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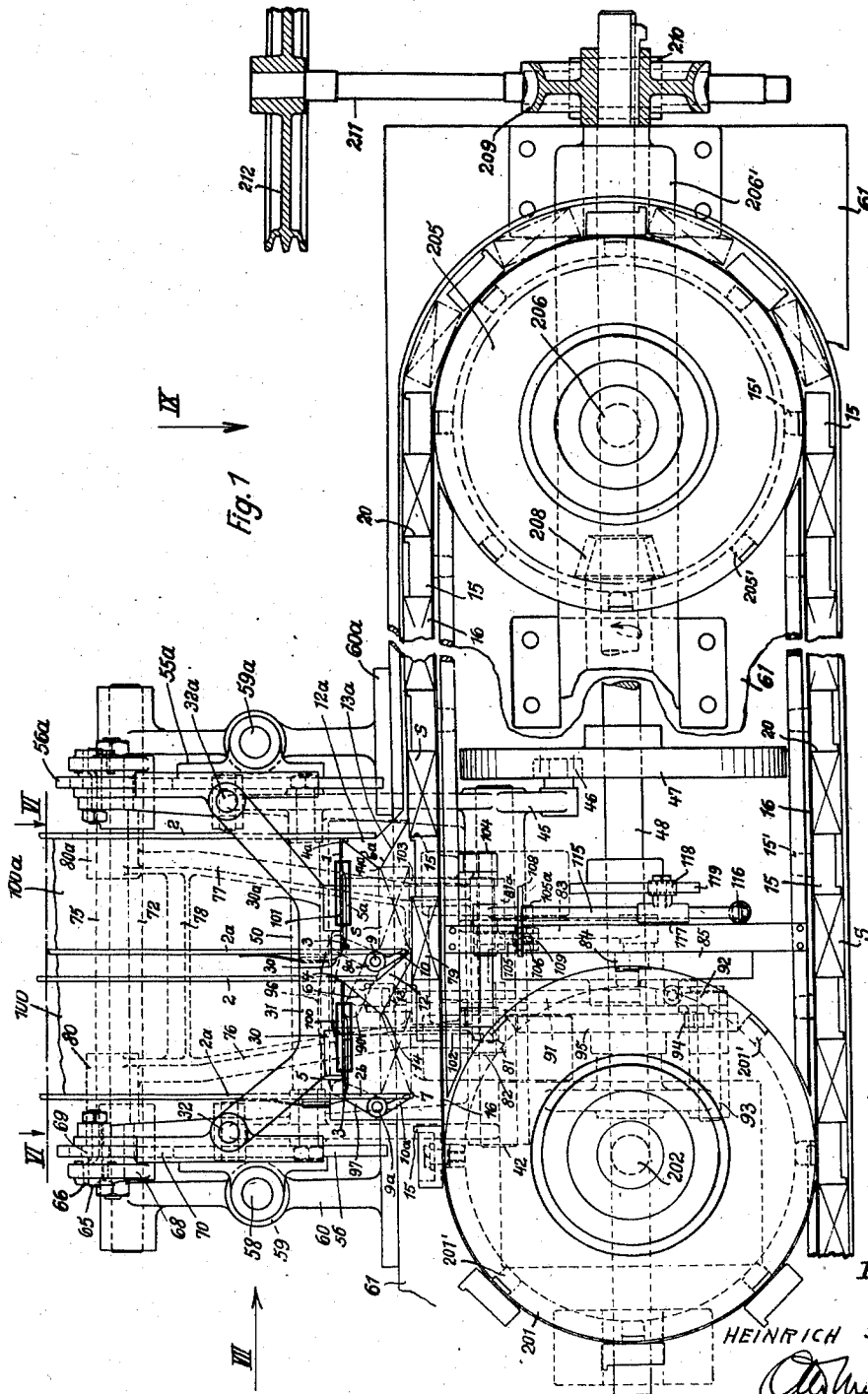
H. SCHWINGER

2,147,994

MACHINE FOR WITHDRAWING FROM A PILE, AND OPENING COLLAPSED FOLDING BOXES

Filed March 24, 1938

5 Sheets-Sheet 1



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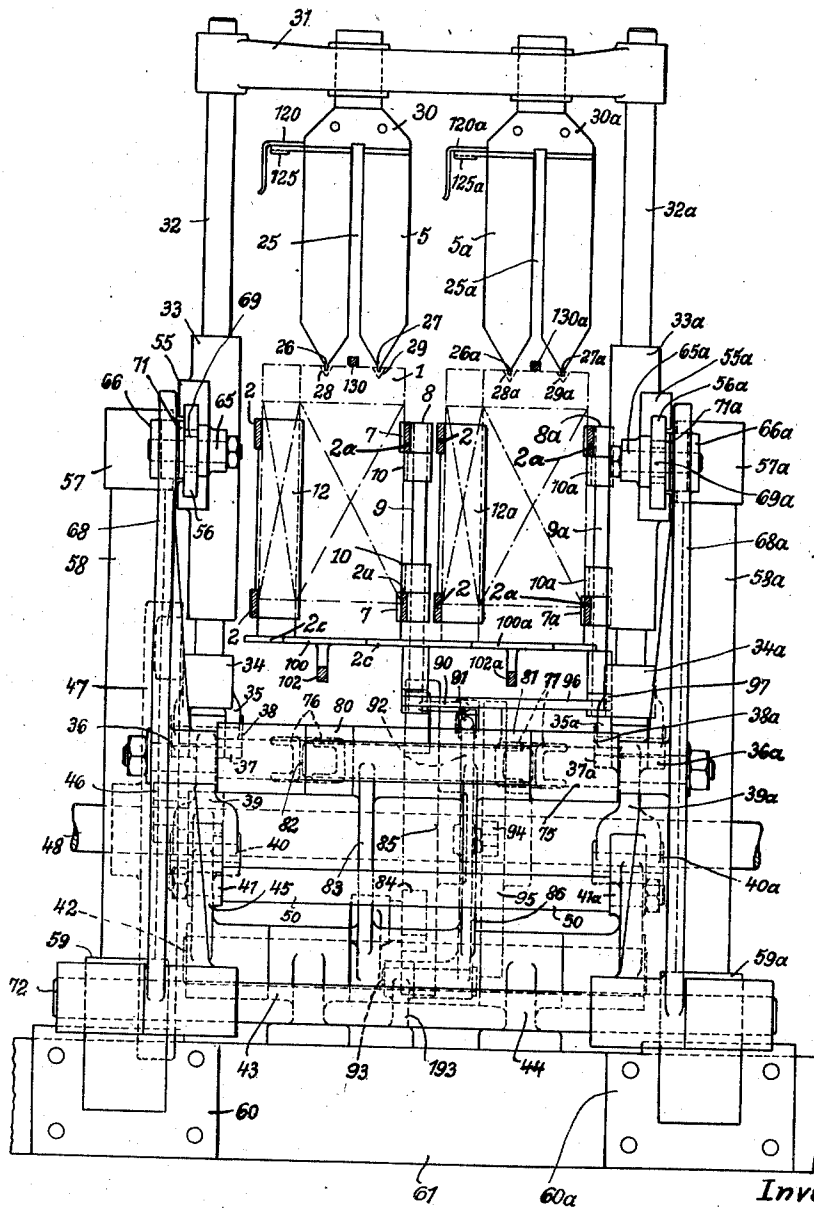
2,147,994

MACHINE FOR WITHDRAWING FROM A PILE. AND OPENING COLLAPSED FOLDING BOXES

Filed March 24, 1938

5 Sheets-Sheet 2

Fig. 2



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Feb. 21, 1939.

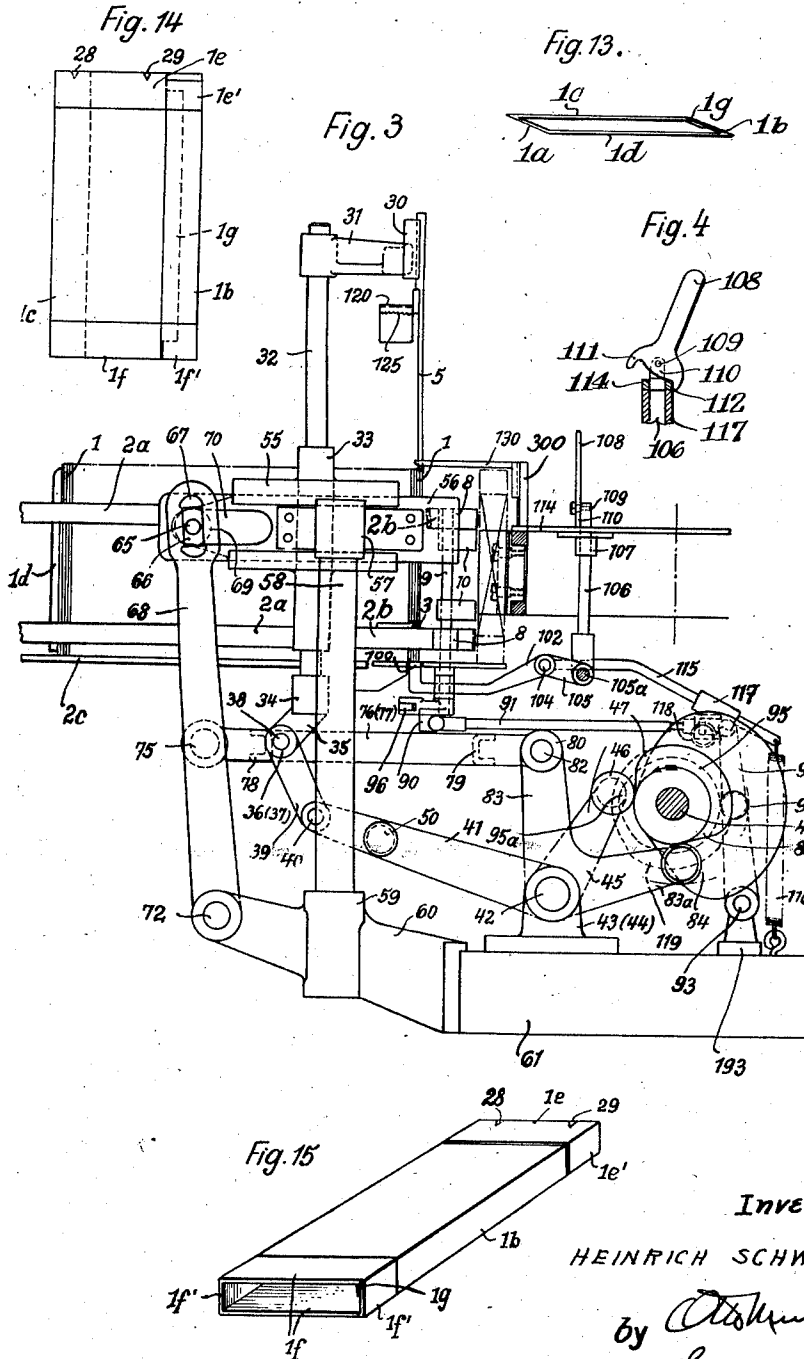
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MACHINE FOR WITHDRAWING FROM A PILE, AND OPENING COLLAPSED FOLDING BOXES

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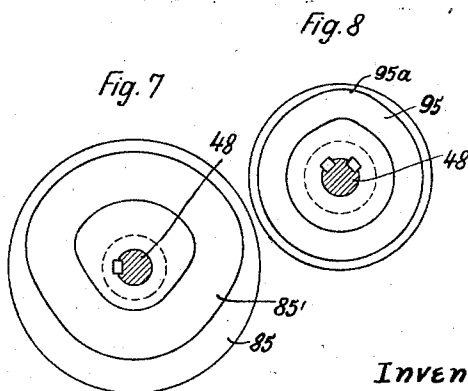
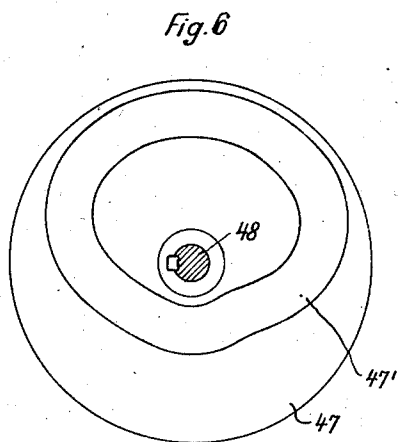
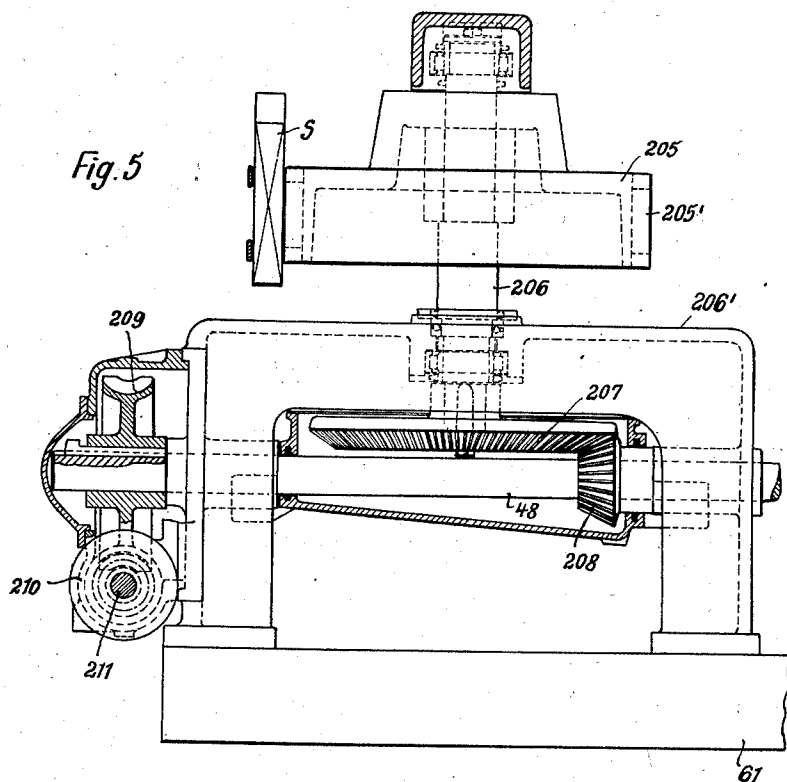
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MACHINE FOR WITHDRAWING FROM A PILE, AND OPENING COLLAPSED FOLDING BOXES

Filed March 24, 1938

5 Sheets-Sheet 4



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2,147,994

MACHINE FOR WITHDRAWING FROM A PILE. AND OPENING COLLAPSED FOLDING BOXES

Filed March 24, 1938

5 Sheets-Sheet 5

Fig. 9

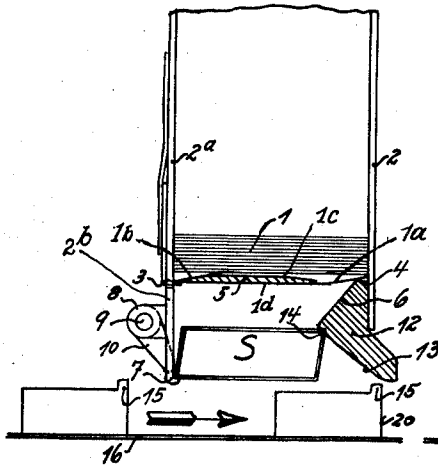


Fig. 10

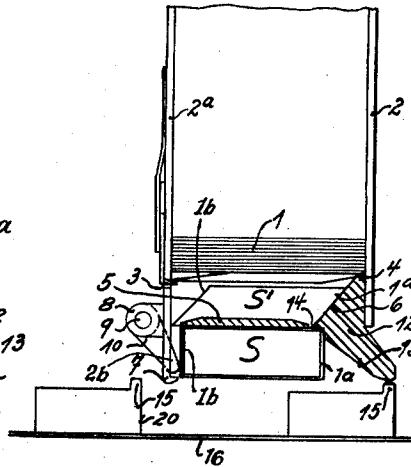


Fig. 11

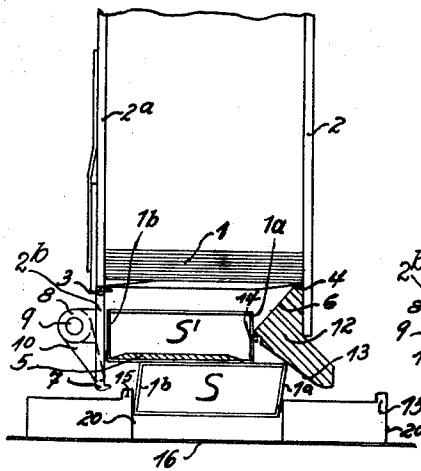
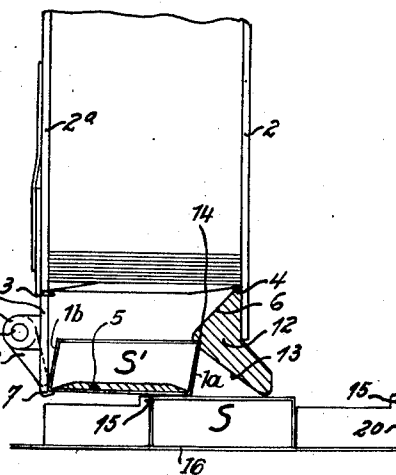
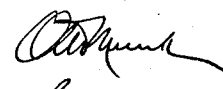


Fig. 12



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UNITED STATES PATENT OFFICE

2,147,994

MACHINE FOR WITHDRAWING FROM A PILE,
AND OPENING COLLAPSED FOLDING
BOXES

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In Germany December 28, 1936

10 Claims. (Cl. 93—53)

My invention relates to machines for opening collapsed folding boxes or cartons which are stacked in a pile and shall be used for packaging. The invention relates more particularly to machines having a blade by means of which the foremost collapsed box is withdrawn from the pile, guided past a device for opening the collapsed box, and fed to a conveyer device. For instance, said conveyer device serves to feed the opened boxes to means for closing the bottom side of the box, for filling the box, and for closing the filled box.

One object of my invention is to provide an improved machine having a continuously driven conveyer device so as to allow a considerable increase in the feeding speed of the conveyer device, and consequently in the working speed of the devices co-operating with the conveyer device, such as, for instance the devices for forming the bottom of the box and for filling and closing the same.

Other objects of my invention will be seen from the following description.

In the accompanying drawings, a machine embodying my invention is illustrated by way of example.

In the drawings:

Fig. 1 is a plan view of the machine, the table of the machine being partly broken away,

Fig. 2 is, in a larger scale, an elevation of a part of the machine, generally on the line VI—VI in Fig. 1, viewed in the direction of the arrows, parts being omitted,

Fig. 3 is an end elevation of a part of the machine, viewed in the direction of the arrow VII in Fig. 1,

Fig. 4 is a detail on a larger scale, showing a handle for interrupting the feed of the collapsed boxes or blanks,

Fig. 5 is an elevation showing the drive of the driven conveyer pulley, viewed in the direction of the arrow IX in Fig. 1,

Figs. 6, 7 and 8 are elevations of three cams forming part of the control,

Figs. 9, 10, 11 and 12 are diagrammatic plan views illustrating the operation of the blade,

Fig. 13 is an end elevation of a collapsed box, as contained in the magazine shown in Figs. 9, 10, 11, and 12, on a larger scale,

Fig. 14 is a plan view of the box shown in Fig. 13, on a smaller scale than in Fig. 13, and

Fig. 15 is a perspective view of the opened box. Similar reference numerals denote similar parts in the different views.

Referring now to the drawings, and first to

Figs. 1 to 5, 61 is the table of the machine which is shown partly broken away in Fig. 1. 206' is a U-shaped bracket secured on the table 61. The bracket 206' supports in a suitable bearing the vertical shaft 206 of the driving conveyer pulley 205. A similar bracket, not shown, is provided and secured on the table 61 for supporting the vertical shaft 202 of the idle conveyer pulley 201. 48 is the main shaft of the machine which is mounted in suitable bearings in the vertical pedestals of the said brackets, as shown for the bracket 206' in Fig. 5. Continuous rotation is imparted to the main shaft 48 from the driving shaft 211 of the machine through the medium of a worm 210 on the driving shaft 211, and a worm wheel 209 on the main shaft 48. The driving shaft 211 is rotated from any suitable and known source of power, not shown, by means of the pulley 212 secured to the shaft 211. Rotation is imparted to the vertical shaft 206 of the driving pulley 205 by means of a bevel gear 207 keyed on the vertical shaft 206, and a bevel pinion 208 keyed on the main shaft 48. The pulley 205 rotates clockwise.

The conveyer 16 is a belt of any suitable material, such as steel, on which are secured drivers 15 spaced to form suitable receptacles or pockets for the reception of the opened boxes S between their end walls 20. The drivers 15 have inwardly directed spurs 15' which are adapted to engage in notches 201' and 205', respectively, of the driven and driving conveyer pulleys 201 and 205, so that the pulleys are positively connected by the belt 16.

The collapsed folding boxes 1 to be opened are stored in vertical position between a pair of upper horizontal bars 2, 2a, and a pair of similar lower bars 2, 2a, as best seen in Figs. 2 and 3, the two pairs of bars making up a magazine, with a pair of horizontal bars 2c at the bottom, and with a movable rear plate 1d for feeding the pile of blanks under action of pressure exerted by the feed plate 1d. For this purpose, the feed plate 1d is acted upon in a forward direction by any suitable means, as for example weights, ropes and pulleys, such means being known per se for this purpose and described, for instance, in the prior Patent No. 1,848,707. By way of example, two magazines have been shown in Figs. 2 and 3 side by side, and obviously any desired number of magazines can be arranged, as desired or required for a given output. The conveyer belt 16 moves past the magazines from the left to the right in Fig. 1. The two magazines are quite similar, and so only one of

them will be described, the parts relating to the other magazine being distinguished by the appendix "a" to the corresponding reference numerals.

5 There is provided a blade 5 (or 5a) for each magazine. Each blade, as best seen in Fig. 2, comprises a pair of parallel parts with a space 25 between them, so that they have the shape of a fork, the upper ends of the blades being adjustably secured to holders 30 and 30a, respectively. Their lower ends 26 and 27 are pointed for cooperating in the well known manner and for the known purpose with triangular notches 28 and 29 provided in the upper ends of the collapsed boxes 1. Secured to one side of each blade is an angular member 120 which supports a short rack 125 with downwardly directed teeth.

Item 100, Fig. 3, is a movable bottom plate near the outlet end of the magazine. The bottom plate is secured to the free end of an arm 102 fixed on a transverse shaft 104 which is rotatably supported in suitable bearings, not shown, of the machine framing. 130 is a stationary horizontal downholder bar arranged above, and in front of, the magazine, intermediate the two parts of the forked blade 5. The bar 130 is adjustably secured to a suitable post 300 of the machine framing.

The lateral bars 2a of each magazine have forward extensions 2b, each with a hook 7 at its outer end, as best seen in Figs. 9 to 12. Mounted in suitable bearings 8 at the outer side of the extensions 2b is a vertical shaft 9 with a pair of fingers 10 projecting toward the outer end of the magazine, one below the extension 2b of the upper bar 2a, and the other above the extension 2b of the lower bar 2a. 3 is a spring catch at the inner end of each extension 2b. A vertical angle bar 12 is secured to the inner side of the lateral bars 2. The inner flange of the angular bar 12 presents an oblique surface 6 and is flattened at its inner end at 4, a little to the rear of the catch 3, in the direction in which the collapsed boxes are fed, and its outer flange presents an oblique surface 13. The angular bar 12 is notched at 14 in the immediate vicinity of its crest.

The controls of the machine will now be described.

56 and 56a are a pair of horizontal slide bars which extend in parallel relation to each other and to the direction in which the collapsed boxes are conveyed, along the outer sides of the two magazines, and are supported by the upper ends of vertical rods 53 and 53a, respectively, whose lower ends are suitably inserted and fixed in sleeves 59 and 59a, respectively, the sleeve 59 forming part of a bracket 60 at the left, and the sleeve 59a forming part of a bracket 60a at the right, as viewed in Fig. 2. The said brackets are secured to one side of the table 61. Mounted to slide on the horizontal bars 56 and 56a are a cross head 55 with a vertical sleeve 33, and a cross head 55a with a vertical sleeve 33a. Rods 32 and 32a are mounted to slide vertically in the respective sleeves, and the upper ends of the rods are connected by the cross bar 31 on which are secured the holders 30 and 30a of the blades 5 and 5a.

The sliding rods 32 and 32a are under the control of a blade-reciprocating cam 47, with a cam groove 47', and the cross heads 55 and 55a are under the control of a cross-head reciprocating cam 85, with a cam groove 85'. The two cams are keyed on the main shaft 48.

An arm 41, Figs. 2 and 3, is mounted for free

oscillation on one end of a transverse shaft 42 which is mounted in a pair of bearings 43, 44 on the table 61. The free end of the arm 45 is equipped with a roller 46 engaging in the cam groove 47' of the blade-control cam 47. An arm 41 is integral with the arm 45 and pivotally connected at 40 to a link 39. This link is pivoted at 38 to the eyes 36, 37 of a fork 35 forming part of a sleeve 34 which is secured to the sliding rod 32. The arm 41 is connected to an arm 41a by means of a cross-stay 50. This arm 41a is similar to the arm 41 and mounted for free oscillation on the opposite end of the shaft 42. The free end of the arm 41a is connected to the other sliding rod 32a by means similar to those described for the arm 41 and rod 32, and distinguished by the appendix "a".

Item 72 is a transverse shaft mounted in bearings at the ends of the brackets 60 and 60a. 66 is an arm mounted to oscillate about one end of the shaft 72. At its free end, the arm has a slotted eye 67 engaging a quadrant block 66. This quadrant block is rotatably mounted on a pin 65 which projects through a slot 70 in the slide bar 56 and is secured in a rear extension of the cross head 55. A flange 69 on the pin 65 slides in the slot 70, and a washer 71, Fig. 2, is inserted between the block and the flange. A similar mechanism whose parts are distinguished by the appendix "a", is provided for the other cross head 55a. The two arms 66 and 66a on the opposite ends of the shaft 72 are connected by a transverse stay 75 on which are suitably fulcrumed eyes 80a at the outer end of a frame, of cast steel or other suitable material, with a pair of side bars 76 and 77, of channel section, which converge toward the table 61 and are braced by stays 78 and 79, also of channel section. The inner end of the frame is fulcrumed on a rod 82 with a pair of eyes 80, and this rod is supported by the free ends of a bellcrank 83, 83a, and of an arm 86, which are mounted to oscillate on the shaft 42 between the bearings 43 and 44. The arm 83a of the bellcrank has a roller 84 at its free end which engages in the cam groove 85' of the cross-head control cam 85.

The finger shafts 9 at the sides of the magazines are operated by the finger-control cam 95 which is keyed on the main shaft 48 and has an elevation 95a, Fig. 8. An arm 90 is keyed on the lower end of that finger shaft 9 which is at the side of the left magazine, as viewed in Fig. 2, and this arm is connected, by a link 91, to a rocking arm 92, Fig. 3, which is fulcrumed on the table 61 at 93 in a bracket 193. A spring, not shown, holds a roller 94 on the rocking arm 92 against the finger control cam 95. A link 96, Fig. 1, connects the arm 90 to an arm 97 on the other finger shaft 9.

The single steps of the operation of the mechanism so far described will now be described with reference to Figs. 9 to 12 as follows:

A pile of collapsed boxes or cartons 1 is placed in the magazine, with the foremost collapsed box bearing against the spring catch 3 (Fig. 9) at one side, and against the offset inner end 4 of the angular piece or bar 12 at the opposite side.

The shape of the collapsed boxes is best seen from Figs. 13 and 14. Each box consists of a flat sleeve of card board or the like, comprising side walls 1a and 1b, a top wall 1c, a bottom wall 1d, and pairs of end flaps 1e, 1e' and 1f, 1f'. The joint 1g is formed by overlapping portions, held together by an adhesive.

In Fig. 9, a box S which has been opened, is ready for ejecting but is, for the present, retained

by its left lower edge resting on the hooks 7, and its right upper edge engaging in the notch 14 below the crest of the angle bar 12. The blade 5 has been lowered into the foremost collapsed box by the blade-reciprocating cam 47 and the described connecting mechanism. The blade is now advanced, that is to say, moved in a continuous stroke toward the right in Fig. 3, by the cross-head reciprocating cam 85 and the described connecting mechanism, until the blade has reached the position illustrated in Fig. 12. On the way of the blade 5 from the position shown in Fig. 9 to the position shown in Fig. 10, the foremost box S' is withdrawn by the blade from the pile, and the box is partly opened or erected by its right-hand side wall 1a sliding along the inwardly projecting oblique surface 6 of the vertical angular member or bar 12. In the position shown in Fig. 10, the finger-control cam 95, by its elevation 95a, moves the fingers 10 inwards, imparting rectangular shape to the box S and pushing its left edge away from the hooks 7.

During the further advance of the blade 5 from the position shown in Fig. 10 to the position shown in Fig. 11, the blade 5 shifts the box S in between the end faces 20 of two drivers 15 which feed it to the right, as indicated by the arrow in Fig. 9. At the same time, the subsequent box S' has had its side walls 1a and 1b fully erected by the cooperation of the blade with the crest of the angle bar 12.

In the position shown in Fig. 12, the blade 5 has arrived at the end of its horizontal forward movement. The box S' which has reassumed a parallelogram shape under action of its elastic forces, is now in the position formerly occupied by the box S in Fig. 9, and is held in an intermediate position between the hooks 7 and the notch 14. The blade is now retracted in upward direction and returned toward the left in Fig. 2 into its initial position, ready for entering the foremost collapsed box of the pile.

It will thus appear that for withdrawing from the pile, and opening, the foremost collapsed box 1, the blade 5 is introduced into the foremost box, separating the side walls 1d and 1c of the box from each other, whereupon the blade is continuously advanced into its final forward position, Fig. 12, past the intermediate positions, Figs. 10 and 11, and entrains the box which is being opened. On this way, the left edge of the withdrawn box S' moves along, and is guided by, the extensions 2b while its right edge slides along the oblique surface 6 of the angle bar 12, as shown in Fig. 10 so that the walls of the box are erected, that is to say, the box is spread open. Immediately after the box has been opened, it is engaged by what may be termed the intermediate holding means, before the box is delivered to the conveyer 16. This intermediate holding means includes the hooks 7 at the front ends of the bar extensions 2b on the one hand, which hooks are in close vicinity to the outer ends of the drivers 15, and the notch 14, on the other hand, which is in line with the upper right hand edge of the fully erected box. This edge enters the notch 14 immediately after the blade 5 has moved the flap 1a past the crest of the angular member 12, under the resilient reaction of the box against deformation, while the diagonally opposite edge of the box is retained by the hooks 7. The blade 5 is now withdrawn from the fully opened box and returned into its initial position, while the box S is retained by the intermediate holding means 7, 14, Fig. 12. Shortly before, or as soon as, the blade, with the subse-

quent box S', presses against the rearward wall of the opened box S deposited in the intermediate holding means 7, 14, the fingers 10 are operated and shift the forward left-hand edge of the box away from the hooks 7, whereby a rectangular configuration is imparted to the box S, Fig. 10, and the box S is shifted further by the continuous movement of the blade 5, Fig. 11, its right rearward edge leaving the notch 14. The box is now free, and its forward edge, at the forward end of the left flap 1b, is moved towards the advancing front 20 of the trailing driver 15 which is in the appropriate position. The right upper edge at the side wall 1a bears against, and slides along, the oblique surface 13 of the angle bar 12 which extends from the notch 14 almost as far as the path of the drivers 15. The box S is fully inserted in the pocket between the two drivers by the shifting action of the blade 5 against its rearward wall 1c while the trailing driver 15, by its front face 20, shifts the box along the surface 13 with its rearward right edge so that when the blade has completed its horizontal forward stroke, Fig. 12, the opened box S is in proper position between two drivers 15 in a pocket of the conveyer. By suitable means which are old in the art (cf. for example U. S. Patents 1,622,709, 1,779,817 and 1,832,262) and, therefore, have not been illustrated, the bottom flaps 1f, 1f' of the box (Fig. 15) are now closed and the box is filled and finally conveyed to a device by which the head flaps 1e, 1e' of the box are folded over and closed.

While in machines of this kind, as designed heretofore, the elastic reaction of the boxes was considered as a drawback, and special means had to be provided for eliminating it, in the machine according to my invention, on the contrary, this reaction is utilized for effecting a rapid and reliable transfer of the boxes from the pile to the conveyer 16 on a short way by the inherent elasticity of the advancing boxes.

The above mentioned racks 125 and 125a at the sides of the blades 5 and 5a exert friction against the upper edges of the underneath lying boxes 1 of the pile when the blades perform their forward stroke, tending to move the said boxes in forward direction towards the catches 3 and 3a, and the recessed inner ends 4 and 4a of the angle bars 12 and 12a. This frictional action is advantageous since the piled flat boxes tend to become deflected toward the rear and to assume an inclined position in the pile which might interfere with the proper entering of the blade into the collapsed boxes. Thus, by means of the racks 125 and 125a exerting frictional and shifting action against the upper edges of the piled collapsed boxes, a regular and reliable withdrawal of the boxes by the blades is secured.

The horizontal downholder bars 130 and 130a retain the opened boxes in the intermediate holding means 7, 14, shown in Fig. 12, when the blades 5, 5a ascend, so that the boxes will not adhere to the ascending blades.

If there is trouble of any kind with the means for filling the boxes, or for folding over the head flaps of the boxes, to which the opened boxes S are conveyed by the conveyer 16, the further supply of boxes from the piles may be readily and simply interrupted. This is effected by means of the movable bottom plates 100, 100a, already referred to. An arm 105, Fig. 3, which is rotatably supported on the shaft 104, is pivotally connected to the forked lower end of a vertical slide rod 106 by a pin 105a. The upper end of the slide rod 106 is guided in a sleeve 107 attached to the

lower side of a horizontal bar 114 which is suitably secured to the machine framing, and pivotally connected at 109 to a handle 108 having a cam 110 and a pair of projections 111 and 112. 115 is another arm keyed on the said shaft 104, 116 is a spring attached to the free end of the arm 115 at one end and suitably anchored on the table 61 at the other end, and 117 is a sleeve which is adjustably mounted on the arm 115 and supports a roller 118 for cooperation with a cam 119 on the main shaft 48. The spring 116 tends to pull down the slide rod 106 and to force the roller 118 against the circumference of the cam 119 but is prevented from doing so by the handle 108 which is normally in the position illustrated in Fig. 4, in which the said projection 112 bears against one side of the bar 114. In this position, the roller 118 is clear of the cam 119. The handle is held in its position according to Fig. 4 by friction or suitable locking means (not shown).

When it is desired to interrupt the feed of boxes, without stopping the drive of the machine, the handle 108 is turned to the left in Fig. 4 until the projection 111 bears against the adjacent side of the bar 114. The spring 116 now pulls down the slide rod 106 and holds the roller 118 against the concentric portion of the cam 119. At the same time, the bottom plates 100 and 100a are elevated by the arms 102 and 102a and raise the foremost few blanks. The blades 5, 5a are now unable to enter the triangular notches 28 and 29 in the upper edge of the foremost box 1 of the pile but slide along the outside of the wall 1d of this box when descending, without entering and feeding the box. When the eccentric portion of the cam 119 strikes the roller 118, the arm 115 is elevated against the action of the spring 116, and the bottom plates 100, 100a are lowered. The lifted boxes are returned into their initial position by the angles 120, 120a of the blades. This alternating ascending and descending movement of the bottom plates 100, 100a with the boxes is repeated until the handle 108 is thrown over to the right in Fig. 4 whereupon the normal feed is reestablished.

While I have herein shown and described certain preferred embodiments of my invention, I wish it to be understood that I do not confine myself to all the precise details herein set forth by way of illustration, as modifications and variations may be made without departing from the spirit of the invention or exceeding the scope of the appended claims.

I claim:

1. A machine of the type specified, comprising, in combination, a magazine for holding a pile of collapsed folding boxes, a blade adapted to withdraw the foremost box from the magazine and to feed it in the longitudinal direction of the magazine, means arranged in the feeding path of the boxes and adapted to open the same, continuously driven conveyer means provided with receptacles for the reception of the opened boxes and arranged transversely relative to the feeding path of the boxes, means arranged intermediate said opening means and the conveyer means and adapted to hold the box open, said blade being operated to guide the withdrawn box past said opening means, and to deposit the opened box in the said intermediate holding means and simultaneously to transfer the box previously deposited in this holding means, by pressing against the rear wall of the box, into a receptacle of the said conveyer means.

2. A machine of the type specified, comprising, in combination, a magazine having two longitudinal side walls for holding a pile of collapsed folding boxes stacked in the said magazine, a blade adapted to withdraw the foremost box from said magazine and to feed it in the longitudinal direction of the magazine, a longitudinal extension on one side wall of the magazine, a member arranged opposite to this extension at the inside of a longitudinal extension of the other side wall and provided with an inwardly projecting oblique surface, continuously driven conveyer means provided with receptacles for the reception of the opened boxes and arranged transversely relative to the feeding path of the boxes, means arranged intermediate said opening means and the conveyer means and adapted to hold the box open, said blade being operated to guide the withdrawn box past said inwardly projecting oblique surface and the extension of the opposite side wall for opening the box, and to deposit the opened box in the said intermediate holding means and simultaneously to transfer the box previously deposited in this holding means, by pressing against the rear wall of the box, into a receptacle of the said conveyer means.

3. Machine of the type specified, comprising, in combination, a magazine having two longitudinal side walls for holding a pile of collapsed folding boxes stacked in said magazine, a blade adapted to withdraw the foremost box from said magazine and to feed it in the longitudinal direction of the magazine, means for opening the box and formed by a longitudinal extension on one side wall of the magazine and by a member provided with an inwardly projecting oblique surface arranged opposite to this extension at the inside of an extension of the other side wall, continuously driven conveyer means provided with receptacles for the reception of the opened boxes and arranged transversely relative to the feeding path of the boxes, means arranged intermediate said opening means and the conveyer means and adapted to hold the box open, said blade being operated to guide the withdrawn box past said opening means, and to deposit the opened box in the said intermediate holding means and simultaneously to transfer the box previously deposited in this holding means, by pressing against the rear wall of the box, into a receptacle of the said conveyer means, said intermediate holding means being formed by a groove-like rest provided behind the said inwardly projecting oblique surface and by a hook-like rest at the foremost end of the said longitudinal extension of the opposite side wall.

4. A machine of the type specified, comprising, in combination, a magazine having two longitudinal side walls for holding a pile of collapsed folding boxes stacked in said magazine, a blade adapted to withdraw the foremost box from said magazine and to feed it in the longitudinal direction of the magazine, means for opening the box and formed by a longitudinal extension on one side wall of the magazine and by a member provided with an inwardly projecting oblique surface arranged opposite to this extension at the inside of an extension of the other side wall, continuously driven conveyer means provided with receptacles for the reception of the opened boxes and arranged transversely relative to the feeding path of the boxes, means for holding the box open arranged intermediate said opening means and the conveyer means and formed by a groove-like rest behind said inwardly projecting oblique surface

and by a hook-like rest at the foremost end of the said longitudinal extension of the opposite side wall, said blade being operated to guide the withdrawn box past said opening means, and to deposit the opened box in the said intermediate holding means and simultaneously to transfer the box previously deposited in this holding means, by pressing against the rear wall of the box, into a receptacle of the said conveyer means, movable means arranged and operated to push the longitudinal edge of the box away from the said hook-like rest for this transfer, and an oblique surface emerging from the said groove-like rest outwardly in the feeding direction approximately to the path of the conveyer means for guiding the box in its opened condition during the transfer.

5. A machine of the type specified, comprising, in combination, a magazine for holding a pile of collapsed folding boxes, continuously driven conveyer means travelling in spaced relation past the foremost box of said pile, means adapted to open the collapsed boxes, means arranged intermediate said conveyer means and the said opening means and adapted to hold the opened box open, and means comprising a blade adapted to withdraw the foremost collapsed box from said magazine, to feed the box past the said opening means, and to deposit the opened box in the said intermediate holding means, thereby transferring the previously deposited box from this holding means into the said conveyer means by pressing against the rear wall of the box.

6. A machine of the type specified, comprising a magazine for holding a pile of collapsed folding boxes, means arranged in continuation of the magazine and adapted to open the boxes, conveyer means for feeding the opened boxes, and a blade adapted to withdraw the foremost collapsed box from said magazine and to feed it in the longitudinal direction of the magazine past the said opening means to the conveyer means, said blade being provided with a toothed member extending parallel to the upper side of the pile and adapted to engage, at the feeding stroke of the blades, frictionally the upper edges of collapsed boxes forming the forward end of the pile.

7. A machine of the type specified, comprising a magazine for holding a pile of collapsed folding boxes, means arranged in continuation of the magazine and adapted to open the boxes, conveyer means for feeding the opened boxes, means provided intermediate the conveyer means and the opening means and adapted to hold the box open, a blade and operating means adapted to insert the blade into the foremost box of the magazine, to advance the blade in the longitudinal axis of the magazine for withdrawing the box and feeding it past the opening means to the intermediate holding means, to retract the blade from the box deposited in this holding means, and to return the blade to its initial position, and means adapted to retain the box in said holding means during the retraction of the blade.

8. A machine of the type specified, comprising

ing a magazine for holding a pile of collapsed folding boxes, means arranged in continuation of the magazine and adapted to open the boxes, conveyer means for feeding the opened boxes, means provided intermediate the conveyer means and the opening means and adapted to hold the box open, a blade and operating means adapted to insert the blade into the foremost box of the magazine, to advance the blade in the longitudinal axis of the magazine for withdrawing the box and feeding it past the opening means to the intermediate holding means, to retract the blade from the box deposited in this holding means, and to return the blade to its initial position, and means adapted to retain the box in said holding means during the retraction of the blade, said retaining means consisting of a rail extending above the said intermediate holding means parallel to the feed path of the boxes and in continuation of the upper side of the pile.

9. A machine of the type specified, comprising a horizontal magazine for holding a pile of collapsed folding boxes, means arranged in continuation of the magazine and adapted to open the boxes, conveyer means for feeding the opened boxes, a blade and operating means adapted to lower the blade into the foremost collapsed box of the magazine and to advance the blade in a horizontal direction for withdrawing the foremost box from the magazine and feeding the withdrawn box past the opening means to the conveyer means, and means to prevent the blade from withdrawing the foremost box, comprising a movable support under a number of collapsed boxes forming the forward end of the pile, automatic driving means adapted to lift and lower said support, said driving means being normally inoperative, and manually actuated means for making said automatic driving means operative to lift the support prior to the lowering of the blade, the blade being provided with means to again lower, at each downward stroke of the blade, the boxes if lifted by the support.

10. A machine of the type specified, comprising a magazine for holding a pile of collapsed folding boxes, means arranged in continuation of the magazine and adapted to open the boxes, conveyer means arranged across the axis of the magazine for feeding the opened boxes, means provided intermediate the conveyer means and the opening means and adapted to hold the box temporarily in a stationary, open position, a blade and operating means adapted to insert the blade into the foremost box of the magazine, to advance the blade in the longitudinal axis of the magazine for withdrawing the box and feeding it past the opening means to the intermediate holding means, to retract the blade from the box deposited in this holding means, and to return the blade to its initial position, and means adapted to retain the box in said holding means during the retraction of the blade by friction exerted by the resilient box.

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