L. M. DIETERICH.
ART AND APPARATUS FOR FORCING MATERIAL INTO A PREDETERMINED FORM.
FILED MAY 20, 1919.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

INVENTOR
LUDWIG M. DIETERICH

BY

ATTORNEY
To all whom it may concern:

Be it known that I, LUDWIG M. DIETERICH, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented an Improvement in the Art and Apparatus for Forcing Material into a Predetermined Form, of which the following is a specification.

This invention relates to stamping apparatus and the like. One of the objects thereof is to provide mechanism of practical construction and efficient action which shall stamp articles into a predetermined form.

Another object is to provide mechanism of the above general nature which is readily adjustable to vary the size or form of the articles produced thereby. Other objects are to provide mechanism of the above general nature which shall be rigid and durable in action, readily assembled and disassembled, and both the first cost and cost of maintenance of which shall be reasonable. Another object is to provide a practical and efficient art for forcing material into a desired shape. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangement of parts and in the steps of the art which will be exemplified in the following description, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which is shown one of various possible embodiments of the mechanical features of this invention,

Figure 1 is a central sectional elevation;

Figure 2 is a diagrammatic plan view of the bottom portion of the parts shown in Figure 1;

Figure 3 is a vertical sectional detail upon an enlarged scale; and

Figure 4 is a detailed plan of a portion of a member stamped out by the apparatus shown in Figure 1.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to these drawings more in detail, the mechanism shown in Figure 1 comprises broadly an upper device 10 and a lower device 11, these devices being respectively mounted by any suitable means in a stamp or press to cause relative vertical movement thereof. The details of the machine by which they are actuated, which is diagrammatically indicated at 12, form no part of the present invention.

Referring now to the upper device 10, there is an outer jaw or receiving member 13 within the flange of which the stamping parts are fitted. The latter parts comprise in the illustrative embodiment here shown, a plurality of short cylindrical members 14 closely fitted one within the other to be capable of telescopic adjustment. These members which are preferably formed of tool steel may be individually lowered into active position or raised into inactive position in accordance with the size and form of the article which it is desired to produce. In the adjustment illustrated, the four members 15 are lowered into active position whereas the remaining outer members 16 and inner members 17 are in raised or inoperative adjustment.

The lowered members 15 rest at their upper ends against annular rings 18, each of the same thickness as the member which it contacts, and these rings thus form a firm abutment by which the upward thrust on the cutting members may be taken up. Obviously these rings are supplied in accordance with which members it is desired to lower when the mechanism is set up for the particular work on hand.

In order to bind the parts securely together after they are adjusted as above and to allow of the machine to draw them upwardly, there are provided in each of these sleeve members 14 a pair of diametrically opposite openings 19 at a predetermined level, and another pair of diametrically opposite openings 20 at a lower level. All of these holes are of the same size and a single retaining pin 21 may be driven through them when they are properly aligned to hold the parts together as assembled. When it is desired that the tool-sleeves be lowered as at 15, the upper openings 19 are selected for the pin, whereas in the case of the raised or inoperative sections, the lower openings are twisted into alignment for the pin to pass therethrough. Obviously the parts may be disassembled and redadjusted by driving out the pin 21 and removing if necessary certain rings 18 and replacing them by rings of other sizes.
The lower or active surfaces of these various tool sections may be if desired formed smooth, but in the present case in which a corrugated article is wanted, they are given the curved shape substantially as indicated in the drawings. For other work the faces may be otherwise shaped.

Referring to the lower member 12 of the apparatus, this is likewise held within a cup or jaw 22 similar to upper member 12, and is provided with a large number of telescopically arranged cutting sleeves 23. These sleeves are advanced by the rings 24 in an upward direction, such advance being of the inoperative members opposite the members 16 and 17 above described. As it is not desired to bring these members into contact with those which they face, the rings 24 are of less depth than the rings 18. These tool sections are provided with openings 25 and 26 similar in function to the openings 20 and 19 in the parts hereinafter described. The pin 27 moreover serves to hold the parts in assembled position by an action which will now be understood.

In this embodiment of the invention the upper or active ends of the sections of the lower member are given a form which is the reverse of that of the active ends of the upper member.

As it is desired in this embodiment of the invention to cut partially free and bend over certain spurs or projecting parts as indicated at 28 in Figure 4 of the drawings, there are inserted in the lower ends of the upper sleeve members at the desired points, cutting pins 29 which project as at 30. The lower members are drilled to correspond with the pin 29, and have a pin 31 inserted therein which does not extend upwardly to the active surface of the sleeve and thus leaves a recess 32. As the projecting shoulder 30, which is of semi-circular form, strikes the metal, it cuts a small portion free along one edge and forces it downwardly into the recess 32, thus providing the outwardly bent spur parts 28.

In the action of the apparatus set up as above described the sheet metal is fed in as at 33 and the upper and lower members forced toward one another. The downwardly advanced members of the upper part cut free an annular disk as they pass the upper edges of the upwardly advanced members of the lower part. This disk is then forced down against the lowered or retracted members of the lower part and is stamped into corrugated form. Also, the various parts 33 are by the same action forced outwardly from the surface of the disk.

This being accomplished, the members are drawn apart and the sheet metal may be shifted to bring a fresh section in position for stamping, and this may be continued for any desired length of time.

Obviously the size and shape of the article stamped out may be readily changed and by substituting sleeves having different active surfaces, the shape of the stamping may be varied. It is also to be noted that certain of the broader features of this invention are not limited to a tubular construction of the cutting parts although there are peculiar advantages inherent to this form.

It will thus be seen that there is provided an apparatus in which the several objects of this invention are achieved and which is well adapted to meet the hardest requirements of practical use.

As various possible embodiments might be made of the above invention and as various changes might be made in the art above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In apparatus of the general nature of that herein described, in combination, a stamping member comprising a plurality of relatively movable sections each of which is adapted to be moved into operative or into inoperative position at will, means adapted to hold said members in the position into which they are moved, and cutting mechanism inserted in those members which are relatively in operative position, said cutting mechanism adapted to operate to cut and bend over a portion of the metal.

2. In apparatus of the general nature of that herein described, in combination, a plurality of relatively movable members each of which has a substantially convex active portion for operation on the material and adapted to be moved to form an active part or an inactive part of a tool, means adapted to operate said tool, means adapted to hold said members in the relative position into which they are moved, and coating parts adapted to be adjusted into mating relation with any desired arrangement of said members, each of said coating parts having a substantially concave active portion for coacting with said convex portion of said members in operation upon the material.

3. In apparatus of the general nature of that herein described, in combination, a plurality of relatively movable members, each of which is provided with an end surface of predetermined shape for individual operation upon the material and each of which is movable into an advanced or retracted position, means adapted to hold said members in the position into which they are moved, means adapted to operate said advanced and retracted members as a whole, and coating parts, each having an end surface of predetermined shape for coacting with said end surfaces on said members in operating on the material, adapted to be adjusted into...
mating relation with any desired arrangement of said members, each of said members being substantially aligned with its respective mating part, whereby one of said members may coact with one of said mating parts mating with a retracted member to cut the material operated upon by said said end surfaces of predetermined shape.

4. In apparatus of the general nature of that herein described, in combination, a pair of relatively movable members each of which comprises a plurality of sections relatively movable in the direction of said first relative movement, means adapted to hold certain of said sections upon one of said members in advanced active position, means adapted to hold the opposite sections upon the other of said members in retracted opposite position, said active sections being formed to cut the material opposite them from the material opposite the inactive sections.

5. In apparatus of the general nature of that herein described, in combination, a pair of relatively movable members each of which comprises a plurality of sections relatively movable in the direction of said first relative movement, means adapted to hold certain of said sections upon one of said members in advanced active position, and means adapted to hold the opposite sections upon the other of said members in retracted opposite position, the retraction of said last sections being less than the advance of said advanced sections whereby the said advanced sections will be brought into operative relation to the retracted sections, and the relative movement of said members stopped before the unmoved sections are brought into operative relation with those opposite thereto.

6. In apparatus of the general nature of that herein described, in combination, a supporting member, a plurality of concentric tool sections adapted to be mounted on said supporting member, means adapted to permit movement of each of said sections at will relative to and independently of the others of said sections thereby to permit any desired number of said sections to be moved into operative or inoperative position, means adapted to hold said sections in their adjusted position, and means adapted to be interposed between a section upon movement thereof and said supporting member and arranged to distribute substantially uniformly the stresses from said moved sections to said supporting member.

7. In apparatus of the general nature of that herein described, in combination, a plurality of inter-fitting sleeves, the end of each of which is adapted to engage the material, means adapted to relatively adjust said sleeves in a lengthwise direction, and adapted thereby to permit the positioning of the ends of as many of said plurality of sleeves as desired to engage the material, means adapted to hold said sleeves as a whole in their relatively adjusted position, and means adapted to move said sleeves as a whole.

8. In apparatus of the general nature of that herein described, in combination, a plurality of concentrically arranged tool sections adapted to be advanced or retracted into operative or inoperative position, and separate rings adapted to be removable inserted beneath the advanced sections and take up thrust exerted thereon.

9. In apparatus of the general nature of that herein described, in combination, a plurality of telescopically disposed sleeve-like sections each of which is adapted at its end to act upon the material, a plurality of rings adapted to be removably inserted beneath certain of said sections and hold them in advanced position, and means adapted to support and move said sections as a whole.

10. In apparatus of the general nature of that herein described, in combination, a pair of co-operating members each of which comprises a plurality of sleeve-like sections relatively moveable in a lengthwise direction, means holding an inner and an outer section on one of said members in advanced position with an intermediate section in retracted position, means holding an inner and outer section upon the other of said members in retracted position and an intermediate section in advanced position, and means adapted to move said members as a whole toward and away one from the other.

11. In apparatus of the general nature of that herein described, in combination, a plurality of telescopically arranged sleeve-like tool sections each of which is provided with a pair of openings unequally spaced from its end, said sections being movable to bring either opening in either section opposite either opening in the other section, and means adapted to pass through said openings in registry to lock said sections in the desired relative position.

12. In apparatus of the general nature of that herein described, in combination, a plurality of operating members, means adapted to move said members toward and away one from the other, a plurality of tubular tool sections mounted upon each of said members, the sections upon each member being telescopically arranged and endwise adjustable, a plurality of rings adapted to be inserted beneath said tool sections at will and hold them in advanced position, and means passing through said tool sections upon each of said members adapted to lock them one to another in either advanced or retracted position, the facing ends of said tool sections being adapted to engage the material.

13. The herein described art of forcing material into a predetermined form which consists in relatively moving members longitudinally to bring one or more as desired.
into an advanced position and one or more others in a retracted position to vary the effective operative area thereof, locking them in the relative positions into which they are moved, forcing them longitudinally against the material, and substantially simultaneously cutting partially free along one edge a portion of said material and bending back the portion of said material thus partially severed.

14. The herein-described art of forcing material into a predetermined form, which comprises relatively moving members to bring one into an advanced and another into a retracted position, locking said members in such relative position, relatively moving co-operating members of another set to bring one into a retracted position and another into an advanced position, locking said members in such relative positions, placing material between said sets of members, forcing one of said sets of members toward the other with the advanced member of one set opposite the retracted member of the other set, and thereby cutting free the material between said last members.

15. The herein-described art of forcing material into a predetermined form, which comprises relatively moving members longitudinally to bring one into an advanced and another into a retracted position, positively locking said members in such relative position, relatively moving longitudinally co-operating members of another set to bring one into a retracted position and another into an advanced position, locking said members in such relative positions, placing material between said sets of members, and forcing one of said sets of members toward the other, with the advanced member of one set opposite the retracted member of the other set.

16. The herein-described art of forcing material into a predetermined form, which comprises relatively moving members longitudinally to bring one into an advanced and another into a retracted position, locking said members in such relative positions, placing material between said sets of members, and forcing one of said sets of members toward the other, with the advanced member of one set opposite the retracted member of the other set.

In testimony whereof, I have signed my name to this specification this 19th day of May, 1919.

LUDWIG M. DIETERICH.