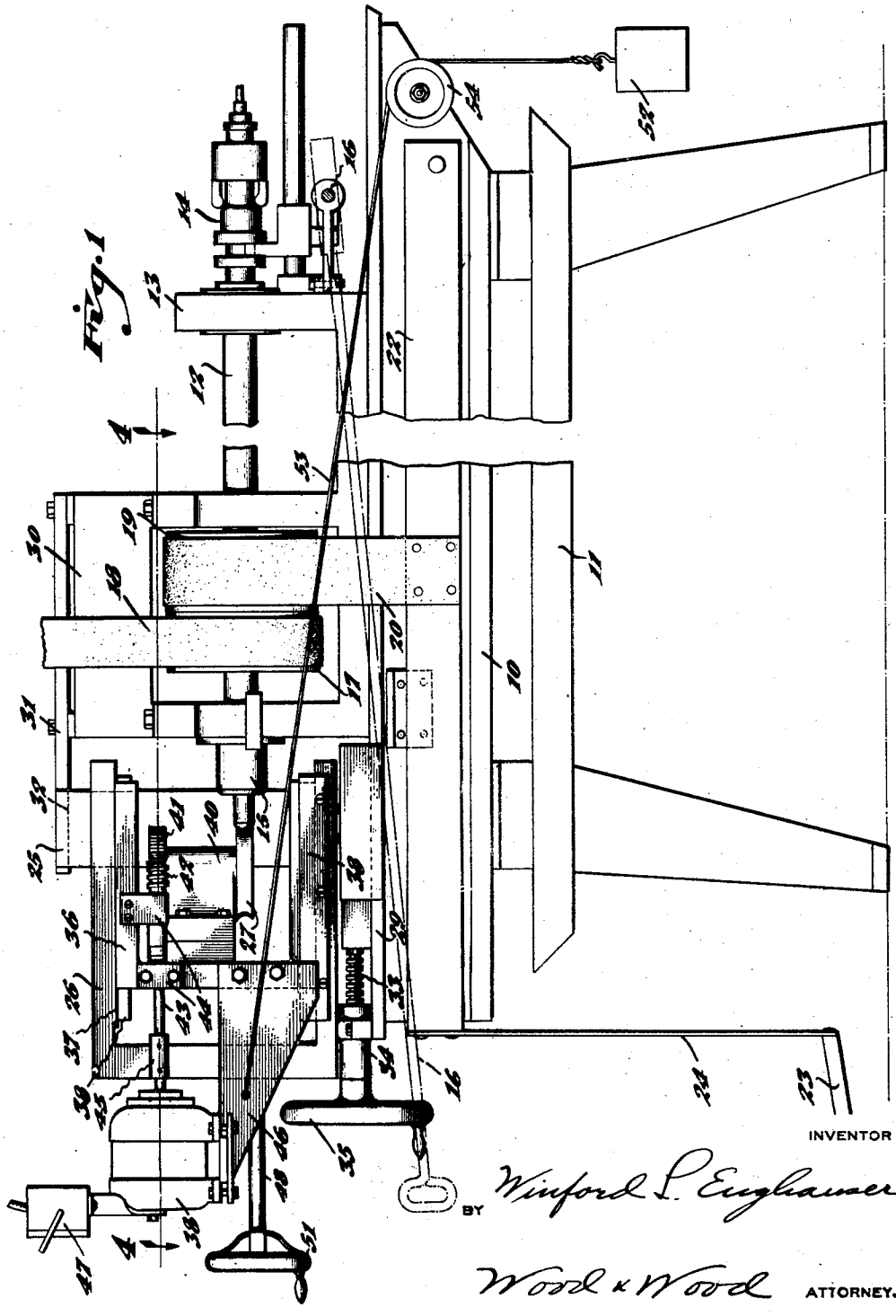
Dec. 19, 1933. W. L. ENGHAUSER 1,939,770

PIPE FORMING MACHINE

Filed June 22, 1931 4 Sheets-Sheet 1

Fig. 1



INVENTOR

BY Winford L. Enghauser

Wood & Wood ATTORNEYS

Dec. 19, 1933. W. L. ENGHAUSER 1,939,770

PIPE FORMING MACHINE

Filed June 22, 1931 4 Sheets-Sheet 2

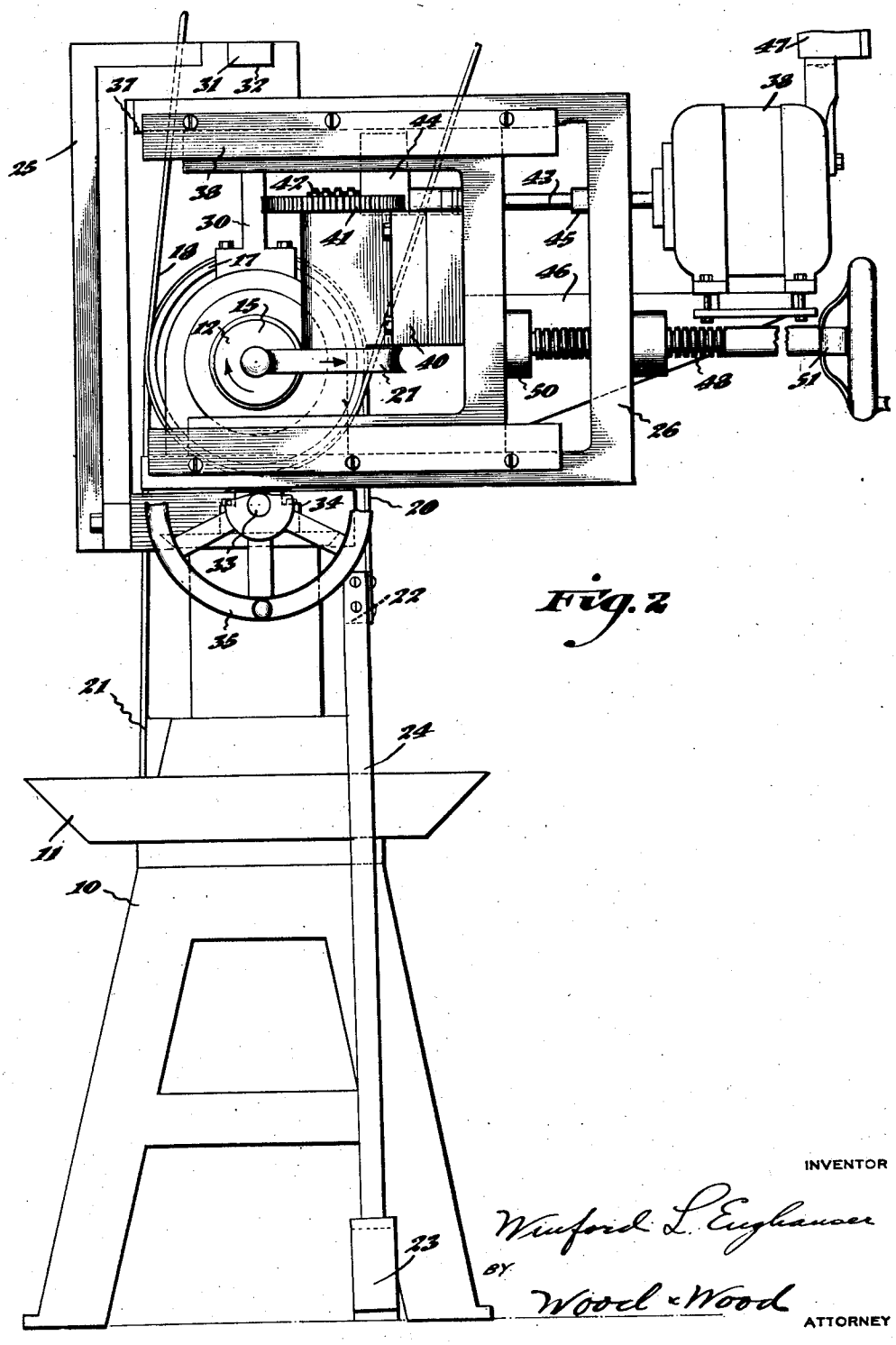


Fig. 2

INVENTOR

Winford L. Enghauser

BY

Wood & Wood

ATTORNEY

Dec. 19, 1933. W. L. ENGHAUSER 1,939,770

PIPE FORMING MACHINE

Filed June 22, 1931 4 Sheets-Sheet 3

Fig. 3

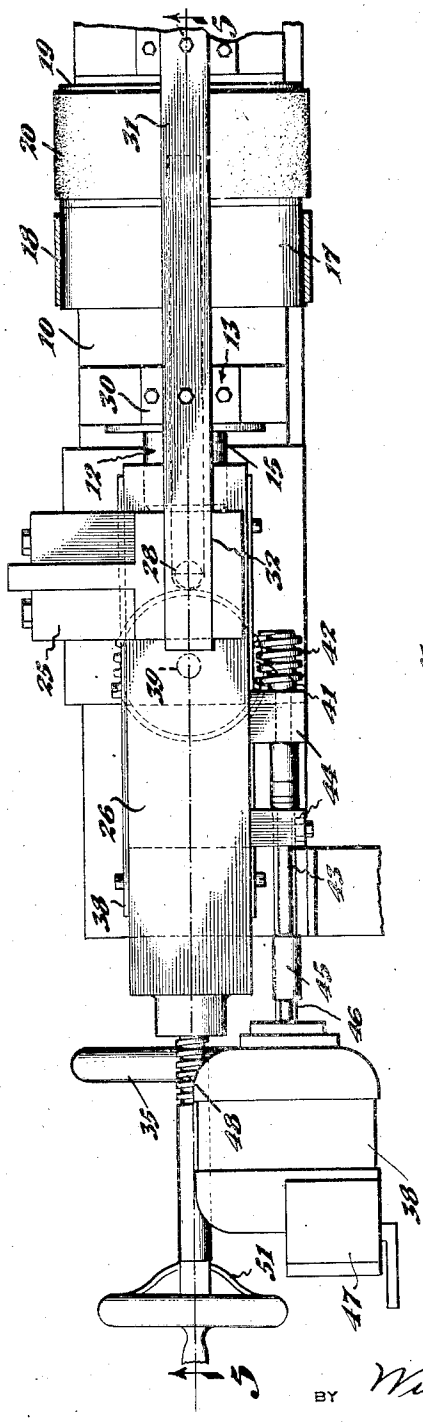
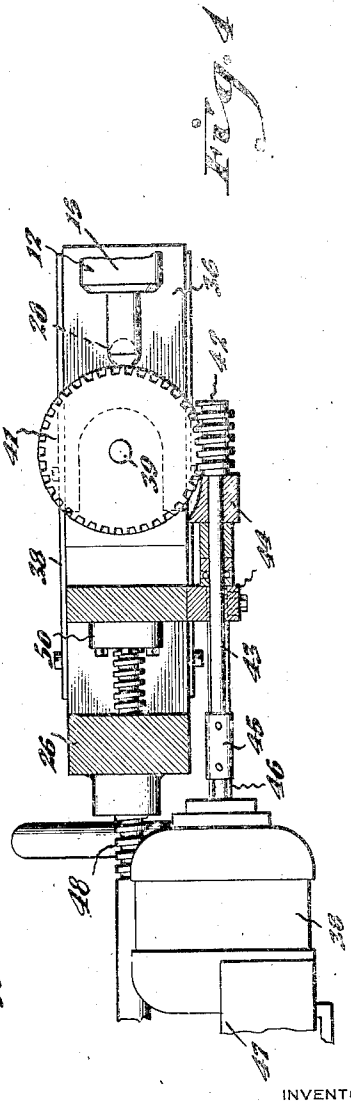


Fig. 4



INVENTOR

BY Winford L. Enghauser

Wood & Wood ATTORNEYS

Dec. 19, 1933. W. L. ENGHAUSER 1,939,770

PIPE FORMING MACHINE

Filed June 22, 1931 4 Sheets-Sheet 4

Fig. 5

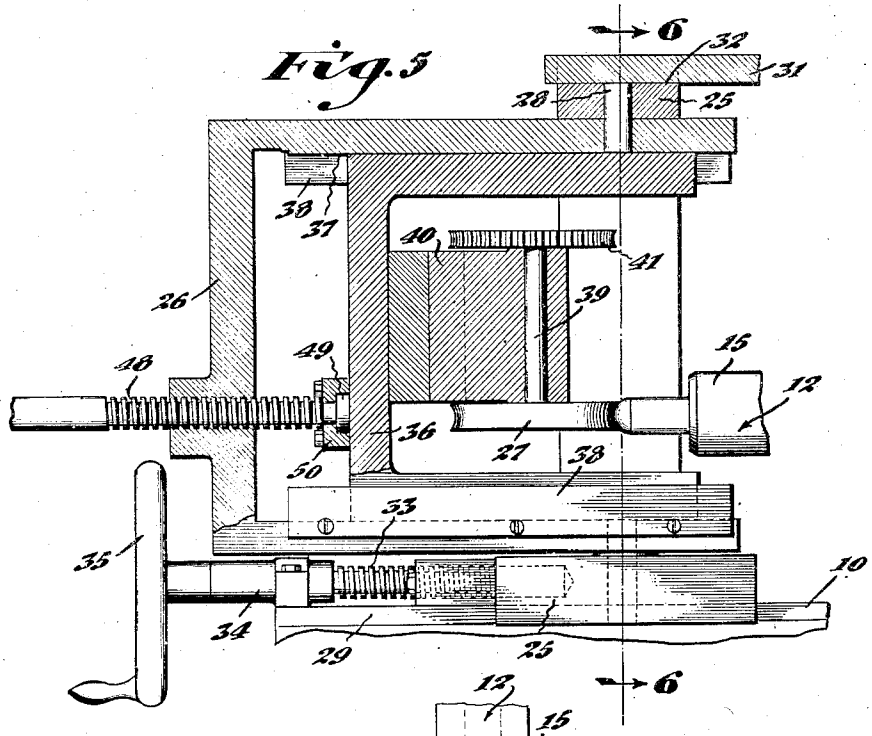


Fig. 6

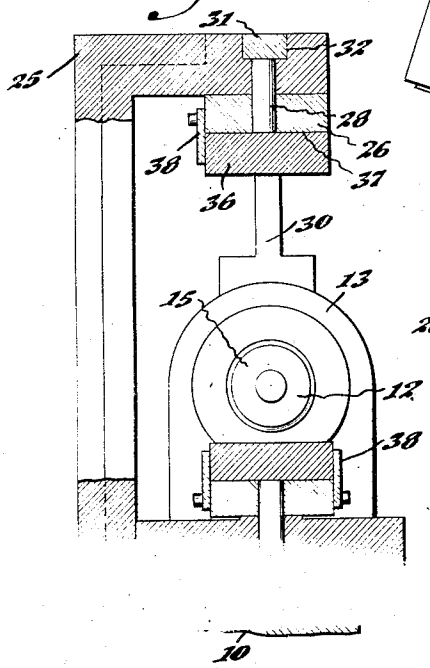
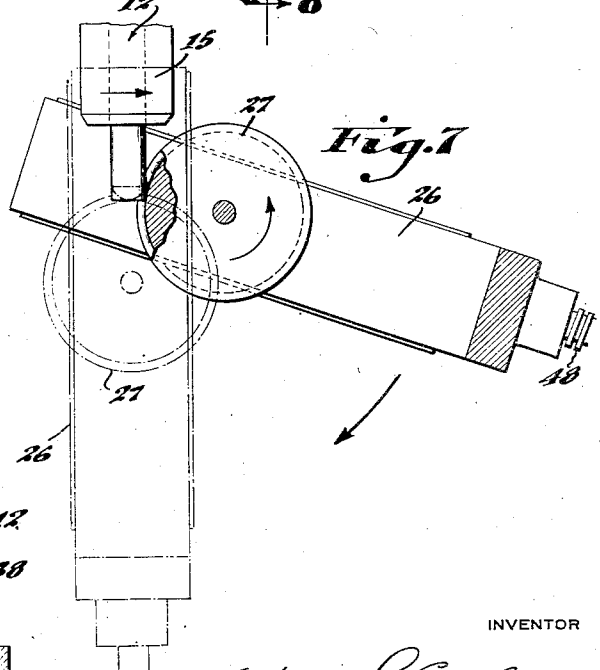


Fig. 7



INVENTOR

BY Winford L. Enghauser

Wood & Wood ATTORNEYS

Patented Dec. 19, 1933

1,939,770

UNITED STATES PATENT OFFICE

1,939,770

PIPE FORMING MACHINE

Winford L. Enghauser, Lebanon, Ohio

Application June 22, 1931. Serial No. 546,028

6 Claims. (Cl. 78—39)

This invention relates to forming machinery and is particularly directed to a machine for forming pipe which is operable for swaging the metal at the end of the pipe for the purpose of closing and rounding the pipe end.

It is an object of this invention to provide a machine of the above nature for operating on the end of a pipe, which machine utilizes a frictional contact between a rotating pipe and a forming element for the purpose of heating the pipe, whereby the same may be readily swaged by swinging the element relative to the end and whereby in the finished product sufficient wall thickness at the end of the pipe is obtained.

It is another object of this invention to provide a rotatable forming disc preferably constantly or continuously rotated during the swaging operation, whereby the wearing of the disc takes place uniformly about its periphery. For the purpose of increased friction and quicker and greater heating of the pipe end, it is preferable to have the axes of the pipe and the forming disc disposed at right angles to each other.

It is another object of this invention to provide a machine of the foregoing character in which the supported pipe is rapidly rotated and in which the rounding instrumentality is accurately and adjustably positioned relative to the end of the tube and efficiently controlled for appropriate frictional contact with the metal under all conditions of operation and wear. The forming device is preferably power rotated through a transmission geared primarily for power rather than speed because of the extreme load on the forming device.

Other objects and certain advantages will be more fully apparent from a description of the accompanying drawings, in which:

Figure 1 is a side elevation of the machine.

Figure 2 is an end view of the machine showing the rounding device carriage swung around to the side of the machine laterally of the work for the start of the operation so that it appears in side elevation.

Figure 3 is a fragmentary top plan view of the end of the machine at which the forming apparatus and pipe are mounted.

Figure 4 is a sectional view taken on line 4—4, Figure 2, illustrating the motor drive and transmission for the forming disc.

Figure 5 is a sectional view taken on line 5—5, Figure 3, detailing the carriage supporting the forming disc and transmission.

Figure 6 is a sectional view taken on line 6—6, Figure 5, illustrating the pivotal mounting for the carriage.

Figure 7 is a diagrammatic top plan view taken similar to Figure 3 but showing the carriage being manipulated to move the forming disc relative to the pipe end.

The machine in general comprises a frame or body in which a spindle is mounted for rotatively supporting the pipe. A carriage is pivotally mounted at the forward end of the machine including a power driven disc, an adjustment device for shifting the carriage on its pivots to properly feed the same relative to the end of the work and a second adjustment device for adjusting the disc axis relative to the pivots of the carriage for the proper swinging movement of the disc relative to the end of the pipe when the carriage is swung on its pivots.

Referring specifically to the drawings, the frame of the machine is generally indicated at 10. This frame includes a pan 11 for receiving the oil and other deposit from the work. The spindle 12 is mounted in a journal bracket 13 and includes a conventional clutch mechanism 14 at the end thereof opposite to the pipe receiving socket or chuck 15. The clutch is controlled by means of a rod 16 extending to the front of the machine. The spindle is driven by means of a pulley 17 fixed thereto between respective bearings of the journal bracket, this pulley being driven by a belt 18.

A brake drum 19 is secured on the spindle adjacent the power pulley. This brake drum is engaged by a brake band 20 fixed to one side of the frame as at 21 and engaged over the upper portion of the drum periphery and fixed at its other end to an intermediate point of a lever bar 22 longitudinally disposed relative to the frame and pivoted at one end thereto. The swinging end of the lever bar 22 has a flexible connection to a treadle 23 at the end of the machine adjacent the rounding mechanism, the flexible connection being accomplished by means of a strip of belting 24.

A pivot bracket or frame 25 is provided for the carriage 26 carrying the rounding disc 27. This pivot bracket 25 is C-shaped and its upper and lower horizontally disposed arm extensions respectively carry pivot pins 28 for the carriage. The pivot bracket is slidably mounted on a dovetailed way 29 on the top surface of the machine body. The carriage is also C-shaped and has its respective arms pivotally fixed to the respective adjacent arms of the pivot bracket 25 by means of the pivot pins 28. For steadying and slidably

mounting the pivot bracket at its upper side, a bracket 30 is secured upon the journal bracket 13 and includes a guide bar 31 extending forwardly through a slot 32 in its upper face of the pivot bracket or frame 25 whereby the frame 25 is free to slide longitudinally of the machine through this connection and the way of the machine frame. The carriage is adjusted on its slideways by means of a screw 33 threaded into the same and rotatively journalled at its outer end in a bearing bracket 34 on the frame 10 and carrying a hand wheel 35 for manipulation.

The carriage carries a slide 36 which is also of C-shape and is telescopically movable within the C-shaped carriage upon ways 37 formed on the inner surfaces of the carriage. Gib plates 38 at each side of the carriage maintain the slide 36 in position against lateral displacement for longitudinal sliding movement on the ways 37.

The pieces of pipe, to be operated upon, as they are inserted in the socket of the chuck of the spindle have straight cut open ends. Normally for the start of each operation the carriage is positioned longitudinally of the machine on its ways so that the axis of carriage swing is substantially coincidental or coaxial with the computed center for the rounded end of the pipe. This, it will readily be observed, could be computed by aligning the axis of the carriage so that the pivotal axis thereof intersects the axis of the pipe the distance of the radius of the pipe back from the straight cut end thereof.

The slide 36 which mounts the disc 27 also carries a motor 38 and a transmission for rotating the disc. The disc is mounted on a horizontal shaft 39 disposed at right angles to the axis of the pipe and journalled in a bracket 40 bolted to the slide. The shaft 39 carries the disc at its lower extending end and has a worm wheel 41 mounted on the upper end of the shaft driven by a worm 42 secured on the end of a power shaft 43 journalled in brackets 44 attached to the slide. This motor power shaft is connected to the stub shaft of the motor by means of a coupling 45. The motor is supported on a motor bracket 46 bolted to the slide 36. A switch 47 is mounted on the motor for controlling the same.

The disc support or slide 36 is adjusted on its ways by means of a screw 48 threaded through the carriage having a head 49 rotatably confined in a block 50 secured on the slide and a hand wheel 51 on its outer end for manipulation. Adjustment of the disc support or slide 36 is made to dispose the face or periphery of the disc so that it will describe a circle taken on the radius of the pipe when the carriage is swung and suitably arranged relative to the axis of the carriage so that the carriage movement is effective for rounding the end of the pipe. The carriage is normally maintained in the position shown in Figure 2 by means of a weight 52 attached to the end of the carriage by means of a cable 53 and operating over a pulley 54 at the opposite end of the machine from the forming mechanism.

Operation of the machine

It will be observed from the foregoing that the spindle and disc are preferably independently driven at different speeds. As a matter of practice, the spindle is usually driven at about 3000 R. P. M., whereas the disc is driven at about 60 R. P. M. The transmission from the motor to the disc is a reduction gearing for the purpose of imparting power rather than speed to the forming disc.

Since the disc is pressed against the pipe end under considerable pressure, a great load is thrown on the motor and considerable power is required to keep the disc in motion. These relative rotative speeds of the spindle and disc may be varied to suit conditions and if a larger motor for the disc is used, a faster rate of rotation may be obtained as an aid in quickening heating of the pipe end being swaged. The present proportion of speeds has been found efficient for a reasonably rapid production of work. The disc is rotated in a direction outwardly toward the end of the pipe or inwardly as the operation progresses so as to draw or spin the metal into the end of the pipe.

After the operator has inserted the pipe in the chuck his first operation, assuming the carriage to be in normal position laterally disposed relative to the pipe, is to operate the hand wheel 51 for bringing the disc into contact with the side of the pipe.

The disc has been shown with a transversely concave periphery, although it will be appreciated that, initially, the disc may have a flat periphery in cross section. As soon as the contact has been established betwen the slowly rotating disc and the rapidly rotating pipe, the pipe end begins to heat up and the operator then begins to oscillate the carriage on its pivot, working it toward the position shown in Figure 1 wherein the carriage is ultimately longitudinally aligned with the spindle. When the carriage has been swung into this aligned position, the operator knows that the rounding of the pipe has been completed and permits the weight 52 to pull the carriage back into its position of rest between operations.

If it is desired to throw more metal into the rounded end of the pipe without due regard to a perfectly rounded end, the operator may feed the slide inwardly or the carriage inwardly as he swings the carriage in completing the rounding operation. As the hardened disc is worn down due to the heated environment in which it is operated and due to frictional contact, it may be readjusted through the hand wheel 51 to properly locate it relative to the pivots of the carriage. The constant rotation of the disc assures even wear around its periphery at all times.

Having described my invention, I claim:

1. In a machine of the class described, a frame, a spindle mounted in said frame, means for rotating said spindle at a high rate of speed, means for supporting a length of pipe in the end of said spindle, a carriage pivotally mounted on said frame, means for adjusting the axis of said carriage longitudinally relative to the spindle, a rotatable forming element, means for rotating said element at a low rate of speed as compared with the spindle speed, a slide for supporting said forming element, said slide mounted for movement longitudinally of the carriage, the axis of said rotatable forming element disposed in a vertical plane, and said forming element disposed in a horizontal plane in alignment with the axis of the spindle, whereby the carriage supporting the slide of the forming element may be swung on its axis to move the forming element around the pipe end on the proper radius for forming and closing said pipe end.

2. In a machine of the class described, means for rotatably supporting a length of pipe, a rotatable forming tool, a pivotally mounted carriage journalling said tool, the axis of said tool and carriage disposed in parallelism, means for adjusting the axis of the tool relative to the axis

of the carriage, said means for rotatably supporting the length of pipe disposing the pipe at right angles to the tool and carriage axes whereby the tool may be engaged with the end of the pipe and revolved thereabout by swinging movement of the carriage for swaging the metal and closing the pipe end.

3. A pipe end closing machine comprising a frame, a spindle mounted in said frame, means for rotating said spindle, a chuck for securing a length of pipe for rotation by said spindle, a pivot located in a plane passing through the pipe end at an angle to the pipe axis, a carriage pivotally mounted on said pivot, a thin disc mounted on said carriage having a peripheral edge for engaging said pipe end, the flat sides of said disc being in substantial alignment with the extended axis of said spindle whereby the disc may be swung from side to side around the pipe end.

4. A pipe end closing machine comprising a frame, a spindle mounted in said frame, means for rotating the spindle at a high rate of speed, a chuck for securing the length of pipe for rotation by said spindle, a pivot located in a plane passing through the pipe end at an angle to the pipe axis, a carriage pivotally mounted on said pivot, a disc mounted on said carriage having a peripheral edge for engaging said pipe end, power means for rotating said disc at a low rate of speed, the sides of said disc being in substantial alignment with the extended axis of said spindle whereby the disc may be swung from side to side around the pipe end.

5. A pipe end closing machine comprising a frame, a spindle mounted in said frame, means for rotating the spindle, a chuck for securing the length of pipe for rotation by said spindle, a pivot located in a plane passing through the pipe end at an angle to the pipe axis, a carriage pivotally mounted on said pivot, a disc mounted on said carriage having a peripheral edge for engaging said pipe end, the sides of said disc being in parallelism with the extended axis of said spindle whereby the disc may be swung from side to side around the pipe end.

6. In a machine for closing the end of a pipe, a spindle for mounting said pipe, a swaging disc, power means for rotating said disc, a carriage for rotatably supporting said disc, said carriage and disc having their axes disposed parallel to each other and crosswise to the axis of the spindle, said carriage axis located on a line passing crosswise through the end of the pipe, the face of said disc adapted to engage the end of the pipe and having its axis revolvable about the end of the pipe for frictionally generating forming heat in the pipe end and swaging the metal on a radius.

WINFORD L. ENGHAUSER.