

[54] MEAT PRESS

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[52] U.S. Cl. 100/53, 100/DIG. 10, 100/218,
100/232, 100/249, 100/269 R

[51] Int. Cl. B30b 7/04

[58] Field of Search 100/53, 295, 232,
100/249, DIG. 10, 218, 69 R; 85/1 R, 35 W

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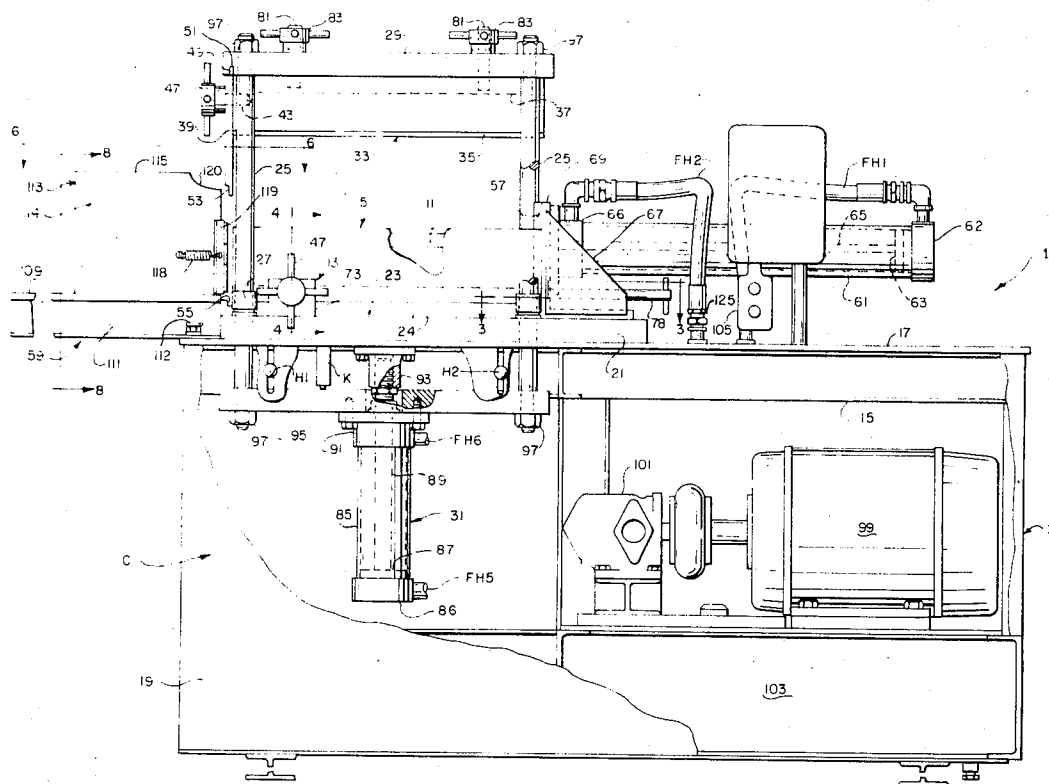
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[57]

ABSTRACT

A press for shaping frozen meat into an elongate block or "log" of uniform cross-section, having a lower die and an upper die movable between a raised retracted position clear of the lower die and a lowered closed position on the lower die, the dies forming a cavity extending lengthwise thereof when the upper die is closed. The upper die carries a plate at its forward end for closing the forward end of the cavity, and a ram is movable in the cavity for compressing frozen meat therein against the plate to form a block of meat, and for ejecting the block of meat on raising the upper die and plate. The block is ejected onto a delivery chute provided with a guard. The dies, plate and chute are readily removable without the use of tools for cleaning.

11 Claims, 14 Drawing Figures

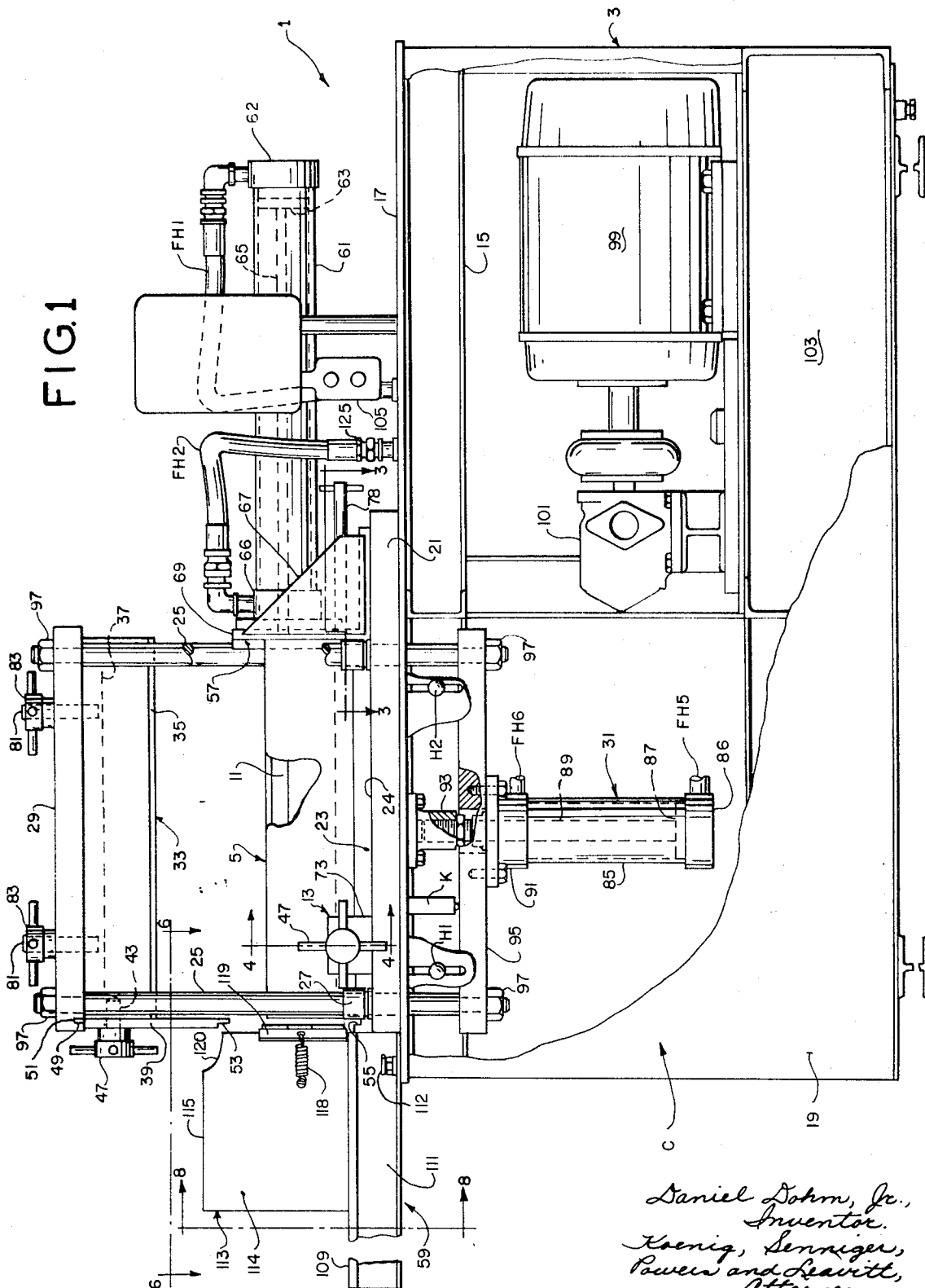


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3,753,398

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FIG. 1



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FIG.3

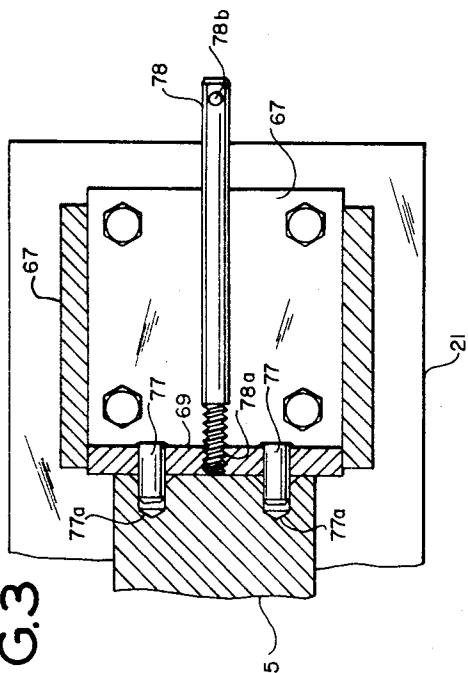


FIG.4

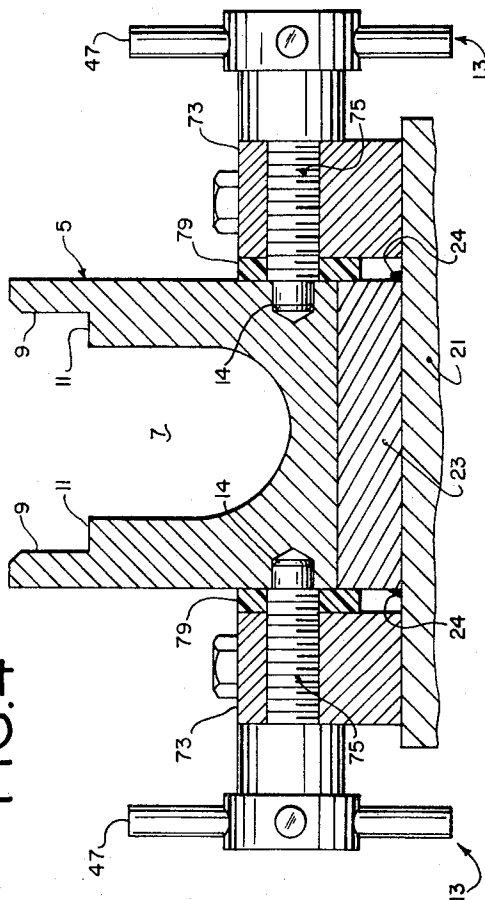
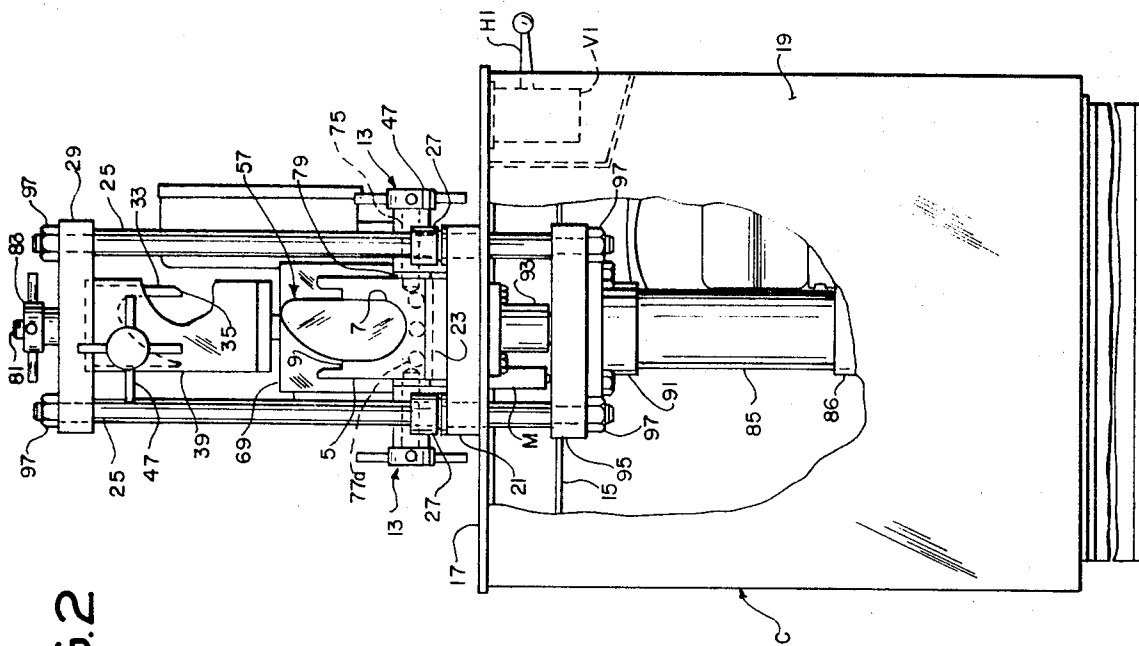


FIG.2



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FIG.5

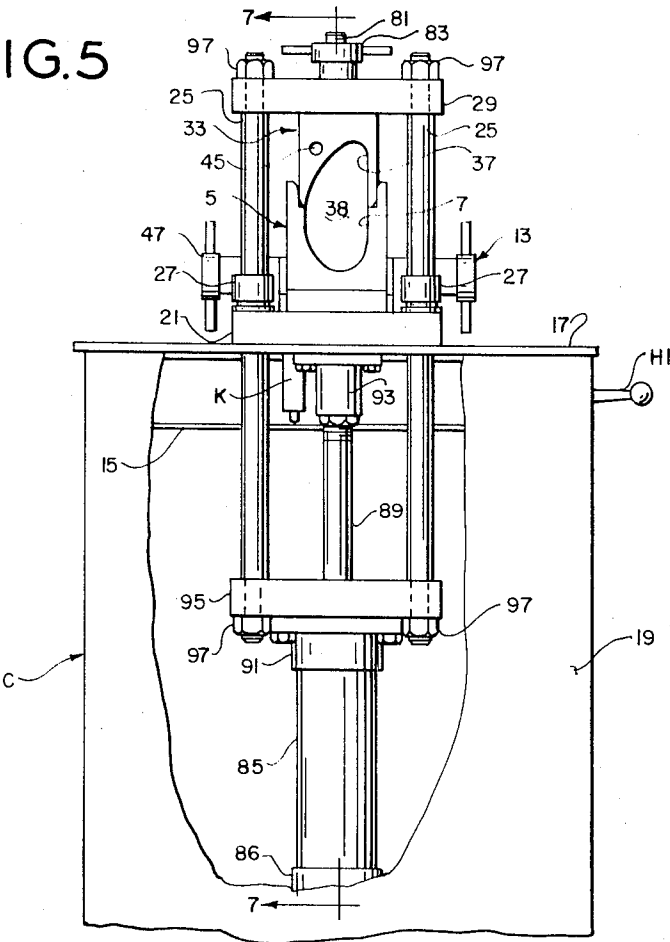


FIG.6

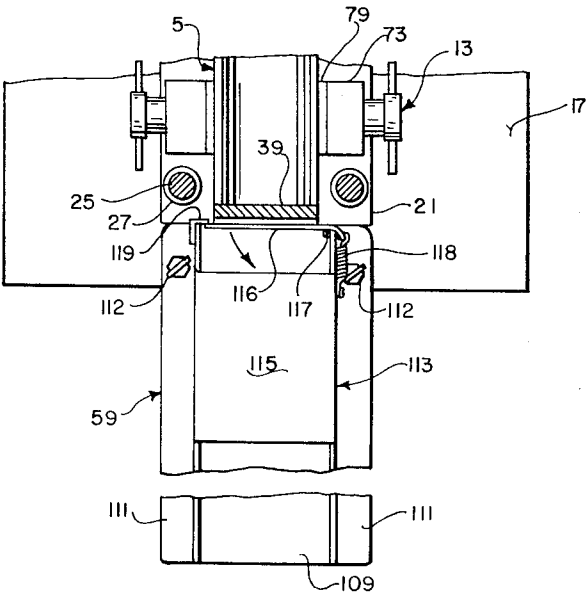


FIG. 7

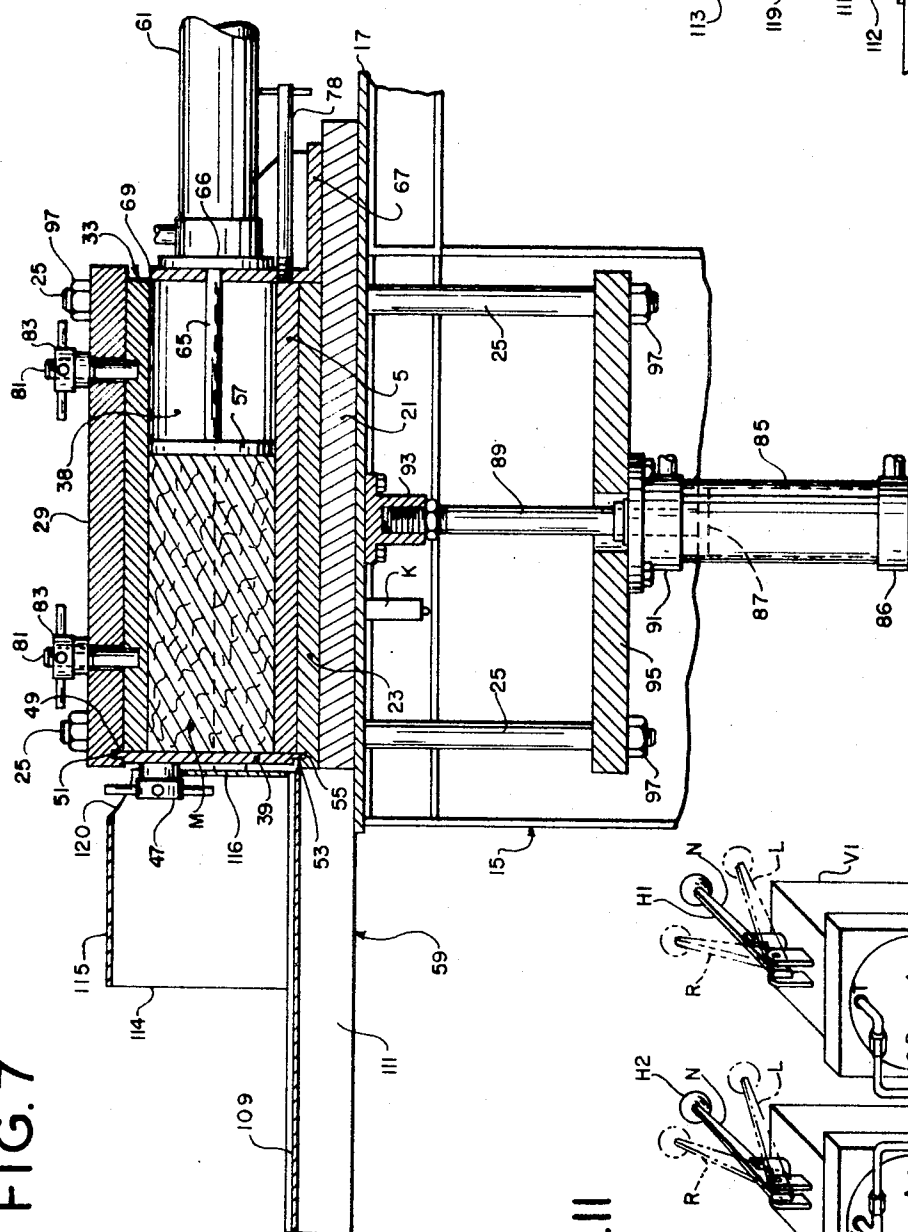


FIG. 11

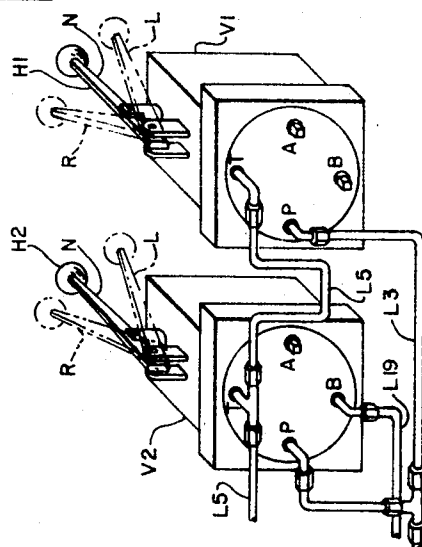
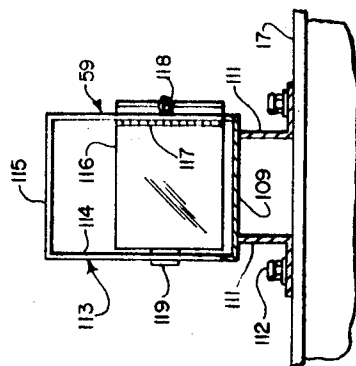


FIG. 8



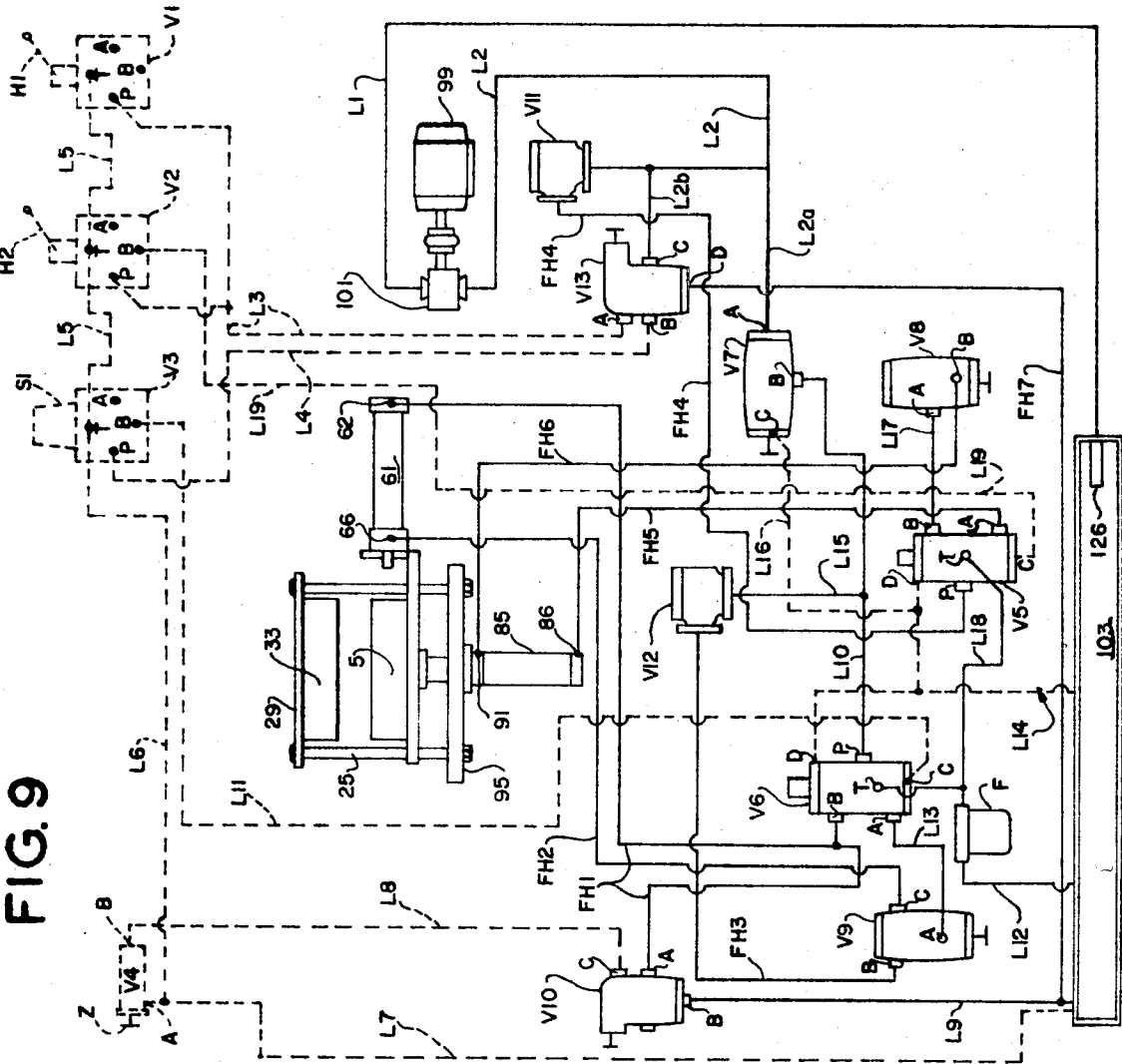


FIG. 10

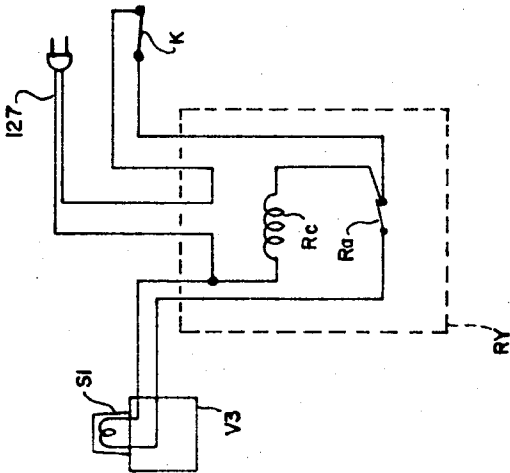


FIG. 12

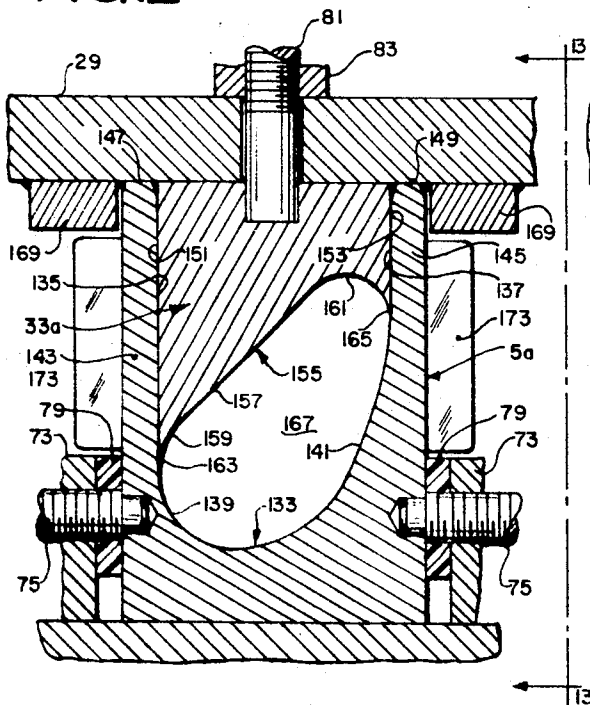


FIG.14

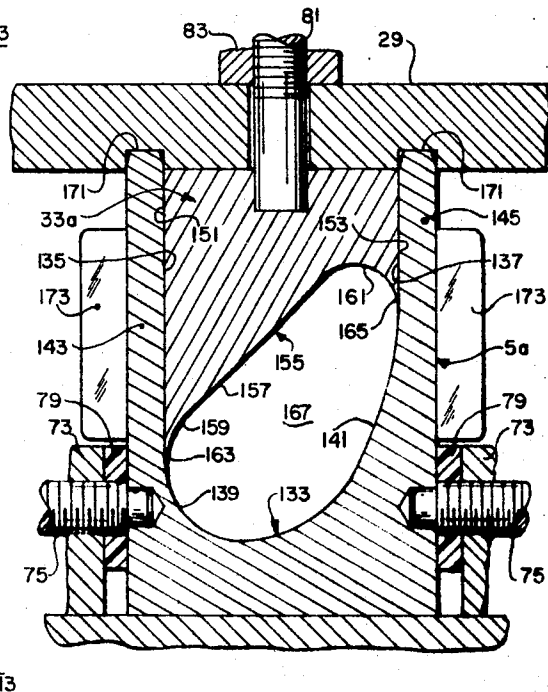
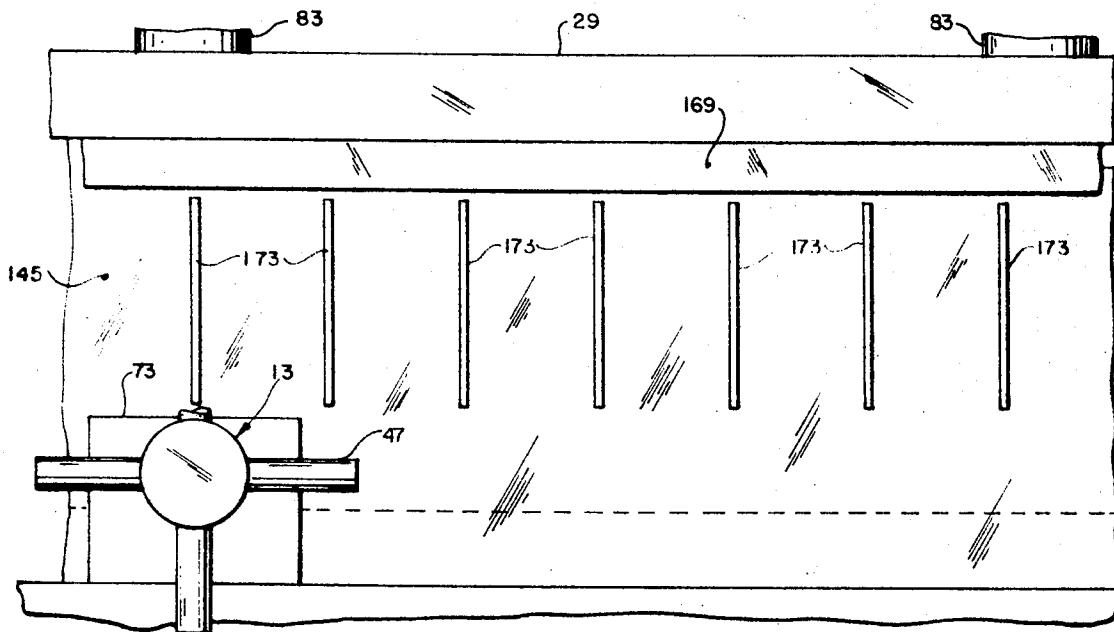


FIG. 13



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MEAT PRESS

BACKGROUND OF THE INVENTION

This invention relates to meat presses, and more particularly to a press for shaping frozen meat.

The invention is in the same general field as the meat presses shown in U.S. Pat. Nos. 2,565,245, 2,932,246 and 3,327,622, for pressing frozen meat into an elongate block or "log" of substantially uniform cross-section throughout its length for being sliced into pieces of uniform size.

SUMMARY OF THE INVENTION

Among the several objects of the invention may be noted the provision of an improved meat press of the class described adapted for easy disassembly for cleaning and for easy reassembly after cleaning without the need of tools; the provision of such a press with a minimum of joints and crevices where meat might collect; and the provision of such a press which is as fool-proof and safe to operate as is possible.

In general, a press made in accordance with this invention for compressing frozen meat into an elongate compressed body of uniform cross-section throughout its length comprises a base having a one-piece lower die removably mounted thereon. This lower die comprises an elongate block having an upwardly opening recess extending from one end thereof to the other, the recess being of uniform cross-section throughout its length corresponding at least in part to part of the cross-section of the compressed body. Means is provided on the base removably engageable in openings in the lower die for securing the lower die in place on the base. Vertically movable rods extend up from the base in planes at opposite sides of the lower die, with means in the base for moving the rods up and down, a head plate being secured to the upper ends of the rods above the lower die. A one-piece upper die is provided for cooperation with the lower die. This upper die comprises an elongate block having a downwardly opening recess extending from one end thereof to the other, and being of uniform cross-section throughout its length corresponding to the remainder of the compressed meat body cross-section. The upper die is adapted to fit within the lower die. Means is provided removably mounting the upper die on the bottom of the head plate in alignment with the lower die for movement with the head plate between a raised open position above the lower die and a lowered operative position entered in the lower die. Means removably secured to the front face of the upper die is provided for closing off the forward ends of the recesses in the dies when the upper die is in its operative position. A ram is provided movable forward within said recesses when the upper die is in its closed position to compress the meat between the ram and the recess closing means uniformly to shape the meat to the cross-section of the cooperable recesses, and movable farther forward to eject the shaped meat from the press when said upper die is opened. The press further comprises means for receiving shaped meat ejected therefrom, and means for driving the ram and the means for moving said rods.

Other objects and features will be in part apparent and in part pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a press of this invention,

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with parts broken away, and showing the upper die of the press in its raised open position;

FIG. 2 is a front end elevation of FIG. 1, with parts broken away;

FIG. 3 is an enlarged horizontal section on line 3—3 of FIG. 1;

FIG. 4 is an enlarged vertical transverse section on line 4—4 of FIG. 1;

FIG. 5 is a view similar to FIG. 2 showing the upper die in its lowered closed position;

FIG. 6 is a horizontal section on line 6—6 of FIG. 1;

FIG. 7 is a central vertical longitudinal section of the press on line 7—7 of FIG. 5, showing the upper die in its closed position;

FIG. 8 is a vertical transverse section on line 8—8 of FIG. 1;

FIG. 9 is a hydraulic diagram;

FIG. 10 is a wiring diagram;

FIG. 11 is a perspective of a portion of the hydraulic circuit shown in FIG. 9 showing two manually operated valves thereof with their handles in the neutral position and with the raised and lowered operating positions of the handles shown in phantom;

FIG. 12 is a view similar to FIG. 4 showing a modification of the upper and lower dies with the upper die in its lowered operative position;

FIG. 13 is a side elevation on line 13—13 of FIG. 12; and

FIG. 14 is a view like FIG. 12 showing another modification.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, there is generally indicated at 1 a press of this invention for compressing frozen meat into an elongate block or "log" of substantially uniform cross-section throughout its length for being sliced into pieces of substantially uniform size. The press 1, as shown, comprises a base generally designated 3, with a lower die 5 on the base. This die is a one-piece die comprising an elongate block having an upwardly opening recess 7 extending throughout its length from one end thereof to the other. Recess 7 is of uniform cross-section throughout its length, the lower part thereof corresponding to part of the cross-section desired for the block of meat to be produced. The one-piece lower die 5 is rabbeted as indicated at 9 on the inside of its opposite side walls at the top providing upwardly facing shoulders 11 along the upper side portions of the recess 7. The lower die 5 is removably secured in place on the base 3 by means generally indicated at 13 carried by the base engageable in holes 14 in the lower die.

The base 3 is constituted by a cabinet structure C having an internal frame 15 carrying a top plate 17 of elongate rectangular shape, with panels 19 removably secured to the frame for access to the components within the cabinet. The top plate and the panels are made of stainless steel or the like to insure cleanliness and to provide a sanitary surface. The lower die 5 is mounted on a lower die bed comprising a base plate 21 and a bed plate 23. The base plate 21 is secured by bolts (not shown) on the top plate 17 toward one end of the cabinet structure (its left end as viewed in FIG.

1) and extends longitudinally of the top plate. The bed plate 23 is narrower than the base plate 21 and of substantially the same width as the lower die 5, and is secured to the base plate as by continuous welding as indicated at 24 to prevent dirt, meat particles and blood etc. from accumulating between the base plate 21 and the bed plate 23.

Four vertically movable rods, each designated 25, extend up from the cabinet structure through top plate 17 and through the side portions of the base plate 21 on opposite sides of the lower die 5 to a position substantially above the lower die. Two of these rods are in a vertical plane at one side of the lower die and the other two are in a vertical plane on the other side of the lower die. The rods are guided for up and down sliding movement in bushings 27 secured to the base plate 21. These rods carry a head plate 29 at their upper ends above the lower die. Means generally indicated at 31 is provided in the cabinet structure for moving the rods up and down. A one-piece upper die 33 is removably mounted on the bottom of the head plate, this upper die comprising an elongate block of a width slightly less than the distance between the lower die side walls so that the bottom surfaces 35 of the top die may engage the upwardly facing shoulders 11 of the lower die when the upper die is moved to its lowered operative or closed position (as shown in FIGS. 5 and 7). The upper die has a downwardly opening recess 37 of uniform cross-section extending throughout its length from one end thereof to the other. The head plate 29 is vertically movable by means 31 for moving upper die 33 between a raised retracted open position above the lower die 5 in which it appears in FIGS. 1 and 2, and the lowered operative closed position in which it appears in FIGS. 3 and 7. With the upper die in its lowered operative closed position, the two recesses 7 and 37 define a cavity 38 extending from one end of the dies to the other, this cavity being of uniform cross-section throughout its length corresponding to the cross-section desired for the block of meat to be formed.

A closure plate 39 is carried by the head plate 29, being removably secured to the forward end of the upper die 33 (its left end as viewed in FIGS. 1 and 7) as by means of a screw 43 threaded into a tapped hole 45 in the forward end of the upper die. The screw 43 is a capstan screw having a hand wheel 47 on its outer end to enable removing it for removal of the closure plate without the use of tools. The closure plate has a reduced-thickness extension or flange 49 at its upper end engageable in a slot 51 in the bottom of the head plate 29 when the closure plate is secured to the upper die by the screw 43, and a reduced-thickness extension or flange 53 at its lower end which is engageable in a slot 55 in the top of bed plate 23 when the upper die is moved down to its closed position. Thus, the closure plate closes off the front end of the cavity 38 and is securely mounted relative to the upper and lower dies to resist the compression of the meat as will be hereinafter described.

A ram 57 is movable in cavity 38 away from the retracted position at the rearward end of cavity 38 in which it appears in FIG. 1 toward the forward (left) end of the cavity for compression of meat M therein when upper die 33 is in its lowered operative position with closure plate 39 closing the forward end of the cavity to form a block of meat. Thereafter, the ram is movable farther toward the forward end of the lower

die 5, after the upper die 33 and closure plate 39 have been moved to their raised retracted position, to eject the block of meat from the lower die to a delivery chute assembly, generally indicated at 59. Ram 57 is driven by a hydraulic cylinder 61 having cap end 62, a piston 63, a piston rod 65, and a rod end 66. The cylinder 61 is carried by a mounting bracket 67 secured to base plate 21. The bracket has a vertical front plate 69 disposed at the rear end of the lower die. The ram cylinder 61 is cantilever-mounted on the front plate 69 and extends rearwardly therefrom as shown in FIGS. 1 and 7. Piston rod 65 extends through an opening in the front plate 69 and has the ram 57 secured at its forward end for movement within cavity 38 to compress the meat therewithin, the ram being shaped for a relatively close sliding fit in the cavity.

More particularly, the means 13 for removably securing the lower die 5 to the base 3 includes a pair of blocks 73 secured on base plate 21 adjacent opposite sides thereof near its forward end. Each block has a screw 75 threaded in a hole therein for engagement in a respective hole 14 in the respective side of the lower die. Means 13 further includes a pair of dowel pins 77 secured in the bracket front plate 69 adjacent its lower edge extending forward therefrom for engagement in corresponding holes 77a in the rear end of the lower die as shown in FIG. 3. With the screws 75 in holes 14 and the dowel pins 77 in holes 77a, the lower die is firmly and accurately secured to the base 3, and by backing off screws 75, the lower die may be readily removed from the base by sliding it forward on the bed plate 23. At 78 is indicated an adjustment rod threaded in a tapped hole 78a in the plate 69 adjacent its lower edge, with the front end of the rod engaging the rearward end of the lower die. Rod 78 has a handle 78b at its outer end. A bushing 79 made of nylon or the like is secured to the inner face of each block 73 for engagement with the sides of the lower die 5 for facilitating longitudinal sliding of the lower die into position and alignment of the rear holes 77a in the lower die with the dowel pins 77 upon repositioning the die. Screws 75 are capstan screws similar to screw 43, each having a hand wheel 47 at its outer end to enable it readily to be backed off for rapid removal of the lower die without the use of tools.

The upper die 33 is removably mounted on head plate 29 by means of a pair of threaded studs each indicated at 81 secured to the top of the upper die and extending up through openings in the head plate 29, the upper die being held in place on the bottom of the head plate by capstan nuts 83 threaded on the studs. The capstan nuts permit the upper die to be easily removed from the head plate without the use of hand tools. As shown in FIGS. 1, 2, 5 and 7, the means 31 for moving the rods 25 up and down to effect movement of the upper die 33 between its raised retracted (open) position and its lowered operative (closed) position comprises a vertically disposed hydraulic cylinder 85 having a cap end 86, a piston 87, a piston rod 89 and a rod end 91. The free upper end of piston rod 89 is threaded in a fitting 93 secured to the bottom of plate 17, thereby fixing the piston rod 89 relative to the press frame 15 and preventing movement of the piston rod 89 relative thereto. The rod 91 (the upper end) of hydraulic cylinder 85 is secured to the bottom of a yoke 95, the latter carrying the rods 25 for up and down movement relative to the top plate 17. Rods 25 have

reduced-diameter upper and lower ends which extend through holes in the head plate 29 and the yoke 95, and have nuts 97 threaded thereon securing the head plate and yoke thereto. By introducing hydraulic fluid under pressure to the upper and lower sides of piston 87, the cylinder 85 is caused to move upwardly and downwardly relative to the plate 17 carrying yoke 95 and upper die 33 between their respective lowered operative positions and raised retracted positions.

At 99 is indicated an electric motor driving a hydraulic pump 101 for supplying hydraulic fluid under pressure to the cylinders 61 and 85 from a tank 103 within the bottom portion of frame 15 via the hydraulic system diagrammed in FIG. 9. The motor 99 is started and stopped by a conventional motor control switch 105 mounted above top plate 17 at a location convenient to the press operator so the press may be immediately turned off in the event of an emergency.

As shown in FIGS. 1 and 6-8, the delivery chute assembly 59 comprises a horizontal delivery chute 109 constituted by a channel mounted on a pair of beams 111 of angle shape in cross-section. The beams 111 carrying the chute 109 are cantilevered forward from the forward end of the top plate 17 of the apparatus, being removably secured to the plate 17 by wing bolts 112, with the chute extending forward from the forward end of the lower die 5 and slightly below the bottom of the recess 7 in the lower die. At 113 is generally indicated guard means for preventing an operator from placing his hand in recess 7 from the front end of the lower die 5. This guard means comprises a tunnel or shroud having side walls 114 extending up at the sides of the chute 109 and a top wall 115 located immediately in front of the lower die. The height of the tunnel is somewhat greater than the height of the cavity 38 defined by the upper and lower dies when the upper die is closed for passage therethrough of a block of meat ejected from the cavity 38 by the ram 57. At the entrance end of the tunnel (its rearward end) is a one-way door 116 adapted to open in forward direction only and stopped against opening in rearward direction. This door is hinged for swinging on a vertical axis at 117 at the rearward edge of one of the tunnel side walls and is biased by a spring 118 to swing rearward to its closed position against a stop 119 at the rearward edge of the other tunnel side wall. The door 116 in its closed position is located in a plane just forward of the vertical plane of movement of the closure plate 39. The height of the door is less than the height of the tunnel, and the side walls 114 and top wall 115 of the tunnel are cut away as indicated at 120 to clear the hand wheel 47 of screw 43 for movement down into the rearward end of the tunnel just above the door when the head plate 29 and upper die 33 move downward.

The door 116, swung closed in rearward direction against the stop 119, prevents an operator from reaching into the lower die 5 from the front when the closure plate 39 is raised. However, when the upper die 33 and closure plate 39 are raised, and the ram 57 moved forward to eject a compressed block of meat from the lower die 5, the door is swung open against the bias of spring 118 by the block of meat moving forward, and is automatically returned to its closed position by the spring 118 when the block of meat is advanced forward on the chute 109 clear of the door.

The hydraulic system shown in FIG. 9 includes manual control valves V1 and V2 for effecting movement

of the upper die 33 between its raised open position and its lowered closed position and for effecting movement of ram 57 to compress the meat M in cavity 38, and to subsequently raise the upper die from its closed position to its raised open position, to eject the meat from the press, and to return the ram to its retracted position (as shown in FIG. 1). The control valves V1 and V2 each have a handle, H1 and H2, respectively, and are spaced apart from each other (as shown in FIG. 1), one handle for operation by one hand of the press operator and the other handle for operation by the other hand of the operator. Each of the valves V1 and V2 has a neutral position N (as shown in solid lines in FIG. 11), a first or lowered operating position L (as shown in phantom), and a second or raised operating position R. The handles H1 and H2 are disposed to be returned to their neutral position from either operating position. Generally, the hydraulic system shown in FIG. 9 is operable only in response to movement of both handles H1 and H2 to their lowered operating positions L to move the upper die 33 from its raised open position to its lowered closed position and for extending ram 57 for compressing the meat M. The system is further operable only in response to movement of both handles to their raised operating positions R for raising the upper die from its lowered closed position for extending ram 57 to eject the block of meat M from the dies onto the delivery chute 59, and for retracting the ram. The hydraulic system is inoperable when either or both of the valves V1 and V2 are in their neutral position N. An electrical timing or sequencing circuit is shown in FIG. 10 which permits operation of ram cylinder 61 to move the ram 57 forward only after head cylinder 85 has moved the head plate 29 and upper die 33 down to their lowered closed position, and which permits return of the ram to its retracted position after ejecting a block of meat onto delivery chute 109.

Referring now to FIG. 9, showing the hydraulic system, there are indicated in addition to the four-way valves V1 and V2, valves V3-V13. Valves V1 and V2 are conventional four-way, three-position valves such as Vickers D-61754-D10C-50-Y valve having handles H1 and H2 mounted thereon. Each valve has ports A, B, P and T, with the ports A and B of valve V1 being plugged and with the port A of valve V2 being plugged. The handles are biased to assume a neutral position wherein port P is connected to port T to permit the fluid from pump 101 to be returned to tank 103 so that the pump will idle at low pressure when the press is not cycling. When both of the handles are pressed down by an operator, the ports P are blocked, which allows pressure to build up in the system to actuate valve V5 to effect downward movement of head cylinder 85 to move upper die 33 down to its closed position as will be hereinafter described. Raising of the handles causes the port B of valve V2 to be connected to its port T which causes valve V5 to supply fluid to the head cylinder 85 to raise the upper die 33 to its raised retracted position. Ports A and B in valve V1 and port A in valve V2 are plugged. As a safety feature, both handles H1 and H2 must be in their raised or lowered positions or the system will continue to idle, and if during operation one or both of the handles is released the system will also idle and operation of the cylinders will stop.

Valve V3 is a conventional solenoid four-way valve such as Vickers DG454-012A-110V-60-50H valve having ports A, B, P and T, and a solenoid S1 which when

deenergized by the sequencing circuit shown in FIG. 10 moves its valve spool to close its port P and to connect its ports B and T, thus allowing fluid to flow from valve V3 to valve V5 for purposes as will appear. Port A of valve V3 is plugged.

Valve V4 is a conventional remote control valve such as a Vickers C175-B-11 valve having an inlet port A and an outlet port B. This valve controls pressure within ram cylinder 61, and is mounted in the press with its control knob Z conveniently located for access by the operator so that the force of the ram may be readily varied to meet the requirements of the meat being pressed.

Valve V5 is a conventional four-way non-adjustable valve such as a Vickers C2-440-S8 valve which controls the upward and downward movement of head cylinder 85. This valve has ports A, B, P and T and pilot ports C and D. When fluid enters the lower pilot port C of valve V5, the valve spool therein shifts so that its port P is connected to its port A, whereby fluid may be directed to the cap end 86 of head cylinder 85 to lower the upper die 33 to its closed position.

Valve V6 is a conventional four-way valve similar to valve V5. The lower pilot port C of valve V6 is connected to port B of valve V3 so that fluid may flow from valve V6 to tank 103 thus shifting the spool within valve V6 to connect its port P to its port B for moving the ram 57 forward from its retracted position to compress the meat within cavity 38.

Valve V7 is a conventional sequence valve such as a Vickers RCT-06-D2-22 valve having an inlet port A, an outlet port B, and a pilot port C. This valve supplies fluid under pressure from its port B to port P of valve V6 to operate the ram cylinder 61 to move the ram 57 forward to compress the meat within cavity 38. Fluid is supplied to valve V6 from valve V7 only after head cylinder 85 has moved the upper die 33 down to its closed position and after the pressure within the head cylinder has increased to the value for which valve V7 was set. Thus, the maximum pressure within each cylinder is identical. This insures that the head cylinder will maintain the upper die in its lowered closed position as ram cylinder 61 compresses the meat because the bore of the head cylinder is larger than the bore of the ram cylinder (4.0 inches and 3.25 inches, respectively, for example) enabling the head cylinder to exert higher downward force on the upper die 33 than the upward force which the ram cylinder is able to exert thereon.

Valve V8 is a conventional counterbalance valve, such as a Vickers RCT-06-B4-22 valve having an inlet port A and an outlet port B. This valve insures that sufficient back pressure will remain in the rod end 91 of head cylinder 85 to keep the head plate 29 and the upper die 33 in their raised position when the press is in its idling mode.

Valve V9 is a conventional counterbalance valve like valve V8 connected to the ram cylinder 61 to maintain the ram in its retracted position when the press is idling.

Valve V10 is a conventional relief valve, such as a Vickers CT-06-B-40 valve, the function of which is to control or limit the maximum force exerted by ram cylinder 61 by limiting the pressure of the fluid supplied thereto. This valve has a port A, a bleed port B and a pilot port C. The bleed outlet B of valve V10 is connected to tank 103 to permit excess fluid to return to the tank.

Valve V11 is a conventional one-way check valve, such as a Vickers C2-825 valve, which permits fluid to flow from pump 101 and which checks back flow to the pump.

Valve V12 is a one-way check valve like valve V11, which combines fluid discharged from the rod end 66 of ram cylinder 61 with fluid entering port P of valve V6 to speed the pressing of the meat and the ejecting of the block of meat from the press.

Valve V13 is a conventional relief valve, such as a Vickers CT-06-B-11 valve, which controls the maximum pressure within the system. This valve has an outlet port A connected to port P of valves V1 and V2, another outlet port B connected to port P of valve V3, an inlet port C connected to pump 101, and a drain port D connected to tank 103. The flow from pump 101 will be vented to the tank via port D unless the outlet port A of valve V13 is pressurized.

Pump 101 has its inlet connected to tank 103 by a line L1 which has a strainer 126 at its downstream end to filter the fluid withdrawn from the tank. A line L2 extends from the outlet of pump 101 to the inlet side of check valve V11. The inlet port A of valve V7 and inlet port C relief valve V13 are connected to line L2 as indicated at L2a and L2b. Outlet port A of relief valve V13 is connected to port P of each of valves V1 and V2 by a line L3 and the outlet port B of relief valve V13 is connected to port P of valve V3 by a line L4. Port T of each of valves V1, V2 and V3 are interconnected by lines L5 and port T of valve V3 is connected to the inlet port A of control valve V4 by line L6 and to tank 103 by line L7. The outlet port B of valve V4 is connected to port C of relief valve V10 by line L8. Bleed outlet B of valve V10 drains to the tank via line L9 and the pressure outlet A of valve V10 is connected to cap ends 62 of ram cylinder 61 by a flexible hose FH1. Referring now to valve V6, its port B is connected to hose FH1, its port P is connected to port B of valve V7 by line L10, its lower pilot port C is connected to port B of valve V3 by line L11, its port T is connected to tank 103 by line L12, its port A is connected to port A of check valve V9 by line L13, and its top pilot port D is connected to the tank by line L14. A filter F is included in line L12 to filter the fluid as it is returned to the tank. Port C of check valve V9 is connected to rod end 66 of ram cylinder 61 by flexible hose FH2 and port B of valve V9 is connected to the inlet side of check valve V12 by hose FH3. The outlet side of check valve V12 is connected to line L10 by line L15 thus enabling valve V12 to communicate with port P of valve V6 and port B of valve V7. Pilot port C of valve V7 is connected to pilot port D of valve V5 by line L16. Referring now to valve V5, its port P is connected to the outlet side of check valve V11 by flexible hose FH4, its port B is connected to inlet port A of counter-balance valve V8 by line L17, its port A is connected to cap end 86 of head cylinder 85 by hose FH5, its port T is connected to line L12 by line L18, and its lower pilot port C is connected to port B of valve V2 by line L19. The outlet port B of valve V8 is connected to rod end 91 of head cylinder 81 by hose FH6. As shown in FIG. 1, the hoses FH1 and FH2 have bulkhead fittings 125 thereon for passage of the hoses through top plate 17 for connection to ram cylinder 61.

Referring now to FIG. 10, showing the electrical circuitry of the apparatus, there is indicated at RY a time-

delay relay, the coil of which is designated Rc. This relay has a set of contacts Ra which are open when coil Rc is deenergized and which close after a time-delay interval on energization of coil Rc. The relay includes conventional means (not shown) for varying the time-delay interval. The solenoid S1 of valve V3 is connected in series with contacts Ra and a microswitch K in a power supply line 127. Switch K is held closed by the yoke 95 when the latter is raised; it opens when the yoke moves downward. Coil Rc is connected across line 127 for energization when switch K is closed and deenergization when switch K opens.

In operation, the meat (either ground meat such as hamburger or whole chunks and pieces) is prepared for forming in the press by freezing the meat to approximately 10° F. The meat is then placed in a cooler and tempered until the meat attains a temperature of approximately 24° F. In the tempered state, the meat is frozen, but it may be readily formed under pressure without shattering. The press 1 is preferably located in a refrigerated room maintained at approximately 38° F. to prevent the meat from becoming unduly thawed. It has been found that the best forming and subsequent slicing results will be attained if the meat is between 22° F. and 28° F. Thus, the meat remains frozen at all times thereby preventing discoloration and lessening the loss of blood and juice.

The press operator starts the press motor 99 by actuating control switch 105 and then operates the handles H1 and H2 to move the press to a position in which the head plate 29 and the upper die 33 are in their raised open positions and the ram 57 is in its retracted position. The press is now ready to receive a requisite amount of meat M in recess 7 of lower die 5. As a safety feature, the press 1 will assume an idling mode if one or both of the handles H1 or H2 are released to return to their neutral positions. In this idling mode, fluid discharged from pump 101 is directed to valve V13 via lines L2 and L2b. Fluid from outlet port A of valve V13 is directed to the ports P of valves V1 and V2 by line L3. The lastmentioned ports P are connected to ports T in valves V1 and V2 when the handles H1 and H2 are in their neutral positions, which allows the fluid in line L3 to be vented to the tank 103 at low pressure via lines L5, L6 and L7. Even if one of the handles is moved from its neutral position, the fluid in line L3 is still vented to the tank via the valve V1 or V2 with its handle in the neutral position. With low pressure at the outlet port A of valve V13, its inlet port C is connected to its drain port D thereby venting substantially all fluid discharged from the pump 101 to the tank 103 via hose FH7. This permits the pump 101 to idle at low pressure when the press is not cycling and greatly increases the operating life of the pump 101 and motor 99.

In order to move the upper die 33 to its lowered operative position and to effect movement of ram 57 to compress the meat M, the operator presses both handles H1 and H2 down and holds them down until the compression phase of the cycle is complete. With both handles pressed down, the ports P of each of the valves V1 and V2 are each connected to their respective ports B, causing the pressure to increase in line L3 and at outlet port A of valve V13 which in turn closes drain port D of valve V13 to permit the system to be pressurized to the maximum value for which valve V13 has been previously set. The fluid discharged from the outlet of pump 101 is thereby directed to port P of valve

V5 via line L2 to check valve V11 and hose FH4. With the port P of valve V2 connected to its port B, fluid is directed to the lower pilot port C of valve V5 via line L19 which causes the spool in valve V5 to shift for connecting its port P to its port A so that fluid from the pump may flow to cap end 86 of head cylinder 85 to lower the upper die 33. Fluid admitted into the cap end of the head cylinder will cause the latter to move down relative to top plate 17 carrying yoke 95, rods 25, head plate 29 and upper die 33 therealong to move the upper die from its raised open position to its lowered operative position. As yoke 95 moves downwardly, switch K is opened to deenergize coil Rc and the solenoid S1 in valve V3 to shift its spool to block its port P and to connect its port B to its port T. Fluid from the lower pilot port C of valve V6 is then vented to the tank 103 via lines L11, L6 and L7 to shift the spool in valve V6 for connecting its port P to its port B. When bottom surfaces 35 of upper die 33 engage shoulders 11 of the lower die, the pressure within the system will increase to the pressure for which valve V7 was previously set, at which time fluid will flow from valve V7 via line L10 through port P of valve V6 to port B and into hose FH1 for delivery to cap end 62 of ram cylinder 61 causing the ram 57 to be driven forward to compress the meat M within cavity 38 against the closure plate 39. The degree to which the meat is compressed depends on the pressure within the ram cylinder 61 which is controlled by valve V4 acting on valve V10.

When the meat M is compressed the desired amount and the movement of the ram 57 ceases, the press operator moves the handles H1 and H2 to their raised positions to raise the head plate 29 and upper die 33 to their raised open positions (as shown in FIG. 1) to extend the ram 57 for ejecting the formed block of meat onto the delivery chute 59, and to move the ram to its retracted position. With the handles H1 and H2 raised, the ports P of valves V1 and V2 are blocked and the ports B of these valves are each connected to their respective ports T to vent fluid in line L19 to tank 103 for lowering the pressure at the lower pilot port C of valve V5 to shift its spool for connecting its port P to its port B and for connecting its port A to its port T. Fluid will then flow from valve V11 to port P of valve V5 via hose FH4, from port B of valve V5 to port A of valve V8 via line L17, and from port B of valve V8 to rod end 91 of head cylinder 85 via hose FH6 to raise the upper die to its raised open position. The shifting of the spool in valve V5 causes the pressure in the cap end 86 of the head cylinder to decrease which lowers the pressure of the system below the value for which sequence valve V7 was set. Thus, flow from valve V7 to the ram cylinder 61 is temporarily blocked. As the upper die reaches its fully raised open position, the pressure in the head cylinder and in the system again increases, which unblocks valve V7 and the latter permits fluid to flow to cap end 62 of ram cylinder 61 as heretofore described for the compression phase of the cycle to fully extend the ram 57 to eject the block of meat onto the delivery tray 59. Furthermore, as the upper die 33 reaches its fully raised open position, the yoke 95 closes switch K to energize coil Rc. When the time for which the time relay RY was set elapses (this time may be varied to insure that the meat M has been ejected by the ram), contacts Ra close to energize the solenoid S1 of valve V3 to shift its spool to connect its port P to its port B. Fluid may then flow from port B of valve V13 to port

P of valve V3 via line L4 and from port B of valve V3 to the lower pilot port C of valve V6 to shift its spool for connecting its port P to its port A. Thus fluid from valve V7 is directed to port P of valve V6 via line L10, from port A of valve V6 to port A of valve V9, from port C of valve V9 to rod end 66 of ram cylinder 61 via hose FH2 to retract the ram. Fluid vented from the cap end 62 of the ram cylinder is returned to port B of valve V6 via hose FH1 and is combined in valve V6 with the fluid entering the rod end 66 to speed the retraction of the ram. The operator releases the handles H1 and H2 and the press assumes its idling mode awaiting the next cycle.

The press is especially adapted to be easily and quickly disassembled for cleaning and then reassembled without the use of hand tools. The closure plate 39 may be removed from the upper die 33 by backing off screw 43 by means of hand wheel 47 thereon. The upper die 33 may be removed from head plate 29 by operating the press to lower the upper die to its lowered operative position resting on the lower die and backing off hand wheel nuts 83. The press may then be operated to raise the head plate leaving the upper die resting on the lower die. The upper die may either be removed from the press for cleaning or cleaned in place in its disassembled condition. The lower die 5 may also be readily removed from the press for cleaning by backing off the screws 75 in blocks 73 along its sides. The delivery chute assembly 59 may be removed as a unit by backing off the two wing bolts 112 and lifting the assembly clear of the press. The lower die may then be slidably moved forward on the top of bed plate 23 (as facilitated by the use of the nylon blocks 79) and lifted clear of the press. The press may be readily reassembled by reversing the above-described procedure.

The press is constructed with a minimum number of cracks and corners in which meat, drippings and dirt may accumulate and the exposed work surfaces of the press are made of materials that may be readily steam-cleaned to permit rapid and sanitary cleaning.

FIGS. 12 and 13 show a modified version of the upper and lower dies, which may be preferred, for enabling provision of a die cavity of greater width for receiving larger pieces of meat. In FIG. 12, the lower die is designated 5a to distinguish it from the lower die 5, and the upper die is designated 33a to distinguish it from the upper die 33. The lower die 5a is again shown as a one-piece die comprising an elongate block having an upwardly opening recess therein extending throughout its length from one end thereof to the other. This recess, which is designated 133 to distinguish it from recess 7, like recess 7 is of uniform cross-section throughout its length with its lower portion corresponding to part of the cross-section desired for the block of meat to be produced, but differs from recess 7 in that where the recess 7 is symmetrical about the central vertical longitudinal plane of the lower die, recess 133 is unsymmetrical about this plane, having a relatively deep vertical flat face 135 at one side and a relatively shallow vertical flat face 137 at the other side, with a relatively sharply curved section 139 developed on relatively short radii at the lower end of face 135 and a relatively broadly curved section 141 developed on relatively long radii at the lower end of face 137 merging with section 139. The sections 139 and 141 define the lower portion of the recess; side faces 135 and 137 extend upwardly generally tangentially thereto reaching

to the top of the lower die. The vertical face 135 is on the inside of the side wall 143 of the lower die, and the other vertical inside die face 137 is on the inside of the other side wall 145 of the lower die. These side walls have flat horizontal coplanar upper edges 147 and 149 engageable by the lower face of the aforesaid head plate 29.

The upper die 33a is dimensioned width-wise for a close sliding fit in the lower die 5a between the side walls 143 and 145 of the lower die (sliding on the vertical faces 135 and 137 of the recess in the lower die). The upper die 33a, like the die 33, is removably mounted on the bottom of the head plate 29 by means of the studs 81 and capstan nuts 83. It has a relatively deep vertical side face 151 slidable on face 135 of the lower die and its other side face 153, which slides on face 137 of the lower die, is relatively shallow. The upper die is formed with a downwardly opening recess 155 in its bottom extending throughout its length from one end thereof to the other of uniform cross-section corresponding to the remainder of the cross-section desired for the block of meat to be produced. As shown, this recess has a flat face 157 at an angle of about 45° to horizontal, with rounded sections 159 and 161 at the sides of face 157 providing knife edges 163 and 165 at the lower edges of the sides of the upper die. As the upper die descends into the lower die, these knife edges scrape off any meat particles which may have clung to the vertical inside faces 135 and 137 of the lower die, and, in its operative position at the bottom of its stroke, the upper die forms a cavity 167 in conjunction with the lower die having the desired cross-section for the block of meat to be produced. The ram (not shown in FIG. 12) is shaped to fit in this cavity for compressing meat therein as in the embodiment of FIGS. 1-8.

Means is provided for preventing the side walls 143 and 145 of the lower die from bending outwardly as the meat within the cavity 167 is compressed by ram 57. As shown in FIGS. 12 and 13, this means may comprise a pair of bars 169 secured as by welding to the bottom face of head plate 29, one on each side of the upper die 33a. The inner edge of each bar 169 is spaced from the respective side of the upper die a distance slightly greater than the thickness of the respective lower die side wall 143 or 145, the latter being adapted to have a close sliding fit in the space between the respective bar and the upper die to restrain the upper edges of the lower die side walls from deflecting outwardly as the meat is compressed. Alternately, as shown in FIG. 14, the upper edges of the lower die may be restrained from deflecting outwardly by means of a pair of grooves 171 provided in the bottom of head plate 29 for receiving the upper edges of the lower die side walls 143 and 145 when the upper die 33a is in its lowered operative position. In both FIGS. 12 and 14, the top edges 147 and 149 of side walls 135 are engageable by the head plate 29 to restrain the upper die from moving down beyond its lowered operative position, thus preventing the knife edges 163 and 165 of the upper die from binding in the lower die. Side walls 143 and 145 of the lower die may be reinforced to resist outward deflection by means of reinforcing ribs such as indicated at 173 secured as by welding on the outside of these walls extending vertically and terminating short of the tops of blocks 73.

The modified dies 5a and 33a are removably secured in the meat press in the same manner as dies 5 and 33

heretofore described, whereby the the dies may be readily removed from the press without the use of hand tools thus facilitating easy disassembly and assembly of the press for cleaning and the like. The operation of the press with the modified dies installed therein is substantially the same as the operation of the press as heretofore described.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A press for compressing frozen meat into an elongate compressed body of uniform cross-section throughout its length comprising:

a base;

a one-piece lower die removably mounted on the base comprising an elongate block having an upwardly opening recess extending from one end thereof to the other, said recess being of uniform cross-section throughout its length corresponding at least in part to part of said body cross-section; means mounted on the base removably engageable in openings in the lower die for removably securing the lower die in place on the base, this last-said means comprising a block on each side of the lower die secured to said base, each said block having a screw threaded therein with the inner end of the screw engageable within a respective opening in the side of said lower die, each screw having means at its outer end for manual operation thereof;

vertically movable rods extending up from the base in planes at opposite sides of the lower die;

means in the base for moving said rods up and down; a head plate secured to the upper ends of the rods above the lower die;

a one-piece upper die cooperable with the lower die comprising an elongate block having a downwardly opening recess extending from one end thereof to the other, and being of uniform cross-section throughout its length corresponding to the remainder of said compressed meat body cross-section, said upper die being adapted to fit within the lower die; means removably mounting said upper die on the bottom of the head plate in alignment with the lower die for movement with the head plate between a raised open position above the lower die and a lowered operative position entered in the lower die;

means removably secured to the front face of said upper die closing off the forward ends of the recesses in said upper die and in said lower die when the upper die is in its said lowered operative position; a ram movable forward from a retracted position within said recesses when said upper die is in its said operative position to compress the meat between the ram and said recess closing means uniformly to shape the meat to the cross-section of the cooperable recesses and movable farther forward to eject the shaped meat from the press when said upper die is opened;

means for receiving said shaped meat ejected from said press; and

means for driving said ram and said means for moving said rods.

2. A press as set forth in claim 1 having a rigid vertical member at the rearward end of said lower die secured to said base, said vertical member carrying at least one dowel pin extending into an opening in the rear end of said lower die.

3. A press as set forth in claim 2 wherein said vertical member carries threaded means engageable with the rear face of said lower die.

4. A press as set forth in claim 1 wherein said means in said base for moving said rods comprises a yoke, the bottom ends of said rods being secured thereto, a hydraulic cylinder for said yoke having its rod end secured to the bottom of said yoke and a piston rod extending up through an opening in said yoke having its upper end secured to said base.

5. A press as set forth in claim 4 wherein said means for driving the ram comprises a hydraulic cylinder for said ram and mounting means secured to the base having a vertical member adjacent the rear face of said lower die carrying said ram cylinder extending rearward therefrom, and a piston rod extending from a piston in the ram cylinder through an opening in said vertical surface and carrying the ram at its forward end for movement lengthwise within the recesses of said dies.

6. A press as set forth in claim 6 wherein said driving means further comprises a hydraulic system for selectively supplying hydraulic fluid under pressure to said yoke cylinder and to said ram cylinder for effecting movement of the upper die between its raised open position and its lowered operative position and for effecting movement of the ram to compress the meat and to subsequently raise the upper die from its lowered operative position to its raised open position, to eject the meat from the press, and to return the ram to its retracted position, said hydraulic system comprising a pair of manual control valves, one for operation by one hand of an operator and the other for operation by the other hand of the operator, each valve having a neutral position, a first operating position, and a second operating position, and each being returned to neutral on release from either operating position, and means operable only in response to movement of both valves to said first operating position for moving the upper die from its raised open position to its lowered operative position and for extending said ram for compressing the meat, and operable only in response to movement of both valves to said second operating position for raising said upper die from its lowered operative position to its raised open position, for extending the ram farther to eject said meat from the dies onto said receiving means and for then retracting said ram, and the last-said means being inoperable when either or both of said valves are in their respective neutral positions.

7. A press as set forth in claim 6 wherein the pressure in said hydraulic system is increased in response to movement of the upper die to its lowered operative position to permit said yoke cylinder to exert sufficient downward force on the upper die to maintain it in its lowered operative position as the meat is compressed by said ram, and wherein said hydraulic system further includes a sequence valve for directing hydraulic fluid under pressure to said ram cylinder for movement of the ram to compress the meat only after said yoke cyl-

inder has moved the upper die down to its lowered operative position.

8. A press for compressing frozen meat into an elongate compressed body of uniform cross-section throughout its length comprising:

a base;

a lower die mounted on the base having an upwardly opening recess extending from one end thereof to the other, said recess being of uniform cross-section throughout its length corresponding at least in part to part of said body cross-section;

an upper die cooperable with the lower die having a downwardly opening recess extending from one end thereof to the other, and being of uniform cross-section throughout its length corresponding to the remainder of said compressed meat body cross-section;

means mounting said upper die for movement between a raised open position above the lower die and a lowered operative position cooperable with the lower die;

means for closing off the forward ends of the recesses in said upper die and in said lower die when the upper die is in its said lowered operative position;

a ram movable forward from a retracted position within said recesses when said upper die is in its said operative position to compress the meat between the ram and said recess closing means uniformly to shape the meat to the cross-section of the cooperable recesses and movable farther forward to eject the shaped meat from the press when said upper die is opened;

means for driving said ram and said means for moving said rods; and

means for receiving said shaped meat ejected from said press,

said receiving means comprising a delivery chute extending forward of the lower die for receiving said shaped meat as it is ejected from the lower die, said chute being substantially at the level of the lowermost surface of the recess in said lower die, said chute having guard means adjacent the forward end of said dies for preventing a press operator from placing his hand between said dies from the front thereof, said guard means comprising a tunnel enclosing the rear portion of said chute adjacent said dies, said tunnel having a oneway door at its end adjacent the dies opening inwardly of the tunnel, said door being movable between a closed position blocking the tunnel and an open position by the meat as it is ejected from the dies onto the chute, said door being biased to swing closed as the block of meat is moved clear of the tunnel.

9. A press as set forth in claim 8 wherein said chute is cantilevered forward from the forward end of said base and is releasably secured thereto.

10. A press for compressing frozen meat into an elongate compressed body of uniform cross-section throughout its length comprising;

a base;

a lower die mounted on said base having an upwardly opening recess extending from one end thereof to the other, said recess being of uniform cross-section throughout its length corresponding at least in part to part of said body cross-section;

vertically movable rods extending up from the base in planes at opposite sides of the lower die;

a head plate secured to the upper ends of the rods above the lower die;

an upper die secured to the bottom of the head plate cooperable with the lower die having a downwardly opening recess extending from one end thereof to the other, and being of uniform cross-section throughout its length corresponding to the remainder of said compressed meat body cross-section;

means including a first hydraulic cylinder in the base for moving said rods to move said head plate and said upper die between a raised open position above the lower die and a lowered operative position;

means closing off the forward ends of the recesses in said upper die and in said lower die when the upper die is in its lowered operative position;

a ram movable forward from a retracted position within said recesses when said upper die is in its said operative position to compress the meat between the ram and said recess closing means uniformly to shape the meat to the cross-section of the cooperable recesses, and movable farther forward to eject the meat from the press when the upper die is opened, and then movable back to its retracted position;

a second hydraulic cylinder for driving the ram;

and a hydraulic system for selectively supplying hydraulic fluid under pressure to said first and second cylinders for effecting movement of the upper die between its raised open position and its lowered operative position and for effecting movement of the ram to compress the meat;

and to subsequently raise the upper die from its lowered closed position to its raised open position, to eject the meat from the press, and to return the ram to its retracted position, said hydraulic system comprising a pair of manual control valves, one for operation by one hand of an operator and the other for operation by the other hand of the operator, each valve having a neutral position, a first operating position, and a second operating position, and each being returned to neutral on release from either operating position, and means operable only in response to movement of both valves to said first operating position for moving the upper die from its raised open position to its lowered operative position and for extending said ram for compressing the meat, and operable only in response to movement of both valves to said second operating position for raising said upper die from its lowered operative position to its raised open position, for extending the ram farther to eject said meat from the dies and for then retracting said ram, and being inoperable when either or both of said valves are in their respective neutral positions.

11. A press as set forth in claim 10 wherein the pressure in said hydraulic system is increased in response to movement of the upper die to its lowered operative position to permit said first cylinder to exert sufficient downward force on the upper die to maintain it in its lowered operative position as the meat is compressed by the ram, and wherein said hydraulic system includes a sequence valve for directing hydraulic fluid under pressure to said second cylinder for movement of the ram to compress the meat only after said first cylinder has moved the upper die to its lowered operative position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,753,398 Dated August 21, 1973

Inventor(s) Daniel Dohm, Jr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the front page, item 73, the assignee's name should be "Cashin Systems Corp.". Column 4, line 33, "plae" should read "plate"; and line 64, "rod 91" should read "rod end 91". Column 6, line 42, "as Vickers" should read "as a Vickers". Column 13, line 49, "means removably mounting" should start a new paragraph. Column 14, line 29, "claim 6" should read "claim 5". Column 15, line 59, the semicolon after "comprising" should be a colon. Column 16, line 60, "dwnward" should read "downward".

Signed and sealed this 27th day of November 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents