April 1, 1952 O. R. VIGNEAULT ET AL 2,591,108

DIE APPARATUS

Filed Jan. 24, 1949

Fig. 1.

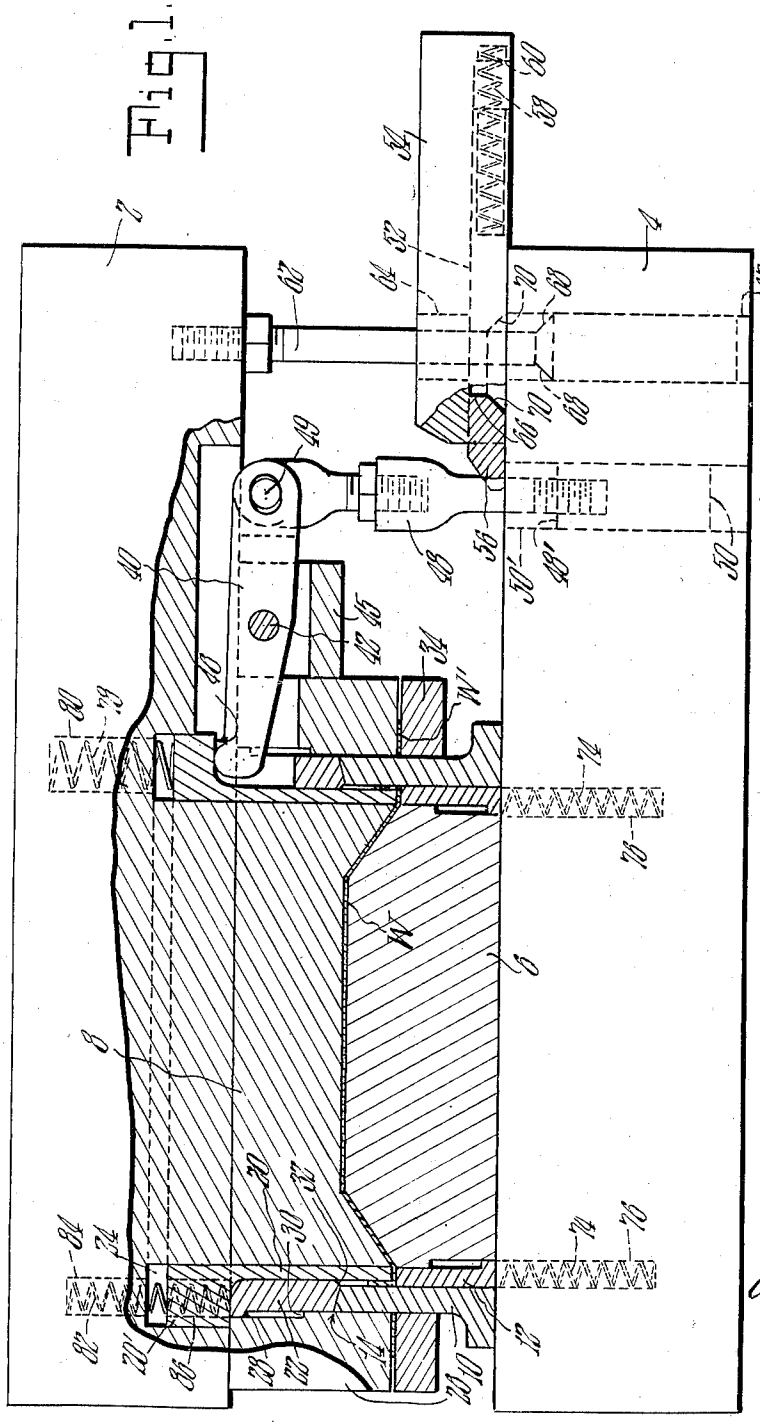


Fig. 4.

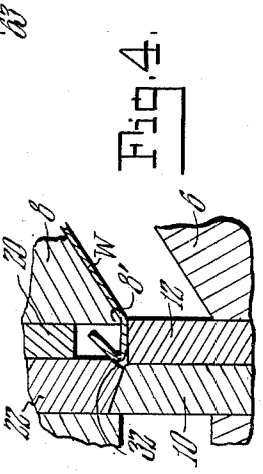


Fig. 3.

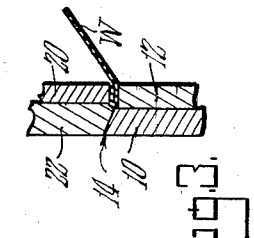
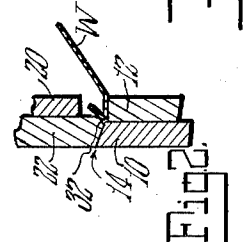


Fig. 2.



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Patented Apr. 1, 1952

2,591,108

UNITED STATES PATENT OFFICE

2,591,108

DIE APPARATUS

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Application January 24, 1949, Serial No. 72,347

2 Claims. (Cl. 113—42)

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This invention relates to improvements in die apparatus.

The principal objects of the invention are directed to the provision of die apparatus for the relatively movable members of a press or the like which is constructed and arranged to operate during a cycle of operation to blank, draw and form a piece of work from sheet stock.

With the foregoing and various other novel features and advantages and other objects of my invention as will become more apparent as the description proceeds, the invention consists in certain novel features of construction and in the combination and arrangement of parts as will be hereinafter more particularly pointed out in the claims hereunto annexed and more fully described and referred to in connection with the accompanying drawings wherein:

Fig. 1 is a combined side elevational and sectional view of die apparatus embodying the novel features of the invention;

Figs. 2 and 3 are fragmentary sectional views to explain certain features of the die apparatus; and

Fig. 4 is a similar view at a larger scale.

Referring now to the drawings more in detail, the invention will be fully described.

Upper and lower members 2 and 4 may be secured to the relatively movable members of a press in such a manner as a die-set is usually secured thereto.

The novel features of the invention are adapted for broad application but for purposes of description the die apparatus will be described in connection with a dished member, such as a plate having a turned or rolled over marginal edge.

A lower support or base 6 is secured in any suitable manner to the lower member 4 and its upper side is shaped as shown for forming a depression in the stock being operated upon.

An upper die member 8 is likewise secured to the upper member 2 and has an inner face complemental to the adjacent face of the base. In Fig. 1 of the drawings, the upper member 2 is shown in its lower position.

A blanking member 10 and sliding member 12 are ring-like in shape. The latter is slidable up and down relative to members 6 and 10. The member 10 is fixed to the member 4 and these members 10 and 12 are concentrically disposed around the member 6.

The blanking member 10 has an upper peripheral piercing or cutting edge 14 and an upper face which inclines inwardly and downwardly therefrom, as shown.

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Inner and outer crimping and deflecting members 20 and 22 are relatively slidable up and down. They are slidable relative to the member 8 and are arranged in concentric relation.

The member 20 has an enlarged upper end 20' which is slidable up and down in a groove 24 of the member 2. A ring 26 surrounds the members 20 and 22 and is secured in some suitable manner to the upper member 2.

A stop 28 on the member 22 is arranged to abut a shoulder 30 of ring member 26 to limit downward movement of said member relative to ring 26. The lower edge of the member 22 is formed so as to be complemental to the upper face of the member 10, as shown.

The transverse thickness of the member 22 is greater than that of member 10 so as to provide a curling shoulder 32 at its lower end and a space between members 10 and 20, as shown.

A stripper 34 in the form of an annulus is movable up and down on the member 10.

At one side of the member 8 a lever 40 is pivoted at 42 between ears 44 of a member 45 secured to member 2. An inner end of said lever is engageable with a shoulder 46 provided in a side of said member 20.

An outer end of said lever 40 has a clevis pivoted thereto at 49, as shown, and the lower end of said clevis threadedly engages an actuating plunger member 48. A lower end 50 of the member 48 is enlarged, as shown, and is reciprocable in a socket 50' of member 4. A shoulder is provided at 48'.

A latch slide 52 is slidable in a guide 54 fixed to member 4 and has a forward nose 56 which engages and may conform to member 48. The slide is adapted to overlie the shoulder 48' at the upper end of the socket 50'.

A spring 58 interposed between the rear end of the slide 52 and an end portion 60 of guide 54 urges the latch inwardly towards member 48.

A cam rod 62 has an upper threaded end in engagement with the member 2 and extends through an enlarged opening 64 in the guide 54 and a cam opening 66 in the slide 52.

The lower end of rod 62 is enlarged and is reciprocable in a bore 63 of the member 4.

Below the latch 52 the rod 62 is provided with cam surfaces 68 which are engageable with cam faces 70 of the latch.

When the upper member 2 is in lower position the latch 52 is held in outer position against member 48 by spring 58, as shown.

One or more springs 74 urge the member 12 up-

wardly and these may be disposed in sockets 76 of the member 4.

With reference to Fig. 4 it will be seen that the member 12 is of greater transverse thickness than member 20 thereabove so that it will not move upwardly beyond the position shown in said figure when the upper member is in its upper position.

Any desired number of springs 78 may be disposed in sockets 80 provided in member 2 for urging the member 20 downwardly.

Other springs 82 in sockets 84 of the member 2 extend through openings 86 in the upper end 20' of member 20 and engage member 22 to urge it downwardly.

There may be any number of springs for acting on the slidable members or in lieu thereof these members may be actuated by hydraulic or other means.

The operation of the apparatus will now be described.

With the upper member 2 in upper position to provide space between the members 6 and 8, a sheet of metal or a strip thereof is fed therebetween.

As the upper member 2 is moved downwardly the member 26 in conjunction with the piercing edge 14 pierces the sheet thus blanking the work, indicated by W.

Subsequent thereto the peripheral portion of the work is drawn over the upper end of member 10 and the lower end of member 22 bears thereon so that the marginal edge of the work is turned upwardly between members 20 and 22 while the coaction of members 6 and 8 draws and forms the work.

The marginal edge of the stock indicated by W' surrounds member 10 above stripper 34.

With the work blanked, drawn and substantially formed, the member 2 moves upwardly. In the initial upward movement thereof the member 48 is moved upwardly so that the upper side of the enlarged part or shoulder 48' thereof brings up against the end of or nose of member 52 whereupon lever 40 is swung so that its outer end acts on and lifts member 20 upwardly to locate its lower end upwardly from the upper end of member 12 as in Figs. 2 and 4.

The member 12 follows the upward movement of member 20 until its upper end brings up against the work which is against shoulder 8' of member 8, see Fig. 4, and during upward movement of member 12 the upstanding rim portion of the work is brought against curling shoulder 32 so that the rim is turned inwardly as shown in said Figs. 2 and 4.

As the member 2 approaches the upward limit of its movement cam face 68 at the right of member 62 engages cam face 70 of member 52 thereabove to move member 52 to the right releasing member 48.

With lever 40 thus released the member 20 is quickly moved downwardly by the actuating means therefor so that its lower peripheral edge strikes the curled edge of the work and flattens it as in Fig. 3.

Thus by a single cycle of operation of the die apparatus, a piece of work is blanked out, drawn and formed thereby to attain speed of operation and efficiency.

The stripper 34 may be operated by a spring and in lieu of the springs shown the cam lever mechanism and the relatively movable components may be operated by hydraulic or other suitable means, all as may be desired.

The invention may be embodied in other specific forms without departing from the essential characteristics thereof. Hence, the present embodiments are therefore to be considered in all respects merely as being illustrative and not as being restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all modifications and variations as fall within the meaning and purview and range of equivalency of the appended claims are therefore intended to be embraced therein.

What it is desired to claim and secure by Letters Patent of the United States is:

1. Die apparatus for forming a dished member having an outwardly extending flange provided with a turned over peripheral edge from sheet material comprising in combination, lower and upper supports adapted for movements towards and away from one another, a cylindrical base secured to said lower support having an upper convex forming face, an upper die secured to said upper support, an annular lower blanking member around and spaced from said base and secured to said lower support having an upper outer peripheral piercing edge, an annular lower slidable member between said base and blanking member slidable up and down relative thereto, an upper outer deflecting member above said lower blanking member and around and spaced from said upper die, an inner deflecting member above said slidable member and between said upper outer deflecting member and upper die, said upper deflecting members being relatively reciprocable and reciprocable relative to said base and die and slidable member, an upper annular ring around said upper outer deflecting member secured to said upper support, spring means urging said slidable member upwardly relative to said base, spring means urging said outer deflecting member downwardly relative to said die, adjacent annular faces of said ring member and blanking member arranged to pierce a blanked member between said base and die as said upper support is moved towards said lower support, a lower end of said upper inner deflecting member disposed radially inwardly from said outer deflecting member providing a space for an upturned peripheral portion of a blanked member, said outer deflecting member provided with an annular inner lower curling shoulder for engaging and turning an upturned portion of a blanked member inwardly as said upper support member moves upwardly from said lower support and said slidable member is urged upwardly by said spring means to move the upturned portion of a blanked member upwardly, a lever pivoted to said upper support having an inner end disposed below a portion of said inner upper deflecting member, a member connected to an outer end of said lever, releasable means for engaging and holding said member as said upper support moves a certain distance upwardly relative to said lower support whereby said inner upper deflecting member is moved by said lever upwardly relative to the spring means therefor and relative to said upper die, and means carried by said upper support for releasing said releasable means by upward movement of said upper support beyond said certain distance whereby said inner upper deflecting member is moved downwardly by the spring means therefor.

2. Die apparatus according to claim 1 wherein adjacent faces of said lower slidable member and said base are provided with cooperating stop

shoulders for limiting relative movement of said slidable member and base in opposite directions.

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