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(54) **Air transfer system for a shell press.**

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Description

The invention relates to an air transfer system, and more particularly to an air transfer system for a shell press having a blanking and forming die station and a curling die station commonly operated therein.

Beverage cans, food cans and the like have a can body and separately manufactured ends, which are called shells that are sealed to the can body. Generally, the shells are manufactured from sheet steel, aluminium, or other acceptable material in a series of pressures, wherein the shell is blanked and formed in one press and then transported to a second press which curls the edges of the blanked and formed shell. The uncurled shell has a peripheral edge that is generally perpendicularly disposed to the main body of the shell, and, before the shell is stacked and then sealed to the beverage can it must first be curled at its peripheral edge and then coated with a sealant which forms a resilient gasket against the can body. By way of example US—A—3537291 describes apparatus for forming such end closures for cans.

A major problem currently existing in the industry is directly related to the use of separate presses to blank and form the shell and to curl the shell. Depending upon the layout of the manufacturing plant, the blanked and formed shells may first have to be stacked one upon the other and then transported to the curling die station to be curled, or the situation may arise wherein it is necessary to store stacked blanked and formed shells due to unforeseen circumstances, for example, an inoperable curler. In any event, the shapes of the blanked and formed shells permit them to be conveniently stacked since one shell tightly nests within another. However, because the blanked and formed shells tightly nest one upon the other, it is virtually impossible to mechanically cut an individual shell from a tightly nested stack of shells. This requires the shells to be stored in an unstacked state, which requires considerable space and is time consuming, costly and inefficient.

In some shell press installations, the blanking and forming die station and curling die station are in close proximity with one another so that the blanked and formed shells may be transported to the curling die station, for example, by use of a conveyor assembly. The shells are generally blanked and formed from the strip stock in groups of twelve, fourteen, or sixteen. For example, a group of sixteen may be blanked and formed from the strip stock in two rows of eight, which rows are staggered relative to each other to minimize the strip stock skeleton remaining after the blanking and forming operation. Since it is not practical to stack the blanked and formed shells, it is necessary to keep them separated from each other between the blanking and forming die station and curling die station.

A typical prior art embodiment of the above shell press installation comprises a double acting press than blanks and forms the shells, a ring curler fur curling the blanked and formed shells, and a conveyor assembly extending therebetween. The blanked and formed shells may be delivered to the conveyor assembly in one of two common ways. The blanking and forming shell press may be designed to tilt towards the conveyor assembly so that the blanked and formed shells slide from the press onto the conveyor for conveyance to the ring curler, or a mechanical kicker-type device may be used with a stationary blanking and forming shell press to eject the blanked and formed shells onto the conveyor. In this particular embodiment, the ring curler generally comprises two rotating rollers between which the shells pass to be curled.

Although the above embodiment permits the blanking and forming operation and the curling operation to be performed in close proximity to each other, certain problems and disadvantages exist such as the requirement for additional space for the conveyor assembly, frequent denting of shells by the kicker device in ejecting the shells onto the conveyor assembly, and the tendency of the ring curler to produce shells having non-uniform curled edges.

Another typical prior art embodiment, which may be a modification of the above described embodiment, uses a die curler in place of the ring curler. Here the blanked and formed shell is curled at a die station, which is commonly housed in a press separate from the blanking and forming shell press and operated independently thereof. The distance between the blanking and forming shell press and the die curler may be such that a conveyor assembly may be used to transport blanked and formed shells to the die curler. Stacking for transporting to the die curler is not practical due to the tight nesting of a stack of blanked and formed shells.

Concerning the conveyance of parts between different shaping operations, means other than conveyor belt assemblies have been utilized, for example, pneumatic systems which generally comprise a large plenum and duct assembly. In these systems, parts such as bottles, cans, records, silicon wafers and the like are transported along a guide track overlying the ducts. The ducts have a plurality of openings disposed therein and the plenum provides a source of low pressure air which flows through the ducts and out the openings to convey the part from one area to another. This type of system poses numerous disadvantages when adapted to a shell press wherein a plurality of shells are formed simultaneously.

Recalling from above, shells are blanked and formed in groups of twelve, fourteen, or sixteen and in rows which are staggered relative to each other such that shells formed in one row overlap shells of adjacent rows. Therefore, it is desirable to transport alternate rows along different paths or tracks, which may be disposed relative to each other in a vertically adjacent manner. In such an arrangement, it is not practical or efficient to

utilize the pneumatic systems of the prior art because of the large size of the ducts that provide air flow to the tracks. Such prior art systems would be difficult to adapt to a blanking and forming die station and a curling die station operated in the same shell press, and would also require an undue amount of material and space.

Examples of such pneumatic systems may be found in U.S. Patents 3,874,740; 3,975,057; 3,953,076; 3,941,070; 3,293,414; and 3,645,591.

The present invention provides a shell press for making shells for beverage cans and the like, comprising:

a slide assembly having a first slide member and a second slide member guided to reciprocate relative to each other, the slide assembly including a blanking and forming die station both of which are operated by said slide assembly;

a pair of first tooling means mounted in said blanking and forming station for blanking and forming a shell, one of said first tooling means being connected to the first slide member and the other of said first tooling means being connected to the second slide member;

means for ejecting a blanked and formed shell from the blanking and forming station;

a pair of second tooling means mounted in said curling die station for curling a blanked and formed shell, said second tooling means being connected to and driven by one of said first and second slide members; and

fluid conveyor means extending between said die stations for conveying the ejected shell from the blanking and forming station to the curling station, said fluid conveyor means including a pair of opposed side walls defining a track and a hollow tube member having a plurality of openings therein, wherein said tube member is connected to a source of air located remotely from said track, said tube member being located in a bottom portion of said track and being contiguous with and extending substantially the distance between said die stations, said tube member being of relatively small diameter in relation to the transverse distance between said opposed side walls and said openings being shaped to provide air flow velocity components directed both upwardly and toward said curling die station when a flow of air is supplied therethrough.

Since the shells are formed, blanked and curled in the same shell press, the curled shells may be easily stacked and, more importantly, easily cut mechanically from a stack. A further advantage of utilizing a die curler in the same shell press with a blanking and forming die station is the uniform shape of curled edges produced by the die in contrast to the curled edges produced by a ring curler.

The pneumatic transfer system provided is compact and easily interfaced between the blanking and forming die station and curling die station in the same shell press. The pneumatic transfer system may comprise two guide tracks extending between the die stations in a double-deck arrangement. Disposed in the upwardly facing surface of each of the guide tracks is a hollow tube having a diameter much smaller than the width of the guide track or the diameter of the shell being conveyed.

Each hollow tube has a plurality of uniquely shaped openings which provide air flow velocity components in the direction of the curling station, and each is connected to an air source which provides a flow of high pressure air. Because the pneumatic system of the present invention utilizes a very small diameter hollow tube in place of the large plenum and duct assembly of the prior art pneumatic systems, the pneumatic system of the present invention is easily installed between a doubledeck guide track arrangement, thereby reducing space requirements and costs.

The present invention minimizes the number of dented shells caused by mechanical kicker-type devices in ejecting the shells from a particular die station. Specifically, there is provided with the curling die station an ejecting or escapement mechanism which directs a pulse of air against a curled shell to eject the shell from the curling die station onto a guide track leading therefrom.

The invention also provides a shell press for making shells for beverage cans and the like, comprising:

a slide assembly having a first slide member and a second slide member guided to reciprocate relative to each other, the slide assembly including a blanking and forming die station and a curling die station both of which are operated by said slide assembly;

a pair of first tooling means mounted in said blanking and forming station for blanking and forming a shell, one of said first tooling means being connected to the first slide member and the other of said first tooling means being connected to the second slide member;

means for ejecting a blanked and formed shell from the blanking and forming station;

a pair of cooperating tool elements in said die station, one of said tool elements being connected to said reciprocating slide member for reciprocative movement relative to the other of said tool elements for performing a shaping operation on a part;

fluid conveyor means extending between said die stations for conveying the ejected shell from the blanking and forming station to the curling station, said fluid conveyor means including a pair of opposed side walls defining a track, a hollow tube member disposed in an upwardly facing surface of said track and having a plurality of openings therein, said tube member being connected to a source of air located remotely from said track, said tube member being contiguous with and extending substantially the distance between said die stations, said tube member having a diameter much less than the transverse distance between said opposed side walls, said openings being shaped to provide air flow velocity components directed both upwardly and toward said curling die station when a flow of air is supplied therethrough, wherein by a first wall

member being disposed between said fluid conveyor means and said die station and connected to said reciprocating slide member to reciprocate therewith, said first wall member having an opening therein, a second wall member being disposed between said track means and said die station and connected to said reciprocating slide member to reciprocate therewith, said second wall member having an opening therein, means for providing a pulsed flow of air against a shaped part in said die station to eject said part therefrom when said reciprocative slide member is at a predetermined position, and means for reciprocating said slide member downwardly from an uppermost position to an intermediate position wherein said first wall member opening is aligned with said fluid conveyor means to permit a part to be shaped to be fluidly conveyed into said die station, and to a lowermost position wherein the part is shaped by said tool elements, said reciprocating means then moving said slide member upwardly from said lowermost position to said predetermined position wherein said second wall member opening is aligned with said track means and said pulsed air flow providing means provides a pulsed flow of air against the shaped part to eject it through said second wall member opening to said track means and to said uppermost position for subsequent reciprocative movement.

The following is a description of a specific embodiment of the invention, reference being made to the accompanying drawings in which:

Figure 1A is a partially broken-away and partially sectioned front elevational view of the blanking and forming die station area of a shell press;

Figure 1B is an extension of the right hand side of the shell press of Figure 1A illustrating an air transfer apparatus extending between a blanking and forming die station and a curling die station incorporating a pneumatic transfer system;

Figure 2 is an enlarged, fragmentary, sectional view of a blanking and forming die station illustrating a blanked and formed shell ready for ejection therefrom;

Figure 3 is a top plan view of a portion of an air transfer apparatus;

Figure 4 is a cross-sectional view of Figure 3 taken along line 4—4 and viewed in the direction of the arrows;

Figure 5 is a cross-sectional view of Figure 3 taken along line 5—5 viewed in the direction of the arrows and illustrates the position of an uncurled shell being conveyed;

Figure 6 is an enlarged, fragmentary, sectional view of the air transfer apparatus;

Figure 7 is a cross-sectional view of Figure 6 taken along line 7—7 and viewed in the direction of the arrows;

Figure 8 is a sectional view of the curling die station depicting an uncurled shell in a stationary position out of the die station and a curled shell being ejected from the die station;

Figure 9 is a view similar to Figure 8 with the uncurled shell entering the curling die station;

Figure 10 is similar to Figure 9 illustrating the shell being curled by the die station; and

Figure 11 is similar to Figure 10 illustrating a curled shell in a position for ejectment from the curling die station.

Referring now to Figs. 1A and 1B the relevant portion of shell press 12 is shown comprising blanking and forming die station 14, air conveyor assembly 16, and curling die station 18. Not shown is a strip stock feeder which feeds strip stock 20 to shell press 12 and a scrap cutter for collecting the skeleton of strip stock 20.

Continuing to refer to Figs. 1A and 1B, blanking and forming die station 14 comprises stationary bolster 22 secured to a press bed (not shown) and cutting die retainer assembly 24 secured on the upper surface thereof. Lower forming die 26, the cross section of which is circular in a plain parallel to tin line 28, is securely mounted within cutting die retainer assembly 24. Bolster 22 and cutting die retainer assembly 24 are rigidly connected to the shell press frame (not shown). Lower forming die 26 also includes an annular bead portion 30, which forms a correspondingly shaped bead portion 32 in shell 66.

Double action slide assembly 35 comprises blanking slide 36 slidably received on shell press posts (not shown) and forming slide 38 slidably guided by blanking slide 36. Slides 36, 38 are driven by connecting rods and a crankshaft operated by an electric motor (not shown) similar to that shown in US patent 3,902,347. Securely mounted to blanking slide 36 is housing assembly 40, which is slidably disposed with respect to spindle 42 and which retains punch 44 for slidable movement relative thereto. Air pressure from air passage 46 yieldably and continuously urges punch 44 downwardly towards annular cutting die 48 in cutting die retainer assembly 24.

Upper forming die 50 is rigidly connected to spindle 42 by retaining rod 52, which is threadedly secured at its lower end to forming die 50 and held against spindle 42 at its upper end by nut 54. Spindle 42 is secured to top plate 56, which is connected to forming slide 38. A dowel 58 prevents rotation between forming die 38 and spindle 42, and forming die 50 has an annular bead portion 60 about its periphery.

Referring now to Figs. 1A, 1B, and 2, ejector mechanism 62 has ejector bar 64 in a ready position to eject blanked and formed shell 66 from blanking and forming die station 14. When blanked and formed shell 66 is positioned as indicated in Figure 2 during the shell press cycle, ejector bar 64 is positively moved by ejector mechanism 62 to a position therein it contacts shell 66 and thereafter is positively, rapidly accelerated to eject shell 66 from die station 14 upwardly along incline 68 to air conveyor assembly 16.

Referring to Figs. 1A, 1B, 3 and 7, air conveyor assembly 16 comprises elongated guide track 70, hollow tube 72 extending the length of guide track 70, shaped openings 74 disposed in hollow tube 72, and a source of high pressure air flow (not shown) connected to hollow tube 72 by a suitable connector 76. Although the disclosure is concerned with the conveyance and subsequent shaping of a single shell 66, it is possible to fully contemplate a plurality of shells 66 being blanked and formed for conveyance along at least two guide tracks 70 positioned one on top of the other to a plurality of curling die stations 18.

In Figs. 1A, 1B, 5, a support plate 78 extends between blanking and forming die station 14 and curling die station 18 and has incline 68 secured to its left hand end portion by screws 80 received through incline holes 82 and threaded hole 84 in support plate 78. Incline 68 has a narrow neck portion 86 (Fig. 3) for ease of installation only, and upwardly facing surface 88 (Fig. 4) of incline 68 is formed by a tapering end section of guide track 70, which is secured to support plate 78 by screws 90 received through guide track holes 92 and threaded holes (not shown) in support plate 78.

Viewing Figs. 3 and 7, guide track 70 has a lower surface 94 with a groove 96 centrally disposed longitudinally therein. Secured within the length of groove 96 is hollow tube 72 having one end 100 closed and the other end 102 (Fig. 1B) connected to connector 76 to supply high pressure air flow through the length of hollow tube 72. The very small diameter of hollow tube 72 in relation to the width of lower surface 94 and the diameter of a shell 66 is important. This allows hollow tube 72 to be easily installed in narrow spaces, for example, between guide tracks positioned one upon the other to provide fluid conveyance of shells from one area to a second area within shell press 12. Hollow tube 72 has a plurality of shaped openings 74 uniquely stamped therein. Each stamped portion 104 (Figs. 6, 7) of hollow tube 72 has a concave surface 106 and a convex surface 108, which faces generally inwardly of hollow tube 72. Consequently, when a supply of high pressure air is provided in hollow tube 72, a flow of high pressure air is discharged through each of the shaped openings 74 providing generally perpendicular and generally parallel velocity components relative to lower surface 94, whereby a shell 66 may be lifted upwardly and moved along lower surface 94 in the direction of the parallel velocity components. To confine shells 66, opposite side walls 110 (Fig. 5) upstand from lower surface 94 and each side wall 110 has an overhanging extension 112 inwardly disposed over lower surface 94. Side walls 110 are spaced apart a distance slightly greater than the diameter of a shell 66, and remote ends 114 of overhanging extensions 112 are spaced apart a distance slightly less than the diameter of shell 66. Side walls 110 and overhanging extensions 112 permit a shell 66 to be fluid conveyed over lower surface 94 in a manner depicted in Fig. 5. Note that shell 66 is lifted above lower surface 94 by the perpendicular velocity components exiting shaped openings 74 and moved along lower surface 94 by the parallel velocity components exiting shaped openings 74.

Referring to Figs. 1B, 8 and 11, curling die station 18 comprises curling die retainer assembly 116, lower curling die 118, liftout device 120, upper curling die 122, and sleeve 124. Curling die retainer assembly 116 is securely mounted to stationary bolster 22 and has lower curling die 118 and liftout device 120 included therein.

Lift out device 120 comprises annular lift out element 126 slidably received within curling die retainer assembly 116 and about lower curling die 118. Lift out element 126 is also receivable within circular groove 130 in bolster 22, however, lift out element 126 is biased upwardly by annular spring 128 disposed within groove 130. Lift out arm 132 is slidably received within opening 136, which has a narrow upper portion 138 and a wider lower portion 140. Lift out arm 132 has cylindrical seat 134 secured to its upper end, and a small piston 142 secured to its lower end in lower portion 140 of opening 136. Lift out arm 132 is biased upwardly by spring 144, which is disposed below piston 142 and in opening lower portion 140 and cylindrical bore 146 in bolster 22.

Slidably disposed in upper curling die 122 is piston 148 which has a narrow midportion 150 slidably received within opening 152, upper portion 154 slidably received within opening 156, and lower portion 158 slidably received within opening 160. Two O-ring seals 162, 164 are disposed in respective grooves 166, 168 in upper curling die 122 and piston upper portion 154, respectively. A source (not shown) of air provides air under pressure to space 170 defined by opening 156 in upper curling die 122 and slide opening 172 in which upper curling die 122 is slidably received.

Sleeve 124 has opening 174 disposed in its side and vertically aligned with guide track lower surface 94, and an angled opening 176 disposed in its side just slightly below opening 174. Opening 174 has vertical and lateral dimensions sufficient to allow a blanked and formed shell 66 to pass therethrough into curling die station 18. Conduit 178 is disposed in support 180 of curling die retainer assembly 116 and has a source (not shown) of air flow connected to it opposite end. A limit switch (not shown) in curling die station 18 causes the source of air connected to the opposite end of conduit 178 to emit a pulse of air flow through conduit 178 when angled opening 176 becomes aligned therewith (Fig. 8). Disposed in sleeve 124 on its side opposite opening 174 and just slightly below opening 174 is opening 182 which has vertical and lateral dimensions sufficient for the ejection of a curled shell 188 therethrough.

Guide track 70 is connected to support 180, which has a hole 184 disposed therein to allow a conveyed blanked and formed shell 66 to pass therethrough into curling die station 18. Support 180 has a second hole 186 disposed therein to allow an ejected curled shell 188 to pass there-

through for further conveyance by air conveyor assembly 16.

Fig. 9 illustrates a blanked and formed shell 66 being received within curling die station 18 and it should be noted that the upper surface 190 of seat 134 is substantially coplanar with guide track lower surface 94 and support hole 184 so that shell 66 may be smoothly conveyed within curling die station 18. Likewise, Fig. 8 illustrates a curled shell 188 being ejected from curling die station 18, and it should be noted that upper surface 190 is substantially co-planar with support hole 186 and lower surface 94 of air conveyor assembly 16.

Upon receiving a portion of strip stock 20, blanking and forming die station 14 blanks and formed a shell 66 and ejector mechanism 62 ejects shell 66 onto guide track lower surface 94 of air conveyor assembly 16. Blanked and formed shell 66 is then conveyed from blanking and forming die station 14 to curling die station 18 by the air jets having perpendicular and parallel velocity components directed through shaped openings 74 of hollow tube 72. Fig. 5 illustrates the position of shell 66 in air conveyor assembly 16 during transport and it may be seen that shell 66 has been lifted by the perpendicular velocity components so that shell bead portion 32 is in contact with overhanging extension 112 to prevent shell 66 from being thrown from lower surface 94, and the parallel velocity components convey shell 66 over lower surface 94 to curling die station 18.

Fig. 8 illustrates curling die station 18 when the crankshaft (not shown) of shell press 12 at at about $0\frac{1}{4}$ of crankshaft rotation. Consequently, blanked and formed shell 66 is shown in its position relative to curling die station 18 at about $0\frac{1}{4}$ crankshaft rotation, and the previous shell is shown as curled shell 188.

Beginning at approximately $0\frac{1}{4}$ crankshaft rotation, blanked and formed shell 66 is positioned as illustrated in Fig. 8 in abutment with sleeve 124. As the crankshaft continues to rotate, blanking slide 36 is moved downwardly and at approximately $67\frac{1}{4}$ crankshaft rotation (Fig. 9) sleeve 124 has moved downwardly to align sleeve opening 174 with support hole 184 to permit shell 66 to be fluidly conveyed through hole 184, opening 174, and into curling die station 18 so that shell 66 is centrally positioned on upper surface 190 of seat 134. Throughout this evolution, space 170 has a supply of air therein at a predetermined pressure to bias piston 148 downwardly as depicted in Fig. 8.

Fig. 10 illustrates curling die station 18 at approximately $180\frac{1}{4}$ crankshaft rotation. During crankshaft rotation from about $67\frac{1}{4}$ to about $180\frac{1}{4}$, piston lower portion 158 contacts the upper surface of shell 66 to firmly hold it in place during the curling operation. As blanking slide 36 continues to move downwardly, lower curling die 118 is forced downwardly against the spring forces of springs 128, 144. After springs 128, 144 have been fully compressed, upper curling die 122 is forced downwardly by blanking slide 36 under a force that is greater than the force applied against piston 148 by the air in space 170. The greater force supplied by blanking slide 36 to upper curling die 122 causes it to curl shell bead portion 32 against inner curling surface 192 of sleeve 124. Just shortly before this curling operation, lift out arm 132 has fully compressed spring 144 so that further downward movement by seat 134 is prevented. Annular lift out element 126 then moves downwardly a small distance against spring 128 to allow die annular bead portion 196 to fully seat with die annular bead portion 194 to curl shell bead portion 32 against inner curling surface 192.

As the crankshaft rotates from about $180\frac{1}{4}$ to approximately $264\frac{1}{4}$, the position of curled shell 188 within curling die station 18 is as illustrated in Fig. 11. As the crankshaft begins to rotate past approximately $180\frac{1}{4}$, blanking slide 36 begins to move upwardly to a position where the force exerted by it on upper curling die 122 becomes less than the force exerted against piston 148 by the air within space 170. At this particular point, and as blanking slide 36 continues to move upwardly, upper curling die 122 moves upwardly so that die annular bead portion 196 separates from curled shell 188 while piston lower portion 158 remains forced against the upper surface of shell 188. Upon further upward movement by blanking slide 36, lower curling die 118 is stopped from further upward movement while liftout element 126 and liftout arm 132 moves upwardly under the spring force exerted by springs 128, 144, respectively. This causes the die annular bead portion 194 to separate from shell bead portion 32, and at this point curled shell 188 is being firmly held by seat 134 and piston lower portion 158.

As the crankshaft approaches approximately $264\frac{1}{4}$ rotation, blanking slide 36 continues to move upwardly to draw piston lower portion 158 away from the upper surface of curled shell 188 as depicted in Fig. 11, so that curled shell 188 now rests on lift out element 126 and upper surface 190 of seat 134 as depicted in Fig. 11.

Referring again to Fig. 8, curled shell 188 is being conveyed from curling die station 18 onto lower surface 94 of air conveyor assembly 16. As the crankshaft rotates from about $264\frac{1}{4}$ to about $294\frac{1}{4}$, sleeve 124 moves upwardly so that sleeve opening 182 becomes aligned with curled shell 188 and sleeve opening 176 becomes aligned with conduit 178. Shortly before sleeve opening 176 aligns with conduit 178, a limit switch (not shown) in curling die station 18 is tripped to cause the source of air connected to the opposite end of conduit 178 to emit a pulse of air flow through conduit 178 and sleeve opening 176 against curled shell 188 to eject it through sleeve opening 182 and support hole 186 onto lower surface 94 of air conveyor assembly 16.

As the crankshaft rotates from about $294\frac{1}{4}$ to about $360\frac{1}{4}$, curled shell 188 is fully ejected fluidly from curling die station 18 and a second blanked

and formed shell 66 is fluidly conveyed by air conveyor assembly 16 against sleeve 124 to be curled by curling die station 18.

Claims

1. A shell press for making shells for beverage cans and the like, comprising:

a slide assembly having a first slide member (36) and a second slide member (38) guided to reciprocate relative to each other, the slide assembly including a blanking and forming die station (14) and a curling die station (18) both of which are operated by said slide assembly;

a pair of first tooling means (44, 50) mounted in said blanking and forming station for blanking and forming a shell (66), one of said first tooling means being connected to the first slide member (36) and the other of said first tooling means being connected to the second slide member (38);

means (62) for ejecting a blanked and formed shell from the blanking and forming station;

a pair of second tooling means (122, 124) mounted in said curling die station for curling a blanked and formed shell, said second tooling means being connected to and driven by one of said first (36) and second (38) slide members; and

fluid conveyor means (16) extending between said die stations (14, 18) for conveying the ejected shell from the blanking and forming station (14) to the curling station (18), said fluid conveyor means (16) including a pair of opposed side walls (110) defining a track and a hollow tube member (72) having a plurality of openings (74) therein, characterised in that said tube member (72) is connected to a source of air located remotely from said track, said tube member (72) being located in a bottom portion of said track and being contiguous with and extending substantially the distance between said die stations (14, 18), said tube member (72) being of relatively small diameter in relation to the transverse distance between said opposed side walls (110), and said openings (74) being shaped to provide air flow velocity components directed both upwardly and toward said curling die station (18) when a flow of air is supplied therethrough.

2. The shell press of claim 1 characterised in that: said downwardly facing surface is defined by a pair of ledges (112) disposed respectively from side walls (110) and have free ends (114) above said upwardly facing surface (94), said remote ends (114) being spaced apart a transverse distance less than the diameter of a shell being removed.

3. The shell press of claim 2 characterised in that said hollow tube member (72) is disposed in said upwardly facing surface (94).

4. The shell press of any of claims 1 to 3 characterised in that said ejecting means (62) is positively driven and synchronised with said slide assembly.

5. A shell press for making shells for beverage cans and the like, comprising:

a slide assembly having a first slide member (36) and a second slide member (38) guided to reciprocate relative to each other, the slide assembly including a blanking and forming die station (14) and a curling die station (18) both of which are operated by said slide assembly;

a pair of first tooling means (44, 50) mounted in said blanking and forming station for blanking and forming a shell (66), one of said first tooling means being connected to the first slide member (36) and the other of said first tooling means being connected to the second slide member (38);

means (62) for ejecting a blanked and formed shell from the blanking and forming station (14);

a pair of cooperating tool elements in said die station (18), one of said tool elements (122) being connected to said reciprocating slide member for reciprocative movement relative to the other of said tool elements (118) for performing a shaping operation on a part (66);

fluid conveyor means extending between said die stations for conveying the ejected shell from the blanking and forming station to the curling station, said fluid conveyor means including a pair of opposed side walls (110) defining a track (70), a hollow tube member (72) disposed in an upwardly facing surface (94) of said track and having a plurality of openings (74) therein, said tube member (72) being connected to a source of air located remotely from said track, said tube member (72) being contiguous with and extending substantially the distance between said die stations, said tube member (72) having a diameter much less than the transverse distance between said opposed side walls (110) said opening (74) being shaped to provide air flow velocity components direct both upwardly and toward said curling die station when a flow of air is supplied therethrough, characterised by a first wall member (124) being disposed between said fluid conveyor means and said die station and connected to said reciprocating slide member to reciprocate therewith, said first wall member having an opening (174) therein, a second wall member (124) being disposed between said track means (70) and said die station and connected to said reciprocating slide member to reciprocate therewith, said second wall member having an opening (182) therein, means (176) for providing a pulsed flow of air against a shaped part in said die station to eject said part therefrom when said reciprocative slide member is at a predetermined position, and means for reciprocating said slide member downwardly from an uppermost position to an intermediate position wherein said first wall member opening (174) is aligned with said fluid conveyor means (16) to permit a part to be shaped to be fluidly conveyed into said die station, and to a lowermost position wherein the part is shaped by said tool elements, said reciprocating means then moving said slide member upwardly from said lowermost position to said predetermined position wherein said second wall member opening (182) is aligned with said track means and said pulsed air flow providing means (176) provides a pulsed flow of air against the

shaped part to eject it through said second wall member opening (182) to said track means and to said uppermost position for subsequent reciprocative movement.

6. The press of claim 5 characterised in that said first and second wall members comprise a sleeve member (124) being disposed about said one tool element (122) and connected to said reciprocating slide member (36) to reciprocate therewith.

7. The press of claim 5 or claim 6 characterised in that said first wall member (124) has second opening (176) therein, and wherein said pulsed air providing means includes a conduit (178) leading to said second opening (176) to deliver a flow of air thereto, said conduit (178) and said second opening (176) in said first wall member (124) being aligned with a shaped part (188) in said die station when said slide member (36) is at said predetermined position whereby a pulsed flow of air is delivered through said second opening (176) to eject the shaped part through said second wall member opening to said track means (70).

Patentansprüche

1. Deckelpresse zum Herstellen von Deckeln für Getränkedosen oder dergleichen, umfassend:

einen Schlitten mit einem ersten Schlittenelement (36) und einem zweiten Schlittenelement (38), in relativ zueinander hin und her gehender Bewegung geführt, wobei der Schlitten eine Ausstanz- und Formgesenkstation (14) sowie eine Wellgesenkstation umfaßt, die beide von dem Schlitten angetrieben sind;

ein erstes Paar Werkzeuge (44, 50), die in der Ausstanz- und Formstation zum Ausstanzen und Formen eines Deckels (66) montiert sind, und von denen eines mit dem ersten Schlittenelement (36), und das andere mit dem zweiten Schlittenelement (38) verbunden ist;

Mittel (62) zum Ausstoßen eines ausgestanzten und geformten Deckels aus der Ausstanz- und Formstation;

eine zweites Paar Werkzeuge (122, 124), die in der Wellgesenkstation zum Wellen eines ausgestanzten und geformten Deckels montiert sind und die mit einem der ersten und zweiten Schlittenelemente verbunden und von diesem angetrieben sind; und

einem Förderer für fließfähiges Medium, der sich zwischen den Gesenkstationen erstreckt, zum Fördern des ausgestoßenen Mittels aus der Ausstanz- und Formstation zur Wellstation und der ein Paar einander gegenüberliegender Seitenwände (110) umfaßt, die eine Führungsbahn und eine Hülse (72) mit einer Mehrzahl von Öffnungen (74) umfassen, dadurch gekennzeichnet, daß die Hülse (72) an eine Luftquelle angeschlossen ist, die entfernt von der Führungsbahn angeordnet ist, daß die Hülse (72) in einem Bodenbereich der Führungsbahn angeordnet ist, sich an die Gesenkstationen anschließt und sich im wesentlichen über den Abstand zwischen diesen hinweg erstreckt, daß die Hülse (72) im Verhältnis zum Querabstand zwischen den genannten, einander gegenüberliegenden Seitenwänden (110) im Durchmesser klein ist, und daß die Öffnungen (74) derart gestaltet sind, daß sie beim Durchströmen von Luft Luftstrom-Geschwindigkeitskomponenten sowohl nach oberhalb als auch gegen die Wellgesenkstation fördern.

2. Deckelpresse nach Anspruch 1, dadurch gekennzeichnet, daß die nach unten gewandte Fläche aus einem Paar Leisten gebildet ist, die jeweils Seitenwänden (110) zugeordnet sind und freie Enden (114) oberhalb der genannten nach oben gewandten Fläche (94) haben, und daß die genannten entfernt liegenden Ende (114) um einen Querabstand voneinander entfernt sind, der geringer als der Durchmesser eines gerade entnommenen Deckels ist.

3. Deckelpresse nach Anspruch 2, dadurch gekennzeichnet, daß die Hülse (72) in der nach oben gewandten Fläche (94) angeordnet ist.

4. Deckelpresse nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß der Auswerfer (62) positiv angetrieben und mit dem Schlitten synchronisiert ist.

5. Deckelpresse zum Herstellen von Deckeln für Getränke, Dosen und dergleichen, umfassend:

einen Schlitten mit einem ersten Schlittenelement (36) und einem zweiten Schlittenelement (38), die in hin- und hergehender Bewegung relativ zueinander geführt sind, wobei die Schlitten eine Stanz- und Formgesenkstation (14) und eine Wellsegenkstation (18) aufweist, die beide von dem Schlitten angetrieben sind;

eine erstes Werkzeugpaar (44, 50), das in der Stanz- und Formstation zum Ausstanzen und Formen eines Deckels (66) montiert ist, wobei eines der ersten Werkzeuge mit dem ersten Schlittenelement (36), und das andere der ersten Werkzeuge mit dem zweiten Schlittenelement (38) verbunden ist;

Mittel (62) zum Auswerfen eines gestanzten und geformten Deckels aus der Stanz- und Formstation;

eine Paar von miteinander zusammenarbeitenden Werkzeugelementen in der Gesenkstation (18), deren eines (122) mit dem hin- und hergehenden Schlittenelement zwecks hin- und hergehender Bewegung relativ zu dem anderen Werkzeugelement (118) verbunden ist, um einen Formvorgang an einem Werkstück (66) auszuführen;

einen Förderer für fließfähiges Medium, der sich zwischen den Gesenkstationen erstreckt, um den aus der Stanz- und Formstation ausgeworfen Deckel zur Wellstation zu fördern und der ein Paar von einander gegenüberliegenden Seitenwänden (110) umfaßt, die ein Führungsbahn (70) sowie ein Hülse (72) bilden, die in einer nach oben gewandten Fläche (94) der Führungsbahn angeordnet ist und eine Mehrzahl von Öffnungen (74) aufweist, wobei die Hülse (72) an eine Von der Führungsbahn entfernt angeordneten Luftquelle angeschlossen ist, wobei die Hülse (72) an die Gesenkstationen Anschließt und sich im wesentlichen über den Abstand zwischen diesen hinweg erstreckt und einen Durchmesser hat, der wesentlich geringer als der Querabstand zwischen den

genannten einander gegenüberliegenden Wänden (110) ist, wobei die Öffnungen (74) derart gestaltet sind, daß sie bei Luftströmung durch diese hindurch Luftströmungs-Geschwindigkeitskomponenten erzeugen, die sowohl nach oben als auch gegen die genannte Wellgesenkstation gerichtet sind, gekennzeichnet durch eine erstes Wandelement (124), das zwischen dem Förderer und der Gesenkstation angeordnet und an das hin- und hergehende Schlittenelement angeschlossen ist, um mit diesem hin und her zu gehen, daß das erste Wandelement eine Öffnung (174) aufweist, daß eine zweites Wandelement (124) zwischen der Führungseinrichtung (70) und der Gesenkstation angeordnet und das hin- und hergehende Schlittenelement angeschlossen ist, um mit diesem hin und her zu gehen, daß das zweite Wandelement eine Öffnung (182) aufweist, daß Mittel (176) zum Erzeugen eines pulsierenden Luftstromes gegen einer Geformten Teil in der Gesenkstation erzeugt, um das Werkstück dann hieraus auszuwerfen, wenn sich das hin- und hergehende Schlittenelement in einer vorbestimmten Position befindet, daß Mittel zum hin- und hergehenden Antreiben des Schlittenelementes von einer oberen Position nach unten in eine Zwischenposition vorgesehen ist, wobei die Öffnung (174) des ersten Wandelementes mit dem Förderer (16) fluchtet, um ein Werkstück, das geformt werden soll, durch Strömung in die genannte Gesenkstation verbringen zu können und in eine unterste Position, in welcher das Werkstück durch die genannten Werkzeugelemente geformt wird, daß das hin- und hergehende Mittel sodann das Schlittenelement aus der untersten Position nach oben in die genannte vorbestimmte Position verbringt, wobei die Öffnung (182) des zweiten Wandelementes mit der Führungsbahn fluchtet und das Mittel (176) zum Erzeugen pulsierenden Luftstromes eine pulsierenden Luftstrom gegen das geformte Werkstück richtet, um dieses durch die Öffnung (182) des zweiten Wandelementes zur Führungsbahn hin und in die oberste Position zwecks anschließender hin- und hergehender Bewegung auszustoßen.

6. Presse nach Anspruch 5, dadurch gekennzeichnet, daß das erste und das zweite Wandelement eine Buchse (124) aufweisen, die das eine Werkzeugelement (122) umgibt und an das hin- und hergehende Schlittenelement (36) angeschlossen ist, um mit diesem hin und her zu gehen.

7. Presse nach Anspruch 5 oder 6, dadurch gekennzeichnet, daß das erste Wandelement (124) eine zweite Öffnung (176) aufweist, daß das Mittel zum Erzeugen pulsierender Luft eine Leitung (178) aufweist, die zu der zweiten Öffnung (176) führt, um hierin einen Luftstrom zu führen, daß die Leitung (178) und die zweite Öffnung (176) in dem ersten wandelement (124) mit einem geformten Teil (188) in der Gesenkstation dann fluchten, wenn sich das Schlittenelement (36) in der genannten vorbestimmten Position befindet, wobei ein pulsierender Luftstrom durch die zweite Öffnung (176) gefördert wird, um das geformte Teil durch die Öffnung des zweiten Wandelementes zu der Führungsbahn (70) hin auszustoßen.

Revendications

1. Presse à coquilles pour la fabrication de coquilles destinées à des boîtes en fer blanc pour boissons et analogues, comprenant: un ensemble de glissière muni d'un premier élément de glissière (36) et d'un second élément de glissière (38) guidés de manière à effectuer un mouvement de va-et-vient l'un par rapport à l'autre, l'ensemble de glissière comprenant un poste de matrice de découpage de flan et de mise en forme (14) et un poste de matrice de courbure (18), ces deux postes étant manoeuvrés par l'ensemble de glissière; une paire de premiers moyens d'outillage (44, 50) montés dans le poste de découpage de flan et de mise en forme pour découper un flan et mettre en forme un coquille (66), l'un de ces premiers moyens d'outillage étant relié au premier élément de glissière (36) et l'autre de ces premiers moyens d'outillage étant relié au second élément de glissière (38) des moyens (62) pour éjecter un flan et une coquille formée, du poste de découpage de flan et de mise en forme; une paire de seconds moyens d'outillage (122, 124) montés dans le poste de matrice de courbure pour courber une coquille découpée en flan et mise en forme, ces seconds moyens d'outillage étant reliées et entraînés par l'un du premier et second élément de glissière; et

des moyens de transport à fluide disposés entre les postes de matrice pour transporter la coquille éjectée du poste de découpage de flan et de mise en forme, au poste de courbure, ces moyens de transport à fluide comprenant une paire de parois latérales opposées (110) définissant un guidage et un élément de tube creux (72) comportant un certain nombre d'ouvertures (74), presse à coquilles caractérisée en ce que l'élément de tube (72) est relié à une source d'air placée à distance du guidage, cet élément de tube (72) étant placé dans une partie du fond du guidage, dans une position contiguë aux postes de matrices et s'étendant sensiblement sur la distance entre les postes de matrice, cet élément de tube (72) étant de diamètre relativement petit par rapport à la distance transversale entre les parois latérales opposées (110), et les ouvertures (74) étant formées de manière à donner des composantes de vitesse de débit d'air dirigées à la fois vers le haut, et vers le poste de matrice de courbure, lorsqu'un débit d'air est envoyé à travers ces ouvertures.

2. Presse à coquilles selon la revendication 1, caractérisée en ce que la surface tournée vers le bas, est définie par une paire de rebords (112) partant respectivement des parois latérales (110) et comportant des extrémités libres (114) venant au-dessus de la surface tournée vers le haut (94), les extrémités à distance (114) étant séparées par une distance transversale inférieure au diamètre d'une coquille à retirer.

3. Presse à coquilles selon la revendication 2,

caractérisé en ce que l'élément de tube creux (72) est disposé dans la surface tournée vers le haut (94).

4. Presse à coquilles selon l'une quelconque des revendications 1 à 3, caractérisée en ce que les moyens d'éjection (62) sont entraînés et synchronisés efficacement avec l'ensemble de glissière.

5. Presse à coquilles pour la fabrication de coquilles destinées à des boîtes en fer blanc pour boissons et analogues, comprenant:

un ensemble de glissière muni d'un premier élément de glissière (36) et d'un second élément de glissière (38) guidés de manière à effectuer une mouvement de va-et-vient l'un par rapport à l'autre, l'ensemble de glissière comprenant un poste de matrice de découpage de flan et de mise en forme (14) et une poste de matrice de courbure (18), ces deux postes étant manoeuvrés par l'ensemble de glissière; une paire de premiers moyens d'outillage (44, 50) montés dans le poste de découpage de flan et de mise en forme pour découper un flan et mettre en forme une coquille (66), l'un de ces premiers moyens d'outillage étant relié au premier élément de glissière (36) et l'autre de ces premiers moyens d'outillage étant relié au second élément de glissière (38), des moyens (62) pour éjecter un flan et une coquille formée, du poste de découpage de flan et de mise en formé; une paire d'éléments d'outil coopérant dans le poste de matrice (18), l'un de ces éléments d'outil (122) étant relié à l'élément de glissière de va-et-vient pour effectuer un mouvement de va-et-vient par rapport à l'autre des éléments d'outil (118), de manière à effectuer une opération de mise en forme sur une pièce (66); des moyens de transport à fluide disposés entre les postes de matière pour transporter la coquille éjectée du poste de découpage de flan et de mise en forme, au poste de courbure, ces moyens de transport à fluide comprenant une paire de parois latérales opposées (110) définissant un guidage (70), un élément de tube creux (72) disposé sur une surface tournée vers le haut des parois de guidage et comportant un certain nombre d'ouvertures (74) ménagées dans celles-ci, l'élément de tube (72) étant relié à une source d'air placée à distance des parois de guidage, cet élément de tube (72) étant contigu avec les postes de matrice et s'étendant essentiellement sur la distance entre ces postes de matrice, cet élément de tube (72) présentant un diamètre beaucoup plus petit que la distance transversale entre les parois latérales opposées (110), les ouvertures (74) étant formées de manière à donner des composantes devitesse de débit d'air dirigées à la fois vers le haut et vers le poste de matrice de courbure, lorsqu'un débit d'air est envoyé à travers ces ouvertures, presse à coquilles caractérisée en ce qu'un premier élément de paroi (124) est disposé entre les moyens de transport à fluide et le poste de matrice, cet élément de paroi étant relié à l'élément de glissière de va-et-vient pour aller et venir avec celui-ci, le premier élément de paroi comportant une ouverture (174) ménagée dans celui-ci, un second élément de paroi (124) étant disposé entre les moyens de guidage (70) et le poste de matrice, ce second élément de paroi étant relié à l'élément de glissière de va-et-vient pour aller et venir avec celui-ci, le second élément de paroi comportant une ouverture (182) ménagée dans celui-ci, des moyens (176) pour envoyer un débit d'air pulsé contre une pièce à être mise en forme dans le poste de matrice, de manière à èjecter cette pièce, lorsquel l'élément de glissière de va-et-vient se trouve dans une position prédéterminée, et des moyens pour faire aller et venir l'élément de glissière vers le bas, à partir d'une position haute maximum, pour qu'il vienne dans une position intermédiaire dans laquelle l'ouverture (174) du premier élément de paroi est alignée avec les moyens de transport à fluide (16) pour permettre à une pièce à être mise en forme, d'être amenée de façon fluide dans le poste de matrice, et dans une position basse maximum, dans laquelle le pièce est mise en forme par les éléments d'outil, les moyens de va-et-vient entraînant ensuite l'élément de glissière vers le haut, à partir de la position basse maximum, pour l'amener dans la position prédéterminée dans laquelle l'ouverture (182) du second élément de paroi est alignée avec les moyens de guidage, et les moyens de production de débit d'air pulsé (176) envoient un débit d'air pulsé contre la pièce mise en forme pour éjecter celle-ci par l'ouverture (182) du second élément de guidage, vers les moyens de guidage et vers la position haute maximum pour un mouvement de va-et-vient ultérieur.

6. Presse selon la revendication 5, caractérisée en ce que le premier et second élément de parois comprennent un élément de manchon disposé autour du premier élément d'outil (122) et relié à l'élément de glissière de va-et-vient (36) pour alle et venir avec celui-ci.

7. Presse selon l'une quelconque des revendications 5 et 6, caractérisé en ce que le premier élément de paroi (124) comporte une seconde ouverture (176) ménagée dans celui-ci, et en ce que les moyens de production d'air pulsé comprennent un conduit (178) aboutissant à la seconde ouverture (176) pour fournir à celle-ci un débit d'air, le conduit (178) et la seconde ouverture (176) du premier élément de paroi (124) étant alignés avec une pièce (188) mise en forme dans le poste de matrice, lorsque l'élément de glissière (36) se trouve dans la position prédéterminée, de sorte qu'un débit d'air pulsé est ainsi envoyé à travers la seconde ouverture (176) pour éjecter la pièce mise en forme à travers le second élément de paroi débouchant dans les moyens de guidage (70).

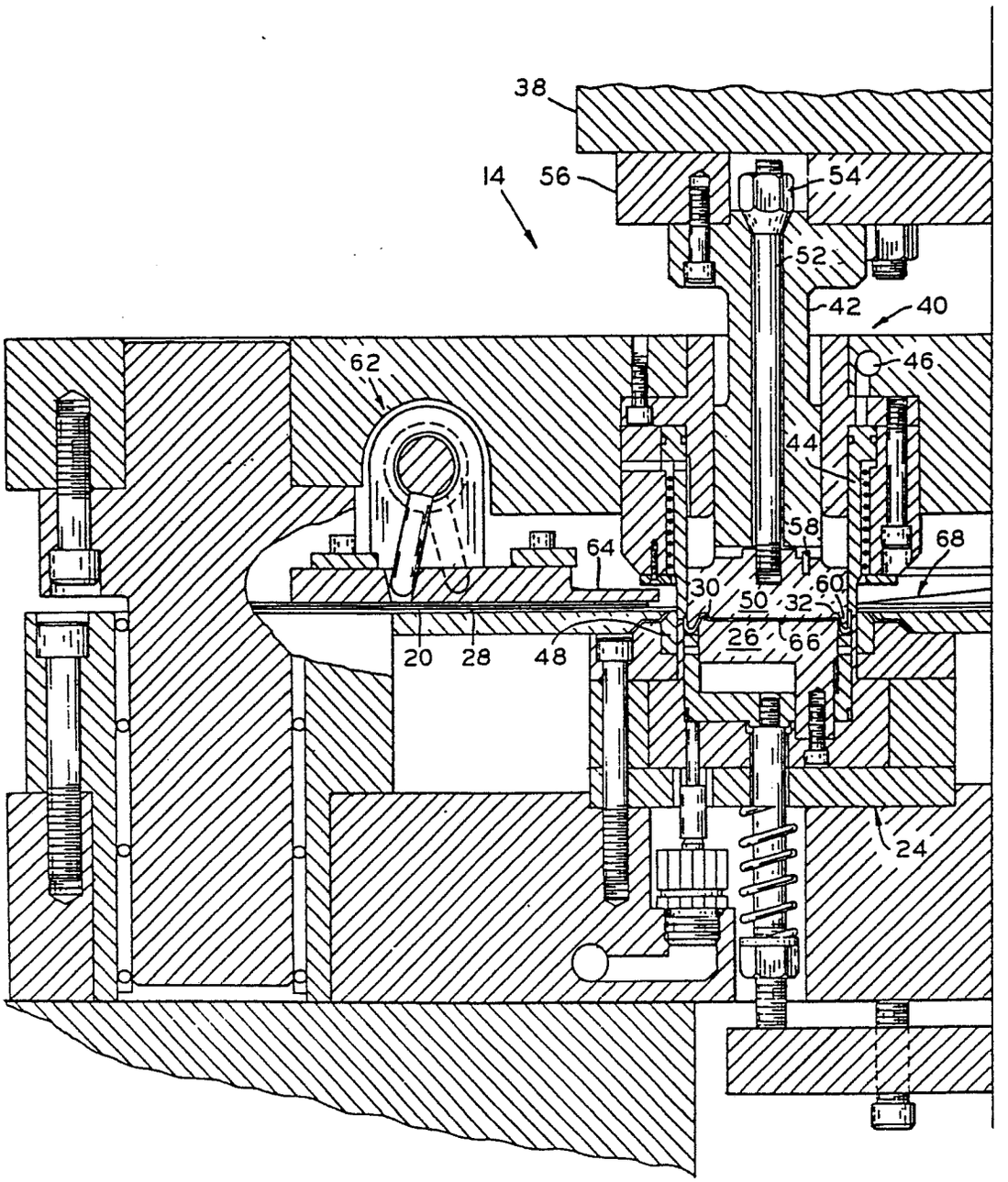

FIG. 1A

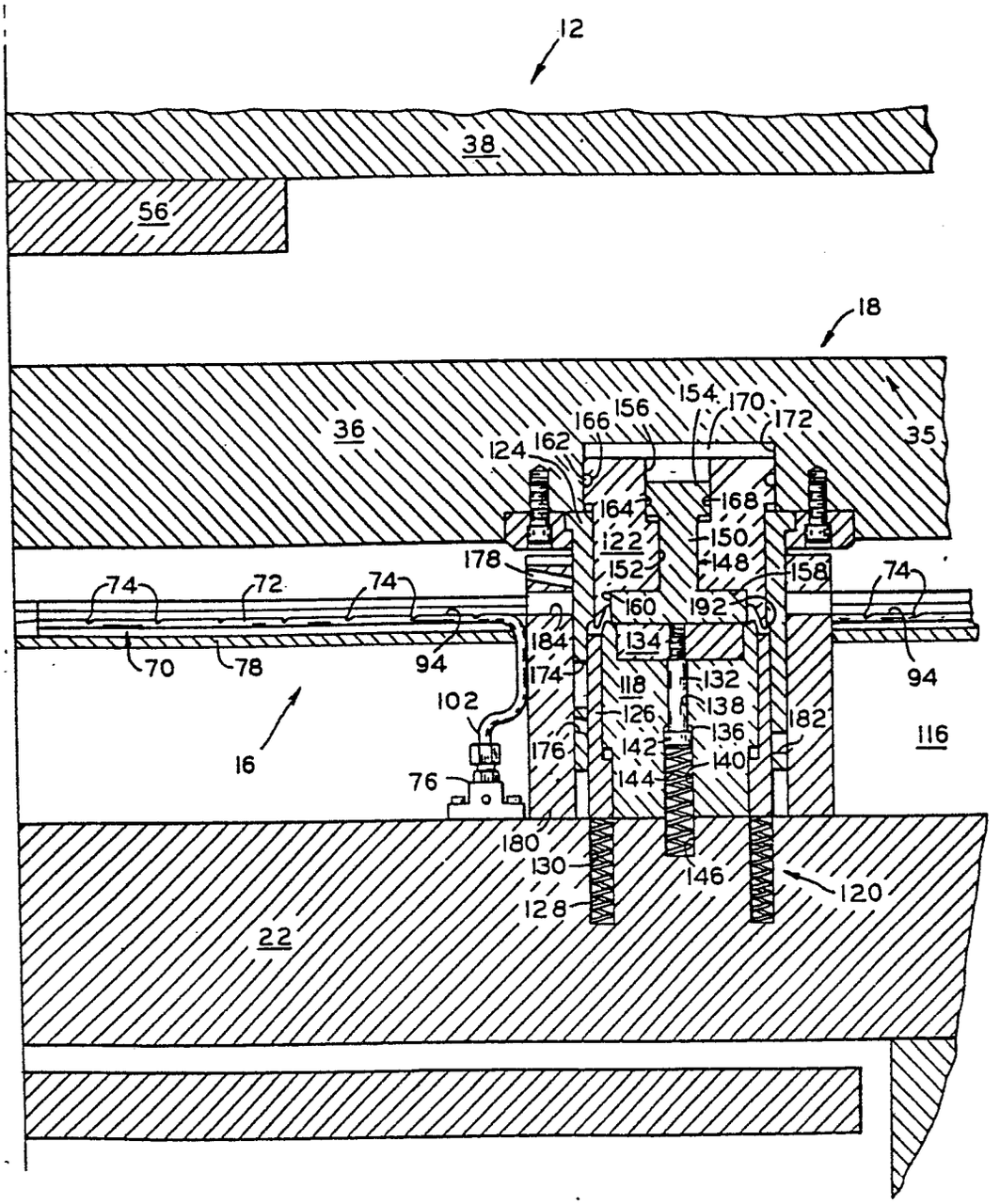
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FIG 1B

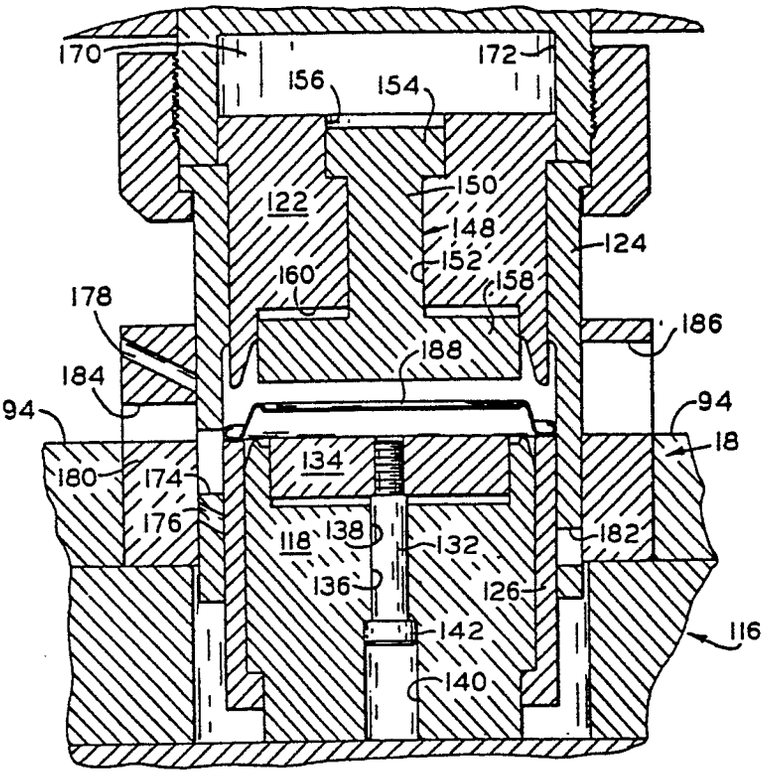
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FIG 11

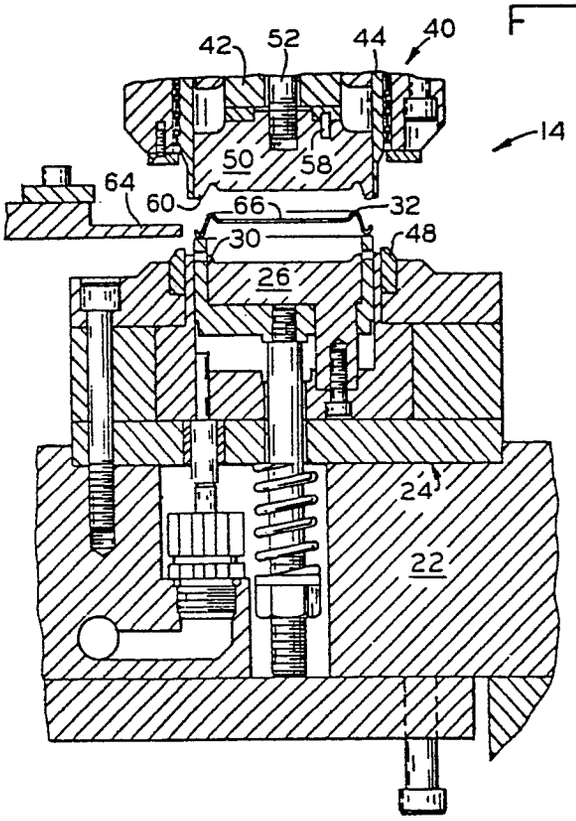
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FIG 2

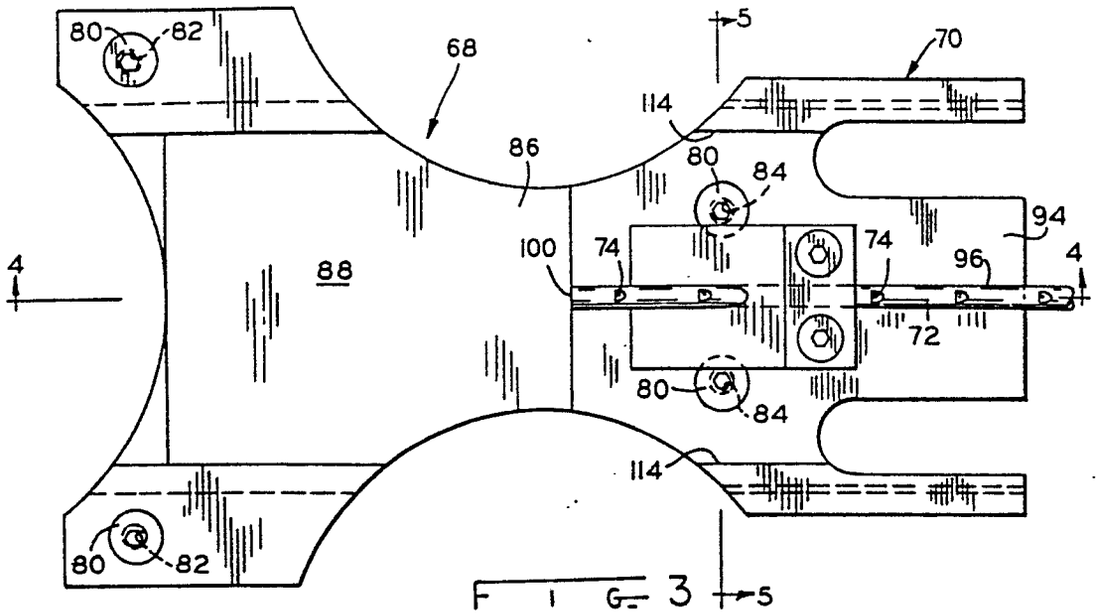

FIG 3

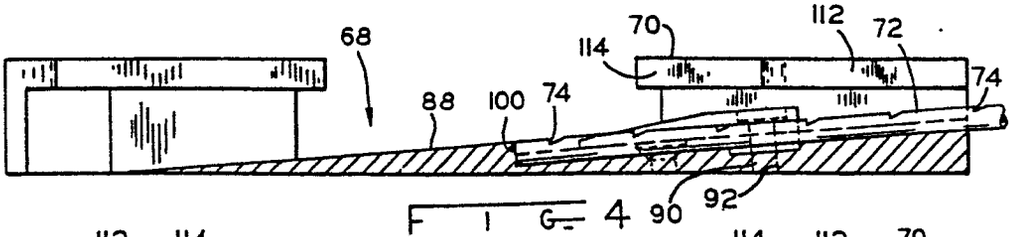

FIG 4

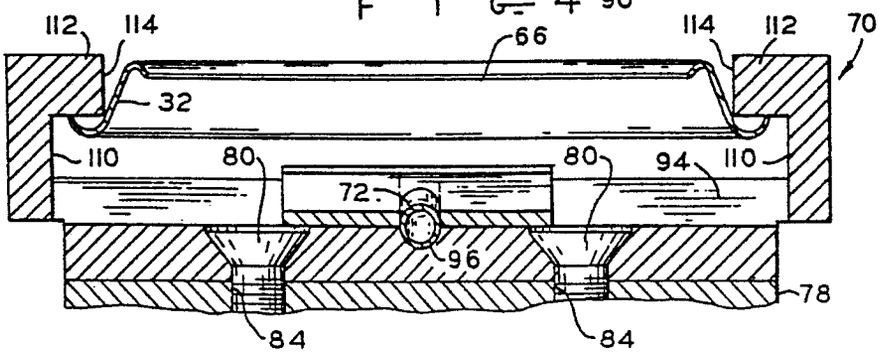

FIG 5

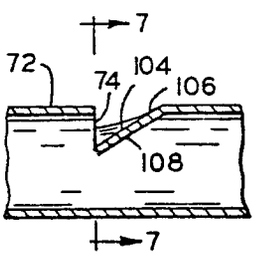

FIG 6

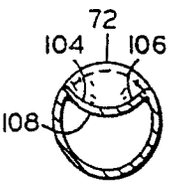

FIG 7

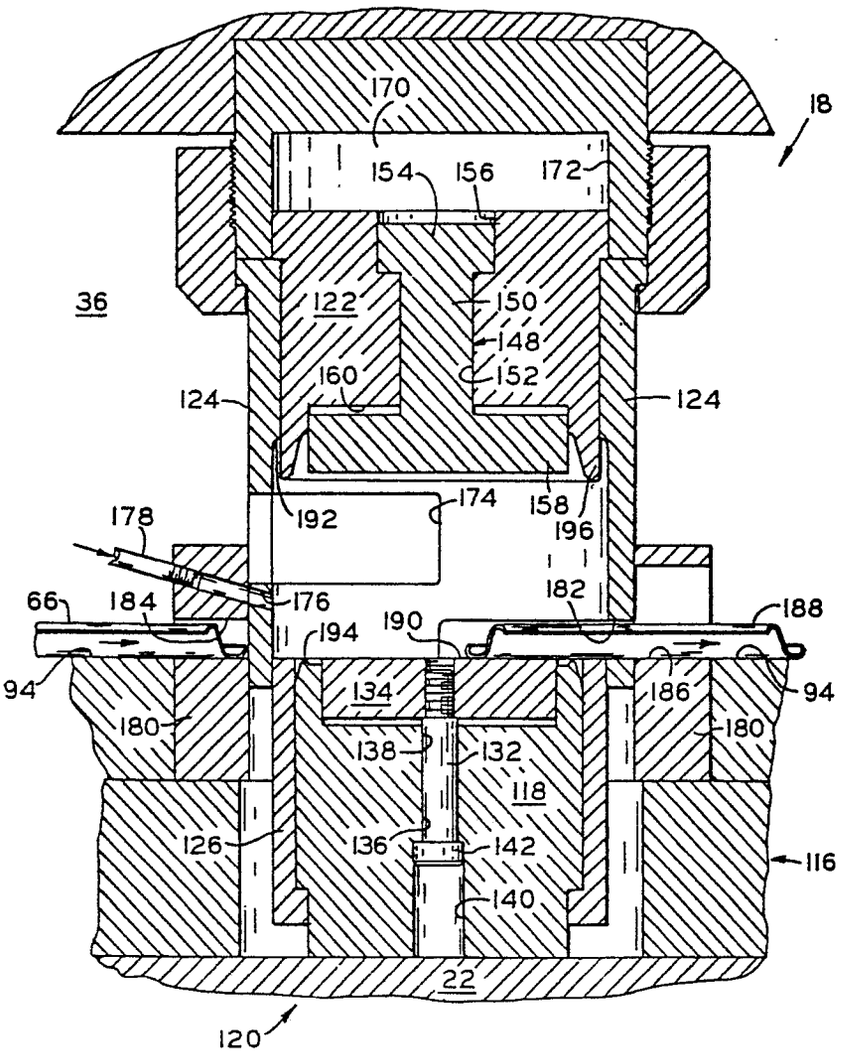
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FIG 8

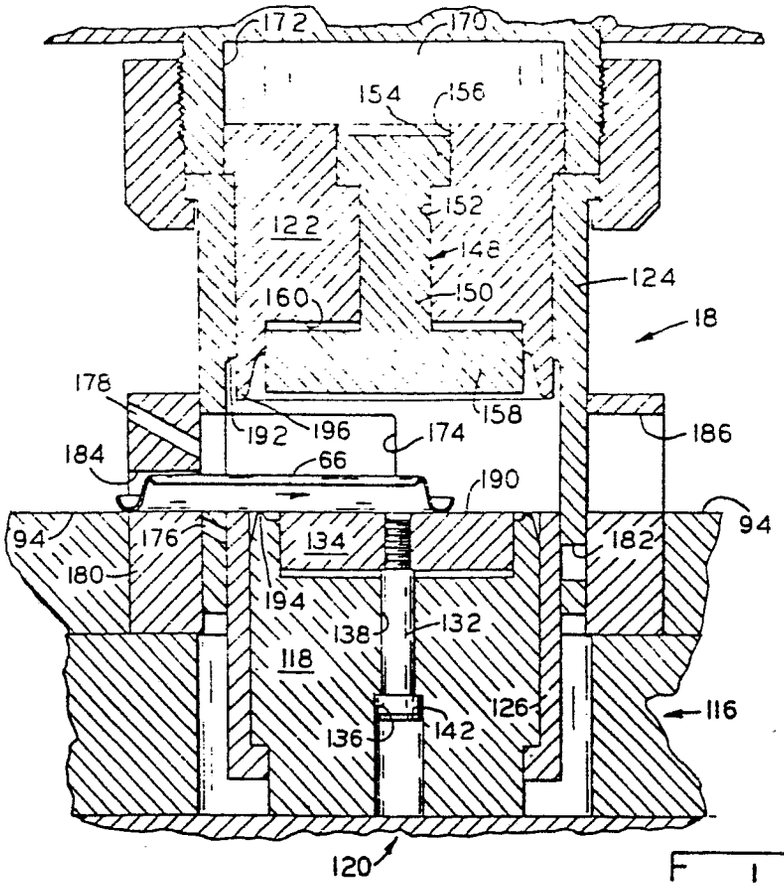
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FIG 9

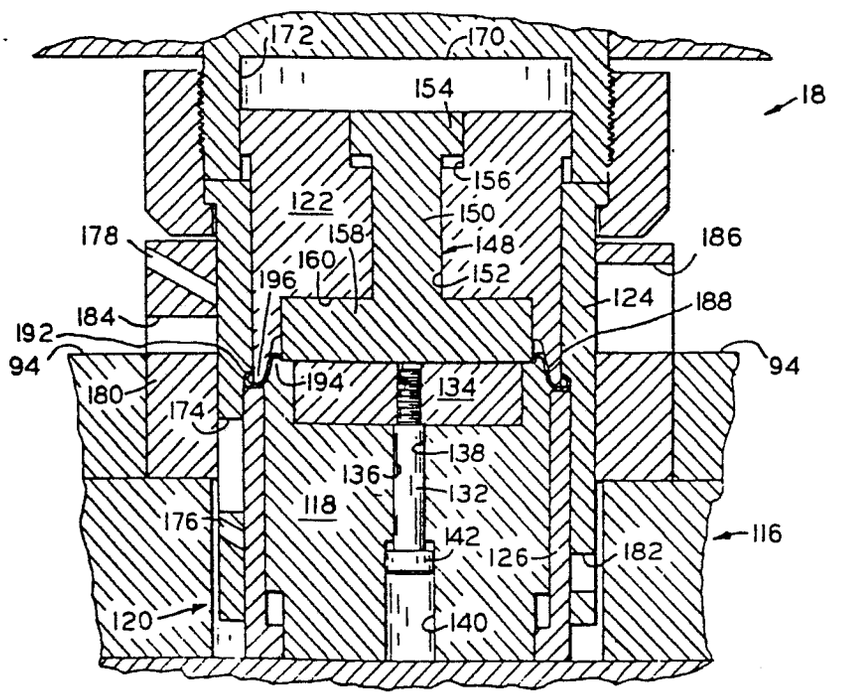
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FIG 10