 received in sleeves 7 wherein they are adapted to be adjustably secured by means of screw clamps 8.

A pusher 9 at one end of the stack receiving table is adapted to be reciprocated in the manner explained below to deliver a stack of cartons or the like from such table. The individual folded cartons 10 (Fig. 3) are adapted to be individually delivered to such table from the stapling or taping machine by means of a conveyor 11 of conventional construction and regularly forming a part of such machines. A counter 12 likewise of conventional construction is mounted adjacent the end of such conveyor and may comprise an upstanding finger operative when struck by a folded carton passing thereover to actuate a limit switch. The counter setter 13 may be mounted on housing 1 as shown and electrically connected with such counter 12. Thus, if such setter be turned to No. 15, for example, pusher 9 will be reciprocated after 15 cartons have passed over counter 12 and been received upon the table, all as explained in more detail below.

Referring now more particularly to Figs. 4–7

inclusive, the operating mechanism contained within sheet metal housing 1 will now be described. Such mechanism is supported by the channel iron frame 14 which also carries the sheet metal housing 1 enclosing the same. Pusher 9 is carried by two upstanding bar members 15 and 16 mounted on a carriage 17 in the form of an inverted channel provided with four pair of wheels or rollers 18 riding on spaced rails 19 and 20 as best shown in Figs. 5 and 7. Two pair of such wheels engage the upper surface of the rails and two pair engage the lower surface thereof so that pusher 9 is held rigidly erect at all times.

An electric motor 21 is adapted, when energized, to drive a worm gear reduction unit 22 to turn crank arm 23 through one complete revolution. A roller 24 carried by the end of such arm rides in a vertical slot 25 in downward extension 26 of pusher supporting bar member 16. It will be seen, therefore, that as crank 23 turns it will first move pusher 9 from left to right as indicated in Fig. 5 and will then return such pusher to the left-hand starting position, whereupon limit switch 27 is engaged and actuated to alter the field of motor 21 to render the same a generator. This action not only stops such motor but provides dynamic braking of the moving parts to leave pusher 9 in such left-hand position.

As best shown in Figs. 2, 5 and 6, idler rollers 3 are carried on transverse rods 28 and cover plate 2 is slotted to permit such rollers to protrude upwardly therethrough. It is upon such rollers that the stack rests during lateral transfer by action of pusher 9. Plate 2 is likewise slotted to permit reciprocation of bars 15 and 16 which support pusher 9 (Fig. 6).

Two parallel stack supporting members 29 and 30 are hingedly mounted at 31 and interconnected by a bridge member 32 having a round headed bolt 33 threaded therein and adapted to be locked in desired position. A curved cam 34 is mounted on the top of carriage 17 in position to engage the head of bolt 33 and thereby slightly elevate members 29 and 30 when such carriage and therefore pusher 9 are in left-hand or retracted position (Fig. 5). When carriage and pusher move to the right, such stack supporting members are promptly dropped and the entire weight of the stack will rest upon rollers 3.

The operation of the illustrated embodiment of my invention will be described with additional reference to diagrammatic Fig. 8 of the drawing. When main line switch 35 connected with a 115-v. A. C. line is closed, current passes to auto-type transformer 36, the coil of which is tapped to deliver 130 v. A. C., and thence through selenium rectifier 37 to produce 110 v. D. C. which is conducted to series field 38 of non-self-starting D. C. motor 21. The field is therefore saturated at all times but the motor will not operate until started by supplementary means.

Counter switch 12 (Fig. 1, not shown in Fig. 8) is plugged into receptacle 39 connected with counter 13 which is of conventional type and may, for example, be the well-known Eagle Microflex instantaneous reset counter. This counter will have been manually set at the desired number of cartons to be accumulated in a single stack. When switch 12 has been actuated this number of times, counter 13 is operated to connect lines 40 and 41, thereby operating magnetic relay 42 to connect lines 43 and 44 and discharge condenser 45. The discharge of such condenser sends a surge through starting field 46 effective to start the motor 21.

Since motor field 38 is already saturated, the motor starts very promptly and crank 23 reciprocates pusher 9 to deliver the accumulated stack laterally of the machine and, for example, onto a conveyor such as 47 (Fig. 5). The reciprocation of the pusher is very rapid and rollers 3 will continue to spin for some time.

When pusher 9 returns to starting position, limit switch 27 (Figs. 5 and 8) is actuated to break counter circuit connection between lines 40 and 41, thereby de-energizing relay 42 and permitting the relay switch to return to normal position connecting lines 43 and 48. Since motor 21 is still turning field 49 is thereby energized counter-acting field 38 and quickly stopping the motor. This form of dynamic braking is, of course, well known to those skilled in the art. Pusher 9 therefore remains in retracted left-hand position (Fig. 5) until a new stack of the proper number of cartons has accumulated.

When carriage 17 returned, cam 34 elevated supports 29 and 30 so that the first carton deposited thereon was partially supported and frictionally held against displacement by spinning idler rollers 3. But for the provision of such means there is a tendency for the first few cartons to be somewhat displaced laterally when rested on such spinning rollers.

It will be seen from the foregoing that I have provided stack transfer mechanism which is very rapid in operation but nevertheless positive in its action and which may be safely left untended for automatic operation. As shown in Figs. 1 and 2, side gauge 4 may be lower than pusher 9 and gauge 5 to permit the folded cartons or other objects to be delivered thereover. Such side gauges may also be adjusted to permit the stack to project considerably beyond the edges of the table.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. Stack transfer mechanism comprising a table adapted to receive a plurality of folded cartons or the like, a pair of adjustable opposed side gauge means adapted to position the resulting stack, a plurality of rollers protruding upwardly through said table mounted to support such stack for movement toward an unobstructed side of said table, a pusher member supported adjacent the opposite side of said table from such unobstructed side and reciprocable toward and away from such unobstructed side, a rigid slotted arm extending downwardly from said pusher member, a non-self-starting direct current electric motor having its field saturated for quick starting, a crank mounted to be driven by said motor and engaged in said slotted arm to reciprocate said pusher member, a counter adjustable to count a predetermined number of objects delivered to said table and stacked thereon, means operated by said counter to start said motor to reciprocate said pusher member to deliver such stack laterally of said table, a limit switch operable by return of said pusher member to starting position adapted to alter the circuit of said motor for dynamic braking to quickly stop said motor and pusher member, temporary stack supporting means on said table, and cam means

reciprocable with said pusher member adapted to elevate said temporary supporting means when said pusher member is in retracted position and promptly to lower said temporary supporting means when said pusher member is reciprocated to deliver a stack from said table, whereby the lower elements of such stack are prevented from being laterally displaced by action of said rollers still spinning from the transfer of the next preceding stack.

2. Stack transfer means comprising a table adapted to receive a plurality of folded cartons or the like, rotary anti-friction means on said table adapted to support the resulting stack for transfer laterally thereof, a pusher member reciprocable transversely above said table adapted to impel such stack laterally to transfer the same, counter means adapted to count a predetermined number of objects delivered to said table and stacked thereon, an electric motor, crank means driven by said motor adapted to reciprocate said pusher member, means operated by said counter to start said motor to reciprocate said pusher member, means operative to stop said motor to leave said pusher member in initial retracted position, local stack supporting means on said table adapted temporarily to support a portion only of such stack in cooperation with said rotary anti-friction means while said pusher member is thus retracted, whereby the lower elements of such stack are prevented from being laterally displaced by action of said rotary anti-friction means still spinning from the transfer of a preceding stack, and means operative in timed relation to such reciprocation of said pusher member to drop said temporary stack supporting means to leave such stack supported solely upon said rotary anti-friction means.

3. Stack transfer means comprising a table adapted to receive a plurality of folded cartons or the like, rotary anti-friction means on said table adapted to support the resulting stack for transfer laterally thereof, a pusher member reciprocable transversely above said table operative to displace the entire stack laterally over said rotary anti-friction means to transfer the same, counter means adapted to count a predetermined number of objects delivered to said table and stacked thereon, drive means actuated by said counter operative to reciprocate said pusher member, local stack supporting means on said table operative to engage a portion only of the stack to support the same cooperably with said rotary anti-friction means while said pusher

member is in retracted position, whereby the lower elements of such stack are prevented from being laterally displaced by action of said rotary anti-friction means still spinning from the transfer of a preceding stack, and means operative to withdraw said local stack supporting means from engagement with a completed stack in timed relation to reciprocation of said pusher member, the withdrawal of said local stack supporting means leaving the stack supported entirely by said rotary anti-friction means and thus movable without disruption of said pusher member.

4. Stack transfer means comprising a table adapted to receive a plurality of folded cartons or the like, rotary anti-friction means on said table adapted to support the resulting stack for transfer laterally thereof, a pusher member reciprocable transversely above said table operative to displace the entire stack laterally over said rotary anti-friction means to transfer the same, counter means adapted to count a predetermined number of objects delivered to said table and stacked thereon, drive means actuated by said counter operative to reciprocate said pusher member, friction means operative normally to engage a portion only of the underside of the lowermost element of such stack to prevent premature displacement thereof due to spinning of said rotary anti-friction means from the transfer of a preceding stack, said friction means including a member pivotally mounted for swinging movement above and below the upper support surfaces of said rotary antifriction means, and means actuated in response to advance of said pusher member to move said friction means from its upper to its lower position, thereby freeing the formed stack for movement by said pusher, the friction means returning to its normal upper position to support a succeeding stack in cooperation with said rotary anti-friction means when said pusher member is retracted.

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