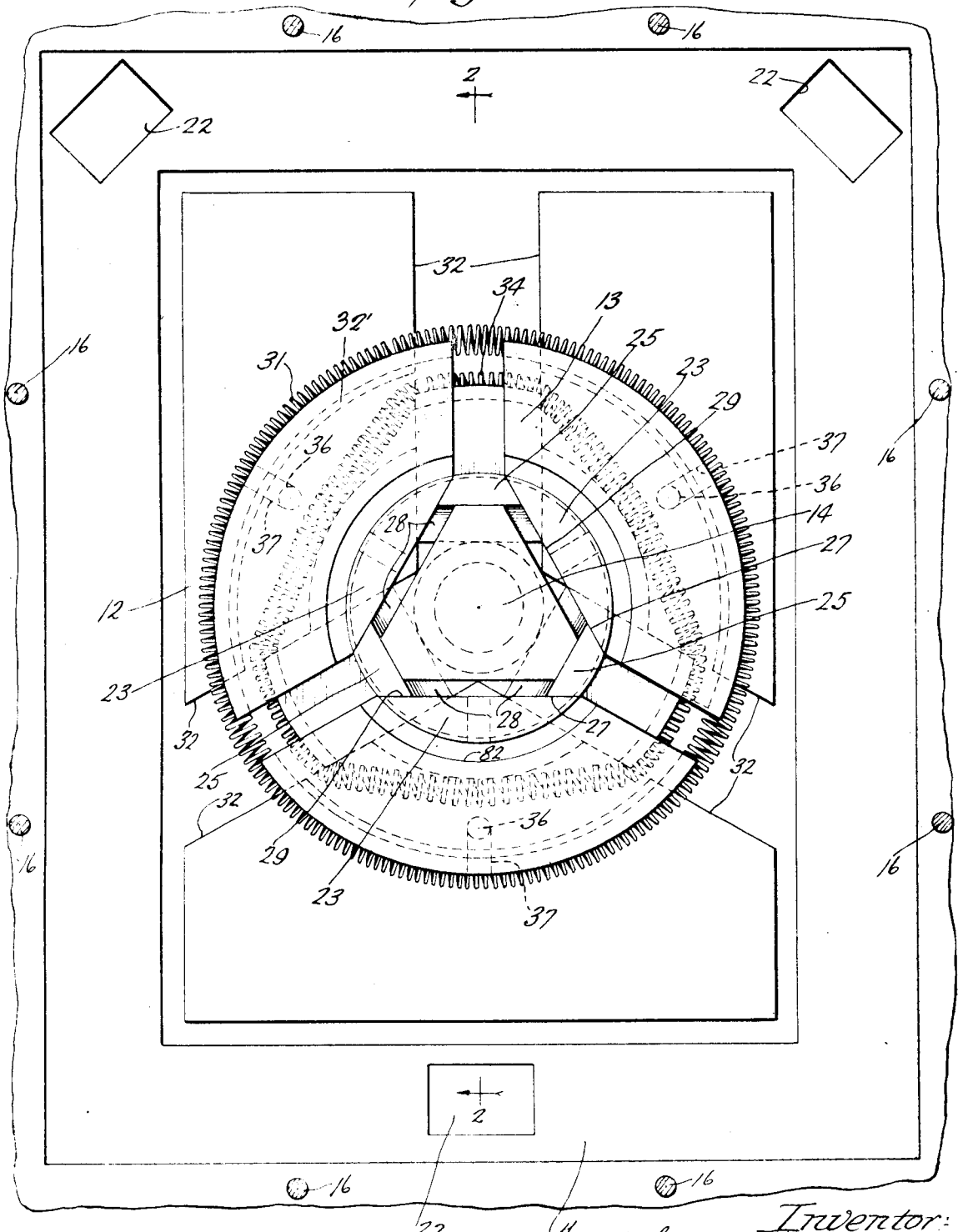
Sept. 15, 1931. J. M. HOTHERSALL 1,823,047

METHOD OF AND APPARATUS FOR BEADING OF FORMED SHEET METAL ARTICLES

Filed Dec. 8, 1926 5 Sheets-Sheet 1

Fig. 1



Inventor:
John M. Hothersall

Munday, Clarke & Carpenter
Attys.

Sept. 15, 1931. J. M. HOTHERSALL 1,823,047

METHOD OF AND APPARATUS FOR BEADING OF FORMED SHEET METAL ARTICLES

Filed Dec. 8, 1926 5 Sheets-Sheet 2

Fig. 2

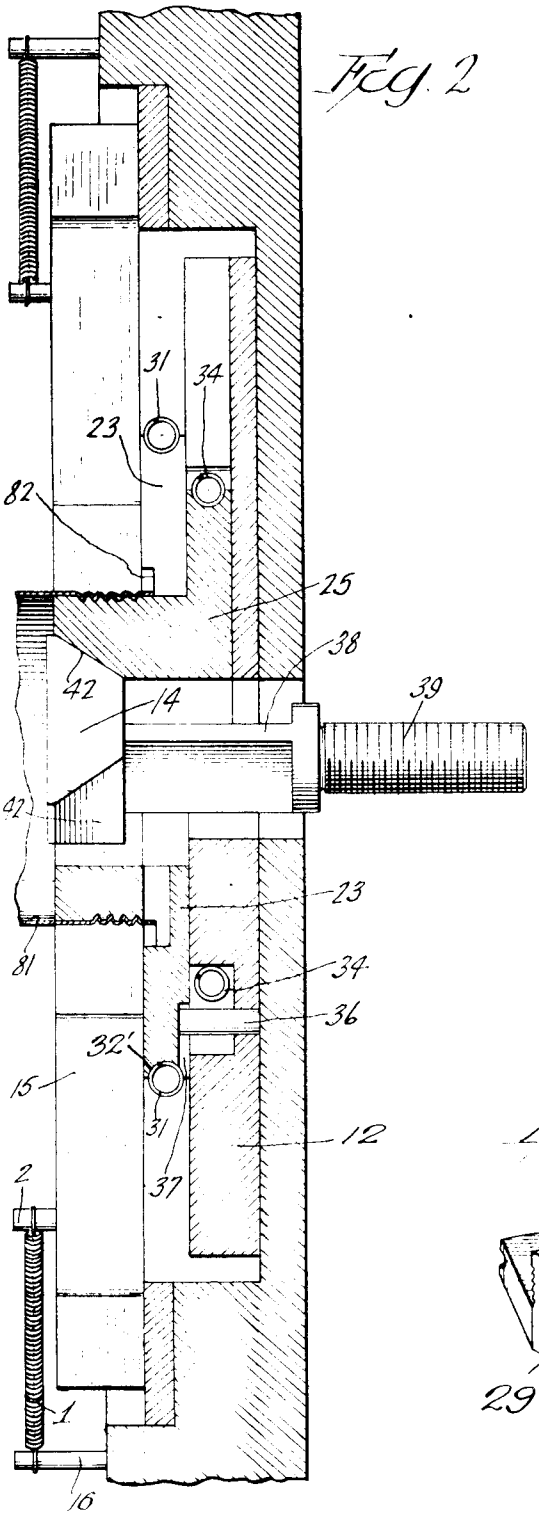


Fig. 3

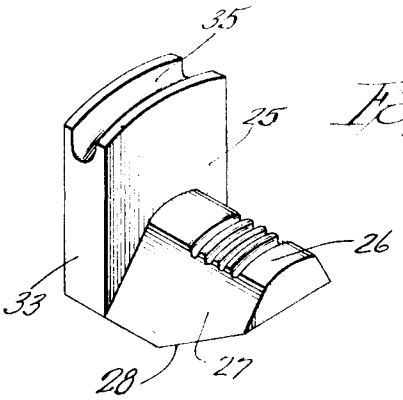


Fig. 4

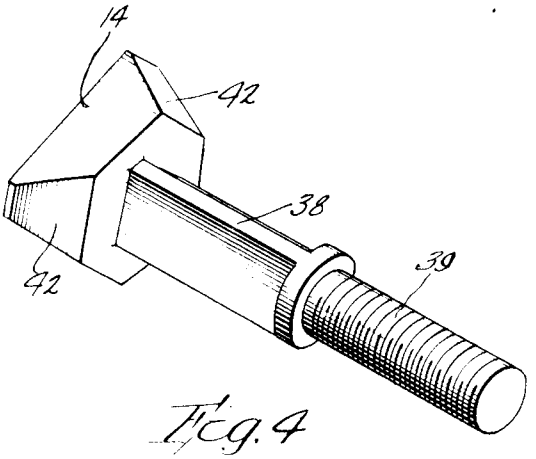
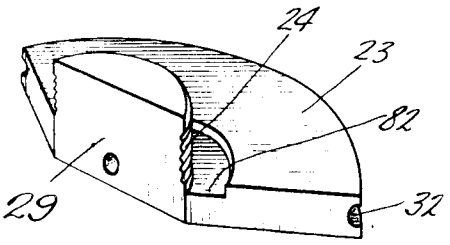


Fig. 5



Inventor
John M. Hothersall

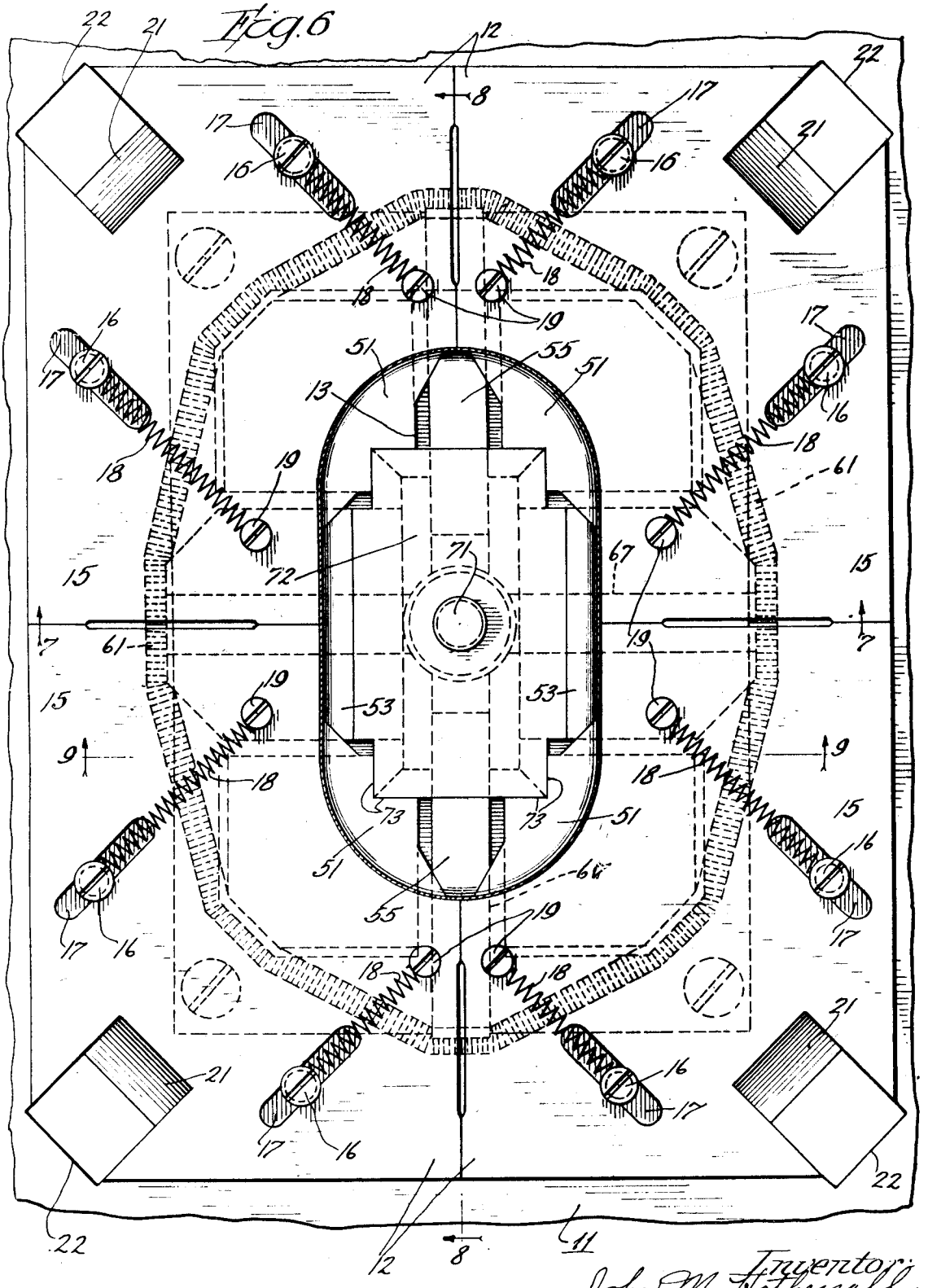
By Munday, Clarke & Lapointe
Attys

Sept. 15, 1931. J. M. HOTHERSALL 1,823,047

METHOD OF AND APPARATUS FOR BEADING OF FORMED SHEET METAL ARTICLES

Filed Dec. 8, 1926 5 Sheets-Sheet 3

Fig. 6



Inventor:
John M. Hothersall
By Munday, Clarke & Carpenter
Attys.

Sept. 15, 1931. J. M. HOTHERSALL 1,823,047

METHOD OF AND APPARATUS FOR BEADING OF FORMED SHEET METAL ARTICLES

Filed Dec. 8, 1926 5 Sheets-Sheet 4

Fig. 7

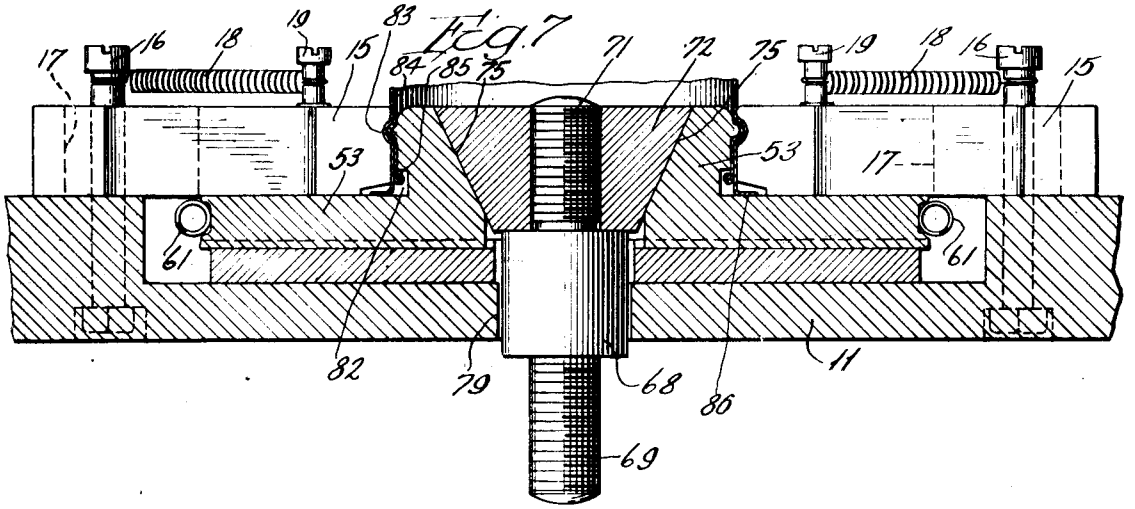


Fig. 8

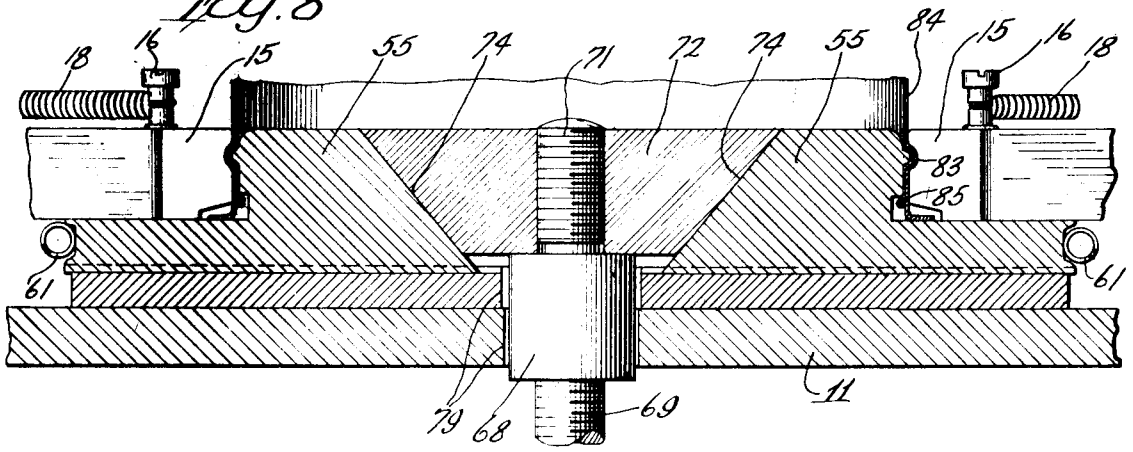
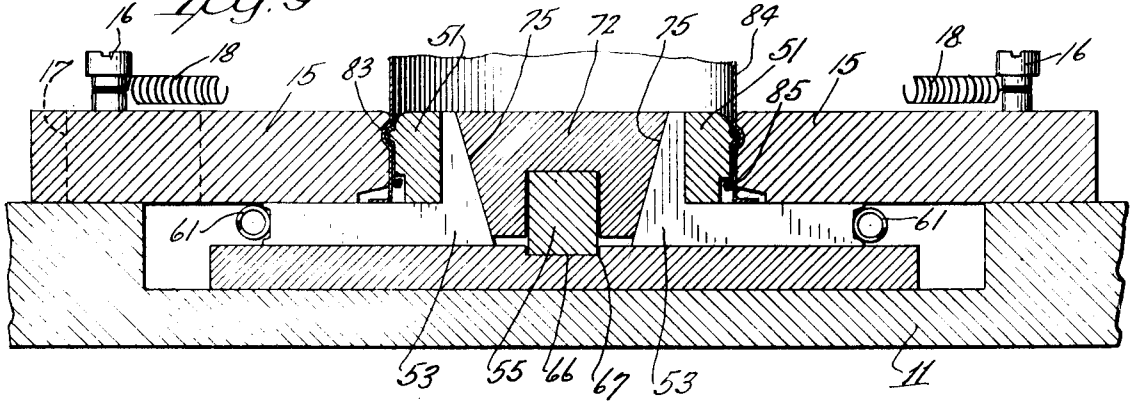


Fig. 9



Inventor:
John M. Hothersall

By Munday, Clarke & Carpenter
Attys

Sept. 15, 1931. J. M. HOTHERSALL 1,823,047

METHOD OF AND APPARATUS FOR BEADING OF FORMED SHEET METAL ARTICLES

Filed Dec. 8, 1926 5 Sheets-Sheet 5

Fig. 10

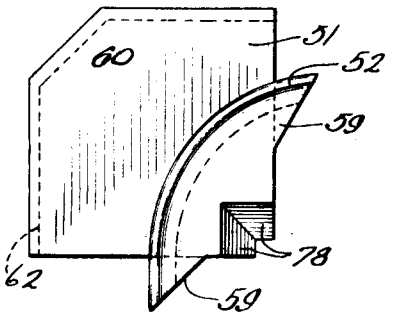


Fig. 11

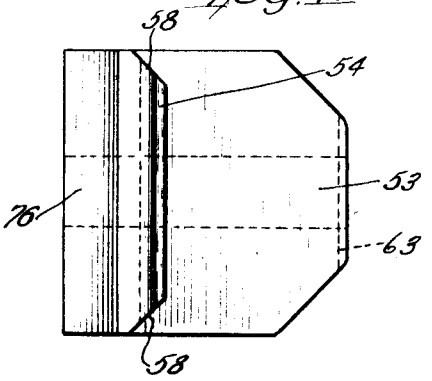


Fig. 12

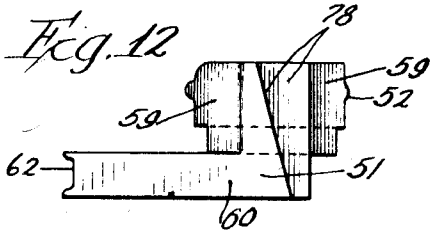


Fig. 13

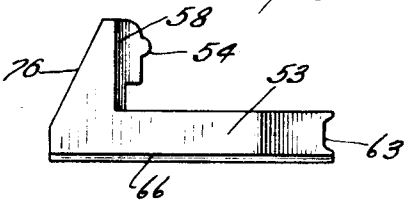


Fig. 14

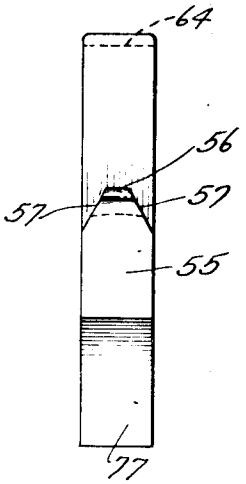
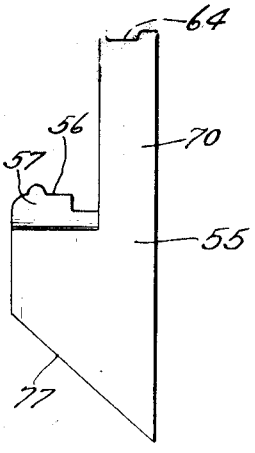


Fig. 15



Inventor:
John M. Hothersall

By Munday, Clarke & Carpenter
Attys.

Patented Sept. 15, 1931 1,823,047

UNITED STATES PATENT OFFICE

JOHN M. HOTHERSALL, OF BROOKLYN, NEW YORK, ASSIGNOR TO AMERICAN CAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY

METHOD OF AND APPARATUS FOR BEADING OF FORMED SHEET METAL ARTICLES

Application filed December 8, 1926. Serial No. 153,232.

This invention relates in general to the beading of formed sheet metal articles, such as can bodies, nozzles, and the like with concavo-convex beads, and it will be manifest as the invention is better understood that the expression "beading" is intended to, and does include the formation of internally and externally extending beads, and also the arrangement of the beads in the form of spirals to provide screw threads in the metal.

Prior to the present invention, it has been generally the custom to bead the can, nozzle, or the like, either by the employment of a roll moving progressively around the can or by arranging the part to be beaded between internal and external dies. The die beading as employed in the past has required the use of internal dies, which merely consisting of a number of parts simultaneously moving radially outwardly or at any rate from a central locus has provided a bead interrupted at points about the surface of the can because of the space between the operative die members occasioned by their separating or generally radial movement. Where the beads have been formed by an internal roll, the operation has of necessity been a slower one because of the need of the roll to confine its action to a progressively moving point about the can, and has also had a further inherent disadvantage because of a tendency to roll up or crowd the metal ahead of it as the roll moved in operation.

My invention has for its principal object the provision for die beading which will positively head or form the entire circumference of the can, or other metal body worked upon, so that the bead will be continuous about the can either in a single plane or in the spiral arrangement of the screw threads.

A further important object of the invention is the provision for the forming of a continuous bead about a can or other metal article through the use of dies and in the ordinary press usually available for this operation.

Another important object of the invention is the provision of an apparatus for the carrying out of my new process of forming a continuous bead through a die, which will consist of few and simple parts, of certain positive action, and unlikely to require frequent repair, replacement or readjustment in service.

Another and important object of the invention is the provision of a process and apparatus of the character described, which can with equal facility be employed in the beading of cans and containers of non-circular as well as circular forms.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of an apparatus embodying my present invention with certain of the parts removed;

Fig. 2 is a section taken on line 2—2 in Fig. 1, with the parts removed from said Fig. 1 in space;

Fig. 3 is a perspective view of one of the internal die members shown in Fig. 1;

Fig. 4 is a perspective view of the expander employed with the die of Fig. 1;

Fig. 5 is a perspective view of another and different die part in Fig. 1;

Fig. 6 is a top plan view of the apparatus arranged to bead oval cans and with the can shown in section.

Figs. 7, 8 and 9 are partially enlarged sections taken, respectively on the lines 7—7, 8—8 and 9—9 of Fig. 6;

Fig. 10 is a top plan view of an internal corner die part of the form shown in Fig. 6;

Fig. 11 is a top plan view of a side central die part of the die of Fig. 6;

Fig. 12 is a side elevation of the die part shown in Fig. 10;

Fig. 13 is a side elevation of the die part shown in Fig. 11; and

Figs. 14 and 15 are respectively front side views of the end central die parts of the internal die of Fig. 1.

The apparatus shown on the drawings and disclosing the present preferred embodiments of my present invention employs the usual internal outwardly or substantially radially moving die parts, which in the usual die bead-

ing action separate as they move from their retracted position to their operative position and these parts leave, as has been usual in the past, spaces between themselves, which cannot be reached by their operative faces in the beading action. In co-operation with these parts, however, I have provided in the present instance other supplemental die parts having a later, or at any rate a retarded movement and which are so constructed that they may move throughout a path provided by this separation of the first mentioned die parts into beading engagement with the wall of the container and this independently of whether the bead extends inwardly or outwardly from the can.

The embodiment of the invention shown on the drawings in Figures 1 to 5 is particularly adapted for cylindrical bodies and the faces of the dies are formed in this embodiment of the invention to provide a screw thread at the end of the metal cylinder. Reference character 11 indicates a base plate which carries the operative parts. The external die members are removed from Figure 1 and are shown at 15 in Fig. 2. The paticular construction and operation of the external dies is or may be that usually employed in any die beading. A detailed description thereof will, therefore, be unnecessary to an understanding of the present invention. I should, however, mention that these dies indicated by reference character 15 in Fig. 2 move inwardly into beading position on the base plate 11. These die members consist of a number of segmental parts normally pulled to inoperative position by spring 1 engaging pins 16 in the base plate and pins 2 on the die members. They are moved in the beading operation by wedge members (not shown) passing through the openings in the dies and through opening 22 in the base member.

The internal die members consist in the present instance of two sets, the members of the two sets being alternately arranged and adapted as has been earlier stated to engage and bead the entire circumference of the can body. A member of one set is shown in Fig. 3 and a member of the other set in Fig. 5. Reference characters 23 indicate the members of one set, i. e.: that shown in Fig. 5, and it will be noted that each of these consists of an upwardly extending operative part 24 having an arcuate face formed to provide a part of the bead and a body indicated by reference character 23 adapted to slide on a bed member 12 on the base plate 11. Pins 36 extend up from the bed member into slots 37 in the underside of these die members. A spring 31 engages in grooves 32′ extending about the outer faces of these die members and serves to move these die members to retracted position after each beading operation. Each die of the other set of die members 25 (illustrated in enlarged detail in Fig. 3) comprises an operative portion or upwardly extending part having an operative arcuate face 26 and cam faces 27, the purpose of which will be presently described. These members have lower base parts 33 adapted to slide radially in grooves 32 in the bed plate. The parts 25 are arranged to alternate with the parts 23 and a spring 34 engaging in grooves 35 of the die parts 25 moves these parts radially back into retracted position after the dies have beaded the can body. Cam faces 27 engage faces 29 of the die parts 23, these faces in this engagement being angularly disposed with respect of the movement of the die parts 25. The expander or spreader 14 engages the die parts 25 to move the parts 23 outwardly through them and moves outwardly also the die parts 23 by reason of the engagement of the cam faces 27 and 29. The die parts 25 are provided with cam faces 28 inclining inwardly and downwardly from the top of the die parts into position for engagement by cam faces 42 on the expander 14. It will be noted that the die parts 23, in moving from retracted to operative position, separate, and in this separation provide an opening or path through which the operative faces of the die parts 25 may move into beading position. The expander is provided with a stem 38 having a threaded end 39 for engagement with a suitable die press part to produce necessary reciprocation of the expander.

The die construction embodying my invention and adapted for the beading of non-circular (oval) cans is disclosed in Figures 6 to 15, on which reference character 15 indicates the external dies which are in appropriate number and formation to control the outer surface of the can during the beading operation. These die members are moved to operative position by wedges (not shown) passing downwardly through openings 22 in the die members and engaging the cam surfaces 21 there provided. They are moved to retracted position by springs 18 engaging shoulder studs 19 on the die members and guide pins 16 extending through slots 17 into the base plate. The internal die consists of a set of members 51 and a set of members 53 and 55 alternately arranged with the members 51. The operation and action of these die parts is that already described in connection with the die parts shown in Figures 1 to 5. Each member 51 consists of an upwardly extending body having an operative face 52 and a body 60 grooved at 62 to receive a spring 61 for retracting the die members. These die members slide upon the bed plate and each is provided with cam faces 59 adapted for engagement with adjacent die parts as will be presently described. The die members 53, one of which is located at each side, and which are adapted to form the bead in the sides of the can, are shown in Figs. 11 and 13 and each

has an operative face 54 and inclined cam faces 58. The body 66 of each of these die members is provided with a groove 63 for engagement by the spring 61. Die members 55 are arranged to form the bead at the extreme ends of the can and each has an operative face 56 and a cam face 57 on each side thereof. The body 70 of each of the die members 55 is provided with a cam groove 64 for the reception of the spring 61. In the present instance a single spring embraces all of the internal die members and moves them to closed position after a beading operation. In this embodiment of the invention, the expander 71 engages all of the internal die members. It includes or consists of a head 72 and a stem 68, this stem passing through an opening 79 in the base plate 11 and threaded at its lower end at 69 for engagement with the press operating mechanism. The head 72 has intersecting cam surfaces 73 which engage cam surfaces 78 formed in the inner corners of die parts 51. It has also cam faces 75 and 74 which respectively engage the cam faces 76 and 77 of die parts 53 and 55. The engagement with the die parts 51 is in advance of the engagement with the die parts 53 and 55 so that the die parts 51 are first moved outwardly or from a central locus to permit the die members 53 and 55 to move up into engagement with the can in the manner earlier described in connection with the die parts 25 of the embodiment shown in Figures 1 to 5. The wedge or cam faces 59 of the die parts 51 are or may be engaged by the wedge faces 57 and 58 of the die parts 53 and 55 at the end of the beading.

The die in the embodiment of the invention shown in Figures 6 to 15 is adapted to form a single circumferential bead about the can and the drawings illustrate the positioning of an internal band within the can end and the conjoint beading of the can body and the band to fasten the two together. Reference character 84 indicates the can and reference character 85 the band or collar and the bead is indicated at 83. If desired, the parts may be recessed or grooved at 82 to accommodate the seaming flange 86 and the curl of the collar, as seen in Fig. 7.

In operating on oblong and rounded can bodies, as shown in Fig. 6, the material of the body is compressed inwardly and outwardly at what may be termed its rounded corners, so as to form concavo-convex beads at said corners, and at the same time pressure is exerted inwardly at the middle of the ends and sides of the bodies, and thereafter the dies 55, 55, 53, 53 come into action and complete the beading of the body at its ends and sides.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the forms hereinbefore described being merely preferred embodiments thereof.

I claim:

1. The process of forming concavo-convex beads in formed sheet metal can bodies, which comprises, squeezing the can body between internal and external dies and thereby forming interrupted bead portions, and then moving said internal dies to exert pressure about the unbeaded inner surface of the bodies at the end of the bead forming operation.

2. The process of forming concavo-convex beads in formed sheet metal can bodies, which comprises, squeezing the can body at alternating places between internal and external dies composed of a plurality of parts, and exerting pressure on an internal part through a second internal part and thereby beading the places of the body not at first beaded.

3. The process of forming beads in formed sheet metal can bodies, which comprises, arranging the can body between internal and external dies, each consisting of a number of parts having bead-forming surfaces, moving predetermined internal parts in the beading action outwardly from a retracted position and thereafter moving other die parts outwardly and in between the first mentioned die parts to form the bead at locations in the can body presented by the separating movement of the first mentioned die parts because of their outward movement from a retracted position.

4. The method of beading sheet metal containers by successive radial pressures and preserving at said beads the original thickness of the sheet metal, which consists in forming the bead at intervals around the container leaving unbeaded sheet metal between the beaded parts, and then beading said unbeaded sheet metal.

5. A method of forming can bodies which are oblong and rounded in cross-section, which consists in compressing the material of said bodies both inwardly and outwardly at the rounded corners of said bodies by radial movements of the compressing elements so as to form concavo-convex beads at said corners, and then pressing said material inwardly and outwardly along said ends and sides to complete the bead at said ends and sides.

6. An apparatus for beading formed can bodies with concavo-convex beads, which comprises, internal and external dies, each consisting of a number of die parts having beadforming surfaces, and means for operating certain of said internal die parts later in their movement to beading position than certain other internal die parts.

7. The process of securing collars within formed can bodies, which comprises squeez-

ing the can body and inserted collar between internal and external die elements, thereby forming interrupted bead portions in said body and collar, and then moving other internal die elements to exert pressure on the unbeaded inner surface of the collars and bodies at the end of the bead forming operation.

8. An apparatus for beading formed can bodies, which comprises, external and internal dies both having bead-making formations and cooperating with each other along a surface of oblong contour extending around the can by engaging opposite sides of the can body wall, said external die comprising a plurality of separate die parts movable from an inoperative position into beading position, and said internal die comprising a plurality of separate die parts movable from a relatively central retracted position into beading position, the other internal die parts movable into beading position through the path opened between the first mentioned die parts by their movement to beading position.

9. An apparatus for beading formed can bodies, which comprise, outer and inner dies both having bead-making formations and cooperating with each other along a surface of oblong contour extending around the can by engaging opposite sides of the can body wall, said outer die comprising a plurality of separate die parts movable from an inoperative position into beading position, the outer dies comprising separate parts for operating on each of the sides, ends and corners of the can body, and said inner die comprising a plurality of separate sets of die parts, the members of one set alternating with the members of the other, a spreader for accomplishing the beading action, said spreader engaging the members of one set of inner die parts and exerting pressure upon the members of the other set through the members of the set first engaged.

JOHN M. HOTHERSALL.