

April 8, 1969

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3,436,896

APPARATUS FOR AUTOMATICALLY FILLING SWING-OUT CASSETTES

Filed May 9, 1966

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FIG. 1

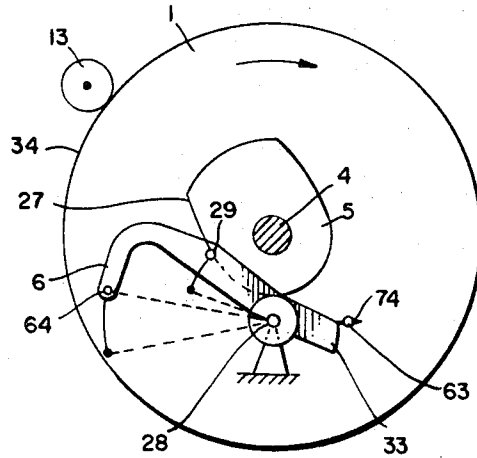
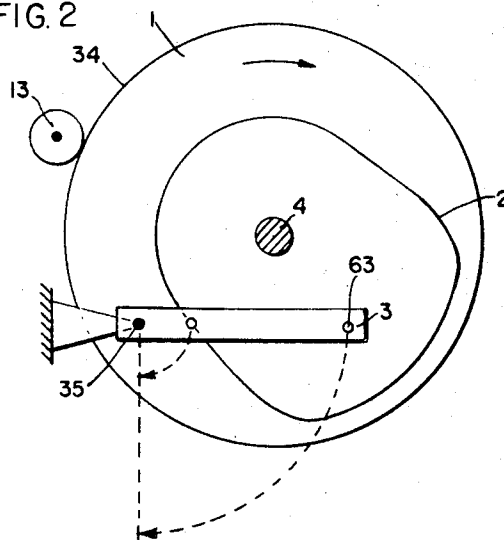


FIG. 2



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FIG. 3

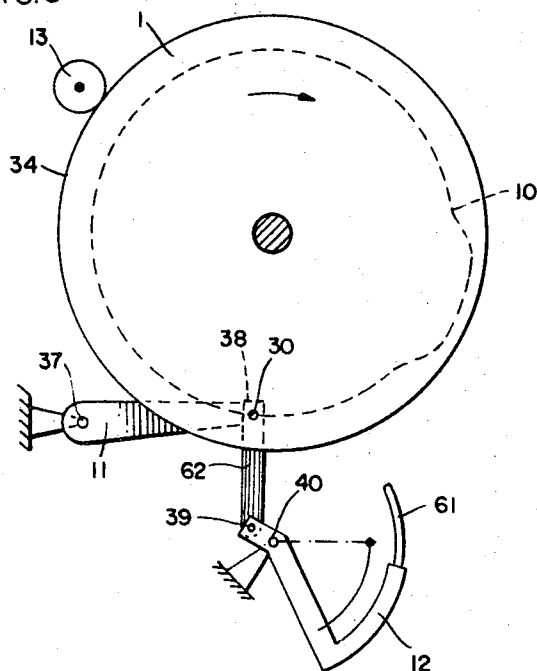
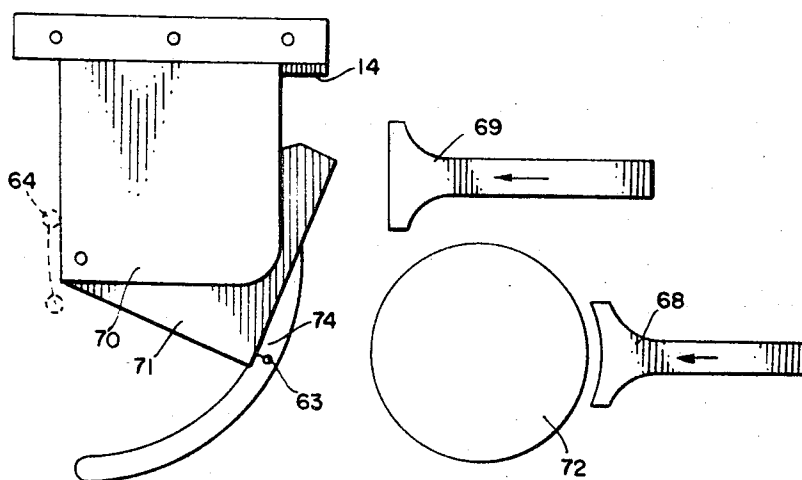


FIG. 5



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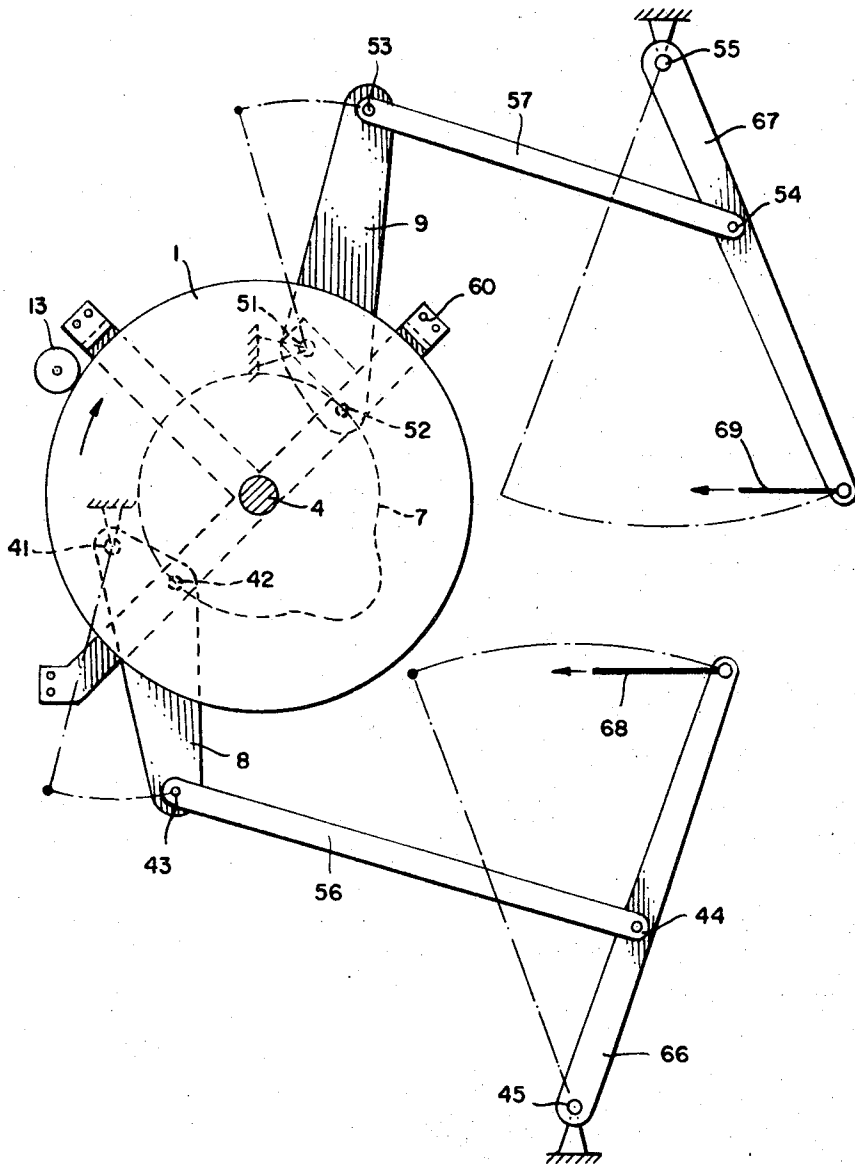
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FIG. 4



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APPARATUS FOR AUTOMATICALLY FILLING SWING-OUT CASSETTES

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B 81,900

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U.S. Cl. 53—266

7 Claims

ABSTRACT OF THE DISCLOSURE

Device for automatically loading a swing-out cassette from a supply stack of cassettes, e.g. with a reel of magnetic tape, which includes a mounting or supporting plate with a rotatable shaft perpendicular thereto and carrying cam means for rotation with the shaft on the side of the plate opposite its loading surface, a cam-controlled clamp extending through a slot in the plate to hold the cassette being loaded, a cam-controlled driving pin extending through another slot to engage and swing open the cassette for loading, and pushers to load an article into the cassette and eject the cassette from the supply stack.

A known method of individually filling articles, such as spools of magnetic tape, is to insert them by hand one by one into swingout cassettes which serve as the packing containers.

The filled inner member of the cassette is then pushed back into the outer member. The disadvantage of this method of packing is that it requires a great deal of time and labor to carry it out and consequently the productivity is low.

It is the object of the present invention to overcome these drawbacks which limit productivity and to propose a method of automatically filling individual articles which are piled one on top of the other in a vertical stack, e.g. spools of magnetic tape, into swing-out cassettes comprising an outer member and an inner member which is arranged pivotally in the outer member. According to the invention the bottom cassette of a stack of cassettes which are situated horizontally one on top of the other is introduced downwards into a receiving chamber where it is held in place by means of its vertical outside walls, its inner member which is provided with an opening being swung out at an angle of 90°, one of the articles being inserted through said opening into the inner member, the filled inner member being swung back to its original position and the filled cassette being finally ejected from underneath the stack out of the receiving chamber to the outside and removed. This process operates automatically and the only manual work involved is that of replenishing the stack with empty cassettes or the articles which have to be packed, and that of removing the filled cassettes.

The apparatus for automatically filling the articles is characterized by the provision in a mounting plate of a vertical center shaft carrying a horizontally disposed central gear wheel, gear teeth on the gear wheel, a central slot-shaped cam track on the upper face and an outer slot-shaped cam track as well as an inner slot-shaped cam track on the underface of the gear wheel, a cam disc mounted on the center shaft above the gear wheel, a two-armed rotatably mounted clamping lever controlled by the cam disc and provided with a pressure roller at the end of one arm and an oblique face at the end of the other arm, a one-armed opening lever provided with a roller engaging the central cam track and a

driving pin at its free end, a one-armed lever with a roller at its free end engaging the outer cam track, a link pivoted on the axle of the roller, a twin arm expander provided with expanding springs and two triangular levers on diametrically opposite sides, each hinged on a fixed pivot and carrying on its inner end a roller engaging the inner cam track and on its outer end a link which is pivotally connected thereto and which reciprocates a one-armed oscillating arm which is hinged on a fixed pivot and which at its free end is pivotally connected to a pusher.

The automatic filling of the swing-out cassettes which receive the spools of magnetic tape is controlled by the central gear wheel which has the three slot-shaped cam tracks and by the cam disc mounted above the same and on the same shaft as the gear wheel. 10 operations are needed.

(1) Pressing the outer member of the cassette against a locating stop by means of the pressure roller;

(2) Pressing the point of the driving pin into the inner member of the magazine;

(3) Opening of the cassette by swinging out the inner member of the cassette;

(4) Inserting the expander into the interior of the cassette;

(5) Inserting the spool of magnetic tape into the inner member;

(6) Withdrawing the expander from the inner member;

(7) Closing the filled cassette by swinging back the inner member;

(8) Clearing the path of ejection of the cassette by the withdrawal of the pressure roller;

(9) Withdrawing the point of the driving pin from the cassette, and

(10) Ejecting the filled cassette.

The accompanying drawings illustratively show the components of the proposed automatic filling apparatus. FIG. 1 shows the gear wheel and cam disc in conjunction with the clamping lever from above, FIG. 2 is the gear wheel and central cam track as well as the opening lever seen from above, FIG. 3 is the gear wheel and the outer cam track with the expander seen from above, FIG. 4 is the gear wheel, cam track, triangular levers, links, oscillating arms and pushers, likewise seen from above, FIG. 5 illustrates the position of the cassettes and the stack of spools, FIG. 6 is a section of the apparatus and FIG. 7 is a plan view of the complete apparatus.

A horizontal mounting plate 65 (FIG. 6) supports a vertical center shaft 4 (FIG. 1). Rigidly mounted on this shaft 4 is a horizontal central gear wheel 1 and above the same a cam disc 5 with a cam edge 27. Alongside shaft 4 is a shaft 28, rotatably mounted in the mounting plate 65 and carrying a clamping lever 6 which is fast on this shaft. The clamping lever 6 carries a roller 29 which rides on the cam edge 27 and which has at the end of one arm a pressure roller 64. The other end of the clamping lever has an oblique face 33. This oblique face 33 cooperates with a driving pin 63 fitted with a pointed pin 74. The gear wheel 1 is driven by a motor (not shown) through a pinion 13 meshing with the gear teeth 34 of the gear wheel 1.

The upper face of the gear wheel 1 is provided with a slot-shaped cam track 2 (FIG. 2). Located above the gear wheel 1 an axle pin 35 is fitted to the mounting plate, and an opening lever 3 pivots on this axle pin within a 90° arc. The lever 3 carries a roller 36 which rides in the cam track 2. At its free end this lever carries the driving pin 63.

Machined into the underface of the gear wheel 1 are two slot-shaped cam tracks, namely an outer track 10 and an inner track 7 (FIGS. 3, 4). Hinged at 37 in supporting bars 60 to one side of gear wheel 1 is a one-armed lever 11 adapted to operate an expander 12 by means of a link 62 hinged at 38 and 39. The expander hinges on a fixed fulcrum 40. At the end of the arc-shaped expander 12 are expander springs 61. The expander is controlled by a roller 30 which is mounted on the pivot 38, and which rides in the outer cam track 10. The same applies to the lever 11.

Underneath the gear wheel 1 two fixed pivots 41 and 51 are fitted to one of the supporting bars 60. These serve as the pivots for two triangular levers 8 and 9. Each of the triangular levers carries a roller (42, 52) which rides in the inner cam track 7. Each of the triangular levers operates a link rod 56 and 57 respectively hinged at 43, 44 and 53, 54 respectively to reciprocate an oscillating arm 66 and 67 respectively carrying pushers 68 and 69 respectively. The oscillating arms 66, 67 are hinged on fixed pivots 45 and 55 respectively. In the course of each revolution of the gear wheel 1 and of the inner cam track 7 each of the triangular levers is reciprocated once through an arc of about 30°.

FIG. 5 is a plan view of the members that are located above the mounting plate 65, namely the stack of cassettes 70, a stack of spools 72, the pusher 68 for pushing the spool into the cassette and the pusher 69 for ejecting the cassette, driving pin 63, pressure roller 64 and a stop 14.

For filling a cassette the clamping lever 6 is operated by the cam disc 5 via the roller 29 in such manner that the pressure roller 64 presses the cassette against the stop 14. At the same time the driving pin 63 which is mounted on the opening lever 3 is released by the oblique face 33 of the lever 6, permitting the pointed pin 74 of the driving pin 63 to be thrust by a tension spring 73 into the interior of the cassette.

The cassette is then opened. The lever 3, actuated by the center track 2 swings outwards through a 90° arc and causes the point 74 of driving pin 63 to swing out the inside member 71 of the cassette. During this operation the gear wheel 1 and the cam track 2 rotate through a 60° angle.

For inserting the expander springs 61 into the cassette the lever 11 is actuated by the outer cam track 10 cooperating with the roller 30. The deflection of the roller 30 is for example 15 mm. Link 62 therefore swings the expander 12 and its expander springs 61 about the fulcrum 40, causing the springs to enter the inner member 71 of the cassette which is now open.

The spool of magnetic tape can therefore be inserted into the cassette. For this purpose the triangular lever 8 is swung by the cooperation of roller 42 with the inner cam track 7 through an arc of 30°. This motion is transmitted by the link 56 to the oscillating arm 66.

The resultant stroke of the pusher 68 is for example 220 mm. This is sufficient to push the spool into the inner member of the open cassette. The pusher 68 is then retracted.

The expander springs 61 are then withdrawn from the cassette. This is effected by the outer cam track 10 cooperating with the roller 30 to deflect the lever and the expander 12.

In order to close the filled cassette the lever 3 which is controlled by the center cam track 2 is swung inwards through a 90° arc. The pointed pin 74 of driving pin 63 therefore returns the inner member 71 of the cassette to its former position. At this stage the gear wheel 1 and the cam track 2 will have rotated through 180° from the time the cassette is opened through the filling operation to the time the cassette is closed.

The cam disc 5 cooperating with the roller 29 of the clamping lever 6 deflects the latter to return the pressure roller 64 to its original position. At the same time

the oblique face 33 of the lever 6 presses against the driving pin 63 so that its point 74 is withdrawn from the inner member 71 of the cassette. Finally the closed cassette is ejected from the apparatus. This is effected by the triangular lever 9 which is deflected by the cooperation of roller 52 with the inner cam track 7, the link 57 and the oscillating arm 67 imparting a forward stroke of for example 245 mm. to the pusher 69, which is sufficient to eject the cassette.

I claim:

1. Apparatus for automatically filling each individual swing-out cassette from a vertical supply stack of cassettes, said apparatus comprising: a horizontal mounting plate with a vertical center shaft carrying a horizontally disposed central gear wheel, gear teeth on said gear wheel, a central slot-shaped cam track on the upper face and an outer slot-shaped cam track as well as an inner slot-shaped cam track on the underface of said gear wheel, a cam disc mounted on said center shaft above said gear wheel, a two-armed rotatably mounted clamping lever controlled by said cam disc and provided with a pressure roller at the end of one arm and an oblique face at the end of the other arm, a one-armed opening lever provided with a roller engaging said central cam track and a driving pin at its free end, a one-armed lever with a roller at its free end engaging said outer cam track, a link pivoted on the axle of said roller, a twin-armed expander provided with expanding springs and two triangular levers on diametrically opposite sides, each hinged on a fixed pivot and carrying on its inner end a roller engaging said inner cam track and on its outer end a link pivotally connected thereto and reciprocating a one-armed oscillating arm hinged on a fixed pivot and pivotally connected at its free end to a pusher.

2. Apparatus for automatically filling a swing-out cassette having an outer cover member and an inner member arranged pivotally at one corner of said outer member to swing out to an open position for receiving an article to be loaded therein, said apparatus comprising:

a mounting plate having a loading surface to receive an individual swing-out cassette from a supply stack of cassettes;

a rotatable shaft extending perpendicularly from the side of the mounting plate opposite its loading surface and carrying cam means for rotation therewith; clamping means extending through a first slot in said plate and controlled by said cam means to pressingly engage said outer cover member and to hold said cassette in its loading position;

means to drivingly engage said cassette inner member extending through a second slot in said plate and controlled by said cam means to swing said inner member out to its open position for loading and back again to a closed position;

means to push an article into said cassette inner member while held in its open position; and

means to push the loaded cassette away from its loading position on said mounting plate.

3. Apparatus as claimed in claim 2 wherein said cam means includes a first cam parallel to said mounting plate in operative connection with said means to drivingly engage said cassette inner member and a second cam parallel to said mounting plate in operative connection with said clamping means.

4. Apparatus as claimed in claim 2 wherein said means to drivingly engage said cassette inner member includes a driving pin pivotally mounted on a cam-operated lever arm controlled by said cam means, said driving pin being actuated to engage the cassette inner member in response to the movement of said clamping means as it engages said cassette outer member.

5. Apparatus as claimed in claim 4 wherein said driving pin is spring-actuated to engage the cassette inner member, and said clamping means is linked to said cam means by a lever arm arranged to contact and pivotally

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disengage said driving pin from said cassette inner member while in its closed position.

6. Apparatus as claimed in claim 2 wherein each of said push means is operatively controlled by said cam means through pivotally mounted reciprocating lever arms.

7. Apparatus for automatically filling a swing-out cassette having an outer cover member and an inner cover member arranged pivotally at one corner of said outer member to swing out to an open position for receiving an article to be loaded therein, said apparatus comprising:

a horizontal mounting plate adapted to receive a vertical stack of cassettes to be loaded;

stop means located on the top surface of said mounting plate to engage the lowermost cassette of said stack at one end opposite its swing-out pivot point while said cassette is in its loading position;

a rotatable vertical shaft extending below said mounting plate;

a horizontal wheel connected to said vertical shaft below said mounting plate and having a cam track on its upper surface with means to rotate said wheel together with said shaft;

a cam disc carried on said vertical shaft between said mounting plate and said wheel for rotation therewith;

a two-armed lever pivotally mounted below said mounting plate in operative connection with said cam disc and bearing clamping means at one free end extending upwardly through a first slot in said mounting plate, said clamping means moving in an arcuate path in response to the rotation of said cam

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disc to pressingly engage said cassette outer member and firmly holding said cassette outer member against said stop means during loading of the cassette;

a one-armed lever pivotally mounted at one end below said mounting plate in operative connection with said cam track and bearing a driving pin at its free end extending upwardly through a second slot in said mounting plate, said driving pin being actuated to engage said cassette inner member in response to the clamping movement of said two-armed lever and said driving pin being controlled by said cam track to swing cassette inner member outwardly to an open position for loading and back again to a closed position;

means to push an article into said cassette inner member while held in its open position; and

means to push the loaded cassette after returning to its closed position away from said stop means and clear of said stack of cassettes.

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U.S. Cl. X.R.

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