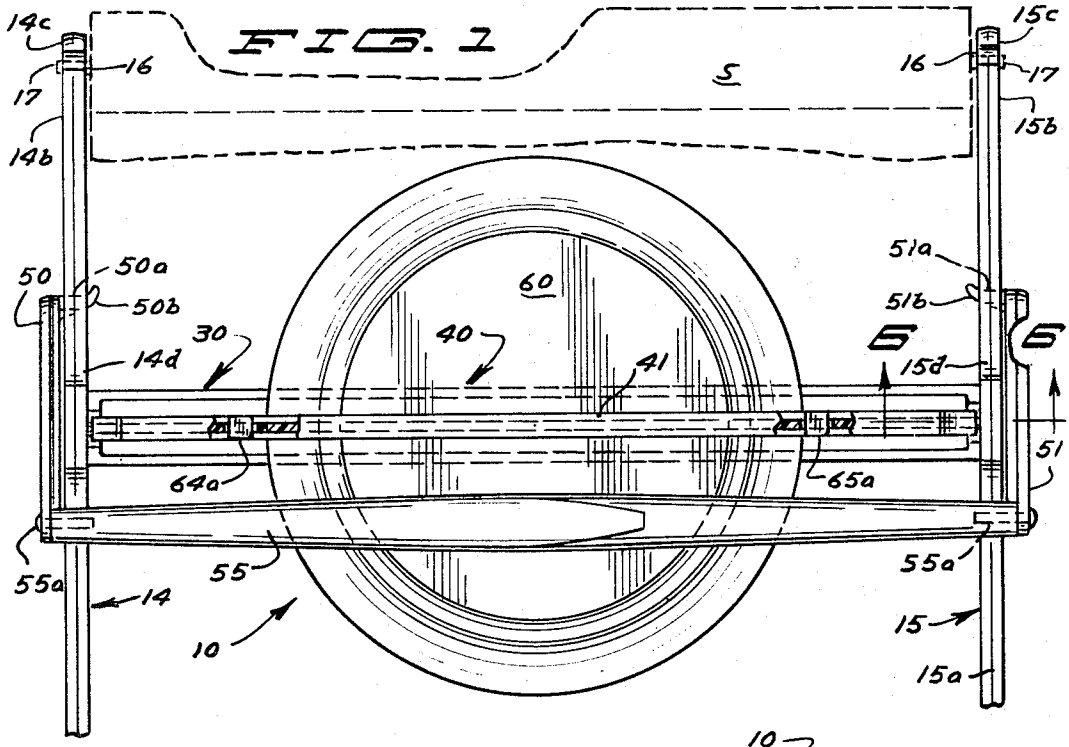
Jan. 3, 1967 J. A. GALE ETAL 3,295,168

SHEET PRESS DEVICE

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FIG. 1



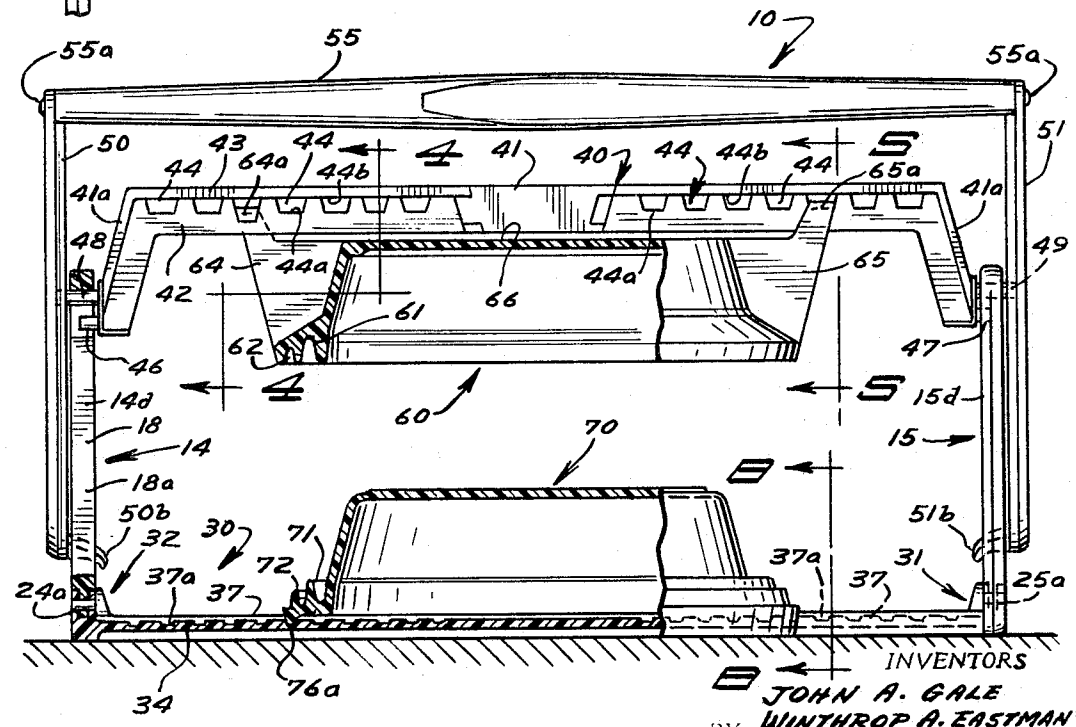


FIG. 2

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SHEET PRESS DEVICE

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FIG. 3

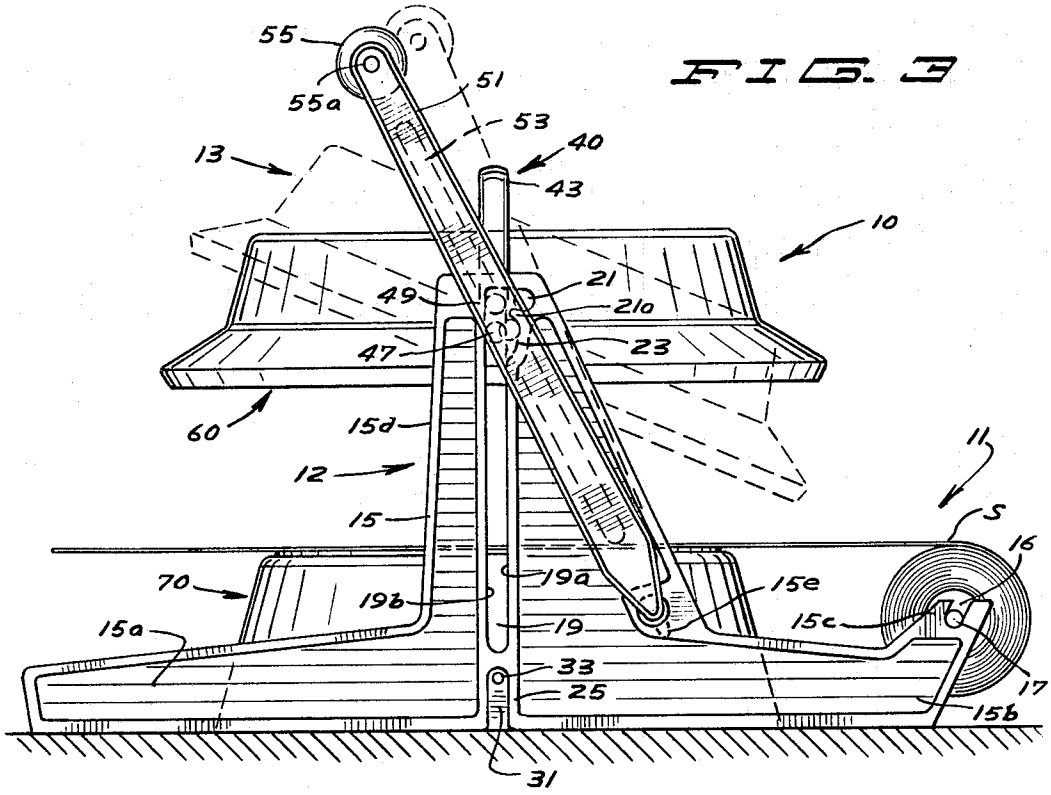


FIG. 4

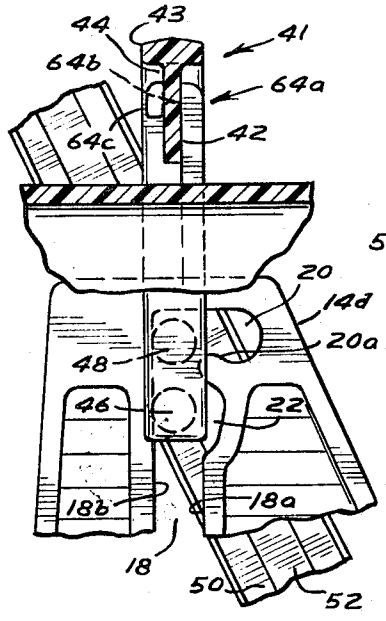
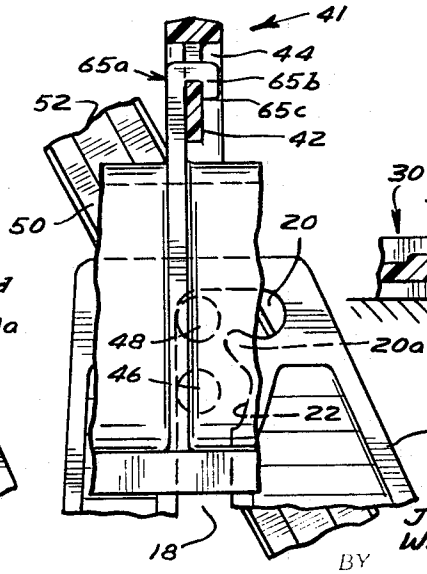


FIG. 5



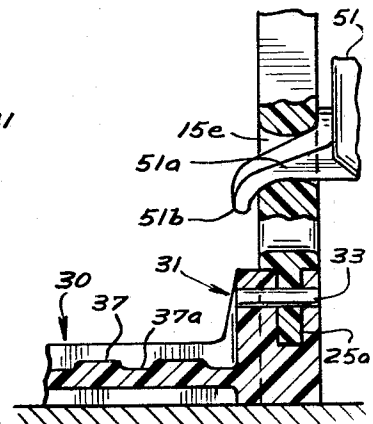


FIG. 6

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FIG. 8

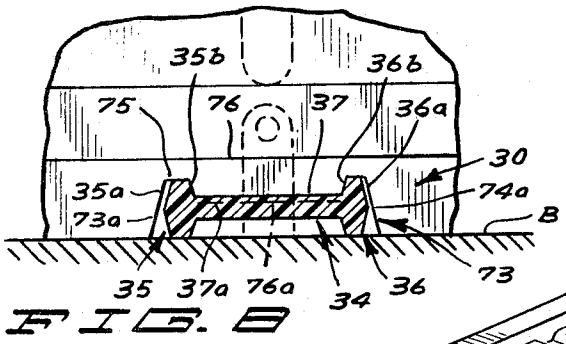


FIG. 7

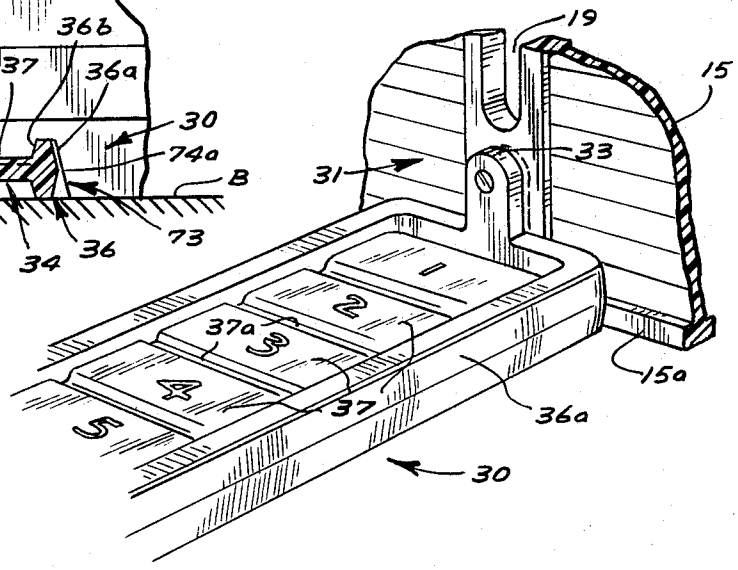


FIG. 9

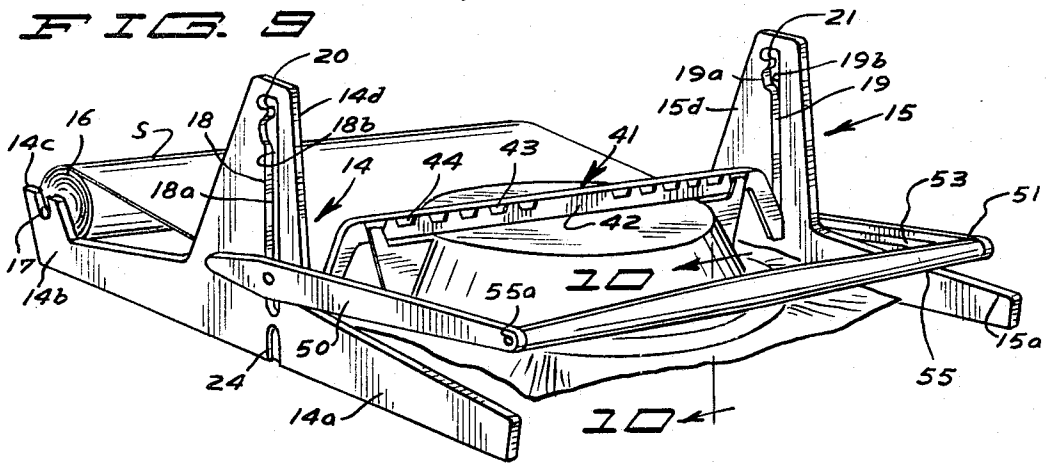


FIG. 10

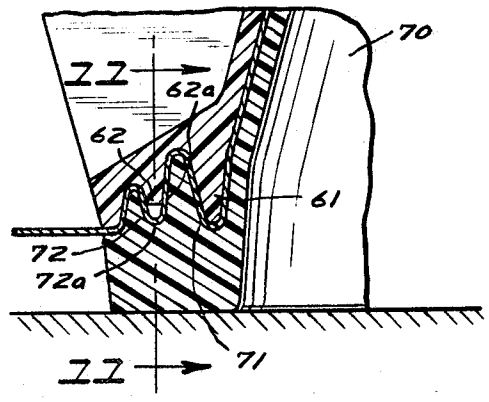
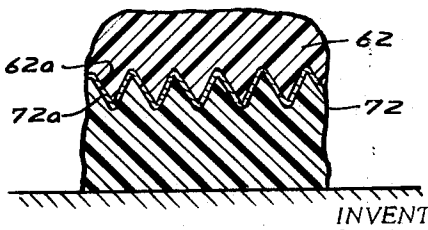


FIG. 11



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United States Patent Office

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3,295,168

SHEET PRESS DEVICE

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Filed June 16, 1965, Ser. No. 464,326

8 Claims. (Cl. 18—19)

This invention relates generally to forming equipment and more particularly to a hand operable device for forming a plurality of shaped articles from thin formable materials such as metallic foils, papers and the like.

There have been various materials available for a period of time which are manufactured in substantially thin cross sectional forms which are formable or moldable into specific shapes and which when molded or formed into these specific shapes will due to the strength of the material substantially hold their molded forms. These materials include the various metallic foils and other sheet products such as impregnated papers including wax paper and the like.

A common practice and product resulting therefrom which has come into being because of the existence of such materials is the production of disposable containers which containers are relatively inexpensive to manufacture and which due to the low cost may be supplied with a product to the ultimate consumer without requiring the return of the container. One common usage of such formed containers is the packaging of bakery goods, particularly those bakery goods which are of the heat and serve variety.

With the device provided and described herein applicant affords the means to produce from such sheet material pans and other containers of various shapes and sizes to the user of such containers who has a limited requirement for such articles. These users would naturally include housewives but would not be limited to housewives in that the small restaurant or bakery owner certainly could make use of such a product on a slightly larger scale than the housewife and this device could likewise supply his needs.

Basically the device as included herein includes a plurality of die sets with means for moving one of the dies into forming position with the other die while capturing and forming the sheet or foil material therebetween and subsequently cutting the same to produce a container of the desired configuration and size.

In order to provide what may be termed a foil forming device and to provide this device to have the capability of forming containers of various sizes and shapes it is of course necessary to provide removable die sets which due to the device's use by housewives and the like must of necessity include a substantially simple die change system. To provide this die change system applicant provides a simple die locating and holding structure which does not require the incorporation of any complicated fastening means but which rather relies upon the mating of certain portions of the die sets with certain portions of the device to provide the necessary locating and positioning structure.

Further in order to provide a unit which is substantially inexpensive to manufacture applicant has so designed this unit to include individual members which are identical in shape and which thus may be inter-changeably provided without regard to the usual left or right side fitting problem and which member may therefore be molded in a single mold.

It is therefore an object of applicant's invention to provide a simple forming device for forming and producing various shaped and sized containers from substantially thin sheet material such as aluminum foil, impregnated papers or the like.

It is a further object of applicant's invention to provide a sheet forming device including a plurality of interchangeable die sets which sets are located and positioned on the device through mating portions included on the dies and on the article itself.

It is a further object of applicant's invention to provide a press capable of forming sheet material into a plurality of shapes and sizes which press further shears or cuts the material after forming the material into a desired shape.

It is a further object of applicant's invention to provide a container press or the like wherein the individual members of the unit are identical in shape such that there may be an interchange of like units without regard to what side of the device the individual members will be used on.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

FIG. 1 is a plan view of a foil or sheet press embodying the concepts of applicants' invention;

FIG. 2 is a partial elevation taken from FIG. 1 showing selected portions thereof in vertical cross section;

FIG. 3 is a side elevation of the press illustrating the top die in two positions;

FIG. 4 is an off set vertical section taken substantially along line 4—4 of FIG. 2;

FIG. 5 is a vertical section taken substantially along line 5—5 of FIG. 2;

FIG. 6 is a vertical section taken substantially along line 6—6 of FIG. 1;

FIG. 7 is a partial perspective of the bottom die locating member;

FIG. 8 is a vertical section taken substantially along line 8—8 of FIG. 2;

FIG. 9 is a perspective view illustrating the press device in its lowermost forming position;

FIG. 10 is a vertical section taken substantially along line 10—10 of FIG. 9 showing the dies in closed, sheet forming position; and,

FIG. 11 is a vertical section taken substantially along line 11—11 of FIG. 10 illustrating the material shearing device provided within the dies.

In accordance with the accompanying drawings the foil or sheet press device embodying the concepts of this invention is generally designated 10 and for purposes of description may be substantially divided into a supply section 11, a support section 12 and a moveable die and forming section designated 13.

Support section 12 in the form shown consists of a pair of spaced apart upright supporting members 14–15 and a base member 30 joining said sides. Each supporting member 14–15 includes a longitudinal extending base portion 14*a*–15*a*, the length of which is determined to provide a substantially long base support for the unit. On the what would be termed the rearward ends 14*b*–15*b* of the longitudinal base sections 14*a*–15*a* upright opening U-shaped members 14*c*–15*c* are provided. Such U-shaped members are designed to house and rotatably receive a roll holder designated 16 which roll holder in practical application will consist of a pair of roll receiving members provided with an axle 17 on the outer side thereof such that the roll receiving portion 16 may be inserted into the usually provided core center of the roll supply.

In this manner it is possible to provide a material supply designated S for producing a number of molded articles therefrom. This entire roll supporting section and

roll is mounted on the rearward extending portion of the device **10** such that in usual operation the travel of the material will be forward from the supply to a forward forming position.

Arranged substantially intermediate the ends of the longitudinal extending base portions **14***a*–**15***a* an upright support portion **14***d*–**15***d* is provided to extend upwardly from the longitudinal base to serve as the upper die guide bar and support element. Arranged vertically within each upright support section **14***d*–**15***d* is a guide slot designated respectively **18**–**19** defined by a pair of guide sides **18***a*–**18***b*, **19***a*–**19***b*. Slots **18**–**19** extend vertically upward from the lowest possible die position to a position wherein the dies will be separated a distance sufficient to provide room through which the material may be drawn into forming position. The upper ends of each of the guide slots **18**–**19** is provided with a rearwardly extending slot portion **20**–**21** with a lip member **20***a*–**21***a* formed at the forward end thereof such that the rearward extending slot portion **20**–**21** is as illustrated in FIGS. 4 and 5 a slightly curved retaining slot portion the purpose of which will be explained hereinafter. Downwardly adjacent from the retaining slot **20**–**21** the width of the guide slots is increased as indicated by the FIGS. 22–23. This increase in width is required and comes into place in conjunction with the rearwardly extending slots **20**–**21** for positioning the movable die section in a rest position.

An additional upwardly extending partial slot designated **24**–**25** is formed respectively upwardly from the longitudinal base sections **14***a*–**15***a* in generally vertical alignment with the vertical slots **18**–**19** and such slots **24**–**25** are formed only on the exteriors of the support members **14**–**15** to provide downwardly extending center portions **24***a*–**25***a* substantially intermediate the exterior surfaces of the support members **14**–**15**.

A base member designated **30** is provided to extend between and position and connect to the side support elements **14**–**15** and likewise forms as will be explained hereinafter a lower die positioning unit. In order to provide attachment to the side members **14**–**15** the base member **30** provides an upstanding bifurcated section designated **31**–**32** on the ends thereof wherein the width between the bifurcation is substantially equal to the cross section of the downwardly extending central portions **24***a*–**25***a* within the slots **24**–**25** as seen in FIG. 6 and the width of the bifurcated sections is such as to be received into the slots **24**–**25** as seen in FIG. 3 such that both lateral and longitudinal stability are imparted through such connection. Pin members **33**–**33** are provided through aligned apertures in the downwardly extending portions **24***a*–**25***a* and the bifurcated sections **31**–**32** to substantially lock the units together.

As stated the base member **30** also serves as the lower die positioning device and therefore this base member **30** serves not only as a portion of the support apparatus but also as a portion of the forming section **13** of the unit **10**. In the form shown the base member **30** may be described as having an I-beam shaped cross section as illustrated in FIG. 8 wherein the web **34** of the beam is arranged substantially parallel to the supporting table or base B upon which the unit rests and the flange portions **35**–**36** are in substantially vertical position. The base member **30** is therefore supported by the outermost portions of the flanges **35**–**36** which outermost portions are in substantially planar relation with the longitudinally extending base sections **14***a*–**15***a* of the side supports **14**–**15**.

As further illustrated in FIG. 8 the flange sections **35**–**36** of the base **30** are substantially hexagonal in shape such that tapered converging surfaces extending outwardly from the web **34** are provided on the exterior surface **35***a*–**36***a* and the internal surface **35***b*–**36***b* thereof. The uppermost ends of the flanges **35**–**36** are as illustrated substantially parallel to the lowermost base engaging edge thereof.

Web portion **34** of base **30** includes a plurality of spaced locating and positioning blocks **37** having locating spaces **37***a* therebetween. The height of such blocks **37** as compared with the remainder of the web **34** the height of blocks **37** being less than the height of flanges **35**–**36** and the spacing between block **37** is such that a locating groove is actually formed at the locating slots **37***a*. This locating groove **37***a* then provides a die positioning groove having stops provided by flanges **35**–**36** at the ends thereof for one side of the lower die to be placed thereon.

By extending such blocks **37** and locating grooves **37***a* completely across the locating base **30** it should be obvious that a plurality of properly sized and properly designed dies may be inserted and located through the use of the two of such grooves **37***a*. As shown in FIG. 7 the blocks **37** may be provided with marking indicia such as numerals thereon and the markings would be identical respectively from the outermost blocks on the ends of base **30** to an innermost block such that sets of such numerals are provided laterally inwardly across the base **30** such that any particular die to be placed thereon would be automatically properly locating by positioning the same adjacent to identically and appropriately numbered blocks.

With respect to the forming section **30** a moveable cross member generally designated **40** is provided for vertical movement within the vertical extending slots **18**–**19** of side supports **14**–**15** and provides what may be called a mounting gantry for mounting an upper die thereon. This gantry, as shown, consists of a laterally extending horizontally oriented supporting member **41** which member as shown in the cross section of FIGS. 4 and 5 may consist of a T-beam shaped member with the leg portion **42** thereof being oriented in substantially vertical relation with the flange section **43** arranged directly thereover. Leg section **42** is provided with a plurality of spaced substantially trapezoidal apertures **44** entirely there across which apertures are positioned such that the reduced side **44***a* of the trapezoidal aperture is positioned downwardly with the longer side **44***b* positioned adjacent the flange section **43**.

To provide proper opening of the dies while maintaining the unit **10** within a limited vertical dimension the ends **41***a* of the gantry section diverge downwardly such that the horizontal section **41** is normally spaced above the ends thereof. A pair of short pin members **46**–**47** are positioned respectively on the ends **41***a* of the gantry and serve as guide pins to ride within the vertical slots **18**–**19** of the side support members **14**–**15**. Spaced upwardly from said first set of pins a second set of pins **48**–**49** are provided on the lower ends of the gantry **41***a* and these pins are of a length to extend entirely through the side support members **14**–**15** such that the same will serve not only as secondary guides within the slots **18**–**19** but such that these pins **48**–**49** may serve as connectors to lever members which drive the gantry and carried die downwardly into foil forming position.

A pair of lever members **50**–**51** are provided exteriorly of the side support members **14**–**15** and are arranged for pivotal rotation on the side supports **14**–**15** by providing receiving passages **14***e*–**15***e* through said side members formed adjacent the rear junction of the upright support portions **14***d*–**15***d* with the longitudinal extending base support portions **14***a*–**15***a* thereof. These passages **14***e*–**15***e* are substantially illustrated in FIG. 6 which shows them to consist of a concavely shaped passage.

A level retaining element is likewise illustrated in FIG. 6 and in the form shown this element consists of a laterally extending hook device **50***a*–**51***a* arranged adjacent the lower end of the levers **50**–**51** wherein the hook end **50***b*–**51***b* is displaced from the lever portion **50**–**51** a length substantially equal to the width of the side support section **14**–**15** such that the hook **51***a* will permit rotation within the aperture **14***e*–**15***e* while preventing lateral movement of the lever **50**–**51** from the aperture. The upper

ends of the lever arms 50–51 are joined through a handle member 55 which handle member may be attached to the levers 50–51 through the use of longitudinal extending cap screws, pins or the like. The handle 55 and operating levers 50–51 as thus described then provide a generally U-shaped operating handle, pivotal about the extending legs of the U.

In order to provide the downward driving force to the die holding gantry 40 a slot 52–53 is respectively formed within the interior of each of the operating levers 50–51 and this slot 52–53 effectively captures the outwardly extending end of the pins 48–49 extending outwardly from gantry 40. In this manner as the handle 55 is rotated and thus raised or lowered the gantry 40 will be guided upwardly and downwardly within the vertical guide slots 18–19.

As previously stated the uppermost portions of the guide slots 18–19 are provided with rearwardly extending positioning slots 20–21, 22–23. These positioning slots are provided to enable the user to position the gantry 40 and attached die in an upper or rest position. In the useage of these slots the lever structure is displaced slightly upwardly and rearwardly such that pin 48–49 will pass over the forwardly extending lips 20*a*–21*a* and into the opening therebehind 20–21. In this position the lower pins 46–47 will be forced slightly rearwardly into the opening 22–23 directly below the extending lips 20*a*–21*a*. This upper rest position permits the dies to be spaced apart and the upper die to be slightly canted forward as illustrated by the dotted line position of FIG. 3.

Reference has been made to the insertion and positioning of various dies upon both the gantry 40 and the base member 30. The device used for positioning each of these dies will be exactly the same for each set of dies and the only difference between the various die sets will be the shape and size of the object which is formed by the dies and the distance between the positioning devices provided thereon.

Reference has been made to a plurality of position grooves 37*a* in base 30 and positioning apertures 44 in gantry 40 and the die sets would be designed to fit into these grooves and apertures in accordance with the actual size of the dies. For purposes of illustration a substantially frusto-conical die set is illustrated consisting of an upper 60 female and lower 70 male die. A pair of what may be termed holding and cutting dies are mounted about the peripheries of the main die portion and these additional dies are designated respectively 61–71, 62–72. Substantially these peripherally arranged dies consist of a pair of internesting rings which are provided in the form of skirts and skirt receiving recesses, the purpose here being to form a material holding skirt structure through the internesting skirt arrangement 61–71 directly adjacent the main die portions with a material cutting or shearing die 62–72 outwardly adjacent the holding ring 61–71 structure. These portions are particularly illustrated in FIG. 10 wherein the cooperating skirts 61 and recesses 71 tend to initially hold the material from which the container will be formed with the cutting portions 62–72 cutting and shearing the material exteriorly of the held portion.

As illustrated in FIG. 11 internesting teeth 62*a*–72*a* are provided in the skirt 62 and skirt receiving portions 72. Substantially any other die sets will have the same holding and shearing die configuration around the peripheries thereof as illustrated herein for the frusto-conical die.

To position the lower die 70 on the unit 10 a pair of openings 73 as illustrated in FIG. 8 are provided on respectively opposite exterior sides of the die. Substantially opening 73 is trapezoidal in shape with the angularly arranged sides 73*a*–74*a* thereof tapered at the same angle as the upwardly arranged sides 35*a*–36*a* of the base 30. Arranged along the upper edge 75 of the opening 73 a trapezoid shape 76 in position to extend downwardly into opening 73 is provided. This trapezoid 76 is designed to extend into grooves 37*a* and rest against the web portion 34 of the cross base 30 such that the lower edge 76*a* thereof will be received within a locating groove 37*a* in the base 30 and will be held between two of the adjacent upwardly extending marked blocks 37. The angularly arranged sides of this trapezoid 76 will conform to the inner tapered sides 35*b*–36*b* of the flange portions of base 30 such that both lateral and transverse movement will be prevented. The remaining peripheral portion of the die 70 is designed to normally abut with the surface B upon which the unit 10 rests and thus the entire pressing load is carried about the entire periphery of the die with locating means provided only on two opposed sides thereof.

The uppermost die 60 is held in position on the gantry cross piece 41 by providing a pair of upstanding wing elements 64–65 diverging upwardly from the die 60 which are provided at their upper ends with a pair of oppositely disposed hook elements 64*a*–65*a*. The disposure of two such hook elements on a die is illustrated in FIGS. 4 and 5 wherein the hook provides a receiving groove 64*b*–65*b* with a downwardly extending capturing ear 64*c*–65*c* completing the receiving channel 64*b*–65*b*. These hook 64–65 members being oppositely disposed with the length of the hook portions 64*c*–65*c* being predetermined permits insertion of hooks respectively into a pair of apertures 44 on the gantry leg portion 42 and upon rotation thereof permits the leg section 42 to be received into the receiving channel 64*b*–65*b*.

As illustrated in FIG. 2 the upper die 60 is then free to drop into the diminished portion 44*a* of the trapezoid opening 44. By providing the wing sections 64–65 to have the same taper as the tapered sides of the trapezoid openings 44 it should be obvious that when the gantry 40 is lowered into pressing position the upper surface 66 of the die 60 will move upwardly to abut with the leg section 42 of the gantry 40 to exert pressure entirely across such surface 66 while the lateral position of the die 60 is maintained through the co-action of the guiding tapered surfaces of the openings 44 with the outer surfaces of the mounting wings 64–65.

The operation of the unit should be obvious from this description in that a roll of aluminum foil or the like is inserted in the supply section 11 and after insertion of a selected set of dies a quantity of foil is placed in forming position between the male and female forming dies. The dies are now closed through use of the handle 55 forming the material therebetween. At the lower portion of the stroke the cutting teeth will effectively shear the formed product from the sheet and upon opening of the dies the formed container may be removed. The container depending upon its specific shape will gain a certain degree of rigidity due to the bunching of the material as it is formed.

As stated the unit is designed to have interchangeable elements. The side supports 14, 15 and the levers 50, 51 are obviously from this description identical. The handle 55, gantry 40 and base 30 must be divided at their midpoints to provide identical sections which sections must then be joined. This joining could be accomplished through many available devices and one such device would be to provide female openings in the innermost ends of each half element and provide male insertion elements to be received commonly into both of the openings.

As this product has been designed for possible household use, it should be pointed out that there are certain mechanical advantages obtained in the specific lever actuating system. At the upper or rest portion of the upper die, the force point is close to the handle member as the upper die is forced downwardly. This lever relationship changes such that the effective force applied is greater in that the distance between the pivot point and the slid-

ing connector affording connection to the upper die decreases. Thus this is in effect provides an increasing moment arm for the force being applied while providing a reducing moment arm for the resisting force. The effect then to the housewife is that force she is able to apply actually increases as the upper and lower dies are brought into registration.

It should be obvious that applicant has provided a new and unique press device for forming containers and the like from thin formable sheet material.

It will, of course, be understood that various changes may be made in the form, details, arrangements and proportion of parts without departing from the scope of the invention, which generally stated consists in the matter set forth in the appended claims.

What we claim is:

1. A press for forming articles from substantially thin sheet material including:

(a) a pair of spaced side supporting elements having a predetermined longitudinal dimension and having a vertical extending slot intermediate the ends thereof;

(b) a base member arranged to be positioned between said side elements for removable connection and support thereof and having a width substantially less than the length of said side members being arranged in substantially vertical alignment with the slots of said side elements and having bottom die positioning means on at least one surface thereof;

(c) an upper die supporting member arranged to extend transversely between said side support elements and having slot engaging extensions on the ends thereof to be received in the guide slots of said side elements and having upper die positioning means arranged transversely thereacross; and

(d) an actuating lever member comprising:

(1) a pair of lever arms having one end thereof respectively pivotally mounted on said side elements and arranged to engage said upper die positioning member whereby said die positioning member will be shifted vertically along said guide slots; and

(2) handle means engaging the other end of said lever arms.

2. The structure set forth in claim 1 and stop means provided on the uppermost portion of the slots of said side supports and said upper die supporting element being shiftable from engagement with the slots of said side supports whereby the guide engaging portions thereof may be supported by said stop means and the upper die supporting member may be maintained in an uppermost storage position.

3. The structure set forth in claim 1 and roll supply means arranged on one end of said side support members opposite said handle means for rotatably mounting a role of sheet material.

4. The structure set forth in claim 1 wherein said base member includes a plurality of raised block members providing positioning grooves therebetween extending across said base and the lower die is provided with groove engaging portions on at least two selected areas around the periphery thereof, the dimension between said groove engaging areas corresponding to a dimension between the grooves on said base member.

5. The structure set forth in claim 4 wherein the grooves of said base member are provided with stops on the ends of the grooves and said die positioning areas on said die are of a dimension to be received between said stops to prevent shifting of said die on said base.

6. The structure set forth in claim 4 wherein the sides of the uppermost portions of said flanges are in converging relationship and the lower die receivable thereon is provided with downwardly diverging flange receiving openings thereon.

7. The structure set forth in claim 1 wherein said upper die positioning member includes a plurality of hook receiving apertures therethrough and at least a pair of spaced apart hook members are provided on said upper die, said hooks being in opposed relation to permit the hook portion to be received through said apertures from opposite sides of the die supporting member and upon rotation thereof said hooks will engage selected portions of said member.

8. The structure set forth in claim 1 wherein said base member includes:

(a) a pair of upstanding spaced apart flange elements,

(b) a plurality of block elements arranged between said flange elements and spaced along the entire length thereof to provide a series of grooves between said side supporting elements; and,

(c) said blocks being of less vertical height than said flanges whereby the upstanding flanges provide stops on the ends of said grooves.

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