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PUSH BENCH DRIVE

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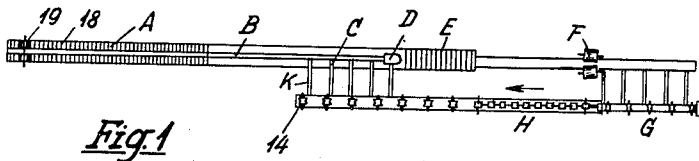


Fig. 1

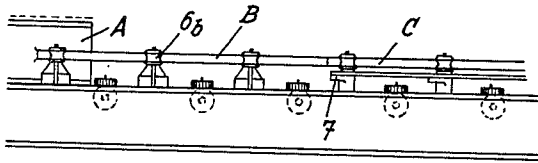


Fig. 2

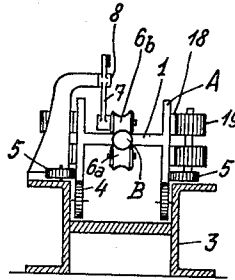


Fig. 5

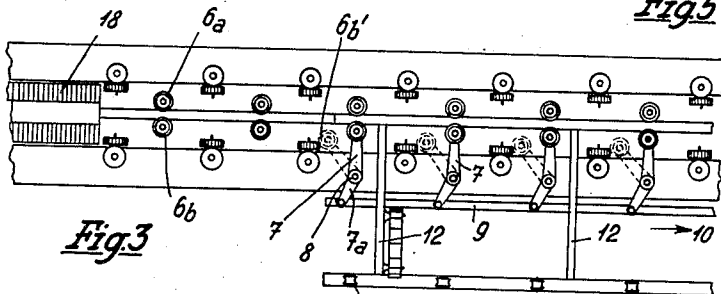


Fig. 3

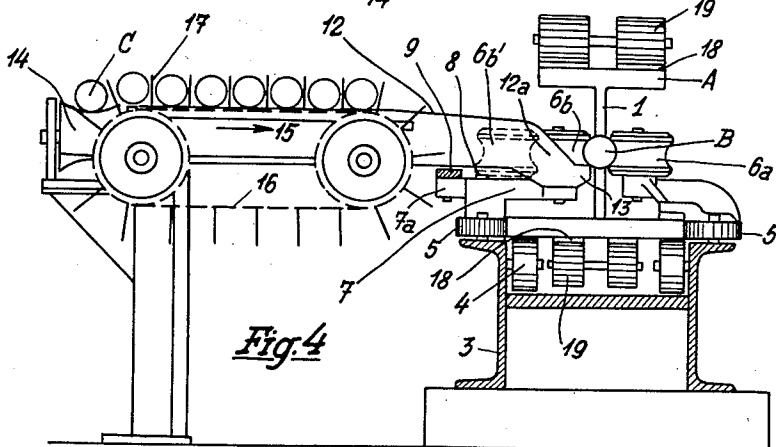


Fig. 4

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PUSH BENCH DRIVE

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3 Claims. (Cl. 205—4)

The invention relates to a forcing mandrel- and ram guide for a type of tube drawing benches adapted to produce immediately from the billet in a single stroke hard metal such as iron tubes having a considerable length and a small wall thickness as for instance the usual gas pipes. The object of the invention is to provide a guide against the excessively high breaking strains for the comparatively long and thin forcing mandrel, as well as for the driving bar. According to the invention the ram which is guided between couples of rollers composed of a stationary and of a movable roller, is connected to the web of the I-shaped cross-section of the driving bar which is adapted to run between guiding rollers and driving pinions both acting on the two opposite outer surfaces of the flanges of the driving bar.

Owing to this, the guide roller couples of the mandrel may enclose the mandrel and ram completely except to very narrow gaps leaving only passage for the web of the driving bar, and perfect guiding is secured against flexion even under the highest strains.

Two constructional examples of the ram guide are shown in the accompanying drawing.

Figure 1 shows the entire tube-drawing bench diagrammatically in plan.

Figures 2, 3, and 4 show the mandrel and ram guide in side elevation, plan and cross section, respectively.

Figure 5 shows a modification of the guide in cross-section corresponding to Figure 4.

As will be seen from the diagrammatic plan of Figure 1, the tube drawing bench consists of the section E comprising the drawing dies and of the driving bar A carrying on its end the ram B which forces the mandrel C and the blank D mounted on the latter through the dies E. Behind the dies E is the pair of loosening rolls F comprising in known manner two driven rolls which have their spindles inclined to each other and which roll the blank together with the mandrel around its longitudinal axis and simultaneously move it forward. The tube emerging from the loosening rolls F is fed together with the mandrel in the transverse direction to the stripping device G which holds the left-hand end of the mandrel and strips the tube off the mandrel towards the right-hand, whereafter the tube leaves the drawing bench, while the mandrel is returned by a conveyor chain train H in the direction of the arrow on to a grating K. From the latter, the mandrel passes in front of the ram B into the mandrel and ram guide in the manner to be described hereinafter.

The driving bar A of the ram B has an I-shaped cross-section Figure 4 and carries on its forward end a ram B corresponding to the internal cross-section of the tube to be made. The driving bar A is supported on the bench 3 on vertical rollers 4 and is guided laterally between horizontal rollers 5, 5.

The ram B is guided between rollers 6a, 6b which are mounted on the bench 3 so as to rotate about vertical axes, and embrace the ram B in two diametrically opposite places of its cross-section, but only to such an extent as to leave between the edges of the rollers a gap corresponding in width to the thickness of the web 1 of the driving bar A. The spindles of the guide rollers 6a lying on one side of the ram B are stationary in the bench 3, while some of the guide rollers 6b situated on the opposite side of the ram are mounted on bell-crank levers 7 adapted to rock about pivots 8 on the bench 3. The arms 7a of the bell-crank levers 7 are coupled together by a rod 9, so that by moving the rod in the direction of the arrow 10 all the levers 7 together with the rollers 6b can be rocked from the position perpendicular to the direction of the mandrel and drawn with full lines into the broken line position 6b'. Situated on that side of the ram guide which is provided with the movable guide rollers 6b is the grating K, see Figure 1 comprising a number of horizontal bars 12 which extend at right-angles to the path of the ram, slope downwardly at their end 12a facing the path of the ram and, projecting with their nose 13 as closely as possible to the path of the web 1 of the driving bar A, contact with the underneath side of the cross-section of the ram B. The rollers 14 are situated at the left-hand end of the return chain train H, indicated in Figure 1, and receive the returned mandrel C.

The device operates as follows:

The driving bar A with the ram B is situated on the extreme left-hand side of Figure 1 in the starting position, in which there is sufficient clearance between the free end of the ram B and the drawing dies E to receive in succession the forcing mandrel C and the blank D. The ram B is situated between those pairs of guide rollers 6a, 6b, the rollers 6b of which are likewise mounted in a stationary manner. The forcing mandrel C, however, is situated between those pairs of guide rollers 6a, 6b, the rollers 6b of which are mounted on the bell-crank levers 7. The blank D is now placed on or in front of the free end of the mandrel C so that, upon the ram being moved, the mandrel is forced into the

blank and the latter is forced between the dies E. The ram is moved forward by the driving bar A which is driven to the right by means of the rack and pinion 18, 19, Figure 1 or of a hydraulic plunger. At the same time, both the mandrel C and the ram B are guided between the guide rolls 6a, 6b so that lateral yielding or bending of the mandrel or ram is prevented. The ram does not need to be substantially longer than the row of drawing dies E. Due to the I-shaped section of the driving bar A, its web 1 can pass into the gap left between the guide rollers 6a, 6b, so that the ram can enter the drawing dies E throughout almost the whole of its length and the driving bar A can approach the drawing dies quite closely. After the blank has been forced through the drawing dies and the driving bar has returned the ram to the left again into the starting position of Figure 1, one of the mandrels C conveyed by the return chain train H on to the rollers 14 can be returned to the operative position between the guide rollers 6a, 6b. The conveyor chains 16 circulating in the direction of the arrow 15 now engage by their teeth 17 the reserve mandrel C returned by the chain H and resting on the rollers 14, and gradually forward it along the grating bars 12 to the guide rollers 6a, 6b. At that moment, the rod 9 is moved in the direction of the arrow 10, so that the guide rollers 6b are retracted into the dotted line position of Figures 3 and 4. The mandrel C can thus roll down the sloping part 12a of the bars 12 until it reaches the stationary guide rollers 6a and abuts against the noses 13 of the bars 12. The rod 9 is now moved to the left, whereby the rollers 6b close the guide and the mandrel is brought exactly into line with the ram.

In the example shown in Figures 2 to 4, the guide rollers 6a, 6b are mounted on vertical spindles, while according to the modification shown in Figure 5, the guide rollers are mounted on horizontal spindles. In this case, the driving bar A with its web 1 must be arranged horizontal and the bell-crank levers 7 carrying the movable guide rollers 6b are adapted to rock in a vertical plane.

What I claim is:—

1. In a push bench, a driving rack bar of I-cross section, guide rollers and driving pinions both acting on the outer surfaces of the flanges of said driving rack bar, and a ram connected to the web of the said driving bar.

2. In a push bench, a driving rack bar of I-cross section with perpendicular web, a ram and mandrel connected to said web, driving pinions with horizontal shafts engaging racks at the opposite outer sides of both horizontal flanges and guide rollers supporting the laterally guided lower flange of said driving rack bar.

3. In a push bench, a driving rack bar of I-cross section, guide rollers and driving pinions acting on the two opposite outer surfaces of the flanges of said driving bar, a ram connected to the web of the said driving bar, and roller couples guiding the mandrel and ram, comprising a series of rocking crank levers, the inner arms of each of said levers being substantially perpendicular to the path of the mandrel, rollers mounted on each of said inner arms, the outer arms of said crank levers being connected to a coupling rod common for all guide roll couples.

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