

Sept. 15, 1931.

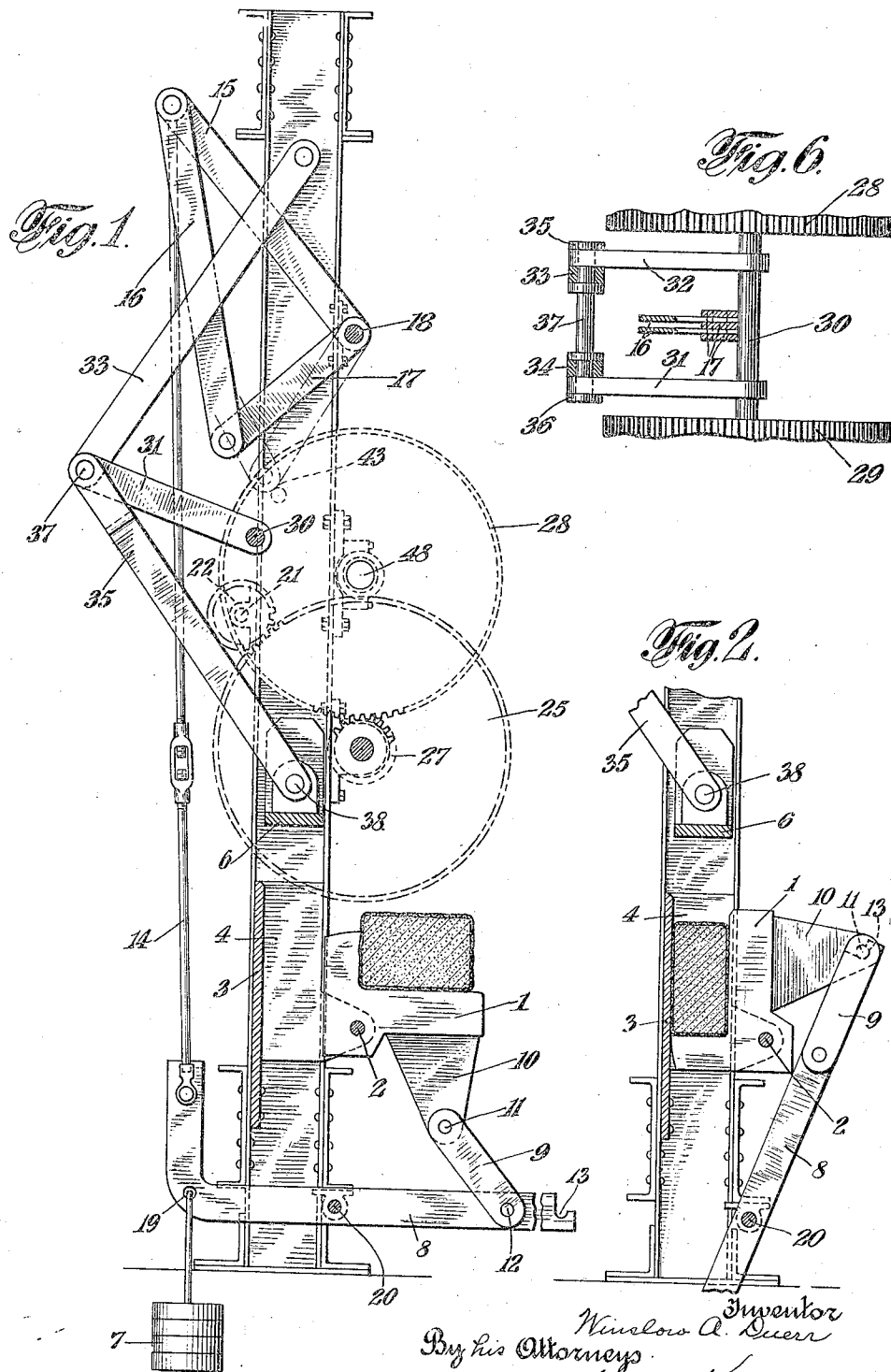
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APPARATUS FOR THE COMPRESSION OF PACKAGED SUBSTANCES

Filed Nov. 3, 1927

3 Sheets-Sheet. 1



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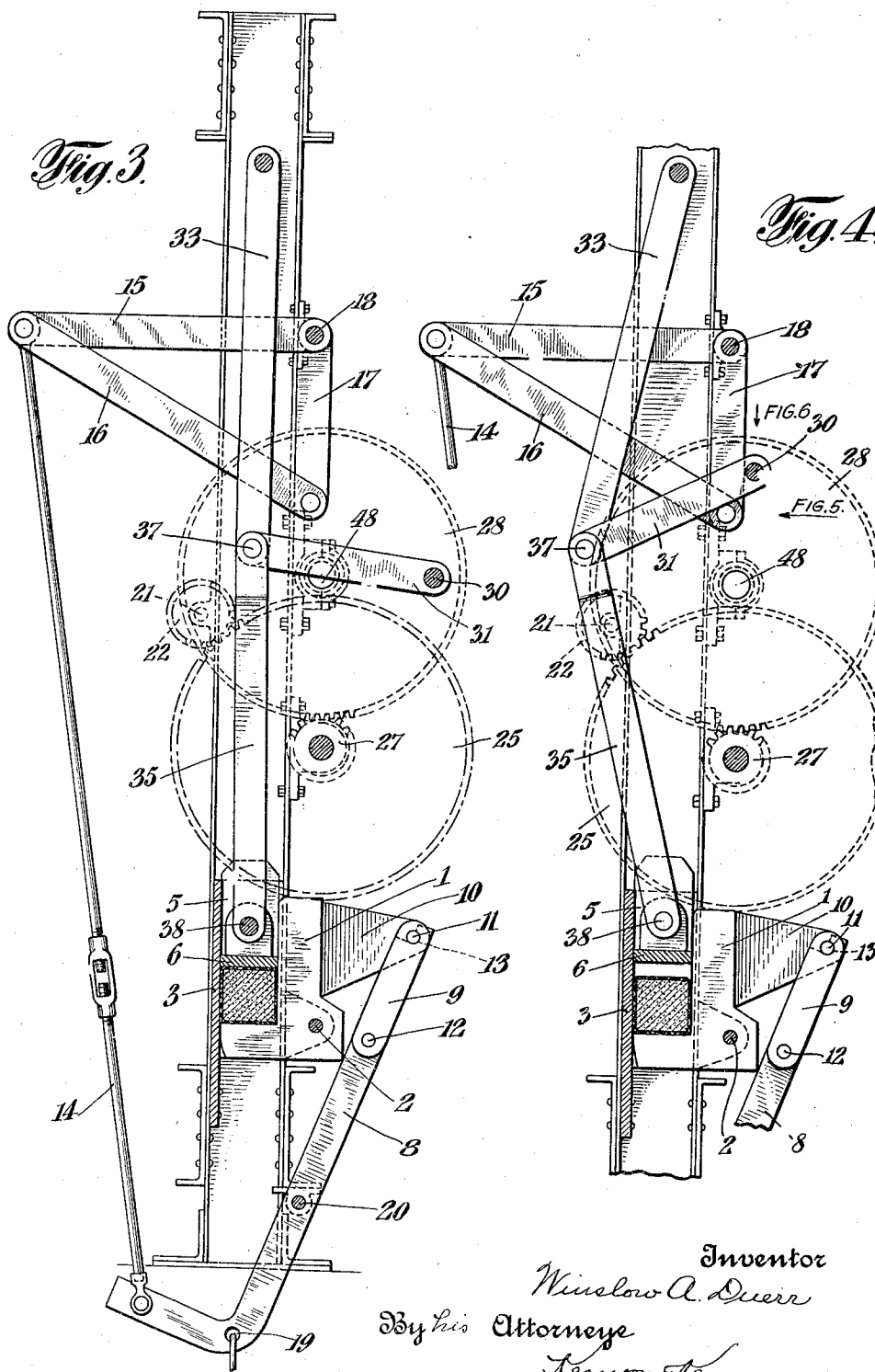
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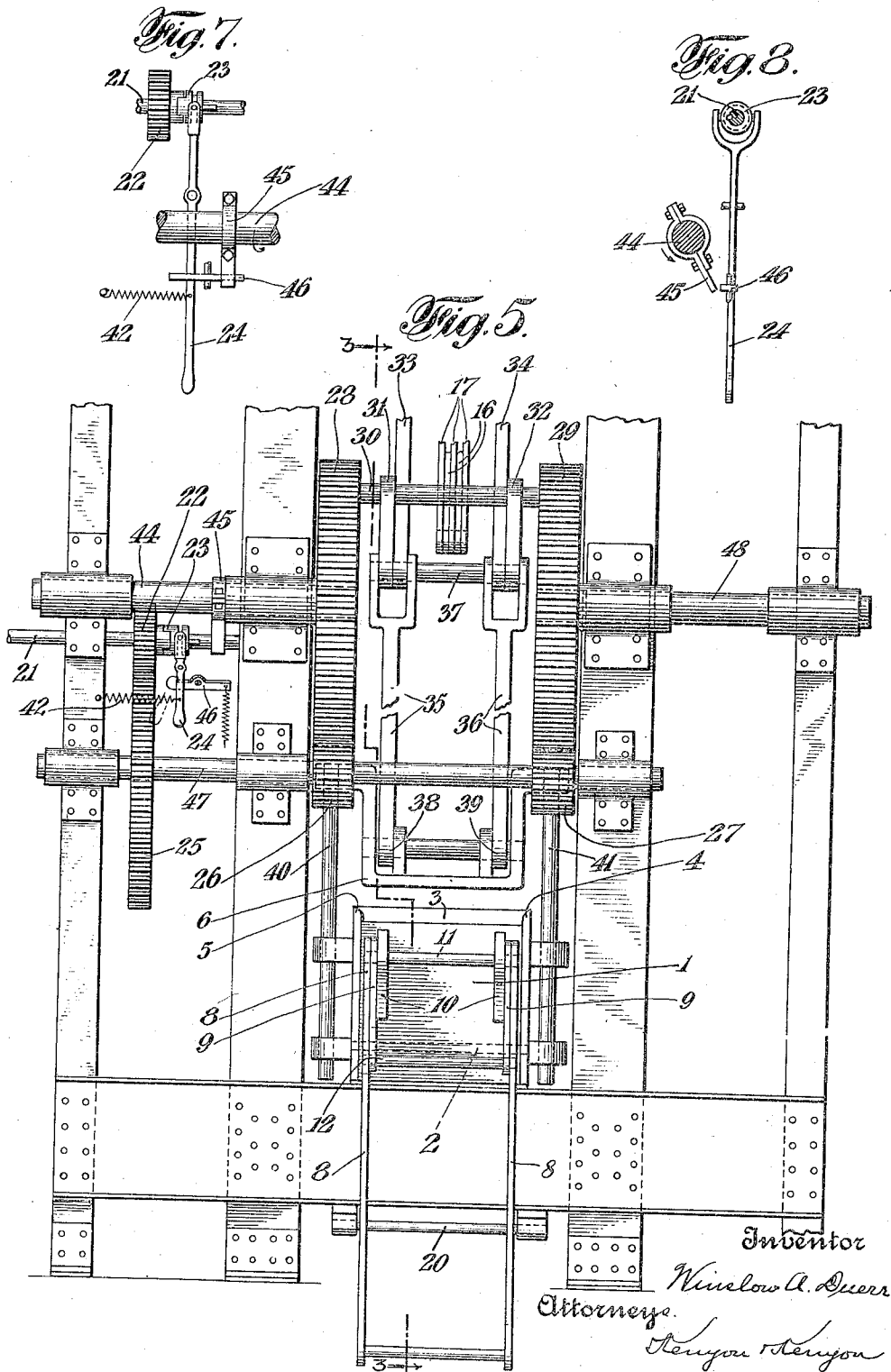
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3 Sheets-Sheet. 3



UNITED STATES PATENT OFFICE

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APPARATUS FOR THE COMPRESSION OF PACKAGED SUBSTANCES

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This invention relates to an apparatus for the compression of packed substances with particular reference to compressible solids contained in flexible sacking. The invention will be disclosed in connection with compression of bags of carbon black, though its application is not limited to such a particular use.

attention to placing the preceding bag of compressed material into its overslip. Accordingly the entire operation can be economically and rapidly performed by one man. The apparatus embodies certain novel features of design and operation which will be described herein.

In the accompanying three sheets of drawings which form a part of this specification,

Fig. 1 is a vertical sectional view of my press taken on the line 3—3 of Fig. 5, showing the press in the starting position with an uncompressed sack in place. The fifth stage of the cycle of operation is partially indicated by certain dotted lines at the point 43.

Fig. 2 is a partial similar section of the lower portion of the press showing the door closed and the press at what may be called the second stage of the cycle.

Fig. 3 is a similar section taken on line 3—3 of Fig. 5, showing the plunger at the lower limit of its stroke, this being what may be called the third stage of the cycle.

Fig. 4 is a partial similar section showing the plunger on its upward stroke and about to cause the door to open, this being what may be called the fourth stage of the cycle.

Fig. 5 is a partial elevation, taken looking from right to left in the direction of the arrow on Fig. 4, the lower toggle arms being broken and the plunger shown at the upper limit of its stroke.

Fig. 6 is a detail looking downwardly in the direction of the arrow on Fig. 4.

Fig. 7 is a detail in perspective of the clutch and automatic release trigger.

Fig. 8 is a section of the same.

Like index figures refer to like parts in the various figures of these drawings.

In accordance with the invention the sack to be compressed is placed upon the hinged door 1 as shown in Fig. 1. This door is cast in the form shown of metal and is designed to be of substantial weight. It is pivoted at 2 and so designed that when it is rotated counterclockwise through an angle of 90° from the position shown in Fig. 1 to the position shown in Fig. 2 and brought to rest substantially in contact with a back member 3

In the manufacture of carbon black in the form of a dry powder it is customary to allow the powder to flow by gravity into paper sacks. When permitted to flow in this manner by gravity into a relatively small sack, the carbon black does not of its own weight pack together to a sufficient degree to enable the sack to be handled commercially, or shipped economically, without additional compression after the sack has been filled and sealed.

Customarily carbon black is packed in paper sacks containing 10 to 15 pounds which, when loosely packed in the first instance, measure approximately 21" x 12" x 8". For commercial purposes it is desirable that these dimensions should be reduced for the reasons suggested above and commercial practice has indicated approximately 21" x 6" x 6" as a desirable size for the sacks. It has heretofore been the practice to employ two single stroke hydraulic or mechanical presses, in simplest form an open top box with fixed sides and a plunger, to attain this result. These two devices are used in succession and the pressed bag is then dropped into a small paper sack, called the overslip, of appropriate dimensions. Such an operation requires the services of at least three men; one to operate each press and a third to slip the pressed bag into the overslip.

The press which is the subject of the present invention, offers several advantages. The entire compression of the original paper sack takes place in a single compression chamber and in one cycle of operation. The operation of the press throughout this cycle, from the moment it is started by the operator, is entirely automatic including an automatic stop and delivery of the compressed sack to a convenient rest, so that the operator during this cycle of operation can devote his

and end members 4 and 5 (Fig. 5), a chamber is formed into which a plunger 6 is designed to pass. The weight of this hinged door is such, and it is so balanced on the pivot 2, that but a small force, easily within the compass of the strength of a man, is required to lift the door from the position shown in Fig. 1, through an intervening dead center, to the position shown in Fig. 2. The weight 7, hereinafter more fully described, is adapted to assist in this rotation, and the weight of the door 1 (after it passes its dead center) and the weight 7 cooperating through the L-lever 8 and the link 9 cause the door 1 to close (i. e., come to the position shown in Fig. 2) with sufficient force to compress the sack to the desired dimension along one of its axes.

Integral with the door 1 is a wing or ear 10 to which is pivoted through the pin 11 the link 9. This in turn is pivoted at pin 12 to the L-lever 8. This L-lever is fitted at its outer end with a notch 13 adapted to engage with the pin 11 when the door 1 reaches the position shown in Fig. 2 in such manner as effectually to lock the door in that position against the lateral thrust of the plunger 6. The L-lever is pivoted at 20 and is connected through rod 14 with the triangle formed of the members 15, 16 and 17 which is adapted to swing about a fixed pivot 18. The weight 7 attached to the L-lever 8 at point 19 is so adjusted that it assists the operator to close the door 1 against the weight of the door until the dead center is reached. Thereafter the weight of the door 1 and the weight 7 cooperate to cause the initial compression upon the sack which has already been described.

The closing of the door 1, and the bringing of the L-lever 8 into the position shown in Figs. 2 and 3, causes the triangle formed of the members 15, 16 and 17 to take the position shown in Fig. 3. The press has now reached the position indicated in Fig. 2 and may be said to have reached the second stage of its cycle of operation.

Referring to Fig. 5 of the drawings the power input is through the shaft 21 which carries a loose pinion 22 adapted to engage therewith through the clutch mechanism 23 keyed to the shaft 21 as shown in Fig. 7. The lever 24 enables the operator to bring this clutch into engagement, where it is held by the catch 46 diagrammatically shown in Fig. 5, and hence to cause the loose pinion 22 to commence to rotate. Power is thus transmitted through the gear 25 to the shaft 47 which in turn, through pinions 26 and 27, operates the main drive gears 28 and 29, mounted respectively upon the shafts 44 and 48. I have found it useful, in the commercial application of my invention, to employ the double gear, double crank, and double toggle mechanism indicated in Fig. 5, and for the sake of convenience this apparatus is here de-

scribed but it is not my intent that the invention is so limited in this, as in other, respects to the particular apparatus shown. The rotation of the main gear 28 is in a counterclockwise direction as seen in Figs. 1, 3 and 4. Gear 29 rotates similarly but is not seen in these figures. A crank pin 30 is mounted between the two main drive gears 28 and 29 and to it are attached the cranks 31 and 32 of the toggle mechanism. Only the crank 31 appears in Figs. 1, 3 and 4. The arms 33 and 34 (Fig. 5) constitute respectively the upper members of the double toggle, and arms 35 and 36 constitute respectively the lower members thereof. Members 31, 32, 33, 34, 35 and 36 are pivoted on the toggle pin 37 as shown in Fig. 5. The lower members of the toggle, 35 and 36, are pivotally attached to the plunger 6 at 38 and 39. The plunger operates upon guide rods 40 and 41 (Fig. 5). As shown in Fig. 5 the L-lever 8 is likewise doubled to gain added strength, but this is optional.

When the door 1 has reached the position shown in Fig. 2, the operator moves the lever 24, against the force of the spring shown diagrammatically at 42 in Fig. 5 so as to bring the clutch mechanism 23 into engagement and thus through the gears already described cause the main drive gear 28 to rotate in a counter clockwise direction from the position shown in Fig. 1. The crank pin 30 thereupon passes through a rotational angle of 180° from the position shown in Fig. 1 to the position shown in Fig. 3. This operates through the toggle mechanism to cause the plunger 6 to pass to the lower limit of its stroke as shown in Fig. 3 at which point the sack is compressed along a second axis to the desired dimension. It may now be said that the third stage of the cycle of operation has been reached. Because of the shape of the door, and its substantial contact with the back plate 3, the bag has now been caused to assume the desired shape and is ready, upon its discharge from the mechanism, to receive the overslip.

Upon the continued rotation in a counterclockwise direction (as viewed in Fig. 3) of the main gear 28, the crank pin 30 is brought to the position shown in Fig. 4 at which it comes into contact with the member 17 as indicated in Figs. 4 and 6. Further and continued rotation of the main gear 28 causes the crank pin 30 to continue to move in a counterclockwise direction from the position shown in Fig. 4. This movement, in contact with the member 17, causes the triangle formed of the members 15, 16 and 17 to rotate in a clockwise direction around the fixed pivot 18 and, under the impulse of the continued motion of the crank pin 30, to assume the position indicated in dotted lines on Fig. 1 at the point 43. At this point the crank pin 30 has pushed the pivoted bar 17

entirely out of its way. The effect of rotation of the triangle formed of the members 15, 16 and 17 about its axis 18 is to cause an upward pull to be exerted upon the bar 14 which in turn is communicated to the lever 8, and through it and the link 9, to cause the door 1 to open and resume the position indicated in Fig. 1. The final few degrees of motion of the door past its dead center to the position of rest (supports not shown) indicated in Fig. 1, causes the triangle formed of the members 15, 16 and 17 to advance because of an upward thrust through the lever 14 to the position representing the limit of its motion indicated in Fig. 1.

The continued rotation of the main drive gear 28 in a counterclockwise direction (Fig. 1) is transmitted through the shaft 44 and a trip 45 mounted thereon (Figs. 5, 7 and 8) to cause a catch 46 shown diagrammatically in Fig. 5 to release the lever 24 which, under the impulse of the spring 42, disengages the clutch mechanism 23 and causes the stoppage of the rotation of the main gears 28 and 29. The position of the trip 45 is so adjusted upon the shaft 44 that the crank pin 30 stops at the position indicated in full lines in Fig. 1, thus halting the plunger 6 at the top of its stroke.

The operator may then remove the compressed sack from the door 1, replacing it with an uncompressed sack and starting the door by hand over dead center toward the closed position, whereupon the cycle is repeated.

During the operation of the cycle, which I have found operates advantageously when the gear ratios are so adjusted as to require about 45 seconds for a single rotation of the main gear 28, the operator is enabled to slip the compressed sack into an overslip.

It is, of course, important that the weight of the various portions of this apparatus be so adjusted that the door 1 shall be held at rest by gravity at each of its two positions indicated in Figs. 1 and 2, that the position of the intervening dead center shall be such that the operator may lift the door 1 from the position shown in Fig. 1 to and across dead center without an unreasonable amount of effort, and that the door should then exert a sufficient force against the sack to accomplish the desired compression on its horizontal axis, assuming the position shown in Fig. 2.

It is impossible to indicate the precise weight of the parts of this apparatus which would be required to attain such results, but they may be attained in large part by an adjustment of the weight 7.

While I have disclosed my press in connection with the compression of sacks of carbon black, it is not my conception that the press is limited either to such a specific material or to the specific form described here but that it is of general application and

adaptability within the limits of the appended claims.

I claim:

1. In a package press, a pivoted and substantially L-shaped door, a pivoted lever adapted to actuate the same, a link movably connecting said lever to said door and a notch in said lever adapted to engage said door when the door is at one limit of its arc of rotation.

2. A package press comprising a compression chamber having a pivoted L-shaped member forming the bottom and one side wall, said member being oscillatable to carry a package into and remove the same from said chamber, a reciprocating plunger, operating means therefor, and means actuated by said operating means to open said L-shaped member.

3. A package press comprising a compression chamber having a pivoted L-shaped member forming the bottom and one side wall, said member being oscillatable to carry a package into and remove the same from said chamber, a reciprocating plunger, a toggle mechanism for reciprocating said plunger, a rotating member having a crank pin, a link connecting said crank pin and toggle mechanism, a pivoted lever having one end connected to said L-shaped member, a pivoted member adapted to be engaged by said crank pin, and a link connecting said pivoted member and said lever to effect opening of said L-shaped member.

4. A package press comprising a compression chamber having a pivoted L-shaped member forming the bottom and one side wall, said member being oscillatable to carry a package into and remove the same from said chamber, a reciprocating plunger, a toggle mechanism for actuating said plunger, means for operating said toggle mechanism, a pivoted lever having one end connected to said L-shaped member, and means connecting said lever with said operating means to effect opening of said L-shaped member by said operating means.

5. In a machine for the compression of packaged substances, the combination of a pivoted door shaped to conform to the package to be compressed and oscillatable within fixed limits of arcuate movement to carry said package into and deliver the same from a compression chamber, a reciprocating plunger for effecting compression of the package within said chamber, means to operate said plunger and means actuated by said plunger operating means to move said pivoted door to its open position and deliver the package from said chamber when compression thereof has been completed.

In testimony whereof, I have signed my name to this specification.

WINSLOW A. DUERR.