March 19, 1940. H. EMBREE 2,194,114

FLANGING MACHINE

Filed Dec. 2, 1937

Fig. 1

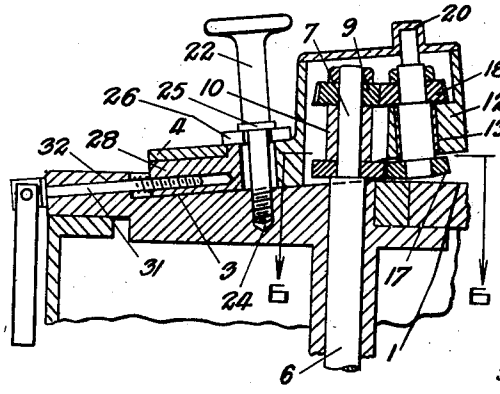


Fig. 2

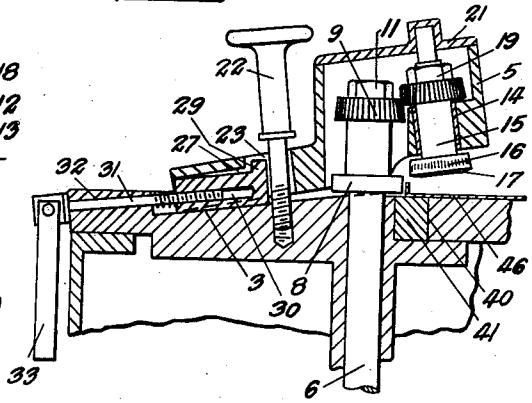


Fig. 3

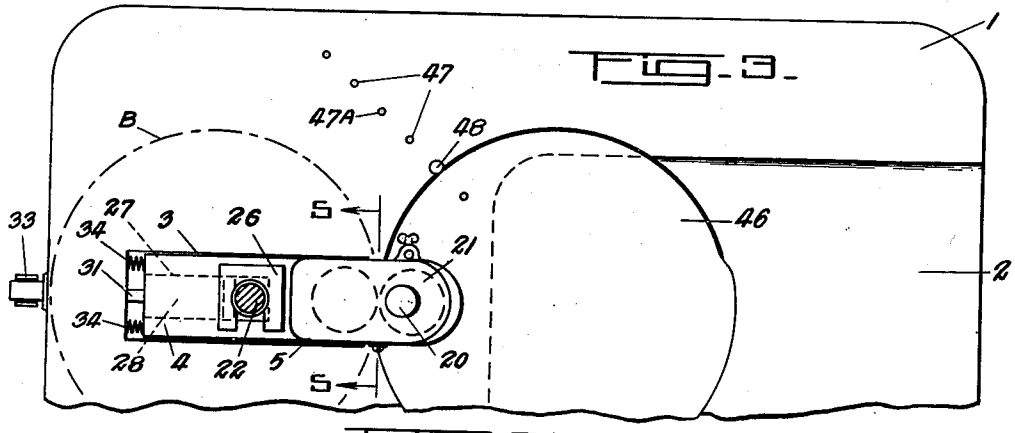


Fig. 5

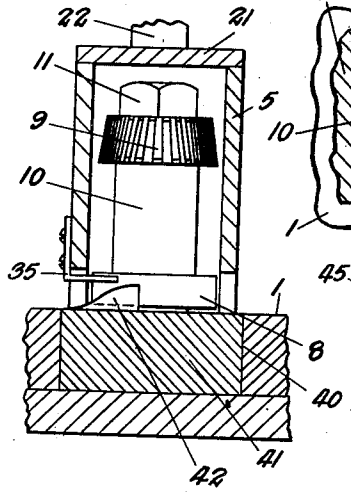


Fig. 6

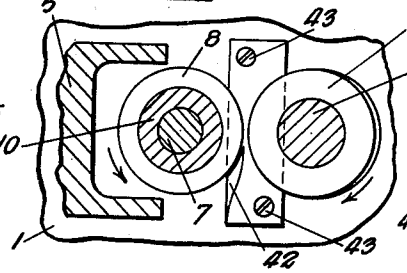


Fig. 4

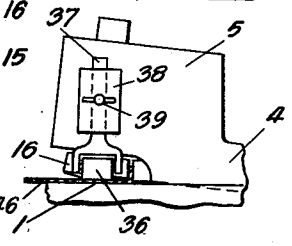
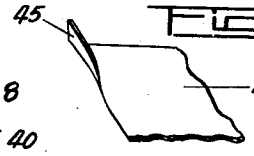


Fig. 7



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2,194,114

FLANGING MACHINE

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5 Claims. (Cl. 153—29)

My invention relates to improvements in flanging machines and the object of the invention is to provide a simple type of machine incorporating a pair of flanging rolls mechanically rotated and adapted to engage the sheet of metal to be flanged and to turn up a flange along the edge thereof.

A further object of my invention is to provide a machine which can be used to turn up flanges along the curved edges of metal sheets whether such curves be of a convex or concave character.

Another object of my invention is to provide a machine wherein one of the flanging rolls can be moved out of juxtaposition with the other roll, whereby a flanged sheet of metal can be readily lifted from the machine, and a still further object of my invention is to form the lower face of the roll with a sheet metal plate engaging bevel so that the rotative movement of such roll assists in feeding the sheet of metal through the machine.

Another and important object of my invention is to furnish my machine with a plough like projection positioned in close proximity to the pair of forming rolls whereby such plough member initially turns up the flange upon the sheet and guides it between the rolls.

With these and other objects in view as shall hereinafter appear, my invention consists of a flanging machine constructed and arranged all as hereinafter more particularly described and illustrated in the accompanying drawing in which:

Figure 1 is a cross-sectional view through the head containing the forming rolls and also through a fragmentary portion of the sheet metal supporting table upon which the head is mounted.

Figure 2 is a similar view to Figure 1 showing the head and one of the forming rolls swung upwardly to a slight degree in order to permit the removal of a flanged sheet as included in this view.

Figure 3 is a plan view of my machine showing a fragmentary portion of the metal sheet supporting table with the head carried thereon, a partially flanged round sheet being shown resting upon the table and passing between the forming rolls.

Figure 4 is a side elevational view of the head, being taken from the opposite side to that shown in Figure 1.

Figure 5 is an enlarged vertical cross-sectional view through the head, being taken through the line 5—5, Figure 3.

Figure 6 is also an enlarged horizontal cross-sectional view through the head, being taken through the line 6—6, Figure 1, and

Figure 7 is a perspective view of a fragmentary portion of a metal sheet to be flanged, showing one end of the edge manually turned up before the sheet is fed through the machine.

Like characters of reference indicate corresponding parts in the different views of the drawing.

The head containing the forming rolls is mounted upon a table 1, such table being supported upon a suitable structure, not shown. The upper face of the table is formed with a recessed portion 2 over which the sheet of metal slides, such recess enabling the operator to insert his fingers underneath the sheet to, if necessary, guide the sheet in its flange forming movement through the machine. The portion of the table face upon which the head is mounted is formed with a rectangular recess 3 which slopes downwardly from the inner portion of the table towards the table edge, which recess is provided to receive an arm 4 projecting from a cylindroidal shaped forming roll housing head 5. The housing head 5 and its arm 4 are thus positioned at an inclination to the table surface, as illustrated in the drawing.

For rotating the forming rolls, I furnish a vertical drive shaft 6 extending upwardly through the table in the vicinity of the inner end of the recess 3 and projecting upwardly into the head 5. The upper end 7 of the shaft 6 is of reduced diameter and carries a forming roll 8 upon its lower portion, which roll is firmly secured thereto and has its lower face in close proximity to the upper face of the table 1. The upper end of the shaft portion 7 carries a bevelled gear 9 resting upon a spacer sleeve 10 and secured to the shaft portion 7 by a nut 11.

The inner portion of the head 5 adjacent to the spindle 7 is of solid form in its lower portion 12 and is formed with an inclined orifice 13 extending therethrough, such orifice containing a bearing sleeve 14 which in turn contains a rotatable spindle 15. The lower end of the spindle 15 is reduced in diameter and carries a second forming roll 16 of slightly frusto-conical form and rigidly secured to the spindle. The bottom face of the forming roll 16 has a suitable bevel 17, which bevel, when adjacent to the forming roll 8, is parallel to the flat face of the table 1. From Figure 1 of the drawing it will be under-

stood that the spindle 15 is angularly inclined in relation to the shaft portion 7 so that the conical face of the roll 16 is parallel to the round face of the roll 8. The upper end of the spindle 15 carries a bevelled gear 18 which is secured upon the spindle by a nut 19 and meshes with the bevelled gear 9. The bevelled gears 9 and 18 are of the same diameter and the forming rolls 8 and 16 are also of the same diameter so that the peripheral speeds of the forming rolls are the same when they are rotated under rotative movement of the driving shaft 6. The upper end of the spindle 15 projects upwardly above the nut 19 and is contained within a suitable bearing head 20 formed in the cover plate 21 of the housing head 5. The conical face of the roll 16 is also slightly knurled to insure its positive feeding engagement with the metal sheet.

The housing head 5 with its arm 4 is firmly secured in place upon the table by a hand screw 22 having its lower end projecting downwardly through a slot 23 in the arm 4 and threaded into an orifice 24 in the table, such hand screw and orifice 24 being at right angles to the inclined bottom of the recess 3. Interposed between the lower flange 25 of the hand screw and the top of the arm 4 I furnish a removable U-shaped washer 26 whereby when the hand screw is loosened, the washer can be slid from out of engagement with the top of the arm 4 and the arm and housing head 5 thus permitted to be swung upwardly to a slight degree, as illustrated in Figure 2.

The outer end portion of the arm 4 is of hollow form, which hollow portion 27 extends from the outer end face of the arm 4 to the hand screw receiving slot 23. The hollow portion 27 is designed to contain an elongated rectangular shaped nut 28 which slidably rests upon the inclined face of the recess 3 and is formed at its inner upper edge with a lip 29 engaging the side of the slot 23. The nut 28 contains a threaded orifice 30 provided to receive the threaded inner end of a screw 31 which rotatably extends through an inclined orifice 32 in the side portion of the table 1. The outer end of the screw 31 carries a handle 33 by which it can be rotated and such screw is at the same inclination as the inclination of the bottom of the recess 3. It will thus be apparent that by rotating the screw 31 so that it enters the threaded recess 30 in the nut 28 that the nut is drawn towards the edge of the table 1 and that as its lip 29 engages the edge of the slot 23 in the housing head arm, that the head and arm will also move in conjunction with the nut. A pair of springs 34 are interposed between the outer end of the arm 4 and the end face of the recess 3. The function of the springs 34 is to help to raise the head 5 and to act as buffers in keeping the arm 4 from rattling in the slot 3 when the hand screw 22 is loosened.

In order to control the height of the flange being formed upon the sheet of metal, one side of the housing head 5 carries an L-shaped guide member 35 which projects inwardly towards the forming rolls and is secured to the outer face of the head 5 by screws or other suitable attaching means. The other side of the housing head 5 carries an adjustable metal sheet engaging roll 36 mounted within the bifurcated lower end of a spindle 37 adjustably mounted within a boss 38 formed on the side of the head. A thumb screw 39 is threaded through the boss 38 to engage the spindle 37 and retain it in its adjusted position.

The portion of the table 1 underneath the forming rolls 8 and 16 is formed with a rectangular recess 40 provided to receive a block of tool steel 41. The block 41 carries a plough shaped guide member 42 upon its upper face, one side of the plough member following the contour of the forming roll 8 and the other side of the plough being of convex form, and both of such sides merging to a point which projects into the entering space between the rolls, as illustrated in Figure 6. The upper edge of the plough is inclined upwardly in a sweeping curve from the top of the block to the edge between the rollers, as illustrated in Figure 5. The block is rigidly secured in place as by screws 43 extending therethrough and threaded into the table assembly.

The operation of my flanging machine is as follows:

When it is desired to flange a sheet of metal, as for example the sheet 44 as illustrated in Figure 7, the end of the edge to be flanged is preferably turned up by hand to form an initial or starting flanged portion 45 and the sheet is then laid upon the table 1 with the flanging head being in the position as illustrated in Figure 1 wherein the bottom bevelled face 17 of the forming roll 16 is bearing upon the upper face of the sheet of metal and the turned up flange portion 45 resting against the side face of the plough preparatory to being fed in between the forming rolls. As the driving shaft 6 is rotated, the forming rolls also rotate in the directions as indicated by arrows in Figure 6 to grip the turned up flange portion 45 and draw the sheet along whereby the flange continues to be formed along the edge of the sheet. The plough is so positioned that it engages the turned up edge of the sheet and assists such edge to bend upwardly preparatory to its being fed between the rolls where it is bent to its final form. The bottom face of the L-shaped guide 35 bears against the top of the flange as it is being formed and thus insures that the flange will be of a uniform height. If a flange is being formed right around the edge of a sheet of metal, as for example the round sheet of metal shown in the machine in Fig. 3, it will be obvious that when the flange is completely formed it would be impossible to slide the sheet from underneath the forming roll 16 as the endless turned up flange would be positioned behind the roll.

In order to remove a flanged metal sheet of such description, it is only necessary to loosen the hand screw 22 and slidably remove the U-shaped washer 26 when sufficient clearance will be provided between the lower flange 25 of the hand screw and the top of the arm 4 to permit the arm 4 and housing head 5 to be swung upwardly into the position illustrated in Figure 2. As the forming roll 8 is carried upon the driving shaft independently of the head, such roll will not move, but as the forming roll 16 with its gear 18 is journalled within the housing head, such roll and gear will move upwardly to a position wherein the roll 16 is sufficiently above the face of the table 1 to permit the flanged sheet 46, as included in Figures 2, 3, and 4, to be slid from underneath the roll 16. In order to adjust the forming rolls 8 and 16 in relation to each other and also to lift the roll 16 to accommodate sheet metal of various thicknesses, the hand screw 22 is losened and the screw 31 rotated through the medium of the handle 33, which rotative movement moves the arm 4, housing head 5, and forming roll 16 in relation to the forming roll 8 and the top of the table 1.

Also when it is desired to remove a sheet of

flanged metal by raising the housing head 5, the screw 32 is slackened so that the forming roll 16 moves away from the forming roll 8 to a slight degree in order that it may be freely swung upwardly. When the sheet has been removed and it is desired to adjust the machine for further flanging, the head 5 is pressed downwardly and the U-shaped washer re-inserted underneath the hand screw 22 after which the screw 32 is adjusted to bring the forming roll 16 into correct relationship with the forming roll 8 and the hand screw 22 then finally tightened down.

To guide metal sheets through the machine without the continuous attention of the operator, I form the face of the table 1 with a plurality of orifices 47, any one of which receives a pin 48 against which the flanged edge of the metal sheet may slide, the pin 48, of course, being inserted in any desired location. For example, in Figure 3 it will be seen that the pin 48 bears against the edge of the circular disc 46 and if a flange were being put upon the straight edge of a metal sheet, the pin would be inserted in the orifice 47A in line with the forming rolls. When the flange is being turned up upon the edge of an orifice in a sheet of metal, the head and arm assembly are contained within the orifice as illustrated by dotted line B in Figure 3.

From the foregoing description, it will be apparent that I have devised a very simple and yet very practical machine for forming flanges upon the edges of metal sheets and wherein the flanged sheets can be very readily removed from the machine by my simple method of lifting one of the forming rolls. Furthermore, by providing the guide plough to initially form the flange before it passes through the forming rolls, I materially reduce wear upon the rolls and also provide a uniform flange irrespective of the contour of the sheet edge. Although I have shown and described a particular embodiment of my invention, it is to be understood that I can make any such changes and alterations as I may from time to time deem necessary without departing from the spirit of my invention as set forth in the appended claims.

What I claim as my invention is:

1. In a flanging machine of the character described, a table for supporting sheet metal to be flanged, a rotated flange forming roll having its lower side face in proximity to the table top, a second rotated flange forming roll in juxtaposition to the first roll and also having its lower side face in proximity to the table top when in the flange forming position, a driving shaft upon which the first roll is secured, a driven spindle inclined in respect to the driving shaft and upon which the second roll is secured, a roll housing head adapted to be swung upwardly from the table and in which the spindle is journalled, and a pair of meshing gears mounted respectively upon the driving shaft and driven spindle, the housing and the second roll with its spindle and gear being swingable upwardly from the table top independently of the first roll and its shaft and gear for the removal of a flanged sheet.

2. In a flanging machine of the character described, a table for supporting sheet metal to be flanged, a rotated flange forming roll having its lower side face in proximity to the table top, a second rotated flange forming roll in juxtaposition to the first roll and also having its lower side face in proximity to and substantially parallel with the table top when in the flange forming position, the axis of the second roll being inclined in respect to the axis of the first roll, and an initial flange forming guide member projecting upwardly from the table top and extending into the entering space between the rolls.

3. In a flanging machine of the character described, a table for supporting sheet metal to be flanged, a rotated flange forming roll having its lower side face in proximity to the table top, a second rotated flange forming roll of frusto-conical form and in juxtaposition to the first roll and also having its lower side face in proximity to the table top when in the flange forming position, the axis of the second roll being inclined in respect to the axis of the first roll so that the conical face of the second roll lies substantially parallel to the round face of the first roll, a plough shaped initial flange forming guide member projecting upwardly from the table top and extending into the entering space between the rolls, and means for quickly lifting the second roll up from the table top independently of the first roll for the removal of a flanged sheet.

4. In a flanging machine of the character described, a table for supporting sheet metal to be flanged, a rotated flange forming roll having its lower side face in proximity to the table top, a second rotated flange forming roll in juxtaposition to the first roll and also having its lower side face in proximity to the table top when in the flange forming position, a driving shaft upon which the first roll is secured, a driven spindle inclined in respect to the driving shaft and upon which the second roll is secured, a roll housing head adapted to be swung upwardly from the table and in which the spindle is journalled, a plough shaped initial flange forming guide member projecting upwardly from the table top, one side of the plough member following the contour of the first roll and the other side of the plough member being of convex form, both of such sides merging to a point which projects into the entering space between the rolls, and a pair of meshing gears mounted respectively upon the driving shaft and driven spindle, the housing and the second roll with its spindle and gear being swingable upwardly from the table top independently of the first roll and its shaft and gear for the removal of a flanged sheet.

5. In a flanging machine of the character described, a table for supporting sheet metal to be flanged, a rotated flange forming roll having its lower side face in proximity to the table top, a second rotated flange forming roll in juxtaposition to the first roll and also having its lower side face in proximity to the table top when in the flange forming position, a driving shaft upon which the first roll is secured, a driven spindle inclined in respect to the driving shaft and upon which the second roll is secured, an inclined face formed in the table top, a roll housing head assembly slidably resting upon the inclined face, clamping means for securing the roll housing head assembly in its adjusted position upon the inclined face, means for permitting the roll housing head assembly to be swung up from the table top upon release of the clamping means, the second roll spindle being journalled within the housing head, and a pair of meshing gears mounted respectively upon the driving shaft and driven spindle, the housing and the second roll with its spindle and gear being swingable upwardly from the table top independently of the first roll and its shaft and gear for the removal of a flanged sheet.

HERBERT EMBREE.