United States Patent

[11] 3,585,925

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[21] Appl. No. **828,578**
[22] Filed **May 28, 1969**
[45] Patented **June 22, 1971**

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[54] **COMPRESSION PACKING**
2 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **100/218,** 53/124, 100/179, 100/229, 100/232, 100/249, 100/295
[51] **Int. Cl.** **B30b 15/32**
[50] **Field of Search** ..... 100/218, 232, 245, 249, 295, 229, 188, 179; 53/24, 124 D

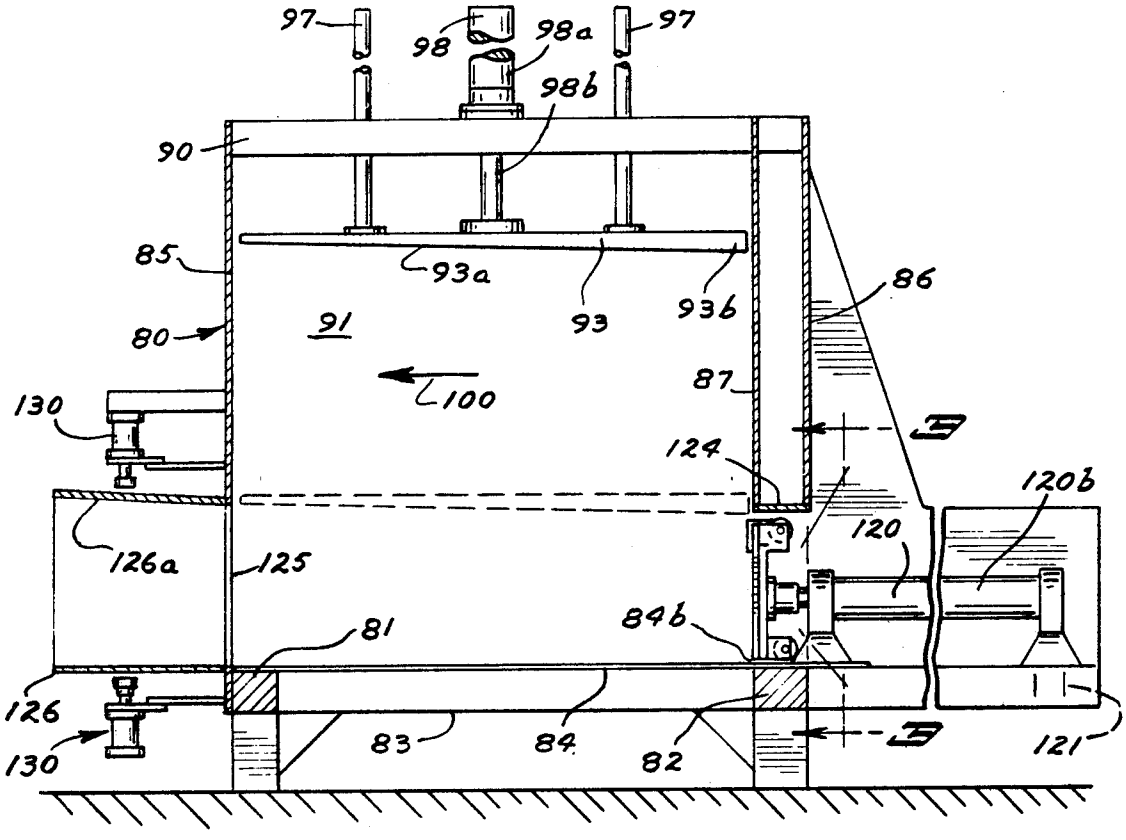
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ABSTRACT: A press for compressing resilient material having a frame, a stationary bottom press plate mounted in the frame, and a piston cylinder combination on the frame for moving a movable press plate between a datum position and a second position more closely adjacent the bottom plate and spaced therefrom. The above plates have adjacent, generally planar pressing surfaces with said surfaces diverging at least a slight amount in the direction that compressed product is to be moved in being ejected from between the plates when the movable plate is in its second position. There is provided a spout through which the compressed product is moved by a power operated pusher head that moves between the plates when the movable plate is in its second position. The pusher head has an extensible portion to move vertically as the presser head moves horizontally relative the tapered press plate.



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SHEET 1 OF 2

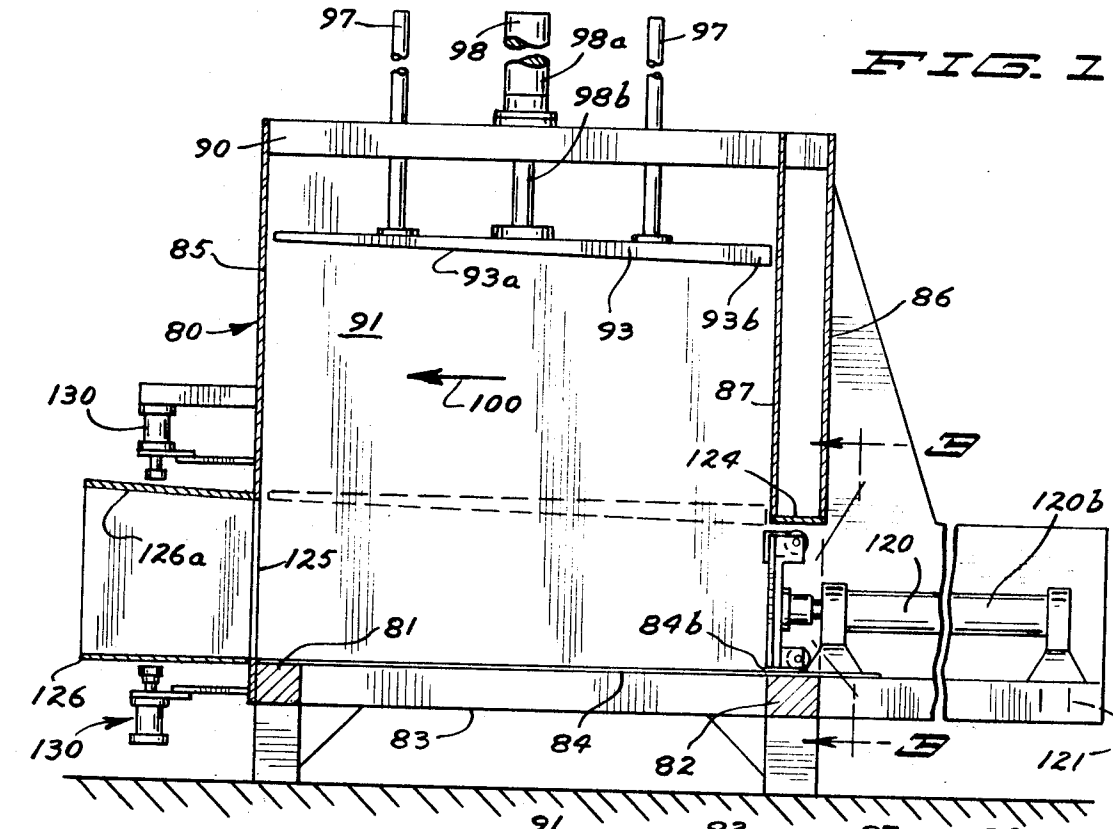


FIG. 1

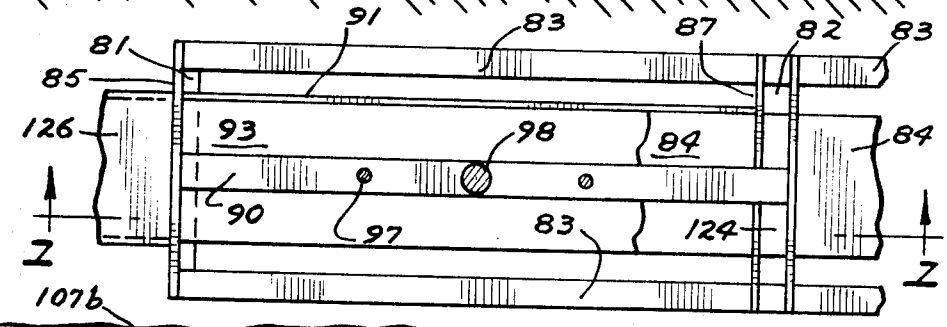


FIG. 2

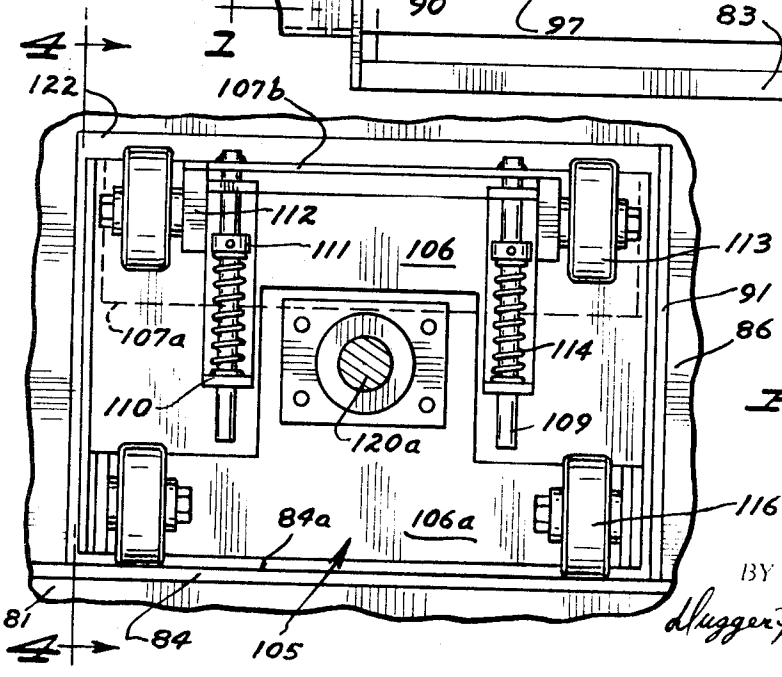


FIG. 3

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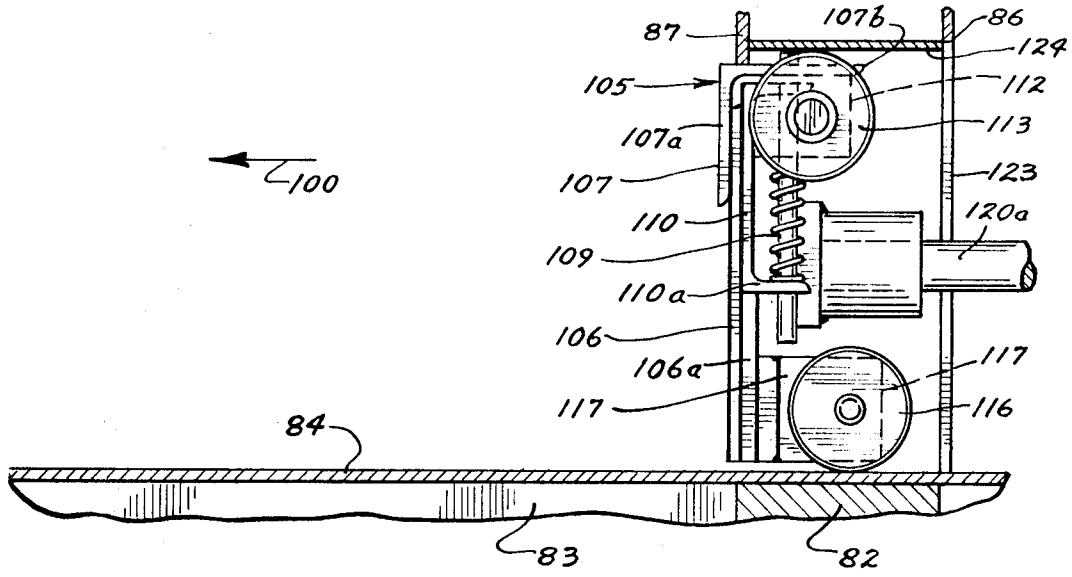


FIG. 4

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COMPRESSION PACKING

BACKGROUND OF THE INVENTION

The invention relates to presses for compressing resilient material. In the prior art it is a common practice with compressible sheet and blanket-type material to pack these materials on presses which have a bed plate and a compression plate to compress the product in a vertical direction, the compression plate and bed plate having parallel pressing surfaces. Such prior art machines have three vertical walls, with one side open for loading the product; and a bag spout fastened to one vertical wall with an opening to push the product through and into the spout. An opening in the wall opposite the spout permits the entrance of a horizontal ram to push the compressed product through the spout and into the bag. However, with such prior art presses, a great force is required for this horizontal transfer, and also there is a tendency for certain products to buckle where the transfer is attempted which may cause damage to the product. Also where the compressed product is to be moved between the press plates in a product compressed condition, with some products, for example a plurality of layers of batts of mineral wool, each having a paper or foil facing, the product is unduly longitudinally compressed prior to the time it starts to move in a longitudinal direction between the plates. In order to overcome problems of the above-mentioned nature and others, this invention has been made.

SUMMARY OF THE INVENTION

For compressing products in one or more planes and then transferring the compressed product in a direction at right angles thereto, a press having a stationary press plate and a movable press plate, and power operated means for pushing the compressed product between the plates, said plates having adjacent pressing surfaces that diverge slightly in the direction that the compressed product is transferred.

The object of this invention is to greatly reduce the force required for the transfer of product between a pair of press plates in a product compress condition where direction of transfer is at right angles to the direction of the application of compressive force to the product. This is accomplished in this invention by constructing the movable press plate (vertical ram) with a slight taper in a direction so that the product will be relieved of pressure as the product is transferred in the right angle direction. If one plate has a horizontal pressing surface, then the other plate preferably would have a degree of taper of one-eighth inch per foot.

Another object of this invention is to provide in a press having relatively tapered press plates a new and novel pusher head to eliminate any substantial spacing between the pusher head and press plates as the pusher head is moved to push product out from between the press plates when the press plates are in a product compress condition. This is accomplished by providing the pusher head (horizontal ram) with a spring loaded follower (extension) which will follow the taper to maintain a close tolerance between the follower and the tapered surface throughout the entire length of the tapered surface to eliminate the possibility of the product wedging between the tapered surface and the horizontal ram.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal cross-sectional view of the invention with various portions broken away, said view being generally taken along the line and in the direction of the arrows 1–1 of FIG. 2 and showing the movable press plate in its datum position in solid lines, and in a product compressed condition in dotted lines;

FIG. 2 is a plan view of the structure of FIG. 1 with portions being broken away;

FIG. 3 is an end view of the pusher head and adjacent structure, said view being generally taken along the line and in the direction of the arrows 3–3 of FIG. 1; and

FIG. 4 is a fragmentary side view of the pusher head and adjacent structure that is generally taken along the line and in the direction of the arrows 4–4 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in particular to FIGS. 1 and 2, the first embodiment of the press of this invention, generally designated 80 will now be described. The press 80 includes bottom transverse frame members 81, 82 and longitudinal frame members 83 that are joined together for mounting the structure to be described. Members 81—83 mount a bottom press plate 84 having a horizontal, generally planar upper surface 84*a*. Mounted by member 81 to extend thereabove is a front plate 85 having approximately the same transverse dimension as member 81 while member 84 mounts a rear plate 86. Plate 84 extends rearwardly from member 82 (in the direction opposite arrow 100). Intermediate plates 85, 86 and more closely adjacent plate 86, a plate 87 of about the same transverse dimension as plates 85, 86 is mounted on the bottom press plate to extend thereabove and parallel to plates 85, 86. A top, centrally located transverse channel 90 is welded to plates 85—87.

A vertical, longitudinal plate 91 is spaced a short distance inwardly from the one vertical edges of plates 85, 86 and is secured to the adjacent edge portions of said plates 85, 87 and the adjacent edge of plate 84. Plate 84 is of a substantially smaller transverse dimension than frame members 83 and is centrally spaced relative thereto.

Directly above plate 84 is a movable top press plate 93 having a generally planar bottom surface 93*a*. A pair of longitudinally spaced, vertical guide rods 97 are attached to plate 93 to extend thereabove and move therewith, the guide rods being slidably extended through channel 90. The cylinder 98*a* of a two way piston cylinder combination 98 is mounted on channel 90 to extend thereabove, the piston rod 98*b* being extended through channel 90 and dependingly mounting plate 93 to have its surface 93*a* tapered to diverge relative surface 84*a* in the direction that the product is transferred from between press plates 84, 93 (arrow 100).

The press 80 includes a pusher head, generally designated 105 having a vertical, main pusher member 106 that is of substantially the same transverse dimension as the press plate 84 and of nearly the same height as the spacing between the end portions 84*b*, 93*b* of the press plates when the press plates are in a product compressed condition (dotted line position of plate 93–FIG. 1). Mounted on member 106 is an extension member (follower) 107 having a vertical portion 107*a* extending in overlapping relation to member 106 on the side of member 106 in the direction of arrow 100. Secured to the upper edge of portion 107*a* to extend in overhanging relationship to portion 107*a* and away from portion 107*a* in a rearward direction (direction opposite arrow 100) is a horizontal portion 107*b*.

The upper end portions of a pair of transversely spaced, vertical rods 109 are dependingly welded to portion 107*b* on the opposite side of pusher member 106 from portion 107*a*. Each rod 109 is slidably extended through the horizontal legs 110*a* of a generally U-shaped bracket 110 that is welded to member 106, a collar 111 being secured on the rod in a fixed position by a setscrew. On each rod there is provided a coil spring 114 that has one end bearing against the lower horizontal leg 110*a* and an opposite end bearing against collar 111 whereby the extension member is constantly resiliently urged upwardly toward the top press plate. At each transverse end of the extension member there is provided a lug 112 that rotatably mounts a roller 113 to rotate about a horizontal transverse axis and extend a slight distance above the top surface of portion 107*b*, the rollers 113 being positioned to roll along surface 93*a*. A pair of rollers 116 are mounted by transversely spaced lugs 117 that in turn are welded to the rearward reinforcing portion 106*a* of the pusher member to extend rearwardly thereof. Rollers 116 extend to a slightly lower elevation than plate 106 to roll over surface 84*a*.

Secured to portion 106*a* of the pusher member to extend rearwardly thereof is a horizontal piston rod 120*a* of a two way acting piston cylinder combination 120. The combination 120 includes a cylinder 120*b* having a front portion mounted on the rear portion of plate 84 and a rear portion mounted on a transverse frame member 121. Member 121 extends between and is mounted by the frame members 83 rearwardly of frame member 82.

Plate 87 has an aperture 122 of a size for the pusher head to move through when the extension has portion 107*b* closely adjacent member 106. Plate 86 has a corresponding aperture 123. A plate 124 has one edge joined to the edge of plate 87 that defines the top edge of aperture 122 and an opposite edge joined to the edge of plate 86 that defines the top edge of aperture 123. When the piston cylinder combination 120 is in a fully retracted position, pusher plate 106 is substantially longitudinally aligned with plate 87 and the rollers 113 bear against plate 124 to retain the extension member 107 at an elevation just below the top press plate in its product compress position.

Longitudinally opposite aperture 122, the plate 85 is provided with an aperture 125 of a size to have the pusher head and compressed product moved therethrough. A spout 126 is secured to plate 85 to extend forwardly thereof. Preferably the spout is of a construction to have a top wall 126*a* that forms a generally planar continuation of the tapered surface 93*a* when the press plate 93 is in the dotted line product compress condition of FIG. 1. Mounted on the wall 85 are a pair of conventional bag clamp assemblies 130 for releasably retaining a bag on the spout.

As to using the apparatus of this invention, the product to be compressed is fed between the press plates in any suitable manner when the movable press plate is in its datum position. For example, if the product is batting, it is stacked in layers on the bottom press plate when the pusher head assembly 105 and top press plate are in their datum, retracted positions, plate 91 serving as a backing plate to aid in aligning the layers of batting. The batting in a stacked condition would have a transverse width slightly less than the corresponding dimension of the inlet of the spout. After sufficient quantity of product has been fed to the press through conventional mechanism, air under pressure is applied to the piston cylinder combination 98 to force press plate 93 to a preselected lower level above the press plate 84, i.e. the rear edge portion of surface 93*a* at substantially the same elevation as plate 124. Depending upon the degree of compactness of the product desired, the press plate 93 may be returned to its datum position, additional product fed between the press plates and then press plate 93 lowered. This cycle may be repeated one or more times.

After the product has been compressed with the desired amount of product between the press plates and the movable press plate in its lower position, and a bag, open end sleeve, or carton clamped on spout 126 to receive product pushed through spout 126, fluid under pressure is applied to the piston cylinder combination 120 to translate the pusher head assembly toward and through the spout, i.e. in the direction of arrow 100. This results in the compressed product being moved toward the spout outlet and the bag. In this connection, through suitable conventional control mechanism that has not been illustrated or described, the downward movement of the movable press head is limited so that there is sufficient spacing between press plates 84 and 93 that the pusher head may be translated therebetween.

When the press plate 93*a* is moved to its product compress condition, the rear edge portion 93*b* abuts against the extension to move the extension downwardly slightly from the elevation the extension is retained at by the rollers abutting against plate 124, or is at a slightly higher elevation than portion 107*a*. As the pusher head moves from its datum position in the direction of arrow 100, the spacing between the top edge of pusher member 106 and the vertically adjacent part of the surface 93*a* gradually increases. If it were not for the provision of the pusher head extension, product would bulge rearwardly over the pusher head (resulting from the increased spacing). However, since the pusher head extension is constantly resiliently urged upwardly as the pusher head is moved in the direction of arrow 100 and the rollers 113 roll against surface 93*a* there is no such increase in spacing between the pusher head assembly and the press plate 93 in its product compress condition for the product to extend into. With the continued movement of the pusher head in the direction of arrow 100, the compressed product is pushed into the bag and the bag clamps are opened when product reaches the end of a bag or sleeve, or a predetermined position relative the end of a bag or sleeve. At the forwardmost position of the pusher head assembly 105, the rollers 113 still abut against the spout top wall so that as the assembly is retracted, the extension is forced downwardly. After the pusher head has been moved to the output of the spout, fluid under pressure is applied to the piston cylinder combination 120 to retract the pusher head to its datum position and then to piston cylinder combination 98 to retract the movable press head to its datum position.

Since the spacing of the opposite press head adjacent surfaces are more closely adjacent one another at the rear end of the press (i.e. adjacent the location of the pusher head in its datum position) than the corresponding spacing adjacent the spout, even a slight tapering of one or both of the press plates eliminates binding of the compressed product that would otherwise occur as the compressed product is moved toward the spout. Further, by tapering the spout wall 126*a* to form a generally planar continuation of the surface 93*a* in a product compress condition, the resistance to the movement of the product into the bag is decreased from what it would be if wall 126*a* were horizontal.

To be mentioned is that if one or both of the press plates were not tapered, in initially moving the pusher head to move the product between the plates in a product compress condition, the product would be unduly compressed in a longitudinal direction as a result of the product binding. This can result in damaging the product particularly if the product is layers of rock wool having a foil or paper facing joined to each layer. In this connection, the layers would be placed in the press to have the facing generally parallel to the bottom press plate. By providing press plates having relatively tapered surfaces as previously described, the amount of force required to start the product initially moving in a longitudinal direction is decreased; and accordingly the chances of damaging the product through the pusher head moving the compressed product is substantially decreased. With layers of batting and such products, advantageously the transverse width of the spout inlet is slightly greater than the width of the compressed product.

Advantageously the press of this invention is used for compressing products such as felt, foam rubber, wool, fiberglass, excelsior, rock wool, cotton batts and etc. and transferring the compressed material into a suitable container.

Further, the degree of divergence of the movable plate and bottom plate pressing surfaces is preferably about one-eighth inch per foot in the direction (arrow 100) that the compressed product is to be ejected from between said plates. By providing the tapered press plates and the pusher head having the spring loaded extension, the likelihood of damage to the product is substantially eliminated while requiring less substantial work to push the compressed product into the bag than if the plates were not tapered.

What I claim is:

1. For compressing a product such as layers of batting or similar material wherein the compressed product is transferred in a given direction generally at right angles to the direction of the application of force for compressing the product, a press comprising a frame, a first press plate mounted on said frame, a second press plate on said frame, first power means mounted on the frame for moving the second press plate toward the first press plate from a datum position to a product compressed second position for com-

pressing product located between said plates, said plates having adjacent, generally planar pressing surfaces, at least one of said pressing surfaces being tapered to extend progressively more remote from the other pressing surface in the direction of transfer of the compressed product, pusher means for moving the compressed product between the press plates when the second press plate is in its product compressed position to move the product in said right angle direction, second power means mounted on the frame and connected to the pusher means for forcing the pusher means between the press plates from a datum position adjacent the location of the minimum spacing of the press plates in a product compressed condition to a second position adjacent the location of the maximum spacing of the press plates, the pusher means including a pusher plate having a first edge adjacent the first press plate, and an opposite second edge substantially more closely adjacent the second press plate than the first press plate when the second plate is in its second position, an extension member, said extension member including a first portion extending along said pusher member in overlapping relationship along the surface of said pusher member that is on the side thereof in said given direction and a second portion having one edge joined to the first portion intermediate the pusher plate second edge and the second press plate, and means for mounting the extension member on the pusher plate to move therewith in said given direction and relative thereto to resiliently retain the extension member in abutting relationship with the second press plate as the pusher plate is moved in said given direction, said extension mounting means including spring means connected to the extension member second portion and mounted on the pusher plate for constantly resiliently urging said extension member away from the first press plate, the second power means being connected to the pusher plate for moving said pusher plate in said given direction form the pusher means datum position to adjacent the pusher means second position, said extension member including roller means abutable against the second press plate and connected to the second portion for retaining the second portion slightly spaced from and within close tolerance to the second press plate as the pusher means is moved toward its second position, the second press plate having a tapered surface portion, and a spout on the frame opposite the pusher means when the pusher means is adjacent its datum position to have the compressed product moved therethrough by the pusher means, said spout having a top wall tapered to form a generally planar continuation of the tapered surface portion of the second press plate in its second position.

2. For compressing a product such as layers of batting wherein the compressed product is transferred in a direction generally at right angles to the direction of the application of force for compressing the product, a press comprising a frame, a first press plate mounted on said frame, a second press plate on said frame, and power means mounted on the frame for moving the second press plate toward the first press plate from a datum position to a product compressed position for compressing product located between said plates, said plates having adjacent, generally planar pressing surfaces, and at least one of said pressing surfaces being tapered to extend progressively more remote from the other pressing surface in the direction of transfer of the compressed product, means for moving the compressed product between the press plates when the second press plate is in its product compressed position to move the product in said right angle direction, power means mounted on the frame and connected to the product moving means for forcing the product moving means between the press plates from a datum position adjacent the location of the minimum spacing of the press plates in a product compressed condition to a second position adjacent the location of the maximum spacing of the press plates, said compressed product moving means including a pusher head having a pusher member, an extension at least partially overlapping the pusher member, and means for mounting the extension of the pusher member and constantly resiliently urging the extension in a direction toward the movable press plate, and a spout attached to the frame opposite the compressed product moving means in its datum position, said spout having a wall that is tapered to form a generally planar continuation of the tapered pressing surface.