

[54] FOOD PRESS

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 100/295, 100/DIG. 10
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 [58] Field of Search 18/16 M, 16 S, DIG. 62;
 100/42, 218, 232, 295, 269; 99/349

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[57] ABSTRACT

A press for shaping comestible products, such as meat and the like, in a tubular aperture of uniform cross section with a ram reciprocable therein. The aperture is formed by channel shaped lower die-forming means and a movable upper die partially receivable therein. Abutting surfaces limit movement of the upper die into the lower die-forming means to maintain a longitudinal opening between otherwise abutable surfaces. Also, this opening plus a side clearance between the lower die-forming means and the portion of the upper die received therein, provides an escape passageway for air entrapped in the aperture when a product is compressed. A fluid actuator of the cylinder and piston type carries the ram on a reciprocable piston rod and is constructed so that the portion of the rod that extends into the tubular aperture is not drawn into the actuating cylinder.

9 Claims, 5 Drawing Figures

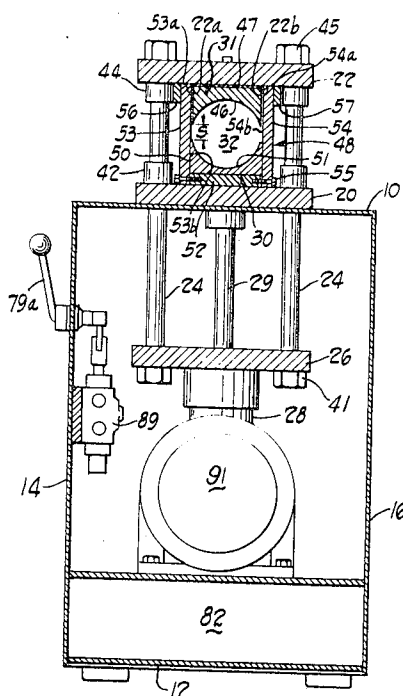


Fig. 1

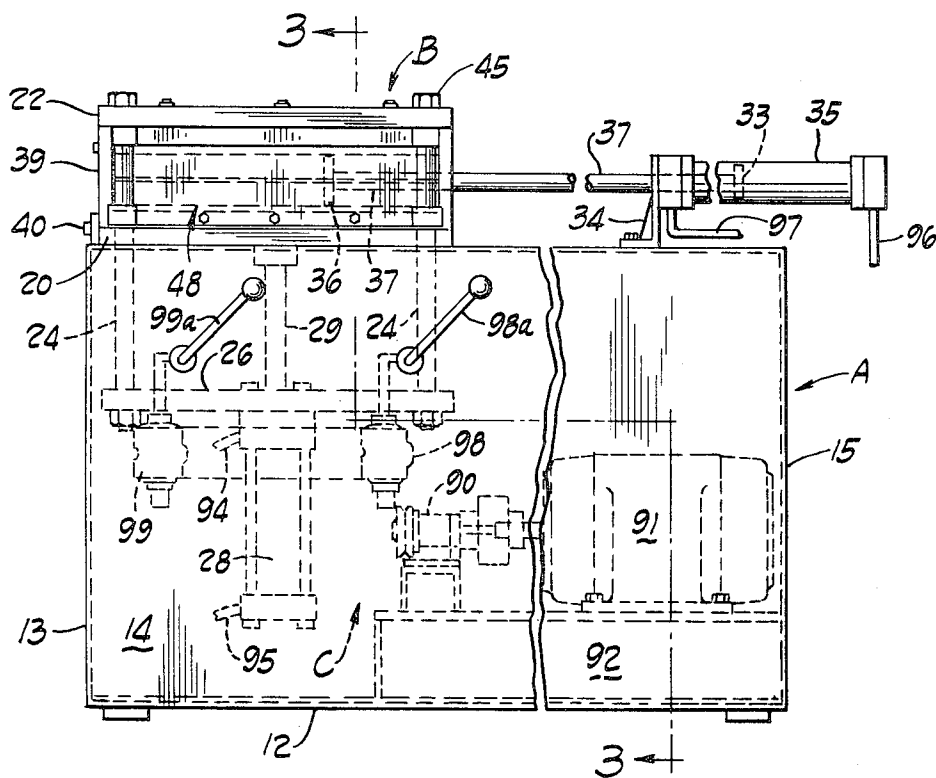
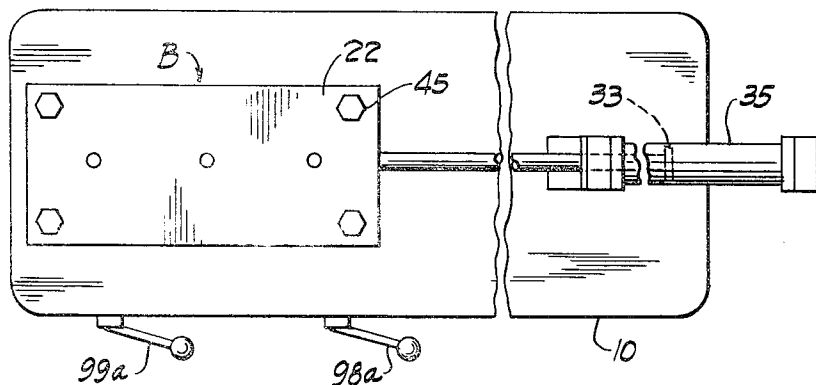


Fig. 2

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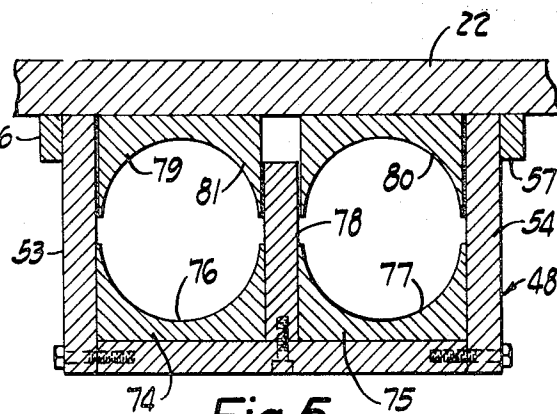
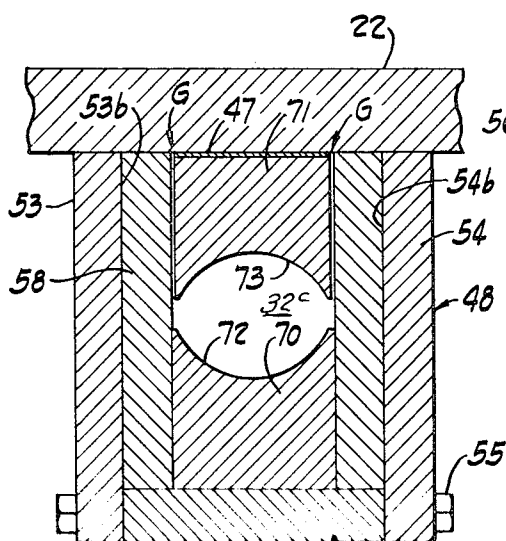
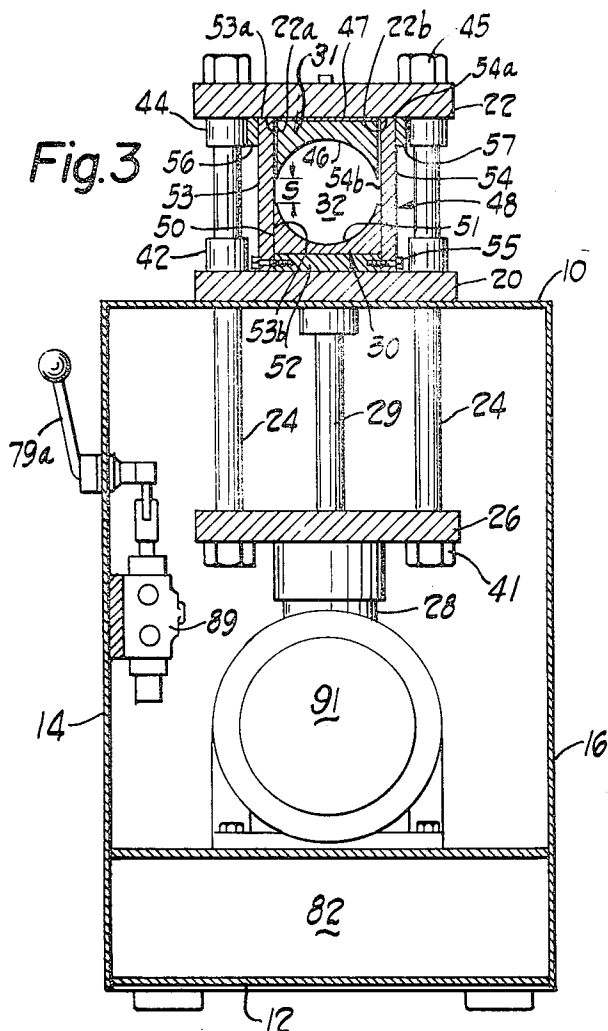


Fig. 5

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FOOD PRESS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to apparatus for compressing and shaping comestible products.

2. Description of the Prior Art

Food products, especially meat products such as ground meat, steaks, knuckles and the like are often pressed into blocks or loaves of desired density and shape, typically while frozen or semi-frozen, to facilitate subsequent slicing into pieces of generally uniform size, shape and weight. Presses for this purpose have utilized opposing die sections that are relatively movable and constructed to form a tight tubular aperture when abutted in face-to-face relationship. In use, the die sections are brought together about a product, one end of the aperture is closed, and a ram conforming to the cross section of the aperture is moved inward from the other end to compress the product. Not infrequently, blocks or loaves so formed are found to have voids or pockets caused by air trapped within the aperture while the product is compressed. In addition, the product, which is typically irregular in shape, often becomes pinched between opposed marginal portions of the dies when the die sections are brought together. This skews or tends to skew the die sections and stresses the press, especially the actuating linkages for the movable die section.

SUMMARY OF THE INVENTION

A principal object of the present invention is the provision of an improved press for comestible products such as meat and the like that readily receives irregularly shaped products, encloses the product in a tubular aperture without pinching portions of the product between marginal portions of opposed die sections, and forms the product to a predetermined shape while avoiding the formation of air pockets or voids.

An important feature of the invention, by which the pinching of the product and the formation of air pockets or the like is avoided, is the provision of opposed die members movable together to form a tubular aperture in which a product is contained and shaped by a ram, with means to control the position of opposed die members to maintain a space therebetween so that the tubular aperture formed by the die members is not sealed longitudinally. One of the die-forming means is generally channel shaped and the other die-forming means is at least partially receives therein to form the aforementioned tubular aperture of uniform cross sectional shape. Side clearance is provided between side portions of the die-forming means to establish a transverse escape path in communication with the longitudinal space between the die-forming means for venting trapped gas from the tubular aperture when opposite ends are closed.

Preferably, the surface of the die-forming means opposed to the channel-shaped die-forming means is in the form of a cavity to facilitate shaping the product to a contour having rounded corners or curved sides. The cavity preferably extends the full width of the lower die-forming means. This assures that the tubular aperture will have a substantially continuous periphery of regular contour, which imparts the desired shape to the product.

In the preferred embodiments, the channel shaped die-forming means includes die box with an open ended planar base and parallel sides, and a die insert part with a concave contour. This construction facilitates changes in the shape of the tubular aperture since only the die insert part need be changed. Furthermore, auxiliary side plates can be inserted along the die box sides to accommodate a narrow die insert and cooperating die member when tubular apertures of small cross sectional dimensions are desired. Also side-by-side die insert parts and suitable cooperating dies can be used with a single die box to provide two side-by-side tubular apertures. In the event the flexibility afforded by the preferred construction is not needed, for example, if there is no need to press products to different shapes, the channel shaped die-forming means can be a unitary member, for example, of the die box and die insert part.

Reciprocation of the ram within the tubular cavity formed by the die-forming means is accomplished with a horizontal fluid actuator of the cylinder and piston type. In the preferred embodiment, the actuating cylinder is supported a distance from the entrance end of the stroke of the actuator equal to at least the length of the aperture and the portion of the piston rod that moves into and out of the aperture is never drawn into the cylinder. This prevents any lubricants or the like for the cylinder, piston and rod from being introduced into the aperture and prevents the piston rod from carrying any food particles or the like from the aperture into the actuating cylinder.

This invention, then, provides a new and improved press for shaping a comestible product that positions a die-forming means at least partially within and spaced from a cooperating die-forming means to provide a product-receiving tubular aperture with a longitudinal separation and a transverse passageway, and one that avoids transfer of contaminants between the tubular aperture and ram actuator.

The above and other objects, features and advantages of this invention will become more apparent as the invention becomes better understood from the following detailed description, when considered in connection with the accompanying drawings, in which:

FIG. 1 is a top view of a press embodying the present invention;

FIG. 2 is a front elevational view of the press of FIG. 1 with enclosed parts showing in phantom;

FIG. 3 is a transverse sectional view taken approximately along the line 3—3 of FIG. 2, showing constructional details; and

FIGS. 4 and 5 are transverse sectional views on an enlarged scale, of die-forming means of modified constructions.

Referring now to the drawings, a preferred apparatus embodying the present invention includes a cabinet A, supporting a hydraulic press B partially above the cabinet and partially within, and a hydraulic system C for the press B, within the cabinet.

The cabinet A is generally rectangular, including a top wall 10, a bottom wall 12, and four side walls, 13, 14, 15 and 16. The top wall 10 supports the hydraulic press assembly B and the bottom wall 12 and side wall 14 support the hydraulic system C.

The press structure B includes a platen 20, generally rectangular in shape, secured to the top wall 10 of the

cabinet A, and a platen 22 of similar shape supported above the platen 20 for movement towards and from the latter by four tie rods 24 at corners of the platen. The tie rods 24 are connected at their lower ends to a yoke plate 26 attached to a vertically movable cylinder of a double-acting hydraulic actuator 28. The actuator 28 is supported by its piston rod 29, which is fixed to and depends from the platen 20. A stationary die-forming means indicated generally at 30 is supported by the platen 20 and a movable die member 31 is carried by the platen 22. The die 31 is partially receivable in the die-forming means 30 and together they form a tubular cavity or aperture 32 in which a product is received and pressed to shape. A horizontal double-acting ram actuator 33 is secured to the top wall 10 of the cabinet A by a mounting bracket 34. The ram actuator 33 includes a hydraulic cylinder 35 that reciprocates a ram 36 on the end of a piston rod 37 within the aperture 32, to compress a product. The ram 36 conforms closely in size and shape to the cross section of the aperture 32. The cylinder 35 is attached to the top of the cabinet 10 with its front end spaced at a distance from the press structure B not less than the length of the stroke of the actuator 33. The piston rod 37 and the cylinder 35 are of sufficient length to reciprocate the ram 36 the length of the aperture 32. Thus, the cylinder is at least as long as the aperture and the piston rod is at least twice the length of the aperture. With this construction, the portion of the piston rod that extends within the aperture when a product is compressed or when the ram is used to eject the product is never drawn into the cylinder.

An end plate 39 at the opposite end of the aperture 32 from the actuator 35 is secured to the platen 22 and closes that end of the aperture when the upper platen is in its lowered position. In the lowered position, the end plate 39 acts as an abutment against which the ram 36 presses the product. A stop shoe 40 secured to the platen 20 engages the outer surface of a lower portion of the end plate 39 when the upper platen is in a lowered position, and aids the end plate 39 in resisting the compressive force of the ram.

With particular reference to FIG. 3, each tie rod 24 is supported adjacent its lower end on a shoulder by the yoke plate 26. A threaded lower end portion of each tie rod extends through the yoke plate 26 and receives a nut 41. The tie rods extend upward through the lower platen 20 and are slidable in bushings 42. Collars 44 adjacent the upper ends of the tie rods support the upper platen 22 and threaded ends of the tie rods extend through the upper platen and receive nuts 45. The upper die member 31 is secured to the lower surface of the upper platen 22, as by suitable screws, and has a cavity 46 opening downward. The die member 31 is generally elongated and the surface forming the cavity 46 is formed of longitudinally extending straight line elements. Shims or spacer plates 47 are interposed between the die member 31 and the upper platen 22 to locate the lower extremities of the die a desired distance from opposed upwardly facing surfaces of the lower die-forming means when the upper platen is in a lowered position.

The lower die-forming means 30, considered as a unit, is an upwardly facing elongated channel that receives at least the lower portion of the upper die 31. In the preferred embodiments shown, the lower die-

forming means 30 includes a die box 48 supported on the lower platen 20 and a removable die insert, such as the insert 50 shown in FIG. 3, with an upwardly facing cavity 51.

The die box 48, has, in the orientation shown, a bottom wall portion 52 and two vertically upstanding side walls 53, 54 secured thereto by screws 55, each said wall having a flat upper surface 53a, 54a, and parallel inner facing surfaces 53b, 54b, respectively. The die box 48 extends longitudinally the length of the upper die 31 and lower die insert 50. Longitudinally extending blocks 56, 57 are secured to the underside of the upper platen 22, spaced apart transversely a distance that portions then directly adjacent the outer upper side edges of the die box side walls 53, 54 to prevent spreading of the die box side walls during use. As shown in FIG. 4, auxiliary side plates 58, 59 may be provided within the die box along the side wall surfaces 53b, 54b in direct engagement with a narrower lower die insert and also form a part of the lower die-forming means 30. The auxiliary side plates accommodate die inserts and upper dies of different widths in a single die box 48. The stationary die-forming means is shown as an assembly of a built-up die box and a die insert but it can be of unitary or monolithic construction, that is, the die box can itself be in the form of a die that partially receives the upper die.

Lower surface portions 22a, 22b of the upper platen 22 located between the blocks 56, 57 and the upper die 31 engage top surfaces 53a, 54a of the die box 48 to limit the downward travel of the upper platen 22 so that the upper die 31 is positioned in a definite predetermined vertically spaced relationship to the opposing surface 51 of the lower die-forming means 30. As shown, a space S is established between opposed portions of the upper die and lower die-forming means. Adjustment of the upper die position relative to the upper opposed surface of the lower die-forming means can be achieved by removing or inserting shims or spacer plates 47 between the upper die and upper platen. With upper platen 22 engaging the ends 53a, 54a of the die box 48, as shown in FIG. 3, portions of the flat inner surfaces 53b, 54b of the lower die-forming means 30 span the distance between the opposed cavity surfaces 46, 51 and together therewith form the wall of the tubular aperture 32. The cavity 46 of the upper die 31 and the cavity 51 of the lower die insert 50 extend the full width of the respective upper die and lower die insert and each merges smoothly with the flat surfaces 53b, 54b so that the surface of the aperture 32 is essentially regular; for example, essentially cylindrical.

The lower die-forming means shown in FIG. 4 includes auxiliary side plates as already described to accommodate narrower die inserts and upper dies. A lower die insert 70 and an upper die 71 each have a cavity 72, 73, respectively, shaped to form a tubular aperture 32c of oval cross section. The major axis of the oval cross sectional shape extends across the width of the die and die insert so that the die openings are of maximum area. The surfaces forming the aperture consist of longitudinal straight line elements so that a ram conforming to the cross sectional shape can be reciprocated within the aperture to compress a product.

As best shown in the enlarged views of FIGS. 4 and 5, but equally true in FIG. 3, the lower die insert in each embodiment is closely received between the side walls of the die box 48 or between the auxiliary plates 56, 57 and the several parts together form a single channel shaped die. The movable upper die, in contrast, is of smaller width than the lower die insert and the space between the channel-forming side walls of the die box to produce a predetermined clearance G on each side of the upper die between it and the side portions of the lower die-forming means. The width of this clearance or gap is on the order of 0.010 inch to 0.015 inch, and preferably is 0.012 inch so that a path adequate for the escape of trapped air but inadequate for the escape of the product itself is provided between the upper die and lower die-forming means. By virtue of the clearance gap G and the spaced relationship of all upper and lower opposed surfaces of the upper die and lower die-forming means, a transverse path of communication is provided along the tubular aperture, between the upper die and lower die-forming means. The clearances G are sufficiently small that the product being pressed cannot be forced through the gap, but at the same time, gases such as trapped air or the like can readily escape in a transverse direction along any longitudinal portion of the product within the aperture.

As illustrated in FIG. 5, a single die box 48 can be used with two side-by-side die inserts 74, 75, each extending the length of the die box with a cavity 76, 77 and separated by a longitudinally extending vertical plate 78 that is secured to the bottom part 52 of the die box. The plate 78 extends above the die inserts but no higher than the die box sides. Side-by-side upper dies 79, 80 with cavities 81, 82 are carried by the upper platen 22 and each is receivable between an adjacent side 53, 54 of the die box and the plate 78, which extends a sufficient distance above the lower die inserts to lie alongside at least a lower portion of each upper die when the upper platen is in a lowered position. The plate 78 functions relative to the upper dies and lower die inserts in the same manner as a side wall of the die box.

The hydraulic system C is provided to operate the actuators 28 and 33 to close the press B and reciprocate the ram 36 to compress the product within the tubular aperture 32. The hydraulic system is conventional, and includes a fluid pump 90 driven by an electric motor 91, both supported within the cabinet A on a reservoir 92 for hydraulic fluid. The pump 90 supplies hydraulic fluid under pressure through suitable conduits, partially indicated as inlet and outlet conduits 94, 95 to the actuator 28 and an inlet and outlet conduits 96, 97 to the actuator 33, under the control of valves 98, 99 secured to the side wall 14 of the cabinet A. Each valve has an actuating lever 98a, 99a extending outside the cabinet. The valve 98 controls the actuator 28 to raise and lower the upper platen 22 of the press B and the valve 99 controls the actuator 33 to reciprocate the ram 36 within the tubular chamber formed by the upper die 31 and lower die-forming means 30. Both actuators 28 and 33 are double-acting, and the control levers 98a, 99a are movable between two positions to selectively actuate the cylinders in either of two directions.

In operation, hydraulic fluid under pressure is supplied through the valve 98 to the inlet conduit 94 to the

cylinder 28 to raise the cylinder and yoke plate 26 from the position shown in FIGS. 2 and 3 to an upper position adjacent the top of the cabinet A. This raises the upper platen 22 and upper die 31 substantially above the lower die-forming means 30 so that a comestible product, such as a frozen meat product, can be placed in the upwardly-facing channel-shaped lower die-forming means 30. The actuating lever 98a of the control valve 98 is then reversed and fluid is introduced through the conduit 95 of the cylinder 28 and exhausted through the conduit 94 to extend the piston rod 29 and lower the yoke plate 26, thereby lowering the upper die 31 until upper surfaces 53a, 54a of the die box engage the upper platen and prevent further movement. In the event the product is larger than the tubular aperture 32, movement of the upper die will initially compress the product within the aperture. The upper die is maintained in the lower position determined by abutting surfaces by the continued fluid pressure exerted through the actuator 28. The control lever 99a is then moved to supply hydraulic fluid under pressure through the control valve 99 to the conduit 96 of the ram actuator 33, to drive the ram 36 into the tubular aperture 32. If necessary, the ram can be withdrawn and actuated repeatedly to obtain the desired density of the product. Typically, the press is equipped with a pressure gauge (not shown) which will permit proper pressure control for each type of product so that the product can be compressed uniformly to a desired density.

While a preferred embodiment of this invention has been described in detail, it will be understood that various modifications or alterations may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. A press for shaping a comestible product such as meat or the like, comprising: a support having a stationary die supporting surface; means forming a lower die supported by said surface and having an upwardly facing elongated channel with spaced planar inwardly facing side surface portions; a movable die carrier on said support; an upper die secured to said movable die carrier and constructed to be at least partially receivable between said inwardly facing side surface portions with a substantial clearance gap therebetween to form with the lower die-forming means an elongated aperture of uniform cross sectional shape; means to move said movable die carrier between a first position in which said upper die is spaced from said lower die-forming means; and a second position in which said upper die is at least partly received in said lower die-forming means with the lower side of the part thereof within said channel spaced from portions of the lower die-forming means that are opposed thereto in the general direction of die movement; a ram conforming in shape to the aperture cross section and closely receivable within said aperture; a ram actuator on said support for reciprocating said ram longitudinally within said aperture from one end thereof; and a closure for the opposite end of the aperture.

2. A press for shaping a comestible product such as meat or the like, comprising: a support having a lower die supporting surface; an upper die supporting member carried by said support for vertical movement

relative to said lower die supporting surface; a die box on the lower die supporting surface opening upward and having two parallel elongated sides with flat vertical facing surfaces; an elongated die insert part in said box with an upwardly facing cavity below top surfaces of said sides; an elongated die secured to said upper die supporting member in opposed relationship to said lower die insert part with a downwardly facing cavity and parallel longitudinally extending side surfaces constructed to fit within said die box with a substantial clearance on each side of approximately 0.010 to 0.015 inch, the cavities in both the upper die and the lower die insert part extending the full length and the full width of the respective parts and forming with the sides of said die box a straight tubular aperture; a hydraulic actuator connected to said upper die supporting member to move it vertically toward and away from the lower die supporting surface; a horizontal ram movable longitudinally within said tubular aperture from a first end thereof and conforming in shape to the aperture cross section and closely receivable within the aperture for compressing a product located within the tubular aperture; and an end plate carried by said upper member for closing a second end of said tubular aperture opposite said first end when said upper member is in a lower position.

3. A press for shaping a comestible product such as meat or the like, comprising: a support having a lower die supporting surface; an upper die supporting member carried by said support for vertical movement relative to said lower die supporting surface; a die box on the lower die supporting surface opening upward and having two parallel elongated sides with flat vertical facing surfaces; a side plate along said facing surface; an elongated die insert part in said box with an upwardly facing cavity below top surfaces of said side plates; an elongated die secured to said upper member in opposed relationship to said lower die insert part with a downwardly facing cavity and parallel longitudinally extending side surfaces constructed to fit between said side plates with a substantial clearance on each side of approximately 0.010 to 0.015 inch, the cavities in both the upper die and the lower die insert part extending the full length and the full width of the respective parts and forming with the side plates a straight tubular aperture; a hydraulic actuator connected to said upper member to move it vertically toward and away from the lower die supporting surface; means to limit downward movement of said upper member and die and maintain the upper die spaced from the lower die insert part; a horizontal ram movable longitudinally within said tubular aperture from a first end thereof conforming in shape to the aperture cross section and closely receivable within the aperture for compressing a product located within the tubular aperture; and an end plate carried by said upper member for closing a second end of said tubular aperture opposite said first end when said upper member is in a lower position.

4. A press for shaping a comestible product such as meat or the like, comprising: a support having a stationary die supporting surface, lower die-forming means in the shape of an upwardly facing elongated channel supported by said surface, a movable die carrier above the stationary die supporting surface, an

upper die secured to said movable die carrier and constructed to be at least partially receivable within said lower die-forming means and when so received to form therewith an elongated aperture of uniform cross sectional shape, means to move said movable die carrier and upper die toward and away from said stationary die supporting surface and lower die-forming means, a ram conforming in shape to the aperture cross section and closely receivable within said aperture, a ram actuator on said support for reciprocating said ram longitudinally within said aperture from one end thereof, said ram actuator including a fluid cylinder and a reciprocable piston rod one end of which extends from one end of the cylinder and carries the ram, said cylinder being of a length at least equal to the length of said aperture and said rod being of a length equal to at least twice the length of said aperture, means mounting said one end of the cylinder a distance from the aperture along the path of piston rod movement a distance at least equal to the length of the aperture, and a closure for the opposite end of said aperture.

5. A press for shaping a comestible product such as meat or the like, comprising: a stationary support, a stationary die-forming means carried by said support and having spaced planar inwardly facing side portions, a movable die carrier on said support, a movable die-forming means secured to said movable die carrier and constructed to be at least partially receivable between said inwardly facing side portions of said stationary die-forming means with a substantial clearance gap therebetween to form with the stationary die-forming means an elongated aperture of uniform cross-sectional shape, means to move said movable die carrier and the movable die-forming means carried thereby between a first position spaced from said stationary die-forming means and a second position in which said movable die-forming means extends into said stationary die-forming means with portions of the movable die-forming means between said side portions of said stationary die slightly spaced from portions of the stationary die-forming means that are opposed thereto in the general direction of die movement, a ram conforming in shape to the aperture cross section and closely receivable within said aperture, a ram actuator on said support for reciprocating said ram longitudinally within said aperture from one end thereof.

6. A press for shaping a comestible product such as meat or the like, comprising: a stationary member having a first die supporting surface, a movable member carried by said stationary member and having a second die supporting surface movable to and from said first die supporting surface, a die box on the first die supporting surface opening towards said second die supporting surface and having two parallel elongated sides with flat facing surfaces; a side plate along each said facing surface, an elongated first die part in said die box with an outwardly facing cavity, an elongated second die part secured to said second die supporting surface in opposed relationship to said first die part with parallel longitudinally extending side surfaces constructed to fit between said side plates with a substantial clearance on each side of approximately 0.010 to 0.015 inch, the cavities in both die parts extending the width of the respective die parts and forming with the side plates when said die parts are adjacent to one another a

straight tubular aperture, hydraulic actuator means operatively connected to said movable member to move the second die part to and from a position adjacent to the die part, a ram conforming in shape to the aperture cross section and closely receivable within the aperture movable longitudinally within said tubular aperture from a first end thereof for compressing a product located within the tubular aperture; and an end plate carried by said movable member for closing a second end of said tubular aperture opposite said first end as said second die part is moved towards said first die part.

7. A press for shaping a comestible product such as meat or the like, comprising: a support, a stationary die-forming means detachably fixed to said support, a movable die-forming means constructed to be at least partially receivable within said stationary die-forming means and when so received to form therewith an elongated aperture of uniform cross sectional shape, means to move said movable die-forming means to and from said stationary die-forming means, a ram conforming in shape to the cross sectional shape of said aperture closely receivable within said aperture, a fluid actuator for reciprocating said ram longitudinally within said aperture, said fluid actuator including a relatively reciprocable cylinder element and piston rod element, and means fixedly supporting one of said elements of said fluid actuator spaced from said stationary die-forming means a distance at least equal to the length of the stroke of said actuator.

8. A press for shaping a comestible product such as meat or the like, comprising: a support, a stationary die-forming means detachably fixed to said support, a movable die-forming means constructed to be at least partially receivable within said stationary die-forming means and when so received to form therewith an elongated aperture of uniform cross-sectional shape, means to move said movable die-forming means to and from said stationary die-forming means, a ram conforming in

shape to the cross-sectional shape of said aperture closely receivable within said aperture, a fluid actuator on said support for reciprocating said ram longitudinally within said aperture, said actuator including a cylinder and a reciprocable piston rod projecting from one end of the cylinder and connected to said ram and said cylinder being spaced from said stationary die-forming means a distance at least equal to the length of the stroke of said actuator.

9. A press for shaping a comestible product such as meat or the like, comprising: a stationary support, a stationary die-forming means carried by said support and having spaced planar facing side portions and an outwardly facing die cavity open at both ends and extending the full width between said facing side portions, a movable die carrier on said support, a movable die-forming means secured to said movable die carrier and constructed to be at least partially receivable between said facing side portions of said stationary die-forming means with a substantial clearance gap therebetween and having a die cavity open at both ends and extending the full width of the part received between said facing side portions to form with the stationary die-forming means an elongated aperture of uniform cross-sectional shape, means to move said movable die carrier and the movable die-forming means carried thereby between a first position spaced from said stationary die-forming means and a second position in which said movable die-forming means extends into said stationary die-forming means with portions of the movable die-forming means between said facing side portions of said stationary die slightly spaced from portions of the stationary die-forming means that are opposed thereto in the general direction of die movement, a ram conforming in shape to the aperture cross section and closely receivable within said aperture, a ram actuator on said support for reciprocating said ram longitudinally within said aperture from one end thereof.

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