Sept. 7, 1954 S. L. KOMARIK ET AL 2,688,151

PERFORATING PRESS FOR ANIMAL PIECES

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Fig. 1

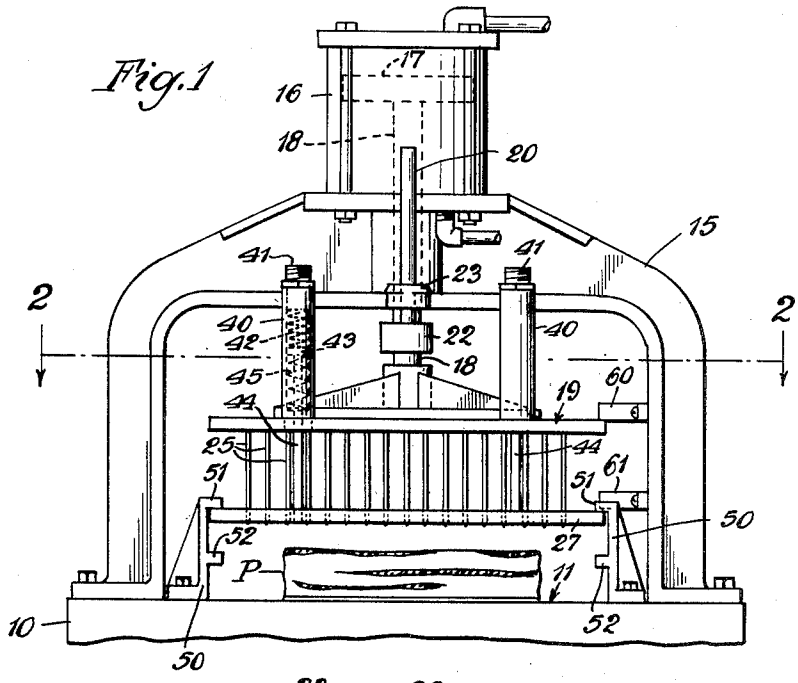
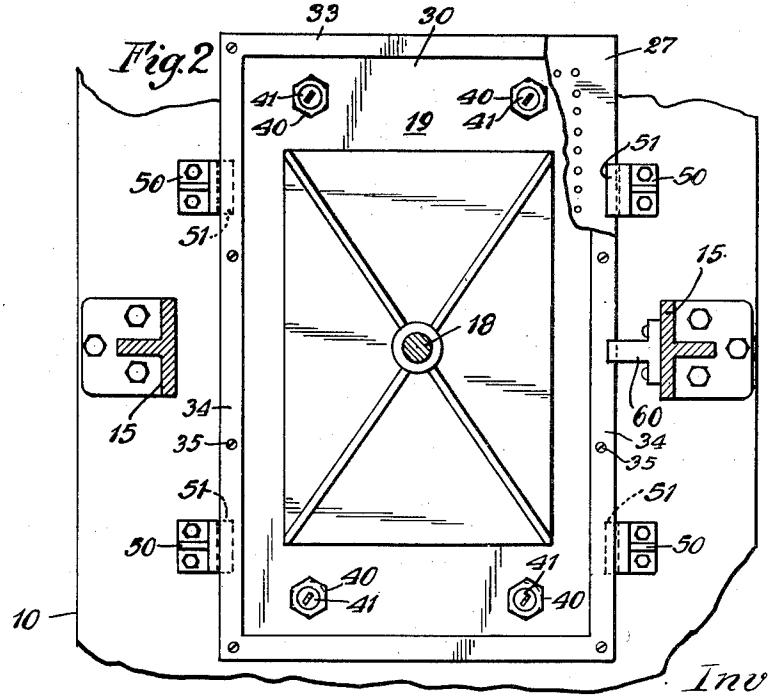


Fig. 2



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Fig. 3

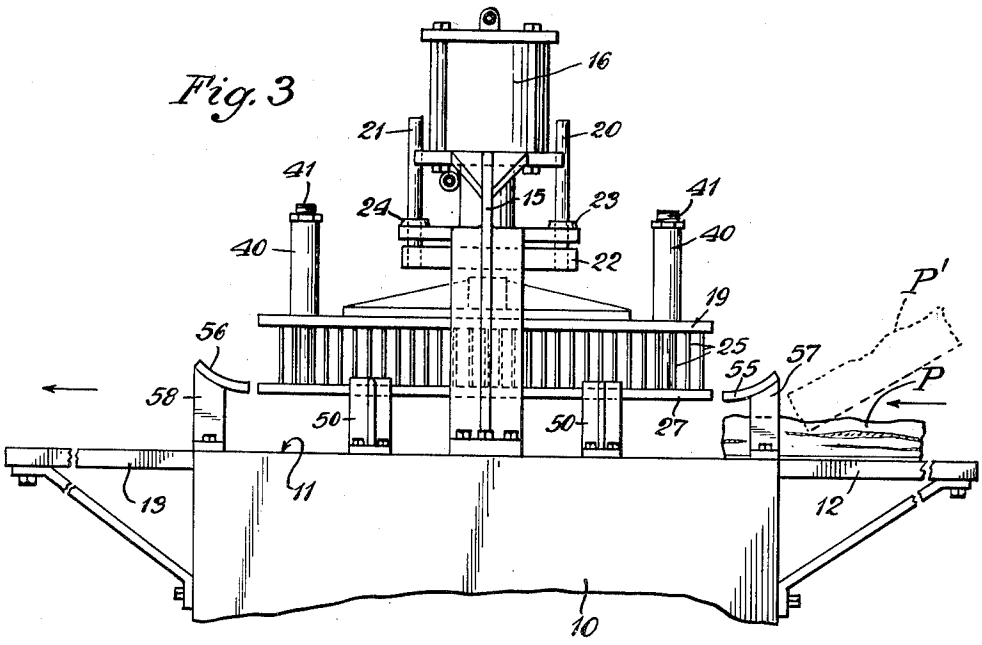


Fig. 5

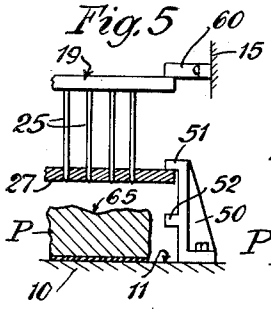


Fig. 6

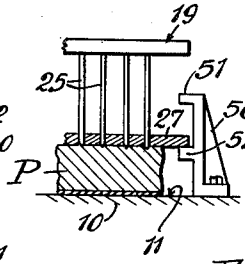


Fig. 7

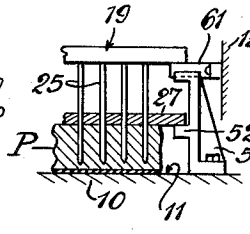


Fig. 8

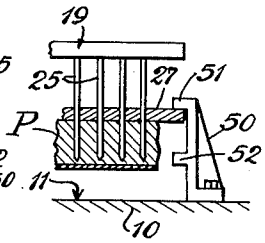


Fig. 4

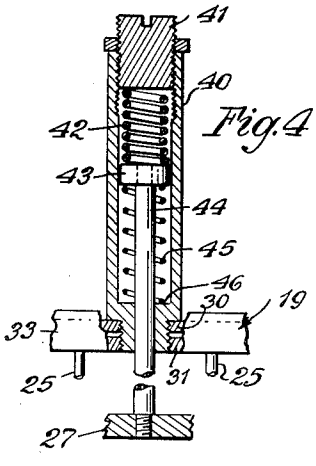


Fig. 10

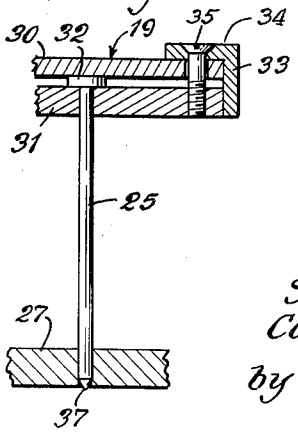
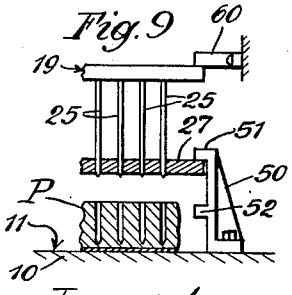


Fig. 9



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PERFORATING PRESS FOR ANIMAL PIECES

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Application December 6, 1952, Serial No. 324,442

3 Claims. (Cl. 17—25)

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The present invention relates generally to presses for perforating animal body pieces, and in particular to a press for forming artificial pores in meat products to be cured, and especially for the production of bacon.

The present invention provides a perforating press for bacon slabs and other pieces such as back fat, jowl, pork hams, beef hams and other dimensional forms which in chilled condition may be compressed to provide two parallel plane faces. The press performs the functions of compression and of perforation. The perforating and compressing may be done in various combinations of timing, such as simultaneously compressing and perforating, or perforating and then compressing before withdrawal of the pins, but it is preferred to compress first and then to insert the pins into the compressed piece before withdrawal of the pins. Because the withdrawal of pins involves a stripping action of the piece from the pins, the preferred press is one which also performs the stripping function. The compressing plate may be made to perform the stripping function also, as described below.

It is the general object of the invention to provide apparatus which produces from irregular shaped pieces of meat uniformly thick pieces, each having two plane parallel faces, and which forms artificial pores from one such face into the interior of the piece to serve as channels for curing material.

It is a particular object of the invention to provide apparatus which first compresses a piece of meat to uniform thickness and then perforates the piece along the thickness dimension.

It is also an object of the invention to provide in a multiple-pin perforating press, a plate through which the pins move, which plate functions to compress the piece to uniform thickness, to guide the pins in their linear direction, and to strip the perforated piece from the pins.

It is another object of the invention to mount a compressing stripper plate on the movable pin-carrying means in a manner to effect the compressing and stripping functions of said plate by the normal movements of entering the pins into the piece and withdrawing them.

Various other and ancillary objects and advantages of the invention will become apparent from the following description and explanation of the invention as illustrated by the presently preferred embodiment thereof shown in the accompanying drawings in which:

Fig. 1 is a front view of the apparatus looking along the axis thereof.

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Fig. 2 is a plan view of the press shown in Fig. 1 shown partly in section, and taken on the line 2—2 of Fig. 1.

Fig. 3 is a view of the press shown in Fig. 1 taken from the left hand side thereof.

Fig. 4 is a detailed enlarged vertical sectional view of an operating and mounting connection between the pressor plate and the pin-carrying head.

Figs. 5 through 9 are a diagrammatic sequence of enlarged fragmentary views partly in vertical cross-section illustrating the operations of the press of Fig. 1 on a bacon belly.

Fig. 10 is a detailed view of the mounting of the pin and its relation to the pressor plate.

In general the apparatus illustrated has a platform on which the work pieces moving in a production line may be momentarily halted under a bank of vertical pins, mounted in a vertically movable head. The head is movable in both directions by fluid pressure, being connected to a piston operating in a double acting cylinder, preferably hydraulic, in which the flow of fluid in both directions is controlled by a suitable valve conveniently located for use by the operator. The motion of the pin-carrying head is limited in both directions by structural stops to provide fixed upper and lower positions. The lower position is such that the ends of all the pins are spaced above the platform, so as to form only well-like pores in the work piece.

A vertically movable pressor plate is provided between the pin-carrying head and the platform, through which plate the pins are free to move. In the upper position of the plate, the pins in their uppermost position reside in holes in the pressor plate, which thus serves as a guide for the pins and minimizes bending of the same out of vertical alinement. The lowermost position of the plate is adjustably fixed by a stop for a predetermined thickness of meat product to be produced. The head and the pressor plate are so related that the two may move together from their uppermost positions, first to compress the work piece until the pressor plate reaches its lowermost position. Then the head continues its downward movement to move the pins through the pressor plate and into the work piece. Considerable force is required to draw the pins from the meat piece, so that in raising the head the meat piece tends to move up with the pins by friction. This is permitted so as to carry upwardly the pressor plate also. When the pressor plate reaches its uppermost position, prior to completion of the upward movement of the head,

the arrested pressor plate strips the work piece from the pins as the head continues its upward motion. The perforated piece then drops to the platform and is pushed along the platform by entry of a new piece likewise to be treated.

One apparatus for effecting the foregoing operations is herein described with reference to its particular design for pork bellies as the work pieces in the production of bacon. However, its use is not limited to pork bellies and other forms may be employed in the same apparatus.

It has a cabinet 10 in which is housed means (not shown) for generating fluid pressure, preferably hydraulic, to operate the press. Cabinet 10 has a horizontal plane top or platform 11 to which temporary or permanent shelf extensions 12 or 13 may be added for convenience. A pork belly P is shown entering the press at the location of shelf 12 to leave at shelf 13, this direction of movement being referred to herein as the axis of the press.

Across the axis of the press there is an inverted U-frame 15 surmounted by a hydraulic cylinder 16 in which moves a piston head 17 having cylindrical plunger rod 18 attached to a pin-carrying head 19. The head 19 is vertically movable and is positioned against rotation about the axis of rod 18 by means including the two vertical posts 20 and 21. Posts 20 and 21 are carried by a cross-bar 22 integral with the head and they slide vertically in bearings 23 and 24 fixed to frame 15.

Head 19 carries a multiplicity of pins 25 of equal length, for example ⅛ inch in diameter, and arranged in a regular rectangular pattern, for example one having a spacing of ¾ of an inch in both directions. Below the pins there is a vertically movable pressure plate 27 having a lower pressing face parallel to the platform 11. The plate has holes arranged in the same pattern as for the pins, through which the pins pass, preferably with considerable friction. Fig. 10 represents one suitable manner of mounting individual pins 25 in head 19 so that a pin may be easily replaced when bent or broken. Head 19 (Fig. 10) consists of separated plates 30 and 31 of which plate 31 is perforated in the same pattern as plate 27. The pins 25 each have a flat head 32 which lies between plates 30 and 31 as spacing members therefor. A peripheral rim of angle iron having vertical flanges 33 and horizontal flanges 34 overlies the edges of the plates 30 and 31. Screws 35 pass through holes in flanges 34 and in plate 30 and are threaded into plate 31, thus to clamp the pin heads tightly in place.

The pins 25 are bluntly pointed as shown at 37 in Fig. 10, and in their uppermost position have a fractional length of their points 37 projecting from plate 27 in its uppermost position. In the event that a pin becomes broken and therefore its end lost, the absence of the projecting point is easily noted by inspecting the underside of the plate 27. The arrangement described with the plate 27 spaced from the head 19, gives the plate 27 the function of guiding the pins in a vertical direction and at the beginning of the pressing operation is corrective of any bent pins, such correcting enhancing friction between the pins and plate 27.

The friction of the pins 25 with plate 27 can readily be such that the friction carries the plate upwardly and downwardly with movement of the head, to the extent that the plate 27 is permitted to move. However, it is preferred to enhance this effect of friction by providing additional means to move the plate 27 in the same manner. Such additional means becomes effective when wear between the pins and holes becomes so great as to render the friction insufficient for its intended purpose. Suitable means is illustrated in detail in Fig. 4.

Cylinders 40 are mounted to the head 19 near the corners thereof so as to extend upwardly. The tops of the cylinders are closed by a threaded plug 41, the turning of which changes the compression exerted by spring 42 between it and a piston head 43 on rod 44. Rod 44 passes through the bottom of cylinder 40 and is connected to plate 27. Piston head 43 fits loosely in cylinder 40 to permit air to pass around it as the piston moves. Where friction between the pins 25 and plate 27 may not be depended upon or may not be sufficient to lift the plate 27 by action of pins 25, the belly P will lift the plate in raising the pins until the belly P is stripped from the pins. Then without friction, the plate 27 might drop. To guard against this a light coiled spring 45 is placed between piston head 43 and the bottom 46 of cylinder 40. The several springs 45 are such in strength and arrangement that the plate 27 is always uppermost when the head 19 is uppermost. In consequence, when head 19 moves downwardly, plate 27 moves downwardly with it until it contacts a belly P under the pins. The friction, or the friction plus the net force from the cylinder 40, maintains downward motion of the plate 27 with the head 19, thereby to compress the belly P to a point where plate 27 reaches its predetermined lower limit. Then the plate 27 is arrested and spring 42 yields as the pins move into the belly to their lower limit.

Suitable means are provided to serve as stops to limit and predetermine movement of plate 27. Four posts 50 are shown mounted on platform 11. These have fixed stops which are set for treating pork bellies, but other posts with different limits may be substituted. Post 50 has upper stop 51 so positioned that the top of plate 27 strikes its underside, and it has lower stop 52 so positioned that its top makes contact with the lower side of plate 27. With respect to a fixed upper position of plate 27 as predetermined by stop 51, curved guide plates 55 and 56 are mounted on posts 57 and 58 at the entry and exit ends of the axis. At the entry end plate 55 facilitates the insertion of one end of a belly to be perforated, especially when the operator does not slide it into position along the shelf 12, as for example when it is moved from a position indicated by the dotted line position P'. Although only one end of these guide plates functions in normal use, two are provided so that the device may be used with equal facility in either direction.

In operation the motion of head 19 may involve structural stops for limiting the positions of the head. To facilitate the description, however, positive stops are indicated such as stops 60 and 61 mounted on the frame 15 serving respectively as the upper and lower stops for the vertical movement of the head 19.

The sequence of operations is best described more or less diagrammatically by reference to Figs. 5 through 9. In Fig. 5 a belly P with irregular flesh face 65 is placed on platform 11 under plate 27 in its uppermost position against its upper stop 51. Head 19 is also in its uppermost position against its upper stop 60. In Fig. 6 the hydraulic pressure in cylinder 16 has lowered head 19 and plate 27 together to the lower stop

52, in the meantime compressing the belly P to provide a plane face thereon, at a level below the irregular face 65 shown in Fig. 5. Continued movement of head 19 carries pins 25 into the compressed belly P until the head 19 reaches its lowermost stop 61 as indicated in Fig. 7. Then the hydraulic pressure is reversed and the head 19 is raised as in Fig. 8, lifting the belly P with the pins by reason of the friction therebetween, until plate 27 is arrested by its upper stop 51. Continuing movement of the head 19 upwardly strips the stationary belly from the pins 25 as the head 19 moves to its uppermost position against stop 60 as shown in Fig. 9, thereby positioning the parts as in Fig. 5 for a repetition of the cycle after replacing perforated belly P of Fig. 9 by an unperforated, uncompressed belly P as in Fig. 5.

The invention is not to be considered as limited to the precise combination and structures illustrated in the drawings, but to comprehend other forms falling within the scope of the appended claims.

We claim:

1. Apparatus comprising in combination a frame, a horizontal platform fixed relative to said frame on which to place a compressible article to be perforated, a vertically movable head mounted on said frame in a position above said platform and having a fixed range of vertical movement relative to said frame, vertical perforating elements carried by said head in position to penetrate said article on said platform, vertically movable compressing and stripper means for said article positioned between said platform and said head and mounted on and carried by said head in vertically movable relation thereto, said compressing means having openings for said perforating elements to pass therethrough, upper and lower stop means carried by said frame predetermining the terminals of the range of vertical movement of said compressing means, first resilient means connecting said head and said compressing means and operatively associated to lift said compressing means during upward movement of said head, relatively stronger second resilient means additionally connecting said head and said compressing means and operatively associated to move said compressing means downwardly to its lowermost position against the force of said first resilient means in downward movement of said head, said second resilient means providing sufficient force to effect compression of said compressible article on said platform, whereby said compressing means is moved impositively and yieldingly by said head during movements of said head, the ends of said elements in the upper positions of the compressing means and said head being sufficiently raised above the platform to permit placing an article on the platform to be compressed and penetrated, the lower stop means for said compressing means predetermining the extent of compressing said article, and actuating means operatively associated with said head to move it in both directions between its stop means.

2. Apparatus comprising in combination a frame, a horizontal platform fixed relative to said frame on which to place a compressible article to be perforated, a vertically movable head mounted on said frame in a position above said platform, upper and lower stop means carried by said frame predetermining extreme positions of the range of movement of said head, vertical perforating elements carried by said head and in position to penetrate said article on said platform, the position of the lower stop means predetermining the extent of penetration, vertically movable compressing and stripper means for said article positioned between said platform and said head and mounted on and carried by said head in vertically movable relation thereto, said compressing means having openings for said perforating elements to pass therethrough, upper and lower stop means carried by said frame predetermining the terminals of the range of vertical movement of said compressing means, first resilient means connecting said head and said compressing means and operatively associated to lift said compressing means during upward movement of said head, relatively stronger second resilient means additionally connecting said head and said compressing means and operatively associated to move said compressing means downwardly to its lowermost position against the force of said first resilient means in downward movement of said head, said second resilient means providing sufficient force to effect compression of said compressible article on said platform, whereby said compressing means is moved impositively and yieldingly by said head during movements of said head, the ends of said elements in the upper positions of the compressing means and said head being sufficiently raised above the platform to permit placing an article on the platform to be compressed and penetrated, the lower stop means for said compressing means predetermining the extent of compressing said article, and actuating means operatively associated with said head to move it in both directions between its stop means.

3. The apparatus of claim 2 wherein the actuating means is a fluid-operated piston and cylinder, whereby to facilitate positioning the stop means for said head.

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