July 14, 1936. S. E. LOFTS 2,047,830

PRESS TOOL

Filed Aug. 23, 1935

Fig. 3.

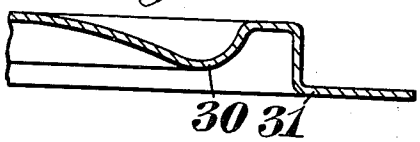


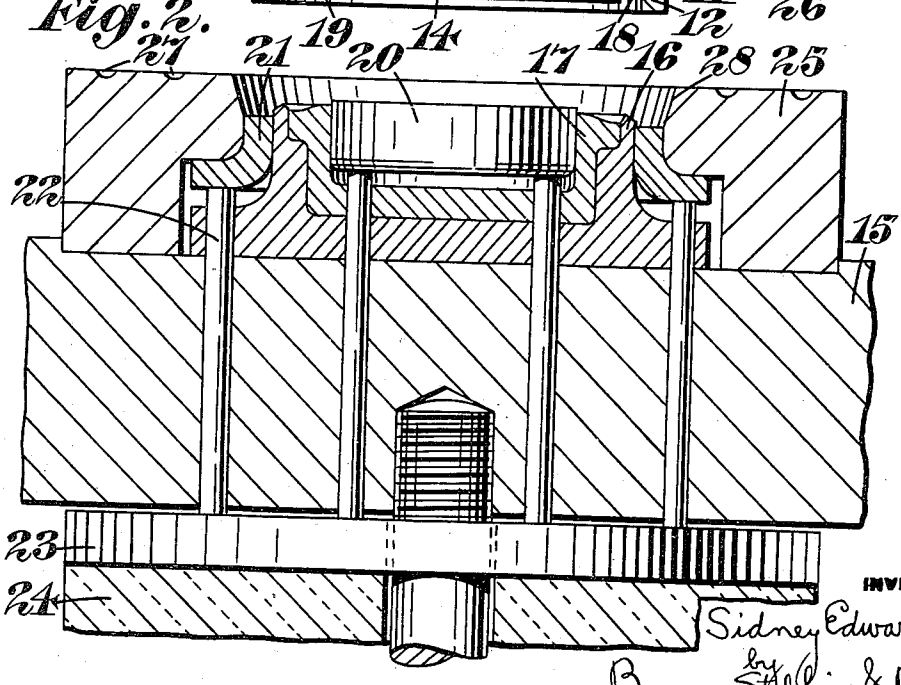

Fig. 1.




Fig. 4.




Fig. 2.




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## PRESS TOOL

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5 Claims. (Cl. 113—15)

This invention relates to press tools for forming the sheet metal ends of cans or like containers.

The invention is concerned with the formation of can ends which are provided on the inner or outer surface with a score which facilitates opening of the can, the material adjacent the score being strengthened by a rib. Usually the score is continuous for example in a circular form, and a reinforcement is provided on the inside of the score to strengthen the material which is to be removed when the can is opened. In some cases, the score is not continuous so as to leave an uncut portion to serve as a hinge for the part which is to be opened.

In forming such can ends it is the practice to first form a bead for reinforcing purposes and then to produce the score close to the bead. It is advisable, and in most cases necessary, that there should be no working of the metal after the score has been produced, otherwise tearing of the metal at the score is very likely to be produced by such a subsequent operation.

It has been found that a can end produced by scoring a blank provided with a bead as hereinbefore described is not satisfactory for easy opening and that it is necessary that the bead should be distorted so as to provide a rib which is inclined towards the score thus producing in the preferred form a double thickness of metal close to the score which will enable the material of the can end within the score to be easily removed without buckling.

An object of the present invention is to provide an improved press tool for forming can ends with a score and reinforcing rib from blanks provided with a bead.

The invention accordingly comprises a press tool for forming can ends from blanks provided with a bead comprising two co-operating tool parts which are provided with co-operating elements for producing a score adjacent to the bead and with other co-operating elements for distorting the bead to produce a reinforcing rib close to the score by means of a single operation of the one tool.

The co-operating elements of the tool for forming the score usually comprise a scoring edge on one tool part and a co-operating flat surface on the other tool part, and heretofore considerable difficulty has been encountered in producing satisfactory scores, mainly due to the permitted tolerance as regards the thickness of any given standard gauge material such as commercial tin plate. Although the variation in thickness is relatively small it has serious effects on the nature of the score produced. It has been found in practice that when the press is set to produce the correct score in a sheet of accurate thickness, not only is the material left at the score less for a relatively thin sheet than for a relatively thick sheet, but also the depth of the score is greater for the thinner sheet, thus accentuating the difference in thickness of the material at the score for the different thicknesses of sheet. By the thickness of material at the score I mean the distance between the deepest part of the incision and the opposite surface of the sheet.

Now the thickness of material at the score is a most important consideration in the final product as any slight departure from a predetermined thickness at this point may render the product unsatisfactory. If this thickness is too small the product is weakened to a serious extent whereas if it is too large the score is not adequate for its purpose of permitting easy opening of the container. Another object of the present invention is to provide a press tool whereby entirely satisfactory scores can be produced irrespective of any variations in the thickness of the material and hence to avoid waste of the material now resulting from the production of so many unsatisfactory products.

According to a further feature of the present invention there is provided a press tool for producing scores in sheet metal wherein the tool parts are provided with co-operating stop members to determine the minimum separation of the tool parts and the thickness of material at the score. By this means the thickness of the material at the score is maintained constant for the products of a given gauge regardless of variations in actual thickness of the material.

One specific embodiment of the invention as applied to a press tool for producing circular can ends is illustrated by way of example in the accompanying drawing, in which:—

Figure 1 is a cross-sectional elevation of the top tool part;

Figure 2 is a similar view of the bottom tool part;

Figure 3 is a cross-section of part of a beaded blank to be treated by the tool, and

Figure 4 is a similar view of the final can end.

Referring to the drawing, the top tool part comprises a block 10, adapted to be carried in the movable part of the press, and a ring member 11 mounted within a housing 12 secured in this block by means of studs 13. A pressure pad 14 is also provided.

The bottom tool shown in Figure 2 comprises a base 15 adapted to be secured to the bed-plate of the press and carries the lower tool part which comprises a scoring ring 16 and a deforming member 17 which co-operate respectively with the flat inner surface 18 and the inner surface 19 of the ring member 11. The bottom tool also comprises a pressure pad 20, and surrounding the scoring ring 16, a pressure ring 21, the pad and

the ring being resiliently supported by pressure pins 22 resting on a pressure plate 23 which, in turn, rests upon a rubber buffer 24. Surrounding the bottom tool part there is provided an annular stop member 25 which co-operates with the annular surface 26 of the block 10 of the top tool to determine the minimum separation of the tool parts in operation. The contacting surface of the stop member 25 is preferably formed with grooves 27 to ensure close contact of this stop member with the surface 26 of the top tool.

The construction of the blank which is to form the can end is shown in Figure 3 and is provided with a bead 30 of circular form, and in addition with a flanged part 31 which is to form the means of securing the can end to the body of the can. This blank is fed on to the pressure pad 20 and the top tool is then brought down on to the blank. The pressure pad 14 of the top tool first makes contact with the blank and, in conjunction with the pressure pad 20 serves to hold the blank in position. The lower annular surface of the housing 12 engages with the flange 31 of the blank and, in conjunction with the inclined surface 28 of the stop member 25, turns up the end of the flange as indicated at 32 in Figure 4. The pressure ring 21 gives way to permit this operation owing to its resilient support.

In the final part of the movement, the scoring ring 16 co-operating with the surface 18 of the top tool produces the score shown at 33 in Figure 4, and the deforming part 17 bears upon the bead 30 of the blank to force this bead outwardly towards the score in order to form the reinforcing ridge 35. The deforming part 17 of the bottom tool is inclined in the direction to ensure that the bead shall be forced outwardly towards the score, and preferably the co-operating surface of the top tool is of complementary shape.

The stop member 25 and the co-operating stop surface 26 are so formed with regard to the tool parts that when these stop members are brought into contact the scoring edge of the ring 16 is separated from the cooperating surface 18 of the top tool part by a distance predetermined to provide the required thickness of material at the score. The stop members thus positively control the thickness of material at the score in the blanks produced by the press tool regardless of variations in thickness of the material, and thus the products which are obtained are all uniform in this respect.

It will be understood that the under surface of the can end as shown in Figures 3 and 4 is intended to be on the outside when the can end is subsequently joined to the body of the can, and the can ends are shown in this position because they are treated in the inverted position in the tool.

The surface 19 of the top tool may be cut away to provide a clearance space, the deforming action being effected by the part 17 of the bottom tool. Furthermore, the stop members may be modified in form, for example they may be formed in one with the respective tool parts themselves and also instead of being annular members they may be of any other desired form depending for instance on the shape of the blank. It is preferable, however, to make the contacting surfaces of the surrounding members of a fairly large area in order to minimize the wear which takes place between the co-operating parts of the tool.

I claim:

1. A press tool for forming can ends from blanks having a bead, comprising two cooperating tool members which are provided with cooperating parts for producing a score adjacent to the bead and with other cooperating parts spaced respectively from said scoring parts according to proximity of the score to the bead, for distorting the bead to provide a reinforcing rib close to the said score by means of a single operation of the one tool for each blank.

2. A press tool for forming can ends from blanks having a bead, comprising two cooperating tool members which are provided with two cooperating scoring parts for producing a score in the blank adjacent to the bead and with two cooperating forming parts spaced respectively from said scoring parts according to proximity of the score to the bead, for distorting the bead to provide a reinforcing rib close to the score in one operation of the tool, at least one of said forming parts being inclined in the direction to deform the bead towards the score.

3. A press tool for forming in one operation can ends from blanks provided with a bead, comprising a tool member having a scoring edge for producing a score in the blank adjacent to the bead, and an inner pressure part spaced from said scoring edge according to the proximity of the score to the bead, for distorting the bead to provide a reinforcing rib close to the score, and a cooperating tool member having a pressure part cooperating with said scoring edge in forming the score.

4. A press tool for forming in one operation can ends from blanks provided with a bead comprising a tool member having a scoring edge for producing a score in the blank at the outer side of the bead, and a pressure part internally of the scoring edge to engage the bead and inclined in the direction to distort the bead outwardly towards the score, and a cooperating tool member comprising an abutment to support the blank against pressure applied by the scoring edge of the other tool part and a pressure part complementary with the pressure part of the other tool member to distort the bead outwardly in the direction of the score.

5. A press tool for forming in one operation can ends from blanks provided with a bead, comprising a tool member having a scoring edge for producing a score in the blank at the outer side of the bead, a pressure part internally of the scoring edge to engage the bead and inclined in the direction to distort the bead outwardly towards the score, a stop member surrounding and rigid with said tool member, a cooperating tool member comprising an abutment supporting the blank against pressure applied by the scoring edge of the other tool member, a pressure part complementary with the pressure part of the other tool member to distort the bead outwardly in the direction of the score, and a stop member surrounding and rigid with said cooperating tool member, which stop members abut in the operation of the tool to determine the minimum separation of the scoring edge from the cooperating abutment of the other tool member in order to control the thickness of the material at the deepest part of the score.

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