Feb. 19, 1946. N. H. NYE 2,395,290

LOADER FOR DRAW BENCHES

Filed Dec. 24, 1943 2 Sheets-Sheet 1

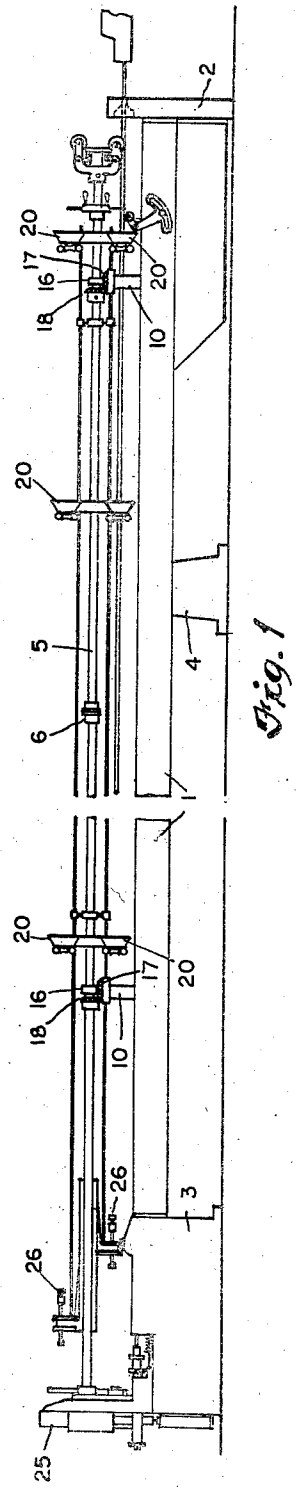


Fig. 1

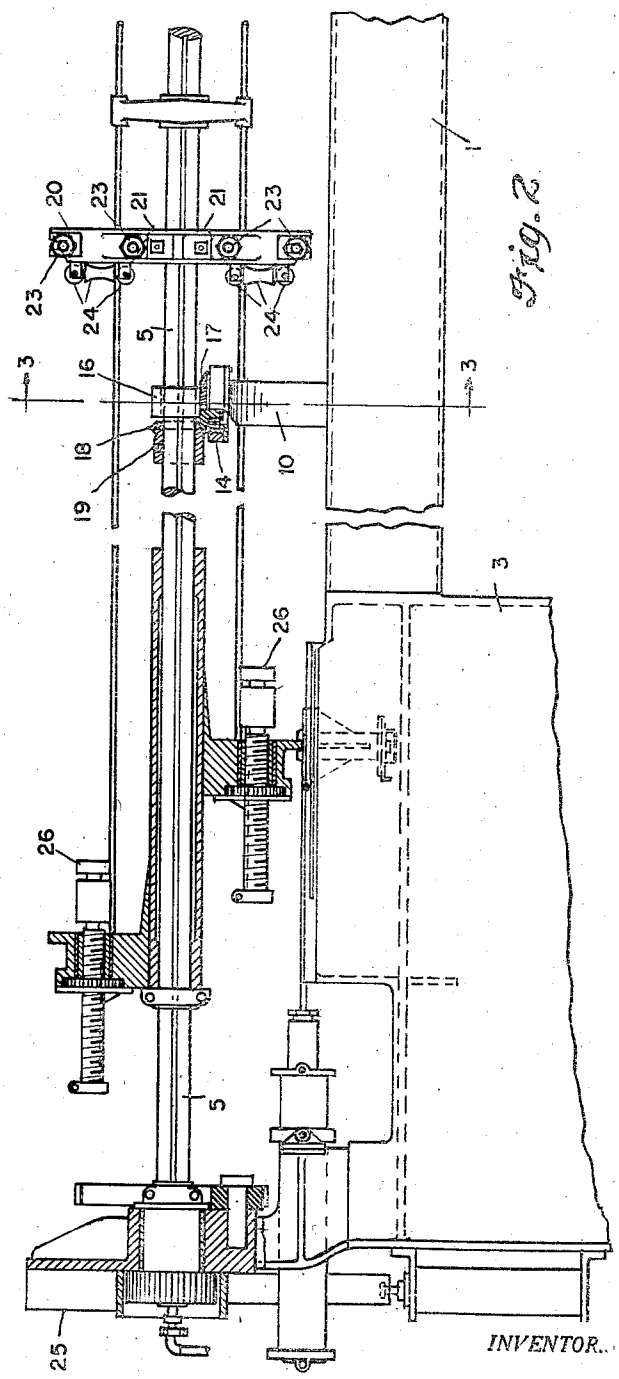


Fig. 2

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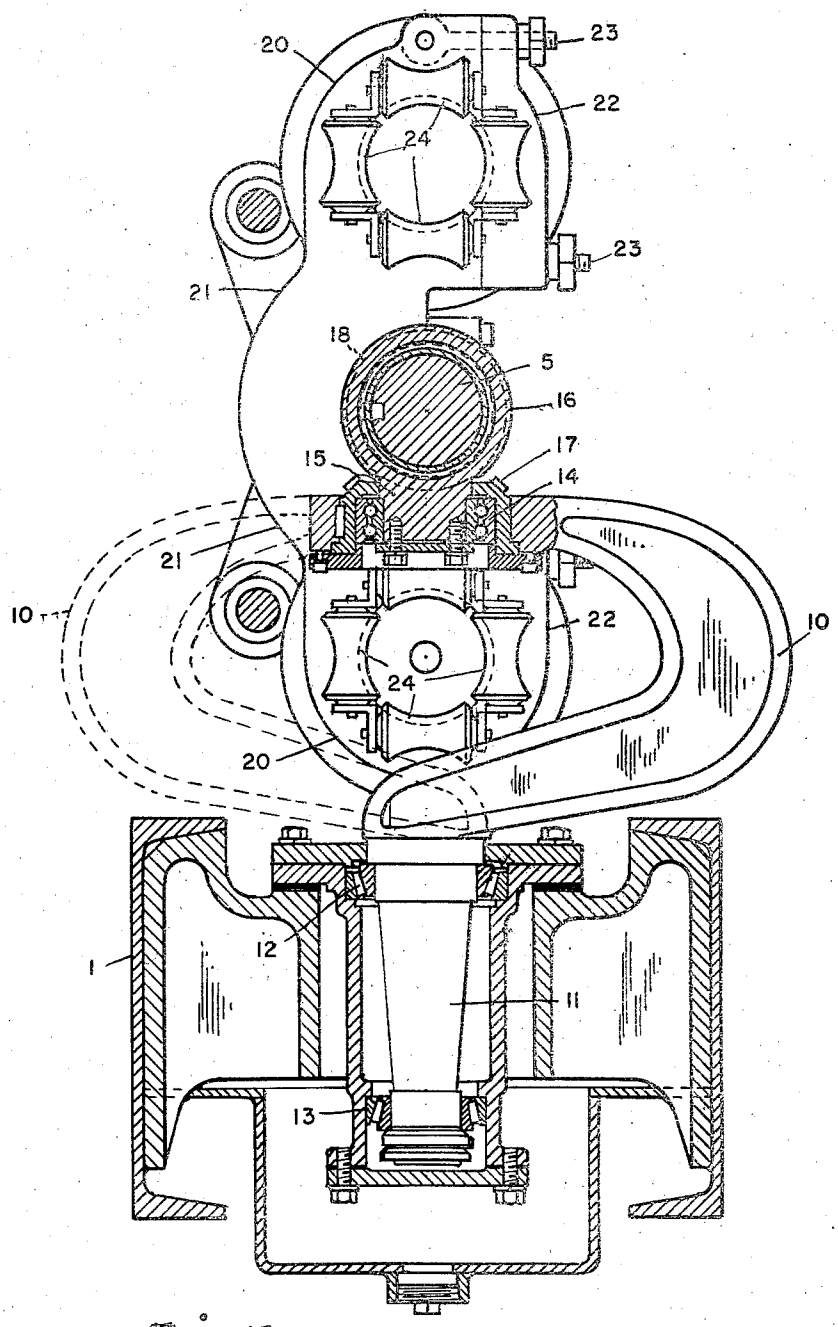


Fig. 3

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LOADER FOR DRAW BENCHES

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Application December 24, 1943, Serial No. 515,548

12 Claims. (Cl. 205—22)

The present improvements, relate as indicated to draw-benches, and more particularly to the loading mechanism whereby work-pieces may be successively supplied to such bench. Still more particularly, such improvements relate to a draw-bench loading mechanism of the general construction disclosed and claimed in the co-pending application filed December 20, 1943 Serial No. 514,936 by Edwin J. McIlvried and myself.

One of the features which forms the subject matter of such co-pending application is a rotatably supported carrier provided with longitudinally aligned work-piece guides mounted in opposite, radially projecting relation on said shaft. One principal object of the present invention is to provide improved supports for the shaft of such carrier which will interfere as little as possible with the loading of work-pieces into the carrier whether such loading be accomplished by endwise or lateral movement of the work-pieces. The invention further comprehends certain improvements in the construction of the guides which, as indicated, form a component part of the carrier.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a side elevation of a loading mechanism embodying my present improvements;

Fig. 2 is a central vertical longitudinal section thereof; and

Fig. 3 is a transverse vertical section taken on a plane indicated by the line 3—3 Figs. 1 and 2.

The draw-bench wherewith my improved loading mechanism is designed to be associated forms no part of the present invention and accordingly has not been illustrated in the foregoing drawings except for a diagrammatic showing of the die in Fig. 1. As thus indicated, such bench, including the die and associated drawing device, is designed to be located to the right of the mechanism as illustrated in Fig. 2, with the die in alignment with the lowermost of the two positions in which, as hereinafter set forth, the work-pieces in the carrier are held by the latter.

The loading mechanism of present interest, as generally illustrated in Fig. 1, comprises a longitudinally extending main frame 1, conveniently assembled of parallel channel or L-shaped sections as illustrated in Fig. 3, such main frame being supported on bases 2 and 3 at its respective ends and by such number of intermediate pedestals 4, as may be required, depending upon the length of the machine. As will be understood, for the purpose of handling certain types of tubular or rod-like products a very long bench is required and a loading mechanism of corresponding length is accordingly necessary. Since the work-pieces, where tubular, require to be placed over a mandrel preliminarily to being drawn, the machine is designed to receive successive such work-pieces from the right as viewed in Fig. 1, and after being loaded therein are then designed to be moved in reverse direction to bring the end of such work-piece in operative relation to the drawing mechanism proper. While work-pieces of solid, i. e. of rod-like form, may be similarly supplied to the machine, this is unnecessary, the use of a mandrel being not involved, and such work-pieces may be loaded into proper position into the carrier by being moved bodily in a lateral direction. As previously indicated, the present improvements are principally concerned with the construction and mounting of the carrier whereby the latter may be adapted thus to receive work-pieces supplied by endwise or lateral movement, as may be found desirable.

The work-piece carrier which is thus adapted to receive successive work-pieces and deliver them to the draw-bench, is mounted for rotative movement above the main frame or bed 1 and extends substantially the entire length of such bed. The main element of this carrier is a central shaft 5, which in case the overall length of the machine should make it necessary or convenient, will be made up of aligned sections joined by one or more couplings 6.

For the purpose of rotatably supporting the shaft 5 on the bed there is provided at spaced intervals along the latter a plurality of C-shaped members 10 (see Fig. 3) which are swingable into a position transverse of or aligned with said shaft as desired. In order to provide for such swinging movement of supports 10, the lower end of each takes the form of a tapered spindle 11 which is journalled in suitable vertically spaced bearings 12 and 13 in the machine bed. Similarly, the upper end of each support is journalled through the medium of aligned bearings 14 on a downwardly projecting stud 15 carried by a ring or bushing 16 on shaft 5. It will thus be seen that the individual supports are capable of being

swung about the vertical axis defined by bearings 12, 13 and 14.

Attached to the upper end of each support adjacent bearing 14 is an annular bevel gear 17 which normally meshes with a corresponding bevel gear 18 attached to shaft 5 through the medium of a set screw 19 or equivalent means which will permit said gear 18 to be left loose on the shaft when desired. However, when the gears 18 associated with the gears 17 on the respective swingable supports 10 are secured to the shaft, it will follow that rotation of the latter will at the same time swing the supports. In the operation of the machine such rotation, as will be presently explained, is reversely effected through an arc of approximately 180°, and the gears which thus connect the shaft with the respective supports 10 are designed, incidentally to such rotative movement or oscillation of the shaft, to swing the latter in unison through the same arc, in a horizontal plane, i. e. from a position lying at right angles to the shaft on one side thereto to a corresponding position on the opposite side (see Fig. 3).

For the purpose of guiding the work-pieces into and out of the carrier and for assisting in holding the same in proper place therein, a series of paired guide members 20 is provided, the detailed construction of which is best shown in Fig. 3. Each such pair is secured to the shaft by oppositely extending arms 21 whereby said members are held in alignment longitudinally of and parallel with the shaft. Said members, furthermore, lie in an axial plane which is designed, in either of the two stationary positions which the carrier assumes, to be disposed vertically and so include the axes of the series of swingable supports 10. Accordingly an axial line through the lowermost of each pair of guides, as indicated in Fig. 3, will lie within the space defined by the C-shaped bodies of the several supports.

While the guide members 20 may take on various forms, they will desirably include separable sections 22 (Fig. 4) which are adapted to be held in place by clamp bolts 23. Under certain conditions of use these sections 22 of the series of guides which is aligned with the drawing mechanism may be removed and the guides then used as rests whereon work-pieces may be laterally received into the carrier. In order to reduce the frictional resistance of the guides to endwise movement of a work-piece therethrough, a plurality of angularly related, concavely shaped rollers 24 is provided in connection with each. These rollers, preferably four in number, are disposed so that their inner surfaces lie within the opening in the guide member, one thereof being carried by the removable section 22 of the guide. Said rollers, it will thus be seen, define the opening through which the work-piece is longitudinally movable into and out of desired position, and by thus making one such roller displaceable lateral movement of the work-piece into and out of such opening is also permitted.

Rising above the main frame 1 of the machine at the end of the carrier opposite that at which the drawing mechanism is located, is a housing 25 in which the corresponding end of the carrier shaft 5 may be journalled and in which operating mechanism may be provided for alternately oscillating the carrier first in one direction, then the other, as well as mechanism for reciprocating the work-pieces placed in the carrier. Since such oscillating and reciprocating mechanism form no part of the present invention and the oscillation of the carrier and reciprocation of the work-pieces may be accomplished in any suitable manner, even manually, it is deemed unnecessary to describe the same except to note that the carrier includes at the end in question two longitudinally reciprocable work-piece holders 26 which are aligned with the paired-guide members 20.

Having thus set forth the construction and operation of its several component parts, the operation of the machine as a whole may now be described. Assuming that the machine is to be employed in the handling of tubular work-pieces, two mandrels (not shown) will require to be provided, each such mandrel being supported by a rod attached at one end to a corresponding holder 26 in the carrier and extending thence through the aligned series of guide members 20 to a point adjacent the opposite, i. e. right hand, end of the machine as viewed in Fig. 1. The tubular work-piece is then moved to the carrier over the uppermost of said mandrels until it abuts the corresponding work-holder, following which the carrier is oscillated to bring such work-piece, with the mandrel over which it has been placed, in the lowermost position, i. e. in alignment with the drawing mechanism. Simultaneously, of course, the other mandrel and aligned series of guide members will be brought into position to receive a fresh work-piece in the manner just described, such work-piece being loaded into the carrier while the previously loaded work-piece is being drawn.

Incidentally to the oscillation of the shaft, as just described, the series of C-shaped supports will likewise be oscillated from one transverse position to the other so as to provide the necessary clearance for the mandrel with tube thereon as moved from upper loading position to lower drawing position.

It has already been explained that when the loading mechanism is employed to deliver solid work-pieces such as rods or bars to the drawing mechanism it is unnecessary that such pieces be moved endwise into the carrier, but on the contrary it is much more convenient to move them laterally into the carrier. Indeed, in such case the carrier may not be required at all and the work-pieces may be brought into alignment with the drawing device independently thereof. Accordingly, in order that the carrier may not interfere with such use, the shaft 5 will be rotated until the guide members 20 will be disposed in a horizontal transverse plane and then be left in that position. Also the bevel gears 18 will be disengaged from said shaft and the C-shaped supports 10 will for the time being be swung into positions to the side of said shaft opposite to that from which the work-pieces are brought up and left there, as shown in dotted outline in Fig. 3. Whenever it is desired to resume operation with tubular work-pieces such supports will be swung back again into their former positions, the guide members 20 brought into vertical alignment with said shaft 5, and the bevel gears on shaft 5 again engaged with the latter. It will thus be seen that my improved loading mechanism may be readily converted for use in the most advantageous manner with either tubular or solid work-pieces.

By providing the guides 20 with removable sections, they may be readily opened to permit the introduction laterally into the carrier of the mandrel rods (not shown) which are employed in drawing tubular work-pieces. The concave rollers associated with said guides not only reduce

the friction on the work-pieces as they move longitudinally therethrough, but serve to center them as well.

Furthermore, where the loading mechanism is utilized to handle tubular work-pieces, the provision of swinging supports of the novel form described above makes possible the elimination of the much more cumbersome ring and arc-shaped bearings for the carrier which have heretofore been proposed; also the placement of the mandrels in the machine is greatly facilitated as well as the handling of the work-pieces. At the same time the improved guides provided with concave rollers eliminate much of the friction heretofore encountered in handling of long work-pieces.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A work-piece carrier for loading a drawbench or like machine, comprising in combination an oscillatory shaft, work-piece guiding means mounted in radially projecting relation on said shaft, and a support for said shaft curved to permit a work-piece held in said guiding means to lie in a plane with said support and shaft, said support being swingable into positions oppositely directed transversely of said shaft.

2. A work-piece carrier for loading a drawbench or like machine, comprising in combination an oscillatory shaft, work-piece guiding means mounted in radially projecting relation on said shaft, a support for said shaft curved to permit a work-piece held in said guiding means to lie in a plane with said support and shaft, said support being swingable into positions oppositely directed transversely of said shaft, and means adapted to swing said support synchronously with oscillation of said shaft.

3. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending oscillatory shaft, longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, and supports for said shaft curved to permit a work-piece to lie in a vertical plane with said shaft, said supports being swingable into positions oppositely directed transversely of said shaft.

4. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending oscillatory shaft, longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, supports for said shaft curved to permit a work-piece to lie in a vertical plane with said shaft, said supports being swingable into positions oppositely directed transversely of said shaft, and means adapted to swing said supports synchronously with oscillation of said shaft.

5. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending oscillatory shaft, longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, supports for said shaft curved to permit a work-piece to lie in a vertical plane with said shaft, said supports being swingable into positions oppositely directed transversely of said shaft, and means adapted to swing said supports synchronously with oscillation of said shaft, said means being disconnectible whereby said supports may be left in selected position independently of oscillation of said shaft.

6. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending oscillatory shaft, longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, and C-shaped supports for said shaft, said supports being swingable into positions oppositely directed transversely of said shaft.

7. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending oscillatory shaft, longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, C-shaped supports for said shaft, said supports being swingable into positions oppositely directed transversely of said shaft, and means adapted to swing said supports synchronously with oscillation of said shaft.

8. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending oscillatory shaft, longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, C-shaped supports for said shaft, said supports being swingable into positions oppositely directed transversely of said shaft, and intermeshing pairs of bevel gears on the respective supports and said shaft whereby the former are thus swung synchronously with oscillation of the latter.

9. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending oscillatory shaft, longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, C-shaped supports for said shaft, said supports being swingable into positions oppositely directed transversely of said shaft, and intermeshing pairs of bevel gears on the respective supports and said shaft whereby the former are thus swung synchronously with oscillation of the latter, one gear of each pair being disconnectible from the member whereon mounted, whereby said supports may be left in selected position independently of oscillation of said shaft.

10. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending shaft, two series of longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, a longitudinally reciprocable work-piece holder associated with each of said series of guides, means adapted to oscillate said shaft through approximately 180° to bring said series of guides and associated holders alternately in vertical alignment, one above and the other below said shaft, supports for said shaft pivoted for swinging movement about vertical axes below the arcuate path of movement of said guides, said supports being curved to provide clearance for a work-piece carried by the series of said guides lying below said shaft, and means adapted to swing said supports synchronously with oscillation of said shaft.

11. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending shaft, two series of longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, a longitudinally reciprocable work-piece holder associated with each of said series of guides, means adapted to oscillate said shaft

through approximately 180° to bring said series of guides and associated holders alternately in vertical alignment, one above and the other below said shaft, supports for said shaft pivoted for swinging movement about vertical axes below the arcuate path of movement of said guides, said supports being curved to provide clearance for a work-piece carried by the series of said guides lying below said shaft, and intermeshing pairs of bevel gears on the respective supports and said shaft whereby the former are thus swung synchronously with oscillation of the latter.

12. A work-piece carrier for loading a drawbench or like machine, comprising in combination a longitudinally extending shaft, two series of longitudinally aligned work-piece guides mounted in opposite radially projecting relation on said shaft, a longitudinally reciprocable work-piece holder associated with each of said series of guides, means adapted to oscillate said shaft through approximately 180° to bring said series of guides and associated holders alternately in vertical alignment, one above and the other below said shaft, supports for said shaft pivoted for swinging movement about vertical axes below the arcuate path of movement of said guides, said supports being curved to provide clearance for a work-piece carried by the series of said guides lying below said shaft, and intermeshing pairs of bevel gears on the respective supports and said shaft whereby the former are thus swung synchronously with oscillation of the latter, one gear of each pair being disconnectible from the member whereon mounted, whereby said supports may be left in selected position independently of oscillation of said shaft.

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