

June 2, 1953

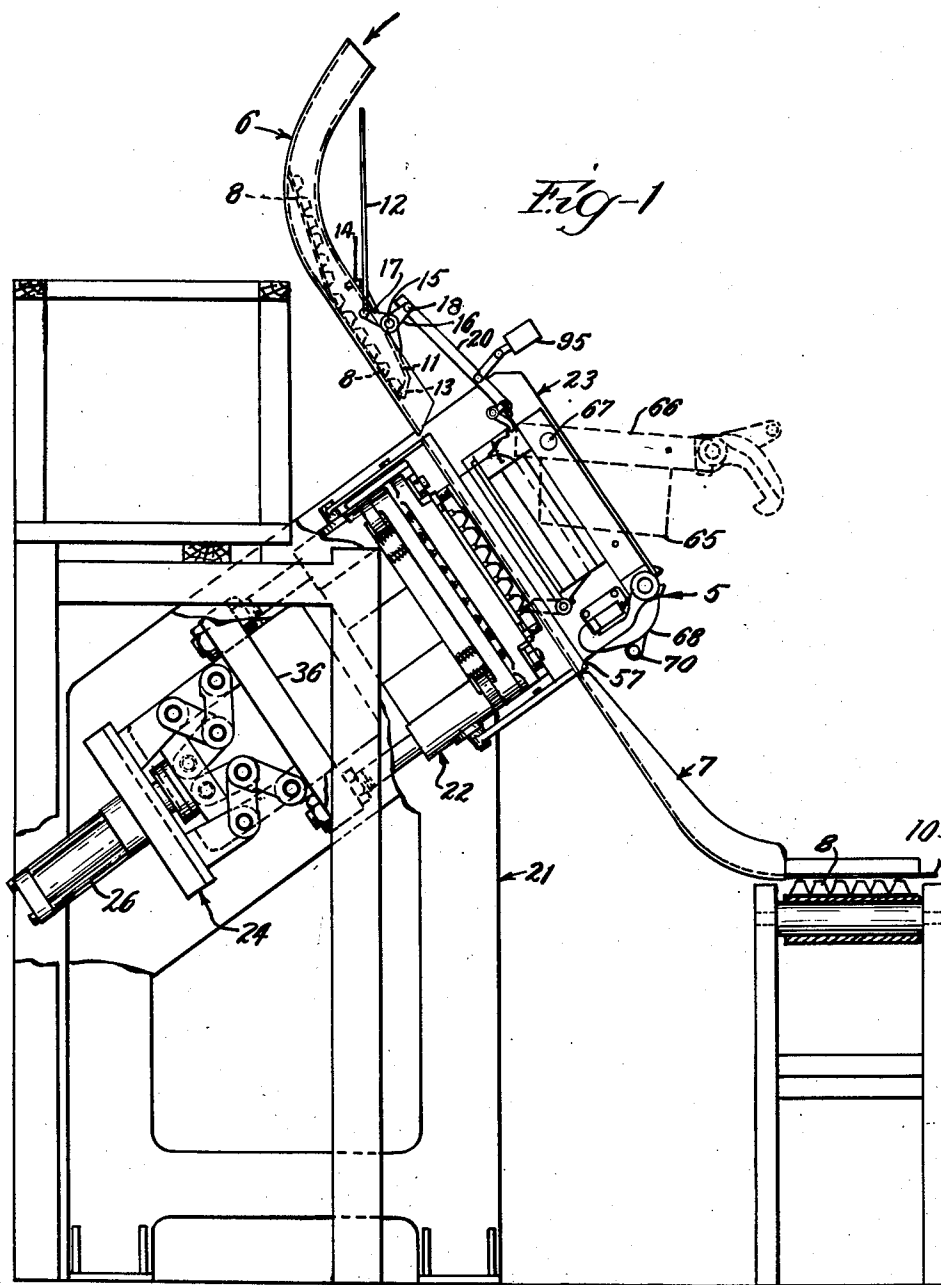
A. E. COMSTOCK

2,640,402

MOLDED PULP CARTON PRESS

Filed April 7, 1951

8 Sheets-Sheet 1



INVENTOR.

Alfred E. Comstock

BY

Cromwell, Treist & Warden

[Signature]

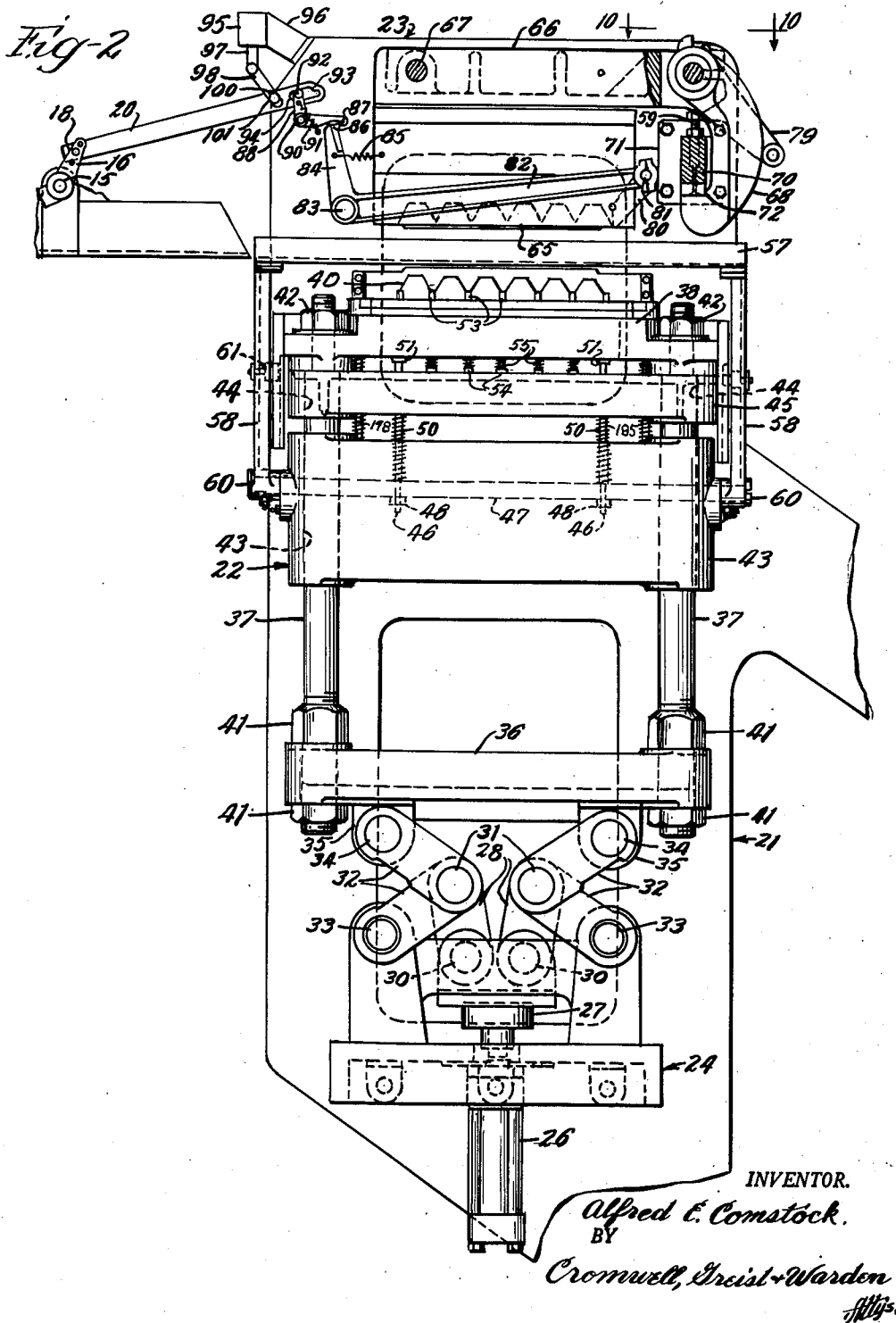
June 2, 1953

A. E. COMSTOCK
MOLDED PULP CARTON PRESS

2,640,402

Filed April 7, 1951

8 Sheets-Sheet 2



June 2, 1953

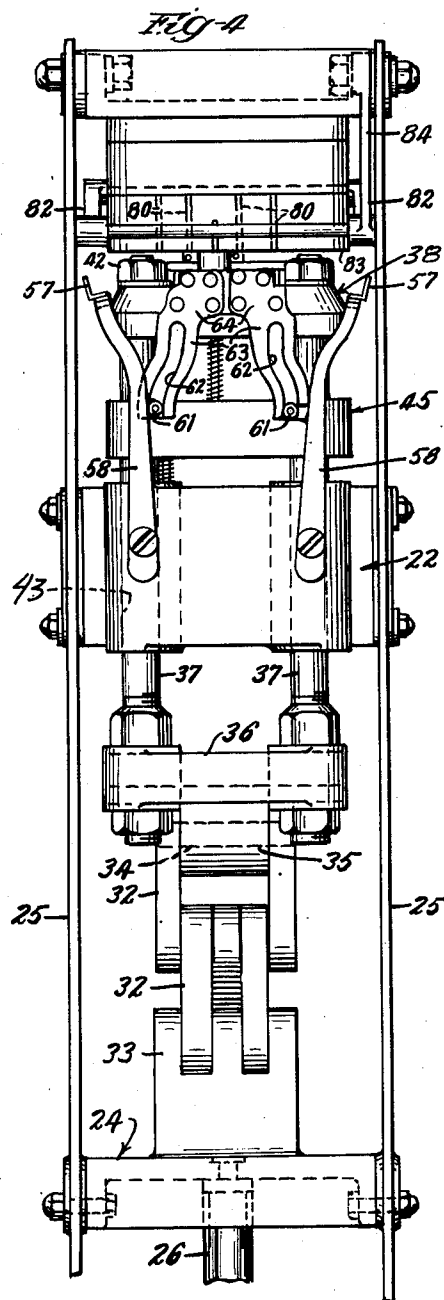
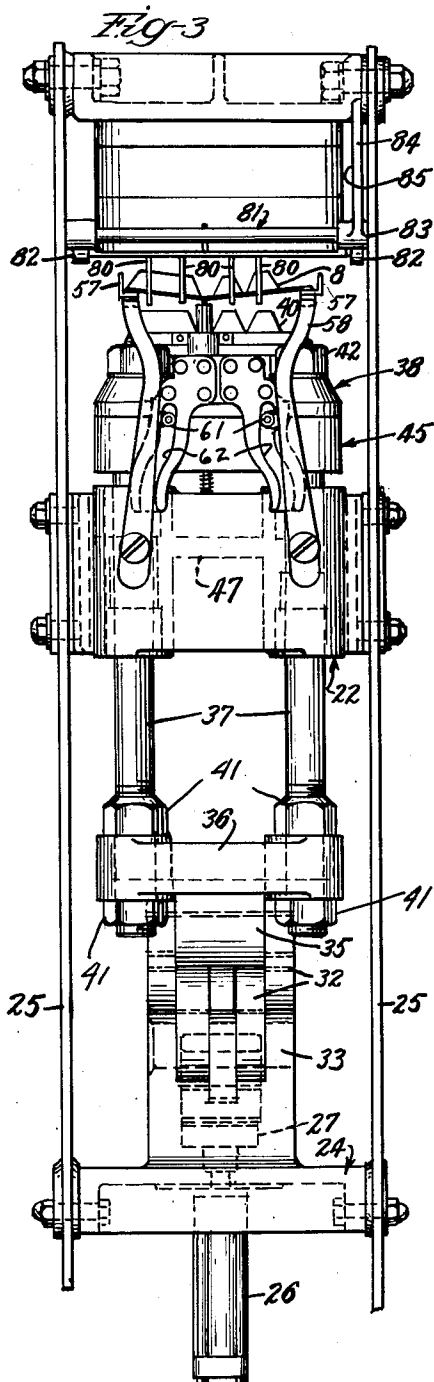
A. E. COMSTOCK

2,640,402

MOLDED PULP CARTON PRESS

Filed April 7, 1951

8 Sheets-Sheet 3



INVENTOR.

Alfred E. Comstock.

BY

Cromwell, Priest & Warden
Attys.

June 2, 1953

A. E. COMSTOCK

2,640,402

MOLDED PULP CARTON PRESS

Filed April 7, 1951

8 Sheets-Sheet 4

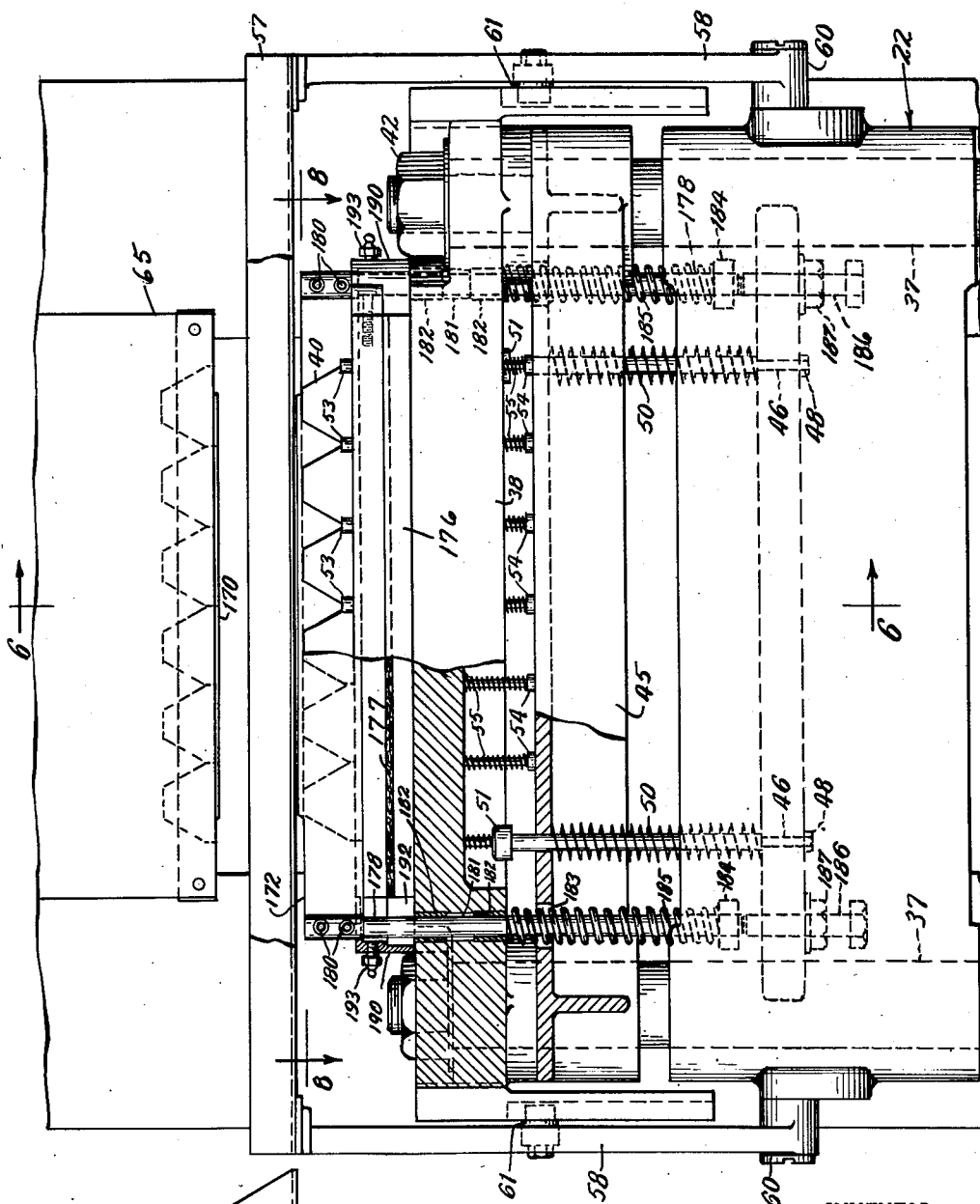


Fig. 5

INVENTOR.
Alfred E. Comstock.
BY
Cromwell, Treist-Warden
Attys.

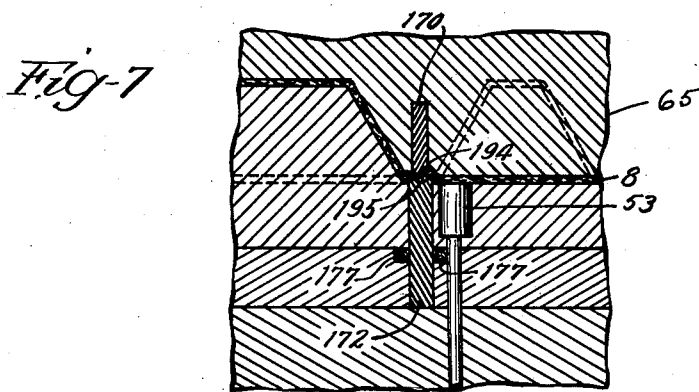
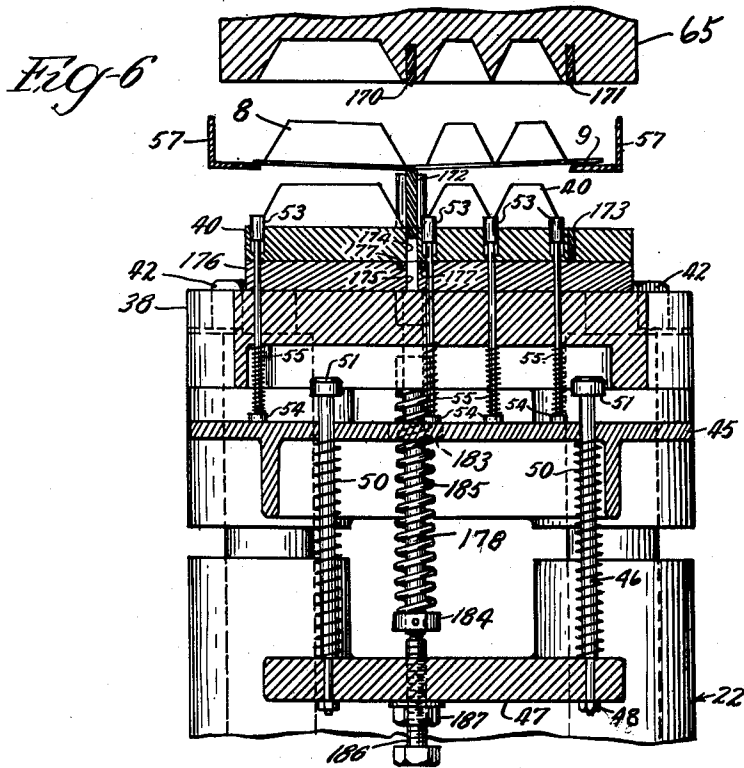
June 2, 1953

A. E. COMSTOCK
MOLDED PULP CARTON PRESS

2,640,402

Filed April 7, 1951

8 Sheets-Sheet 5



INVENTOR.
Alfred E. Comstock
BY
Cromwell Treist-Warden
Attys.

June 2, 1953

A. E. COMSTOCK

2,640,402

MOLDED PULP CARTON PRESS

Filed April 7, 1951

8 Sheets-Sheet 6

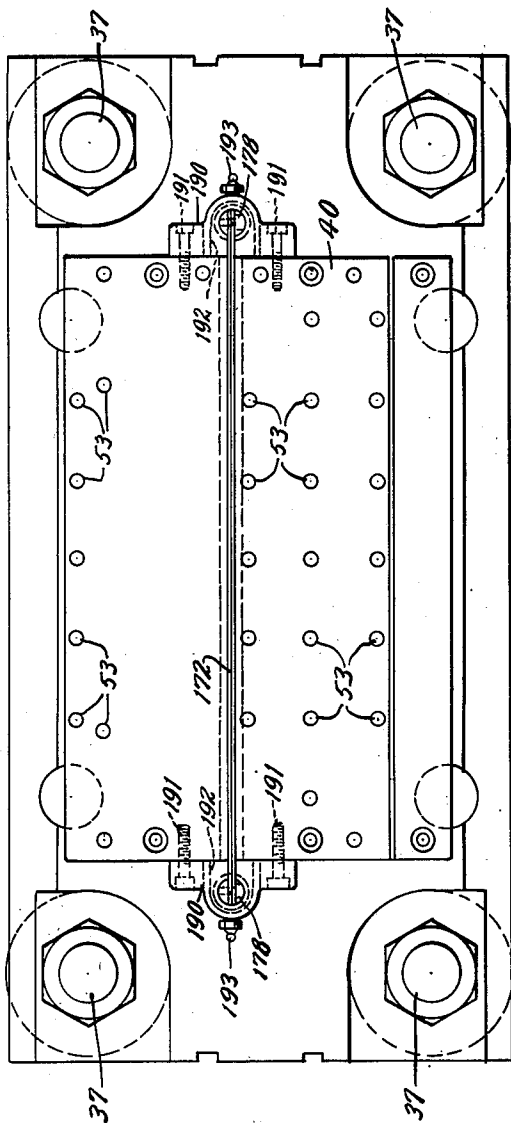
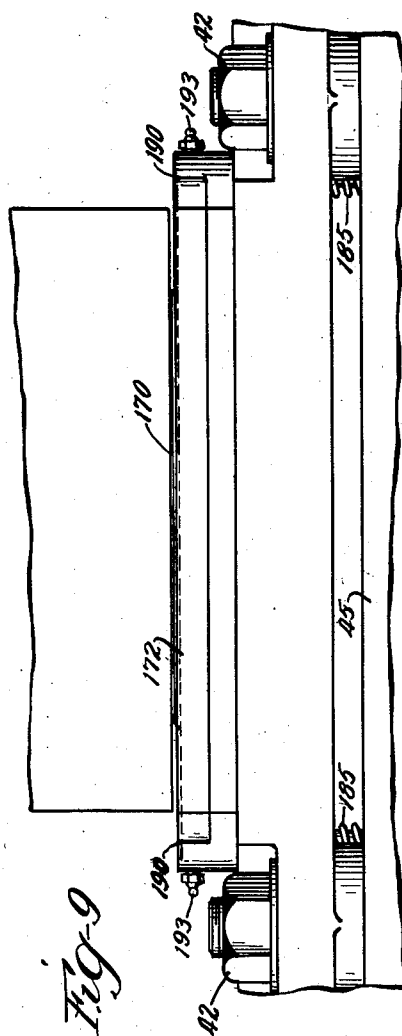


Fig. 8



6-627

INVENTOR.

Alfred E. Comstock.

BY

Cromwell, Treist Alwarden.

海。

June 2, 1953

A. E. COMSTOCK
MOLDED PULP CARTON PRESS

2,640,402

Filed April 7, 1951

8 Sheets-Sheet 7

Fig-10

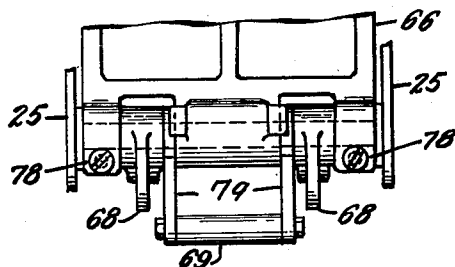


Fig-11

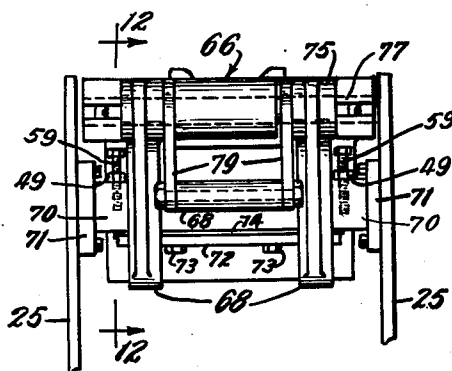
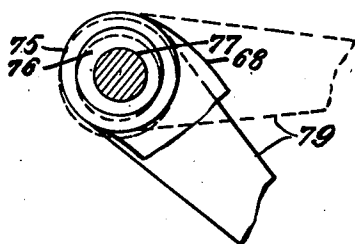


Fig-12



INVENTOR.

Alfred E. Comstock.

BY

Cromwell Greist & Warden

Attys.

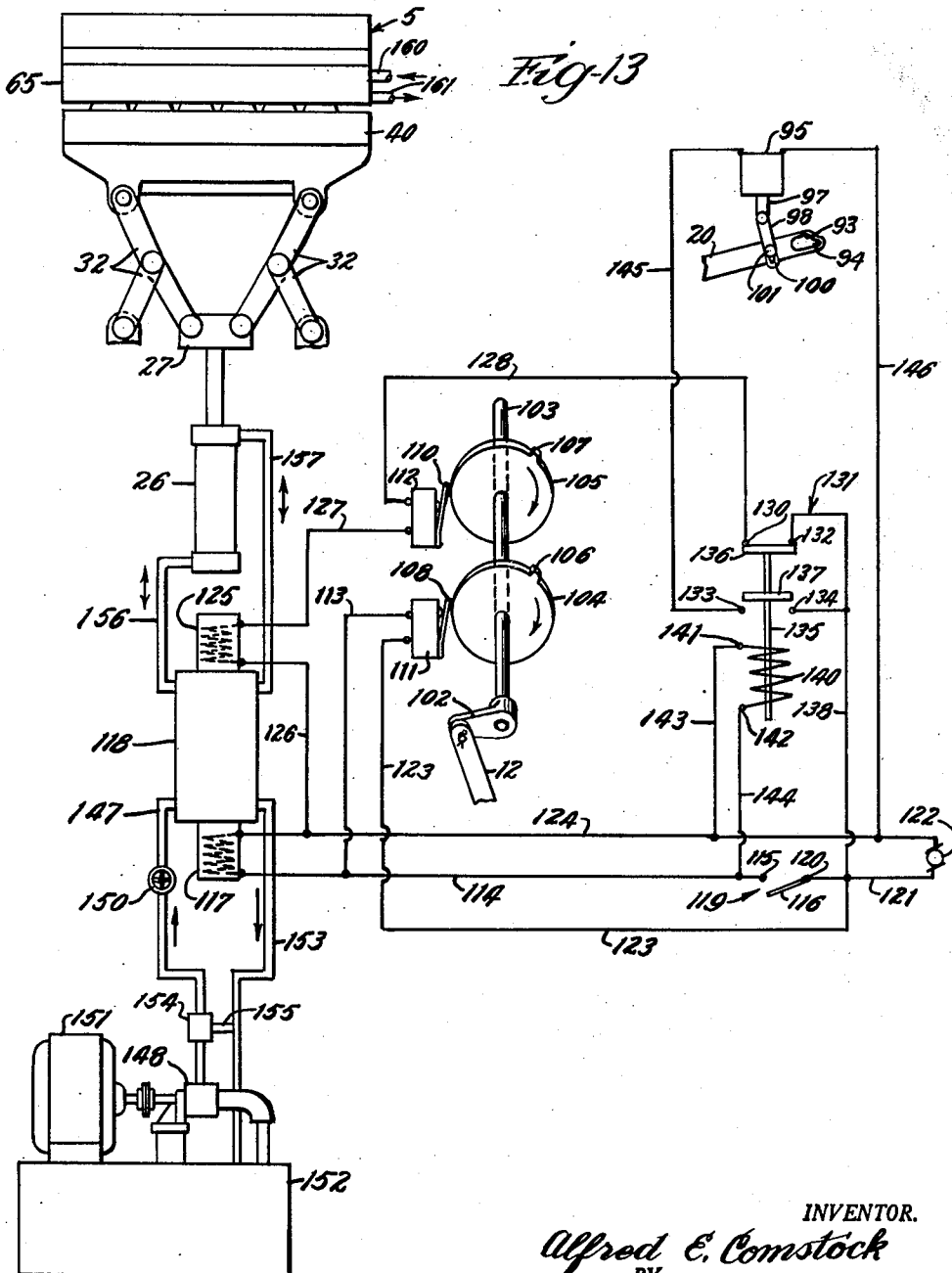
June 2, 1953

A. E. COMSTOCK
MOLDED PULP CARTON PRESS

2,640,402

Filed April 7, 1951

8 Sheets-Sheet 8



INVENTOR.

Alfred E. Comstock
BY
Cromwell, Dreist & Warden

Attys.

UNITED STATES PATENT OFFICE

2,640,402

MOLDED PULP CARTON PRESS

Alfred E. Comstock, Palmer, Mass., assignor to
Shellmar Products Corporation, Chicago, Ill., a
corporation of Delaware

Application April 7, 1951, Serial No. 219,841

6 Claims. (Cl. 92-68)

1

This invention relates, generally, to apparatus for pressing molded pulp articles, such as egg cartons, after they have been molded and dried, for the purpose of squaring up such articles and giving a smooth ironed or calendered finish thereto.

This application is a continuation-in-part of my copending application Serial No. 183,945 filed September 9, 1950.

When molded pulp articles such as egg cartons are made in accordance with the conventional manner in which a layer of pulp is formed over a foraminous die or screen and the wet molded article is passed through a drier, the dried articles will usually not be exactly square or true to shape and their surfaces will have a rough finish. According to the present invention I have found a practical apparatus and method for pressing the dried molded pulp articles as they are stripped and discharged from the molding apparatus so as to give the articles a smooth calendered or ironed finish and also to right or square up the articles and take out any warpage or distortion which may have set in during drying.

An important object of the invention is the combination of a finishing press with gravity delivery chutes leading from a pulp molding machine.

An important object of the invention is to hot-press dry molded pulp articles so as to impart a finished surface thereto and also to square up the articles as they are discharged through inclined chutes leading from the stripper of an automatic type molded pulp article making machine to a conveyor for removing the finished article away therefrom.

Another important object of the invention is to simultaneously hot-press and form fold scoring in drying molded pulp articles as they are discharged through inclined chutes leading from the stripper of an automatic type molded pulp article making machine to a conveyor for the finished articles.

Another important object of the invention is the combination of an automatically controlled press for dry molded pulp articles, such as egg cartons, as they are discharged through a chute leading from a stripper of an automatic type pulp molding and drying machine to a conveyor leading away therefrom, the press being operatively interconnected with the molded pulp article making machine and the control gates of the discharge chute so that the operation of the press is synchronized with that of the article producing machine.

2

Another important object of the invention is an automatic type finishing press for righting up and surface-finishing molded pulp articles, such as egg cartons, which is adapted to be installed in a discharge chute for the molded pulp articles and to be controlled by the apparatus which delivers the molded pulp articles into the chute.

Another important object of the invention is an automatic type hydraulic press for squaring up, fold scoring, and surface-finishing molded pulp articles which has male and female dies which are normally separated and at least one of which is movable relative to the other, wherein there are reciprocally operating article receiving guides adapted to be inserted as a section of a gravity type discharge chute for the molded pulp articles and to support each article as it passes through the chute until the press is closed sufficiently to support the article whereupon the support guides are withdrawn when the dies are closed and then returned to their article supporting position to support the article after the press is opened and the pressed articles has been discharged from the dies.

Still another important object of the invention is an automatic type press for molded pulp articles adapted to be located intermediate the ends of a gravity chute for such articles and including a stationary female die, a movable male die below the female die, reciprocally operating guides on opposite sides of the space between the dies when the press is opened and operable to support and guide each article into the press prior to closing and to support and guide each article out of the press when it is opened, and a separately operable score forming die member located in the male die adapted to cooperate with the female die to form a fold score in each article when the press is closed and to cooperate with the guides to serve as an intermediate support for each article as it is fed into the press prior to closing and again when the press is opened and the article is discharged.

Certain other objects of the invention will, in part, be obvious and will, in part, appear herein after.

For a more complete understanding of the nature and scope of the invention, reference may now be had to the following detailed description thereof taken in connection with the accompanying drawings, wherein:

Fig. 1 is an elevational view, partly broken away, showing a molded pulp article finishing press made in accordance with the present invention and combined with a gravity feed discharge

3

chute leading from the stripper of an automatic type molded pulp article making machine to a conveyor for removing the finished articles therefrom;

Fig. 2 is a side elevational view on enlarged scale of the press shown in Fig. 1 with certain parts of the press shown in a different position of operation;

Fig. 3 is an elevational view of the press taken from the left-hand side of Fig. 2;

Fig. 4 is a view corresponding to Fig. 3 but showing the relationship of the parts when the press is closed;

Fig. 5 is a fragmentary side elevational view on an enlarged scale and partly in vertical section of the mating dies and associated mechanism as viewed in Fig. 2;

Fig. 6 is a vertical sectional view with certain parts shown in elevation and taken on line 6—6 of Fig. 5;

Fig. 7 is an enlarged fragmentary detail section through the dies in closed condition and showing the means for forming fold scores in the articles being pressed;

Fig. 8 is a top plan view of the lower die taken on line 8—8 of Fig. 5;

Fig. 9 is a side elevational view showing the dies in closed condition;

Fig. 10 is a fragmentary top plan view taken along line 10—10 of Fig. 2 and showing the latching mechanism for the upper die block of the press;

Fig. 11 is a fragmentary elevational view of the latching mechanism shown in Fig. 10;

Fig. 12 is a fragmentary sectional view on enlarged scale taken on line 12—12 of Fig. 11; and

Fig. 13 is a diagrammatic view showing the control mechanism for the molded pulp article finishing press of Fig. 1.

Referring to the drawings, in Fig. 1 a finishing press is indicated, generally, at 5 which forms one embodiment of the present invention and which is combined with and positioned in a gravity feed egg carton discharge chute, the upper section of which is indicated at 6 and the lower section of which is indicated at 7. This discharge chute corresponds to any one of the discharge chutes 61 described in my copending application Serial No. 134,229 filed December 21, 1949. The upper section 6 of the chute leads from a carton stripper (not shown) such as the stripper forming the subject matter of my copending application. Such a stripper serves to strip dry molded pulp egg cartons of the type shown in U. S. Patent No. 2,455,295 from an automatic apparatus for forming such articles, including pulp molding equipment and article drying equipment. Molded pulp egg cartons 8 fall by gravity through the discharge chute and are discharged by the bottom section 7 upon a conveyor mechanism indicated at 10 which leads to equipment for printing and stacking the finished articles.

The molded pulp egg cartons 8 are of the 2 x 6 two-section type and each carton has a bottom section and a cover section. Three-section 2 x 6 cartons are also made commercially such as those disclosed in the copending application of Ruth M. Schilling Serial No. 632,331, filed December 3, 1945, now U. S. Patent 2,600,130. It will be understood that the apparatus of the present invention is applicable to the three-section cartons as well as the two-section cartons.

In most molded pulp machines, a plurality of the molded articles will be formed simultaneously

4

across the width of the machine. Accordingly, there will be a number of parallel discharge chutes leading from the stripper onto the conveyor 10, and in each of these chutes an automatic type finishing press 5 will be positioned. The apparatus and arrangement shown in Fig. 1 can thus be duplicated as many times as are required, depending upon the number of discharge chutes for a particular installation.

While the egg cartons 8 are formed and stripped at a uniform rate, there may be some variation in their timing, and in order to control the release of the cartons through the discharge chute, particularly where there are a plurality of such chutes, a gate is provided in the upper section 6 of each chute. This gate is operated in synchronism with the stripper and with the gates of other chutes. For example, in Fig. 1 such a gate is indicated at 11 in broken line and is operated from the stripper by means of a connecting rod 12. Referring to my aforementioned copending application Serial No. 134,229, the gate 11 corresponds to one of the gates or dogs designated in that application by the reference numeral 69 and the connecting rod or operating member 12 corresponds to one of the connecting rods 72 so designated and referred to in said application. It will be understood that the connecting rod 12 is reciprocated at a rate corresponding to the rate at which the egg cartons are stripped and discharged into the chute section 6.

In Fig. 1, the gate 11 takes the form of an elongated member having a projection 13 on the bottom end and a projection 14 on the upper end. The gate 11 is supported on a pin 15 to which there is also connected a bell crank lever 16. The bottom end of the connecting rod 12 is pivotally connected at 17 to one arm of the bell crank lever 16 and the other arm thereof is pivotally connected at 18 to a lever 20 which serves to operate the trip mechanism for lowering the mechanism to stop the egg cartons at the right position within the press 5, as will be more fully described below.

Each egg carton 8 passing through the discharge chute is normally stopped in the press 5 and the press then operates automatically to close male and female die members, at least one of which is preferably heated, so as to impart a smooth ironed or calendered finish to the egg carton and also to square up and straighten out any distortions or warps therein. Thereupon, the press is automatically opened and the finished article permitted to drop by gravity through the chute section 7 and onto the conveyor 10.

The press 5 is supported on a suitable frame structure which is indicated generally at 21. The details of the frame structure 21 are not important in so far as the present invention is concerned and a detailed description of the frame will not be given.

The main stationary parts of the press 5 comprise a middle block 22, a top block 23, and a bottom block 24. These blocks are secured together in their respective spaced relationships by a pair of side plates 25—25 as shown in Figs. 3 and 4 which are bolted to the blocks in known manner, as shown. Preferably, the blocks 22, 23 and 24 are in the form of castings in which the proper openings and cavities are formed.

The blocks 22, 23 and 24 are rigidly supported from the frame 21 in a suitable manner and the various moving parts of the press 5 are properly assembled and supported for movement on

5

the stationary parts. The press 5 is hydraulically operated by means of a hydraulic cylinder 26 attached to the bottom block 24. The piston rod of the cylinder 26 is connected at the outer end with a cross head 27 to which two links 23—23 of a toggle mechanism are pivotally connected as indicated at 30—30. Each of the links 23 is pivotally connected at 31 to a pair of toggle links 32—32 and each set of the toggle links 32—32 is pivotally connected on one end to a stationary pin 33 and on the other end to a pin 34 carried on ears 35—35 projecting from the bottom of a block 36. The purpose of the toggle linkage mechanism is to multiply the force delivered by the hydraulic cylinder 26 and thereby reduce the size of the cylinder required.

It will be understood that as the piston of the hydraulic cylinder 26 is forced outwardly so as to thereby move the head 27 upwardly, the toggle links 32—32 are straightened somewhat and the block 36 is forced upwardly a distance, somewhat less than the distance moved by the piston of the hydraulic cylinder 26, and dependent upon the mechanical advantage of the toggle links. The block 36 serves to support at the corners thereof four rods 37—37 which carry on their upper ends a block 38 supporting the male die 40 (Fig. 2) of the press 5. Each of the four rods 37 is threaded at opposite ends and each rod is secured at the lower end to one of the corners of the block 36 by means of a pair of nuts 41—41 drawn up tight on opposite sides thereof. The upper threaded ends of the rods 37 project through openings provided therefor in the block 38, and nuts 42—42 are tightened down thereon to prevent the threaded ends from pulling out. The rods 37 project and slide through transverse openings 43—43 provided therefor in the stationary block 22 and also through holes 44—44 provided therefor in a movable, spring supported block 45 connected to the stationary block 22 by a plurality of connecting bolts 46—46 (Fig. 2). The bolts 46 project through the central web 47 of the block 22 and the lower ends thereof are provided with nuts 48—48 which bear against the bottom of the web 47. The bolts 46 are surrounded for the main lengths thereof by compression springs 50—50. The bottom ends of the springs 50 are supported on the top surface of the web 47 while the upper ends of the springs press against the underside of the top face of the movable block 45. The bolts 46 project beyond the top of the block 45 and are provided with heads 51—51 on the upper ends thereof as shown in Figs. 2 and 6.

During the upward movement of the block 38 carrying the male die 40, the compression springs 50 cause the block 45 to initially follow the block 38. However, after a predetermined upward movement of the block 45 has been completed, the bolt heads 51 engage the top face of the block 45 and arrest its further movement while block 38 continues its upward movement until the press is fully closed.

The male die 40 is provided with a series of carton lifting tappets 53—53 (Figs. 2 and 8), the heads of which are situated in the bottoms of the pockets or valleys formed in the top side of the male die 40 as shown. There may be as many as 16 of these spring-loaded tappets 53 which extend downwardly through the block 38 and the lower heads 54 of which press against the top face of the block 45. The bottom ends of the tappets 53 are surrounded by compression springs 55—55 which are compressed between the bottom of the block or die platen 38 and the upper sides

6

of the heads 54. The tappets 53 are vertically reciprocable and when the block 38 is separated from the block 45, the compression springs 55 serve to press downwardly the bottom head 54 of each of the tappets, thereby retracting the upper end of the tappet to a seated position in the face of the male die 40 when it closes against the stationary female die 65. However, when the block 38 is brought down against the block 45 during opening of the press, the tappets 53 will each be lifted or projected from its retracted or seated position as the bottom ends 54 engage the top of the block 45.

In order to guide egg cartons into the press 5 and to support them before the press is closed and again after the press is opened, a pair of reciprocable carton supports or side rails 57—57 are provided each of which is carried on the upper ends of one of two sets of arms 58—58.

Each of the swingable arms 58 is provided with an integral hub 60 (Fig. 2) on the bottom end thereof which pivotally fits over a support pin therefor projecting from the side of the stationary block 22. Each of the arms is provided midway between the ends thereof with a roller 61 which serves as a cam follower to follow a cam groove or cam track 62 provided in each one of a set of four members 63—63 having plate portions 64 by which they may be bolted to the sides of the movable block 38 as shown, for example, in Figs. 3 and 4. When the head 38 is in its lower or retracted position, the members 63 are correspondingly lowered and the cam slots or tracks 62—62 are so shaped as to cause the arms 58—58 to swing inwardly so as to move the rail members 57 toward each other and into a carton supporting position as shown, for example, in Fig. 3. In this position the guides or rail sections 57 form extensions of the discharge chute sections 6 and 7. When the press 5 is closed and the head 38 is raised, the cam followers or rollers 61 will be shifted outwardly and the arms 58 will also be swung out as shown, for example, in Fig. 4 in which position the guides 57—57 no longer support an egg carton and do not interfere with the final closing together of the die members with an egg carton positioned therebetween.

In addition to finishing the surfaces of the molded pulp articles 8 and straightening any warps therein when they are hot-pressed in the press 5, it is desirable to form in the same pressing operation a fold score or crease in the portion of the egg cartons which longitudinally interconnects the bottom and cover sections. Accordingly, there is embodied in the press 5 mechanism for forming such fold scoring or creases when the dies of the press are closed together with one of the cartons 8 therebetween. After the fold scores or hinge creases have been formed between the carton sections, they tend to sag in the middle when the male die 40 is retracted and the carton is supported along the opposite sides on the side rails 57. Accordingly, I have arranged one of the crease or score forming members in such a way that it also serves the dual purpose of supporting each carton at the hinge between the carton sections when the press is opened and the dies are separated.

The modification of the stationary female die 65 in order to form a hinge score between the sections of an egg carton 8 involves the insertion in the die of a creasing member 170 in a longitudinal slot provided therefor in the die block. If other fold scores are to be formed in the egg cartons, additional crease forming members may be inserted in the female die 65 such, for ex-

7

ample, as the member 171 (Fig. 6) which is located to cooperate in the formation of a hinge score in the carton side flap 9. If desired, the creasing elements 170 and 171 may be integrally formed as part of the female die block.

The movable male die 40 is provided with crease forming members 172 and 173 (Fig. 6) which cooperate with the crease forming members 170 and 171. Since the element 172 is to serve the dual purpose of affording an intermediate support for the articles 8 while the press is opened, it has to be suitably supported with stop means in order that it will function in the desired manner. The crease forming element 173 which is co-operable with the element 171 may be inserted in a slot provided therefor in the male die 40.

The crease forming bar 172 is in the form of a flat strip which is vertically reciprocable in elongated slot openings 174 and 175 machined in the male die 40 and spaced member 176. The spacer plate 176 supports the die 40 on the platen member 38. In order to lubricate the creasing bar 172 and prevent its seizure in the slots 174 and 176, felt wipers 177—177 are provided on opposite sides of the bar 172. The wipers 177 are seated in longitudinal recesses provided therefor in the spacer 176 along the opposite sides of the opening 175 as shown.

The creasing bar 172 is supported at opposite ends by rods 178—178, the upper ends of which are slotted so as to receive the ends of the bar 172. Set screws 180—180 serve to clamp each of the ends of the bar 172 in place. The rods 178 pass downwardly through holes 181—181 provided therefor in opposite ends of the platen 38 and in order to obtain smooth, non-binding operation, each of the holes 181 is provided at the top and bottom with sleeve bushings 182—182. Each of the rods 178 extends down through an opening 183 in the spring supported block 45 and is provided on its bottom end with a head 184. A compression spring 185 fits over the downwardly projecting end of each of the rods 178 and each of the springs 185 is compressed between the adjacent head 184 and the underside of the die platen 38 as shown in Fig. 5.

In view of the fact that the springs 185 are under compression, the creasing bar 172 is biased to a retracted position within the male die 40 so as to tend to move with the male die 40 toward and away from the female die 65. However, in order that the creasing bar may serve the dual purpose of providing a cooperating support intermediate the side rails 57 for egg cartons 8 which are located in the press opening between the dies when the press 5 is opened, it is necessary to provide stop means which will prevent the creasing bar 172 from being withdrawn the full stroke that the male die 40 and the die platen 38 are withdrawn. One suitable means for so arresting the downward movement of the creasing bar 172 is to provide adjustable stops in the form of bolts 186—186 which project upwardly through the web 47 of the stationary block 43 in coaxial alignment with the rods 178 as shown in Figs. 5 and 6. The stop bolts 186 are provided with lock nuts 187 so that they may be securely locked in place once they are properly adjusted for engagement with the heads 184 on the rods 178.

The felt wipers 177 and the bushings 182 are supplied with lubricant by fittings 190—190 fastened to opposite sides of the spacer plate 176 by sets of stud bolts 191—191. These fittings provide chambers 192—192 around the upper end of each of the rods 178 beneath the creasing bar 172

8

and lubricant may be supplied to these chambers 192 through the inlet fittings 193—193.

The creasing bar 172 is made of such a height relative to the thickness of the die 40 and the spacer 146 so that when the die 40 and spacer 176 are fully withdrawn away from the female die 65 and the downward movement of the creaser bar 172 is arrested when the heads 184 engage the stop bolts 186, the bottom edge of the creaser bar 172 will not leave the slot opening 174 in the die 40. This relationship is shown in Fig. 6 and this feature prevents paper trimmings and other foreign material from entering the slot openings 174 and 175 and becoming lodged underneath the creasing bar 172 so as to interfere with its functioning.

Each time the male die 40 begins its closing movement toward the stationary female die 65, the lifted creasing bar 172 remains stationary until the bottom edge of the creasing bar 172 is engaged by the top surface of the platen 38 as shown in Fig. 7. When this engagement with the platen 38 occurs, the heads 184 on the bottom of the support rods 178 leave the upper ends of the stop bolts 186. Accordingly, during the final closing movement of the male die 40 against an article 8 fitting between it and the female die 65, the creasing bar 172 will be backed up by the platen 38 and will serve to form a fold score or hinge crease 194 in the article as shown in Fig. 7. In order to form a better crease or score, the upper end of the bar 172 is provided with a slight recess or groove 195 which cooperates with the rounded end of the creasing element 170 carried by the stationary die 65. When the press is opened and the male die 40 is moved away from the stationary female die 65, the compression springs 185 keep the creasing bar 172 in its downward position against the platen 38 until the heads 184 on the rods 178 engage the upper ends of the stop bolts 186, whereupon the downward movement of the creasing bar 172 is arrested and the springs 185 are further compressed while the die 40 and the platen 38 continue their downward movement. This action causes the upper end of the creasing bar 172 to be retained in an elevated position in respect to the die 40 so as to provide a center rail support for the carton 8 intermediate the reciprocal side rails 57. Such support prevents the carton from sagging unduly in the middle which it otherwise would do along the hinge score formed during the pressing operation.

The female die 65 is carried on a cover block 66 which is pivotally mounted adjacent its upper side on a rod 67 (Fig. 1) carried by the stationary block 23. The lower side of the block 66 is provided with means for releasably locking and latching it in its closed position. The latching mechanism includes a pair of hooks 68 which are adapted to catch under a bar 70 (Figs. 2 and 11) extending between the side plates 25—25 and supported thereon by means of end plates 71—71. The hooks 68 do not engage the bar itself but do engage a work-hardened plate 72 which is secured thereto by stud bolts 73—73. In order to compensate for wear, a shim 74 (Fig. 11) of suitable thickness may be inserted between the bar 70 and the plate 72.

The hooks 68 have integrally formed hubs 75 which fit over collars 76 (Fig. 12) which are eccentrically mounted on a rocker shaft 77 journaled at opposite ends in bearings 78—78 formed integrally on the cover 66. In order to turn the shaft 77, a pair of spaced arms 79—79 are rigidly

mounted thereon and have a handle 69 supported between the outer ends thereof.

It will be seen from Fig. 12 that when the handle 69 is rotated upwardly from its closed position, the eccentrics 76 first move the hooks 70 so as to free them from locking engagement with the plate 72. As soon as the hooks 68 are free, the entire female die unit may be swung up as shown in broken line in Fig. 1.

When the female die 35 is closed, it should be exactly parallel with the male die 40. The parallel adjustment is obtained by means of bolts 59—59 (Figs. 2 and 11) carried in the top of the cross bar 70. These bolts 59 are adjusted so that the heads thereof support the cover block 66 when closed in position which brings the female die parallel to the male die 40. Lock nuts 49—49 lock the bolts 59 in place.

In order to stop and also to position a carton released into the press 5 by the gate 11, a carton stop or catch mechanism is provided therefor which takes the form of a series of spaced, downwardly extending, blades or fingers 80—80 depending from a shaft 81 extending along one side of the female die block 65 and supported at opposite ends by means of a pair of side arms 82—82. Slot openings are provided in the adjacent side of the female die block 65 so as to permit the raising of the fingers 80 which fit within the slots as shown, for example, in Fig. 2. The fingers 80 are shown in their lowered position in Fig. 3.

The side arms 82—82 are supported at their rear end on opposite ends of a rock shaft 93 journaled in the side plates 25—25. A crank arm 84 is integrally connected with one of the side arms 82 and projects upwardly therefrom as shown, for example, in Figs. 2 and 3. A tension spring 85 having one end connected to the crank arm 84 and the other end connected to the block 23 as shown in Fig. 2 normally biases the fingers 80 to their lowered position when the side arms 82 are free to rotate.

The upper end of the crank arm 84 is in the form of a catch 86 adapted to be engaged by a catch or hook 87 formed on one of the arms of a bell crank lever 88 pivotally mounted on a supporting pin 90, as shown in Fig. 2. The bell crank lever 88 is normally biased in a clockwise direction (Fig. 2) by means of a tension spring 91 thereby causing the catch 87 to engage hook 86.

The upwardly projecting arm of the bell crank lever 88 is provided with a side pin 92 which extends through a slot opening in one end of the member 20. The slot opening has an elongated lower section indicated at 94 and a shorter upper section indicated at 93. Due to its weight alone, the member 20 is ordinarily in its lower position with the pin 92 resting against the upper side of the shorter slot opening 93 as shown in Fig. 2.

Thus, when the connecting rod 12 is pushed down so as to raise the front end 13 of the gate 11, the bell crank lever 16 will be rotated counterclockwise as shown in Fig. 1 and will shift the member 20 to its upper position. The right-hand end of the shorter slot section 93 will engage the pin 92 and in turn rotate the bell crank lever 88 in a counterclockwise direction against the force of the spring 91 so as to thereby lift the catch 87 and trip the mechanism for holding up the carton stops or fingers 80.

As will appear more fully hereinafter, there are conditions under which it is not desired to have the fingers 80 lowered even though the gate 11 is raised and an egg carton is allowed to pass into the press. Accordingly, an arrangement is

provided for holding the lever or member 20 in its upper position under such conditions so that the side pin 92 on the bell crank trip lever 88 is located in the elongated and lower slot section 94. This slot section is long enough so that even when the member 20 is shifted to its uppermost position, the bell crank lever 88 will not be tripped. The mechanism for swinging and holding the member 20 in its outer position consists of a solenoid unit 95 mounted on the upper block 23 by means of a bracket 96. The operating member 97 of the solenoid is connected at its bottom end to a link 98, the bottom end of which is provided with a slot 100 which fits over a pin 101 projecting from the side of the member 20. When the operating member 97 is in its projected and non-operative position, the length of the slot 100 is such that the pin 101 is not engaged. However, when it is desired to swing the member 20 so that it can no longer bring about the tripping of the carton stop fingers 80, the operating member 97 is retracted so that the bottom end of the slot 100 engages the pin 101 and swings the member 20 to the point where the pin 92 rides in the elongated slot section 94.

Reference is now made to Fig. 13 of the drawings for a description of the control means for operating the carton finishing press 5. In that figure, the press 5 is shown diagrammatically including the female die 65, the male die 40, the toggle linkage 32, and the hydraulic cylinder 26. The upper end of the operating rod 12 is shown connected to a crank arm 102 which is secured to one end of a shaft 103 driven by the stripper mechanism of the molded pulp egg carton forming and drying machine and apparatus. The shaft 103 may be a special shaft which serves as a timer shaft for supporting the crank arm 102 and a pair of cam-carrying wheels 104 and 105. Each of these wheels carries on its periphery a cam 106 and 107, respectively, which upon rotation of the shaft 103 in turn engage with and close spring contacts 108 and 110, respectively, of switches 111 and 112. Preferably the switches 111 and 112 are microswitches and these are normally open but are adapted to be closed momentarily upon depression of the contacts 108 and 110 as they are engaged by the closing cams 106 and 107, respectively.

A conductor 113 is interconnected between one of the two terminals of the microswitch 111 and a conductor 114. The conductor 114 is connected at one end to one terminal 115 of a single pole switch 119 having a movable blade or contact 116. At the other end, the conductor 114 is connected to one terminal of a solenoid unit 117 forming part of a double-acting solenoid valve 118 which controls the operation of press 5 as will be set forth below. The second terminal 120 of the single pole switch 119 is connected by a conductor 121 with a source of energization such, for example, as 110 volt alternating current source which is shown diagrammatically at 122. The second terminal of the microswitch 111 is connected by a conductor 123 to the conductor 121. The second terminal of the solenoid unit 117 is connected by a conductor 124 to the opposite terminal of the current source 122 from that terminal to which the conductor 121 is connected. It will thus be seen that when the microswitch 111 is closed, the solenoid unit 117 will be energized by the current source 122.

The double-acting solenoid valve 118 has a second solenoid unit 125 and one terminal of this unit is connected by a conductor 126 to the con-

ductor 124 and is thus interconnected with one terminal of the current source 122. Ordinarily, the conductor 124 will be connected to the ground terminal of the current source. The other terminal of the solenoid unit 125 is connected by a conductor 127 to one of the terminals of the microswitch 112. The other terminal of the microswitch 112 is connected by a conductor 128 to a terminal 130 of a solenoid operated, double-pole, double-throw switch indicated generally at 131. In addition to the terminal 130, the switch 131 includes terminals 132, 133 and 134. The movable operating member 135 of the switch 131 carries contacts 136 and 137. When the member 135 is in its upper position, the contact 136 engages and closes a circuit between the terminals 130 and 132. When the member 135 is in its alternate or downward position, the contact 137 engages and closes a circuit between the terminals 133 and 134. The terminals 132 and 134 are connected in circuit relationship with the conductor 121 by means of a conductor 138.

The solenoid unit 140 of the switch 131 has two terminals 141 and 142. The terminal 141 is interconnected with the conductor 124 by means of a conductor 143, while the terminal 142 is connected to the conductor 114 by means of a conductor 144.

One of the two terminals of the solenoid unit 95 is connected by a conductor 145 to the terminal 133 of the switch 131. The second terminal of the solenoid unit 95 is connected by a conductor 146 to the conductor 124.

The double-acting solenoid valve unit 118 is supplied with oil or other hydraulic fluid under pressure through a supply line 147 which connects with a supply pressure pump 148. In the supply line 147 a manually operable control valve 150 is located which can be adjusted so as to regulate the rate at which the hydraulic fluid is supplied to the unit 118 so as to in turn control the speed with which the press 5 operates. The pump 148 is driven by an electric motor 151 with the motor and pump unit being mounted on a suitable base 152. The fluid return line from the unit 118 is indicated at 153. Ordinarily the pump will operate continuously and excess pressure in the supply line 150 is relieved by means of a relief valve 154 located therein and discharging into the return line 153 through the connection 155. Hydraulic fluid to operate and close the carton press is supplied to the pressure cylinder 26 from the double-acting solenoid valve unit 118 through a supply line 156. The line 156 also serves as a return line when the press is opened and the piston within the cylinder 26 is retracted. The hydraulic fluid under pressure for opening the press is supplied to the opposite end of the cylinder 26 by means of a supply line 157. The line 157 also serves as a return line when the press is closed.

In operation: In normal operation the shaft 103 (Fig. 13) will be driven and rotated along with the stripper mechanism which serves to strip the dried molded pulp egg cartons from the conveyor by which they are carried through the drying tunnel. The drying tunnel and the stripper form portions of the over-all automatic apparatus for forming the molded pulp cartons from wet stock or pulp slurry. Upon each rotation of the shaft 103, the connecting rod or link 12 is reciprocated so as to operate the carton control gate 11 in the chute section 6, first to the open position and then to the closed position. In the open position, the gate 11 allows one of

the cartons 8 to slide down into the press 5 which is in the open condition with the dies separated. At the same time, the rear projection 14 on the gate 11 holds back any cartons 8 that may remain in the chute 6 above the gate.

Each carton slides down into the press 5 and rides in on the side guides or rails 57—57 and the top edge of the creasing bar 172 as shown in Figs. 3 and 6. At the time the gate 11 is raised, the connecting link 20 is moved up and serves to trip the catch 87 which holds up the stop mechanism for the press 5. When this mechanism is tripped, the spring 85 causes the stop members 80 to be lowered to their position as shown in Fig. 3 where they obstruct and arrest the movement of the carton as it drops or slides into the press 5.

The cam projection 107 on the wheel 105 (Fig. 13) carried on the shaft 103 leads the cam member 106 on the cam wheel 104 by a suitable number of degrees so that as the shaft 103 rotates the cam 107 will first engage the contact member 110 of the microswitch 112, thereby closing this switch momentarily until the cam member 107 disengages the contact member 110.

Closure of the microswitch 112 serves to energize the solenoid unit 125 which is the unit which operates the double-acting solenoid valve 118 in such a way as to supply the hydraulic fluid under pressure through the line 156 to the rear (e. g. bottom) of the pressure cylinder 26. The solenoid carton stop controller switch 131 is normally positioned where the contact member 136 engages the terminals 130 and 132, thereby completing the circuit between the microswitch 112 through the conductor 128 and through conductor 138 which is connected by conductor 121 to one of the terminals of the current source 122. The other terminal of the current source 122 is connected through conductors 123 and 126 to the other terminal of the solenoid unit 125.

When the hydraulic fluid under pressure is thus admitted to the base of the pressure cylinder 26, the piston of the cylinder is forced out (i. e. up) so as to raise the block 36 of the press 5 by means of the toggle connection. As the block 36 is raised, the four posts 37—37 are lifted and carry upwardly on the upper ends thereof the die platen 38 on which the male die 40 is supported. The compression springs 50 cause the block 45 to follow the block 38 for a portion of the upper movement of the latter. As the block 38 moves up, the cam rollers 61 are forced out as they follow the cam tracks 62 of the members 63. In turn, the arms 58 supporting the carton guide or support rails 57 are moved out to the position in Fig. 4. The platen 38 continues to rise until the carton 8 to be pressed is firmly pressed between the male die 40 and the female die 65 which serves to arrest the final upward movement of the male die 40.

When the platen 38 during its closing movement engages the bottom edge of the creasing bar 172, it carries the creasing bar with it during the remainder of the closing stroke and lifts the bolt heads 184 on the rods 173 off from the stop bolts 186. The element 170 carried by the female die 65 to form the fold score or hinge crease 194 as illustrated in Fig. 7.

The cam member 106 is so positioned on the cam wheel 104 (Fig. 13) that shortly after the press has been closed the cam member 106 engages the contact member 108 of the microswitch 111, thereby closing the same. At this time the cam 107 will have already disengaged the con-

tact member 110 of the microswitch 112 and this switch will be opened. When the microswitch 111 is closed, the solenoid unit 117 of the double-acting solenoid valve 118 will be energized from the current source 122 and the unit 118 will be operated so as to deliver the hydraulic fluid under pressure through the line 157 to the upper side of the piston and the pressed cylinder 26. Hydraulic fluid will be discharged through the line 155 and returned through the line 153 to the pump 143. The piston is retracted in the cylinder 126 and the press block 38 is thereby lowered, carrying with it the male die 40. As the press 5 is thus opened, the side rails 57 are retracted to their inner position as shown in Figs. 3 and 15 and the die block 38 is sufficiently lowered so that the bottom heads 54 on the tappets 53 strike the upper surface of the lifted block 45 and cause the tappet heads to raise, thereby freeing the carton from the male die 40. The parts are so dimensioned and their actions related that as soon as the carton is thus freed, it comes to rest on the guide rails 57 and the creasing bar 172 and the continued downward movement of the die block 38 frees the carton from the male die 40. During the opening of the press, the creasing bar is withdrawn along with the male die 40 and platen 38 until the bolt heads 184 of the rods 178 strike the upper ends of the stop bolts 186, whereupon the retraction of the creasing bar 172 is arrested.

The upper and closing movement of the male die 40 serves to reset the carton stop mechanism including the stop fingers 80-80. That is, the fingers 80 are raised and the side arms 82 are pivoted around the shaft 83 so that the hook 84 is again engaged and held by the hook or catch 87. The pressed carton is thereby allowed to slide out of the press into chute section 7 and onto the conveyor 10.

The above completes the cycle of the operation which is repeated during the operation of the machine.

There may be instances in which it is desired to open the press 5 or to keep it open while the carton making machine is in operation. The manually operable switch 119 serves as an emergency or control switch for this purpose. It will be seen that when switch 119 is closed, the solenoid unit 117 of the unit 118 is energized and serves to open the press in the manner described above and to hold it open so long as this unit is energized. At the same time that the switch 119 is closed and energizes the solenoid unit 117, it will also be seen that the solenoid 140 is energized and the switch 131 is operated so that the contact member 136 disengages the terminals 135 and 132 and the contact member 137 establishes a circuit between the terminals 133 and 134. The closing of the latter contacts serves to complete the circuit to the solenoid unit 95 and this unit serves to lift the operating link 29 as described above so that the elongated slot 93 is engaged by the pin 92. Thus, the member 20 can continue to reciprocate without tripping the stop mechanism which includes the stop fingers or prongs 80.

It will be noted that so long as the switch 119 remains closed, the circuit to the solenoid unit 125 of the press control valve cannot be closed and it is impossible for the press to be closed accidentally.

Preferably one or both of the press dies is heated in order to obtain a better pressing action. That is, a carton can be squared up faster and given a smoother finish when at least one

of the dies is heated. The die may be heated either electrically or by means of a circulating hot fluid such as steam or oil. The particular details of the heating arrangement are not important and any suitable known arrangement may be made. The temperature should be high but without danger of scorching or burning the molded pulp cartons. In Fig. 13 the female die 65 is shown with inlet and outlet connections 160 and 161 through which steam or other heating medium may be introduced into and withdrawn from the hollow interior of the die block.

It will be understood that certain changes and modifications of a detail design nature may be made in the embodiment of the invention described above in connection with the accompanying drawings without departing from the spirit and scope of the invention. For example, modifications may be made in the electrical control circuits and the control systems for operating the press 5. The mechanical linkages for operating the carton gate 11 and the carton stops 80 may be replaced with electrically or hydraulically operated mechanism. Other variations of like nature will be apparent and occur to those skilled in the art.

The invention also is applicable to molded pulp machines upon which the molded articles are dried on an open belt which does not require a stripper mechanism. In this type machine the molded articles come through the drier in processional relationship and fall into the chutes leading to the presses. Thereafter, they are timed and pressed as described.

Having fully described my invention and set forth the presently preferred embodiment thereof, what is claimed as new is:

1. A finishing press for pressing and fold scoring molded pulp articles and adapted to be located in a conveyor chute for said articles, comprising, mating male and female dies at least one of which is movably supported, means for opening and closing said dies, parallel article side support members reciprocally mounted on opposite sides of the opening between said dies and adapted to form continuations of said conveyor chute, means operatively connecting said support members with a movable die whereby said members are separated upon closure of said dies and are closed to article supporting position upon the opening of said dies, an elongated article scoring member cooperable with said dies for forming a fold score in an article pressed therebetween and independently mounted for movement in an elongated slot opening in said movable die, and actuating means operatively connected with said article scoring member for retaining the same in a retracted article supporting position intermediate said reciprocable side support members when said press is open.

2. A finishing press for pressing and fold scoring molded pulp articles and adapted to be located between upper and lower sections of a gravity discharge chute, comprising, mating male and female dies arranged in superposed relationship, stationary support means for the upper die, actuating means operatively connected with the lower die for cyclically raising said lower die to a closed pressing position and retracting it to a lowered position so as to provide a press opening between said dies at least large enough to allow entry and escape of each article pressed, a pair of article side support rails, support means for said rails whereby they are cyclically movable to an article supporting position in opposite sides of

15

said press opening when said lower die is retracted and retractable to a position outside of said press opening when said lower die is raised to closed position, actuating means operatively interconnecting said rails with said actuating means for said lower die, an elongated article creasing bar slidably disposed in a slot opening therefor in said lower die and cooperable with a mating scoring portion on said upper die, the planes of said slot opening and said creasing bar being parallel to each other as well as parallel to the direction of movement of said lower die, said creasing bar being raised to closed position along with said lower die, and stop means for said creasing bar for retaining it in a raised position in said slot opening to support an article in said press opening in cooperation with said support rails when said movable die is retracted to its lowered position.

3. A finishing press for pressing and fold scoring molded pulp articles and adapted to be located between upper and lower sections of a gravity discharge chute, comprising, mating male and female dies arranged one above the other, stationary support means for the upper one of said dies, movable support means for the lower one of said dies, actuating means operatively connected with said movable support means for cyclically closing said movably supported die against said stationary die and for retracting it therefrom so as to provide a press opening between said dies at least large enough for entry and escape of each article pressed, a pair of article support rails, support arms for each of said rails pivotally mounted on a fixed portion of said press so that said rails are swingable into article supporting relationship within said press opening between said dies when the dies are separated and swingable out of said press opening when said dies are closed, actuating means operatively interconnecting said rail support arms with said movable die support means, an elongated article scoring bar slidably operable in a slot opening provided therefor in said movable die and cooperable with a mating scoring portion of said stationary die, the planes of said slot opening and said scoring bar being parallel to each other as well as parallel to the direction of movement of said lower die, connecting means operatively interconnecting said scoring bar with said movable die whereby said bar is brought into its closed position along with said movable die, and stop means for said scoring bar for retaining said bar in raised position to support an article in said press opening in cooperation with said support rails when said movable die is retracted from its closed position.

4. A finishing press for pressing and fold scoring molded pulp articles and adapted to be located between upper and lower sections of a gravity discharge chute, comprising, mating male and female dies arranged with the female die superposed over said male die, means for stationarily supporting said female die, a platen for said male die, support means for said platen permitting it to raise said male die to a closed pressing position and to retract said male die to a lowered position so as to provide a press opening between said dies at least large enough to allow entry and escape of each article there-through, actuating means operatively connected with said platen for cyclically raising and retracting said platen, a pair of article support rails, support arms for each of said rails pivotally mounted on a fixed portion of said press so

16

that said rails are swingable into article supporting relationship within said press opening when said male die is lowered and swingable out of said press opening when said male die is raised to closed position, actuating means operatively interconnecting said rail support arms with said platen, an elongated article creasing bar slidably disposed in a slot opening in said male die extending in parallel alignment with said article support rails and projecting through said male die to the top face of said platen, the planes of said slot opening and said creasing bar being parallel to each other as well as parallel to the direction of movement of said lower die, spring means operatively connected with said creasing bar for biasing it in a lowered position in said slot opening so that said bar is supported on said platen, and stop means for said creasing bar disposed to retain it in a raised position in said slot opening to support an article in said press opening in cooperation with said support rails when said platen and male die are retracted to their lowered position.

5. A finishing press for pressing and fold scoring molded pulp articles and adapted to be located between upper and lower sections of a gravity discharge chute, comprising, a stationary die support, a die mounted on said stationary support, a stationary block spaced away from and parallel to said stationary die support, a movable die platen carried on connecting rods projecting through said stationary block, a die on said platen mating with said stationary die, a follower block slidably mounted on said connecting rods intermediate said stationary block and said platen, a plurality of bolts extending through openings provided therefor in said follower block with the ends of bolts being secured to said stationary block and the heads of said bolts located intermediate said follower block and said platen, compression springs surrounding the shanks of said bolts and compressed between said stationary block and said follower block so as to force said follower block away from said stationary block and to follow said platen, said bolt heads being located so as to arrest the following movement of said follower block before said platen carries said die mounted thereon into closing relationship with said stationary die, press actuating means operatively connected to said connecting rods for cyclically operating said platen to close and open said press, a pair of article support rails, a pair of support arms for each of said rails, each of said arms being pivotally mounted adjacent one end to said stationary block and supporting one of said rails adjacent its opposite end so that said rails are swingable into article supporting relationship within the press opening between said dies when said platen is fully retracted from said stationary die and swingable out of said press opening when said dies are closed together, actuating means for each of said rails comprising a cam follower and a cam track one of which is carried by one of said arms and the other of which is carried by said platen, an elongated article creasing bar slidably disposed in a slot opening in said male die extending in parallel alignment with said article support rails and projecting through said male die to the adjacent face of said platen, the planes of said slot opening and said creasing bar being parallel to each other as well as parallel to the direction of movement of said lower die, a support rod on each end of said bar projecting back through a guide opening therefor in

said platen and through a registering opening in said follower block, a head on the rear end of each of said support rods, a coil spring fitting over each of said support rods and compressed between said head and said platen so as to force said creasing bar onto said platen, and stop bolts carried by said stationary block in position to engage said support rod heads and arrest the movement of said creasing bar as said platen is retracted so as to retain said creasing bar in said press opening to support an article therein in cooperation with said support rails when said press is open.

6. A finishing press for pressing and fold scoring molded pulp articles and adapted to be located between upper and lower sections of a gravity discharge chute, comprising, a stationary die support, a die mounted on said stationary support, a stationary block spaced away from and parallel to said stationary die support, a movable die platen carried on connecting rods projecting through said stationary block, a die on said platen mating with said stationary die, a follower block slidably mounted on said connecting rods intermediate said stationary block and said platen, a plurality of bolts extending through openings provided therefor in said follower block with the ends of bolts being secured to said stationary block and the heads of said bolts located intermediate said follower block and said platen, compression springs surrounding the shanks of said bolts and compressed between said stationary block and said follower block so as to force said follower block away from said stationary block and to follow said platen, said bolt heads being located so as to arrest the following movement of said follower block before said platen carries said die mounted thereon into closing relationship with said stationary die, press actuating means operatively connected to said connecting rods for cyclically operating said platen to close and open said press, a pair of article support rails, a pair of support arms for each of said rails, each of said arms being pivotally mounted adjacent one end to said stationary block and supporting one of said rails adjacent its opposite end so that said rails are swingable into article supporting relationship within the press opening between said dies when said platen is fully retracted from said stationary die and swingable out of said press opening when

said dies are closed together, actuating means for each of said rails comprising a cam follower and a cam track one of which is carried by one of said arms and the other of which is carried by said platen, a plurality of headed tappets extending through said platen and said die thereon with the heads disposed toward said follower block, compression springs fitting around each of said tappets and compressed between said platen and said tappet heads so as to retain said heads in contact with said follower block, said tappets being of such length that the ends thereof projecting in said die on said platen will be projected sufficiently to free a pressed article from the die when said platen is retracted and will be located in said movable die when it is closed with said stationary die, an elongated article creasing bar slidably disposed in a slot opening in said male die extending in parallel alignment with said article support rails and projecting through said male die to the adjacent face of said platen, the planes of said slot opening and said creasing bar being parallel to each other as well as parallel to the direction of movement of said lower die, a support rod on each end of said bar projecting back through a guide opening therefor in said platen and through a registering opening in said follower block, a head on the rear end of each of said support rods, a coil spring fitting over each of said support rods and compressed between said head and said platen so as to force said creasing bar onto said platen, and stop bolts carried by said stationary block in position to engage said support rod head and arrest the movement of said creasing bar as said platen is retracted so as to retain said creasing bar in said press opening to support an article therein in cooperation with said support rails when said press is open.

ALFRED E. COMSTOCK.

References Cited in the file of this patent

UNITED STATES PATENTS

45 Number	Name	Date
241,309	Davis et al.	May 10, 1881
771,090	Pugh	Sept. 27, 1904
1,570,710	Schenck et al.	Jan. 26, 1926
1,778,934	Chapman	Oct. 21, 1930
2,238,698	Kraust	Aug. 15, 1941
2,515,113	Chaplin	July 11, 1950