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MANDREL FOR PIPE FORGING MACHINES

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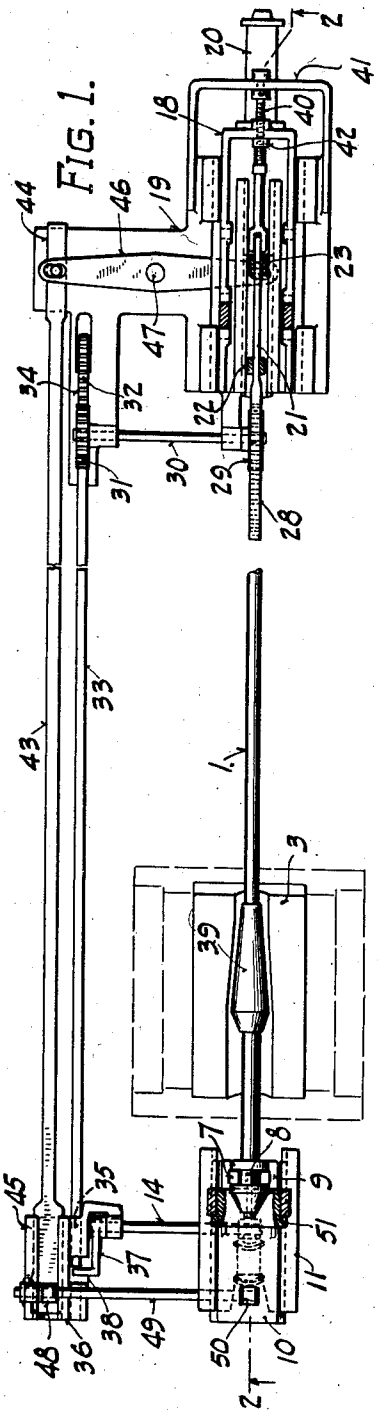


FIG. 1.

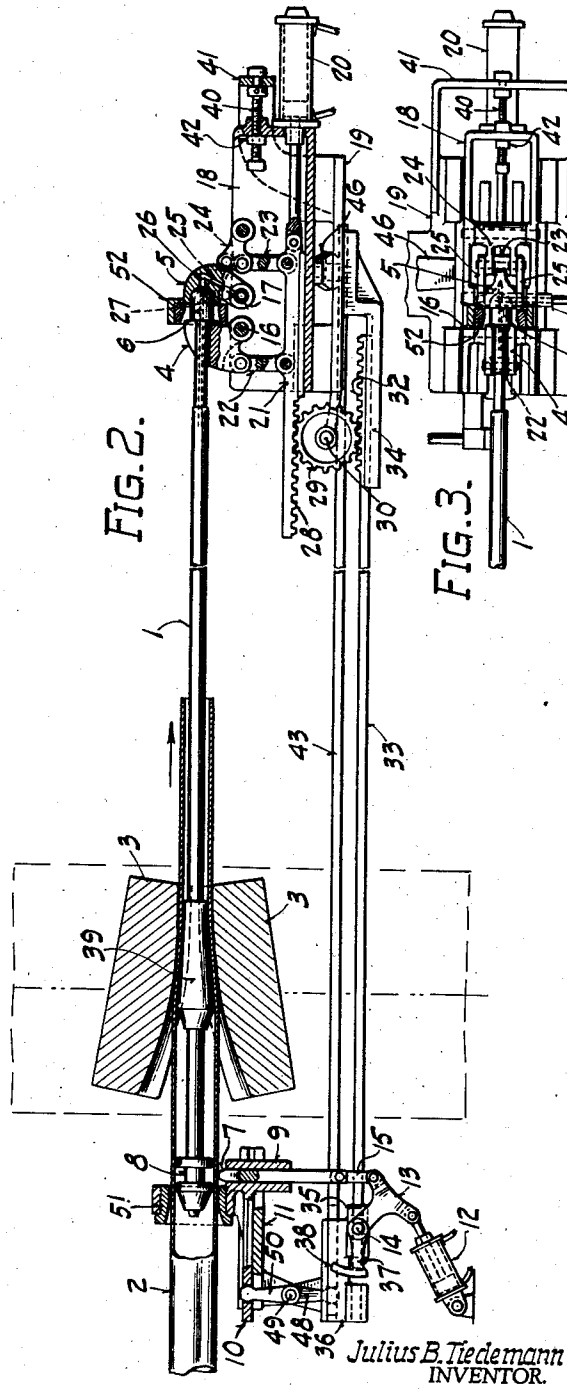


FIG. 2.

FIG. 3.

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MANDREL FOR PIPE FORGING MACHINES

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5 Claims. (Cl. 80—14)

This invention relates to a mandrel for pipe forging and rolling machines.

The object of the invention is to provide a simple and efficient mandrel holder with means to supply a cooling fluid to the mandrel and to adjust the position of the mandrel with respect to the machine.

Other objects will appear hereinafter.

The accompanying drawing illustrates a preferred embodiment of the invention.

In the drawing

Figure 1 is a top plan view of the apparatus, parts being omitted;

Fig. 2 is a longitudinal section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary top plan view of the right hand end of the machine, parts being broken away.

In the machine shown a mandrel 1 is adapted to have a pipe 2 move onto it from the left hand end and to support the pipe against intermittent swaging operations of the dies 3 as the pipe is fed intermittently along the mandrel to the right as disclosed in my co-pending applications Serial Numbers 276,046 filed May 27, 1939, now Patent No. 2,247,863, and 286,627 filed July 26, 1939, now Patent No. 2,247,864.

To support the mandrel and hold it in fixed relation to the dies, a pair of clamping jaws 4 and 5 are provided to engage a head 6 on the right hand end of the mandrel.

After the pipe has cleared the swaging dies and is ready for removal to the right, a fork 7 is raised to enter an annular groove 8 at the left hand end of the mandrel to hold it against longitudinal movement so that the jaws 4 and 5 may be opened to permit removal of the pipe.

The fork 7 is mounted for vertical movement in a bearing 9 on a plate 10 which is longitudinally adjustable on a stationary base 11. The fork is operated by an air cylinder 12 through a bell-crank lever 13 secured to a rock-shaft 14. A link 15 is interposed between the fork and lever to compensate for the arcuate movement of the latter.

The jaws 4 and 5 are mounted to swing in opposed relation on stub shafts 16 and 17, respectively, journaled in a frame 18 longitudinally adjustable on a fixed base 19. An air cylinder 20 secured to the frame 18, operates the jaw 4 through slide rod 21 and link 22. The air cylinder 20 operates the jaw 5 through rod 21, link 23 and toggle links 24 and 25 pivoted to the base 18 and the jaw 5 respectively. When the jaws are in closed position, as shown, the links 22, 23 and the toggle links 24 and 25 stand at dead center position to lock the jaws.

The jaw 4 is channelled so that it may straddle the shaft of the mandrel.

The jaw 5 is provided with a port 26 registering with a port 27 in the head 6 to supply a cooling liquid to the mandrel. Liquid is supplied to the jaw from any suitable source through the tubular shaft 17 with which the port 26 communicates.

The fork 7 is interlocked with the jaws 4 and 5 to insure engagement of the mandrel by at least one of the holding means. For this purpose the rod 21 has a rack 28 meshing with a pinion 29 on one end of shaft 30. A pinion 31 on the other end of shaft 30 meshes with a rack 32 of a longitudinally extending rod 33 having at its right hand end a sliding bearing 34 in the base 19 and at its left hand end a sliding bearing 35 in a fixed base 36 and in a horizontal plane with the shaft 14. The rock shaft 14 has secured thereto an arm 37 having an arcuate lateral flange 38 at its end adapted to lie in the path of the rod 33 and prevent its being shifted to the left, when the fork 7 is disengaged as shown, thus preventing the opening of the jaws 4 and 5. When the fork 7 moves into engagement with the mandrel the flange 38 swings downward out of the path of the rod 33 and permits the opening of the jaws.

The jaws are opened by admitting pressure into the left hand end of cylinder 20 thus forcing the rod 21 to the right and swinging each jaw away from the head 6 and downward clear of the path of the pipe.

The movement of the rod 21 and the rack 28 thereon rotates the pinion 29, shaft 30 and pinion 31 causing the rack 32 and the rod 33 to move to the left. The left hand end of rod 33 passes over the flange 38 thus preventing the disengaging of the fork 7 from the mandrel until the jaws are again closed and the rod 33 withdrawn from the path of the flange 38. This interlock allows both end mechanisms to operate to hold the mandrel simultaneously but allows only one to be released at a time and thereby insures that the mandrel will always be held at least at one end.

The swaging zone of the mandrel 1 comprises a conical enlargement 39 and therefore adjustment of the mandrel to the right or left relative to the dies determines the thickness at which the pipe will be swaged. The adjustment means includes a screw 40 rotatably held in a bracket 41 of the base 19 and having threaded engagement in the end wall of frame 18. By rotating the screw 40 the frame with its jaws and therefore the

mandrel may be adjusted relative to the dies. A nut 42 locks the screw 40 in adjusted position. The mandrel can thus be accurately adjusted and securely held in position.

Shifting of the mandrel requires a corresponding shift of the fork 7 as it must be maintained in vertical alignment with annular groove 8. For this reason the two locking mechanisms are tied together as by a rod 43 sliding in ways 44 and 45 in the bases 19 and 36 respectively. The rod 43 is responsive to movement of the frame 18 through the lever 46 pivoted at its center to the base 19 by a pin 47. The left hand end of rod 43 transmits an equal movement to plate 10 through arm 48, rock shaft 49 and arm 50. The arms 48 and 50 engage slots in their respective rod and plate.

Tapered rings 51 and 52 mounted on plate 10 and frame 18, respectively, encircle the mandrel at each end and support its respective end when not held by the fork or clamping jaws. The rings also guide the pipe onto and along the mandrel.

Various embodiments of the invention may be employed without departing from the spirit and scope of the claims.

I claim:

1. In a pipe forming machine, a mandrel having a tapered working portion and a substantial length over which the pipe moves from one end to the other, dies for cooperation with the working section of the mandrel to forge the pipe thereon, means at the rear end of the mandrel for holding the same against longitudinal movement during forging operations, means for releasing said holding means when the pipe is to be removed from the end of said mandrel, means at the other end of said mandrel normally out of contact therewith and actuated to engage the same and hold it against longitudinal movement when said first named means is released, and means for adjusting the position of the working section of the mandrel relative to said dies and the corresponding positions of said holding means.

2. In a pipe forming machine employing reciprocating die members for swaging the pipe on a tapered mandrel, means for alternately supporting the mandrel from opposite ends to provide for the passage of the blank being worked upon onto the mandrel at one end and off from the mandrel at the other end, means to adjust the position of the mandrel and its supporting means relative to the die members, and means for retaining said supporting means a fixed distance apart to engage parts on said mandrel interlocking therewith to maintain the mandrel against axial movement.

3. In a pipe forming machine employing reciprocating die members for swaging the pipe on a tapered mandrel, means for alternately supporting the mandrel from opposite ends to provide for the passage of the blank being worked upon onto the mandrel at one end and off from the mandrel at the other end, and means to adjust the position of the mandrel and its supporting means relative to the die members, to vary the space between the dies and said tapered mandrel.

4. In a pipe forming machine, a mandrel, dies cooperating with said mandrel to swage a pipe being advanced over the mandrel, means at one end of the mandrel for holding the same while a pipe is being telescoped over the mandrel at the other end, and means at the other end of the mandrel for holding the mandrel while the pipe is being stripped from the mandrel at the first named end, at least one of said holding means being disposed to hold said mandrel against axial movement during swaging, said mandrel having its working portion retained in predetermined position relative to the dies at all times.

5. In a pipe forming machine, a mandrel, dies cooperating with said mandrel to swage a pipe being advanced over the mandrel, means at one end of the mandrel for holding the same while a pipe is being telescoped over the mandrel at the other end, means at the other end of the mandrel for holding the mandrel while the pipe is being stripped from the mandrel at the first named end, at least one of said holding means being disposed to hold said mandrel against axial movement during swaging, said mandrel having its working portion retained in predetermined position relative to the dies at all times during swaging operations, and interlocking means between said holding means to prevent the simultaneous release of the latter.

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