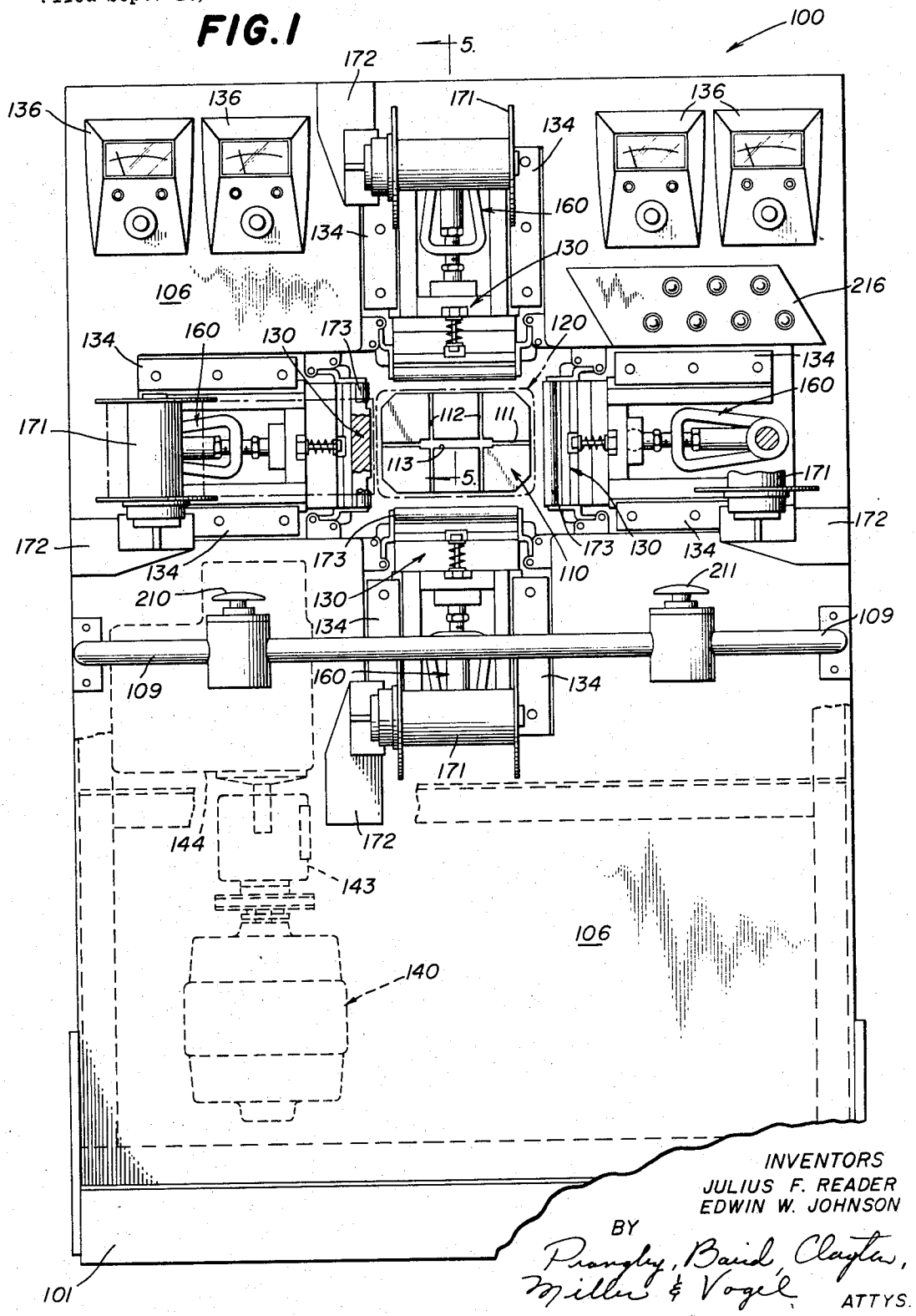
Nov. 19, 1968 J. F. READER ET AL 3,411,438

HOT STAMPING PRESS

Filed Sept. 16, 1966 5 Sheets-Sheet 1

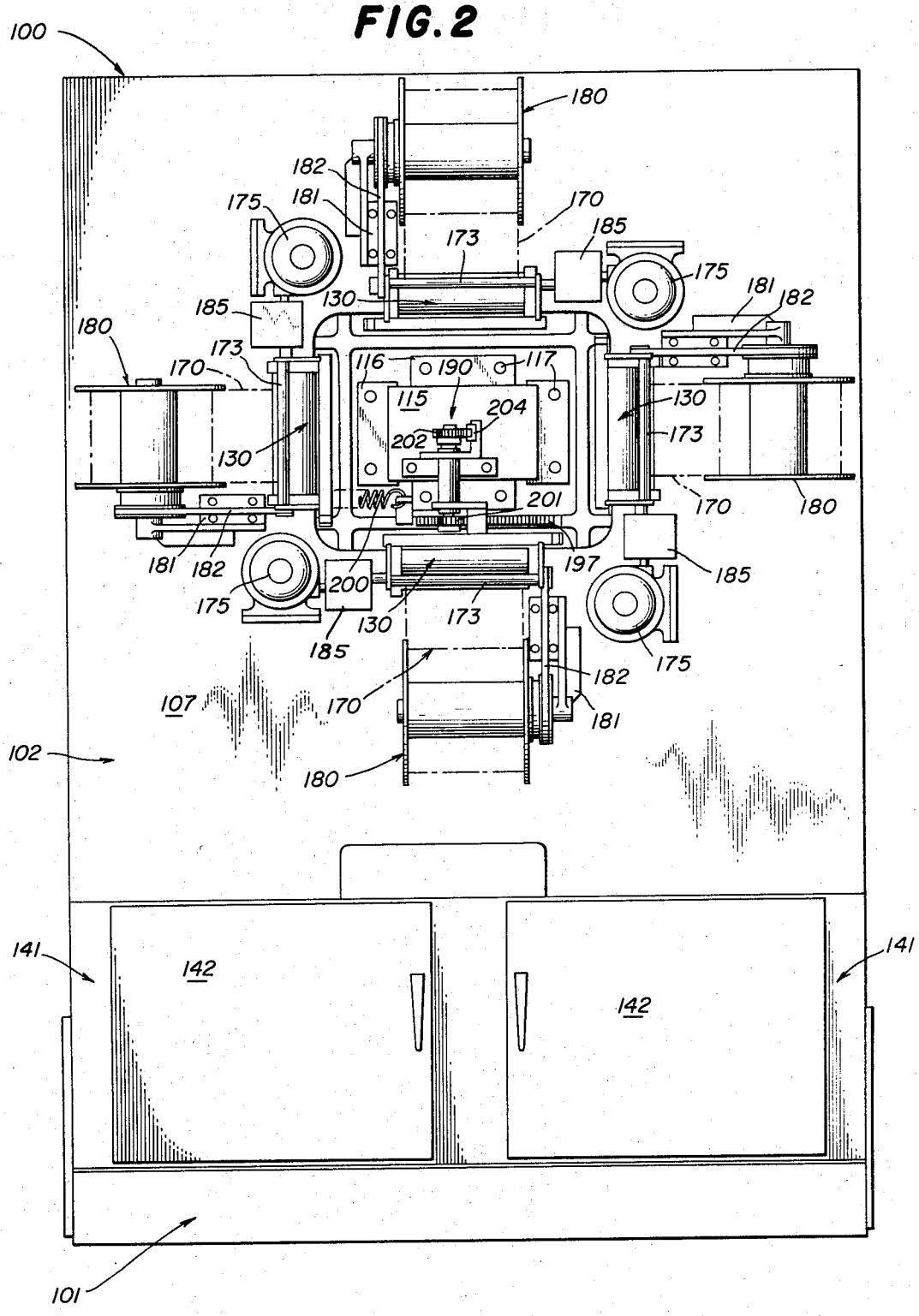
FIG. 1



INVENTORS
JULIUS F. READER
EDWIN W. JOHNSON

BY
Pranglay, Baird, Clayton, Miller & Vogel ATTYS.

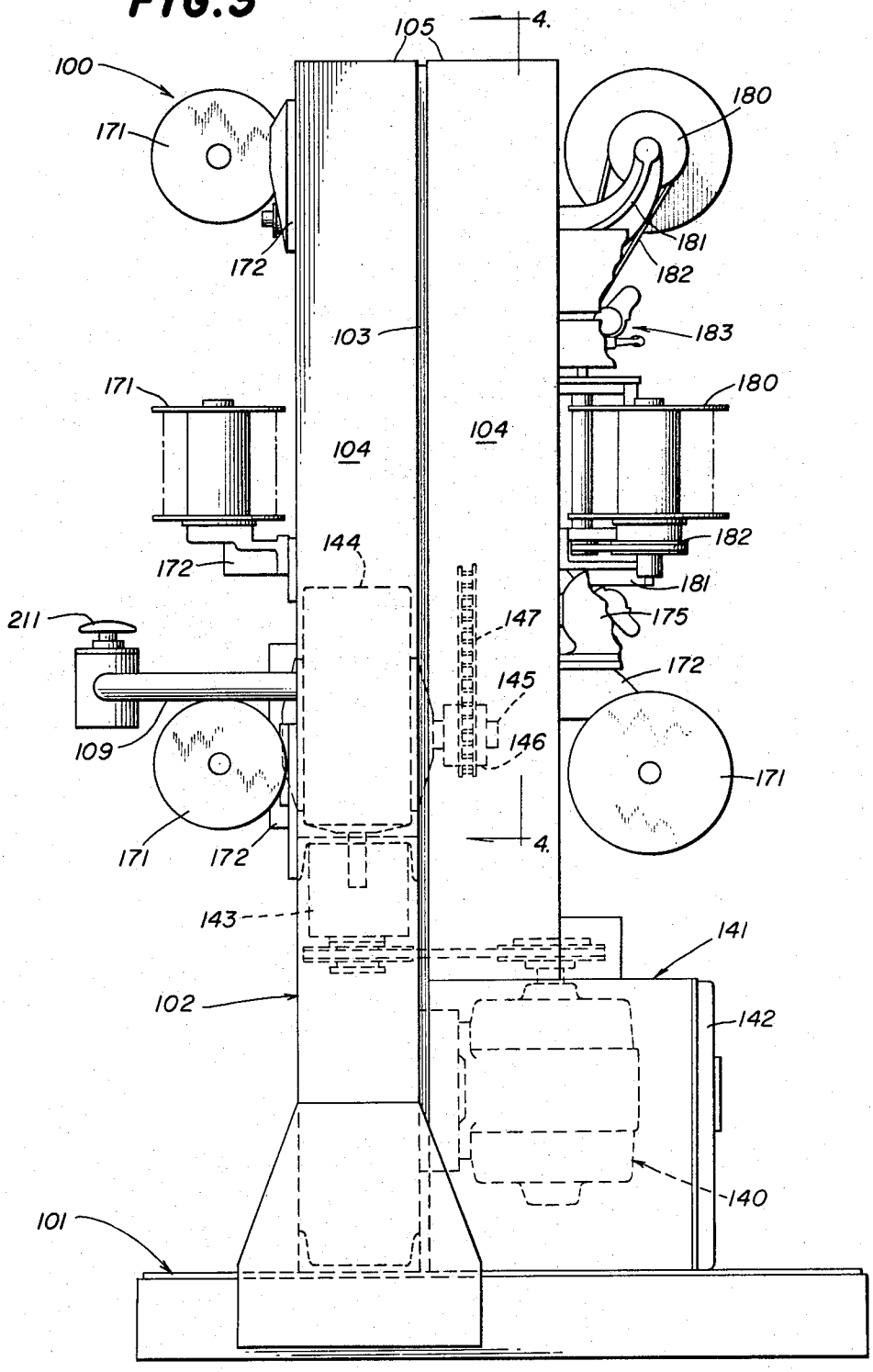
FIG. 2


100
180
182
181
175
170
173
185
130
116
190
117
115
204
202
201
197
200
107
102
141
142
101

HOT STAMPING PRESS

Filed Sept. 16, 1966 5 Sheets-Sheet 3

FIG. 3

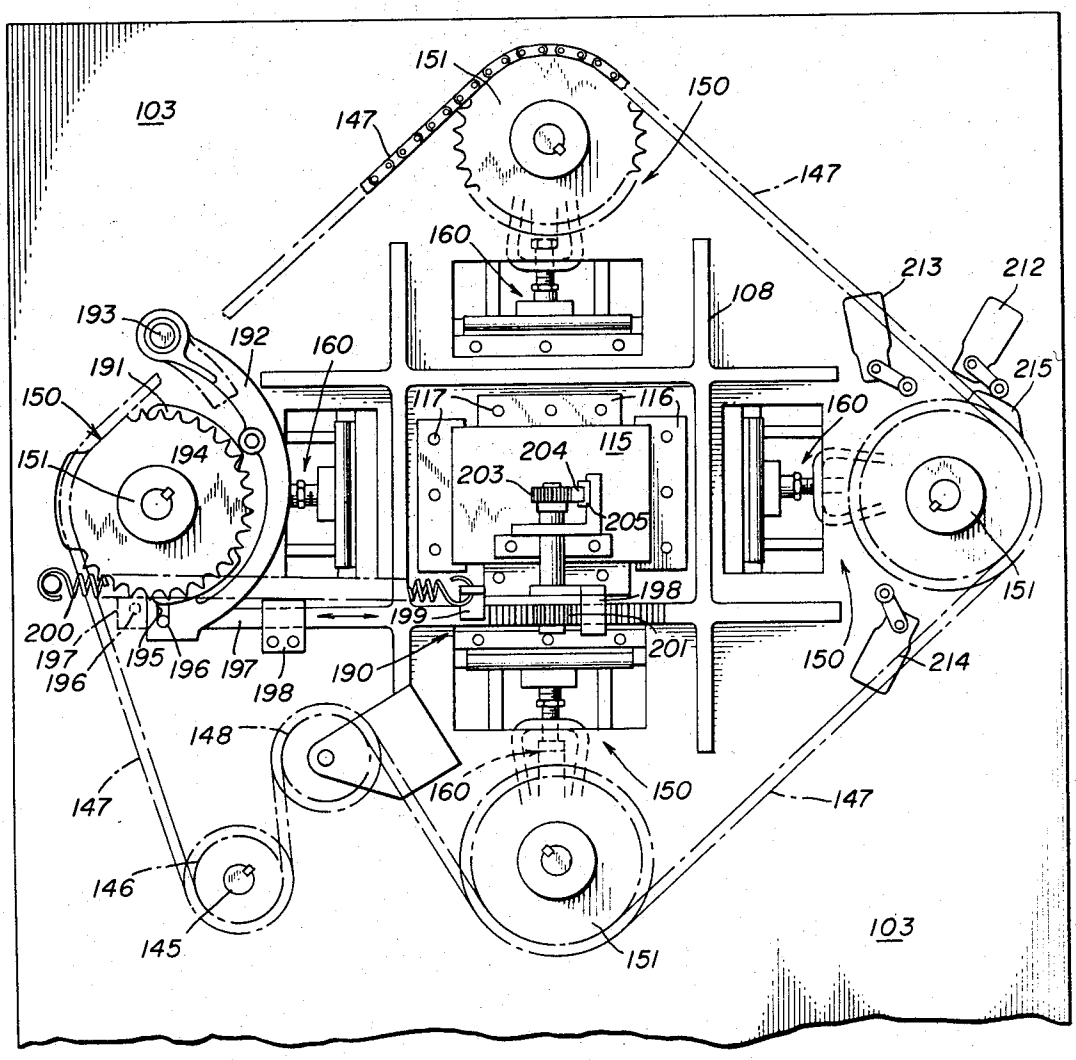


Nov. 19, 1968 J. F. READER ET AL 3,411,438

HOT STAMPING PRESS

Filed Sept. 16, 1966 5 Sheets-Sheet 4

FIG. 4



Nov. 19, 1968 J. F. READER ET AL 3,411,438

HOT STAMPING PRESS

Filed Sept. 16, 1966 5 Sheets-Sheet 5

FIG. 5

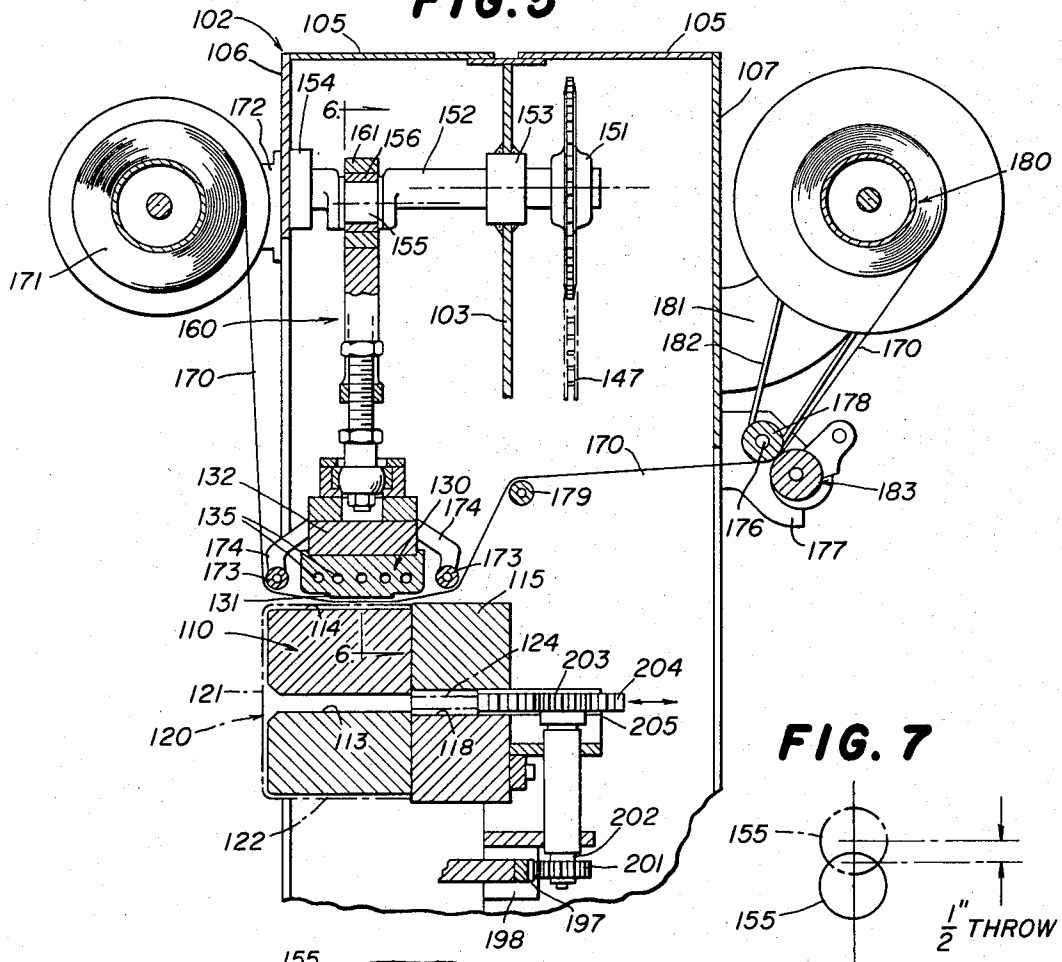


FIG. 6

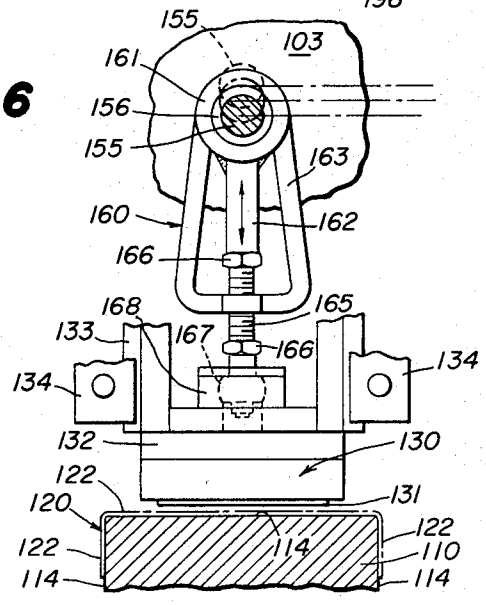
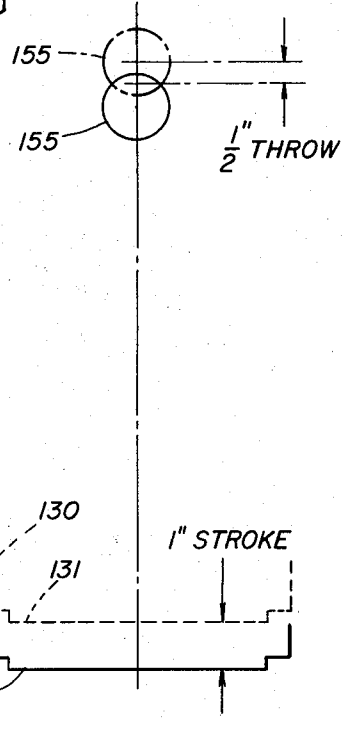


FIG. 7



United States Patent Office 3,411,438 Patented Nov. 19, 1968

3,411,438

HOT STAMPING PRESS

Julius F. Reader, Park Ridge, and Edwin W. Johnson, Mount Prospect, Ill., assignors, by mesne assignments, to United States Steel Corporation, Pittsburgh, Pa., a corporation of Delaware

Filed Sept. 16, 1966, Ser. No. 580,039
9 Claims. (Cl. 101—9)

ABSTRACT OF THE DISCLOSURE

There is disclosed a hot stamping press for applying indicia to the outer surfaces of the four walls of a substantially rectangular hollow plastic bottle carrying case; the press includes a mandrel for supporting the case and the inner surfaces of the four walls thereof, four heatable dies arranged opposite the four walls of the case and each die carrying thereon raised portions corresponding to the indicia to be applied to the adjacent wall, four feed mechanisms for feeding film carrying a pigment in front of the dies, four drive mechanisms respectively associated with the four dies for moving the dies into and out of engagement with the pigment carrying films and the four walls of the case, and a single drive chain interconnecting the four drive mechanisms for driving the dies in synchronism and to impart simple harmonic motion thereto immediately before, during and after pressing against the associated walls, opposed pairs of dies striking the adjacent walls simultaneously, one pair of opposed dies striking the associated walls shortly after the other. There also is shown mechanism for advancing the pigment carrying film in synchronism with the die drive.

The present invention relates to an improved hot stamping press, and specifically to a hot stamping press for applying indicia to the walls of a plastic bottle carrying case.

Although the hot stamping press of the present invention is of general utility, certain advantages thereof are more fully realized when it is constructed and arranged to apply indicia in the form of pigment to the four sides of a bottle carrying case of the type disclosed and claimed in U.S. Patent No. 3,178,052 granted Apr. 13, 1965, to Kenneth W. Bromley for Carrying Cases for Bottles. In the Bromley patent mentioned, there is disclosed a bottle carrying case formed of polyethylene synthetic organic resin including a bottom wall having integral therewith four upstanding side walls, divider walls being disposed integral with and interconnecting the bottom wall and the side walls to form bottle receiving pockets, and an upstanding handle disposed generally centrally of the case and integral therewith and extending upwardly above the four side walls. It is highly desirable to apply to at least the upper portions of the four side walls indicia which may include the trademark for the product to be carried therein, the manufacturer's name, trade slogans, decorations, and the like. Preferably the indicia are in the form of white pigment applied to and heat sealed onto the outer surfaces of the side walls of the case by a hot stamping press such as that of the present invention.

It is an important object of the present invention to provide a hot stamping press that will apply the desired indicia to the outer surfaces of the side walls of the case, preferably by fusing the pigment onto the surface thereof at an elevated temperature, all without unduly weakening or destroying the side walls of the case, the indicia being applied rapidly with a minimum of labor and cost.

Another object of the invention is to provide an improved hot stamping press of the type set forth comprising a mandrel for supporting the plastic bottle carrying case

and the several walls thereof on which the indicia are to be applied, a plurality of heatable dies corresponding in number to the several walls of the case to which the indicia are to be applied, each of the dies carrying thereon raised portions corresponding to the indicia to be applied to the adjacent wall, a drive motor, and drive mechanism positively interconnecting the dies and the drive motor for moving the dies in synchronism between retracted positions wherein the raised portions are spaced away from the adjacent wall and stamping positions wherein the raised portions are disposed near the adjacent wall, whereby when the dies in the heated condition thereof are moved to the stamping positions thereof the raised portions on the dies form patterns on the respectively adjacent walls corresponding to the indicia carried by the respectively associated dies.

In connection with the foregoing object, another object of the invention is to provide a hot stamping press of the type set forth wherein the mandrel is shaped complementary to the inner surfaces of the several walls of the case on which the indicia are to be applied to the outer surfaces thereof, the stamping press including an electric heating element associated with each of the dies to heat the same, all of the dies arriving in the stamping positions thereof simultaneously.

Another object of the invention is to provide an improved hot stamping press of the type set forth wherein the drive mechanism imparts harmonic motion to the dies when the dies are adjacent to the stamping positions thereof to provide zero velocity of the dies at the stamping positions thereof and maximum deceleration of the dies at the stamping positions thereof.

In connection with the foregoing object, it is another object of the invention to provide an improved hot stamping press of the type set forth wherein the drive mechanism includes guides for the dies to direct the dies along rectilinear paths disposed normal to the adjacent wall, the dies having imparted thereto simple harmonic motion, the preferred drive mechanism being a crank and an associated connecting rod interconnecting the die and the crank arm on the crank shaft.

A further object of the invention is to provide an improved hot stamping press of the type set forth including means for providing between each of the dies and the adjacent wall a film carrying pigment to be transferred therefrom to the adjacent wall, the dies in the stamping positions thereof pressing the raised portions thereon against the adjacent area of the film and to press against the adjacent wall the pigment on the film in patterns corresponding to the indicia, thereby to adhere the pigment to the adjacent wall in a pattern corresponding to the raised portions on the die thus to stamp the corresponding indicia on the wall.

In connection with the foregoing object, it is another object of the invention to provide additional drive mechanisms for advancing the films to present fresh pigment surfaces to the dies after movement of the dies out of their stamping positions.

Further features of the invention pertain to the particular arrangement of the parts of the hot stamping press whereby the above-outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which:

FIGURE 1 is a front elevational view with certain parts broken away of a hot stamping press made in accordance with and embodying the principles of the present invention;

FIG. 2 is a rear elevational view of the hot stamping press of FIG. 1;

FIG. 3 is a side elevational view of the hot stamping press of FIG. 1 as viewed from the righthand side thereof, portions of the press having been broken away for clarity;

FIG. 4 is a view in vertical section along the line 4—4 of FIG. 3 with a portion broken away and illustrating part of the drive mechanism;

FIG. 5 is an enlarged fragmentary view in vertical section along the line 5—5 of FIG. 1, certain portions of the view being diagrammatic to illustrate better the cooperation among the parts;

FIG. 6 is a fragmentary view in vertical section along the line 6—6 of FIG. 5; and

FIG. 7 is a diagrammatic view illustrating the relationship between the movement of the crank arm and the associated die.

Referring particularly to FIGS. 1 to 3 of the drawings, there is illustrated a hot stamping press **100** made in accordance with and embodying the principles of the present invention, the press **100** including a generally rectangular and horizontally disposed base **101** that carries thereon toward the forward edge thereof a vertical upstanding frame **102**. The frame **102** is also generally rectangular both in front and side elevation and includes an inner frame member **103** (see FIG. 5 also), four side members **104**, a pair of top members **105**, a front plate **106** and a back plate **107**, the back plate **107** being hingedly connected to the frame **102** to provide access to certain parts disposed therein.

Mounted on the frame **102** toward the upper end thereof and centrally thereof in a horizontal direction is a mandrel **110** that is adapted to receive and support a plastic bottle carrying case **120** during the stamping of indicia thereon. The mandrel **110** is generally rectangular as viewed along all three principal axes and is essentially a solid block of steel having a longitudinally extending slot **111** therein and a pair of transversely extending slots **112** therein, the slot **111** being enlarged centrally thereof as at **113**, the slots **111** and **112** receiving the divider walls (not shown) on the associated case **120** and the enlarged slot **113** receiving a handle **124** on the case **120** (see FIG. 5 also). Four substantially rectangular side walls **114** are provided around the periphery of the mandrel **110** to rest against the inner surfaces of the four side walls **122** on the associated case **120** (see FIGS. 5 and 6 also), each side wall **114** on the mandrel **110** supporting the associated side wall **122** of the case **120** during the stamping operation. In order to mount the mandrel **110**, a rectangular base **115** is provided carrying outwardly directed flanges **116** that are suitably secured as by screws **117** to the inner frame member **103**, thereby to support the mandrel **110** thereon, the base **115** having an elongated slot **118** centrally thereof to receive the handle **124** of an associated case. From the above it will be seen that the case **120** can be mounted on the mandrel **110** by inserting the handle **124** thereof in the slot **113** and pushing the case **120** in a horizontal direction and toward the rear of the press **100**, thereby fully and firmly to support the case **120** upon the mandrel **110** during the hot stamping of indicia upon the outer surfaces of the side walls **122** of the case **120**.

In order to effect the hot stamping operation, four heatable dies **130** are respectively positioned adjacent to the outer surfaces of the four side walls **122** of the case **120** mounted upon the mandrel **110**, i.e., adjacent to the four side walls **114** of the mandrel **110** and normally spaced outwardly with respect thereto and with respect to the side walls **122** of the case **120**. Referring particularly to FIGS. 5 and 6 of the drawings, it will be seen that each of the dies **130** is essentially rectangular in configuration and carries on the face thereof disposed toward the associated side wall **114** of the mandrel **110** raised portions **131** in the form of indicia to be stamped upon the adjacent side wall **122** of the case **120** mounted on the mandrel **110**. The die **130** is more particularly mounted on a base **132** having attached thereto slides or gibs **133** which are mounted by guides **134** to accommodate movement of the die **130** toward and away from the mandrel **110**, such movement of the die **130** being along a rectilinear path and substantially normal to the associated side wall **114** of the mandrel **110**. In order to heat the die **130** to the necessary operating temperature thereof, there are imbedded therein heating elements **135** that are electrically energized, a meter **136** being provided adjacent to the upper edge of the front plate **106** for each of the four dies **130**, see FIG. 1, the dies normally being heated in the range from about 200° F. to about 300° F.

In order to move each die **130** toward and away from the mandrel **110**, a drive motor **140** has been provided on the frame **102** (see FIGS. 1 and 3) the drive motor **140** being disposed within a housing **141** carried on the base **101** and to the rear of the frame **102**, the housing **141** being essentially rectangular in shape and provided with a pair of doors **142** permitting access to the motor **140** and the other components disposed within the housing **141**. The output of the motor **140** is connected by means of a clutch **143** to the input of a speed reducer **144**, the clutch **143** and the speed reducer **144** both being disposed in the frame **102**. The speed reducer **144** is provided with an output shaft **145** (see FIG. 4 also) that carries thereon a sprocket **146** to be driven thereby, the sprocket **146** engaging a drive chain **147** of the continuous and endless type, a sprocket **148** also being provided in engagement with the drive chain **147** to adjust the length thereof.

Interconnecting the drive chain **147** and each of the dies **130** is a drive mechanism **150**, four drive mechanisms **150** being provided so that each of the four dies **130** has its own drive mechanism **150**. The drive mechanisms **150** are of a type which convert rotary motion to rectilinear simple harmonic motion, thereby to impart to each of the dies **130** simple harmonic motion of a reciprocating character along a rectilinear path. Each of the drive mechanisms **150** includes a sprocket **151** having teeth thereon engaging the drive chain **147**, whereby all of the drive mechanisms **150** are driven in unison by the drive chain **147**. Referring to FIGS. 5 and 6, the top drive mechanism **150** for the top die **130** and will be described in detail, it being noted that the sprocket **151** is fixedly mounted on the outer end of a crank shaft **152** that is supported by a first bearing **153** on the inner frame member **103** and a bearing **154** on the front plate **106**, the crank shaft **152** being mounted for free rotation. Disposed between the bearings **153–154** is a crank arm **155** integral with the crank shaft **152** and having provided thereon a bearing sleeve **156**.

Interconnecting the crank arm **155** and the topmost die **130** is a connecting rod **160**, the connecting rod **160** carrying at the upper end thereof a hub **161** receiving the bearing sleeve **156** therein and having integral therewith both an elongated ram **162** and a yoke **163**. The outer end of the ram **162** has a threaded opening therein and the outer central portion of the yoke **163** has a threaded opening therein in alignment with the threaded opening in the ram **162**, the aligned threaded openings receiving an externally threaded arm **165** therein carrying two positioning nuts **166**. The outer end of the arm **165** carries a ball pivot **167** that is received in a cage **168** mounted on the rear of the die base **132** and fixedly connected thereto. The nuts **166** are threadedly movable along the arm **165** so as to position the ball joint **167** at any desired adjusted position away from the crank arm **155**, thereby effectively to adjust the length of the connecting rod **160**. It will be understood that the crank **155** acting through the connecting rod **160** will reciprocate the die **130** along a rectilinear path determined by the guides **134**, the distance of reciprocation of the die **130** being equal to twice the throw of the crank **155** and the inner and outer positions of the die **130** being predetermined by the adjustment of the arm **165** with respect to the crank **155** and the die **130**. The described con-

struction serves to impart simple harmonic motion to the die **130** as it is reciprocated along a rectilinear path, the rotary motion of the crank arm **155** being converted to rectilinear simple harmonic motion as is diagrammatically illustrated in FIG. 7. In such harmonic motion of the die **130**, the die **130** has essentially zero velocity at the solid line position illustrated in FIG. 7 and maximum deceleration at the solid line position illustrated in FIG. 7, the velocity and acceleration being sinusoidal when the parts move between the solid line position and the dashed line position of the die **130** in FIG. 7.

In accordance with the present invention, it further is desirable to provide a film **170** carrying a pigment on at least one surface thereof, the pigment preferably being white, the film **170** being disposed between the heated die **130** and the associated side wall **122** of the case **120** so that when the die **130** is moved into the stamping position, the pigment carried by the film **170** is disposed toward the adjacent side wall **122** and is transferred thereto and imbedded therein in accordance with the indicia provided by the raised portion **131** on the die **130**. After a hot stamping operation, a new pigment surface of the film **170** is then presented to the die **130** so as to ensure a full supply of pigment for the next hot stamping operation. Preferably four of the films **170** are provided, one for each of the dies **130**.

Referring particularly to FIGS. 1, 2 and 5, the structure for supplying and moving the films **170** will be described in detail, such structure for the film **170** associated with the topmost die **130** being described for illustrative purposes. A supply reel **171** for the film **170** is provided, the supply reel **171** being mounted by a bracket **172** on the front plate **106** above the die **130** and in substantial longitudinal alignment therewith. Carried on the die base **132** is a pair of guide rolls **173** respectively mounted by arms **174**, the guide rolls **173** being mounted on opposite sides of the die **130** to hold a section of the film **170** in overlying relationship with respect to the raised portions **131** on the die **130**, whereby to position the aforementioned section of the film **170** between the raised portions **131** of the die **130** and the adjacent side wall **122** of the case **120**. After a stamping operation, it is necessary and desirable to present a fresh section of the roll **170** to the raised portions **131** on the die **130**, and to this end a drive motor **175** has been provided for the film **170**, it being pointed out that a separate drive motor **175** is provided for each of the separate four films **170**. The output of the drive motor **175** is connected as the input to a drive box **185** and the output of the drive box **185** is connected to a shaft **176** journaled in a bracket **177** mounted on the back plate **107**. The shaft **176** carries a drive roll **178** which is driven thereby and over which is fed the film **170**, a guide roll **179** being provided between the adjacent guide roll **173** and the drive roll **178**. The tape from the drive roll **178** is wound upon a take-up reel **180** mounted by means of a bracket **181** on the back plate **107**, a belt **182** interconnecting the drive shaft **176** and the take-up reel **180** so that the take-up reel **180** is driven thereby. A squeeze roll **183** is also provided adjacent to the drive roll **178** to ensure a smooth and proper feeding of the film **170** thereby.

It will be seen that the movement of the die **130** into operative contact with the case **120**, and more specifically the movement of the raised portions **131** toward the adjacent side wall **122**, will carry the adjacent section of the tape **170** into contact with the adjacent side wall **122**, the pigmented surface of the film **170** being disposed toward the adjacent side wall **122**. The die **130** is heated as noted above and in the heated condition can soften the synthetic organic plastic resin, such as polyethylene resin, of which the case **120** is formed, and also presses the adjacent section of the film **170** against its associated side wall **122**. Only the raised portions **131** on the die **130** are brought into contact with the film **170** and the heat from the die **130** is conducted through the raised portions **131** and the film **170** to heat the material of the adjacent side wall **122**, pigment from the tape **170** also being transferred onto and into the softened or melted material of the adjacent side wall **122**. Only the area of the side wall **122** corresponding to the raised portions **131** will be heated and will have pigment from the film **170** deposited thereon and fused thereinto. It will be appreciated that the die **130** must be pressed firmly against the side wall **122** but must not be pressed too hard if the structural integrity of the wall **122** is to be preserved. Accordingly, the adjustment provided by the threaded arm **165** and the nuts **166** is made so that only a shallow indentation is made in the side wall **122** by the heated raised portions **131**.

It has been found that the simple harmonic motion imparted to the dies **130** by the drive mechanisms **150** is very beneficial in providing a proper amount and proper character of contact of the heated dies **130** through the films **170** with the associated side walls **122**. It further has been found highly advantageous to move the two dies in an opposed pair of the dies **130** into the stamping positions thereof simultaneously so that the stamping pressures are applied uniformly to the opposite sides of the mandrel **110** and the case **120** mounted thereon, one pair of opposed dies moving into the stamping position shortly after the other. The positive drive from the motor **140** through the drive chain **147**, the sprocket **148** and the drive mechanisms **150** ensures that all four of the heated dies **130** reach the inwardmost positions thereof simultaneously, the dies **130** being moved in unison and in synchronism by the described drive train. The drive mechanisms **150** impart simple harmonic motion to the dies **130** when moving between the retracted and stamping positions thereof, thus to effect the highly desirable character of contact between the dies **130** and the side walls **122** through the films **170** described above. After the dies **130** are moved from the stamping positions thereof toward the retracted positions thereof, the motors **175** are automatically energized to advance the associated films **170** a distance sufficient to present a fresh film section and an associated fresh pigment surface to the opposite raised portions **131** of the associated die **130**, the fresh film being supplied from the supply reel **171** and the used film being wound upon the take-up reel **180** via the drive reel **178** and the drive belt **182**.

After the indicia have been hot stamped upon the side walls **122** of the case **120**, it is desirable automatically to eject the case **120** from the mandrel **110** and to this end a knockout mechanism **190** has been provided. Referring to FIGS. 2, 4 and 5 of the drawings, it will be seen that the sprocket **151** disposed to the left in FIG. 4 has associated therewith a cam **191** which is driven in synchronism therewith from the drive motor **140**, the cam **191** cooperating with a crescent shaped arm **192** pivoted at one end as at **193** and carrying thereon a roller **194** in contact with the cam **191**. The other end of the arm **192** has a slot **195** therein receiving a pin **196** attached to a rack **197**, the rack **197** being supported in a pair of guides **198**. The arm **192** is held in a position toward the cam **191** to place the roller **194** continually in contact therewith, and to this end a bracket **199** is provided on the rack **197** and has connected thereto one end of a coiled spring **200**, the other end of the spring **200** being secured to the inner frame member **103**, the spring **200** serving to urge the rack **197** to the left as viewed in FIG. 4 and thus to pivot the arm **192** in a clockwise direction and thus to urge the roller **194** into contact with the cam **191**. The rack **197** carries the usual teeth on the outer end thereof that are engaged by a pinion **201** supported on the lower end of a shaft **202**, the shaft **202** being rotatably mounted with respect to the inner frame member **103**. The upper end of the shaft **202** carries a second pinion **203** which engages the teeth on a knockout rack **204**, the rack **204** being supported by guides **205** for movement in a direction normal to the inner frame mem-

ber **103**. Referring to FIG. 5 it will be seen that the inner end of the rack **204** extends into the slot **118** in the mandrel base **115** and in alignment with the handle **124** of the case **120** mounted on the mandrel **110**. Inward movement of the rack **204**, i.e., movement to the left as viewed in FIG. 5, will place the rack **204** in contact with the handle **124** and further movement of the rack **204** to the left will serve to push the case **120** from the mandrel **110**. The necessary motion of the rack **204** is derived from the cam **191** and is transmitted thereto via the roller **194**, the crescent shaped arm **192**, the pin **196**, the rack **197**, the pinion **201**, the shaft **202** and the pinion **203**. The parts in FIGS. 4 and 5 are shown with the rack **204** in the retracted position. Movement of the pin **196** to the dashed line position in FIG. 4 will cause the rack **197** to move to the left thus to rotate the pinions **201** and **203** in a counterclockwise direction as viewed from the top and will move the rack **204** inwardly or to the left as viewed in FIG. 5. From the above described connection, it will be seen that the knockout mechanism **190** will be automatically operated at a predetermined point in the cycle of operation due to the fact that the control cam **191** is driven by the main drive motor **140** through the main drive chain **147**.

Preferably the hot stamping press **100** is essentially automatic in operation and to this end a guard rail **109** is provided on the front and carries a pair of operating buttons **210** and **211**, see FIGS. 1 and 3. A plurality of control switches **212**, **213** and **214** are operated by a cam **215** driven with the sprocket **151** disposed to the right as viewed in FIG. 4, whereby the main drive chain **147** controls the operation thereof, the switches **212**, **213** and **214** being incorporated in a conventional control circuit and being operated in predetermined time sequence with respect to all other operations of the press **100** to effect the proper sequential operation of the parts of the press **100** in the order and manner described above. There further is provided on the front plate **106** a control panel **216** carrying a plurality of push button controls for energizing the various motors and heaters.

In the operation of the hot stamping press **100**, the operator first ascertains that a suitable supply of film **170** is present on each of the supply rolls **171** and that each of the films **170** passes across the raised portions **131** of the associated die **130** and over the drive roll **178** and up onto the take-up reel **180**. Suitable electrical connections are then made to the heating elements **135**, the motor **140** and the motors **175**. A case **120** is then placed upon the mandrel **110** in the position illustrated in FIGS. 1, 5 and 6. The operator presses the operating buttons **210** and **211** to cause the intiation of a cycle of operation. The motor **140** at this time is connected via the clutch **143** and the speed reducer **144** to the drive chain **147** to cause movement thereof at a predetermined rate. The drive chain **147** in turn positively drivers simultaneously and in synchronism the four drive mechanisms **150** associated respectively with the four heatable dies **130**. The drive mechanisms **150** convert the movement of the main drive chain **147** to rectilinear simple harmonic motion of the heated dies **130** toward the adjacent section of the films **170** and toward the associated side walls **122** of the case **120**. The heated raised portions **131** are brought into contact with the films **170** and press the pigment on the other side thereof into contact with the outer surface of the adjacent side walls **122**, and the portions of the side walls **122** opposite the heated raised portions **131** are softened whereby to receive indentations therein corresponding to the indicia formed by the raised portions **131** and also to receive from the films **170** pigment areas corresponding to the raised portions **131**, the pigment not only being transferred from the film **170** onto the side walls **122**, but also being fused onto the softened and melted surfaces of the side walls **122**. In accordance with the present invention, the simple harmonic motion imparted to the dies **130** provides for optimum contact with the films **170** and optimum pressure against the adjacent side walls **122** and an optimum duration of contact therewith. It also is important that all four dies **130** move to the stamping positions thereof in synchronism and that both dies in an opposing pair of the dies **130** reach the stamping position simultaneously, one pair of opposed dies moving into the stamping position shortly after the other, thereby to balance the forces applied of the mandrel **110** and the case **120** supported thereon.

As the dies **130** are moved from the stamping positions thereof toward the retracted positions thereof, the motors **175** are energized by the control circuit outlined above, thereby automatically to advance the film **170**; after a predetermined advancement of the films **170** so as to provide a fresh section opposite the raised portion **131** on the associated die **130** and thus to prevent a fresh pigment surface thereto, the motors **175** are de-energized. It will be understood that the used films **170** are wound upon the associated take-up reels **180** during the film advancement operation.

Also during the time that the dies **130** are moving from the stamping positions thereof toward the retracted positions thereof, the knockout mechanism **190** is operated from the drive chain **147** to remove the case **120** from the supporting mandrel **110**. After these operations, the control mechanism automatically decouples the drive chain **147** from the motor **140** until such time as the operating buttons **210** and **211** are again actuated. It will be understood that at this time the operator would insert a new case **120** onto the mandrel **110** for the next hot stamping operation.

From the above it will be seen that there has been provided an improved hot stamping press which fulfills all of the objects and advantages set forth above. While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A hot stamping press for applying indicia to the outer surfaces of the four walls of a substantially rectangular hollow plastic bottle carrying case; said press comprising a mandrel supporting the case and the inner surfaces of the four walls thereof, four dies arranged adjacent to the outer surfaces of the four walls of the case and each die carrying thereon raised portions corresponding to the indicia to be applied to the adjacent walls, each of said dies being mounted for movement between a retracted position wherein said raised portions are spaced away from the adjacent wall and stamping positions wherein said raised portions are pressed toward the adjacent wall, means for heating said dies, a drive motor, and drive mechanism positively interconnecting all four of said dies and said drive motor for moving said dies in synchronism between said retracted positions and said stamping positions, said drive mechanism imparting harmonic motion to said dies as said dies approach and are retracted from the stamping positions thereof to provide zero velocity of said dies at the stamping positions thereof and maximum deceleration of said dies at the stamping positions thereof, opposed pairs of said dies moving into the stamping positions thereof simultaneously so that the stamping pressures therefrom are applied uniformly to the opposite sides of said mandrel and the case mounted thereon, whereby when said dies in the heated condition thereof are moved to the stamping positions thereof indicia corresponding to the raised portions on said dies are applied to the walls.

2. The hot stamping press set forth in claim **1**, wherein said mandrel is shaped complementary to the inner surfaces of the four walls of the case on which the indicia are to be applied on the outer surfaces thereof.

3. The hot stamping press set forth in claim **1**, where-

in one pair of opposed dies moves into the stamping positions thereof shortly after the other pair of opposed dies moves into the stamping positions thereof.

4. The hot stamping press set forth in claim 1, wherein said drive mechanism directs said dies along rectilinear paths disposed substantially normal to the adjacent wall.

5. The hot stamping press set forth in claim 1, wherein said drive mechanism imparts simple harmonic motion to said dies in moving between the retracted positions and the stamping positions thereof.

6. A hot stamping press for applying indicia to the outer surfaces of the four walls of a substantially rectangular hollow plastic bottle carrying case; said press comprising a mandrel supporting the case and the inner surfaces of the four walls thereof, four dies arranged adjacent to the outer surfaces of the four walls of the case and each die carrying thereon raised portions corresponding to the indicia to be applied to the adjacent walls, each of said dies being mounted for rectilinear movement between a retracted position wherein said raised portions are spaced away from the adjacent wall and stamping positions wherein said raised portions are pressed toward the adjacent wall, means for heating said dies, a drive motor, a drive mechanism for each of said dies including a crank shaft mounted for rotation about the longitudinal axis thereof and having a crank arm, a connecting rod interconnecting the crank arm and the associated dies, a drive chain positively interconnecting said drive motor and all four of said crank shafts for driving said dies in synchronism, said drive mechanisms each imparting simple harmonic motion to the associated die as the die approaches and is retracted from the stamping position thereof to provide zero velocity of the die at the stamping position thereof and maximum deceleration of the die at the stamping position thereof, opposed pairs of said dies moving into the stamping positions thereof simultaneously so that the stamping pressures therefrom are applied uniformly to the opposite sides of said mandrel and the case mounted thereon, whereby when said dies in the heated condition thereof are moved to the stamping positions thereof indicia corresponding to the raised portions on said dies are applied to the walls.

7. The hot stamping press set forth in claim 6, wherein one pair of opposed dies moves into the stamping positions thereof shortly after the other pair of opposed dies moves into the stamping positions thereof.

8. A hot stamping press for applying indicia to the outer surfaces of the four walls of a substantially rectangular hollow plastic bottle carrying case; said press comprising a mandrel supporting the case and the inner surfaces of the four walls thereof, four dies arranged adjacent to the outer surfaces of the four walls of the case and each die carrying thereon raised portions corresponding to the indicia to be applied to the adjacent walls, each of said dies being mounted for movement between a retracted position wherein said raised portions are spaced away from the adjacent wall and stamping positions wherein said raised portions are pressed toward the adjacent wall, means for heating said dies, four feed mechanisms mounted respectively adjacent to said dies for feeding a film carrying a pigment to be transferred therefrom to the adjacent wall, a drive motor, and drive mechanism positively interconnecting all four of said dies and said drive motor for moving said dies in synchronism between said retracted positions and said stamping positions, said drive mechanism imparting harmonic motion to said dies as said dies approach and are retracted from the stamping positions thereof to provide zero velocity of said dies at the stamping positions thereof and maximum deceleration of said dies at the stamping positions thereof, said raised portions in the stamping positions of said dies pressing the associated films and the pigment thereon at the areas corresponding to said raised portions against the adjacent walls, opposed pairs of said dies moving into the stamping positions thereof simultaneously so that the stamping pressures therefrom are applied uniformly to the opposite sides of said mandrel and the case mounted thereon, whereby when said dies in the heated condition thereof are moved to the stamping positions thereof the pigment on the films in the areas corresponding to said raised portions on said dies is pressed against the respectively adjacent walls and the pigment adhered thereto in patterns respectively corresponding to said raised portions thus to apply the respectively corresponding indicia to the walls.

9. The hot stamping press set forth in claim 8, and further comprising additional drive mechanism operatively connected to said films for advancing the same to present fresh pigment surfaces to said dies after movements of said dies out of their stamping positions.

References Cited

UNITED STATES PATENTS

2,505,900	5/1950	Knitter	101—41
2,860,572	11/1958	Prohaska	101—41
3,180,253	3/1965	Hildmann	101—41
3,282,201	11/1966	Sobran	101—9
2,132,981	10/1938	Avery	101—316

ROBERT E. PULFREY, *Primary Examiner.*

H. DINITZ, *Assistant Examiner.*