

March 11, 1930.

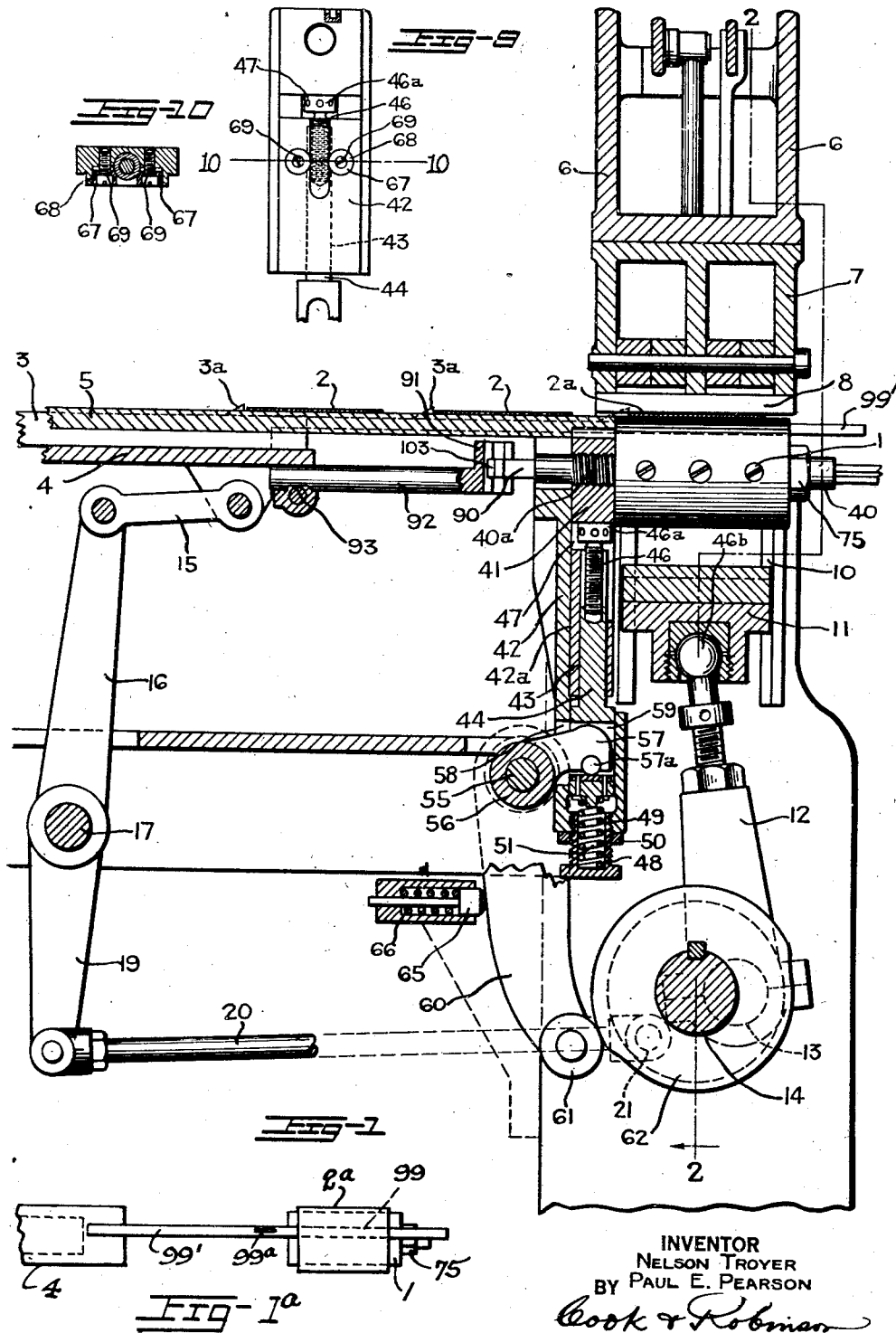
N. TROYER ET AL

1,750,550

EXPANDER AND CLAMP MECHANISM FOR CAN BODY MACHINES

Filed Oct. 1, 1928

3 Sheets-Sheet 1



March 11, 1930.

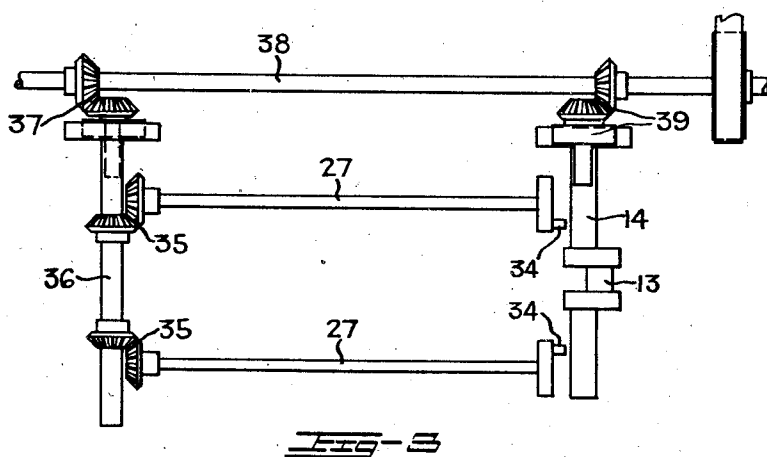
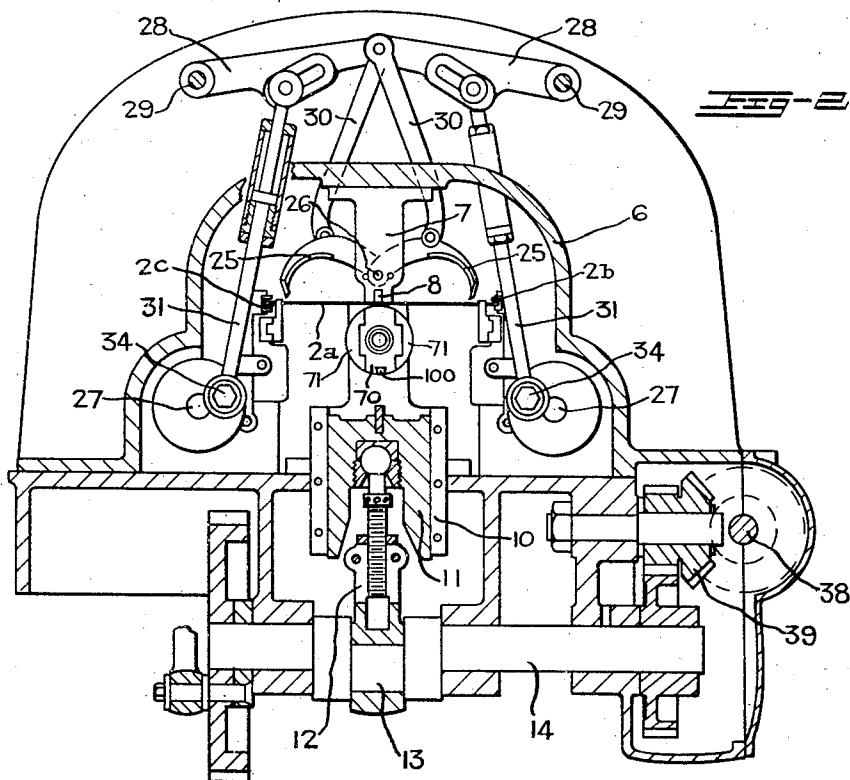
N. TROYER ET AL

1,750,550

EXPANDER AND CLAMP MECHANISM FOR CAN BODY MACHINES

Filed Oct. 1, 1928

3 Sheets-Sheet 2



INVENTOR
NELSON TROYER
PAUL E. PEARSON

BY *Look & Robinson*
ATTORNEY

UNITED STATES PATENT OFFICE

NELSON TROYER AND PAUL E. PEARSON, OF SEATTLE, WASHINGTON, ASSIGNORS TO
SEATTLE ASTORIA IRON WORKS, OF SEATTLE, WASHINGTON, A CORPORATION OF
WASHINGTON

EXPANDER AND CLAMP MECHANISM FOR CAN-BODY MACHINES

Application filed October 1, 1928. Serial No. 309,662.

This invention relates to can body making machines, and more particularly to improvements in mechanism associated with the horn about which the can bodies are formed; it being the principal object of the invention to improve the construction and arrangement of parts making up the horn, also to simplify the means for expanding the horn and to provide an easy adjustment for regulating the clearance between the horn and the abutment bracket against which the body blanks are clamped by the horn during the forming and seaming operations.

In can body machines of the type embodying the present improvements, the body blanks are intermittently advanced, by reciprocating feed bars, along a guideway past certain devices which operate to form oppositely turned hooks on the ends of the blanks, after which the blanks are advanced to the horn and are wrapped or formed about it by the action of a pair of wing clamps, so that their flanged edges will be brought into overlapped relation. Just before the forming operation the horn is slightly moved so as to clamp the blank against an abutment to prevent slipping and then the horn is expanded diametrically so that the overlapped ends of the blank will be hooked together, one within the other, and when in this relation, they are struck by a bumper so as to clamp them together in a tightly closed seam.

Heretofore, the forming horn was made with pivotally mounted, opposite side plates adapted to be swung outwardly by the action of an expander bar moving between them, the bar, in turn, being actuated in synchronism with the feed bars through connection with the same shaft by which the bumper was actuated. While the prior construction was very satisfactory, in so far as its efficiency was concerned, it was not entirely satisfactory from a mechanical and manufacturing standpoint. Therefore, it has been the principal object of this invention to so improve the horn construction that it is more durable, whereby the desired expansion is secured by less movement of the side portions thereof, and by direct connection of the expander bar with the feed mech-

anism instead of its being connected indirectly through a series of links or levers with the bumper shaft, thereby greatly reducing the cost of construction and providing a more desirable arrangement.

It is also an object of the present invention to provide an improved means whereby the horn is shifted to give clearance between it and the abutment for the placing of the body blanks in position for forming, and also to provide means for making easy adjustment for varying the clearance to accommodate tin plate of various thicknesses.

Other objects of the invention reside in the various details of construction and in the combination of parts and their mode of operation, as hereinafter described.

In accomplishing these objects, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a vertical section, taken in the central longitudinal plane of the machine, showing the horn and the connection of the horn expanding bar with the body blank feed slide, and also illustrating the action of the horn supporting slide and the seam closing bumper.

Figure 1^a is a plan view illustrating the feed slide for advancing can bodies from the forming horn.

Figure 2 is a cross section, taken on the line 2—2 in Figure 1, showing the horn, bumper, the wing clamps and their operating devices.

Figure 3 is a view diagrammatically showing the shafts and gearing whereby the parts of the machine associated with this invention are operated.

Figure 4 is a horizontal section centrally of the horn, particularly illustrating the expander bar.

Figures 5 and 6 are end views of the horn, showing, respectively, the parts thereof in contracted and expanded positions, with the can body formed thereabout.

Figure 7 is a sectional detail taken on the line 7—7 in Figure 4.

Figure 8 is a cross section of the horn, taken on the line 8—8 in Figure 2.

Fig. 9 is a face view of the horn supporting slide plate.

Fig. 10 is a section taken on line 10—10 in Fig. 9.

Referring more in detail to the drawings—
The present invention deals with improvements in machines of that general construction shown in United States Patent No. 1,543,460, issued to Nelson Troyer on June 23, 1925, which shows a machine comprising a guideway along which can body blanks are advanced by the action of reciprocating feed bars, past a series of mechanisms which notch the opposite ends of the blanks and then flange and bend back the ends to form oppositely turned hooked portions which later are interlocked and seamed together to form the blanks into cylindrical bodies.

In the present drawings, only those parts of the machine are shown which are thought to be necessary to give a proper understanding of the present invention.

In Figures 1 and 2, 1 designates the forming horn about which the can body blanks, as designated at 2, are wrapped to cylindrically shape them, and 3—3 designate the slidably mounted reciprocating feed bars equipped with feed fingers 3^a whereby the blanks are advanced by a series of intermittent movements along the guideway past the several notching and flanging devices, not shown, and finally delivered to the forming horn. The feed bars are operatively fixed to a slide plate 4 which is mounted for reciprocal movement on a bar 5 which extends horizontally and centrally beneath the guideway and terminates flush with the top of the horn; this bar serving to support the central portions of the body blanks 2 as they are delivered to the horn.

A yoke like frame portion 6 of the machine overlies the horn and fixed to this, is a downwardly extended bracket 7 having a bar 8 set within its lower edge centrally and longitudinally overlying the horn. This serves as an abutment against which the horn is sustained when the bumper is driven against it for closing the can seam, as will presently be described. The body blanks when advanced to the horn are positioned beneath the bar 8; the horn at this time being spaced therefrom to give proper clearance, then the horn is shifted upwardly to clamp the blank between it and the bar 8 during the seam closing operation.

Beneath the horn is a vertical guideway 10 in which a bumper 11 is reciprocally contained; the bumper being connected by a pitman 12 with an eccentric 13 on a rotatably driven cross shaft 14, so that, incident to rotation of the shaft, the bumper will be driven upwardly against the horn for closing the seam of the can.

In the construction, as shown in Figure 1, the slide 4 is operatively connected, by

means of a link 15, with the upper end of an oscillating lever 16 fixed to a supporting cross shaft 17 which, also, has a downwardly extended lever 19 fixed thereto that is operatively connected by a rod 20 with an eccentric 21 at one end of the shaft 14.

After a can body blank has been advanced by the feed bars, past the hook forming devices to a position overlying the horn as shown at 2^a in Figure 2, the opposite end portions of the blank are then bent downwardly about the horn so as to bring their hooked end portions 2^b—2^c into overlapped relation. This bending of the blank is accomplished by the downward closing movement of a pair of wing clamps 25—25 which are pivotally supported from the bracket 7 by means of a pivot pin 26 and which are adapted to be actuated between open and closed positions by operative connections with rotatably driven shafts 27—27 mounted along the opposite sides of the machine; the connections, as shown best in Figure 2, comprising the two levers 28—28 with their outer ends pivotally attached, as at 29, to the frame member 6 and their inner ends connected by links 30—30 with the wing clamps. Rods 31—31 connect the levers 28—28 at points intermediate their ends with eccentrics 34 on the ends of the shafts 27 so that, as the shafts rotate, the wing clamps are swung between open and closed positions about the horn.

As is shown in Figure 3, the two shafts 27 are driven by suitable sets 35 of gearing from a cross shaft 36 which, in turn, has geared connection, as at 37, with a main drive shaft 38 extended along one side of the machine. This drive shaft 38 also has a geared connection, as at 39, with the cross shaft 14 providing that the feed bars, horn, wing clamps and bumper all operate in synchronism.

The forming horn 1 is axially supported on a horizontally extending, tubular stud 40 which, at one end as at 40^a, is threaded through a slide block 41 mounted for slight vertical movement in a guideway 42^a provided in a supporting bracket 42 that is fixed rigidly in the machine frame. In the lower end portion of the block 41 is a vertical bore 43 in which an extension piece 44 is slidably fitted and which, at its upper end, is equipped with an adjusting bolt 46 that is threaded therein with the head portion 46^a of the bolt bearing against the flat base of an opening 47 that is provided through the block and into which the upper end of the bore 43 opens. A hollow plug 48 is adjustably threaded into a hole 49 formed in the lower end of the bracket 42 in alignment with the bore 43 and is held by a lock nut 50. A coiled spring 51 is seated in the plug and bears upwardly against the lower end of the extension piece 44 to urge the latter upwardly to thereby shift the block 41 and horn upwardly for

the purpose of clamping the body blank between the horn and bracket bar 8.

Mounted rotatably upon a horizontal cross shaft 55 located just back of the bracket 42, as in Figure 1, is a sleeve 56, which at one end has a laterally extending lever 57 that projects therefrom into alined openings 58 and 59, respectively, in the lower portion of the bracket 42 and the extension piece 44; this lever being provided at its end with a roller bearing 57^a engaging against a wear plate seated on the base of the opening in the extension member. At the other end of the sleeve, is a depending lever arm 60 with a roller 61 at its end arranged in rolling contact with the surface of the cam 62 that is fixed on the cross shaft 14. A spring pressed plunger 65 is mounted in a bearing block 66 supported from the machine frame to engage with the lever 60 to thereby retain the roller in contact with the cam surface. The cam 60 is so formed that its action causes oscillating movement of the levers 57 and 60 whereby the slide block 41 will be pulled down against the supporting pressure of the spring 51 coincident with each advance movement of the feed bars to shift the horn downwardly to give clearance to permit a formed can body to be advanced from the horn as a following blank is advanced into position to be formed. Then, the cam relieves the slide to permit the spring 51 to raise the horn to clamp the latter blank and to hold it against movement while its ends are being folded down by the wing clamps and its ends seamed together by action of the bumper.

Since it is especially desired that the vertical movement of the horn from and toward the abutment bracket be as little as possible and also, since it is desirable to change this to suit blanks of various thicknesses, we have provided the adjusting bolt 46 which, by being threaded onto or from the piece 44, advances or retracts the extension piece 44 and in this way provides for more or less movement of the horn incident to action of the lever 57. Adjustment of the bolt 46 is made easy by exposing the head 46^a in the opening 47 and by providing the head with openings 46^b for receiving a wrench or tool for turning the bolt.

In order to retain any adjustment, clamping blocks 67 (see Figs. 9 and 10) are set within recesses 68 in the block and bolts 69 are extended through them and threaded into the block 41 to draw the clamp blocks against the shank of piece 44; the shank being split lengthwise to permit its being clamped against bolt 46 to prevent the latter from turning.

In its improved form of construction, the horn comprises a central body portion 70 to which opposite side pieces 71—71 are fitted; these latter pieces being adjustable laterally from and toward the central portion. The

three parts of the horn are of such form that, when the side pieces are adjusted outwardly, they provide a horn that is exactly circular in cross section and of a diameter equal to the interior diameter of the can body to be formed thereon.

Coaxially of the central piece 70 of the horn, is a bore 72 which receives the mounting stud 40 and, when the parts are assembled, the inner end of the horn is abutted against the block 41 and is held there by a lock nut 75 threaded onto the outer end of the shaft; the shaft may extend slightly beyond the nut so as to provide a shank of sufficient length for connection with another horn (not shown) onto which the can bodies, after being seamed, are advanced for soldering.

The opposite side pieces 71 of the horn are provided along their inner faces with longitudinally extending recesses or grooves 74 adapted to slidably fit over correspondingly arranged ribs 76 provided on the opposite sides of the middle portion 70 so as to hold the side pieces in proper alined relation to the body and to permit their being adjusted outwardly and inwardly therefrom. Also, in the inner faces of the side pieces, are longitudinal, inwardly opening recesses 78 in which leaf springs 79 are contained; the opposite ends of the springs being retained within pockets 80 in the ends of the recesses. The springs are attached centrally to the central block 70 by shoulder bolts 81 which have their shank portions projected through openings in the springs and threaded into the body 70 with their shoulders seated tightly against the springs, the springs being so arranged and connected with the body of the horn that the side pieces 71 will be yieldingly held in their contracted positions tightly against the central portion of the horn, as shown in Figure 5. For the purpose of assembly, the side pieces 71 have openings 82 therein containing the heads of the bolts 81 and through which the bolts may be applied or removed.

For expanding the horn, that is, for spreading the side portions 71—71 thereof outwardly from the central portion so that they will assume the relation shown in Figure 6 and thereby cause the hooked ends of a body blank, when wrapped about the horn, to be interlocked for seaming, there is provided an expander bar 90 that is slidably fitted within a lining sleeve 40^a in the tubular shaft 40. At its outer end, the bar has connection with an enlarged head portion 91 of a connector rod 92 which, in turn, is fixed to the slide plate 4, as at 93, so that the parts will reciprocate with the feed bars. Formed longitudinally in the opposite sides of the expander bar are grooves 94—94 in which rollers 95 travel when the bar is shifted lengthwise; these rollers 95 being located in

retainers 96 that are set within openings 96^a in the side walls of the stud 40. The rollers are interposed between the expander bar and the flat inner ends of screw studs 97 that are threaded through the opposite ends of the side plates 71 and into openings 98 in the side of the horn body portion 70 into which the rollers extend.

The expanding and contracting of the horn is effected by outward and inward shifting of the side plates 71—71 from and toward the body 70, and this results incident to shifting of the expander bar outwardly or inwardly because of variation in the depth of the grooves 94 in which the rollers 95 travel. As shown in Figure 4, the grooves 94 are relatively deep along the outer end of the bar, then they merge through inclined surfaces 94^a into shallower portions and these, toward the inner end of the bar, merge through outwardly inclined surfaces 94^b into portions of still lesser depth. This leaves the bar with a core portion between the grooves that acts as a wedge whereby, when shifted outwardly incident to retraction of the feed bars, the sets of rollers pass from deeper portions of the grooves into shallower portions and are thereby shifted outwardly to move the side plates 71 of the horn accordingly. Then, when the bar 90 is moved inwardly, incident to advance movement of the feed bars, the rollers move again from the shallower portions of the grooves into the deeper portions, and the side plates are drawn inwardly by the springs 79.

The body portion, 70, of the horn is provided along the top with a longitudinal groove 99 in which a feed slide 99' operates to advance the can bodies from the horn; this slide being connected at its inner end to the feed slide plate 4 as shown in Figure 1^a so that it reciprocates with the latter and near its outer end it has a downwardly yieldable pusher 99^a pivotally mounted at its top edge, which, on retractive movement of the slide, passes beneath the can body wall, but on outward movement of the slide, engages the end of the body and pushes the can from the horn. Also, a hardened spline 100 is fitted within a groove 101 in the base of the horn and this serves as an abutment against which the bumper drives the interhooked ends of the body blank in closing the seam.

In order to provide an operative connection between the inner end of the bar 90 and the head 91 of the bar 92 that will permit the slight vertical shifting of the horn by action of the cam, I have provided the rod 90 at that end with a reduced shank 102 and a square shouldered head 103 and have provided the head portion 91 of bar 92 with a vertical slot 104 into which this end of the rod extends. A pair of holding blocks 104^a are fitted in grooves 105 at opposite sides of the shank to engage therewith back of the head 103 to

thereby provide a secure connection which permits relative vertical movement of the connected parts. The block 104^a are pressed inwardly by leaf springs 106 placed back of them, but they may be drawn outwardly, to permit disconnection of the rod, by pulling outwardly on bolts 107 which are slidable through openings 108 in the opposite side faces of the head 91 and which are threaded into the blocks. (See Fig. 7.)

Assuming the parts to be so constructed, and connected in the manner described; in operation the feed bars 3—3 are reciprocated through their connection with the slide 4 which, in turn, is operatively connected by link 15, levers 16 and 19 and rod 20, with the eccentric 21 at one end of shaft 14. Reciprocation of the feed bars advances the body blanks along the guideway through the machine and brings them successively into position above the forming horn. During the advance movements of the feed bars, the horn is slightly lowered so as to give clearance for receiving the blanks between it and the bar 8 in the bracket 7, but as soon as the blank is placed there, the horn is shifted upwardly to clamp it tightly against the blank; the horn being shifted upwardly each time by the upward pressure of the spring 51 against the slide extension 44, and it is lowered or pulled down against the pressure of the spring by the action of the cam 62 on the lever 60 and lever 57.

Just following each clamping action of the horn, the wing clamps 25—25 are actuated downwardly against the end portions of the body blank and these are bent downwardly so that their hooked ends overlap, as in Figure 5. Then, retractive movement of the expander bar 90 incident to retraction of the feed slide, causes the horn to be expanded and the hooked ends to be interlocked. Immediately following this, the bumper is driven upwardly against the hooked ends of the blank by action of the pitman 12 on the eccentric 13 of shaft 14 and this closes the body seam. Then, as the feed bars again advance, and shift the expander rod 90 forwardly, the horn is contracted by the inward movement of side plates 71 under influence of springs 79 and the seamed body then pushed therefrom by the pusher 99^a of the slide 99', while another blank is brought by the feed bars 3 into position for seaming.

When a change is made in the thickness of tin plate used for the body blanks, the movement of the horn to give proper clearance below the abutment 8 is regulated by adjustment of the bolt 46.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent, is:

1. In a can body forming machine, a forming horn comprising a central body portion, side plates fitted thereto and adapted for

outward and inward adjustment, horn expanding means, leaf springs disposed lengthwise within the horn and centrally attached to the horn body and engaging at their opposite ends with the side plates to draw them

inwardly against the central portion and means interposed between the expanding means and side plates for moving the plates outwardly incident to movement of the bar.

2. In a can body forming machine, a forming horn comprising a supported, central body portion, side plates arranged therewith for direct outward and inward adjustment, an expander bar longitudinally slidable within the central portion of the horn, yieldable means for drawing the side plates inwardly to contract the horn, studs mounted in the side plates to project inwardly therefrom and rollers mounted in the horn between the inner ends of the studs and adapted for rolling contact with the expander bar.

3. In a can body forming machine, a forming horn comprising a supported, central body portion, opposite side plates arranged therewith for direct outward and inward adjustment for expanding and contracting the horn, an expander bar slidably contained in the central body portion having longitudinally extending grooves, of varying depths, in its opposite sides, springs contained within the horn for drawing the side plates inwardly toward the central portion, studs mounted in opposite ends of the side plates, and rollers interposed between the ends of the said studs and the expander bar and operable in the grooves of the latter for adjusting the side plates incident to movement of the expander bar.

4. In a can body forming machine, a forming horn comprising a supported central body portion, opposite side plates arranged therewith for direct outward and inward adjustment for expanding and contracting the horn; said side plates having inwardly opening, longitudinal recesses in their inner faces and having pockets at the ends of said recesses, leaf springs contained in said recesses and seated at their ends in said pockets and attached between their ends to the central body whereby the side plates are yieldably held in contracted relation, an expander bar longitudinally adjustable in the central portion of the horn and means interposed between the expander bar and side plates and movable by the bar for adjusting the plates outwardly.

5. In a can body forming machine, a forming horn comprising a supported central body portion with ribs along its opposite sides, opposite side plates fitted to the central portion and having grooves for receiving said ribs on which said plates are slidably adjustable inwardly and outwardly; said plates having longitudinal recesses in their inner faces with pockets at the ends of the recesses,

leaf springs disposed in said recesses and seated at their ends in said pockets, shoulder bolt centrally attaching the said springs to the central body, an expander bar slidable in the central body, studs mounted in the opposite ends of the side plates and extended inwardly therefrom, and rollers interposed between said studs and expander bar through which adjustment of the side plates is made incident to adjustment of the expander bar.

6. In a machine of the character described, a forming horn comprising a tubular supporting stud, a central body portion mounted on said stud, opposite side plates fitted to the central portion for direct outward and inward adjustment, an expander bar slidable in the tubular stud, yieldable means for drawing the side plates toward the central body and means interposed between the expander bar and plates whereby they are adjusted outwardly or inwardly incident to adjustment of the expander bar.

7. In a machine of the character described, a forming horn comprising a tubular supporting stud, a central body having a central bore whereby it is mounted in said stud, opposite side plates fitted to the central body for direct inward and outward adjustment, an expander bar slidable in the stud and having grooves of varying depths in its opposite sides, springs contained in the horn for drawing the side plates inwardly, studs mounted in the ends of the side plates and projecting inwardly therefrom; said central body having openings therein receiving the studs and registering with said grooves of the expander bar, and rollers retained in said openings for travel in the grooves and bearing against said studs whereby the side plates are caused to be adjusted incident to adjustment of the expander bar.

8. In a can body machine, a reciprocating feed slide, a forming horn arranged to receive body blanks advanced by the action of the slide, means for bending the blanks into body form about the horn and a horn expander operable by direct connection with the feed slide.

9. In a can body machine, a reciprocating feed slide, a forming horn arranged to receive body blanks advanced by action of the feed slide, means for forming the blanks about the horn and means for seaming their ends together; said horn comprising a supported central body and opposite side plates fitted thereto for adjustment to expand and contract the horn, and an expander bar slidable in the horn and connected with the feed slide to be reciprocated therewith as a means of expanding and contracting the horn.

10. In a can body machine, a blank feeding means, a forming horn arranged to receive blanks advanced thereby, means for forming the blanks about the horn, means for seaming their ends together, an abutment against

which the blanks are clamped by the horn while being formed and seamed, and means synchronized with the action of the feeding means for actuating the horn from and toward the abutment.

11. In a can body machine, a reciprocating feed slide, a forming horn arranged to receive the blanks successively advanced by the slide, means for forming the blanks about the horn, means for seaming their ends together while so formed, an abutment against which the blanks are clamped by the horn during the forming and seaming operations, a movable support for the horn and means synchronized with the movement of the feed slide for moving said support to shift the horn from and toward the abutment.

12. In a can body machine, a reciprocating feed slide, a forming horn arranged to receive the blanks successively advanced by the slide, means for forming the blanks about the horn, means for seaming their ends together while so formed, an abutment against which the blanks are clamped by the horn during the forming and seaming operations, a movable support for the horn, yieldable means bearing against the support to urge the horn toward the abutment and means operating in synchronism with the feed slide for moving the horn away from the abutment.

13. In a can body machine, a feed slide, a forming horn arranged to receive body blanks advanced by action of the feed slide, means for forming the blanks about the horn, a reciprocable bumper for seaming the blanks, an abutment against which the blanks are clamped by the horn while being formed and seamed, a movable support for the horn, a rotatably driven shaft, a cam on the shaft for controlling movement of the horn support to move the horn from and toward the abutment and means operable by the shaft for actuating the feed slide and bumper.

14. In a can body machine, in combination, a forming horn, means for advancing can body blanks to the horn, means for forming the blanks about the horn and means for seaming their ends together after being formed about the horn, an abutment against which the blanks are clamped by the horn during the forming and seaming thereof, a fixed bracket, a horn mounting slidable in the bracket, a spring supported by the bracket and bearing against the mounting to urge the horn toward the abutment, a rotatably driven cam, and a rocker lever operated by the cam and engaging the horn support to draw the horn from the abutment.

15. In a can body machine, a reciprocating feed slide, a forming horn for receiving body blanks advanced by the slide, means for forming the blanks about the horn, an expander bar for the horn connected with the feed slide, a bumper for seaming the ends of the blanks when wrapped about the horn, an

abutment against which the blanks are clamped by the horn during seaming, a movable support for the horn, a rotatably driven shaft, a cam on the shaft, means operable by the cam to shift the horn support to move the horn from the abutment, and means connecting the shaft with the feed slide and bumper whereby they are actuated in synchronism.

16. In a can body machine, an abutment, a bracket, a horn supporting block slidable in the bracket, a forming horn mounted by the block and movable therewith from and toward the abutment, an extension for said block, a spring for urging the horn toward the abutment, means operable against the extension for retracting the horn from the abutment, and an adjusting bolt interposed between the extension and block and adjustable on the extension to vary the movement of the horn produced by the action of the retracting means.

Signed at Seattle, Washington, this 18th day of November, 1927.

NELSON TROYER.
PAUL E. PEARSON.