Sept. 1, 1964 D. DOHM, JR., ETAL 3,146,697

COMPRESSION APPARATUS

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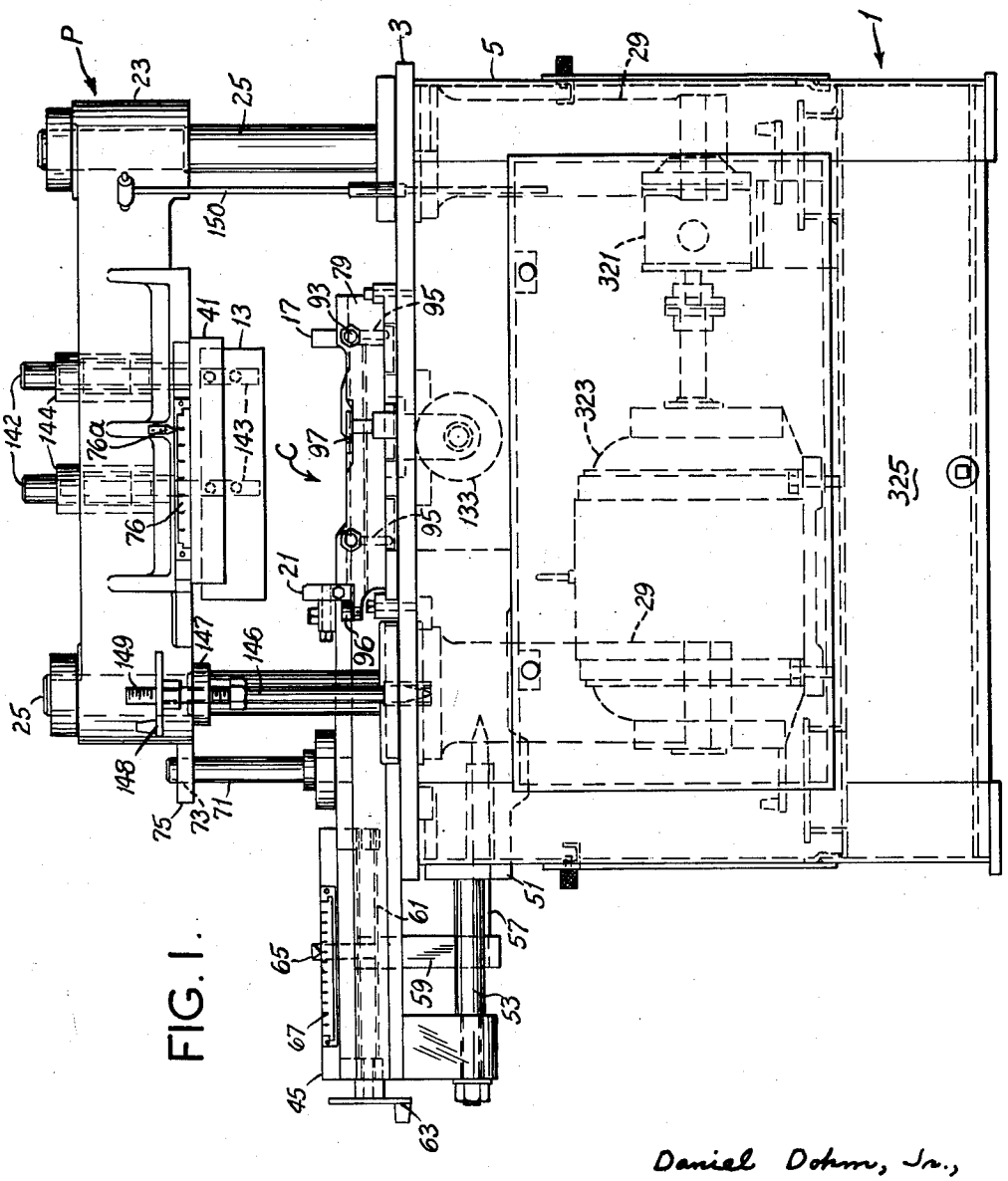

FIG. 1.

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Eric W. Anderson,
inventors.

Koenig, Pope, Senniger and Powers,
attorneys.

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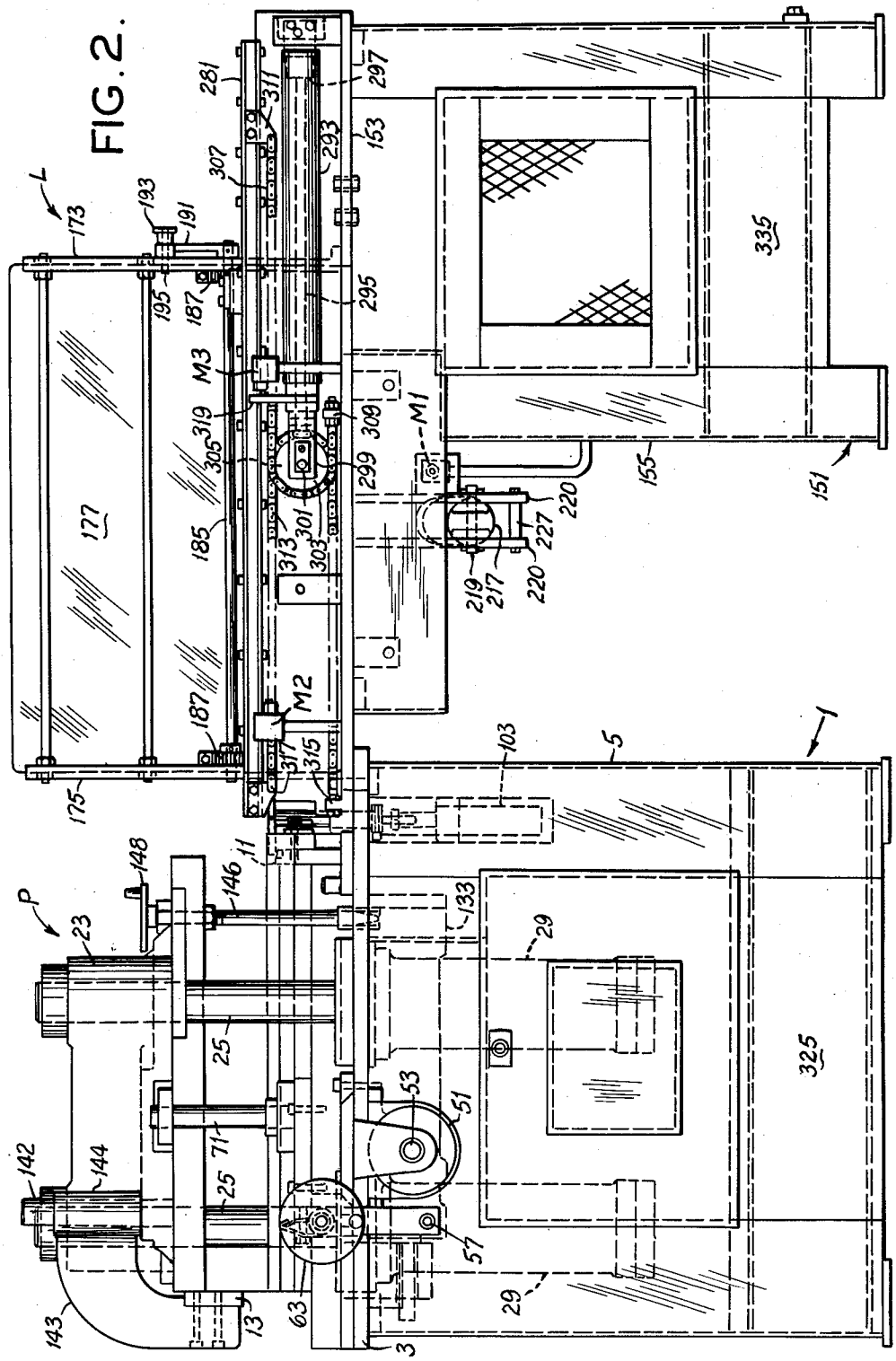
FIG. 2.



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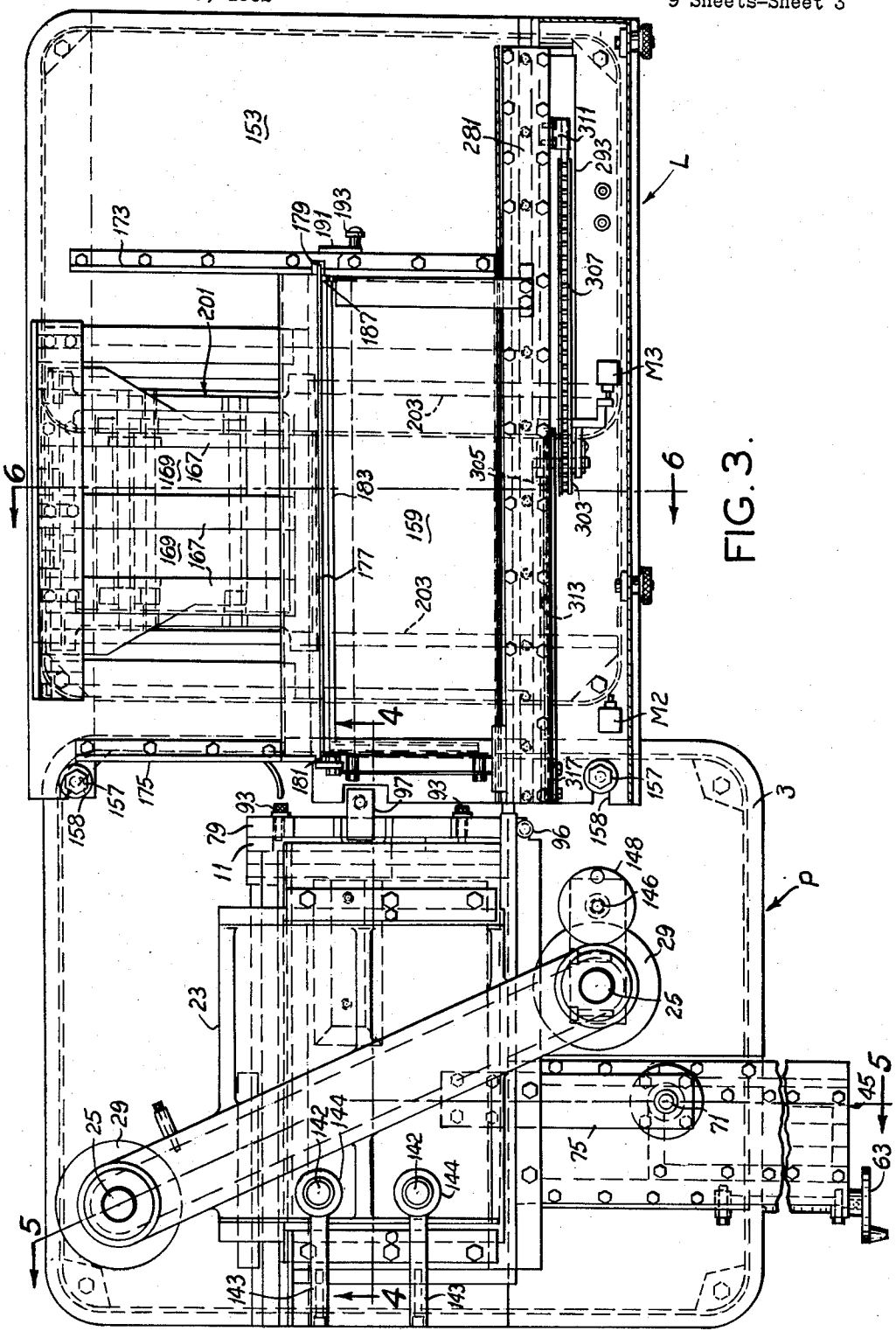

FIG. 3.

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FIG. 4.

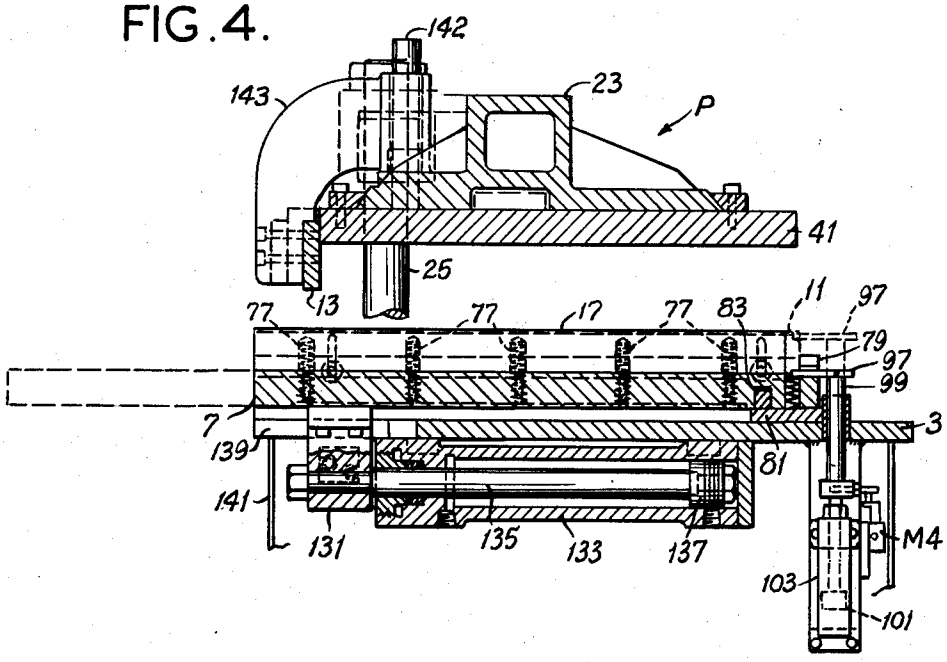

FIG. 6.

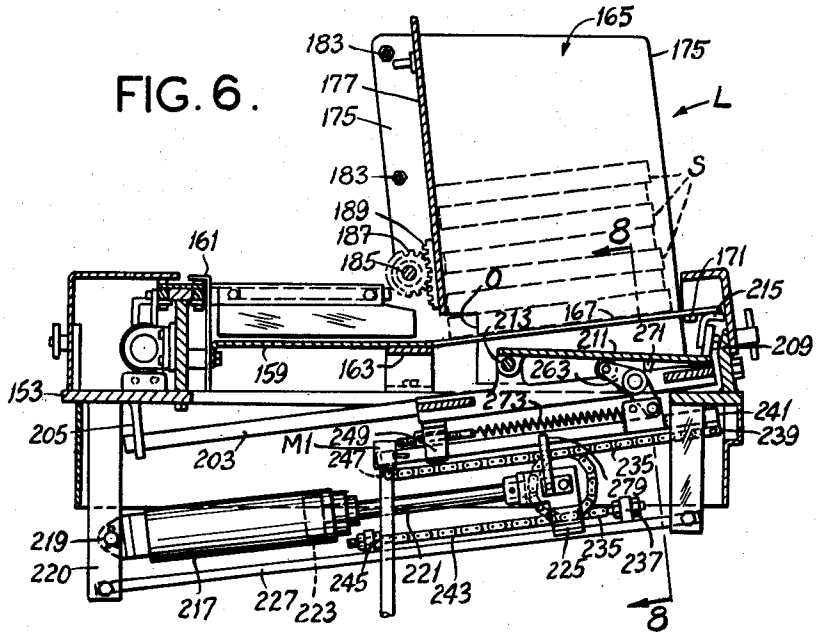

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FIG.6A.

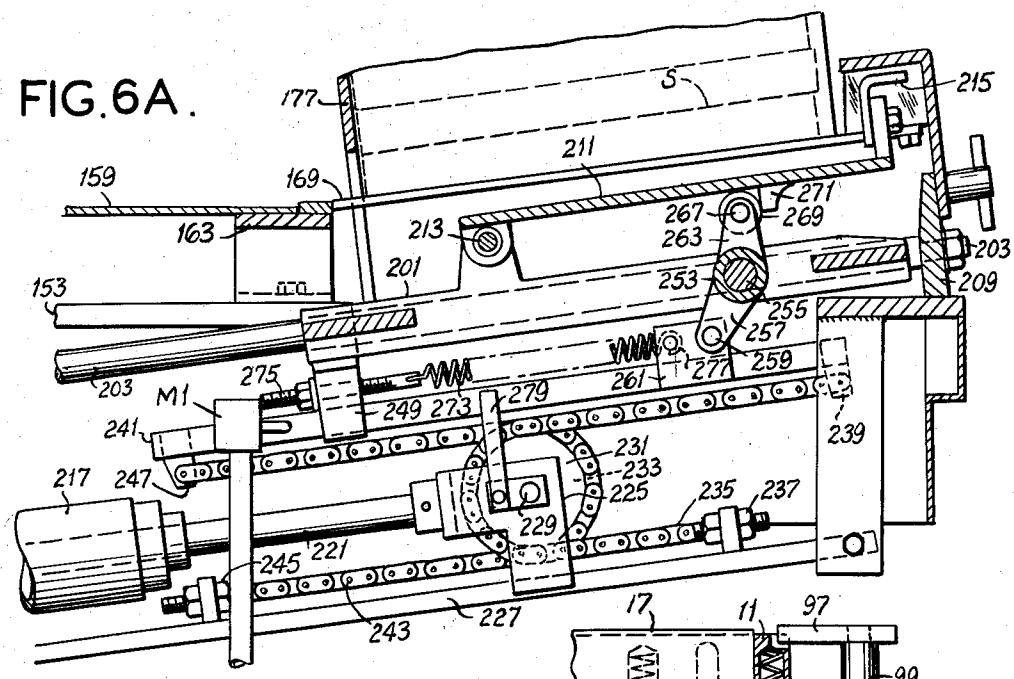


FIG.9.

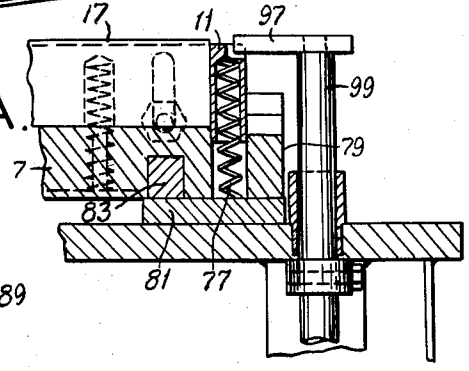
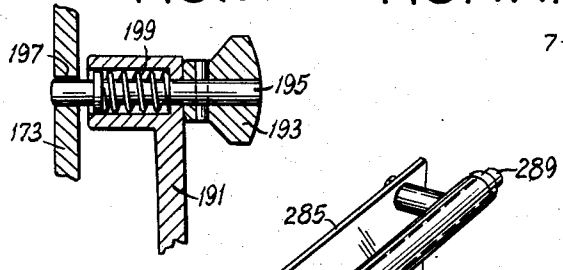


FIG.4A.



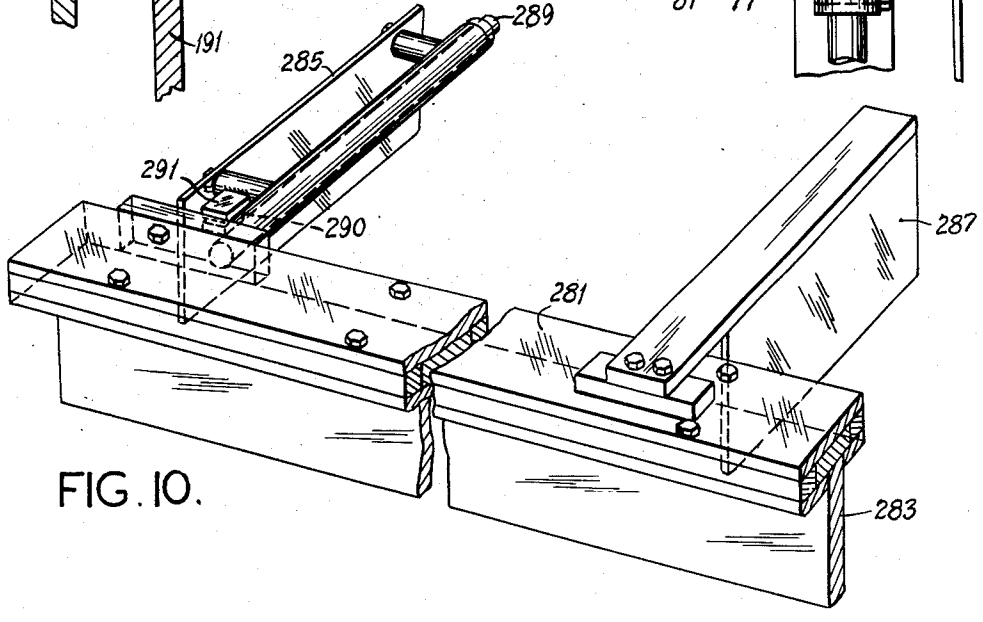


FIG.10.

FIG. 5.

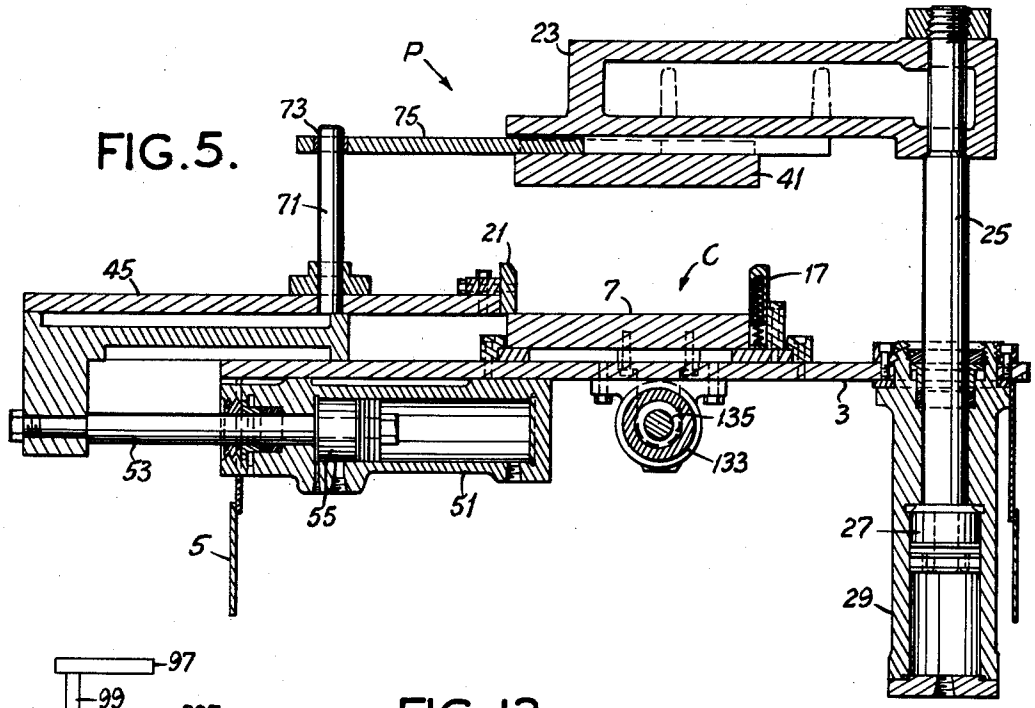

P
23
73
75
41
71
21
25
45
C
17
7
135
3
133
53
55
51
5
27
29

FIG. 13.

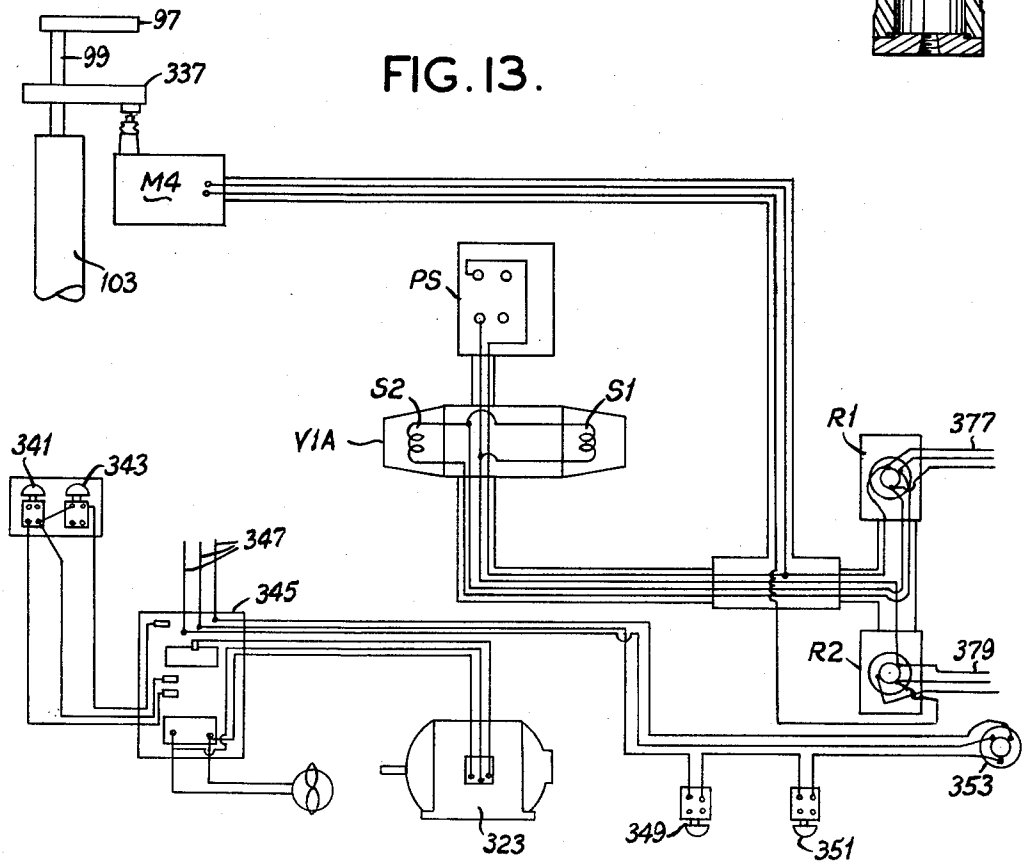

97
99
337
M4
103
PS
S2
S1
V1A
R1
377
341
343
347
345
R2
379
353
323
349
351

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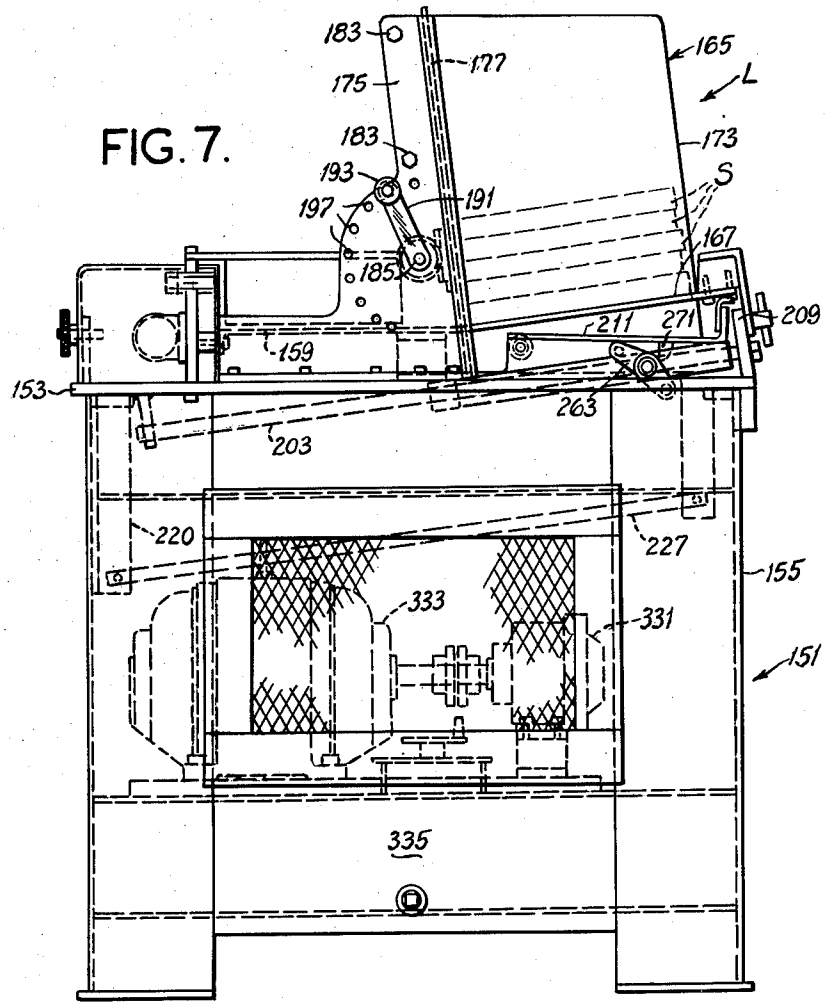
FIG. 7.



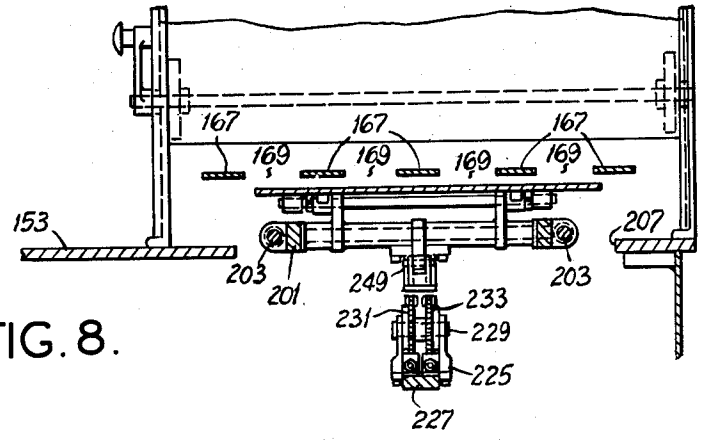


FIG. 8.

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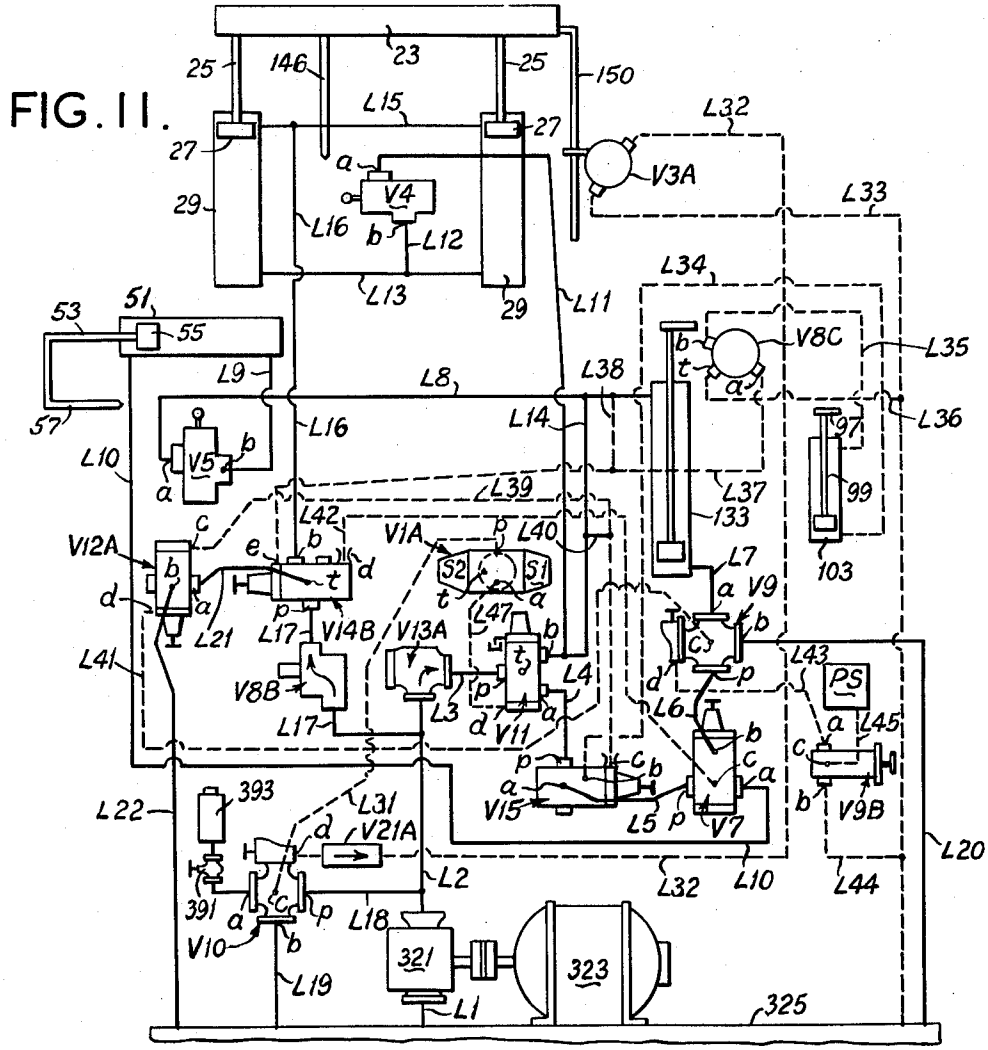
FIG. 11.



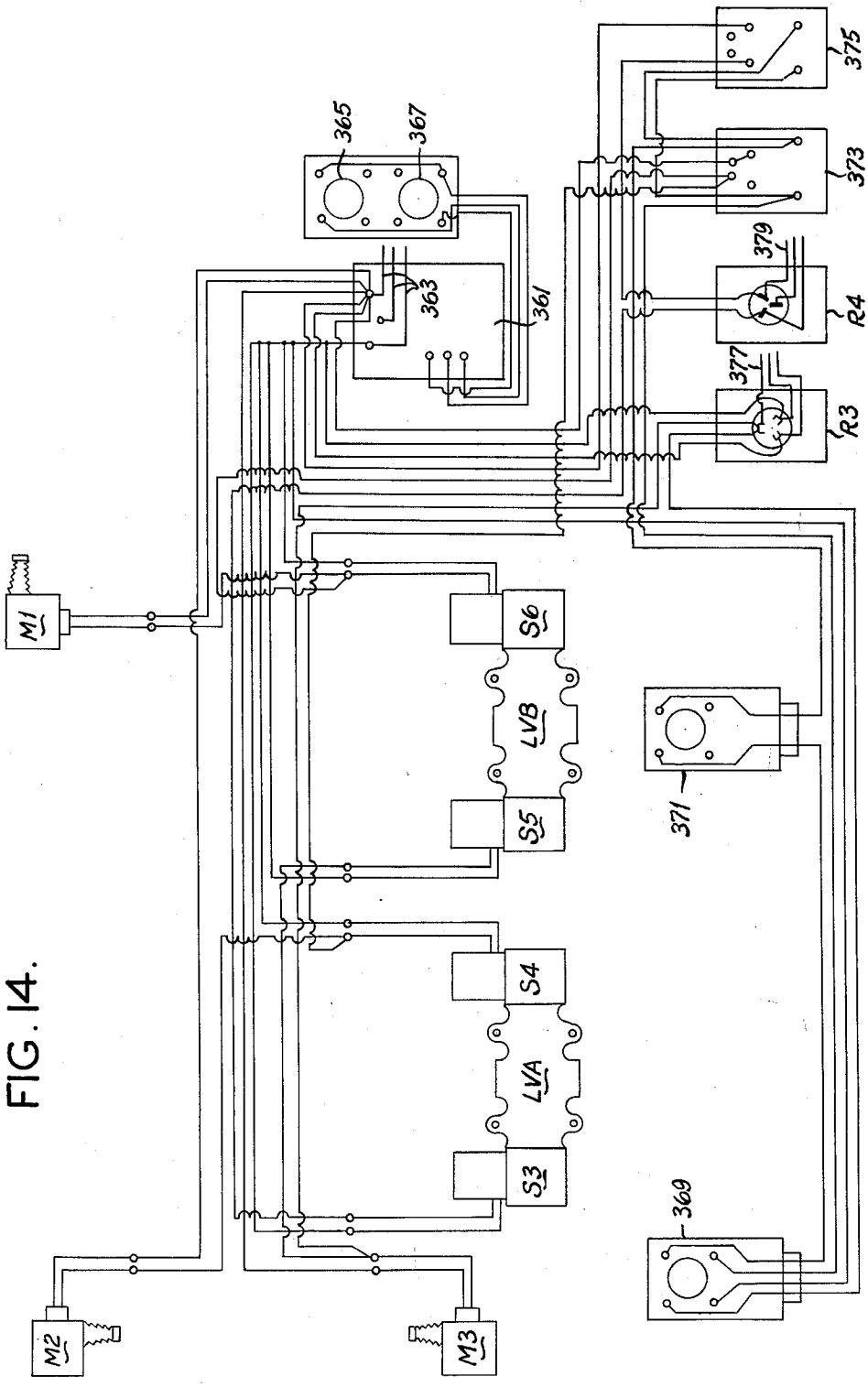

375
373
379
R4
377
R3
365
367
363
361
M1
S6
LVB
S5
371
S4
LVA
S3
369
M2
M3

FIG. 14.

United States Patent Office 3,146,697 Patented Sept. 1, 1964

3,146,697

COMPRESSION APPARATUS

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Filed Mar. 16, 1962, Ser. No. 180,198
10 Claims. (Cl. 100—53)

This invention relates to compression apparatus, and more particularly to apparatus comprising a press for compressing slabs of bacon and means for effecting automatic operation of the press, automatic delivery of slabs to the press, and automatic discharge of compressed slabs from the press.

In U.S. Patent 2,850,966 of Daniel Dohm, Jr., one of the inventors herein, issued September 9, 1958, there is shown a press for compressing a slab of bacon to flatten it to be of uniform thickness and to square its ends, whereby uniform slices may be obtained and waste is eliminated. Compression is effected heightwise, laterally and endwise on a slab. The press shown in said patent is operable in single cycles under manual control, its operation involving manual loading of a slab into the press, manual operation of certain valves to effect closing of the press to compress the slab and subsequent opening of the press, and manual unloading of the compressed slab from the press. Among the several objects of this invention may be noted the provision of compression apparatus including a press similar to that shown in said patent for effecting heightwise, lateral and endwise compression of slabs, and means for automatically loading slabs into the press and automatically unloading compressed slabs from the press, said apparatus operating automatically to load a slab into the press, then automatically to effect operation of the press to compress the slab which has been loaded into the press and then open the press, and then to effect unloading of the compressed slab and loading of another slab into the press, automatically repeating this cycle until shut off; the provision of apparatus such as described which is adapted substantially to increase the rate of production of compressed slabs over that possible with a manually operable press such as shown in said patent; and the provision of apparatus such as described which is efficient and reliable in operation. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated.

FIG. 1 is a front elevation of the press per se (similar to FIG. 1 of U.S. Patent No. 2,850,966);

FIG. 2 is a side elevation of the press and the unloading and unloading means;

FIG. 3 is a plan of FIG. 2;

FIG. 4 is a vertical section taken on line 4—4 of FIG. 3;

FIG. 4A is an enlarged fragment of FIG. 4 showing a moved position of parts;

FIG. 5 is a vertical section taken on line 5—5 of FIG. 3;

FIG. 6 is a vertical section taken on line 6—6 of FIG. 3;

FIG. 6A is an enlarged fragment of FIG. 6 showing a moved position of parts;

FIG. 7 is a front elevation of the loading and unloading means;

FIG. 8 is a section taken on line 8—8 of FIG. 6;

FIG. 9 is a detail section;

FIG. 10 is a detail perspective with parts broken away;

FIG. 11 is a diagram illustrating the hydraulic circuit of the press;

FIG. 12 is a diagram illustrating the hydraulic circuit of the loading and unloading means;

FIG. 13 is a diagram illustrating the electrical circuit of the press; and

FIG. 14 is a diagram illustrating the electrical circuit of the loading and unloading means.

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

Referring to the drawings, reference character P designates the press for effecting heightwise, lateral and endwise compression of slabs of bacon, and reference character L designates the automatic loader and unloader for loading uncompressed slabs into the press and unloading compressed slabs from the press. Press P is basically similar to the press shown in the aforesaid U.S. Patent 2,850,966, with certain modifications thereof as will be made clear. Like the press shown in said patent, press P comprises a bed generally designated **1**, which comprises a top plate **3** on a base cabinet structure **5**, and a bottom platen **7** mounted to slide on the top plate **3** toward the left as viewed in FIG. 4 (and in FIGS. 2 and 3) away from the retracted position shown therein and then back toward the right. For convenience the end of the press P at the right in FIGS. 2–4 may be referred to as its forward, front or loading end, and the end of the press at the left in FIGS. 2–4 may be referred to as its rearward or unloading end. Also as in U.S. Patent 2,850,966, there is provided a depressible forward end platen **11** associated with the bottom platen **7** at its forward end for front-to-rear movement therewith and an end abutment **13** at the rear of the press, endwise compression of a slab being effected between platen **11** and abutment **13** upon forward movement of bottom platen **7** (carrying with it the raised forward end platen **11**). Also as in U.S. Patent 2,850,966, there is provided a depressible side abutment **17** which is carried by the bottom platen **7** for front-to-rear movement therewith and which is fixed against lateral movement relative to the bottom platen, and a pressure-applying side platen **21** extending parallel to side abutment **17** and mounted for movement from the sidewise retracted position shown in FIGS. 1 and 5 toward the side abutment **17** across the upper surface of bottom platen **7** for lateral compression of a slab. The abutments and platens define a molding chamber C having the platen **7** for its bottom.

Press P also has a press head **23** (like that shown in U.S. Patent 2,850,966) mounted for movement toward and away from the top plate **3** and located above the latter. This head is fixed on the upper ends of a pair of piston rods **25** which extend from pistons **27** in a pair of hydraulic cylinders **29** (which may be referred to as the head cylinders). These extend vertically downward from top plate **3** within cabinet **5**, and are located as in said patent. Head **23** carries a top platen **41** mounted for sliding movement in transverse direction.

As in U.S. Patent 2,850,966, side platen **21** is carried by a slide **45** guided for sliding movement laterally on the top plate, being movable in and out by means of a hydraulic cylinder **51** (which may be referred to as the side cylinder) mounted under top plate **3**, this cylinder having a piston rod **53** extending from its piston **55** to a connection with the slide. A valve-operating cam rod **57** is movable with the slide **45** and adjustable lengthwise relative to the slide for limiting the inward travel of the slide **45** and the side platen **21** and thereby determining the width of the compressed slab. Rod **57** has one end fixed to a block **59** slidably carried by the slide **45** and having a tapped hole receiving an adjusting screw **61** having a handwheel **63** at its outer end. A pointer **65** movable with the block **59** indicates the slab width in conjunction with a slab width scale **67** on slide **45**. A post **71** extends

upward from slide 45 through a hole 73 in a plate 75 extending from the top platen 41 for movement of the latter with side platen 21 while permitting vertical movement of plate 75 and top platen 41 with the press head 23. The top platen carries a slab width scale 76 cooperable with a pointer 76a on the press head 23.

As in U.S. Patent 2,850,966, the forward end platen 11 is slidable vertically and laterally relative to the bottom platen 7, being biased upward by springs 77. It is vertically slidable between the forward end of the bottom platen 7 and a vertical guide plate 79 which extends upward from a slide plate 81 having a key 83 slidable in a transverse groove in the bottom of bottom platen 7 (see FIG. 4a). Springs 77 tend to bias forward end platen 11 upward to a raised position such as illustrated in solid lines in FIG. 4A. Screws 93 threaded in plate 79 are engaged by the lower ends of vertical slats 95 in platen 11. The latter is movable downward against the bias of springs 77 to a depressed position shown in FIG. 4 in which its upper edge is generally flush with the top surface of bottom platen 7, as shown in solid lines in FIG. 4 (and in FIG. 1). Plate 79 has a roller 96 at its left end as viewed in FIG. 1 engaging behind side platen 21 so that plate 79 and platen 11 slide laterally of the press in conjunction with the side platen 21. Where in U.S. Patent 2,850,966 the forward end platen is retracted by a horizontal cylinder which acts to pull it off to the right, forward end platen 11 here is movable downward to its depressed retracted position by a finger 97 on the upper end of a piston rod 99 extending from piston 101 in a vertical cylinder 103 (which may be referred to as the front cylinder) which is mounted below top plate 3 adjacent the forward end of the press.

The bottom platen 7 has a block 131 fastened to its bottom at its rearward end. It is movable endwise in front-to-rear direction by a hydraulic cylinder 133 (which may be referred to as the end cylinder) mounted under the top plate 3 within the cabinet 5 and having a piston rod 135 extending from its piston 137 to a connection with block 131, the same as in U.S. Patent 2,850,966. When the piston 137 is retracted to the forward end of cylinder 133, the bottom platen is moved to its retracted position illustrated in FIG. 4. In this position of the bottom platen, block 131 is received in a notch 139 in the rearward edge of top plate 3. Cabinet 5 has an opening at 141 for passage of the block.

The end abutment 13, instead of being fixed on top of plate 3 as in U.S. Patent 2,850,966, is carried by the press head 23 for vertical sliding movement relative to the head. For this purpose, head 23 has a pair of rods 142 extending upward therefrom, and abutment 13 is carried by a pair of curved arms 143 having sleeves 144 slidable on the rods. When the press head is raised, abutment 13 moves up with the press head to open up molding chamber C at the rear or unloading end of the press. When the press head is lowered to compress a slab of bacon heightwise, the slidable connection between the end abutment 13 and the press head permits head 23 to move farther downward after abutment 13 has come down into engagement with bottom platen 7.

A slab thickness control cam rod 146 extends vertically downward from the press head 23. This is vertically adjustable to vary the slab thickness setting by being threaded in a bracket 147 on the press head and having a handwheel 148 on its upper end for turning it. The handwheel indicates compressed slab thickness in conjunction with a slab thickness scale 149 on the press head. There is also shown a valve control rod 150 extending vertically downward from the press head.

The automatic loader L is positioned at the loading end of the press P (its front end). It comprises a base generally designated 151 which comprises a top plate 153 on a base cabinet structure 155. Plate 153 projects from the base 155 over the top plate 3 of the press, its outer end engaging the top of plate 3 and being removably secured thereto as by bolts 157 extending through slots 158 in the end of plate 153. The projection of plate 153 from the base is sufficient to provide a crawl space between base 155 of the loader L and base 5 of the press P for access to the respective ends of bases 5 and 155. If more working room is desired, or if it should be desired to use the press without the loader, bolts 157 may be loosened and the entire loader L moved away from press P.

A delivery table 159 is provided on plate 153 aligned with and at the level of bottom platen 7 of press P. This table is supported at the left by an elongate plate 161 extending along the left side of plate 153 and at the right by a bar 163 mounted on plate 153 to extend longitudinally above plate 153 generally centrally of plate 153. A magazine generally indicated at 165 is provided for supporting a stack of slabs S of bacon to be compressed at the right of table 159, and means is provided for delivering the lowermost slab in the stack laterally on to the table. The magazine includes plurality of bottom bars 167 inclined downward toward table 159, these bars extending laterally with respect to the table with spaces 169 between adjacent bars. Bars 167 are supported at one end on bar 163 and at their other end as indicated at 171. The lowermost slab in the stack rests on these bars. The magazine further includes plates 173 and 175 spaced lengthwise of plate 153, and a gate 177 toward table 159 which is adjustable heightwise. For this purpose, gate 177 is slidable in guide grooves 179 and 181 provided on plates 173 and 175, these grooves extending in a plane at right angles to the plane of bars 167 so that the gate 177 is angled off from vertical as appears in FIGS. 6 and 7. Tiebars for plates 173 and 175 are indicated at 183. A shaft 185 extends horizontally between plates 173 and 175 on the side of gate 177 toward table 159. This shaft carries a pair of pinions 187 in mesh with racks 189 on gate 177. It has a crank 191 on its end outward of plate of plate 173. Crank 191 has a knob 193 on a pin 195 slidable into and out of any one of an arcuate series of holes 197 in plate 173. These holes lie on an arc centered in the axis of shaft 185. A spring 199 biases the pin in the direction toward plate 173 (see FIG. 9). By withdrawing the pin 195 from whatever hole it may be in, crank 191 may be turned to rotate shaft 185 to adjust gate 177 up or down, as the case may be, and the shaft is then locked to lock gate 177 in adjusted position by return of pin 195 into a hole. The purpose for adjustment of gate 177 is to position its bottom edge a distance above slab-supporting bars 167 greater than the thickness of a slab but less than twice the thickness of a slab to provide an appropriate slab discharge opening O between the bottom edge of gate 177 and bars 167.

Means is provided for ejecting the lowermost slab S of the stack in the magazine laterally on to the table 159. As shown best in FIGS. 6, 6A and 7, this means comprises a carriage 201 slidable laterally with respect to table 159 in an inclined plane parallel to the plane of slab-supporting bars 167 underneath these bars and the table. The carriage 201 is mounted for sliding movement on a pair of guide rods 203. These have their left ends supported by lugs 205 extending down from plate 153 at the left, extend through an opening 207 in plate 153, and have their right ends supported by lugs such as indicated at 209 on the top of plate 153 at its right edge. An ejector plate 211 is pivoted at its left edge as indicated at 213 on the carriage for pivotal movement on an axis above the carriage and below bars 167 and extending parallel to the length of table 159. At its right edge, ejector plate 211 carries a plurality of ejector fingers 215 adapted, when plate 211 is raised, to extend up through the spaces 169 between adjacent bars 167. These fingers when raised, and on movement of the carriage 201 and plate 211 toward the left, act to push the lowermost slab S of the stack supported on bars 167 toward the left and on to the table 159.

The carriage 201 is adapted to occupy the retracted position under the bars 167 in which it appears in FIG. 6, and is slidable toward the left from this retracted position to an advanced position under the table 159 for pushing the lowermost slab on to the table. For moving the carriage 201 back and forth between its retracted and advanced positions, there is provided a cylinder 217 pivoted at one end as indicated at 219 on members 220 extending down from plate 153 at the left thereof. Cylinder 217 extends toward the right under plate 153. A piston rod 221 extends from a piston 223 in cylinder 217 out of the right end of the cylinder. A clevis 225 is mounted on the outer end of the piston rod, and is guided for sliding movement on a fixed inclined bar 227 located below the cylinder extending parallel to the plane of guide rods 203. A shaft 229 is journalled in the clevis on a horizontal axis parallel to the length of the table 159, and carries a pair of sprockets 231 and 233. A first chain 235 has one end secured to bar 227 at 237, extends around the first sprocket 231, and has its other end secured at 239 to one end of a bar 241 carried by the carriage 201 and adapted for limited sliding movement relative to the carriage in the direction of movement of the carriage. A second chain 243, arranged reversely to chain 235, has one end secured to bar 227 at 245, extends around the second sprocket 233, and has its other end secured at 247 to the other end of bar 241. The latter is guided for sliding movement relative to the carriage in a guide 249 extending down from the carriage. The carriage 201 is of open rectangular form, and a rock shaft 253 extends across the carriage. This rock shaft is journalled at its ends on pins 255 mounted in the sides of the carriage. An arm 257 on the rock shaft at the center of the latter has a pin connection at 259 with a clevis 261 fixed on the bar 241. Arms 263 on the rock shaft adjacent its ends carry a lift bar 267. This lift bar has lift rollers 269 engageable by the bottom of ejector plate 211. These rollers are also engageable with lugs 271 on the bottom of ejector plate 211. A coil tension spring 273 is connected at one end to the carriage as indicated at 275 and at its other end to the clevis 261 on bar 241 as indicated at 277.

When the carriage 201 is in its FIG. 6 retracted position, bar 241 occupies the retracted position relative to the carriage in which it appears in FIG. 6, lift bar 267 is down, and ejector plate 211 is down. Upon retraction of piston rod 221 into cylinder 217, chain 235 first pulls bar 241 toward the left from its FIG. 6 retracted position (without movement of the carriage). This rocks shaft 253 clockwise as viewed in FIG. 6 to raise the lift rod 267 and rollers 269 thereon, thereby lifting ejector plate 211 (see FIG. 6A). Rollers 269 come into engagement with lugs 271 on the ejector plate 211 and this locks bar 241 and the carriage together. Then, on continuing movement of bar 241 toward the left by chain 235, the carriage 201 moves with the bar 241 toward the left, ejector plate 211 being raised so that its ejector fingers 215 extend up through spaces 169 between bars 167 (see FIGS. 6A) for pushing the lowermost slab S of the stack supported on bars 167 toward the left and on to the table 159.

The carriage 201, with the ejector plate 211 raised, moves toward the left to an advanced position determined by engagement of a lug 279 on clevis 225 with a limit switch M1 suitably fixed in position to determine the limit of movement of piston rod 221. On operation of this switch, retraction of piston rod 221 into cylinder 217 stops and the hydraulic connections to cylinder 217 are reversed (as will be made clear) so that the piston rod is returned to its extended position of FIG. 6. During the initial phase of the return, chain 243 pulls bar 241 toward the right (without movement of the carriage 201), and shaft 253 rocks back counterclockwise to lower the ejector plate 211 so as to lower ejector fingers 215 below the slab-supporting bars 167. Then, on continuing movement of the bar 241 toward the right by chain 243, the carriage 201 moves with the bar 241 back to its FIG. 6 retracted position.

It will be observed that the bar 241 is supported from the carriage adjacent one end of the bar by guide 249 and adjacent the other end of the bar by arm 257. The pin connection between arm 257 and bar 241 swings in an arc centered in the axis of shaft 253, and the connection at 249 is such as to permit a slight angling of the bar 241 to allow for this swing.

Means is provided for pushing a compressed slab out of the press P and for pushing a fresh slab which has been delivered on to the table 159 by the ejector fingers 215. As shown best in FIGS. 2, 3, 6 and 10, this means comprises an elongate slider 281 mounted for sliding movement on the head of a T-section rail 283 secured on top plate 153 of base 151 of the loader L at the left thereof (and at the left of table 159). The slider carries a forward or leading pusher 285 for pushing a compressed slab out of the press and a rearward or trailing pusher 287 for pushing the fresh slab along table 159 and into the press. The leading pusher 285 is pivoted for swinging movement on a horizontal axis extending transversely to the slider, being pivotally hung on a horizontal rod 289 extending laterally from the slider. It is adapted to swing upward in clockwise direction as viewed in FIG. 10 to enable it to return back over a slab which has been loaded into the press, stops such as indicated at 290 and 291 being provided on slider 281 and on the pusher to prevent it from swinging up in counterclockwise direction so that it is effective to push a compressed slab out of the press. The trailing pusher 287 is rigidly secured to the slider extending laterally therefrom over the table 159, spaced rearward of the leading pusher a distance sufficient to accommodate the largest slab to be handled therebetween.

The slider 281 is adapted to occupy the retracted position in which it appears in FIGS. 2 and 3 wherein the leading pusher 285 is positioned generally coplanar with the wall 175 of the slab magazine 165 and the trailing pusher 287 is positioned generally coplanar with the plate 173 of the magazine. It is slidable toward the left as viewed in FIGS. 2 and 3 from this retracted position to an advanced position for pushing a compressed slab out of the press P and pushing a fresh slab along table 159 and into the press. For moving the slider back and forth between its retracted and advanced positions, there is provided a cylinder 293 mounted on the outside of rail 283. A piston rod 295 extends from a piston 297 in the cylinder out of the left end of the cylinder. A clevis 299 is mounted on the left end of the piston rod. A shaft 301 is journalled in the clevis on a horizontal axis transverse to the piston rod and carries a pair of sprockets 303 and 305. A first chain 307 has one end secured to top plate 153 at 309, extends around the first sprocket 303, and has its other end secured at 311 to the slider adjacent the rearward end of the slider. A second chain 313, arranged reversely to chain 307, has one end secured to top plate 153 at 315, extends around the second sprocket 305, and has its other end secured at 317 to the slider adjacent the forward end of the slider.

On extension of piston rod 295 from cylinder 293, chain 307 pulls slider 281 toward the left as viewed in FIG. 2 to move it from its FIG. 2 retracted position to its advanced position, and on retraction of piston rod 295 into cylinder 293, chain 313 pulls slider 281 back toward the right to its retracted position. The chain and sprocket mechanisms are for motion multiplying purposes, motion of the slider 281 being twice the motion of the piston rod 295, for example. A lug 319 is provided on clevis 299 for engagement with left-hand and right-hand limit switches M2 and M3 mounted on top plate 153. When the piston rod 295 and slider 281 moves to the left away from the FIG. 2 retracted position, lug 319 ultimately engages the left-hand switch M2. This effects reversal of

motion of the slider (thereby determining its advanced position), as will be made clear. The slider then is retracted and lug 319 ultimately engages the right-hand switch M3. This stops the slider (thereby determining its retracted position), and effects closing of press P and operation of ejector plate 211 to push the lowermost slab of the stack in magazine 165 onto table 159, as will be made clear.

Hydraulic cylinders 29, 51, 103 and 133 of the press P are connected in a hydraulic circuit as shown in FIG. 11 supplied with oil under pressure by a pump 321 driven by a motor 323. The pump and motor, together with a tank or sump 325 for oil, are housed in cabinet 5 of the press. Hydraulic cylinders 217 and 293 of the loader L are connected in a separate hydraulic circuit as shown in FIG. 12 supplied with oil under pressure by a pump 331 driven by a motor 333. Pump 331 and motor 333, together with a tank 335 for oil, are housed in cabinet 155 of the loader L. FIG. 13 shows the electrical circuit for the press and FIG. 14 shows the electrical circuit for the loader.

The hydraulic circuit for the press includes a four-way solenoid valve V1A for controlling the press. This is connected in the press electric circuit as shown in FIG. 13. The press electric circuit includes two plug-in receptacles R1 and R2, a pressure switch PS having a set of normally open contacts and a set of normally closed contacts, and a switch M4 which is normally open and which is closed on pull-down of finger 97 by an arm 337 on piston rod 99. The motor 323 of the press is connected in a separate electric circuit including motor start and stop switches 341 and 343, an automatic starter 345 to which is connected power supply line 347, two press-operating switches 349 and 351 for use in the event the press is to be manually operated independently of the loader L, and a plug 353 for plugging into receptacle R1 in the latter event.

The hydraulic circuit for the loader includes two four-way solenoid valves LVA and LVB connected in the loader electric circuit as shown in FIG. 14. The loader electric circuit (see FIG. 14) includes a motor starter 361 for the loader motor, to which is connected a power supply line 363, motor start and stop switches 365 and 367, switches M1, M2 and M3 previously referred to, press and loader start and stop switches 369 and 371, relays 373 and 375, and two plug-in receptacles R3 and R4. For joint operation of the press and loader, a conductor cable 377 is plugged into receptacles R1 and R3, and a conductor cable 379 is plugged into receptacles R2 and R4. For operation of the press independently of the loader, these cables are plugged out of receptacles R1 and R2, and plug 353 is plugged into receptacle R1.

Referring now to FIG. 11, showing the hydraulic circuit for the press, there are indicated, in addition to the solenoid valve V1A, valves V3A, V4, V5, V7, V8B, V8C, V9, V9B, V10, V11, V12A, V13A, V14B, V15 and V21A.

Solenoid valve V1A is a conventional type of valve such as a Vickers C–572–K valve having two solenoids S1 and S2. When S1 is energized, it shifts a spool in valve V1A to connect ports *p* and *a* of this valve and to block a port *t*, which is connected back to the tank 325 by a line (not shown). When S2 is energized, it shifts the spool to connect ports *a* and *t*, and to block port *p*.

Valve V3A is a conventional on-off valve, such as a suitably plugged Vickers C2–523A valve, mechanically actuated by rod 150 extending down from the press head 23. When the press head is raised, this valve is open. Shortly after the head starts to move down, rod 150 closes this valve. Then when the head comes back up to its fully raised position, rod 150 opens this valve.

Valve V4 is a conventional deceleration valve, such as a Vickers C–712 valve, having a valve member therein adapted to be shifted from a first to a sescond position by the slab thickness control cam rod 146 extending down from the press head 23 as the press head, moving downward, approaches the lower end of its stroke. In its first position, the valve member connects port *b* of valve V4 to port *a* for free exit of oil from the lower ends of head cylinders 29. In the second position, the valve member blocks direct flow through the valve to trap oil in the lower ends of the head cylinders 29, but valve V4 may then function via a check valve therein to allow flow of oil from port *a* to port *b* to direct oil to the lower ends of the head cylinders for raising the press head. When cam rod 146 releases the actuator of valve V4, the valve member returns to first position and oil may then flow directly from port *a* to port *b*.

Valve V5 is a deceleration valve, which may be identical to valve V4, having a valve member therein adapted to be shifted from a first to a second position by the slab width control cam rod 57 movable with the side platen 21 as the side platen, moving inward, approaches the inner end of its stroke. In its first position, the valve member connects port *b* of valve V5 to port *a* for free exit of oil from the inner end of the side cylinder 51. In the second position, the valve member blocks direct flow through the valve to trap oil in the inner end of side cylinder 51, but valve V5 may then function via a check valve therein to allow flow of oil from port *a* to port *b* to direct oil to the inner end of side cylinder 51 for retracting the side platen 21. When cam rod 57 releases the actuator of valve V4, the valve member returns to first position and oil may then flow directly from port *a* to port *b*.

Valve V7 is a conventional sequence valve, such as a Vickers RCT–06–D2–10 valve, having ports *p*, *a*, *b* and *c*, and functions to delay operation of bottom platen 7 and forward end platen 11 until after side cylinder 51 has operated to move side platen 21 inward to apply lateral pressure to a slab in the press. It contains a valve member normally positioned for connection of port *p* to port *a*. This member shifts in response to increase of pressure entering port *p* to connect port *p* to port *b*. Oil exits from port *c* in either position of the valve member.

Valve V8B is an adjustable flow control valve, such as an Auto-Ponent F–750 valve. It functions to provide unrestricted flow in the direction of the arrow (upward as viewed in FIG. 11) and restricted flow in the opposite direction for the purpose of restricting flow of oil from the upper ends of head cylinders 29 to delay upward movement of the press head 23 until the bottom platen 7 has fully returned to retracted position.

Valve V8C is a conventional on-off valve, such as a suitably plugged Vickers C2–1523A valve, mechanically actuated by an actuator on block 131 on piston rod 135, and functioning to insure that the bottom platen 7 has fully returned to retracted position before front cylinder 103 operates to depress the forward end platen 11. This valve has ports *a*, *b*, and *t* and a valve member having a first position connecting *a* to *b*. When actuated by block 131 at the end of a stroke of the bottom platen, the valve member shifts to a second position connecting *b* to *t*. Then, on return of the bottom platen, the valve member returns to its first position.

Valve V9 is a conventional valve, such as a Vickers CT–06–BV–10 valve, for controlling the endwise compression of a slab by limiting the pressure applied to a slab by end cylinder 133 through the forward end platen. It has a valve member shiftable therein and ports *p*, *a*, *b*, *c* and *d*. Port *d* is provided with a restriction. Pressure in port *d* controls the valve member. With pressure in port *d*, the valve member occupies a first position connecting port *p* to port *a*. On relief of pressure in port *d*, the valve member shifts to a second position connecting port *a* to port *b*. Oil is directed from port *c* in either position.

Valve V9B is a conventional pressure-responsive valve, such as a Vickers C2–671–B valve, for controlling delivery

of hydraulic fluid to pressure switch PS. It is adjustable for setting it to determine the maximum endwise pressure exerted on a slab. When the pressure in this valve reaches the preset maximum value, pressure fluid is delivered to the pressure switch PS for actuating the latter. It has a valve member therein and ports *a*, *b* and *c*. The valve member has a first position blocking both *b* and *c* from *a*. When pressure in *a* increases to the preset maximum, the valve member shifts to a second position connecting *a* to both *b* and *c*.

Valve V10 is a conventional valve, such as a Vickers CT–06–BV–10 valve, the same as valve V9, and is provided for limiting the hydraulic pressure in the system to a predetermined maximum and for unloading pump 321 at the end of a cycle. It has ports *p*, *a*, *b*, *c* and *d*, the same as valve V9, port *d* in this instance being unrestricted. Port *a* is connected through a cock 391 to a pressure gauge 393.

Valve V11 is a conventional pilot pressure operated four-way valve, such as a Vickers C2–440–S8 valve, having ports *p*, *a*, *b*, and *t*, and a pilot port *d*. Port *p* is a pressure port; port *t* is a tank port. With *d* vented, *p* is connected to *b* and *a* is connected to *t*. With pilot pressure in *d*, *p* is connected to *a* and *b* is connected to *t*.

Valve V12A is a sequence valve, such as a Vickers RT–06–BP2–10 valve, the function of which is to allow hydraulic fluid to flow from the head cylinders 29 to the tank 325 as the side cylinder 51 is operating through a closing stroke, to allow the press head 23 in effect to "float" and then to trap fluid in the head cylinders as the end cylinder 133 is operating through a closing stroke to provide a controlled pressure on top of the slab being compressed. This valve has ports *a* and *b* and pilot ports *c* and *d*. With pressure in *c* and with *d* vented, a valve member in valve V12A is held down to connect ports *a* and *b*. With pressure in *d* and with *c* vented, the valve member is held up and the valve is closed.

Valve V13A is a conventional check valve, such as a Vickers C2–825 valve, the function of which is to trap fluid in the lower ends of the head cylinders 29 when pump 321 is unloaded to avoid the possibility of rapid drop of the press head 23 after wear of parts or development of slight valve leakages.

Valve V14B is a conventional valve, such as Vickers C2–440–S8 valve, like valve V11 but with the *a* port blocked and with a restriction for the *d* port. It functions to allow free flow of fluid from the head cylinders 29 as the side cylinder 51 and end cylinder 133 are operating through a closing stroke, as will appear. Pilot pressure in its port *d* and relief of pressure on its port *e* shifts the valve member in valve V14B to connect port *b* to *t*. On relief of pilot pressure in *d*, and delivery of pilot pressure to *e*, the valve member shifts to connect port *p* to port *b*.

Valve V15 is a conventional valve, such as a Vickers RCT–06–D2–10 valve like valve V7, the function of which is to insure that the press head 23 is closed first, and pressure is built up before side cylinder 51 starts to operate through a closing stroke. It has ports *p*, *a*, *b* and *c*, with a restriction for *c*. In response to increased pressure in *p*, the valve member of valve V15 shifts from a first position blocking *p* to a second position connecting *p* to *a*. Oil is directed from *b* in either position. Port *c* is a control port to prevent chattering of the valve member.

Valve V21A is a conventional check valve, such as Vickers DT–8P1–02–65–10 valve, the function of which is to maintain a minimum pressure (such as 65 p.s.i.) on the entire system, thereby to prevent the piston rod 99 of front cylinder 103 from moving upward when the pump 321 is unloaded and idling.

Main line connections of the press hydraulic system are as follows:

Pump 321 has its inlet connected to tank 325 as indicated at L1. A line L2 extends from the pump outlet to the inlet of check valve V13A and a line L3 extends from the outlet of this check valve to port *p* of valve V11. A line L4 connects port *a* of valve V11 and port *p* of valve V15. A line L5 connects port *a* of valve V15 to port *p* of valve V7. A line L6 connects port *b* of valve V7 to port *p* of valve V9. A line L7 connects port *a* of valve V9 to the forward end of end cylinder 133. A line L8 connects the rearward end of end cylinder 133 to port *a* of valve V5, and a line L9 connects port *b* of valve V5 to the inner end of side cylinder 51. A line L10 connects the outer end of side cylinder 51 to port *a* of valve V7. A line L11 connects port *b* of valve V11 to port *a* of valve V4, and a line L12 connects port *b* of valve V4 to a line L13 connecting the lower ends of head cylinders 29. A line L14 connects port *b* of valve V11 and line L8. A line L15 connects the upper ends of head cylinders 29, and a line L16 connects this line to port *b* of valve V14B. A line L17 including valve V8B connects line L2 to port *p* of valve V14B. A line L18 connects line L2 to port *p* of valve V10, and a line L19 connects port *b* of valve V10 to tank 325. A line L20 connects port *b* of valve V9 to the tank 325. A line L21 connects port *t* of valve V14B to port *a* of valve V12A. A line L22 connects port *b* of valve V12A to the tank 325.

Pilot line connections of the press hydraulic system are as follows:

Line L31 connects port *c* of valve V10 and port *p* of valve V1A. Line L32 connects port *d* of valve V10 to one side of valve V3A. Line L33 connects the other side of valve V3A to tank 325. Line L34 connects port *b* of valve V15 and the lower end of the front cylinder 103. Line L35 connects the upper end of cylinder 103 to port *b* of valve V8C. Line L36 connects port *t* of valve V8C to tank via line L33. Line L37 connects port *a* of valve V8C to port *e* of valve V14B, and has a connection indicated at L38 to line L8. Line L39 connects port *c* of valve V15 and port *c* of valve V12A and has a connection at L40 with line L14. Line L41 connects port *d* of valve V12A and port *c* of valve V9. Line L42 connects port *c* of valve V7 and port *d* of valve V14B. Line L43 connects port *d* of valve V9 to port *a* of valve V9B. Line L44 connects port *b* of valve V9B to the tank 325 via line L33. Line L45 connects port *c* of valve V9B to pressure switch PS. Line Y47 connects port *a* of valve V1A to port *d* of valve V11.

Referring now to FIG. 12, showing the hydraulic circuit for the loader L, each loader solenoid valve LVA and LVB is shown to have an inlet port *p*, two transfer ports *a* and *b*, and an outlet port *t*. Valve LVA contains a valve member shiftable by solenoids S3 and S4 (also see FIG. 14) and valve LVB contains a valve member shiftable by solenoids S5 and S6. When S3 is energized, the valve member of LVA shifts to a position connecting its port *p* to its port *a*, and *b* to *t*. When S4 is energized the valve member of LVA shifts to a position connecting *p* to *b* and *a* to *t*. Similarly as to valve LVB, when S5 is energized, *p* is connected to *a* and *b* to *t*, and when S6 is energized, *p* is connected to *b* and *a* to *t*. Pump 331 has its inlet connected to tank 335 as indicated at L51. A line L52 extends from the pump outlet to a relief valve 395, such as a Vickers C–167B valve. A line L53 extends from this valve to ports *p* of valve LVA and LVB. A cock 397 and a pressure gauge 399 are provided. Line L54 connects the *a* port of valve LVA to the right end of cylinder 293 as viewed in FIG. 2, and line L55 connects the *b* port of valve LVA to the other end of cylinder 293. Line L56 connects the *a* port of valve LVB to one end of cylinder 217 and line L57 connects the *b* port of valve LVB to the other end of cylinder 217. The *t* ports of both valves LVA and LVB are connected to tank 335 as indicated at L58.

Operation is as follows:

With motors 323 and 333 in operation driving pumps 321 and 331, and with a stack of slabs S of bacon in the magazine 165, operation of the press P and loader L is started by closing the press and loader start switch

369 and the press and loader then operate automatically to effect compression of a slap in the press, discharge of the compressed slab and delivery of a fresh slab to the press for the next press cycle. Each press cycle may be regarded as starting with the press head 23 raised, and with bottom platen 7 and side platen 21 in their retracted or open position, also with piston rod 99 of front cylinder 103 retracted downward so that the forward end platen 11 is depressed. Ejector carriage 201 and slider 281 of loader L are retracted. There will be a slab of bacon on bottom platen 7 in molding chamber C.

Closing of the press is triggered by energization of solenoid S1 of solenoid valve V1A to shift the valve member of this valve to press-closing position wherein its port *p* is connected to its port *a*, and its port *t* is blocked. Oil from the pump 321 at low pressure is thereupon directed via lines L18, L31 and L47 to pilot port *d* of valve V11, causing the valve member therein to shift to position connecting its port *p* to its port *a* and connecting its port *b* to its port *t* (which is connected to tank 325 by a line not shown). Oil from the pump 321 at low pressure is then directed via line L2, valve V13A, line L3, ports *p* and *a* of valve V11, line L4, ports *p* and *b* of valve V15 and line L34 to the lower end of front cylinder 103. The upper end of front cylinder 103 is vented via line L35, ports *b* and *a* of valve V8C, lines L37, L38, L8, L14 and ports *b* and *t* of valve V11. Accordingly, piston rod 99 and finger 97 move upward to release the forward end platen 11 for movement to its raised position of FIG. 4A under the bias of springs 77. This opens switch M4.

With port *b* of valve V11 connected to its port *t*, the lower ends of the head cylinders 29 are vented via lines L13 and L12, valve V4, line L11 and ports *b* and *t* of valve V11, and press head 23 starts to move downward, carrying with it the top platen 41. Rod 150 extending down from the press head shifts valve V3A, and vent line L32 for port *d* of valve V10 is thus blocked. This results in actuation of valve V10 to close off the by-pass of oil from pump 321 back to the tank 325 via line L19, enabling higher pressure to build up in the system.

Oil from the pump 321 is directed via lines L2 and L17 (including valve V8B), ports *p* and *b* of valve V14B, and lines L16 and L15 to the upper ends of head cylinders 29. The lower ends of these cylinders are vented, as before, via lines L13 and L12, valve V4,, line L11 and ports *b* and *t* of valve V11. The press head 23 moves downward and, via top platen 41, exerts heightwise compression on the slab in the press. It moves downward to the point where the slab thickness control cam rod 145 extending down from the press head actuates valve V4. This traps oil in the lower ends of the head cylinders 29, thereby limiting the downstroke of the press head and limiting the thickness of the slab.

With oil trapped in the lower ends of the head cylinders 29, pressure of oil in the system increases, and this build-up of pressure actuates valve V15. Oil is then directed via lines L2, valve V13A, line L3, ports *p* and *a* of valve V11, line L4, ports *p* and *a* of valve V15, line L5, ports *p* and *a* of valve V7 and line L10 to the outer end of the side cylinder 51. At the same time oil is directed via line L42 to port *d* of valve V14B to connect its port *b* to its port *t*, the latter being connected by line L21 to port *a* of valve V12A. However, oil is blocked in valve V12A until sufficient pressure is built up to shift the valve member of this valve to its position wherein its port *a* is connected to its tank port *b*. This allows oil to escape from the upper ends of the head cylinders 29 via lines L15, L16, ports *b* and *t* of valve V14B, line L21 and ports *a* and *b* of valve V12A, to permit the press head to "float." The inner end of side cylinder 51 is vented via line L9, valve V5, lines L8 and L14, and ports *b* and *t* of valve V11. Accordingly, the piston 55 of side cylinder 51 moves inward to drive the side platen 21 inward to effect lateral compression of the slab. The top platen 41 moves inward with the slide platen 21 to effect a sidewise smoothing action on the top of the slab.

Inward movement of the side platen 21 continues to the point where the slab width control rod 57 actuates valve V5 thereby to cut off discharge of oil from the inner end of the side cylinder 51. This determines the slab width and causes pressure to build up in valve V7, and the valve member of valve V7 shifts in response to this increase in pressure to connect ports *p–b* of valve V7. Oil is thereupon directed from valve V7 via line L6, ports *p* and *c* of valve V9 and line L41 to port *d* of valve V12A, causing the valve member therein to shift back to position blocking free flow of oil from the upper ends of the head cylinders 29. This terminates the floating of the press head 23 and holds a controlled pressure on top of the slab in the press.

Oil is also directed via ports *p* and *a* of valve V9 and line L7 to the rearward end of the end cylinder 133. The forward end of the end cylinder is vented via lines L8, L14 and ports *b* and *t* of valve V11. Accordingly, the bottom platen 7 moves forward carrying with it the raised forward end platen 11 to effect endwise compression of the slab. This endwise compression ultimately results in build-up of pressure in line L43 and when this pressure reaches the value set into valve V9B, the latter is actuated to deliver oil via line L45 to pressure switch PS. Upon actuation of the pressure switch, solenoid S1 is deenergized and solenoid S2 is energized to shift the valve member of valve V1A to its position connecting it port *a* to its port *t* and blocking its port *p*. This vents line L47 and the valve member of valve V11 shifts to its position connecting its port *a* to its port *t* and connecting its port *p* to its port *b*. When valve V11 so returns, reverse action occurs, and the press opens, all parts returning to their initial position. Thus, oil is directed via ports *p* and *b* of valve V11, line L11, valve V4 and lines L12 and L13 to the lower ends of head cylinders 29, and oil is vented from the upper ends of the head cylinders via lines L15 and L16, ports *b* and *p* of valve V14B, line L17 (including valve V8B) to combine with the flow in line L2. This raises the press head, the regenerative type circuit used increasing the speed of raising the head. Pressure in port *d* of valve V14B holds it open during this part of the cycle. Oil is directed via ports *p* and *b* of valve V11, lines L14 and L8, valve V5 and line L9 to the inner end of the side cylinder 51, and vented from the outer end of the side cylinder 51 via line L10. This retracts the side platen 21. Oil is also directed via ports *p* and *b* of valve V11, lines L14 and L8 to the left end (as viewed in FIG. 4) of end cylinder 133 and vented from its other end via line L7 and ports *a* and *b* of valve V9 to retract the bottom platen 7. Oil is directed to the upper end of front cylinder 103 via from line L8 via line L38 and line L37, valve V8C (which shifts on retraction of the bottom platen 7) and line L35, and vented from the lower end of cylinder 103 via line L34, ports *b* and *p* of valve V15. This moves down piston rod 99 of front cylinder 103 so that finger 97 depresses the forward end platen (after return of the bottom platen 7), and closes switch M4.

Upon closure of switch M4, solenoid S3 of loader control valve LVA is energized. This shifts the valve member of this valve to connect its port *p* to its port *a* and to connect its port *b* to its port *t*. Oil from loader pump 331 is thereupon delivered via lines L52 and L53, ports *p* and *a* of valve LVA and line L54 to the rearward end of cylinder 293, and vented from the forward end of this cylinder via line L55 and ports *b* and *t* of valve LVA to extend piston rod 295. This effects forward movement of slider 281 carrying the forward and rearward pushers 285 and 287. The forward pusher

285 pushes the compressed slab rearward out of the press P. The rearward pusher 287 pushes a fresh slab to be compressed off delivery table 159 on to the bottom platen 7 of the press.

The slider 281 moves forward to the point where lug 319 engages the forward switch M2. This energizes solenoid S4 of valve LVA to shift the valve member of this valve to position connecting its ports *p–b* and connecting its ports *a–t*. Oil is thereupon delivered via line L53, ports *p–b* of valve LVA and line L55 to the forward end of cylinder 293, and vented from the rearward end of this cylinder via line L54 and ports *a–t* to retract the piston rod 295. This effects rearward movement of the slider 281 back to its retracted position. The forward pusher 285 swings up over the slab placed in the press and slides back on top of this slab.

When the slider 281 returns to its retracted position, lug 319 actuates switch M3. This results in energization of solenoid S1 of valve V1A to start a closing cycle of the press, as above described, and also energizes solenoid S5 of loader control valve LVB. This shifts the valve member of valve LVB to connect its port *p* to its port *a* and to connect its port *b* to its port *t*. Accordingly, oil is delivered from the loader pump 331 via lines L52 and L53, ports *p* and *a* of valve LVB, and line L56 to the right end (as viewed in FIG. 6) of the ejector cylinder 217 and vented from its other end via line L57, ports *b* and *t* of valve LVB. This retracts piston rod 221 of cylinder 217 to move carriage 201 forward and raise the ejector plate 211 to push the bottom slab S of the stack in the slab magazine 165 on to table 159 (between the forward and rearward pushers 285 and 287). The carriage 201 moves forward to the point where lug 279 actuates switch M1. This energizes solenoid S6 of valve LVB, shifting its valve member to position connecting its port *p* to its port *b* and connecting its port *a* to its port *t*. This effects delivery of oil to the left end of cylinder 217 via line L57 and venting of oil from the right end of cylinder 217 via line L56 to extend piston rod 221 and retract the carriage 201.

Thus, each time the press P opens, the forward end platen 11 is pulled downward, to clear the way for operation of slider 281, and slider 281 moves toward the left as viewed in FIGS. 2 and 3 so that pusher 285 pushes the compressed slab out of the press and so that pusher 287 pushes a fresh slab into the press for the next cycle. Then, on return of the slider 281 to retracted position, ejector plate 211 is actuated to push the lowermost slab of the stack in magazine 165 on to delivery table 159 in position to be pushed into the press by pusher 287 at the conclusion of the next opening cycle of the press.

It is to be mentioned that the compressed slabs exiting from the press may be carried away by a suitable conveyor, or they may be fed to a slicer for cutting them into slices.

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. Compression apparatus comprising a press for compressing an item heightwise, laterally and endwise, said press comprising a bed, a bottom platen slidable rearward on the bed away from a forward open position and back to open position, means for moving said bottom platen away from and back to open position, a depressible side abutment movable with the bottom platen as it slides on the bed, a side platen movable away from an open position toward the side abutment across the bottom platen and back to the open position, means for moving the side platen away from and back to open position, a vertically movable head, means for moving the head downward away from an open position and back upward to open position, a rearward end abutment carried by the head and slidably mounted on the head so as to allow continued downward movement of the head after engagement of the rearward end abutment with the bottom platen, and a depressible forward end platen movable with the bottom platen as it slides on the bed, said platens and abutments defining a molding chamber, said head on downward movement compressing an item in said chamber heightwise, said side platen on movement away from open position compressing an item in said chamber laterally against said side abutment, and said forward end platen on rearward movement with said bottom platen compressing an item in said chamber endwise against said rearward end abutment, said forward end platen being removable to a retracted position opening up the front of the chamber so that an item may be fed into said chamber from the front, and means for moving said forward end platen to its said retracted position, said rearward end abutment being raised on upward movement of said head to open position so that an item may be discharged from said chamber at the rear.

2. Compression apparatus as set forth in claim 1 further comprising a table at the front of the press for supporting an item to be fed into said chamber, pusher means movable away from a retracted position for pushing an item off the table into said chamber and pushing a compressed item out of said chamber to the rear, and then movable back to retracted position, means for holding a supply of items to be compressed, and means for delivering an item from said supply onto said table when said pusher means is in retracted position.

3. Compression apparatus as set forth in claim 2 wherein said pusher means comprises a first pusher for pushing the compressed item out toward the rear of the press and a second pusher spaced from the first pusher a distance such as to accommodate between said pushers an item to be compressed and adapted to push the latter off the table into the press, said first pusher being movable to a raised position for return over the item pushed into the press on return of the pusher means to retracted position.

4. Compression apparatus as set forth in claim 2 having means responsive to opening of said bottom platen, side platen and head for moving the pusher means away from and back to retracted position, and means responsive to retraction of said pusher means for closing and then opening said bottom platen, side platen and head and operating said delivering means to deliver an item from said supply to said table.

5. Compression apparatus as set forth in claim 4 wherein said pusher means comprises a first pusher for pushing the compressed item out toward the rear of the press and a second pusher spaced from the first pusher a distance such as to accommodate between said pushers an item to be compressed and adapted to push the latter off the table into the press, said first pusher being movable to a raised position for return over the item pushed into the press on return of the pusher means to retracted position.

6. Compression apparatus as set forth in claim 5 said holding means comprises a magazine adapted to hold a stack of said items and said delivering means comprises an ejector adapted to push the lowermost item of the stack on to said table.

7. Compression apparatus comprising a press having opposed first compression members for compressing an item heightwise, one of said first compression members being constituted by a head movable downward from a raised open position to a closed position for compressing an item heightwise and then movable back upward to open position, means for moving said head downward away from its open position and upward back to its open

position, opposed second compression members one of which is movable from an open position toward the other to a closed position for compressing said item laterally and then movable back to open position, means for moving said movable second compression member away from and back ot its open position, and opposed third compression members one of which is movable from an open position toward the other to a closed position for compressing said item endwise and then movable back to open position, said press having a front and a rear and said movable third compression member being movable in front-to-rear direction, said movable third compression member when in open position being located adjacent the front of the press, means for moving said movable third compression member rearward away from its open position and forward back to its open position, means mounting each of said third compression members for movement in planes at right angles to said front-to-rear direction between an operative position for effecting endwise compression of an item and a retracted position when all said movable compression members are opened to permit items to be compressed to be fed into the press from the front thereof and items compressed therein to be discharged from the rear; means for loading and unloading the press comprising a table at the front of the press for supporting an item to be fed into the press, pusher means movable away from a retracted position for pushing an item off the table into the press and pushing a compressed item out toward the rear of the press and then movable back to retracted position, means for holding a supply of items to be compressed, and means for delivering an item from said supply onto said table when said pusher means is in retracted position; means for effecting operation of the press through a cycle involving operation of said head and said movable second and third compression members to compress an item heightwise, laterally and endwise, followed by opening of the head and said movable second and third compression members and retraction of said third compression members; and means responsive to completion of a press cycle for effecting operation of the pusher means to push the compressed item out toward the rear of the press and to push an item off the table into the press, followed by retraction of the pusher means and then effecting operation of the delivery means to deliver an item from said supply onto the table.

8. Compression apparatus as set forth in claim 7 wherein the said other third compression member is carried by the head for movement therewith and slidably mounted on the head for movement relative to the head in a plane at right angles to said front-to-rear direction.

9. Compression apparatus as set forth in claim 8 wherein said pusher means comprises a first pusher for pushing the compressed item out toward the rear of the press and a second pusher spaced from the first pusher a distance such as to accommodate between said pushers an item to be compressed and adapted to push the latter off the table into the press, said first pusher being movable to a raised position for return over the item pushed into the press on return of the pusher means to retracted position.

10. Compression apparatus as set forth in claim 9 wherein said holding means comprises a magazine adapted to hold a stack of said items and said delivering means comprises an ejector adapted to push the lowermost item of the stack on to said table.

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