

Aug. 3, 1926.

1,594,657

W. E. BURNS  
FLANGE ROLLING MACHINE

Filed Oct. 22, 1925

3 Sheets-Sheet 1

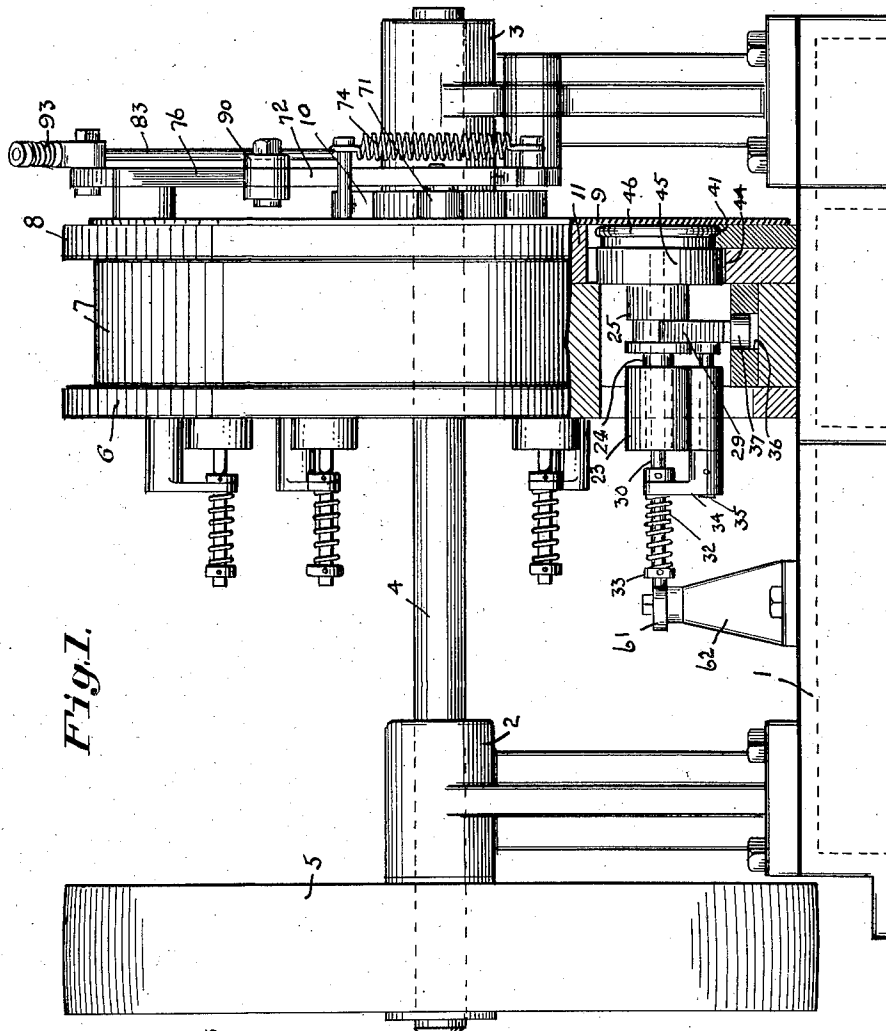


Fig. 1.

Fig. 2. Fig. 3.

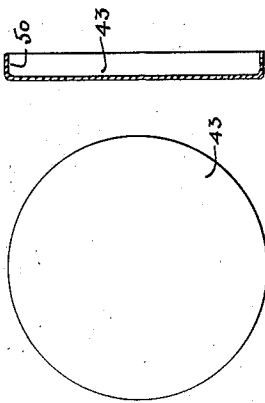
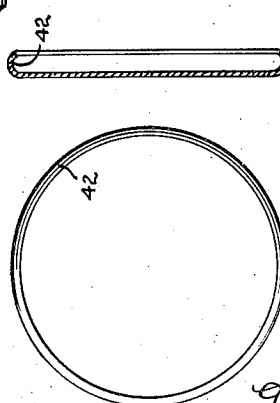


Fig. 4. Fig. 5.



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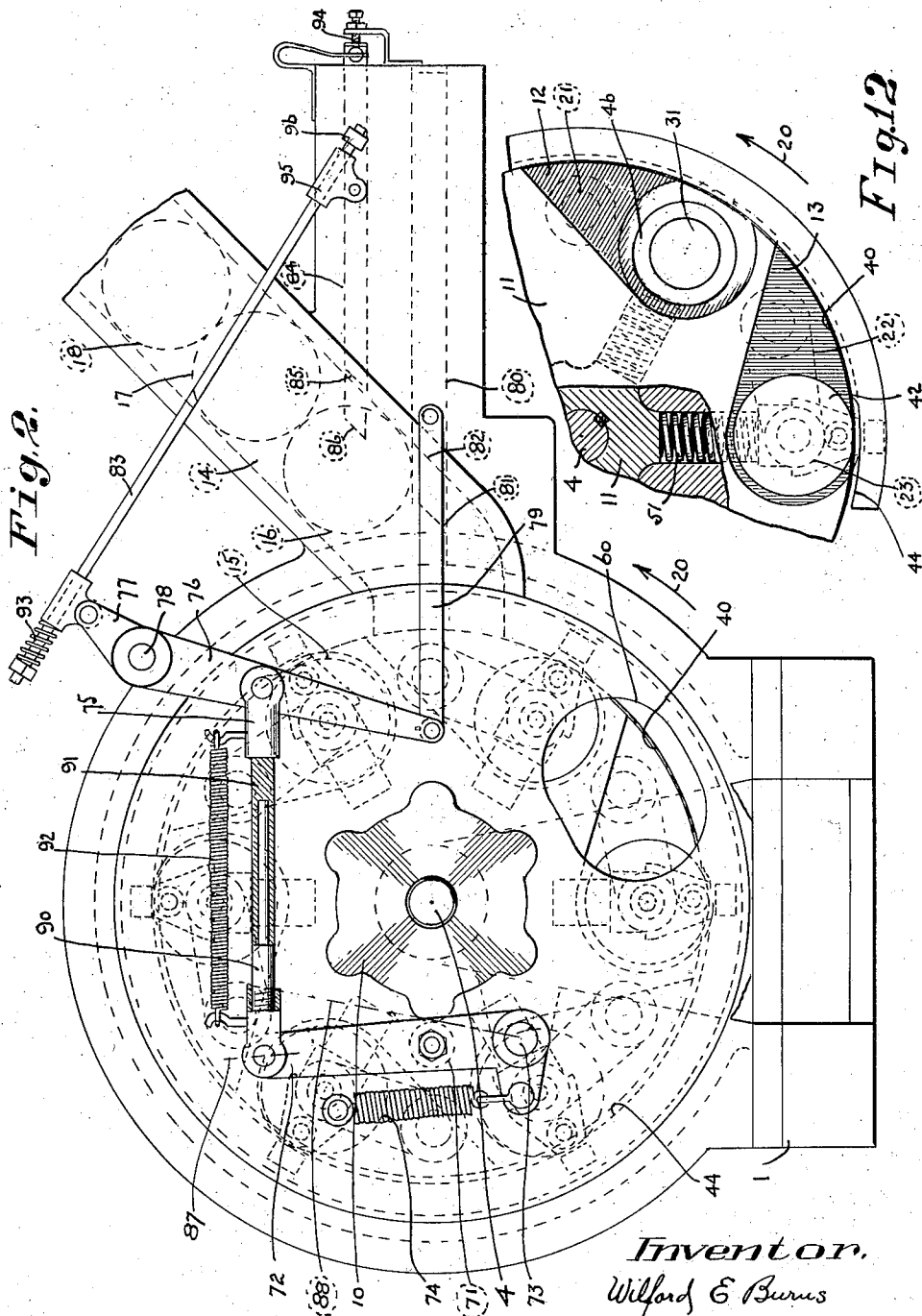
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*Fig. 3.*

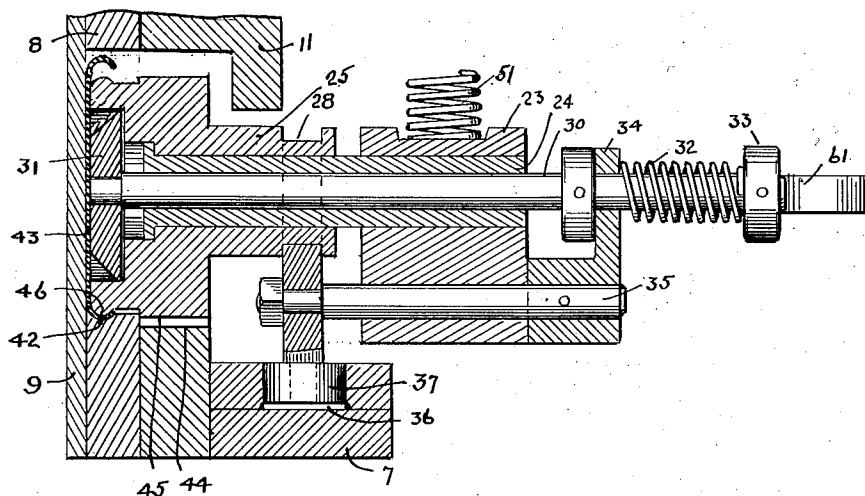
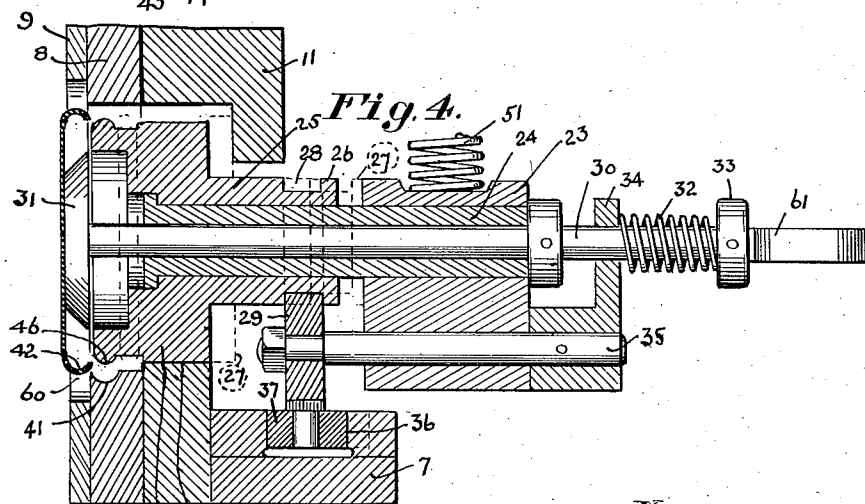


*Fig. 9.*

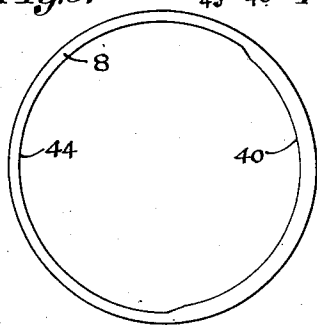


*Fig. 10.*

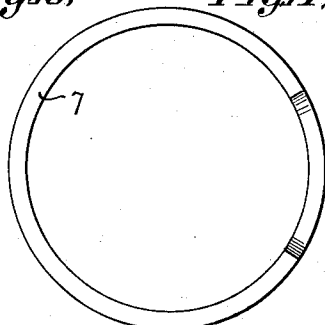


*Fig. 11.*



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## UNITED STATES PATENT OFFICE.

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## FLANGE-ROLLING MACHINE.

Application filed October 22, 1925. Serial No. 64,139.

My invention has for its object a machine in which the various flanging elements are continuously rolling in circular paths at a constant rate of travel and where-  
in blanks usually of thin sheet metal are received into the rotating element of the machine and therein flanged and subsequently ejected while moving in a circular path.

A further object is a machine of the character described where the blanks are flanged more cheaply, quickly and accurately than heretofore.

Other objects will appear from the drawings and specifications which follow.

By referring to the drawings my invention will be made clear.

Fig. 1 is a side view of a machine embodying my invention partly in section.

Fig. 2 is an end view of Fig. 1.

Fig. 3 is a cross section detail of one of the rollers with fragments of the casing.

Fig. 4 is a fragmentary showing of Fig. 3 and illustrating the action when the finished flanged cover is being ejected.

Figs. 5 and 6 are a flange cover as received in blank and after the rolling operation respectively.

Figs. 7 and 8 are front views of Figs. 5 and 6 respectively.

Fig. 9 is a side view of the ring cam for displacing the flanging rolls in a radial direction.

Figs. 10 and 11 are front and side views of the cam for displacing the flanging rolls in an axial direction.

Fig. 12 is a fragmentary portion of the driving plate and casing and certain of the associated parts.

Throughout the figures similar numerals refer to identical parts.

A main base plate is shown by the numeral 1, from which pedestal bearings 2, 3, respectively, are supported. In these bearings is carried the operating shaft 4 actuated by any conventional source of power as through the rotation of the pulley 5 mounted on the said shaft.

A casing of generally cylindrical form, but consisting of the ring 6, cam ring 7, end

ring 8, end plate 9, is fixed upon the bed plate 1.

Mounted on the shaft 4 is also the feeding cam 10.

A driving plate 11 is also fixed on the shaft 4 adapted to rotate within the rings 6, 7, 8. The driving plate 11 is recessed about its periphery with a plurality of pockets, two of which are shown at 12 and 13 respectively, into which the blanks fall from the chute 14. One of these blanks which has just fallen into place in the machine is shown at 15, and other blanks positioned in the chute are shown at 16 which will be the next to fall into the pocket 13, and be thereafter followed by blanks 17, 18 respectively, as the driving plate 11 rotates in the direction of the arrow 20.

Pivotally mounted as at 21, on the driving plate 11 are a series of levers one of which is shown at 22 having a boss 23 upon its free end. This boss carries a sleeve bearing at 24. On the outside of this bearing 24 is mounted the roller 25, free to rotate on 24 and having a freedom of end movement between the flange 26 and the boss 23, as shown by the dotted end at 27. See Fig. 4.

The roller is recessed at 28 and provided with a conventional fork 29 whereby it may be shifted laterally on the bearing sleeve 24 between the full line position 26 and the dotted line position 27.

Within the bearing sleeve 24 is the spindle 30 having the ejector head 31 on one end and the compressed coiled spring 32 on the other end, the latter acting between the collar 33 and standard 34, forcing the spindle 30 and head 31 at all times towards its limited position at the left.

The standard 34 is carried on the axially displaceable stem 35 and having the fixed fork 29 and roller 37 integrally mounted therewith.

The roller 37 rotates upon the extremity of the fork 29 and follows an annular cam path in the cam slot 36, and is driven by and about the center of the shaft 4, as best shown in Figs. 2, 3 and 4.

It will now be understood that the rollers 25 may move radially with respect to the

axis of the shaft 4 because of being mounted on the free end of the levers at 22 pivoted at 21 to the driving plate 11 and that the said rollers also have a longitudinal movement parallel with the axis of the shaft 4 through the action of the fork 29 actuated by the roller 37 moving in the annular cam slot 36 between the full line limits of Fig. 4 and the dotted position 27.

Moreover, independent of these several movements the ejector head 31 has a longitudinal movement by the movement of the spindle 30 within the sleeve bearing 24 upon the compression of the spring 32.

The end ring 8 is provided with a cam surface at 40 and a flange forming surface at 41 whose cross section is the desired shape of the cross section of the finished flange portion 42 to be rolled on the blank 43 (see also Figs. 5 and 6) as the same is rotated about the center of the shaft 4 and against the end plate 9 and forming recesses 41.

The end ring 8 is provided with two circular paths 44 on the larger radius and 40 on a shorter but concentric radius.

The shorter radius portion of the cam 40 is one on which the head 45 of the roller 25 is adapted to roll during a portion of the rotation of the driving plate, and during such time the forming edge 46 of the said roller is withdrawn within and out of contact with the edge of the blank 43 whereas when the head 45 rolls off of the cam surface 40 it contacts on the inner edge 50 of the blank 43 (see Figs. 3, 4, 5 and 9) and is by the compression spring 51 adapted to force the blank in the forming groove 41 and due to the circular motion from the driving shaft causes the blank 43 to rotate within the ring member 8 with the roller pressing it from the inside into the forming groove 41 under the action of the compressing spring 51 until the flange is rolled into the shape shown at 42.

The finished flange article is now ejected through the opening 60 in the end plate 9 (see Figs. 2 and 4) by the end of the spindle 30 riding over the tripping wheel 61, carried on the bracket 62.

This forces the spindle from the position shown in Fig. 3 to the position shown in Fig. 4, during which the spindle and ejector head 31 have moved from the position of Fig. 3 to the position of Fig. 4 whereby the head 31 ejects the finished article 43 through the opening 60 in the plate 9.

The spindle 30 now passed beyond the sphere of action of the roller 61 the spring 32 returns the ejector head within the roller 25 (see Fig. 3) and immediately thereafter the roller 37 rides into the cam slot 70 from its former path in the portion of the slot 36 causing the entire roller 25 and its associated parts to be shifted by the

action of the fork 29 into the dotted position 27 thus withdrawing the parts from the end plate 9 sufficient to admit the next blank 16 into one of the pockets as 13 of the driving plate 11.

The pocket 13 which has therefore just discharged a finished article is recharged with a blank ready to be formed and a further movement of the shaft 4 now causes the head 45 to roll off of the cam surface 40 and into the clearance portion 44 but out of contact with the latter, the forming member 46 contacting against the surface 50 of the blank 43 (see Figs. 3, 4 and 5).

Coincident with, or slightly anticipating this action, the roller 37 has passed out of the cam portion 70 and into the straight circular path 36 of the cam ring 7.

The operation is now repeated and the finished flanged article ejected from the machine through the opening 60 just before the completion of a revolution.

In the machine here shown there are 6 forming rolls and 6 corresponding pockets for receiving blanks and the action is continuous and extremely rapid with all of the major operations consisting of continually rotating movements at a constant rate.

The feeding of the blanks takes place through the action of the parts best shown in Fig. 2, wherein the cam plate 10 rotating against the roller 71 shifts the lever 72 mounted on the fixed pivot at 73 and acting against the tension spring 74 and through the connecting member 75 draws the double lever 76, 77 mounted on the fixed pivot 78 which acting through the link 79 shifts the main feed bar 80 so that its end travels between the limits 81, 82.

Coincident with this movement the connecting rod 83 moves the gauge bar 84 in an opposite direction to the feed bar 80 and between the limits 85, 86.

When the parts are in the full line position shown in this figure, the blanks 16, 17, 18 ride against the feed bar 80 in its advanced position 81 and restrain them from falling into the machine.

When the cam 10 is rotated and the lever 72 is thrown from the position 87 to the position 88 the gauge bar is advanced from its position 85 to the position 86 at the same time that the blank 16 is allowed to clear the receding end of the feed bar 80 as it approaches the position 82.

The gauge bar at 86 therefore restrains the blank 17 from falling with the blank 16, the blank 16 now passing on into the machine into one of the pockets at 13 as the plate 11 rotates in the direction of the arrow 20.

The next movement by the cam plate 10 causes the feeding bar to be restored to the full line position 81, at which time the blank previously restrained by the gauge bar 84 whose end is now in the position 85 ad-

vances therefrom and against the feed bar now extended into the position 81 and a cycle of movements has taken place among the blanks in the chute 14 so that they will now occupy the positions indicated in the figure.

The connecting member 75 is preferably formed of two telescoping parts 90 and 91 held in minimum adjusted length by the tension spring 92, whereby in the event of sticking or jamming in any of the blanks in chute 14 the spring 92 is stretched before any of the parts are broken.

A safety means is also preferably introduced on the connecting rod 83 through the employment of a compression spring 93 which, should any of the blanks jam against the gauge bar, is compressed without damaging the machine and without causing any other action than the interruption of the falling of a single cover.

The gauge bar 84 in its restricted position 85 rides against the adjusting screw 94 whereby its restricted position 85 may be accurately adjusted with regard to the chute wall 14.

The connecting rod 83 telescoping through the swivel member 95 and having the head 96 is free to move beyond the adjusted position of the gauge bar but upon movement to the left of the connecting rod 83 the head 96 picks up the swivel member 95 and with it the gauge bar 84 moving the latter to the left, into the position 86. This also allows a time interval for the blank to pass the gauge bar end.

The operation is as follows:

Blanks are automatically fed into the machine by the rotation of the cam 10 functioning through the lever connections and actuating the feed bar 80 and reciprocating therewith the gauge bar 84.

As the blanks thereby released into the machine pass down the chute 14 they fall successively into the pockets as 12, 13 of the rotating plate 11 and are there cradled with a radial freedom of movement on account of the pocket being made somewhat larger than the blank.

This feeding movement takes place when the forming head 25 has been laterally shifted to the left of Fig. 4 from the full line position to the dotted position 27, this shifting of the head being occasioned by the roller 37 riding in the cam portion 70 of the ring 7 (Fig. 11).

As soon as the blank is in position in and during the further rotation of the plate 11 the rollers 37 rides out of the cam slot 70 and into the path 36 restoring the head 25 into the flange rolling position of Fig. 3.

As soon as the head is in this position the plate 11 continuing its rotation, the head portion 45 having rolled off of the cam portion 40 and being within the clearance portion

44, the spring 51 forces the forming edge 46 against the surface 50 of the blank 43 and compresses and rolls it against the stationary forming ring 41.

The driving plate 11 while causing all of the other parts to rotate, forces the rotation of the blank 43 with its flanged edge compressed during the rolling action between the forming head at 46 and the stationary ring at 41.

This action continues throughout substantially the greater portion of the revolution of the plate 11 and in fact all of the time that the rolling edge 45 of the head 25 is on the cam portion 44 of the ring 8.

At such time as the head surface 45 rolls up upon the cam 40 of the ring 8, the head is released from further pressure against the now formed flange 42 and immediately thereafter the spindle 30 rides over the tripping wheel 61 forcing the ejector head 31 from the position of Fig. 3 to the position of Fig. 4 and forces the now finished flanged article of Fig. 8 to be ejected through the opening 60 in the stationary plate 9.

The head 31 is again retracted from the position of Fig. 4 to the position of Fig. 3 through the action of the spring 32 as soon as the end of the spindle 30 passes the wheel 61.

The roller 37 again rides into the cam slot 70 and the parts are fully retracted, allowing the next blank to enter the rotating plate 11 and the cycle of operation is repeated.

The same action takes place for each of the six sets of forming mechanism positioned on the plate 11.

I claim:

1. In a flange rolling machine, a driving plate of disc form, a casing within which said plate is adapted to rotate, a plurality of pockets opening from the periphery of said plate and each adapted to receive a blank to be flanged, a stationary flange forming member against which the blanks are adapted to roll when being driven by said plate, a head having a flange forming edge within each pocket free to rotate, a rolling face on each head, means permitting a radial movement of each head while compelling a rotative movement with said plate, an arcuate surface against which said rolling faces engage during a portion of each revolution of said plate whereby each said edge is restrained substantially concentric with its corresponding blank and whereby during the remainder of each of said revolutions the said edge is free to contact against the inner rim of said blank and form thereon a finished flange by rolling the said rim in contact with said forming member.

2. A flange rolling machine embodying the elements set forth in claim 1 wherein

mechanism is provided to shift each head axially during a portion of each revolution of said plate to admit a blank to one pocket and also to eject a finished flanged blank from another pocket and clear of said casing.

3. A flange rolling machine embodying the elements set forth in claim 1 wherein mechanism is provided to shift each head axially during a portion of each revolution of said plate to admit a blank to one pocket and also to eject a finished flanged blank from another pocket and clear of said casing comprising an axially movable bearing for said head, an annular cam slot, a roller in said slot, a fork actuated by said roller and a slot in said head within which said fork engages.

4. In a flange rolling machine, a driving plate or disc form, a casing within which said plate is adapted to rotate, a plurality of pockets opening from the periphery of said plate and each adapted to receive a blank to be flanged, a stationary flange forming member against which the blanks are adapted to roll when being driven by said plate, a head having a flange forming edge within each pocket free to rotate, a rolling face on each head, means permitting a radial movement of each head while compelling a rotative movement with said plate, an arcuate surface against which said rolling faces engage during a portion of each revolution of said plate whereby each said edge is restrained substantially concentric with its corresponding blank and whereby during the remainder of each of said revolutions the said edge is free to contact against the inner rim of said blank and form thereon a finished flange by rolling the said rim in contact with said forming member, an ejector concentric with and normally collapsed within each head and a spindle passing through said head, a roller against which said spindle contacts during each revolution and by which said ejector is forced axially from its collapsed position to eject a finished flanged blank.

5. A flange rolling machine embodying the elements set forth in claim 4 wherein mechanism is provided to shift each head axially during a portion of each revolution of said plate to admit a blank to one pocket and also to eject a finished flanged blank from another pocket and clear of said casing.

6. A flange rolling machine embodying the elements set forth in claim 4 wherein mechanism is provided to shift each head axially during a portion of each revolution of said plate to admit a blank to one pocket and also to eject a finished flanged blank from another pocket and clear of said casing, comprising an axially movable bearing for said head, an annular cam slot, a roller

in said slot, a fork actuated by said roller and a slot in said head within which said fork engages.

7. In a flange rolling machine, a driving plate of disc form, a casing within which said plate is adapted to rotate, a plurality of pockets opening from the periphery of said plate and each adapted to receive a blank to be flanged, a stationary flange forming member against which the blanks are adapted to roll when being driven by said plate, a head having a flange forming edge within each pocket free to rotate, a rolling face on each head, means permitting a radial movement of each head while compelling a rotative movement with said plate, an arcuate surface against which said rolling faces engage during a portion of each revolution of said plate whereby each said edge is restrained substantially concentric with its corresponding blank and whereby during the remainder of each of said revolutions the said edge is free to contact against the inner rim of said blank and form thereon a finished flange by rolling the said rim in contact with said forming member, and feeding mechanism for blanks on which flanges are to be formed including a chute through which said blanks descend by gravity, a feed bar displaceable in and out of said chute, a gauge bar displaceable out and in said chute, and means reciprocating said bars in synchronism with said driving plate.

8. A flange rolling machine embodying the elements set forth in claim 7 wherein mechanism is provided to shift each head axially during a portion of each revolution of said plate to admit a blank to one pocket and also to eject a finished flanged blank from another pocket and clear of said casing.

9. A flange rolling machine embodying the elements set forth in claim 7 wherein mechanism is provided to shift each head axially during a portion of each revolution of said plate to admit a blank to one pocket and also to eject a finished flanged blank from another pocket and clear of said casing comprising an axially movable bearing for said head, an annular cam slot, a roller in said slot, a fork actuated by said roller and a slot in said head within which said fork engages.

10. In a flange rolling machine, a driving plate of disc form, a casing within which said plate is adapted to rotate, a plurality of pockets opening from the periphery of said plate and each adapted to receive a blank to be flanged, a stationary flange forming member against which the blanks are adapted to roll when being driven by said plate, a head having a flange forming edge within each pocket free to rotate, a rolling face on each head, means permitting

a radial movement of each head while compelling a rotative movement with said plate, an arcuate surface against which said rolling faces engage during a portion of each  
5 revolution of said plate whereby each said edge is restrained substantially concentric with its corresponding blank and whereby during the remainder of each of said revolutions the said edge is free to contact  
10 against the inner rim of said blank and form thereon a finished flange by rolling the said rim in contact with said forming member, a spindle and an ejector concentric with and normally collapsed within each  
15 head and mounted on said spindle and passing through said head, a roller against which said spindle contacts during each revolution and by which said ejector is forced axially from its collapsed position to  
20 eject a finished flanged blank, feeding mechanism for blanks on which flanges are to be formed including a chute through which said blanks descend by gravity, a feed bar displaceable in and out of said chute, and

a gauge bar displaceable out and in said chute means reciprocating said bars in synchronism with said driving plate.

11. A flange rolling machine embodying the elements set forth in claim 10 wherein mechanism is provided to shift each head  
30 axially during a portion of each revolution of said plate to admit a blank to one pocket and also to eject a finished flanged blank from another pocket and clear of said casing.

12. A flange rolling machine embodying the elements set forth in claim 10 wherein mechanism is provided to shift each head  
35 axially during a portion of each revolution of said plate to admit a blank to one pocket and also to eject a finished flanged blank from another pocket and clear of said casing comprising an axially movable bearing for said head, an annular cam slot, a  
40 roller in said slot, a fork actuated by said roller and a slot in said head within which said fork engages.

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