

Sept. 11, 1934.

E. J. DREIS

1,973,164

PIPE FORMING MACHINE

Filed June 23, 1931

4 Sheets-Sheet 1

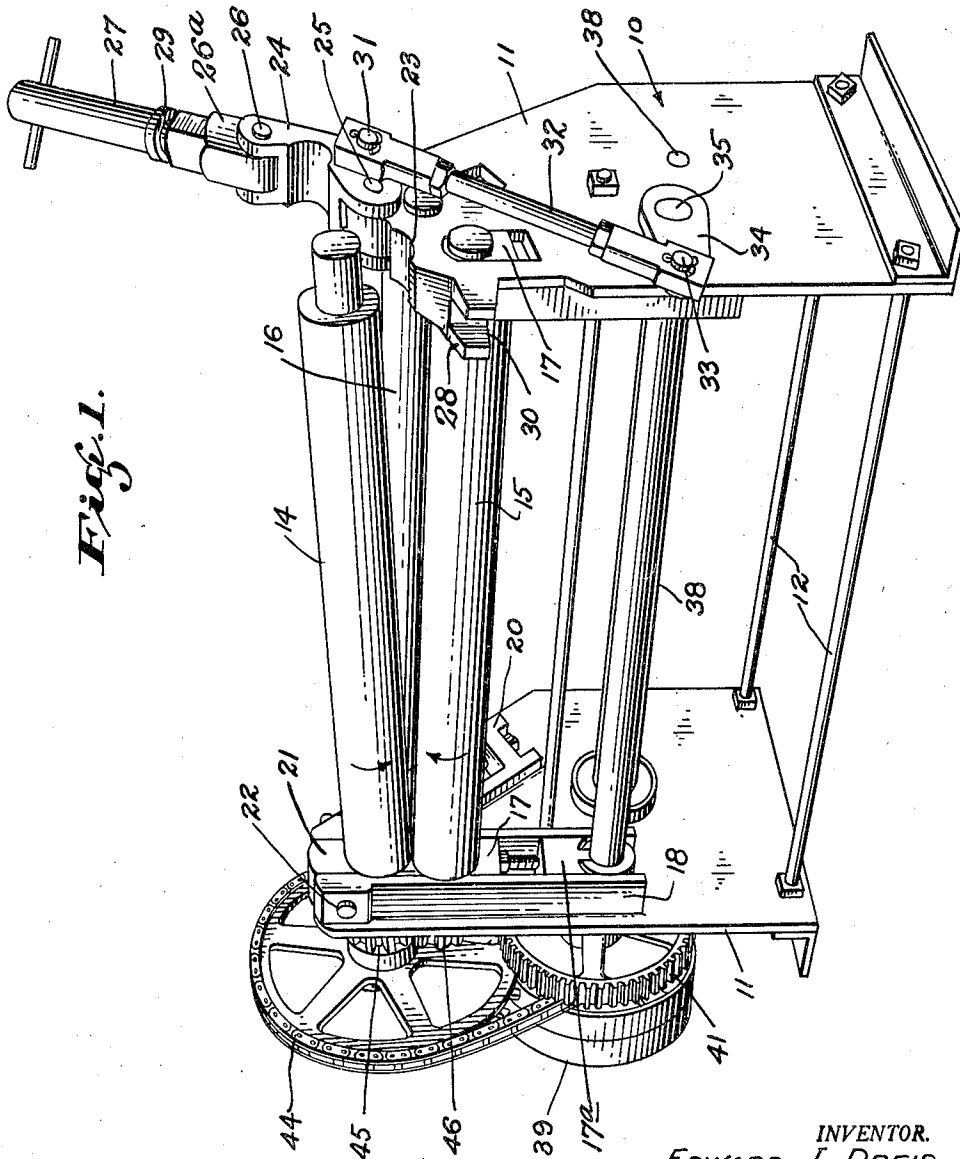


Fig. 1.

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4 Sheets-Sheet 2

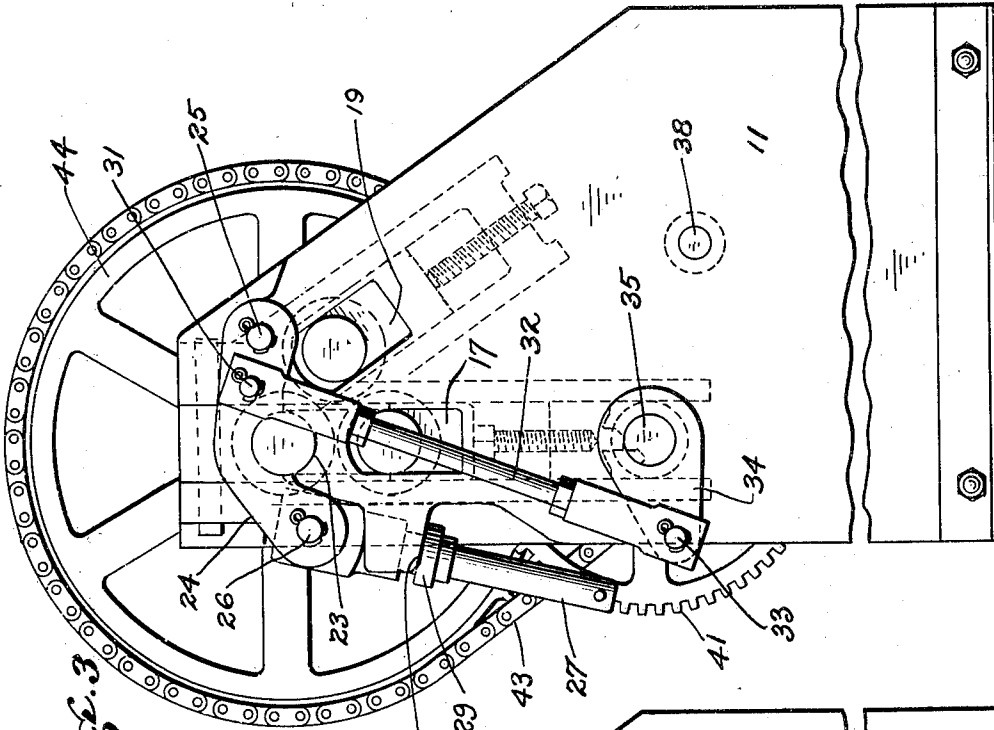


Fig. 3

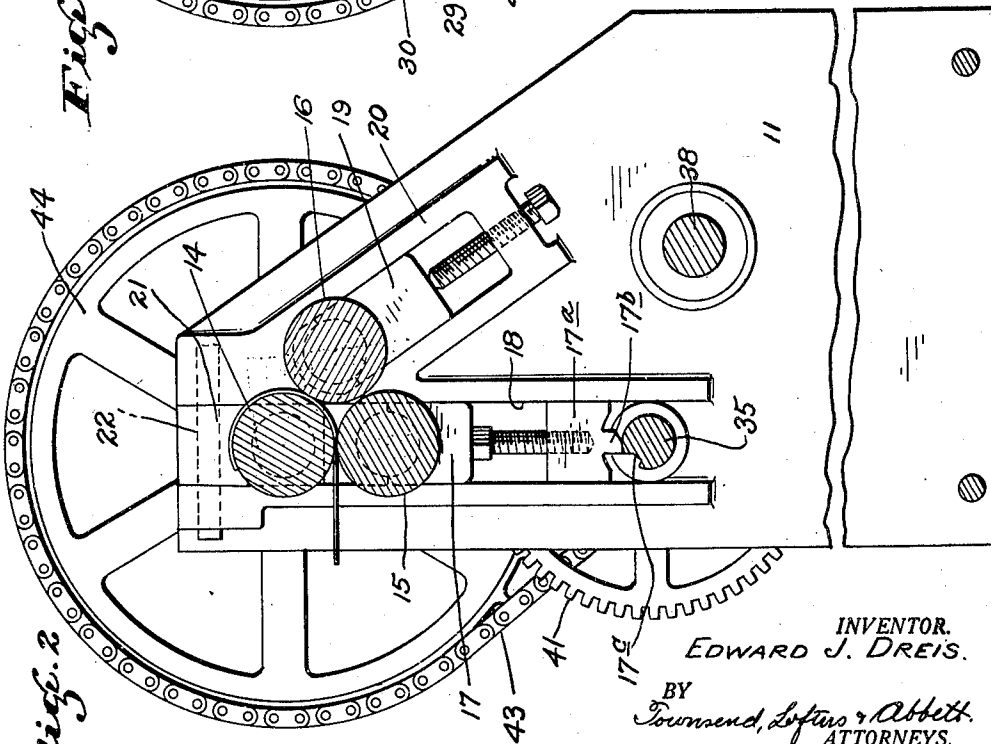


Fig. 2

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4 Sheets-Sheet 3

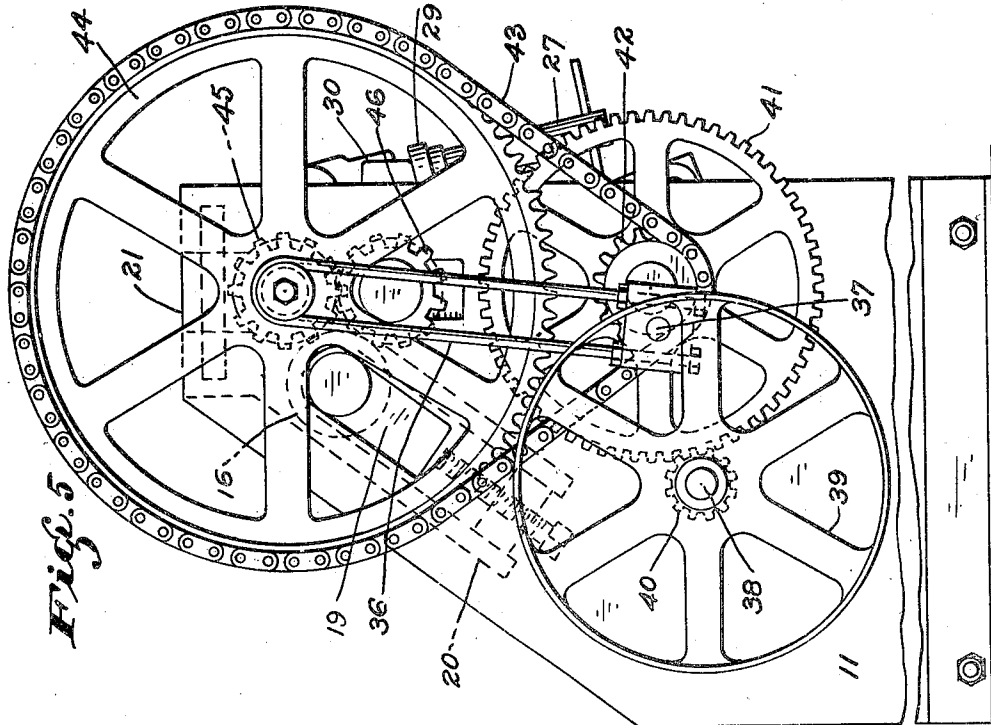


Fig. 5

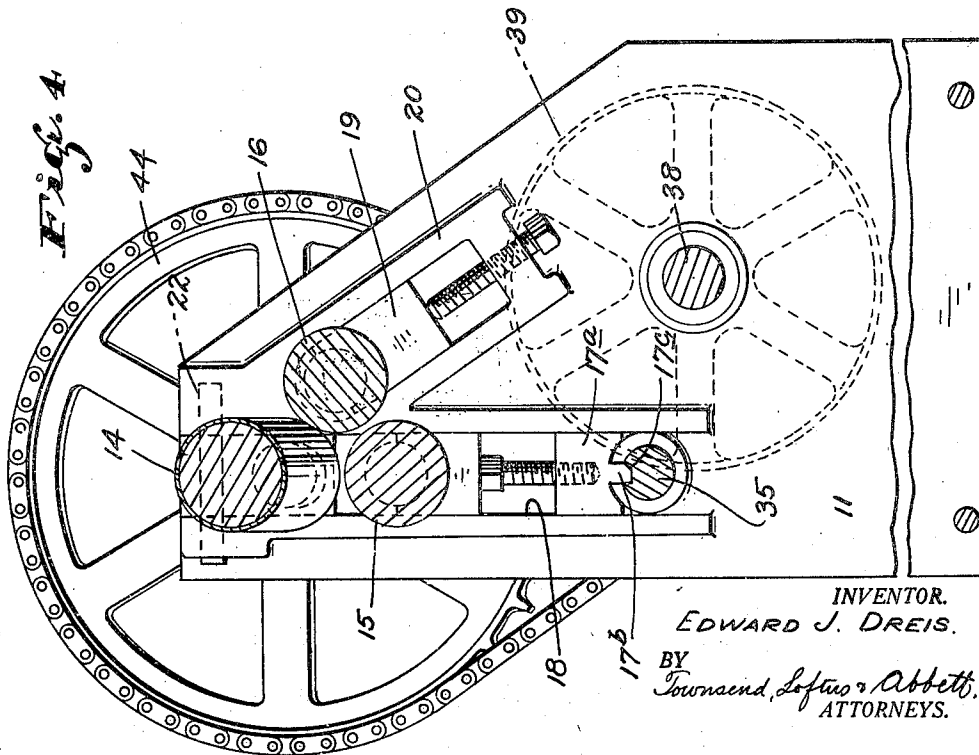


Fig. 4

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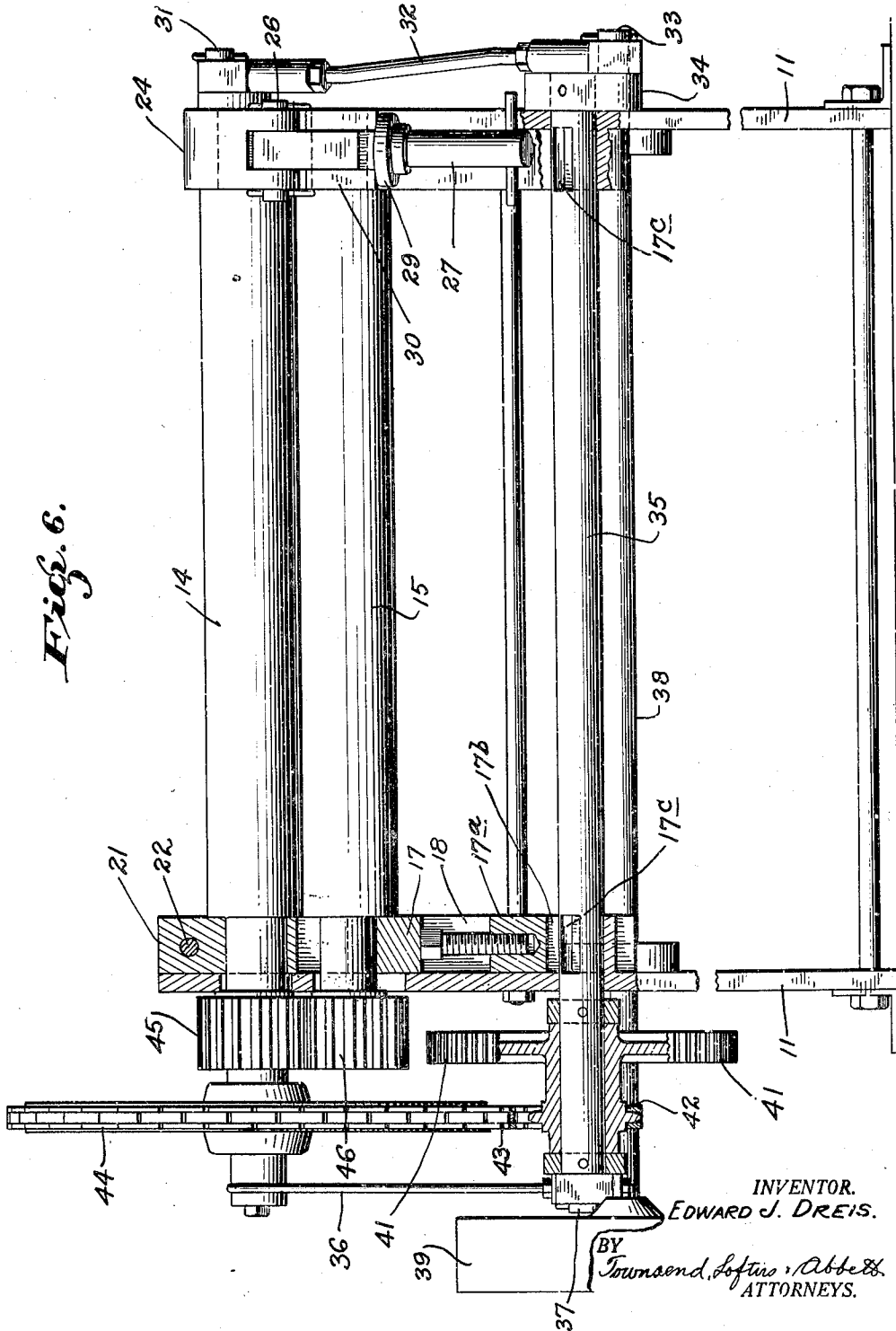
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4 Sheets-Sheet 4

Fig. 6.



UNITED STATES PATENT OFFICE

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PIPE FORMING MACHINE

Edward J. Dreis, San Francisco, Calif.

Application June 23, 1931, Serial No. 546,253

5 Claims. (Cl. 153—61)

This invention relates to sheet metal working machines and particularly pertains to a machine for forming sheet metal tubing.

It is the principal object of the present invention to generally improve the construction and operation of pipe forming machines of the character referred to by providing a machine wherein the forming rolls may be, through the medium of a single operation, disposed in a position enabling removal of the formed tube therefrom. This obviously increases the capacity of the machine and consequently reduces the cost of producing the tubing.

In carrying the invention into practice the forming roll on which the tube is formed is so mounted that one end thereof may be disposed in an unobstructed position to enable the tube to be removed therefrom. The mechanism associated with the roll mentioned is such that in a single operation the forming rolls are separated and the forming roll on which the tubing is formed is released and one end thereof disposed in a position enabling removal of the formed tube. Likewise, but one operation is required to re-position the forming rolls in operative position for subsequent operation.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a perspective view of a pipe forming machine embodying the preferred form of my invention.

Fig. 2 is a transverse sectional view thereof showing the mounting of the roll bearing blocks and guides.

Fig. 3 is a view in end elevation of the machine.

Fig. 4 is a view similar to Fig. 2 with rolls in released position.

Fig. 5 is a view in end elevation of the drive end of the machine.

Fig. 6 is a side elevation of the machine with parts in section.

Referring more particularly to the accompanying drawings, I have illustrated a metal working machine for forming tubing out of sheet metal. The machine here disclosed comprises a suitable frame construction 10 including two end frames 11 suitably connected together by means of tie rods 12 or other structural elements.

Carried by the end frames 11 and extending horizontally therebetween are three forming rolls, an upper forming roll 14, a lower forming roll 15 and a third forming roll 16. The lower forming roll 15 is rotatably mounted at its ends in bearing

blocks 17 which are reciprocally mounted in guideways 18 formed in the end frames for vertical reciprocable movement. The mounting of the bearing blocks 17 of the roll 15 is such that the bearing blocks may reciprocate vertically in the guides 18 when the operator so desires so as to move the roll 15 in a direction at right angles to its axis toward and away from the upper forming roll 14. By this means the roll 15 may be released from engagement with a tube formed on the upper roll so that the formed tube may be removed.

It will be noticed that the forming roll 16 is positioned to one side of the upper and lower forming rolls 14 and 15 so as to cooperate therewith in forming a pipe of a sheet of metal fed between the upper and lower rolls about the upper roll 14. The disposition of the rolls as shown in the drawings is such as in common practice. It will be noticed that the side forming roll 16 is mounted in adjustable bearings 19 in guideways 20 on the end frames so that the forming roll 16 may be adjusted toward and away from the upper and lower forming rolls 14 and 15.

The upper forming roll 14 is rotatably mounted in one end in a hinged bearing block 21 which is pivotally mounted as at 22 so that the entire roll 14 may be swung about the pivot 22 toward and away from the lower roll 15. To permit this pivotal movement of the upper roll 14, its end opposite the pivotal bearing 21 is journaled in a bearing 23, the lower half of which is formed in the end frame 11 and the upper half of which is formed in a clamp member 24. This clamp member is pivoted as at 25 to the end frame 11 at a point eccentric to the axis of the upper roll 14 at one side thereof. At the opposite side of the axis of the upper roll 14 the clamp is pivotally connected as at 26 to a pivoted nut 26a which includes a socket for the threaded reception of a latch bar 27, which latch bar is adapted to be interposed between two latching lugs 28 when the clamp member is in a position so that the bearing half formed therein cooperates with the bearing half in the end frame to rotatably support the upper roll 14. The latching bar 27 is provided with an annular shoulder 29 which cooperates with a cam face 30 on the underside of the latching lugs 28 to secure the clamp in position.

Connected to one end to the clamp at a point 31 which is intermediate the pivotal point of the clamp and the axis of the upper roll 14 is a pitman 32. The other end of this pitman is pivotally connected as at 33 to a crank arm 34

secured on a trip shaft 35. This shaft is mounted in bearings in the end frame as indicated.

It will be noticed, particularly from Figs. 1 and 2, that the bearing blocks 17 of the lower roll 15 are each fitted with a trip member 17a which are also guided for vertical reciprocation in the guideways 18 so as to reciprocate in unison with the bearing blocks 17 of the lower forming roll 15. The trip members 17a are adjustably connected to the bearing blocks 17 of the lower forming roll 15 as illustrated. At their lower ends the trip members 17a are each formed with a projection 17b which are in engagement with the periphery of the trip shaft 35. Formed in this trip shaft 35 in a position where they will register with the projections 17b of the trip member 17a are recesses 17c, one recess being provided for each projection 17b and which recesses are in longitudinal alignment on the trip shaft 35. When these recesses 17c register with the projections 17b, the projections 17b descend into these recesses, lowering the bearing blocks 17 and consequently lowering the lower forming roll 15 with respect to the upper forming roll 14. While I have shown the structure described above for lowering both ends of the forming roll 15, it is obvious that if it is desired to lower one end only of said roll, the mechanism 17a, 17b and 17c may be provided at that end only.

At the end of the upper forming roll 14 opposite the clamp member and which projects beyond the pivotal bearing 21, the end of the upper forming roll 14 is connected with a downwardly depending connecting rod 36. The lower end of this connecting rod 36 is connected to a crank pin 37 fixed to the trip shaft 35 at an eccentric point relative to the axis thereof so that when turning movement is imparted to the shaft in the proper direction the connecting rod 36 will be moved downwardly and impart downward movement to the projecting end of the upper forming roll 14, causing the bearing 21 to pivot about its pivotal point 22 and upraise the opposite end of the upper forming roll 14 to permit removal.

To drive the forming rolls, I provide a drive shaft 38 mounted on which is a pulley 39 which drives a pinion 40. This pinion is in mesh with a spur gear 41 rotatably mounted on the trip shaft 35 but relatively fixed to a sprocket 42. An endless chain 43 is led around this sprocket and around a large sprocket 44 secured on the projecting end of the upper forming roll 14, so as to impart a drive thereto. A spur gear 45 is also fixed on the projecting end of the upper forming roll 14 and is in mesh with a spur gear 46 fixed on the lower forming roll 15. Therefore, when a drive is transmitted to the pulley 39 such drive will be transmitted through the pinion 40 and gear 41 to the sprocket 42 and thence through an endless chain to the sprocket 44 and the upper roll 14. The drive of the upper roll will be transmitted to the lower roll through the gears 45 and 46, causing these rolls to revolve in opposite directions.

In operation of the device, it is constructed and assembled as shown in the drawings and to form a tube, the clamp is disposed in the position shown in Fig. 3. In this position the recesses 17c will be out of register with the projections 17b on the trip members 17a and consequently the lower roll will be in an elevated position and operatively related to the upper forming roll 14. A drive is then transmitted to the two rolls as previously described and a sheet of metal is led therebetween.

As this material feeds between the rolls, the roll 16 cooperates therewith to cause the pipe to be formed about the upper forming roll 14.

As soon as the pipe or tube has been formed about the upper forming roll 14, the latch bar 27 is disengaged from the latching lugs 28 and the clamp member is swung to a position as illustrated in Fig. 1. The swinging movement of the clamp from the position shown in Fig. 3 to the position shown in Fig. 1 will impart movement to the pitman 32. The movement of this pitman will be transmitted to the trip shaft 35 causing the recesses 17c to align with the projections 17b of the trip members 17a and as these parts register the bearing blocks 17 of the lower roll 15 will descend, causing the lower roll to separate from the upper roll 14 so as to release the pipe therefrom.

Simultaneously with this descending movement of the lower roll 15, the crank pin 37 will cause lowering of the connecting rod 36 which will be imparted to the projecting end of the upper roll 14. This lowering of the projecting end of the upper roll 14 will cause the upper roll bearing 21 to pivot about its pivotal point 22 and upraise the opposite end of the roll 14, as illustrated in Fig. 1, so that the tube or pipe formed on this upper roll may be removed therefrom. This end of the upper roll may move upwardly, of course, due to the fact that the clamp 24 has been moved to an unobstructing position as illustrated in Fig. 1.

As previously stated the principal feature of the present machine is to provide a pipe forming machine wherein the formed pipe may be expeditiously removed from the machine. In the present instance only one operation is required to release the pipe on the forming roll 14. This operation is the swinging of the clamp 24 to the position shown in Fig. 1 through the medium of the latch bar 27.

From the foregoing it is obvious that I have provided a comparatively simple pipe forming machine which is efficient in operation and which may be utilized to expeditiously form pipe or other tubing from sheet metal.

While I have shown the preferred form of my invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

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

1. In a tube forming machine an upper and a lower forming roll, means for simultaneously lowering the lower roll relative to the upper roll and releasing and upraising one end of the upper roll to a position enabling a tube thereon to be removed therefrom, said means including a clamp engageable with the end of the roll to be released, said clamp being movable to a releasing position, latch means for latching the clamp in clamping position and capable of use in moving the same to and from releasing position, reciprocable bearings carrying the lower roll, operating means for said bearings, and an operative connection between said operating means and said clamp.

2. In a tube forming machine an upper and a lower forming roll, means for simultaneously lowering the lower roll relative to the upper roll and releasing and upraising one end of the upper roll to a position enabling a tube thereon to be removed therefrom, said means including a clamp engageable with the end of the roll to be released,

said clamp being movable to a releasing position, a bearing for the opposite end of said roll pivotally mounted to enable upraising of the other roll end, bearing blocks for the lower roll, guides for
 5 guiding said bearings for vertical movement toward and away from the upper roll, a trip shaft, trip means connected with the bearing blocks and associated with the trip shaft whereby operation of the trip shaft will lower or raise said bearing
 10 blocks, a connection between the trip shaft and said clamp whereby movement thereof to releasing position will operate the trip shaft to lower said bearing blocks and movement to clamping position will raise the bearing blocks, and an
 15 operative connection between the trip shaft and said upper roll whereby operation of the clamp will be accompanied by raising or lowering of the released end of the upper roll.

3. In a tube forming machine an upper and a
 20 lower forming roll, means for simultaneously lowering the lower roll relative to the upper roll and releasing and upraising one end of the upper roll to a position enabling a tube thereon to be removed therefrom, said means including a clamp
 25 engageable with the end of the roll to be released, said clamp being movable to a releasing position, a bearing for the opposite end of said roll pivotally mounted to enable upraising of the other
 30 roll end, bearing blocks for the lower roll, guides for guiding said bearings for vertical movement toward and away from the upper roll, a trip shaft, trip means connected with the bearing blocks and associated with the trip shaft whereby operation of the trip shaft will lower or raise said
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bearing blocks, a connection between the trip shaft and said clamp whereby movement thereof to releasing position will operate the trip shaft to lower said bearing blocks and movement to clamping position will raise the bearing blocks, a connecting rod connected at one end to the upper roll exteriorly of said pivoted bearing and at the other end to an eccentric point on the trip shaft whereby operation of the latter will be accompanied by raising or lowering of the released end of the upper roll. 80 85

4. In a machine of the character described having a roller journalled in a frame, a pivoted clamp member overlying one end of the roller, a pivoted nut on the free end of said clamp member, a pair of lugs on the frame, a latch bar threadedly connected to said nut and insertable between said lugs, and an annular shoulder on the latch bar engageable with said lugs to hold the clamp member against the roller. 90 95

5. In a machine of the character described having a roller journalled in a frame, a pivoted clamp member overlying one end of the roller, a pivoted nut on the free end of said clamp member, a pair of lugs on the frame, a latch bar threadedly connected to said nut and insertable between said lugs, and an annular shoulder on the latch bar engageable with said lugs to hold the clamp member against the roller, said latch bar serving as adjusting means for said annular
 100 shoulder by means of its threaded connection with the pivoted nut and also serving as a lever engaging and disengaging the shoulder and lugs. 105

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