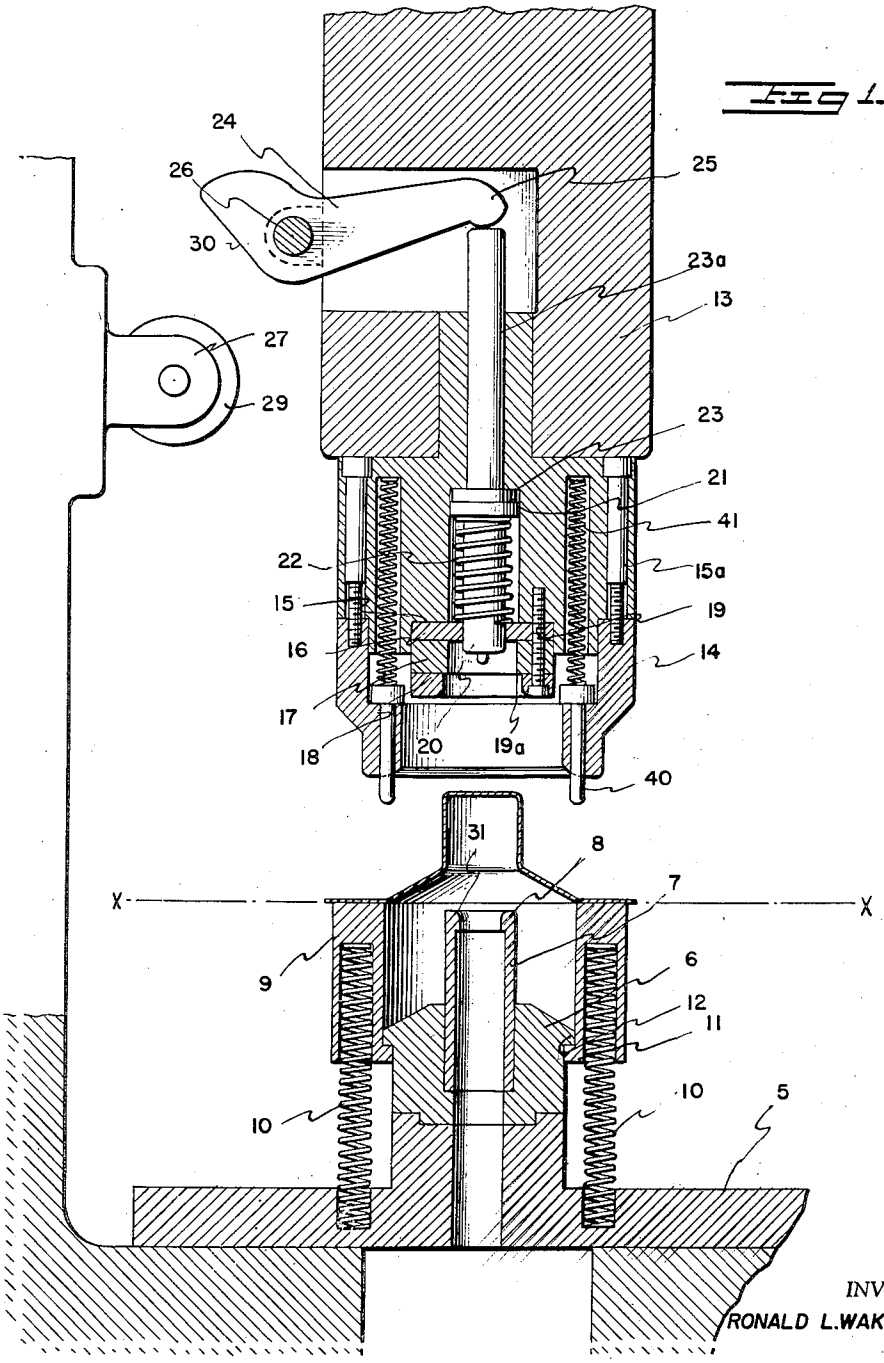
Dec. 4, 1956 R. L. WAKELEE 2,772,735

MULTIPLE SLIDE PRESS FOR CUTTING SHEET METAL PARTS

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Fig 1.



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Fig 2.

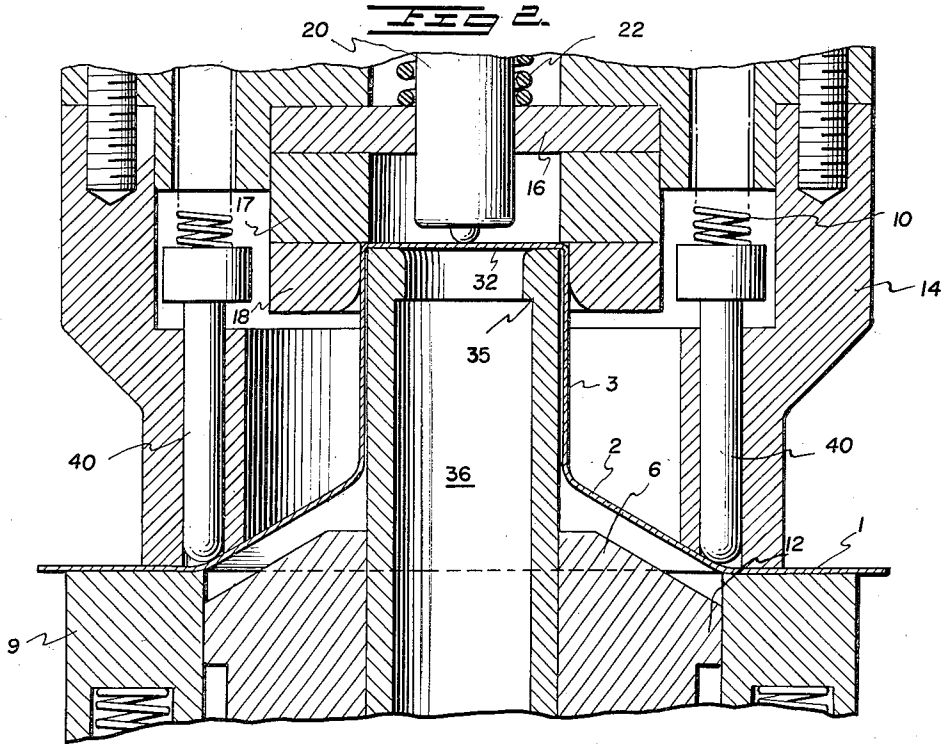


Fig 5.

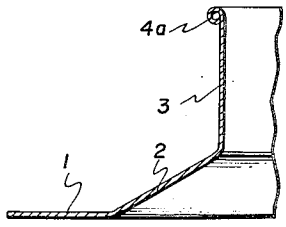


Fig 4

Fig 6.

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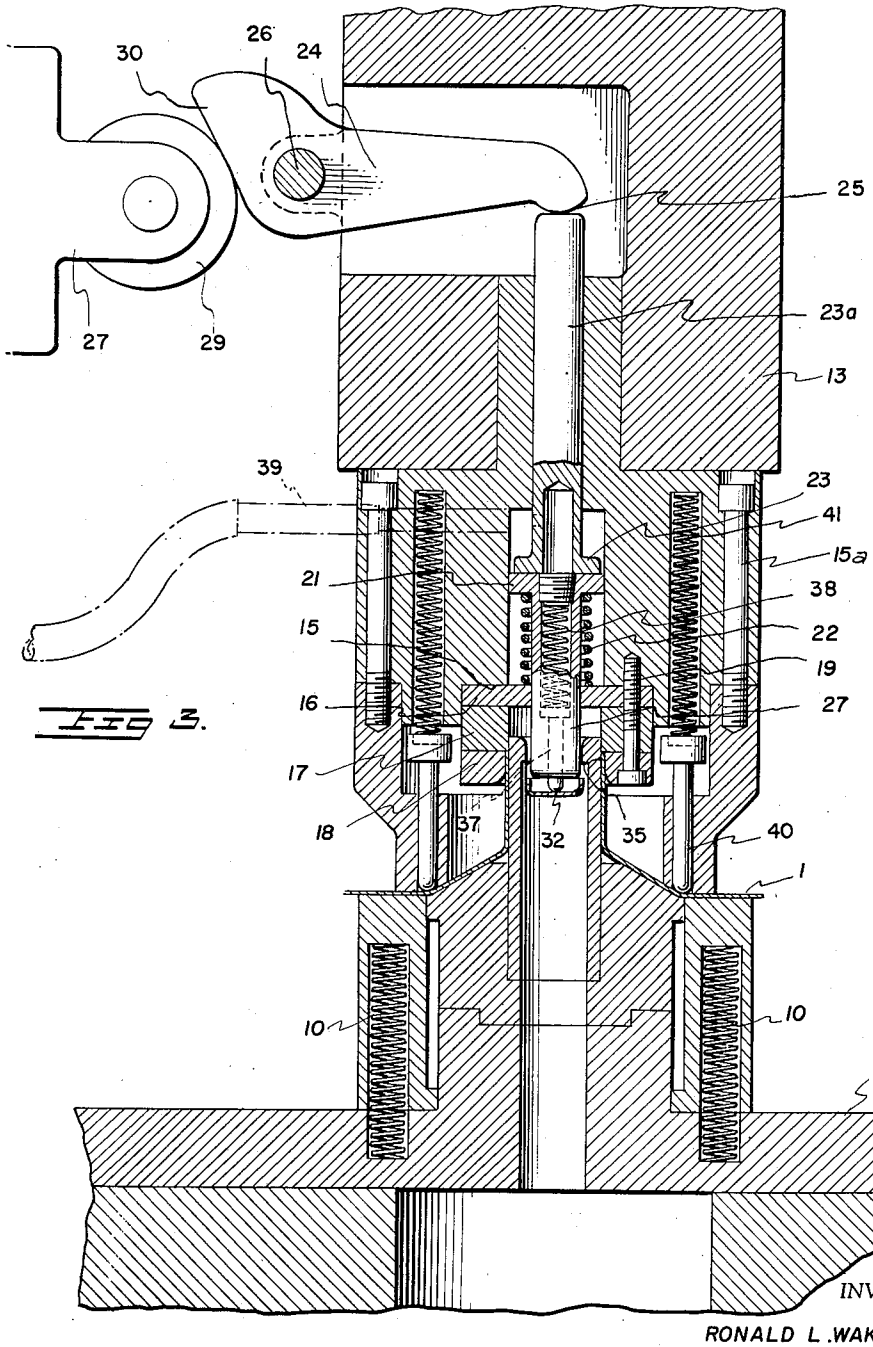


Fig 3.

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MULTIPLE SLIDE PRESS FOR CUTTING SHEET METAL PARTS

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Application October 9, 1953, Serial No. 385,089

3 Claims. (Cl. 164—86)

This invention relates to new and useful improvements in a single action multiple slide press means for cutting the end out of a thin walled cylindrical shell drawn from a metal sheet.

An object of the invention is to provide a single action multiple slide press having cooperative punching and cutting dies for cutting the end out of a thin walled cylindrical shell drawn from a metal sheet on a line substantially in alignment with the inner face of the cylindrical shell so as to leave little or no inwardly projecting lip to interfere with the subsequent die rolling or flanging outwardly of the cut end portion of the shell.

A further object of the invention is to provide a press of the above type with the forming punch disposed so as to cooperate with the inner edge portion of an annular cutting punch in the shaping of a cut out disc so as to reduce the over-all diameter thereof and permit the disc to be discharged through the central passage in the annular cutting punch.

A further object of the invention is to provide a means for operating the shaping punch on the same down stroke of the press that cuts out the disc for shaping and discharging the cut out disc.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings which show by way of illustration one embodiment of the invention:

Figure 1 is a vertical sectional view through a multiple slide press embodying the improvements with sliding head at the upper end of its stroke and with a blank centered beneath the head.

Figure 2 is a similar view of a portion of the machine on an enlarged scale, with the blank positioned on the punch and with the cutting die in position for cutting the end disc out of the blank.

Figure 3 is a view similar to Figure 1 but showing the sliding head at the lower end of its stroke and the disc forming punch at the lower end of its stroke, with the disc cut-out shaped to reduce its over-all diameter and being discharged from the machine.

Figure 4 is a vertical sectional view through a can end blank showing the end of the cylindrical neck portion cut out and reshaped for discharge downward through the neck of the blank.

Figure 5 is a vertical sectional view of the blank with the edge curled, and

Figure 6 is a vertical sectional view of the blank with edge flanged.

The multiple slide press as illustrated in the drawings is especially adapted for cutting out the end of the drawn neck portion of a can end blank. The blank with the end out is shown in part in Figure 4; said blank includes a portion **1** for attachment to the can body and a cone shaped portion **2** centrally of the end which terminates in a drawn thin walled cylindrical neck portion **3**. The neck portion **3** has initially a closed end.

One of the purposes of the machine is to cut out the end so as to leave a minimum amount of inwardly projecting lip **4**.

This enables the end of the neck to be rolled outwardly into a curl as shown at 4^a, Figure 5, or to be flanged outwardly as shown at 4^b, Figure 6, without splitting the edge of the metal. Another purpose of the machine is to shape the cut out disc so as to reduce its overall diameter and thus permit the disc to be discharged from the machine through a central passage in the punch which cuts out the disc.

The machine includes a bed **5** to which is fixedly attached a cutting punch holder **6**. The cutting punch **7** is annular in cross section and is cylindrical on its outer face. There is a cutting or shearing edge **8** at the upper outer peripheral edge of the punch.

Mounted on the bed is a work supporting pad **9**. This pad is mounted on springs **10**. The pad has a projecting ledge **11** which is adapted to engage a shoulder **12** on the punch holder **6**. This limits the upward movement of the pad. Disposed above the bed is the sliding head **13** of the press. Said sliding head has a presser ring **14** secured thereto by bolts 15^a. This presser ring cooperates with the work supporting pad **9**. The sliding head of the press has a recess **15** formed in its lower end and in this recess is located a backing up plate **16** and an annular ring die **17**. Centering ring **18** guides neck of blank to cutting position. The backing up plate, the annular die and the centering ring are secured by clamping bolts, one of which is indicated at **19**. The lower inner peripheral edge of the ring die 19^a is shaped so as to provide a shearing or cutting edge which cooperates with the cutting edge **8** on the punch **7** in cutting out the closed end of the neck portion **3**.

As shown in Figure 2, the top end of blank **3** is in position in the machine and the closed end is about to be severed from the blank. The blank as described above is fed into the machine by sliding the same along a work support, the top of which is indicated by the line *x*—*x*. When the workpiece is being fed into the machine the sliding head **13** of the press is in raised position as shown in Figure 1, and when in raised position the presser ring **14** and the ring die **17** are raised well above the work support so that the blank with its formed neck portion extending upwardly will clear the presser ring **14** and move to a position directly over the cutting punch **7**. The top end blank may be fed to this position by any suitable mechanism not shown or it may be placed by hand in the machine. It is essential, however, that the neck portion shall be upstanding. The spring pad **9** is lifted by means of the springs **10** when the head is raised and the upper end of the pad will be substantially in alignment with the upper surface *x*—*x* of the work support so that when the work is slid over the punch it will rest on this work supporting pad. As the sliding head is lowered the centering ring **18** will engage the upper end of the neck portion of the blank and center it so that further downward movement of the slide will move the blank telescopingly onto the cutting punch **7** and into engagement with the punch supporting member **6**. It is the presser ring **14** which engages the blank and moves it down onto the punch. There is just sufficient clearance between the outer face of the annular cutting punch and the neck of the blank so as to permit easy movement of the neck portion onto the cutting punch. In this downward movement of the sliding head the cutting die ring **17** is brought into contact with the closed end of the neck portion of the blank. This occurs before the supporting pad **9** and the presser **14** have reached their lowermost position and as this cutting die moves downward to the position shown in Figure 2 it is about to cut the end from the neck. The cutting edge on the male punch contacts the inner face of the end substantially in alignment with the inner face

of the neck portion of the blank so that the cutting line will leave little or no inwardly projecting lip at the cut edge 4 of the neck. It has already been stated that this is of great advantage to the subsequent treating of the blank by die rolling the upper edge portion of the neck outwardly into a curled bead or into a flange. The drawn neck portion is very thin and when this line of cutting is well in from the inner surface of the neck portion the outward turning of the neck portion is likely to split the metal. When, however, the end which is cut is very close to the inner face of the neck portion there will not be left a sufficient portion of the lip so that it may be die shaped outwardly without splitting the metal.

Disposed centrally of the head is an ejecting punch **20**. This punch moves bodily up and down with the sliding head and in addition thereto it has an independent reciprocating movement. At the upper end of the punch is a flange **21** forming an enlarged guiding head for the punch. The punch is also centered and guided by the backing up plate **16**. A spring **22** bears against this head **21** at its upper end and against the back up plate at its lower end and serves to normally hold the ejecting punch in its raised position in the sliding head. There is an operating stem **23a** slidable in the head **13** which has a flange **23** at its lower end extending laterally and contacting the enlarged head **21** on the punch. A lever **24** has a rounded nose **25** adapted to engage the upper end of the stem **23a**. This lever is pivoted at **26** to a lug on the sliding head. Mounted on the frame of the machine is a bracket **27** carrying a roller **29**. The outer end of the lever **24** has a cam shaped face **30** which is adapted to engage the roller when the sliding head moves downward. This contacting of the lever with the roller will force the inner end downward onto the stem **23a** and this will move the forming punch downward, compressing the spring **22**.

The inner upper edge of the annular cutting punch is rounded into a shaping die **31**. The ejecting punch moves downward into contact with the cut-out end of the neck and will force it downward into contact with the die **31** and as the edge portion of the disc moves into the punching die it will turn the edge of the disc upwardly into a flange. The disc, after its formation, is indicated at **32** in Figure 4 and the upstanding flange is indicated at **33**. As the flange is turned the metal in the flange will be formed into a fluted edge indicated at **34**. The inner surface of the annular cutting punch is provided with a ledge **35** and the space beneath this ledge is of slightly greater diameter so that when the punch has forced the shaped disc below the shoulder it will fall by gravity and be discharged through the passage in the annular punch and a similar passage **36** in the punch holder and bed of the machine. Thus it is that the cut-out disc or end of the neck portion is reshaped so as to decrease its overall diameter and this permits the shaped disc to be discharged in the manner just stated in order to leave the end cutting punch and die free for its next cycle of operation.

It is noted that the roller is so positioned on the frame that the head moves down and onto the disc cut out of the blank before the ejecting punch contacts the disc for die shaping the same. It is also noted that the disc is cut out, shaped and discharged from the machine in the same downward stroke of the hand.

Centrally of the punch is an ejector rod **37** which is moved downwardly by a spring **38**. The disc after it is shaped and carried to a position beneath the ledge **35** will be stripped from the punch on its upward movement by this ledge if the ejector has not already released it from the punch.

This ejector may be omitted from the machine and the shaped disc stripped from the punch by a blast of air. In Figure 3 the sliding head is shown as provided with a passage **39** which leads to the central passage through the punch formed when the ejector is removed. It is through this passage that air may be directed against the shaped disc for releasing it from the punch. After the cutting of the disc and the shaping operations are completed the sliding head is bodily moved upwardly. The pad **9** will follow up with the presser **14** until the finished blank is reached to the level of the work table. The sliding head continues in its upward movement so as to clear the neck portion of the blank.

There are ejectors **40** which are moved downwardly by springs **41**, and two of these ejectors and springs are shown in Figure 1. The ejectors strip the neck portion of the blank from the centering ring **18**.

It will be understood that many changes in the details of construction may be made without departing from the spirit of the invention as set forth in the appended claims. It is essential, however, that the male cutting punch shall be vertical with the cutting edge at the upper end thereof and that this punch shall be annular in cross section so as to provide a passage through which the cut out discs from the closed ends of the blank may be shaped and discharged from the machine. It is also essential that the cutting edge of the punch shall be at the outer periphery thereof and contact the closed end which is to be cut substantially in alignment with the inner surface of the neck of the blank so as to leave a minimum amount of an inwardly projecting portion at the cut edge of the neck. While the blank for forming a can top is described as having a cylindrical neck it will be understood that the neck portion may be elliptical or otherwise shaped, in which case the punch and dies would be shaped to conform to the blank.

I claim:

1. A punch press for cutting off the end of a sheet metal cylinder comprising a vertically arranged punch having a circular cutting edge at its upper periphery, yielding means for supporting a workpiece having a drawn cylindrical portion and a closed end both in contact with said punch, a head vertically slidable above said punch, an annular cutting die carried by said head, said die having a cutting edge at its inner lower periphery for shearing engagement around the cutting edge of the punch.

2. A punch press for cutting off and removing the end of a sheet metal cylinder comprising a vertically arranged tubular punch formed with a circular cutting edge at its upper outer periphery and as a shaping die at its upper inner periphery, said punch being so proportioned as to fit closely within the cylindrical workpiece and to support the end thereof, a head vertically slidable above said punch, an annular cutting die carried by said head, said die having a cutting edge at its lower inner periphery for shearing engagement around the cutting edge of the punch, and an ejecting punch slidable centrally of said die and movable into the tubular punch.

3. A punch press for cutting off and removing the end of a sheet metal cylinder comprising a vertically arranged tubular punch formed with a circular cutting edge at its upper outer periphery and as a shaping die at its upper inner periphery, said punch being so proportioned as to fit closely within the cylindrical workpiece and to support the end thereof, a head vertically slidable above said punch, an annular cutting die carried by said head, said die having a cutting edge at its lower inner periphery for shearing engagement around the cutting edge of the punch, an ejecting punch slidable centrally of said die, a pivoted lever carried by the head and means for actuating the lever and advancing the ejecting punch into the tubular punch after the cutting die has cut off the end of the metal cylinder.

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