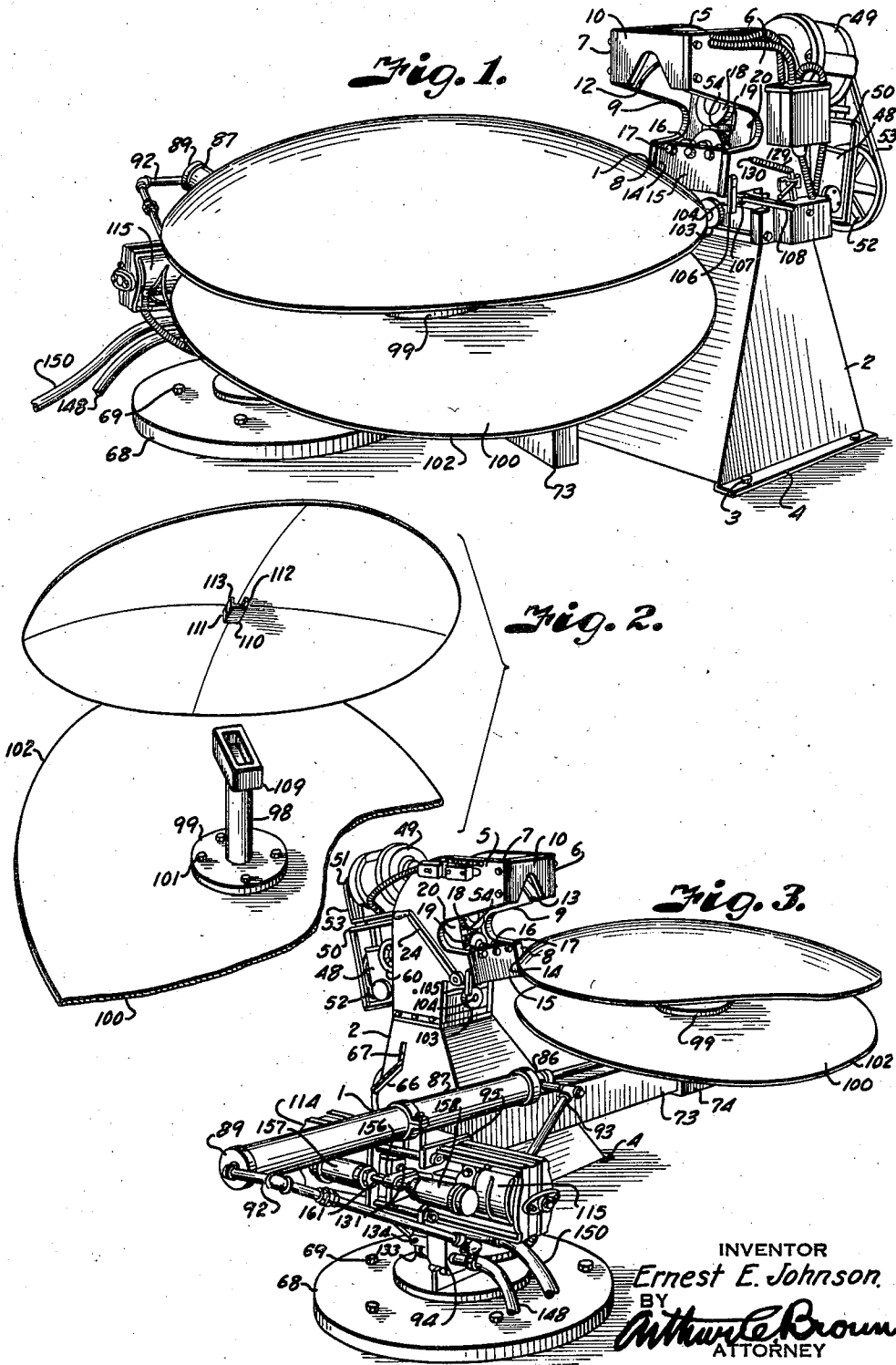


Jan. 12, 1943.

E. E. JOHNSON
APPARATUS FOR FLANGING OR OTHERWISE
FORMING MARGINAL EDGES OF PLATES
Filed Dec. 30, 1939

2,308,432

4 Sheets-Sheet 1



INVENTOR

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BY

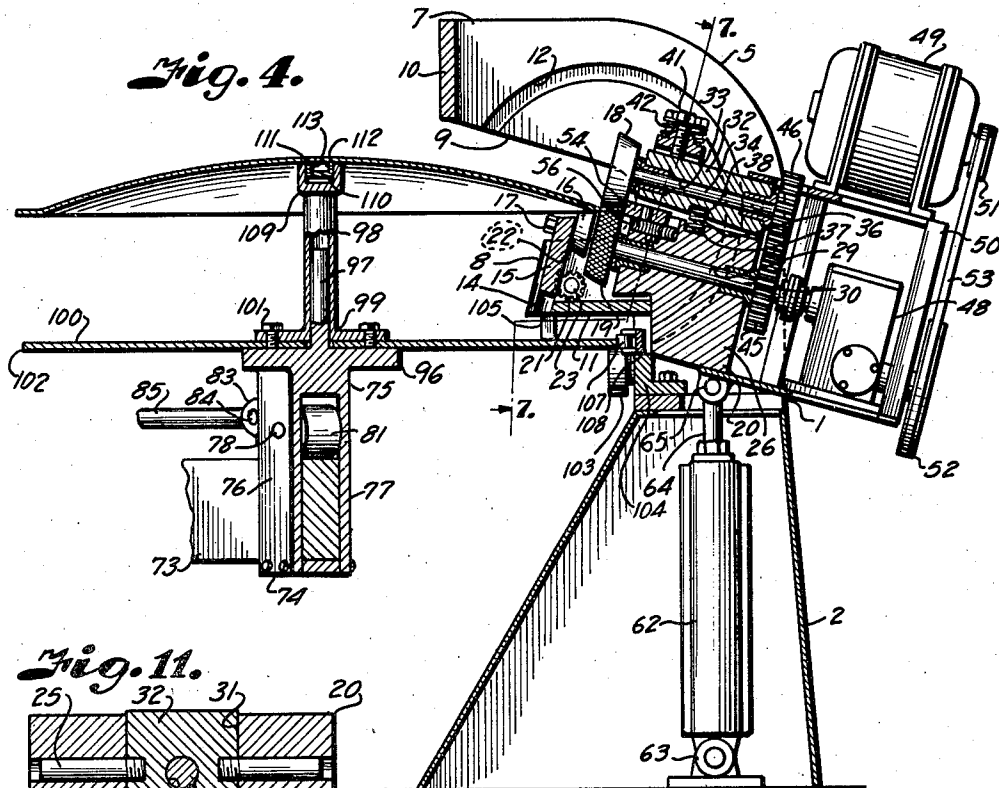
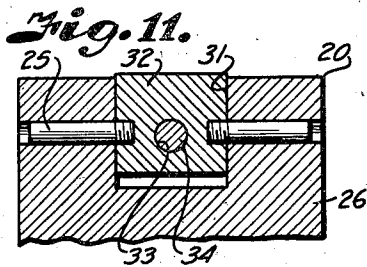
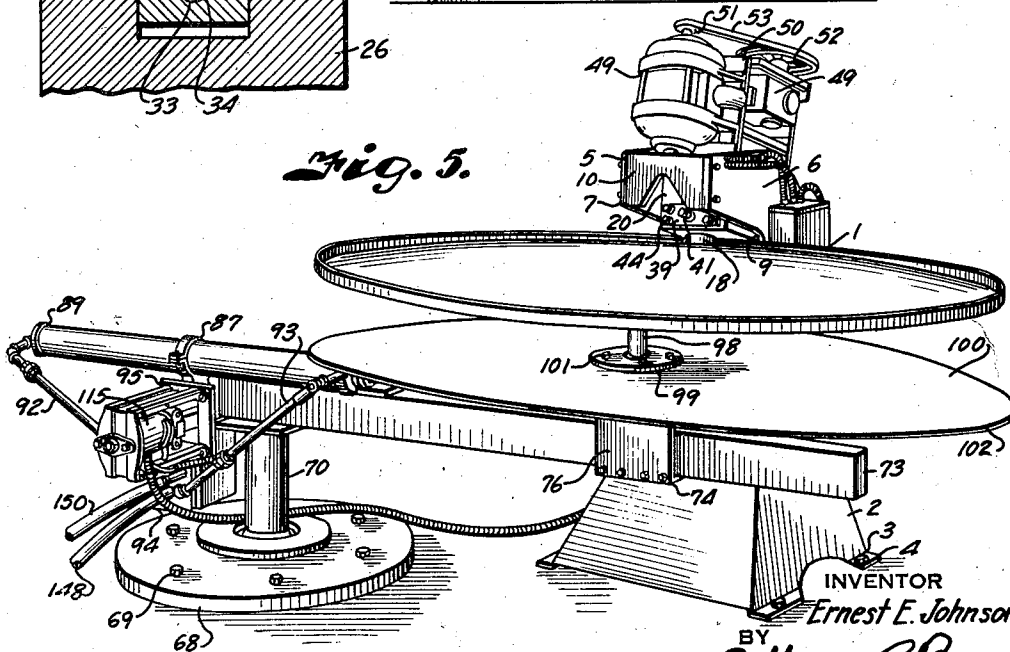
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4 Sheets-Sheet 2



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Fig. 6.

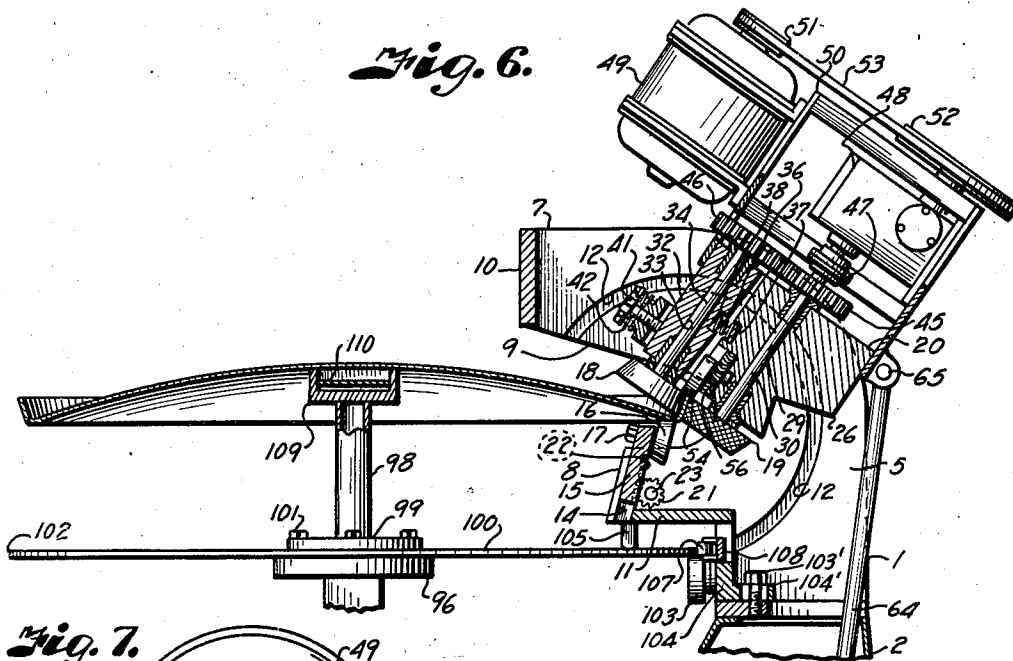


Fig. 7.

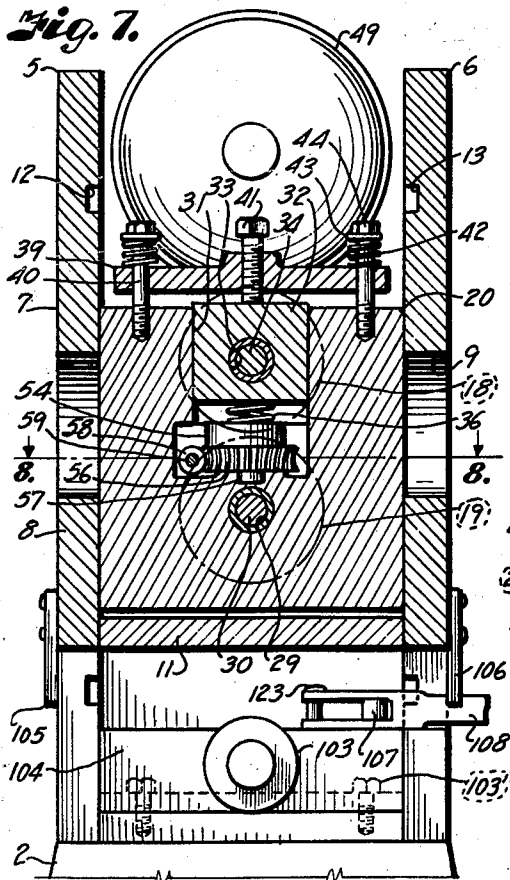
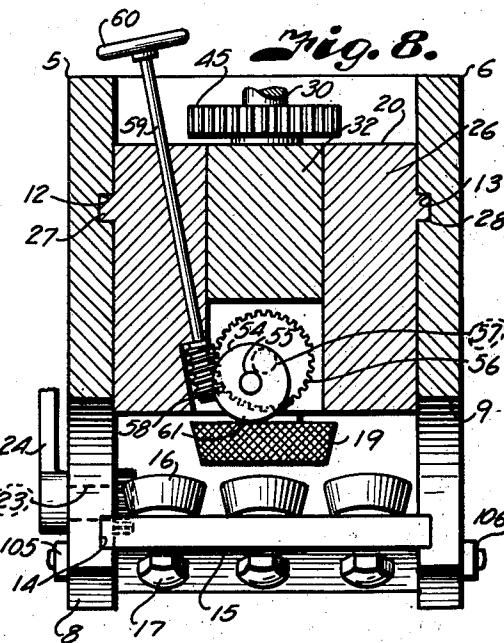


Fig. 8.



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Fig. 9.

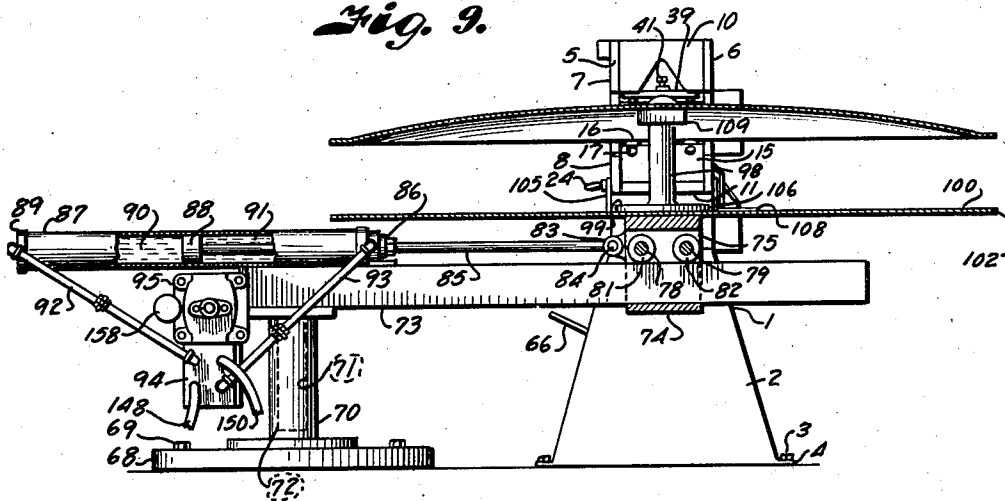
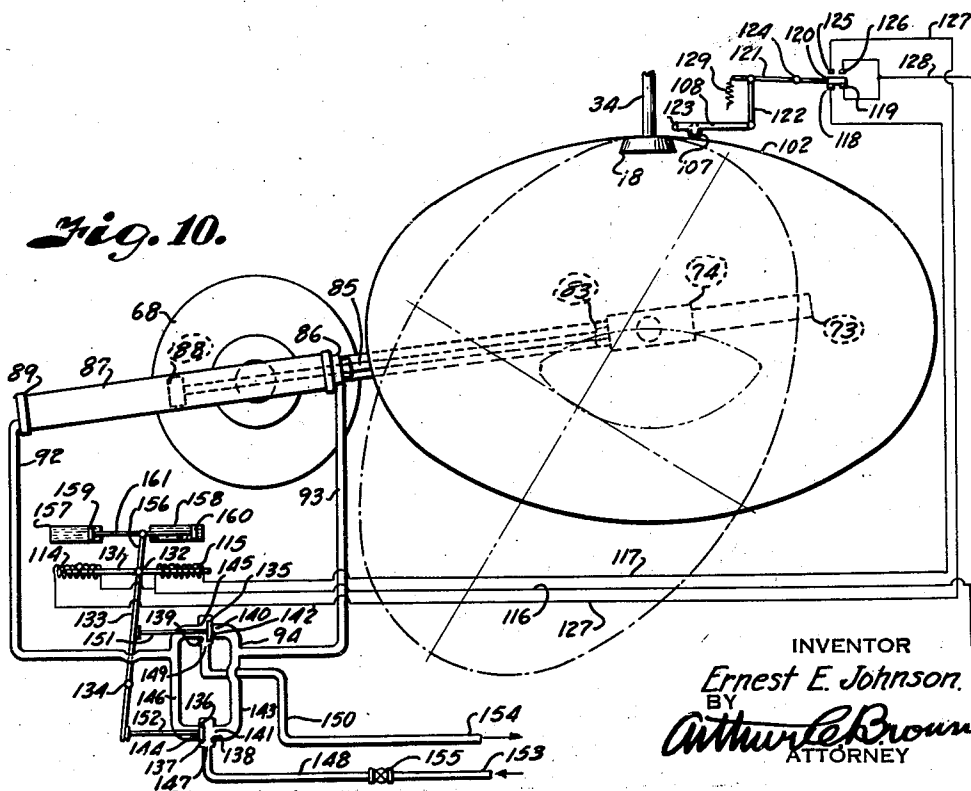


Fig. 10.



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2,308,432

APPARATUS FOR FLANGING OR OTHERWISE FORMING MARGINAL EDGES OF PLATES

Ernest E. Johnson, Kansas City, Mo.

Application December 30, 1939, Serial No. 311,717

16 Claims. (Cl. 153—19)

This invention relates to apparatus for flanging or otherwise forming marginal edges of plates, particularly those of elliptical shape such as the heads of truck tanks and similar vessels, and has for its principal object to provide an apparatus of this character which is constructed to accurately form a marginal flange or the like without the use of a matrix.

Other objects of the invention are to provide mechanism for rotatively supporting the work piece on an axis shiftable relatively to the flanging or forming rollers; to provide for movement of the rollers to flange forming position progressively with rotation of the work piece; to provide automatic means for shifting the axis of rotation; to provide an electric control for the shifting mechanism operable responsive to a templet conforming to the shape of the work piece; and to provide a hydraulic actuator for the shifting mechanism.

In accomplishing these and other objects of the invention, as hereinafter pointed out, I have provided improved structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a flanging apparatus constructed in accordance with the present invention and showing the set up for flanging an elliptical plate which comprises the end wall of a truck tank.

Fig. 2 is a perspective view of the rotating support and a plate to be flanged shown in spaced relation to better illustrate the driving connection therebetween.

Fig. 3 is a perspective view similar to Fig. 1 and showing the apparatus as viewed from a different angle.

Fig. 4 is a vertical section through the marginal edge of the plate showing start of the flanging operation.

Fig. 5 is a perspective view similar to Fig. 1 showing the position of the apparatus when nearing completion of the flanging operation.

Fig. 6 is a section similar to Fig. 4 but showing the flanging apparatus in the position illustrated in Fig. 5.

Fig. 7 is an enlarged section through the flanging roller carrying head on the line 7—7 of Fig. 4.

Fig. 8 is a detail section on the line 8—8 of Fig. 7.

Fig. 9 is a vertical section through the apparatus particularly illustrating the hydraulic actuator for shifting the axis of rotation for the plate being flanged.

Fig. 10 is a diagrammatic view of the sheet rotating mechanism and controls therefor.

Fig. 11 is a detail section through the upper flanging roller support, particularly illustrating the pivotal mounting thereof.

Referring more in detail to the drawings:

1 designates an apparatus constructed in accordance with the present invention and which is particularly designed for flanging the marginal edges of work pieces or plates, for example those used in forming the crowned heads of elliptical vessels.

The apparatus includes a hollow base 2 adapted to be rigidly secured to a floor or foundation by fastening devices such as bolts 3 extending through flanges 4 along the lower sides of the base. Carried upon the base are spaced side frames 5 and 6, each having forwardly extending arms 7 and 8 which are spaced apart to provide an open mouth 9. The arms 7 and 8 of the respective side frames are connected by cross bars 10 and 11 to provide a rigid structure and maintain positive spacing between arcuate tracks 12 and 13 on the inner faces of the side frames.

In the illustrated instance the tracks consist of arcuate grooves arranged concentric with the horizontal axis of the mouth 9. The cross bar 11 is arranged horizontally and spaced inwardly from the ends of the arms 8 to accommodate grooves 14 forming guides for the ends of a movable cross bar 15. The cross bar 15 carries a plurality of rollers 16 loosely supported for rotation on studs 17. Since the cross bar is arranged to move at an angle the peripheries of the rollers are coned to provide a rolling horizontal support in substantial alignment with flanging rollers or rolls 18 and 19 that are carried on a bending head 20. The bar 15 is moved in the guide grooves to adjust the rollers in supporting contact with the plate by means of a pinion 21 which meshes with rack teeth 22 formed in the inner face of the bar. The pinion 21 is mounted on a shaft 23 journaled in one of the arms 8 and adapted to be rotated by a crank 24 that is fixed thereon.

The head 20 is adapted to move between the side frames in guided relation with the grooves and includes a block-like body 25 having arcuate ribs 27 and 28 on the sides thereof which engage in the arcuate tracks 12 and 13. The block-like body is provided with a bore 29 having bushed ends and in which is rotatably mounted a drive shaft 30 carrying the flanging roll 19. The portion of the body directly above the shaft has a parallel recess 31 in which is pivotally supported

a bearing block 32 having a bore 33 provided with bushed ends journaled a driven shaft 34 for the other flanging roll 18. The bearing block is pivoted on trunnions 35 that are journaled in openings at sides of the recess as shown in Fig. 11. The flanging rolls are urged apart by a coil spring 36 having one end seated in a socket 37 at the bottom of the recess 31 and the other in a socket 38 formed in the facing side of the bearing block. A yielding pressure, however, is applied to the bearing block to retain the rollers in contact with the work piece by means of a cross bar 39 (Fig. 7) extending transversely of the bearing block and having its ends slidably supported on studs 40 carried by the body member.

Threadedly mounted in an opening at the center of the bar is a pressure adjusting screw 41 engaging the bearing block. The studs 40 project through the bar and carry coil springs 42 each having one of its ends bearing against the bar and its other end against a washer 43 retained on a respective stud by an adjusting nut 44. The shaft 30 carries a gear 45 meshing with a gear 46 on the driven shaft 34. The drive shaft 30 is connected by a coupling 47 with a speed reduction gearing 48 that is operated from the motor 49. The motor and speed reduction gearing are carried on an open frame 50 extending rearwardly from the block-like body member 26. The armature shaft of the motor is provided with a pulley 51 which aligns with a pulley 52 of the reduction gearing and operating over the respective pulleys is a belt 53. It is thus obvious that when the motor is energized the flanging rolls are simultaneously rotated to feed the marginal edge of the work piece therebetween. In order to effect positive feed of the work piece, the periphery of one of the rolls, for example the roll 19, is knurled or otherwise roughened as indicated in Fig. 4.

I also provide an edge abutment roll 54 which is mounted on a pin 55 located eccentrically of a gear wheel 56, the gear wheel 56 being rotatably mounted on a stud 57 carried by the block-like body and which projects upwardly from the bottom of the recess. The gear 56 is rotated to adjust position of the pin 55 by a worm 58 meshing therewith and fixed on the end of an operating shaft 59, which projects from the block-like body and carries a hand wheel 60. By rotating the hand wheel 60, the position of the pin 52 may be varied with respect to the flanging wheels so that the peripheral face 61 of the roll 54 forms an adjustable abutment for the edge of the object to be flanged and gages width of the flange to be formed on the work piece.

The flanging head just described is moved about the axis of the mouth 9 by means of a hydraulic jack 62 having one end pivotally supported on the foundation as indicated at 63. The jack also includes a shaft 64 which is movable with respect to the body of the jack and is pivotally connected, as at 65, with the flanging head. The jack is manipulated by means of a lever 66 which projects through a slot 67 in the side of the base 2 (Fig. 2).

Cooperating with the mechanism just described is a work supporting mechanism including a base plate 68 which is secured to the foundation in fixed relation with the support 2 by suitable fastening devices such as bolts 69. Carried on the base plate is a post 70 having a vertically arranged bore 71 rotatably mounting a cylindrical shank 72 of a swing arm 73. Movably mounted on the swing arm is a carriage 74. The

carriage 74 consists of a saddle-like body 75 having depending sides 76 and 77 that are spaced apart to pass the arm 73 therebetween.

Rotatably mounted on journals 78 and 79 having their ends fixed in the depending sides 76 and 77 are rollers 81 and 82 arranged so that the faces thereof roll upon the upper edge of the arm as clearly shown in Figs. 4 and 9. Projecting from the sides 76 and 77 of the carriage, in the direction of the pivotal end of the arm, are ears 83 connected by a pin 84 with a piston rod 85. The opposite end of the piston rod projects through a stuffing box 86 on a cylinder 87 and carries a piston 88 slidable in the cylinder chamber. The cylinder 87 is secured to the swing arm and has its outer end closed by a head 89. The cylinder chamber is thus divided into closed pressure chambers 90 and 91 on the respective sides of the piston into which an actuating fluid is admitted and discharged through pipes 92 and 93 having their opposite ends connected with a valve housing 94. The valve housing 94 is shown as suspended from the under side of an electromagnet supporting frame 95 which is fixed transversely of the pivoted end of the swing arm as shown in Fig. 3 and later described.

Mounted on the carriage 74 is a plate 96 having an upwardly extending spindle 97 which carries a tubular work support 98. The tubular work support 98 has a flange 99 at its lower end to which a templet 100 is attached by fastening devices such as screws 101 (Fig. 4), the templet 100 having a peripheral edge 102 conforming in shape to the work piece. The under marginal face of the templet is supported on a roller 103 rotatably mounted on a stud projecting from a cross bar 104 that is adjustably carried between the frames 5 and 6. Cooperating with the roller are lugs 105 and 106 which are attached to the arms 8 of the respective side frames 5 and 6 and having their lower ends engaging the upper face of the templet to prevent vibration or weaving of the templet with respect to a follower roller 107 of a feeler mechanism and which is pivotally supported on an arm 108 in contact with the edge 102 of the templet for a purpose later described. The bar 104 is of angle shape and has a flange 104' provided with slotted openings 104'' through which fastening devices 103' are extended to anchor the bar in an adjusted position.

Fixed on the upper end of the work support 98 is a socket 109 preferably of elongated shape to receive a key 110 that is fixed to the axial center of the work piece. In the illustrated instance the key includes a section of channel iron having its side flanges 111 and 112 tack welded to the work piece indicated at 113, the channel section being of sufficient length and width to snugly engage in the elongated socket so that when the work piece is rotated the work supporting sleeve 98 moves therewith to rotate the templet, which templet actuates the feeler mechanism to open and close electric circuits and energize solenoids 114 and 115 carried on the frame 95 previously mentioned. Current is supplied to the electric magnets through conductors 116 and 117, the conductor 116 being directly connected with one of the terminals of each of the magnet windings and the other conductor being connected to switch contacts 118 and 119 that are adapted to be respectively contacted by a contact 120 carried on the end of a pivoted lever 121 having its opposite end connected by a link 122 with the arm 108. The arm 108 and lever 121 are pivotally supported, as at 123 and 124 respectively, so that

movement of the follower roller will cause engagement of one or the other contacts to close circuit with complementary contacts 125 and 126 that are connected by conductors 127 and 128 with the other terminals of the magnet windings as shown in Fig. 10.

The feeler roller is normally retained in contact with the peripheral edge of the templet by means of a coil spring 129 which preferably connects with the lever 121 and a suitable anchor 130. It is thus obvious that when the roller causes swinging of the arm in one direction contacts are closed to one of the magnet windings and opened to the other, and when the arm is moved in the opposite direction the other set of contacts are closed and the closed contacts are opened, with the result that the electromagnets are alternately energized to effect reciprocation of an armature 131.

Fixed to the armature by a connection indicated at 132 (Fig. 10), is a lever 133 having a fixed pivot 134 to alternately operate valves 135 and 136 located in the valve housing 94 previously mentioned. The valves 135 and 136 are arranged to alternately engage seats 137—138 for the valve 136 and 139—140 for the valve 135. The seats 138 and 140 circle ports 141 and 142 that are interconnected by a passageway 143 having connection with the pipe 93 previously mentioned. The other seats 137 and 139 circle ports 144 and 145 connected by a passageway 146 with the pipe 92 previously mentioned. A liquid pressure medium, for example water, is admitted to the valve housing through a port 147 located intermediate the ports 141 and 144 so that water is delivered to one or the other chambers 90 or 91 of the cylinder 87 through a pipe 148 connected with the port 147. Likewise water is discharged through a port 149 that is located between the ports 142 and 145 to a drain pipe 150. It is thus obvious that the water is discharged from one or the other chambers 90 or 91 depending upon location of the valve 135. Since the pivot 134 is located intermediate the stems 151 and 152 of the respective valves, the valves are so arranged that when water is admitted to one of the cylinder chambers it is being discharged from the other to allow movement of the piston 88 for positioning the carriage on the arm 73.

Since the valve housing 94 is mounted to swing with the arm 73, the pipes 148 and 150 must have swing joints or be of flexible character and have their opposite ends connected with supply pipes 153 and a drain pipe 154, flow through the pipe 153 being controlled by a valve 155.

To provide smooth operation and prevent chattering of the armature, the armature is connected by an arm 156 with a checking mechanism comprising spaced cylinders 157 and 158. Slidable in the cylinders are pistons 159 and 160 which are interconnected by a rod 161 to which the arm 156 is connected. The cylinders are filled with a checking liquid which controls movement of the pistons under actuation of the arm 156, to thereby regulate movement of the armature of the electromagnets.

In using an apparatus constructed and assembled as described, the head of the flanging mechanism is moved to the position shown in Fig. 1. A key 110 is then temporarily welded to the center of the work piece which may be a crowned elliptical plate as shown in Fig. 1. A templet conforming to the shape of the plate is attached to the work support which is then

sleeved over the spindle 97. The elliptical plate is then applied to the support in such a manner that the key thereon engages in the socket 109 and the swing arm 73 is swung to a position so that the marginal edge of the elliptical plate engages between the flanging rollers 18 and 19. The abutment roller 54 is then adjusted to engage the edge of the plate by manipulating the hand wheel 60 which determines the depth of the flange to be formed on the plate. The rollers 16 are then brought into supporting contact with the under face of the plate by manipulating the crank 24. In this position the edge 102 of the templet is engaged by the following roller 107. Upon energizing the motor 49 the shaft 30 is rotated to rotate the flanging rollers 18 and 19, the upper roller 18 of which has been brought into gripping contact with the marginal edge of the plate through adjustment of the screw 41 which effects rotation of the elliptical plate together with its support on the spindle 97, the feed of the flanging rollers 18 and 19 being such that the edge of the plate is normally retained in contact with the abutment roller 54. It is, however, necessary to shift the axis of rotation of the work piece corresponding to the changing radius between the flanging rollers and the support 98 incidental to the elliptical shape of the plate in order that the marginal edge of the plate will enter between the flanging rolls at the correct angle. This is effected through feeler mechanism which contacts the edge 102 of the templet. For example assuming that the templet tends to move away from the follower roller 107, the arm 108 will move in a clockwise direction (Fig. 10) to swing the contact 120 into engagement with the contacts 125 and 126 thereby closing circuit to the magnet 114 to effect shifting of the armature 131 to the left, thereby unseating the valve 136 from the seat 137 so that water is discharged under pressure through the pipe 92 and into the cylinder chamber 90. Simultaneously the valve 135 is moved to engage the seat 139, thereby opening the port 142 and since the port 141 has been closed by the valve 136 water discharges from the cylinder chamber 91 through the pipe 93 to the drain pipe 150. The piston 88 therefore moves in a forward direction to move the carriage toward the outer end of the swing arm until such a time that the edge of the templet moves the follower roller sufficiently to close the contacts 118 and 119 thereby energizing the other electromagnet 115 and opening a circuit to the electromagnet 114. This effects shifting of the armature in the opposite direction to reverse the position of the valves so that water is admitted to the chamber 91 and discharged from the chamber 90, again adjusting the carriage on the swing arm. The follower roller 107 will thus maintain a fixed position for the peripheral edge of the templet relatively to the flanging rollers 18 and 19 so that the flanging rollers will travel in a path of uniform width about the periphery of the elliptical plate. Upon each pass of the plate between the flanging rollers, the lever 66 will be actuated to operate the hydraulic jack, thereby moving the head of the flanging apparatus toward the position shown in Fig. 6. With each pass the head is advanced until the flange is formed at the desired angle. Owing to the fact that the bending point of the flange is at the tangent point of the flanging rollers and at the outer face of the upper roller, the bend will form

a uniform ellipse corresponding to the elliptical shape of the templet.

It is thus obvious that I am able to form a flange on a work piece without the use of a matrix over which the flange is usually formed. Therefore an elliptical plate of any diameter may be flanged without the expense of shaping a matrix, it being only necessary to provide a relatively inexpensive templet having a shape proportional to that of the plate. During bending of the flange the supporting rollers back the plate so that the bend is abruptly defined.

Attention is directed to the fact that the head is supported at the beginning of the flanging operation with the axes of the flanging rollers at an angle from the horizontal, and the faces of the rollers are tapered so that the rollers are capable of bending the flange at a 90° angle without striking the crowned portion of a dished plate.

What I claim and desire to secure by Letters Patent is:

1. An apparatus of the character described including a support for mounting an elliptical plate, an abutment engaging an edge of the plate, means movably mounting the support, gripping means adapted to grip the plate to maintain said edge in contact with the abutment upon rotation of the plate, a templet movable with the plate, a feeler contacting the templet, means for shifting the support to maintain said contact, and means having connection with the feeler for actuating the shifting means to shift the support in a direction transverse to the movement by said gripping means.

2. In combination with a forming mechanism for shaping the marginal edge of a work piece, an arm, means supporting the arm for swinging movement to and from said forming mechanism, a carriage movable on the arm, a spindle on the carriage, means rotatably supporting the work piece on the spindle, fluid pressure means for effecting movement of the carriage on said arm, and means including a part of said forming mechanism for gripping said marginal edge to rotate the work piece.

3. In combination with a forming mechanism for shaping the marginal edge of a work piece, an arm, means supporting the arm for swinging movement to and from said forming mechanism, a carriage movable on the arm, a spindle on the carriage, means for rotatably mounting the work piece on the spindle, a templet rotatable on the spindle with the work piece, a feeler contacting the templet, a cylinder supported on the arm, a piston slidable in the cylinder, means connecting the piston with the carriage, and means actuated responsive to movement of the feeler for selectively admitting an actuating fluid to the respective ends of the cylinder for effecting movement of the carriage on said arm.

4. In combination with a forming mechanism for shaping the marginal edge of a work piece, an arm, means supporting the arm for swinging movement to and from said forming mechanism, a carriage movable on the arm, a spindle on the carriage, means mounting the work piece for rotation about the spindle, a templet rotatable on the spindle, a feeler contacting the templet, a cylinder supported on the arm, a piston slidable in the cylinder, means connecting the piston with the carriage, a pair of oppositely arranged electromagnets having a common armature, electric circuits connected with the respective electromagnets, a current supply for said circuits, a

switch controlling said circuits, an operating connection between the switch and feeler for closing the circuit and to effect reciprocation of the armature, and means having connection with the armature for selectively admitting a pressure fluid to the respective ends of the cylinder to effect actuation of the carriage on said arm.

5. In combination with a forming mechanism for shaping the marginal edge of a work piece, means supporting the arm for swinging movement to and from said forming mechanism, a carriage movable on the arm, a spindle on the carriage, means mounting the work piece for rotation about the spindle, a templet rotatable on the spindle with the work piece, a feeler contacting the templet, a cylinder supported on the arm, a piston slidable in the cylinder, means connecting the piston with the carriage, a pair of oppositely arranged electromagnets having a common armature, electric circuits connected with the respective magnets, a current supply for said circuits, a switch controlling said circuits, an operating connection between the switch and said feeler, means supplying pressure fluid to the respective ends of the cylinder, valves controlling said pressure medium supply, and means connecting the armature with said valves.

6. An apparatus of the character described including a forming machine having a head provided with a pair of cooperating flanging rollers and an abutment member cooperating with the flanging rollers, a work support for carrying a work piece with the marginal edge thereof engaged between the flanging rollers, means for shifting the work support for maintaining the marginal edge of a work piece in engagement between the flanging rollers and in contact with said abutment member, means on the head for actuating the flanging rollers to effect rotation of the work piece, and means for bodily moving the head to effect turning of a flange on said work piece.

7. An apparatus of the character described including a forming machine having a head provided with a pair of cooperating flanging rollers and an abutment roller cooperating with the flanging rollers, a work support, means movably mounting the work support, a templet movable with the work support, means for shifting the work support, a feeler contacting the templet, means responsive to movement of the templet for actuating the shifting means to maintain the marginal edge of a work piece carried by the work support in engagement between the flanging rollers and in contact with said abutment roller, means for actuating the flanging rollers to effect rotation of the work piece, and means for bodily moving said head to effect turning of a flange on said work piece.

8. An apparatus of the character described including a forming machine having a head provided with a pair of cooperating flanging rollers, an abutment roller cooperating with the flanging rollers, means for rotating at least one of said flanging rollers, a work support, movable means rotatably mounting the work support for rotation about an axis, a templet movable with the work support, means shifting the work support for positioning the axis of rotation relatively to the flanging rollers, arcuate tracks supporting the head and arranged with their axis extending through the contacting point of one of said rollers with an elliptical work piece carried on the work support, and actuating means for mov-

ing the head on said tracks to bend the marginal edge of the work piece simultaneously with rotation thereof by said flanging rollers.

9. In an apparatus of the character described, a flanging mechanism including a head, a pair of flanging rollers on the head, means rotating the flanging rollers, means for supporting an elliptical plate for rotation about an axis while the marginal edge is engaged between the flanging rollers, means for shifting the supporting means to maintain the marginal edge of the plate in flanging position relative to said rollers, and means movably supporting the head for angular movement in the direction of the elliptical plate simultaneously with rotation of the plate on said axis.

10. In an apparatus of the character described, a flanging mechanism including a head, a pair of flanging rollers on the head, means rotating the flanging rollers, means for supporting an elliptical plate for rotation about an axis while the marginal edge is engaged between the flanging rollers, means for shifting the supporting means to maintain the marginal edge of the plate in flanging position relative to said rollers, means movably supporting the head for angular movement in the direction of the elliptical plate simultaneously with rotation of the plate on said axis, and supporting rollers engaging the opposite face from which the flange is turned to cooperate with the flanging rollers in determining the bending point of said flange.

11. In an apparatus of the character described, a flanging mechanism including a head, a pair of flanging rollers on the head, means rotating the flanging rollers, means for supporting an elliptical plate for rotation about an axis while the marginal edge is engaged between the flanging rollers, means for shifting the supporting means to maintain the marginal edge of the plate in flanging position relative to said rollers, means movably supporting the head for angular movement in the direction of the elliptical plate simultaneously with rotation of the plate on said axis, supporting rollers engaging the opposite face from which the flange is turned to cooperate with the flanging rollers in determining the bending point of said flange, and an abutment roller carried by the head and engaging the edge of said plate to maintain a constant depth for said flange.

12. An apparatus of the character described including a forming mechanism having a pair of cooperating gripping rollers adapted to grip the marginal faces of a plate, plate supporting rollers, a rotatable support for the plate, means movably mounting the rotatable support for rotation about a shifting axis, a templet movable with the rotatable support, means for shifting the rotatable support, a feeler contacting the templet, means for actuating the shifting means responsive to movement of the feeler by said templet for maintaining the margin of the plate in engagement between the gripping rollers, means supporting said gripping rollers for bodily angular movement relative to the supporting rollers to bend the plate, driving means for at least one of the rollers for effecting rotation of the plate, and means for bodily moving the gripping rollers.

13. An apparatus of the character described including a forming machine having a pair of co-

operating gripping rollers adapted to grip the marginal faces of a plate to be flanged, means for supporting said gripping rollers for bodily movement in an angular position relatively to said plate, means for bodily moving said rollers to bend the marginal portion of the plate, abutment means supporting the plate against the bending action of the gripping rollers, a rotating support for the plate, means movably mounting the plate support, a templet movable with the plate support, means for shifting the plate on said mounting means, a feeler contacting the templet, means for actuating the shifting means responsive to movement of the feeler for maintaining the marginal portion of the plate in predetermined engagement between the gripping rollers, and means for rotating at least one of said rollers to effect rotation of the plate.

14. An apparatus of the character described, including a plate bending means, a plate supporting means, means for moving one of said means in an angular position relatively to the other to bend the margin of a plate carried by the supporting means, supporting means for one of said means having movement to and from the other means and for movement transversely of said first named direction, gripping means included in said plate bending means adapted to grip said margin and retain the edge of the plate in one direction relatively to the plate bending means, means for effecting relative rotational movement between said means to extend said bend about the periphery of the plate, a templet fixed to the work supporting means, a feeler carried by said bending means and engaging the templet, and means shifting one of said supporting means in said transverse direction responsive to movement of the feeler.

15. In an apparatus of the character described, work forming mechanism, a work support, means movably mounting the work support for movement to and from the forming mechanism, a templet movable with the work support, said forming mechanism including gripping means arranged to grip work carried by the work support to move said work support in one direction, a feeler contacting the templet, means for shifting the work support in a direction transversely to the direction of movement effected by said gripping means, and means responsive to movement of the feeler for actuating the shifting means to effect said transverse movement of the work support.

16. In combination with a forming mechanism including rollers for gripping the marginal edge of a work piece, a rotatable support, means removably mounting a work piece on the support, means for actuating the gripping rollers to effect rotation of the work piece, means for shifting the work support transversely relative to the axes of the gripping rollers to maintain the portion of said edge gripped by the rollers uniform during rotation of said work piece, means supporting the gripping rollers for bodily movement from an angular position relative to the axis of rotation of the work piece support, and means for bodily moving the gripping rollers to bend said marginal edge in the form of a lateral flange.

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