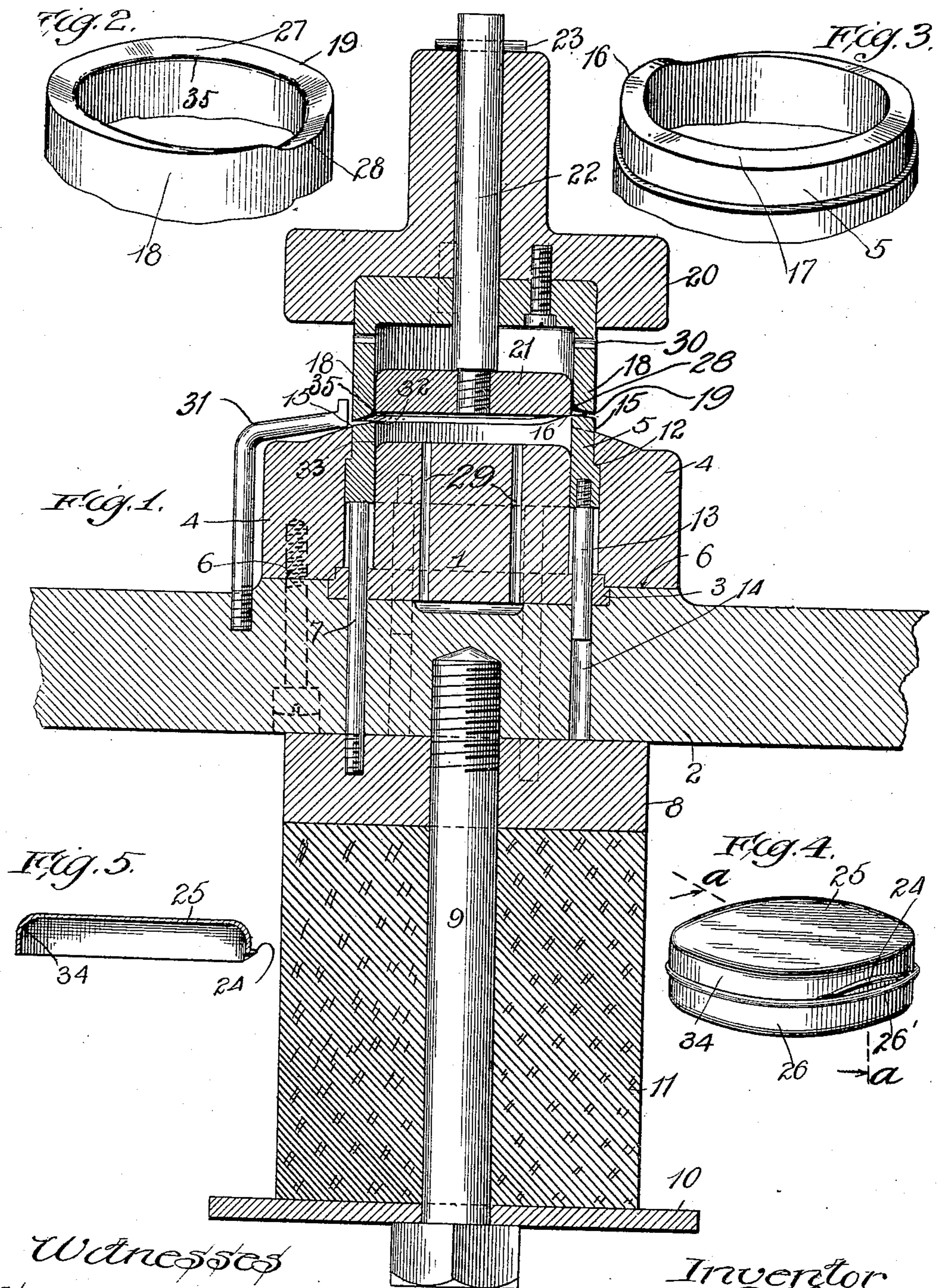


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PATENTED NOV. 5, 1907.

D. R. LEVIN.  
SHEET METAL STAMPING DIE.  
APPLICATION FILED MAR. 28, 1907.



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# UNITED STATES PATENT OFFICE.

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## SHEET-METAL-STAMPING DIE.

No. 869,916.

Specification of Letters Patent.

Patented Nov. 5, 1907.

Application filed March 28, 1907. Serial No. 364,983.

*To all whom it may concern:*

Be it known that I, DAVID R. LEVIN, a citizen of the United States of America, and a resident of Chicago, Cook county, and State of Illinois, have invented certain new and useful Improvements in Sheet-Metal-Stamping Dies, of which the following is a specification.

The main object of this invention is to provide a die mechanism which will, at one operation, form from flat sheet metal stock a downwardly flanged box-lid or can cap with a short outwardly projecting lip upon its flanged edge; which will operate upon either plain or enameled stock without wrinkling the metal and without scratching or cracking the enamel. This object is accomplished by the device shown in the accompanying drawings, in which:

Figure 1 is a vertical central section of die mechanism embodying this invention and adapted for making circular caps. Fig. 2 is a perspective, partly broken away, of the member which serves both as the male cutting die and the female forming die, the same being shown in an inverted position. Fig. 3 is a perspective of the flange-drawing ring. Fig. 4 is a perspective of a sheet-metal box whose cover is formed by the dies herein shown. Fig. 5 is a section of the cover of the box on the plane of the lines *a—*a** of Fig. 4.

In the construction shown, the die mechanism comprises an upper or active die 18, and a lower or passive die; which last named die comprises three principal die members, 1, 4 and 5. The die member 1 will be herein termed the male flanging die; the member 4, the female cutting die; die 18, the female flanging and male cutting die, combined; and member 5, a yieldable drawing ring or companion to the die 18, which coacts with the die 18 in smoothly drawing down the flange of the box cover and in giving the peculiar lipped shape to the flange.

The lower die member 1 is supported by and seated within a recess in a heavy plate or shoe 2, which is fastened to the bed of the press in the usual manner, not illustrated. The base of the die member 1 is outwardly flanged, as shown at 3. The die 4, fits over the flange 3 and rests solidly upon an annular surface 6 of the plate 2 to which it is secured by suitable screws. The annular drawing ring 5 is supported by a plurality of pins 7, which extend down and slidably through holes in the flange 3 and the shoe 2, their lower ends being screwed into a metal plate 8 below the shoe 2. A bolt 9, threaded into the shoe 2, extends down and supports a metal plate 10, between which and the plate 8 is interposed a stiff elastic cushion 11 preferably in the form of a block of rubber.

The die 5 is depressible within the die 4 when sufficient pressure is brought upon it. It is shown in its normal position, in which the greater part of its upper surface is flush with that of the die 4. Its upward movement is limited by shoulders 12, and its rotation is prevented by a plurality of guide pins 13, secured

thereto and passing slidably through holes 14 in the flange 3 and the shoe 2. The upper surface of the die 5, with the exception of a short projection or rise 16, is normal and is preferably slightly conical, being inclined outwardly. The rise 16 is elevated above the normal surface 17 as is shown in Fig. 3.

The movable die 18 which is mounted on the movable head of the press coacts with dies 1 and 5 in giving the peculiar conformation to the cap. The outer periphery of this die is shaped and sized to slidably fit within the bore of cutting die 4 when depressed, and has an exterior cutting edge 19 which coacts with the cutting edge 15 of said die 4, to cut a disk of material from a sheet or strip, for making the cover. The die 18 is fixed upon a head 20, which is reciprocated toward and away from the lower die members by suitable mechanism not shown. The die 18 is made hollow, with a bore which is slightly larger than the diameter of the male flange-forming die 1 to allow for the thickness of the metal operated upon. The die 18 is the coacting female flange-forming die, with respect to the male flange-forming die 1, and it also coacts with die 4 in cutting out the disks, and with the peculiarly formed yielding drawing ring 5 in producing the lip 24 on the finished cap 25, as shown in Fig. 4. For this purpose said die 18 is formed with a normal annular end surface 27, and with a depression or recess 28, which is shaped to form the lip on the cap-flange, as hereinafter described. Said recess is alined with the rise 16 on the ring 5 so as to register therewith when die 18 is depressed. The rise 16 on the ring 5 is shaped to fit into the recess 28 of the die 18.

Within the die 18 is the "flipper" 21, having a vertically slidable stem 22, held up by a stop pin 23 resting upon the head 20.

The dies 18 and 1 are provided with air-holes 29 and 30 respectively, for the inflow and escape of air.

When fed by hand, one or more guides 31 are provided, by the aid of which the operator sets the sheet or strip of material in correct register with the dies for each operation. These guides are mounted on the shoe 2.

The operation of the device shown is as follows: The die 18 being raised, a sheet or strip of sheet metal is placed upon the lower die. As the die 18 descends, its cutting edge 19, together with cutting edge 15 of the female die 4, punch out a disk of the metal of the proper diameter. The height of the flange that is to be formed is predetermined by the relative size of the cutting dies to that of the male flanging die 1. The edges of the disk are held tightly between the die 18 and the ring 5; the latter yields to the pressure of the former, depressing pins 7 and plate 8, and compressing the elastic block 11. The part of the disk which forms the flange is forced down over the rounded upper edge of die 1. Continued movement of the die 18 causes the edges of the disk of metal to be drawn inward in all

directions and to be compressed into a cylindrical flange between the opposed peripheries of the dies 1 and 18. The pressure of the drawing ring 5 against the die 18 prevents the metal of the disk from puckering and causes it to "flow" over the rounded inner edge 35 of the die 18 without even scratching an enameled surface of the sheet metal operated upon. In practice the movement of the jaw of the press upon which the die 18 is mounted is so adjusted that it comes to a stop when the normal lower surface 27 of said die has come into register with the edge of the completed flange 34. An ordinary flange of the required shape has thus been formed, except at that part which is adjacent to the rise 16 of ring 5 and the recess 28 of die 18. The recessed part 28 of die 18 has not moved as far down as its normal surface 27, and therefore has not moved far enough to turn down the lower edge of the flange thereunder. Accordingly, a lip, as 24, has been left projecting outwardly between the recess 28 of die 18 and the closely under-fitting rise 16 of die 5, which is held up with great pressure by the elastic block 11. The lip 24 takes its arched or bowed form from the contour of the rise 16 and recess 28. When die 18 ascends, the ring 5 also rises until it is arrested by the shoulders 12. The edge 32 of the ring 5 engages the lower edge of the flange of the cap 25 and causes the cap to be withdrawn with the die 18. During the upward movement of the die 18, the stem 22 is forced down by mechanism of the press (not shown), whereupon the flipper 21, which had been elevated by contact with the cap, will eject the finished cap from the die. It is usual in presses of this class to mount the dies in an inclined position from that shown in the drawing so that when thus ejected the finished article will fall from between the dies.

The dies described have been proved in practice to form flanged box caps from enameled and printed sheet metal stock without causing the slightest scratching or cracking of the enamel.

Fig. 4 shows a tin box provided with one of these novel covers. The box 26 has a bead 26' adjacent to the edge of the cap when closed. The cap may be readily pried off by placing the edge of a small coin between the lip and the bead and giving a sharp twist to the coin.

What I claim as my invention and desire to secure by Letters Patent, is:

1. A device for forming sheet metal caps, comprising coacting male and female flanging dies, a drawing ring surrounding the male die and normally urged outward to yieldingly oppose the movement of the female die with respect to the male so as to prevent buckling of the edges of an interposed sheet of metal during the flanging operation, the opposed faces of said female die and ring being provided respectively with a recess and a rise to leave a transverse lip on the flange at a limited part of the periphery of the cap when the dies have moved together sufficiently to completely flange the remainder of the periphery.

2. A device for forming sheet metal caps, comprising coacting male and female flanging dies, a drawing ring surrounding the male die and normally urged outward to yieldingly oppose the movement of the female die with respect to the male so as to prevent buckling of the edges of an interposed sheet of metal during the flanging operation, the opposed faces of said female die and ring being normal throughout their major part and being respectively formed at a certain other part with a recess and a rise to form a transverse lip offset from the rim of the flange when the dies have moved together sufficiently to complete the part

of the flange of the cap which is adjacent to said major part of said faces. 70

3. A device for forming sheet metal box caps, comprising a fixed flanging die, a yielding drawing ring outside of said die, and a cutting die outside of said ring, in combination with a movable flanging die coacting with said fixed die and yielding ring and having a cutting edge coacting with said cutting die, said movable die and ring being directly opposed and being provided respectively with a recess and a rise to form on the box cap a normal flange having a transverse lip on a limited part of its periphery. 80

4. The combination of a female flanging die, a male flanging die coacting therewith, and a yieldable drawing die opposed to said female die and embracing said male flanging die, said female flanging die and opposed drawing die being formed with major normal surfaces and with respectively interfitting recess and rise. 85

5. The combination of a combined female flanging and male cutting die, a male flanging die coacting therewith, a yieldable drawing die opposed to said first named die and embracing said male flanging die, and a female cutting die embracing said yieldable die and coacting with said first named die, said first named die and opposed yieldable die being formed with major normal surfaces and with respective interfitting recess and rise. 90

6. The combination of concentric unyielding cutting-out and flanging dies spaced apart, a yieldable die concentrically interposed between said cutting and flanging dies, an active cutting and flanging die opposed to said yieldable die, an ejector within said movable die, and means normally urging said yieldable die to a certain normal position, said active and yieldable dies being formed with opposed major normal surfaces and with respective interfitting recess and rise. 95

7. A die for making flanged can-caps, comprising means for cutting out a blank from sheet metal, means for drawing an endless flange upon such blank, and means for offsetting a limited fractional part of such flange to form a lip, said means coacting with each other to form a complete cap at one operation. 100

8. In a device for stamping can-caps, the combination of a drawing ring, a pair of opposed cutting-out dies adapted for cutting out can-cap blanks, one of said cutting-out dies embracing said drawing ring, the other being mounted to reciprocate toward and from the drawing ring, said other cutting-out die being formed with a forming recess, a male forming die within said drawing ring, being adapted to enter said recess to coact in forming a flange upon the blank, said other cutting-out die and drawing ring being shaped to form an outwardly disposed lip upon a limited fractional part of the periphery of such flange, through the operation of said dies. 105

9. A device of the class described comprising a male flanging die, a female flanging die movable toward and away from said male die in axial alinement therewith, a drawing ring surrounding said male die and slidable axially thereon, said female die having a normal end surface and a depression at one side thereof, said drawing ring being formed with a normal surface opposed to the normal surface of said female die and having a rise registering with the depression in said female die, a cushion of resilient material yieldingly urging said drawing ring toward said female die, and a stop for limiting the movement of said drawing ring during the return movement of said female die. 110

10. A device for forming sheet metal caps of the class described, comprising a male flanging die having a substantially cylindrical periphery, a drawing ring fitting the periphery of said male die and slidably mounted thereon, a female cutting die surrounding said drawing ring and extending beyond the free end of said male die, a stop adapted to limit the outward movement of said drawing ring to a position adjacent to the face of said female cutting die, a resilient cushion yieldingly urging said drawing ring toward said stop, a tubular die member mounted in axial alinement with said male die, having an inner periphery adapted to coact with said male die for flanging an interposed disk of metal, and having an outer periphery provided with a cutting edge adapted to coact with said female cutting die for cutting such disk from a sheet of 115

metal, the major part of the cutting face of said female die being normal and having therein a depression extending across the same between its inner and outer peripheries, the opposed face of said drawing ring being formed to fit that of said female die, and all being arranged to form a transversely extending lip at one side of the flange of the cap.

11. The combination of a female flanging die, a male flanging die coacting therewith, a yielding drawing ring opposed to said female die and embracing said male flanging die, the opposed surfaces of said female flanging die and drawing ring being normal throughout the major part thereof and being formed at another part with respective interfitting recess and rise, and guiding means controlling the movement of said drawing ring and adapted to prevent the same from turning out of registering position with respect to said female die.

12. The combination of a supporting plate, a male die rigidly mounted thereon and having a free end, a drawing

ring fitting the periphery of said male die and axially movable thereon, a female cutting die surrounding said drawing ring and rigidly mounted on said plate, a female flanging die mounted in axial alinement with said male die and movable relatively thereof in an axial direction, said drawing ring and female flanging die being formed with opposed major normal surfaces and provided with respective interfitting recess and rise, a plate movably mounted below said first plate and having parts extending through said first plate into engagement with said drawing ring, and a cushion of resilient material mounted below said second plate and adapted to yieldingly urge said drawing ring toward the upper end of said male die.

Signed at Chicago this 23d day of March 1907.

DAVID R. LEVIN.

Witnesses:

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