

June 29, 1954

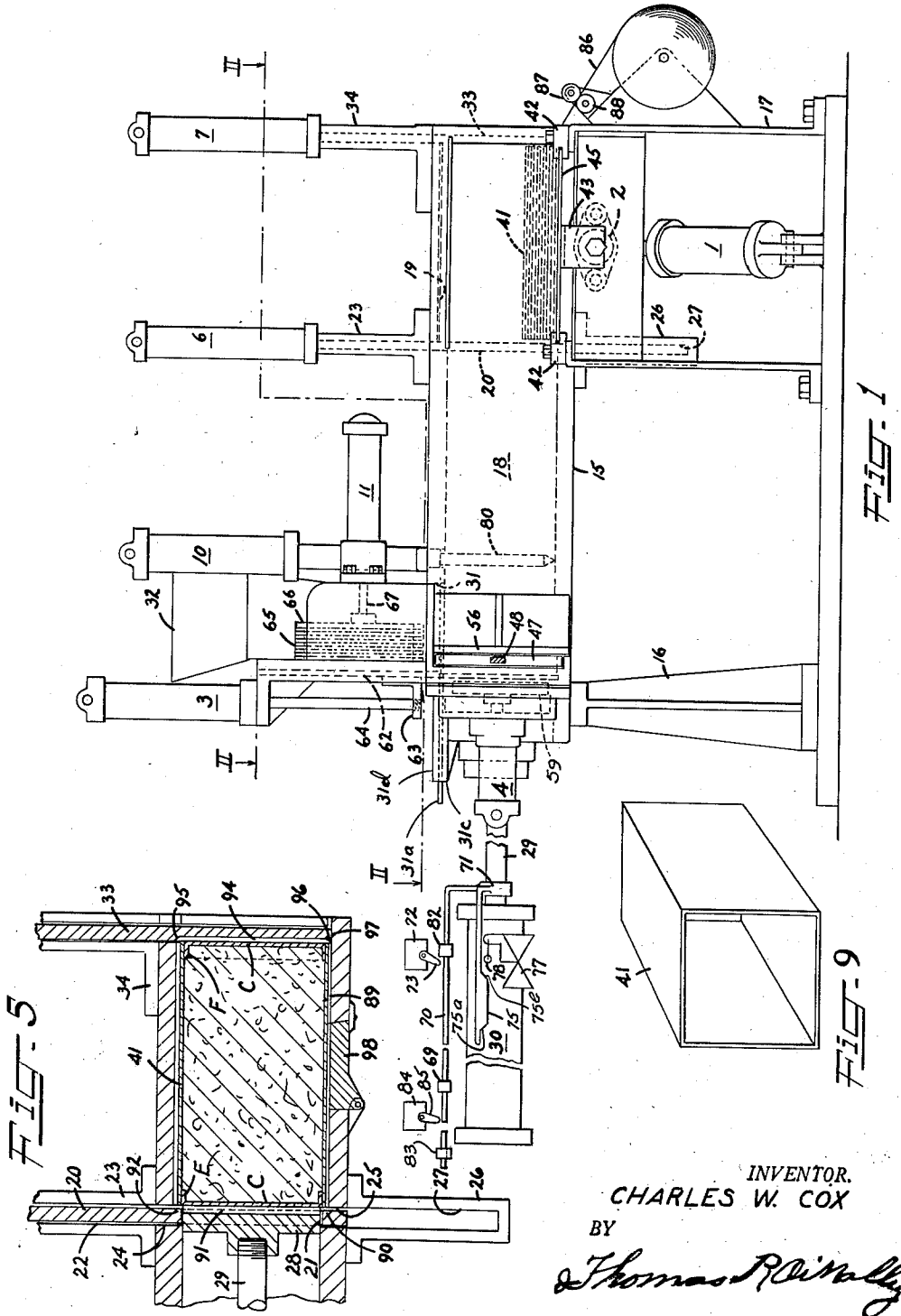
C. W. COX

2,682,137

METHOD FOR BALING FIBERS AND THE LIKE

Filed Nov. 5, 1948

5 Sheets-Sheet 1



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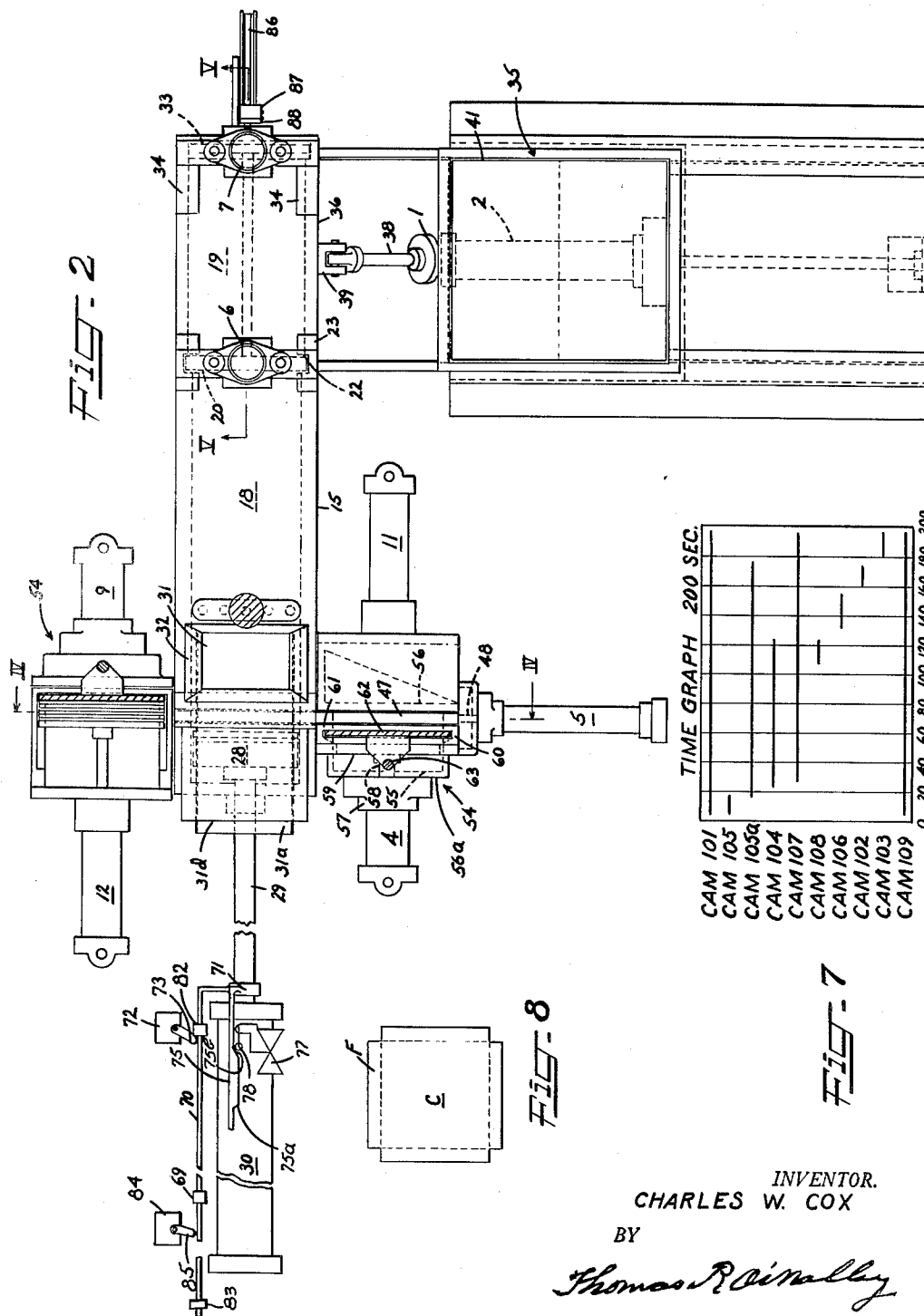
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METHOD FOR BALING FIBERS AND THE LIKE

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5 Sheets-Sheet 2



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FIG-3

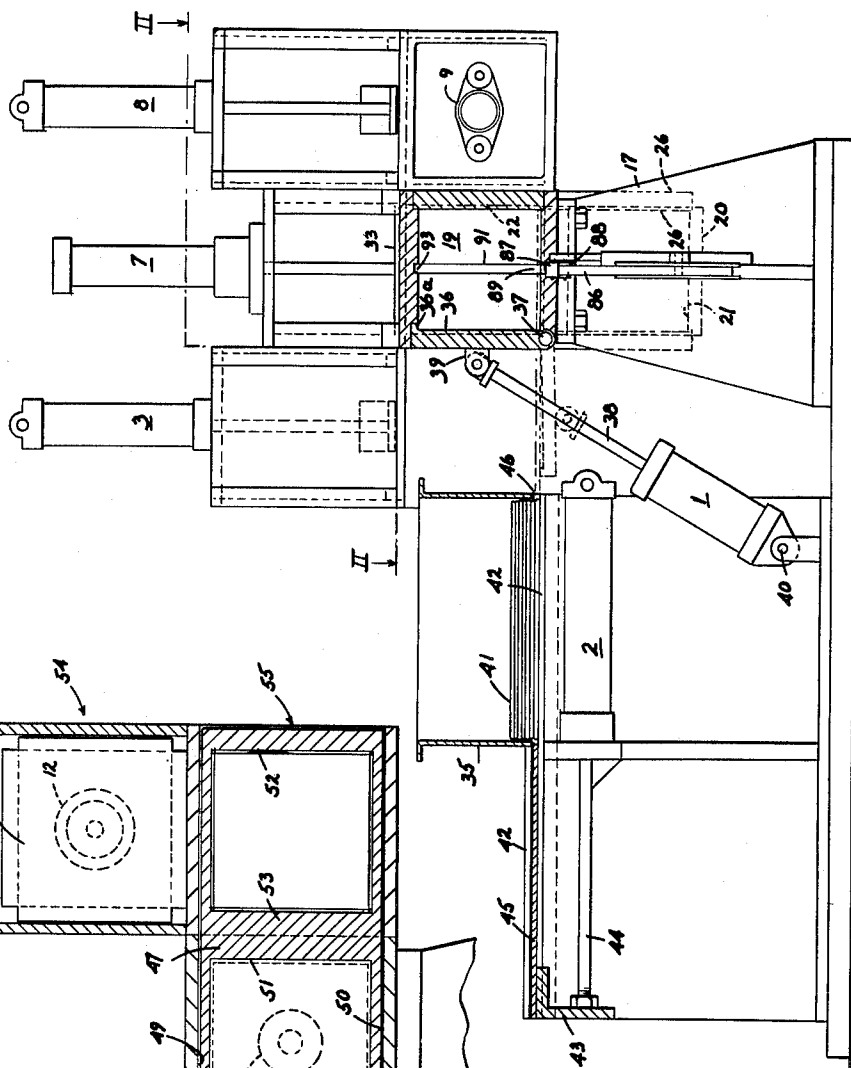
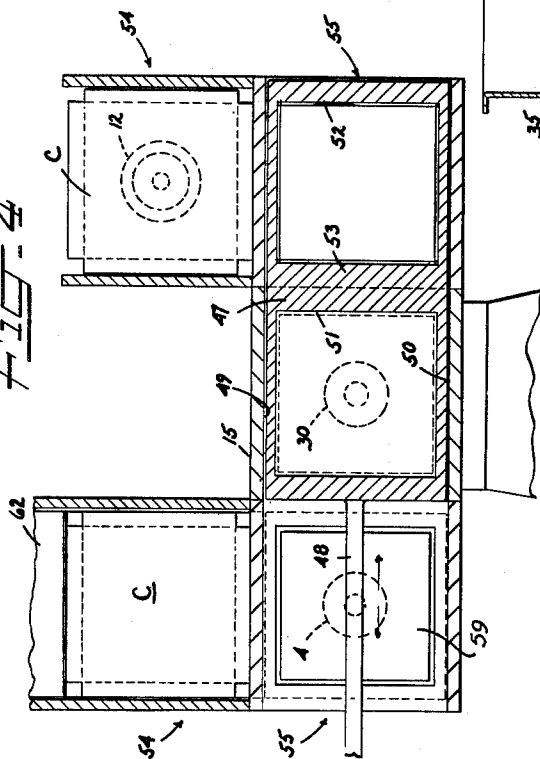


FIG-4



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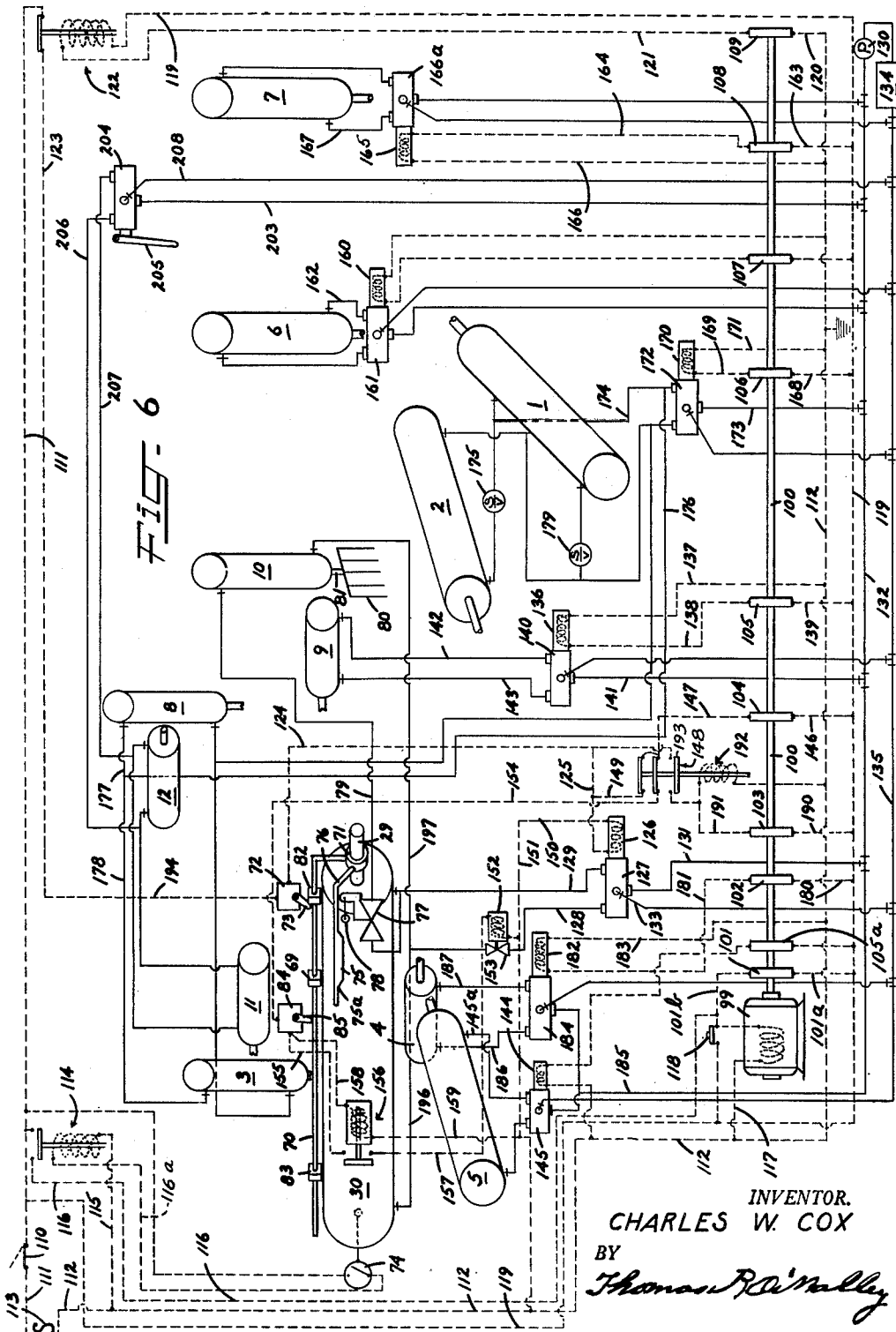
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METHOD FOR BALING FIBERS AND THE LIKE

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METHOD FOR BALING FIBERS AND THE LIKE

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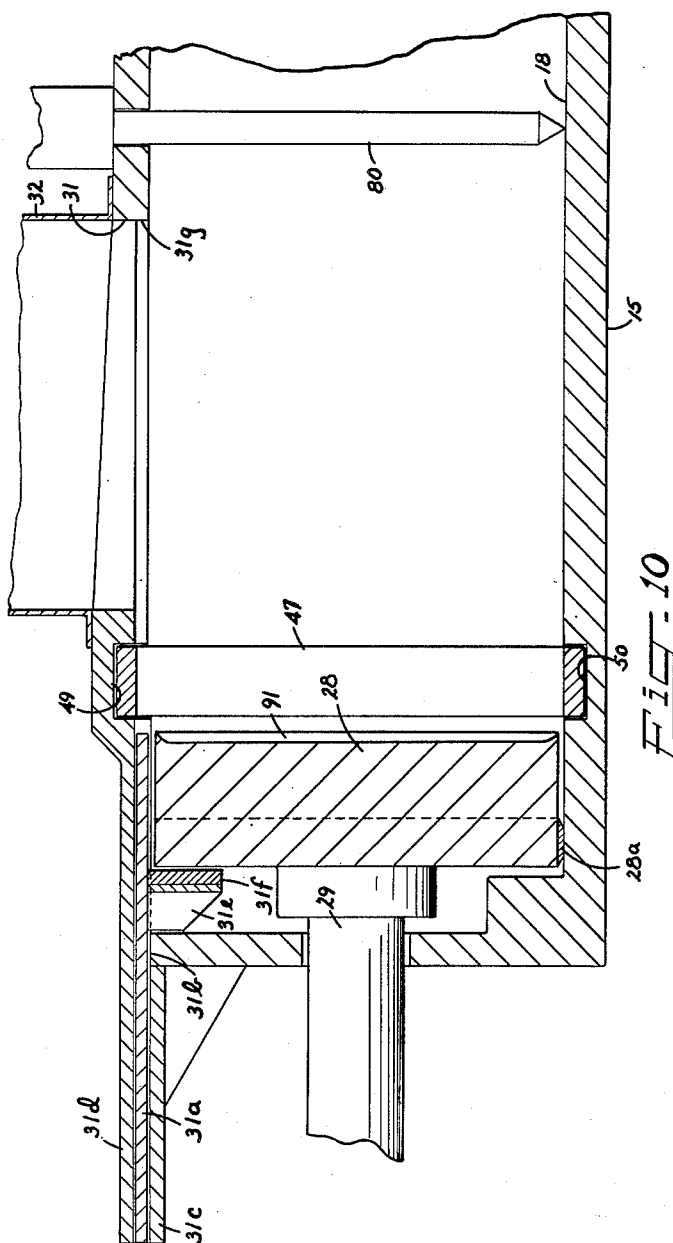


Fig. 10

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UNITED STATES PATENT OFFICE

2,682,137

METHOD FOR BALING FIBERS
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Application November 5, 1948, Serial No. 58,534

1 Claim. (Cl. 53—6)

1

2

This invention relates to methods for baling or packaging staple fiber and the like, and other fibrous or particulate material, such as grass, hay, alfalfa, etc.

It is an object of the invention to provide an improved system of packaging fibrous materials, which term in the present specification and the claims is intended to be generic to all types of materials which it may be desirable to compress for the preparation of a package for storage, shipment and the like. A more particular object of the invention is to provide an improved system of packaging in which the material to be packaged is preliminarily compressed and then transferred after compression into a wrapper, such as a carton for protecting the product during shipment, storage and the like.

A further object of the invention is to provide an automatic apparatus adapted to carry out the invention. Other objects and advantages of the invention will be apparent from the drawing and the description thereof hereinafter.

In the drawing, which is illustrative of the invention, a preferred form of an automatic apparatus constituting one embodiment and adapted to execute the methods of the invention in an efficient manner, is shown.

Figure 1 is a side elevation of the automatic apparatus with cylinder 5 (see Figure 2) removed to facilitate a clear showing. Also the hydraulic lines to the cylinders and the control for those lines are removed to clarify the illustration.

Figure 2 is a section taken on lines II—II of Figures 1 and 3,

Figure 3 is an end view with the carton magazine and baling chamber in section,

Figure 4 is a section on line IV—IV of Figure 2,

Figure 5 is a longitudinal section through the baling chamber on line V—V of Figure 2,

Figure 6 is a diagrammatic view showing the electrical and hydraulic connections for operating the automatic apparatus,

Figure 7 is a graph showing operation of the timer,

Figure 8 is a face view of an end carton blank,

Figure 9 is a perspective view of the main carton blank before flattening, and

Figure 10 is a vertical mid-section through the ram and feed end of the tamping chamber.

The present invention generally involves the pressing of the material to be baled in an endwise direction while confining it within lateral limits, and after sufficient material has been

compressed in this fashion, transferring the material endwise into an open-ended carton. Before the transfer is made, a closing carton end is placed against one end of the compressed material, and this carton end is simultaneously transferred with the material into the carton, the material entering first and the carton end closing the open end of the receiving carton, after which the carton is bound, fastened or secured, as by strapping and then discharged for storage or shipment. This compressing action within laterally confining walls provides a compact mass which has a tendency to expand endwise and very little of such tendency in other directions. The greatest pressure is, therefore, exerted on the ends having comparatively small areas, but the bulging at the ends can easily be prevented or reduced to an unobjectionable minimum by a single strap. The lateral surfaces of the carton having practically no bulging tendency but the compacted fibers support or back up the carton sides as well as the ends so that a sound package is obtained, the container walls of which are well protected against deformation or puncture when accidentally dropped or struck by other objects.

As shown in the drawing, the invention comprises as one aspect an automatic apparatus for accomplishing the method hereinabove described. This apparatus comprises a ram adapted to be reciprocated through a tamping, packing or compressing chamber one or more times, depending upon how compact it is desired that the package be and the relative amount of material received at a single feeding compared to the dimensions of the package finally desired. The apparatus also comprises a baling or packaging chamber adapted to receive a carton and to hold such carton while the packed or compressed material is transferred from the tamping chamber. Other auxiliary means necessary to form a complete packaging operation will be mentioned as they come into the description hereinafter.

Referring particularly to Figures 1 and 2, the press comprises a hollow casing 15 supported on suitable pedestals 16 and 17. The interior of the casing is divided into two main chambers 18 and 19, the former serving as a tamping or compressing chamber, and the latter serving as a packaging or baling chamber. A vertically reciprocable plate 20, having an aperture 21 (see Figure 5) in its lower end, slides within a suitable guideway formed by grooves 22 in the opposed upright members 23. The plate 20 passes through slots 24 and 25 in the upper and lower

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walls respectively of the casing 15 and additional guiding members 26 provided with grooves 27 may be disposed on opposite sides of the path of the plate 20 beneath the casing 15. The plate 20 is operated by a piston reciprocably driven within the cylinder 6 by means of a fluid, and preferably a liquid. The aperture 21 is sufficiently large to allow the passage of the ram 28 which operates within the casing 15. The cross-section of the ram corresponds with that of the interior of casing 15 but is somewhat smaller, so as to provide a clearance of about $\frac{1}{8}$ to $\frac{1}{4}$ inch or so around the front end of the ram. This allows the ram head 28 to fit within the folded side flaps of the first carton end to be inserted. A slide bearing strip 28a (see Figure 10) of brass or the like may be provided beneath the ram or all around it at the back portion thereof. The cross-section may be round, oblong or any desired shape but a rectangular or specifically a square section is preferred. The ram 28 is connected by means of the rod 29 to a piston within the main ram cylinder 30 which is hydraulically operated.

An opening 31 in the top of the casing 15 (Figure 2 and 10) serves as the entrance for the material to be packaged and a hopper 32 may be provided to guide the material into the entrance. This opening 31 is preferably near the end of the casing 15 to which the ram 28 moves when it is retracted. While horizontal disposition of the casing and ram is shown, the invention is equally adaptable to vertical disposition with the chamber 19 below 18. A downwardly inclined chute would then serve to feed the fiber through opening 31 in the side.

At the top of the casing 15 and extending from the ram end under the hopper 32, there is provided a slidable closure or cover plate 31a which slides through a slot 31b and along the guideway formed between the fixed plates 31c and 31d. A transverse bracket 31e secures a permanent or electromagnetic magnet 31f to the underside of cover 31a. The ram head is of a magnetic material so that forward movement of the head 28 draws the plate 31a into position closing the opening 31. The abutment 31g limits the forward motion of the plate 31a but the ram 28 positively engages and pushes the plate 31a out of opening 31 on the return stroke of the ram.

A plate 33 is reciprocated vertically by a piston within cylinder 7 adjacent the end of casing 15 from which the final package is adapted to be discharged. Members 34 are provided to serve as a guideway for the plate 33.

When plate 33 is in its lower position serving to close the discharge end of the casing 15 and plate 20 is in its lower position, the tamping chamber 18 is separated from the packaging chamber 19. This makes it possible to position the wrapper materials within the packaging chamber 19 and then after closing the plate 20 to feed and tamp the material to be packaged within the chamber 15 without disturbing the wrapper sections in position within the chamber 19.

Means is provided for inserting wrapper sections into the packaging chamber and for some of these sections use is made of the ram, whereas for others, a separate means is provided. The means for inserting the main body of the carton comprises a hopper or magazine 35 disposed to one side of the packaging chamber. The adjacent side wall 36 of the packaging chamber 19 is hinged as at 37 (Figure 3) and is adapted to

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be swung to closed position shown in solid lines in Figure 3 and to the open position shown in dotted lines in Figure 3 by hydraulic means comprising the cylinder 1 and the rod 38 connecting a piston within the cylinder to a lug 39 on the side wall or door 36. The cylinder 1 is pivotally mounted at 40 and the rod 38 makes a pivotal connection with lug 39 in order to allow of the swinging motion. When the door 36 is in its wide-open position it is inclined downwardly from the horizontal in the direction away from the hinge 37 and serves as a guiding support for the carton body to be inserted. The carton bodies 41 (see Figure 9) constitute a hollow sleeve of cardboard, prefolded so as to form the proper shape when reopened upon insertion into the packaging chamber. In the magazine 35, however, they are flattened to a closed position. The cartons 41 rests upon spaced supporting members 42 between which the cross-head 43 secured to the piston rod 44 and carrying rigidly secured thereto a carton-pushing plate 45, is adapted to reciprocate. An opening 46 extends clear across the bottom of the wall of hopper 35 which faces the packaging chamber 19 so that when the piston in cylinder 2 is moved to the right as viewed in Figure 3, plate 45 forces the lowermost carton 41 through the slot 46 into position on top of the bottom of chamber 19 and the open door 36. Motion of the pusher-plate 45 in the opposite direction slides it out of the cartons 41 and allows the next lower carton to fall into position for insertion on the next stroke of the pusher-plate 45. The upper edge of the door 36 has a longitudinal projection, lip, or ridge 36a, and when the door 36 is swung upwardly into closed position, the ridge 36a catches the carton edge and forces the carton to open itself automatically. It finally occupies its position in the packaging chamber 19 with all of the four walls of the carton in close proximity to the four walls of the chamber. It will be noted particularly, as shown in Figures 1 and 5, that the inside dimensions within the packaging chamber are somewhat larger than the inside dimensions within the compressing chamber 18 so that when the carton 41 is disposed within the chamber 19 the inside walls of the carton 41 leave an unobstructed passage somewhat larger than the passage within chamber 18. If desired, this unobstructed passage within the carton 41 may be substantially the same in cross-section as the passage in chamber 18, but it is preferred to have a little favoring of the carton to facilitate insertion of the carton ends and the material to be baled.

The press is provided near the feeding end with an arrangement for feeding the carton ends into the path of the ram at proper times relative to the other operation of the machine. This arrangement comprises an apertured slide 47 connected by a rod 48 to the piston within the cylinder 5 and reciprocable transversely of the casing 15 through a slot having upper and lower walls 49 and 50 respectively constituting a guideway therefor. The slide 47 has two apertures 51 and 52 spaced apart by an intervening rib 53 so that when one of the apertures is in alignment with the chamber 18 of casing 15 the other is in alignment with one of the loading systems 54. As shown in the drawings, the two loading systems are similar in construction but one is turned around relative to the other for purposes that will be apparent from the description hereinafter. Each loading system 54 comprises a lower chamber 55 in alignment with one of the apertures 51

or 52 when the other of such apertures is in alignment with the chamber 18 of the press. This loading chamber 55 may be considered to be defined by a stationary backing plate 56 and the end wall and lateral walls of a recessed enclosing member 56a to which is concentrically secured a supporting flange 57 for one of the operating cylinders 4 and 9. Each of these cylinders is provided with a piston connected by a rod 58 to a recessing head 59. A vertical slideway is provided between members 60 and 61 for guiding the slide 62. This slide 62 is secured by an arm 63 and a connecting rod 64 to a piston within one of the driving cylinders 3 and 8 for reciprocating the slide into and out of the loading chamber 55. When the slide 62 is in its upper position, its thin lower end is in alignment with a number of carton ends 65 in a magazine thereof. One of the pistons in cylinders 11 and 12 urges a plate 66 by means of the connecting rod 67 against the back of the magazine of carton ends which are in flattened condition during such storage. This pressure against the carton ends is maintained constant regardless of the number of such carton ends in the magazine, as it is dependent on the pressure of the fluid in the cylinders. The shoulder 68 is disposed above the foremost carton end in the magazine when the slide 62 is in its uppermost position so that upon the next downward motion of the slide, it moves the foremost carton end downwardly into the loading chamber 55 where it is disposed in the way of the recessing ram or head 59 between such head and one of the apertures 51 and 52. As will appear hereinafter, carton ends may be moved downwardly into the loading chambers 55 on both sides of the press simultaneously, if desired, by means of the slide 62 and after such loading, the slides 62 return to their uppermost position in readiness for the next loading stroke. It will be noted that the apertures 51 and 52 are of approximately the same size as the internal cross-section of chamber 18 but the overall dimensions of the flattened carton ends as disposed in the magazines are considerably larger to the extent of four lateral or peripheral flaps F spaced around the central portion C as shown in Figure 8. Hence, when the recessing head 59 moves forward and presses the carton end into one of the apertures 51 and 52, the edge portions are bent backwardly over the outer edges of the ram 53.

The first position of slide 47 in the baling cycle is such that aperture 51 (see Figure 4) is in alignment with its loading chamber 55 and aperture 52 is in alignment with the main ram head 28 in casing 15. During or after the insertion of the main wrapper section or carton body 41, the piston in cylinder 4 moves the recessing head 59 forward, thereby folding the lateral flaps F at a 90° angle to the central area C of the end wrapper section or carton end and disposing the folded carton end entirely within aperture 51, the thickness of the slide 47 being at least the width of flaps F. The piston in cylinder 4 then retracts the head 59 and cylinder 5 shifts the slide 47 so that the folded carton end in aperture 51 is in alignment with the ram head 28 which then pushes the carton end clear through both the tamping chamber and the packaging chamber in which the main carton body has already been inserted until it comes to rest with its main area C against the end gate 33 and its flaps F in contact with the inside wall of the main carton body 41.

After insertion of the one end of the carton, 75

the ram head 28 is returned and cylinder 6 lowers the plate 20 to close off baling chamber 19 from tamping chamber 18.

After the ram head 28 has been returned, the material to be baled, such as staple fiber, or a portion thereof, is fed through hopper 32 into the casing 15. The ram head 28 then moves forward to a position which is spaced from plate 20 a distance corresponding approximately to the length of the package to be made, that is, the distance between plate 20 and end plate 33. In moving to this position, it compresses the material in chamber 18 against the plate 20. A dog 69 fixedly carried on a rod 70 projecting from a collar 71 rigidly attached to the piston rod 29 opens a toggle switch 72 through the finger 73 and this operates electrically to stop the forward motion of the ram and to immediately reverse the ram. If, as is generally the case, more than one such portion of the material is desired in the final package, the ram head 28 returns, a second portion is fed into the casing, this portion is compressed, and so on, until the amount introduced is sufficient for the final package desired. A pressure switch 74 connected to the cylinder 30 serves to control the amount of material to form the package. Means operated by the pressure switch 74 and described hereinafter is provided for rendering switch 72 ineffective after sufficient material is tamped against plate 20 so that the ram head 28 can insert the closing carton end, and after strapping, will complete the stroke to eject the completed bale, and another to introduce the first carton end.

On each return stroke of the head 28, a dog 75 on a rod 76 secured to collar 71 opens a valve 77 (normally held closed by an internal spring, which, however, allows a return flow from the top of cylinder 10 during upward motion of the piston therein), by means of the actuating finger 78 and this allows the hydraulic liquid to flow through line 79 connected to link 129 into the top of cylinder 10 to lower a set of fiber-retaining rods 80 connected to a common rod 81 to the piston in cylinder 10. Dog 75 is of sufficient length to assure complete lowering of rods 80 before dog 75 releases finger 78 which then causes valve 77 to close under spring return action. The position of ram head 28 at which the rods 80 are lowered is just after the head 28 has passed under the rods 83 so that such rods serve to prevent the material from re-expanding and following the ram head 28 under the feed entrance 31 to the casing 15. This keeps this entrance clear for a fresh supply of material after every return stroke.

A dog 82 on rod 70 closes switch 72 which causes the ram to again move forward until switch 72 is again opened by dog 69. This reciprocation occurs until the material tamped creates sufficient resisting pressure to actuate switch 74 which through a relay system described hereinbelow renders the switch ineffective so that dogs 69 and 82 can no longer limit and control the movements of the ram head 28.

After pressure switch 74 thus cuts out switch 72, the ram head 28 returns, the piston in cylinder 9 advances the recessing head to insert the closing carton end into aperture 52, and then returns, the piston in cylinder 5 shifts the loaded aperture 52 into the casing 15, and then the ram head 28 advances to press the closing carton end against the tamped material. At the same time plate 20 is raised. Since the aperture 52 is loaded from the side opposite that from

which the aperture 51 is loaded, the lateral flaps are bent toward the tamped material and are the first parts of the carton end to engage the material.

When the ram head 28 has advanced to bring the carton end against the material while pressing it to bale size in chamber 19, dog 83 closes a spring-return or spring-release switch 84 by engaging a finger 85. This stops the ram 28 for reasons explained hereinafter in the position shown in Figure 5, and operates a time relay.

This stoppage is followed by insertion of the strip 86 of flexible strapping material, such as of spring steel, by means of the feed rolls 87 and 88. To facilitate the insertion of strip 86, the bottom of the baling chamber 19 is provided with a shallow groove 89 (Figure 5), the plate 20 is provided with an arcuate-bottomed notch 90, the ram head 21 is provided with a groove 91, the upper edge of the aperture in plate 20 is provided with an arcuate-bottomed notch 92, the top wall of the chamber 19 has a groove 93, and the end plate 33 has a groove 94 terminating with gradually sloped curves at 95 and 96. A groove 97 in the lower edge of the end plate 33 deflects the upwardly fed strip 86 into the groove 89 and the curved bottom surfaces of notches 90, 92, and the curves 95 and 96 guide the leading end of the strip around the corners, and the flexibility of the strip allows it to be forced to encircle the closed carton and to overlap itself along the bottom wall.

Any suitable means for fastening may be employed, such as spot welding, banding or crimping. A door 98 allows the insertion of a conventional banding device for tightening and fastening the overlapped ends of the strip together and cutting the fastened strip from that supply.

Figure 6 shows electrical and hydraulic circuits for operating the system automatically in proper sequence. The electrical circuit lines are dotted while the hydraulic or pneumatic circuit lines are solid. Most of the actions in the baling cycle are controlled by a multiple switch timer operated by a motor 99. The shaft 100 of this motor carries ten cams 101, 102, 103, 104, 105, 105a, 106, 107, 108, 109, which may be closely spaced to make a compact unit but in the drawings are shown widely spaced to facilitate illustration. Each cam has a high portion which presses a swingably mounted switch arm against a fixed contact to close an electric circuit. The time during which the switch remains closed is determined by the arcuate length of the cam rise. The relative times of closing and duration of closing of the several switches by the cams are shown in Figure 7 in which the dark bars represent the rises of the respective cams.

Operation

The description of the operation could start with any stage of the cycle since once the machine is started, the cycle is repeated. As a matter of convenience, the following description starts at the time the tamped material acquires sufficient compactness to close the pressure switch 74 since this starts operation of the control motor 99. At this time, a main carton section 41 and the first carton end are disposed within the baling chamber 19 and the slide 47 is disposed with the opening 51 in the casing 15 and opening 52 in readiness to receive the other carton end disposed between it and the corresponding recessing head 59.

The main switch 110 is closed during the operation of the machine. Lead-lines 111 and 112

then are in circuit with the source of electricity 113, such as 110 volt A. C. The coil of a normally open relay 114 is connected at one end through line 115 to line 112 and at the other side through line 116a to one terminal of switch 74 so that when switch 74 is closed, the contactor of relay 114 closes the circuit through lines 111, 116, motor 99, line 117, and line 112. Pushbutton 118 in line 119 provides an alternate circuit for driving motor 99 under the control of the operator.

Immediately after motor 99 starts, cam 101 closes the switch associated with it, thereby connecting line 119 to motor 99, through leads 101a and 101b. This cam, therefore, acts to provide a holding circuit for the motor 99 cutting off the motor current at the end of the timer sequence as shown in Figure 7. Also, when motor 99 starts, cam 103 closes the switch between lines 120 and 121, the former being connected to line 112 and the latter to the coil of a normally closed relay 122. The other end of this coil is connected through lines 119 to line 111 so that energization of relay 122 opens its contactor and the circuit from line 111 to line 123 and switch 72 is broken. In addition, the current flow is interrupted from switch 72 through lines 124 and 125 to the coil 126 of the solenoid-operated four-way hydraulic valve 127, which may be the conventional spool valve well known in the hydraulic power art. This de-energizes the coil and the valve 127 is returned to de-energized position under the influence of a spring. The valve 127 is connected to the ends of the main ram cylinder 38 by pipes 128 and 129 and is connected to the hydraulic power source, such as a pump 130 by means of pipe 131 connected to the common feed line 132. The discharge line 133 connects the valve 127 to the reservoir 134 through a common line 135. When de-energization of coil 126 thus shifts valve 127, the hydraulic fluid is passed through line 129 to return the ram head 28. On each return of the ram 28, dog 75 opens valve 77 which causes cylinder 10 to lower rods 80 immediately after the head 28 passes therebelow.

Cam 105 closes the circuit through coil 136 by means of lines 137 and 112 on one side and lines 138, 139, 119, and 111 on the other side. This energization of coil 136 shifts valve 140 and causes oil flow from line 141 through line 142 into cylinder 9, thereby moving the recessing head 59 against the carton end and forcing the latter into aperture 52. Cam 105 then opens the circuit to coil 136 which reverses valve 140 and feeds the hydraulic fluid through line 143 to the other end of cylinder 9, thereby returning the recessing head 59. Then cam 105a closes the circuit to solenoid 144 which shifts valve 145 and causes the hydraulic liquid to flow through line 145a to the cylinder 5 and this causes shifting of the aperture plate 47 to bring aperture 52 into alignment in casing 15.

Then cam 104 closes the circuit between lines 146 and 147. Line 146 is connected through lines 119 to line 111, and line 147 is connected through one of two normally closed contactors of a relay 148 to line 149 and one end of coil 126, the other end of which coil is connected by lines 150 and 151 to line 112. This energization of coil 126 shifts valve 127 which elevates rods 80 and advances the ram head 28, forcing the closing carton end into the baling chamber.

At, or shortly after, the beginning of this stroke of the ram head 28, cam 107 closes the circuit through the coil 160 of the solenoid-operated

valve 161. This shifts valve 161 to pass the liquid through line 162 into cylinder 6, thereby raising the plate 20 between tamping and baling chambers 18 and 19.

The ram head 28 continues to advance and forces the tamped material and closing carton end into the baling chamber. When the position shown in Figure 5 is attained, dog 83 trips switch 84 which energizes a time relay 156 thereby closing its contactor and energizing solenoid 152 which closes valve 153 and stops the ram head 28. The time relay 156 permits the strapping operation hereinabove described and also the lifting of the end gate 33 which is effected by the cam 108 closing the circuit between lines 163 and 164 and energizing coil 165 which is connected to line 112 by line 166. Coil 165 shifts the valve 166a and causes flow of liquid into the lower end of cylinder 7 through line 167.

When the gate 33 is up, the time relay 156 interrupts the current through coil 152 and this opens valve 153, allowing liquid flow into cylinder 30 to advance the ram head 28 and eject the package.

The dwell of cam 104 then opens its switch which breaks the circuit through lines 147, 149, and the coil 126, causing the valve 127 to shift and return the ram head 28 to fully retracted position. During this return stroke of ram head 28, cam 108 opens its switch, so that coil 165 is de-energized and the gate 33 is lowered.

Then cam 106 closes the circuit between lines 168 and 169 energizing coil 170 connected by line 171 to line 112. This shifts valve 172 and causes liquid to flow from pipe 173 through pipe 174 into the upper end of cylinder 1 for opening and lowering the side wall 36 of the packaging chamber 19. When the wall 36 is completely lowered, sequence valve 175 opens, allowing liquid into the left end of cylinder 2, thereby causing the plate 45 to push a carton body section 41 into place on the bottom and lowered side wall of chamber 19. The sequence valve 175 is of the type allowing free flow in the reverse direction. The so-called "counterbalance valve, directly operated, internal drain" of Vickers, Inc., shown in Figure 13 of that company's catalog copyrighted 1946 and entitled "Vickers Pressure Control, 'Hydro-cushion' type Valves for Oil Hydraulic Systems," Bulletin 45-34, is an example of the type that may be used.

While liquid flows through pipe 174 it also flows through a branch 176 and branches 177 and 178 therefrom into the upper ends of cylinders 3 and 8 which causes each of the slides 62 to move a carton end down into the loading chambers 55 on either side of the casing 15. When cam 106 opens its switch, the valve 172 shifts and the pistons in cylinders 1, 2, 3 and 8 all return to their former positions. A sequence valve 179 (like 175) assures the return of plate 45 before side wall 36 is closed.

Then cam 102 closes the circuit between lines 180 and 181, energizing coil 182 connected by line 183 to line 112. This shifts valve 184 and feeds liquid from pipe 185 through pipe 186 into cylinder 4, causing the recessing head 59 to insert the first carton end into aperture 51 of the aperture plate. Then the dwell of cam 102 opens the circuit to coil 182, shifting the valve 184 and feeding liquid into the other end of cylinder 4 through pipe 187. After the recessing head is retracted, cam 105a opens the circuit to solenoid 144, allowing spring return of valve 145 which causes flow of hydraulic liquid to the outward end

of cylinder 5. This shifts plate 47 and disposes the loaded carton end in aperture 51 in the path of ram head 29 in the main casing and the empty aperture 52 in readiness to receive its carton end previously lowered into the loading chamber as above described.

Then cam 103 closes the circuit between lines 190 and 191, energizing coil 192 of relay 193, opening the two normally closed contactors and closing the normally open contactor 193. The contactor 193 energizes coil 126 through lines 124 and 125, 150, 151, and 112 on the one hand and lines 111, 113, 190, and 191 on the other. This shifts valve 127 causing the main ram head 28 to move forward and push the carton end through to the end of the packaging chamber. Since the closing of the switch associated with cam 103 shifts the contactor of the relay 148, the middle contactor element thereof opens the circuit between lines 147 and 154 so that there is a dead circuit through switch 84 and hence when the dog 83 trips the finger 85, nothing happens to stop the forward motion of the ram head 28, and the carton end is pushed through to the very end of the packaging chamber.

As cam 103 comes to the end of its rise, its corresponding switch is opened and the coil 192 of relay 193 is deenergized. The shifting of contactor 193 opens the circuit through the solenoid 126 so that valve 127 shifts and the ram head 28 starts to return. At the end of this return stroke, cam 107 breaks the circuit through solenoid 160 which causes shifting of the valve 161 and the lowering of the middle slide gate 20 by virtue of the descent of the piston in cylinder 5. At about the same time, cam 109 opens the circuit between lines 120 and 121, de-energizing the solenoid of relay 122. This closes the circuit from line 111 through lines 123, 194, switch 72, lines 124, 125, solenoid 126, lines 150, 151 and 112. As a result of the closing of this circuit and of the closing of switch 72 by dog 82 at the end of the return stroke of the ram head 28, solenoid 126 is energized and shifts valves 127, causing the ram 28 to advance and when the foremost slope 75b of dog 75 opens valve 77, which occurs before the ram head reaches the rods, the rods 80 are caused to be lifted. This forward motion of the ram presses the fiber or other material introduced through the hopper into the tamping chamber 18 and the forward motion of the ram is limited by dog 69 which opens the switch 72 through the finger 73. Opening of this switch reverses valve 127, causing the liquid to flow through line 129 into the other end of cylinder 30. As the ram 28 is thus returned, the dog 75 opens valve 77 through finger 78, the rearmost end 75a of such dog being set upon the rod 76 in such a position that the valve 77 is opened just after the ram 28 passes the rods 80. Opening of valve 77 causes the liquid to flow through line 79 into the upper end of cylinder 10, thereby lowering rods 80 to hold the fiber or other material and to keep it from following with the ram 28. When the ram returns, dog 62 closes switch 72 causing the ram to again move forward, pressing the staple or other material into the tamping chamber. This reciprocation of the ram and the retaining rods 80 occurs until sufficient material has been tamped in the chamber 18 to actuate the pressure switch 74, at which time the sequence of operations hereinbefore described is repeated.

A fluid line 203 branches off line 132 and leads to a valve 204, the spool of which is actuable by

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the hand lever 205. Normally, the valve is set to direct the liquid through line 206 to the closed ends of cylinders 11 and 12, thereby urging plates 66 against the carton ends in the magazines. To release the plates 66, lever 205 is shifted to direct the liquid through line 207. The valve 204 is provided with discharge pipe 208.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the present invention as described in the appended claim.

I claim:

A method of assembling and packing a carton with loose material which comprises the steps of squaring the four side walls of the main carton body, inserting an end wall into said main carton body, forcing said end wall longitudinally through said main carton body, precompressing a charge of loose material to substantially the volume and shape of the main carton body outside of and in alignment with an opened end of the carton body, pressing the charge into the carton body, and completely exteriorly supporting the four side walls of the carton body and the end wall while said charge is pressed into the body.

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