

Nov. 22, 1960

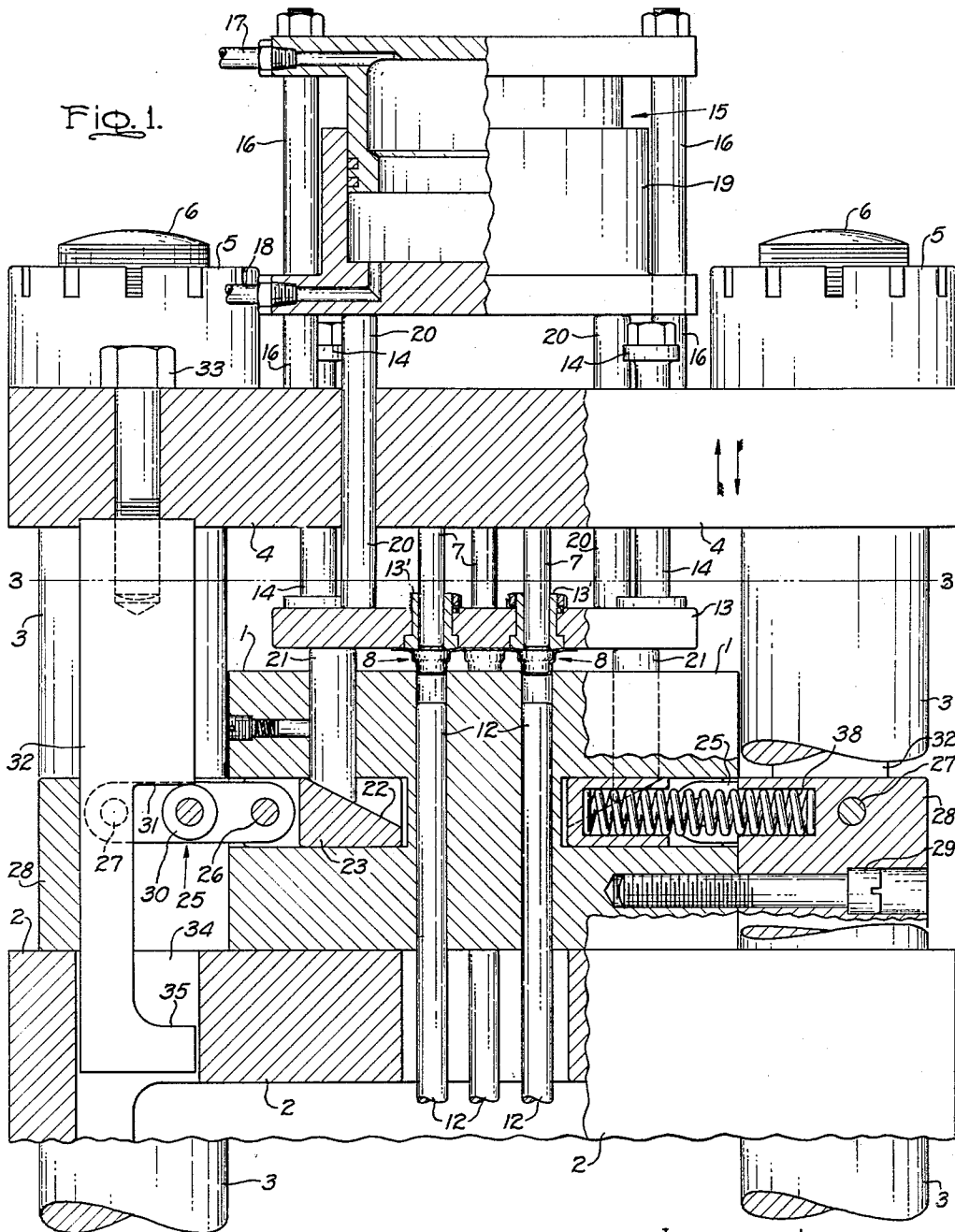
A. W. SMITH ET AL

2,960,949

SHELL PRESS

Filed Sept. 17, 1958

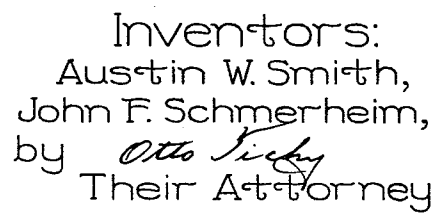
3 Sheets-Sheet 1



Inventors:
Austin W. Smith,
John F. Schmerheim,
by *Otto Tichy*
Their Attorney.

2,960,949

3 Sheets-Sheet 2



Nov. 22, 1960

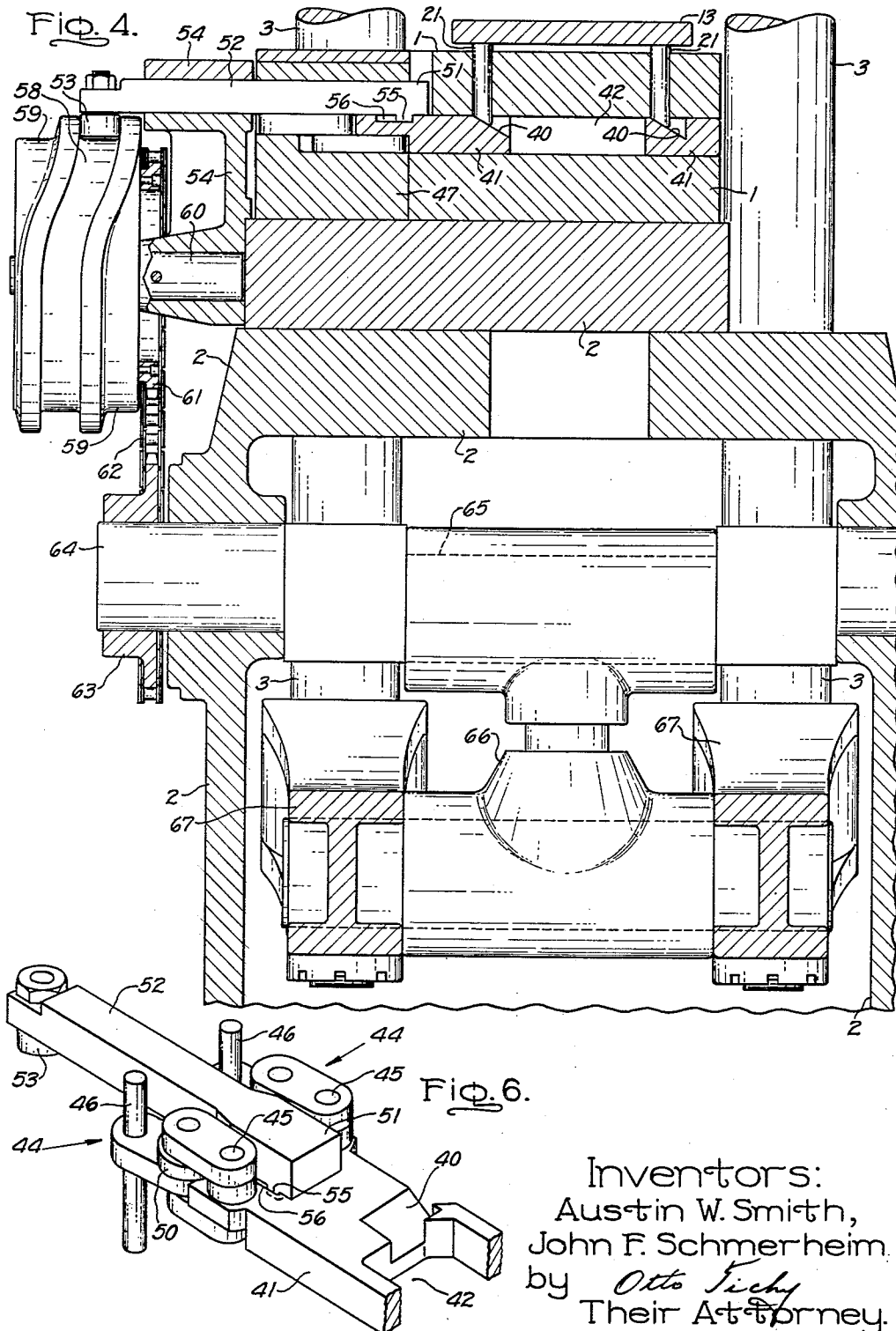
A. W. SMITH ET AL

2,960,949

SHELL PRESS

Filed Sept. 17, 1958

3 Sheets-Sheet 3



Inventors:
Austin W. Smith,
John F. Schmerheim
by *Otto Fichy*
Their Attorney.

1

2,960,949

SHELL PRESS

Austin W. Smith, Chesterland, and John F. Schmerheim,
Richmond Heights, Ohio, assignors to General Electric
Company, a corporation of New York

Filed Sept. 17, 1958, Ser. No. 761,523

3 Claims. (Cl. 113—50)

The present invention relates to draw presses for forming shells from light-gauge metal strips, such as the shells of bases for electric lamps.

In forming lamp base shells from thin-gauge brass and aluminum strips the body of the shell is formed by a series of dies in a punch press which includes punches, stripper plates for the punches and means for reciprocating the punches and the stripper plates with respect to the dies. The dies are arranged to reduce the diameter and increase the length of the shell body progressively as the metal strip from which the shells are punched is moved step by step from one die to the next in the operation of the punch press. The parts of the strip from which the bodies of the shells are formed remain attached to the strip for movement through the punch press. At the last reduction die of the press the shell has an annular flange at one end which is attached to the strip by a number of integral carriers or ribbons. After the shell has been processed by the last reduction die of the press it is moved to the part of the press whereat the flange is trimmed from the shell to separate the formed shell from the strip.

Difficulties have been encountered in preventing the flange on the base shell from being wrinkled when processed by the last reduction die. The wrinkles cause poorly trimmed flanges, bumps in the rim of the trimmed shell, uneven trimming of the shell and too little flange for effective trimming by the press. Further difficulties encountered because of the presence of wrinkles in the flange are reduction in the useful life of the trimming tool for separating the flange from the shell, broken carriers caused by excess working, poor length control of the shell caused by the uneven flanges, and frequent punch and die replacements. These difficulties result in excessive punch and die costs, poor quality of the product and excessive down time of the machine for repairs.

The principal object of the present invention is to overcome the above difficulties by eliminating the occurrence of wrinkles in the flange of the shell at the last reduction die of punch presses. Further objects and advantages will appear from the following detailed description of species of apparatus embodying the invention.

The invention attains its objects by providing means including movable stop pins which control the downward movements of the stripper plate of the punch press in such manner that the plate engages the flange on the shell before the shell is forced completely into the last reduction die by the punch and the stripper plate is in contact with the flange when the flange is brought into engagement with the upper surface or face of the die.

The flange on the shell thus is clamped between the upper face of the die and the lower surface of the stripper plate as the punch completes its downstroke so that the flat, unwrinkled shape characteristic of the flange on the base shell prior to the redrawing and elongation of the body of the shell at the last reduction die is retained after the shell has been reshaped by this die to the end that the difficulties caused heretofore by the oc-

2

currence of wrinkles in the flange at this stage of the manufacture of the base shell are completely eliminated.

In the drawings accompanying and forming part of this specification two species of the invention are shown in which

Fig. 1 is an end view partly in section of the bed portion of a punch press showing the punch and die arrangement at the last reduction die station of a draw press, the partially-formed shells attached to the strip, the stripper plate in contact with the flanges on the partially-formed shells and the actuating and control means for the stripper plate and, in part, the actuating means for the punch.

Fig. 2 is a series of five sectional views designated as A, B, C, D and E and showing from left to right of this figure the positions of a punch and the stripper plate relative to each other and to the die plate of the press as a shell is redrawn by these components of the punch press at the last reduction die station shown in Fig. 1.

Fig. 3 is a top plan view in transverse section through the punch press taken along the line 3—3 of Fig. 1 at an elevation directly above the stripper plate.

Fig. 4 is a vertical transverse section through a stripper plate and another embodiment of the control means for the stripper plate together with the actuating means of a punch press.

Fig. 5 is a fragmentary, partly sectional top plan view of the parts of the punch press illustrated in Fig. 4.

Fig. 6 is a fragmentary, perspective view of part of the press shown in Figs. 4 and 5.

Like numbers denote like parts in all the figures.

The parts of the punch press illustrated in Figs. 1 to 3 of the drawings, other than the stripper plate and the actuating and control means for the stripper plate, are conventional and well known to those skilled in the art. A brief description thereof thus is sufficient for a complete understanding of the invention which is concerned principally with the stripper plate and the stripper plate actuating and control means, the operation of which is correlated with the usual parts of the punch press including the punches, as described below.

Referring to Figs. 1 and 3 of the drawings, the punch press comprises a stationary horizontal lower bedplate 1 which includes the dies. The bedplate is secured to the frame 2 of the press and a plurality of vertically reciprocable rods 3 extend upward through bushings (not shown) in the lower bedplate. The upper bedplate or platen 4 of the press is fastened by nuts 5 to the upper threaded ends 6 of the rods 3 and the rods are connected at their lower ends to the usual drive mechanism (not shown) of the press by which the rods 3 and therewith the upper bedplate 4 secured thereto are reciprocated vertically. A plurality of punches 7 are fastened to the upper bedplate 4 in vertical alignment with the dies in the lower bedplate 1 and on reciprocation of the upper bedplate enter the dies in the lower bedplate a sufficient distance to perform a redrawing operation on a metal shell blank 8, as shown in Fig. 2.

In the manufacture of lamp base shells from metal strips, the strips 9 (Fig. 3) are moved step-by-step through the draw press and between the upper and lower bedplates 4 and 1, respectively. The bedplates are elongated rectangular members and dies are provided at successive draw stations located along the path of travel of the strip through the press. The dies are arranged in gangs or sets at stations spaced along the path of travel of the strips to perform a plurality of drawing and redrawing operations on parts of the strip as the strip is moved step-by-step from one station to the next as the upper bedplate is reciprocated as described above. The shells 8 are formed from the strip 9 in a progressive manner as the strip is

moved from one draw station to the next with the partially-formed shells attached to the strip.

Two such stations are shown in Fig. 3 in which the station preceding the last redraw or reduction station shown in detail in Fig. 1 has thereat the punches 10, shown at the top of Fig. 3. At these stations, which are the last two redrawing stations of the press, the partially-formed shells 8 are attached to the strip 9 by thread-like carrier parts 11 of the strip. The strip extends through both stations and is moved from the station having punches 10 to the station having punches 7 and thence beyond the last named station to the trimmer (not shown) during operation of the press. The shape of the shell after processing by the station having punches 10 is shown in view A at the extreme left of Fig. 2 and the shape thereof after processing by the station having punches 7 is shown in view E at the extreme right of Fig. 2. The changes in the shape of the shell as the punches 7 move into the die at the last redraw station are shown in the three middle views B, C and D of Fig. 2 and is described in detail hereinafter.

Punch presses of the type illustrated in Figs. 1, 2 and 3 also include ejector pins 12 one of each of the dies, which, during operation of the press, force the formed shells 8 out of the dies after the punches have been lifted from the dies on the upstroke of the upper bedplate 4. The actuating and control mechanisms for the ejector pins are well-known in the art in connection with commercially available presses of this type and a detailed description thereof is not necessary for a complete understanding of the invention by those skilled in the art.

In punch presses of the type shown utilizing ejector pins 12 to force the shells 8 up out of the dies a stripper plate is also provided for removing the shells from the punches at each station of the press as the punches are lifted. In accordance with the present invention a stripper plate 13 separate from the stripper plate or plates provided at the other stations of the press is provided at the last two stations described above.

As shown in Figs. 1 and 3, the stripper plate 13 has hardened inserts 13' secured thereto and is hung below the upper bedplate 4 on four hanger rods or studs 14, one at each corner of the stripper plate 13, which extend through openings in the upper bedplate so as to be movable in a vertical direction relative to the upper bedplate 4. The stripper plate 13 is urged in a downward direction and toward a forward position on the bedplate 4 by compression means in the form of an air cushion or cylinder 15 which is affixed to the upper bedplate 4 by bolts 16 and is connected by the conduit 17 to a source of air under pressure. A drain plug 18 is provided for the cushion 15. The lower movable segment 19 of the air cushion presses against four rods 20 passing through openings in the upper bedplate 4 and engaging the stripper plate 13 at the corners of the latter adjacent the studs 14. The rods 20 are movable vertically in the bedplate 4. Thus, the stripper plate 13 is urged away from the upper bedplate 4 in a downward direction but is relatively movable vertically with respect to the upper bedplate and the ends of the punches which extend through openings in the plate. The stripper plate thus floats on the upper bedplate 4.

The above-described parts of the punch press and the actuating and timing means therefor including the means for actuating the ejector pins 12 and for moving the strip 9 step-by-step through the punch press are well-known in the art and constitute no part of the present invention which is concerned with the means for controlling the movement of the stripper plate 13 relative to the lower ends of punches 7 as the upper bedplate 4 together with the punches 7 affixed to the latter are moved downward during each operating cycle of the punch press.

Of course, the stripper plate control means also controls the movement of the stripper plate 13 relative to the

lower ends of punches 10 but since the height of the partially formed shells presented for processing at the station having punches 10 is less than the height of the shells presented for processing at the station having punches 7 the stripper plate 13 engages the flange 8' on the shells 8 at different times and does not act on the flange in the same manner. Since wrinkles do not occur in the shell flanges at the station having punches 10 the stripper plate 13 need serve only the usual purpose of separating the shells 8 from the punches 10 on the upstroke of the upper bedplate 4. It does this successfully when the press including the stripper plate control means of this invention is operated as described below.

The species of the stripper plate control means shown in Figs. 1, 2 and 3 comprises a plurality of vertically movable stop pins 21 extending upward through openings in the lower bedplate 1 and located below the four corners of the stripper plate 13 (Fig. 2). The upper ends of the pins 21 engage the plate 13 as the stripper plate is lowered on the downstroke of the bedplate 4. The lower ends of the stop pins 21 engage the sloping surfaces 22 of the wedges 23 mounted in slideways in the lower bedplate 1. Each wedge 22 is engaged by two pins 21, as shown. The surfaces 22 of the wedges slope downwardly in an inward direction with respect to the lower bedplate 1. The pins 21 engaging the surfaces 22 and forced thereagainst on the downstroke of the upper plate 4 by the air cushion 15 urging the stripper plate 13 in a forward position with respect to the upper bedplate 4 and the lower ends of the punches, as described above, are moved downward as the wedges 23 are moved outwardly of the lower bedplate. Thus, the downward movement of the stripper plate 13 after the plate 13 engages the pins 21 is controlled by the outward movement of the wedges 23 with respect to the bedplate 1.

In the species of the invention illustrated in Figs. 1 to 3, the outward movement of the wedges 23 is accomplished through toggle joints 25 pivoted at one end 26 to the wedges 23 and at the opposite end 27 to fixed blocks 28 bolted as shown at 29 to the sides of the lower bedplate 1. The knees of the toggle joints are each provided with a roller 30 which, on part of the downstroke of the upper plate 4, is engaged by the shoulder 31 of a post 32 bolted to the upper bedplate 4 as shown at 33. The posts 32 extend vertically downward toward the lower bedplate 1 and openings 34 are provided in the frame 2 for accommodating their lower ends (Fig. 1). The lower ends of the posts are each provided with a shoulder 35 for the purpose described below.

The relative positions of the punches 7 and the stripper plate 13 with respect to each other and with respect to the lower bedplate 1 as the punches are moved with the upper plate 4 from the top toward the bottom of their stroke and back again during the operation of the press are shown in views A to E of Fig. 2 with the punches 7 at the top of their stroke in Fig. 2A and at the bottom of their stroke in view D.

As shown in view A of Fig. 2, at the top of the stroke with the upper bedplate 4 and the hanger rods or studs 14 holding the stripper plate 13 in its upper position, the lower ends of the punches 7 are above the lower surface of the stripper plate 13 and the lower surface of the stripper plate is above the top surface of the lower bedplate 1 a sufficient distance to allow the strip 9 with the shells 8 attached thereto to be moved laterally step-by-step therebetween in the operation of the press.

As the upper bedplate 4 moves downward toward the lower bedplate 1, the punches 7 and the stripper plate 13 are in the relative positions shown in view A of Fig. 2 until the stripper plate 13 has been lowered into engagement with the top of the pins 21. The downward motion of the stripper plate 13 is arrested at this point by the stripper plate control means including the

5

pins 21 with the lower surface of the stripper plate engaging the pins 21 and the top of the metal strip 9. With the stripper plate in this position the bottom of the shells 8 are in the dies in the lower bedplate 1 as shown in view B of Fig. 2.

While the stripper plate 13 is supported temporarily in this position by the stripper plate control means, the upper bedplate 4 continues its downstroke to carry the punches 7 and the posts 32 downward and change their positions in a vertical direction relative to the stripper plate 13. As the lower ends of the punches 7 approach the level of the lower surface of the stripper plate 13 resting on the pins 21 the shoulders 31 on the posts 32 engage the rollers 30 on the toggle joints 25 and start to bend downward the toggle joints at the knees.

The relative positions of the lower ends of the punches 7 and the stripper plate 13 and the relative positions of the shoulders 31 and the rollers 30 at this time are shown in view B of Fig. 2 and in Fig. 1, respectively.

As the toggle joints are bent at the knees further by the continued downward motion of the upper bedplate 4 the distance between the ends of the toggle joints 25 is shortened and since one end 27 of each of the joints 25 is pivotally anchored to the block 28 affixed to the lower bedplate 1 the opposite end 26 of the toggle joint is forced to move outwardly of the lower bedplate 1 moving with it the wedge 23 to which it is pivotally attached. As the wedges 23 are pulled outwardly of the lower bedplate 1 the lower ends of the stop pins 21 slide along the sloping surfaces 22 allowing the stripper plate 13 to move downward under the force exerted thereon through the air cushion 15.

The punches 7 continue to descend as the toggle joints 25 are bent as described above and the stripper plate is slowed in its descent by the control mechanism including the pins 21, the wedges 23 and the toggle joints 25.

The stripper plate 13 as it descends under the control of the mechanism described above forces the shells 8 further into the dies in the lower bedplate 1 until the shells have been lowered in the dies a distance such that the steps or shoulders 36 on the shells 8 are about to engage the upper ends of the dies in the lower bedplate 1. At this time the lower ends of the punches 7 engage the bottoms of the shells 8 and since the punches are descending at a more rapid rate than the stripper plate 13 the punches force the shells downward at a rate faster than the rate at which the stripper plate is descending so that, as the shoulders 36 on the shells engage the upper ends of the dies, the flanges 8' on the shells 8 are separated a slight distance from the bottom surface of the stripper plate 13. The relative positions of these parts of the punch press with respect to each other and to the shells at this time are shown in view C of Fig. 2.

The small spacing between the flanges 8 on the shells and the stripper plate is gradually reduced as the punches 7 and the stripper plate 13 continue their downward movement from their positions shown in view C of Fig. 2 due to the elongation of the shell parts between the shoulders 36 and the flanges 8' as these shell parts are being drawn. This spacing is so adjusted relative to the elongation of these parts of the shells that the flanges 8' are again engaged by the lower surface of the stripper plate 13 just before the punches 7 and the plate 13 reach the bottom of their stroke. Thus, when the punches 7 and the stripper plate 13 are at the bottom of their stroke, the flanges on the shells are lightly clamped or pressed between the lower surface of the stripper plate and the upper surface of the lower bedplate 1, as shown in view D of Fig. 1. Because of the action of the stripper plate 13 on the flanges 8' during the drawing of the cylindrical parts of the shells 8 immediately adjacent the flanges 8', the occurrence of wrinkles in the flanges is prevented in a positive manner. The elongation of the shells when completely drawn is indicated in broken lines in view A of Fig. 2.

6

On the upstroke of the assembly including the upper bedplate 4, the punches 7, the stripper 13 and the air cushion 15, the posts 32 are lifted so that the wedges 23 and therewith the pins 21 can be moved back to their original positions. Springs 38 are provided to force the wedges back to their original positions in the bedplate 1 as the posts 32 are lifted. The springs 38 are accommodated in recesses in the blocks 28 and at the ends of the elongated wedges 23, as shown in Figs. 1 and 3. The springs are compressed when the wedges 23 are moved outward of the bedplate 1 as described above and force the wedges 23 inward of the bedplate 1 to straighten the toggle joints 25 and to move upward the pins 21 and therewith the stripper plate 13 when the posts 32 are lifted. The rollers 30 on the toggle joints follow the shoulders 31 on the posts 32 so that the stripper plate 13 and the punches 7 move upward together until they are at the level shown in Fig. 1 of the drawings with the pins 21 in their fully lifted position. The stripper plate 13 remains at this level while the punches 7 continue their upward movement until they are retracted into the plate 13, and are withdrawn from the shell 8 as shown in view E of Fig. 2. The stripper plate is lifted into the position shown in view A of Fig. 2 when the upper bedplate 4 engages the studs 14 on the stripper plate 13.

The lower shoulders 35 on the posts 32 are provided as a safety feature to engage the rollers 30 on the toggle joints 25 to assist the springs in straightening the joints when the posts 32 are lifted if the springs 38 fail for any reason to alone force the wedges back into the bedplate 1 on the upstroke of the punch and stripper assembly.

The ejector pins 12 are moved upward in the dies in the bedplate 1 as the punches 7 and the stripper plate 13 are lifted. The ejector pins 12 force the shells completely out of the dies after the upward movement of the stripper plate 13 and the punches 7 have progressed until both are above the strip 9 carrying the shells 8 and the shells 8 have been stripped from the punches 7 by the stripper plate 13. As soon as the shells 8 are ejected from the dies the ejector pins 12 are returned to their lowered positions. The strip 9 with the completely drawn shells 8 attached thereto is moved after the shells are free from the dies and the punches to move the completely drawn shells to the trimmer (not shown) of the press and to bring another group of partially drawn shells to the last reduction die station of the press whereupon the above-described operation of the press is repeated automatically. The shape of a shell after trimming to remove the flange is indicated in broken lines in view A of Fig. 2.

As mentioned above, the stripper plate 13 serves at the station of the press preceding the last redrawn station merely to strip the shells from the punches 10 at that station. Since wrinkles do not occur in the flanges at the station having punches 10 it suffices that the stripper serves only the usual purpose of separating the shells from the punches 10 on the upstroke of the punch and stripper assembly.

The species of the invention shown in Figs. 4, 5 and 6 of the drawings is similar to that shown in Figs. 1 to 3. In this embodiment the wedge surfaces 40 engaged by the lower ends of the stop pins 21 for the stripper plate 13 are correspondingly inclined and are part of a slide member 41 extending completely across the lower bedplate 1. The slide member 41 including the two wedge surfaces 40 constitutes a single unit which is movable in guideways in the lower bedplate 1. As shown in Fig. 5, the slide member 41 has a central opening 42 so that this member does not interfere with the ejector pins 12 of the punch press.

In Fig. 5 of the drawings the strip 9 travels in the direction indicated by the arrow, that is from the bottom toward the top of the figure which is the reverse of the travel of the strip 9 in the press illustrated in Fig. 3. The last redraw station in Fig. 5 is that whereat the ejector pins 12 are shown in this figure and the station immediately preceding the last redraw station is located

at the position indicated by the punches 10 in this figure. The opening 42 in the slide member 41 allows clearance for the ejector pins 12 at both of these stations.

Since the wedge surfaces 40 slope correspondingly in the same direction the pins 21 engaging these sloping surfaces are lowered and raised together when the slide member 41 is moved laterally of the pins. For example, when the wedge surfaces 40 are moved toward the left from their positions shown in Fig. 4 the pins 21, urged downward by the stripper plate 13 as described above in connection with Figs. 1 to 3, move downward in the lower bedplate 1. The pins 21 and therewith the plate 13 are forced upward again when the wedge surfaces 40 are returned to the positions shown in Fig. 4.

The actuating mechanism for so moving the slide member 41 having the wedge surfaces 40 includes a pair of toggle joints 44 (Figs. 5 and 6) pivoted to the slide member 41 at one end as shown at 45 and pivoted at the other end as shown at 46 to a stationary block 47 (Figs. 4 and 5) bolted as shown at 48 to the lower bedplate 1. The knees of the toggle joints 44 are provided with rollers 50 and are moved outward from each other to move the slide member 41 outward from the lower bedplate 1 by the wedge-shaped inner end 51 of a slide bar 52 which engages and spreads apart the rollers 50 when moved from right to left of its position shown in Figs. 5 and 6.

The slide bar 52 is reciprocated in a longitudinal direction through a cam follower in the form of a roller 53 mounted at its outer end. The slide bar 52 moves longitudinally in guideways in member 54 affixed to frame member 2 and has on its wedge-shaped inner end 51 a projection 55 extending downwardly into the slot 56 provided in the slide member 41. The projection 55 and the slot 56 are constructed and arranged so that as the slide bar is moved outward to spread the rollers 50 apart and move the slide member 41 from right to left of its position shown in Fig. 4, the projection 55 engages the outer end of the slot 56 to complete the movement of the slide member 41 in this direction. Thus, the initial movement in a downward direction of the stripper plate 13 is controlled by the toggle joints 44 and the final movement of the plate 13 in a downward direction is controlled by the projection 55 engaging the outer end of slot 56 in slide member 41 as the slide bar 52 is moved outwardly. When the slide bar is moved inwardly from its outer position the projection 55 engages the opposite end of the slot 56 to return the slide member 41 to its original position and thereby lift the pins 21 and the stripper plate 13 to their original lifted positions.

The roller 53 of the slide bar 52 engages the cam track 58 on the periphery of a drum cam 59. The track 58 is arranged to reciprocate the slide bar longitudinally when cam 59 is rotated. The cam 59 is mounted for rotation on a spindle 60 secured to the member 54 affixed to frame 2 of the punch press. The cam 59 has attached to it a sprocket 61 which, in turn is connected by the chain 62 to the sprocket 63 keyed to the crank shaft 64 of the punch press. Thus, as the crank shaft 64 of the press is driven by the main drive means of the press the slide member 41 is moved in and out of the lower bedplate 1 to the end that the pins 21 are moved upward and downward in the lower bedplate 1 to control the movements of the stripper plate 13 in the same manner and in the same time sequence with respect to the punches 7 and 10 described in connection with Figs. 1 to 3.

Also shown in Fig. 4 of the drawings are the offset section 65 of the drive shaft 64, the crank 66 and the yokes 67 which together constitute part of the usual actuating means in this type of punch press for moving the rods 3 connecting the upper bedplate 4 of the press to the main drive of the press.

While two species of the invention have been shown and described it will be understood, of course, that changes in the form and details of the apparatus illus-

trated may be made by those skilled in the art without departure from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. A stripper plate control mechanism for the last redraw station of a punch press for drawing flanged shells, said press having a frame, a stationary die mounted on the frame, a reciprocable punch for the die, actuating means for the punch and a floating stripper plate mounted on the punch, said control mechanism including a pin mounted for reciprocation in the path of the stripper plate to intercept the plate on the downstroke of the punch, a wedge engaging the lower end of the pin and reciprocable transversely of the pin for lowering and raising the pin and therewith the stripper plate, a toggle joint pivotally joined to the frame and to the wedge for reciprocating the wedge and means connected to the punch actuating means for bending the toggle joint at the knee to lower the stripper plate at a rate such that the stripper plate follows the flange on the shell while the shell is being redrawn and elongated by the punch and the die and presses the flange against the surface of the die around the die opening as the punch approaches the termination of its downstroke to prevent wrinkles in the shell flange, said mechanism comprising also means connected to the wedge for raising the stripper plate on the upstroke of the punch.

2. A stripper plate control mechanism for the last redraw station of a punch press for drawing flanged shells, said press having a frame, a stationary die mounted on the frame, a reciprocable punch for the die, actuating means for the punch and a floating stripper plate mounted on the punch, said control mechanism including a pin mounted for reciprocation in the path of the stripper plate to intercept the plate on the downstroke of the punch, a wedge engaging the lower end of the pin and reciprocable transversely of the pin for lowering and raising the pin and therewith the stripper plate, a toggle joint pivotally joined to the frame and to the wedge for reciprocating the wedge and means including a post having a shoulder for engaging the knee of the toggle joint, said means being connected to the punch actuating means for bending the toggle joint at the knee to lower the stripper plate at a rate such that the stripper plate follows the flange on the shell while the shell is being withdrawn and elongated by the punch and the die and presses the flange against the surface of the die around the die opening as the punch approaches the termination of its downstroke to prevent wrinkles in the shell flange, said mechanism comprising also means connected to the wedge for raising the stripper plate on the upstroke of the punch.

3. A stripper plate control mechanism for the last redraw station of a punch press for drawing flanged shells, said press having a frame, a stationary die mounted on the frame, a reciprocable punch for the die, actuating means for the punch and a floating stripper plate mounted on the punch, said control mechanism including a pin mounted for reciprocation in the path of the stripper plate to intercept the plate on the downstroke of the punch, a wedge engaging the lower end of the pin and reciprocable transversely of the pin for lowering and raising the pin and therewith the stripper plate, a toggle joint pivotally joined to the frame and to the wedge for reciprocating the wedge and means including a slide bar for engaging the knee of the toggle joint and a cam engaging the slide bar and connected to the punch actuating means for bending the toggle joint at the knee to lower the stripper plate at a rate such that the stripper plate follows the flange on the shell while the shell is being redrawn and elongated by the punch and the die and presses the flange against the surface of the die around the die opening as the punch approaches the termination of its downstroke to prevent wrinkles in

the shell flange, said mechanism comprising also means connected to the wedge for raising the stripper plate on the upstroke of the punch.

References Cited in the file of this patent

UNITED STATES PATENTS

250,255 Jordan ----- Nov. 29, 1881

487,271
787,052
1,416,168
1,519,552
1,570,199
2,369,187
2,872,887

5

Hodgson ----- Dec. 6, 1892
Ross ----- Apr. 11, 1905
Carleton ----- May 16, 1922
Rigby ----- Dec. 16, 1924
Beyer ----- Jan. 19, 1926
Swertfager et al. ----- Feb. 13, 1945
Praturlon ----- Feb. 10, 1959