Dec. 12, 1939. B. BANNISTER 2,182,910

MANDREL BAR

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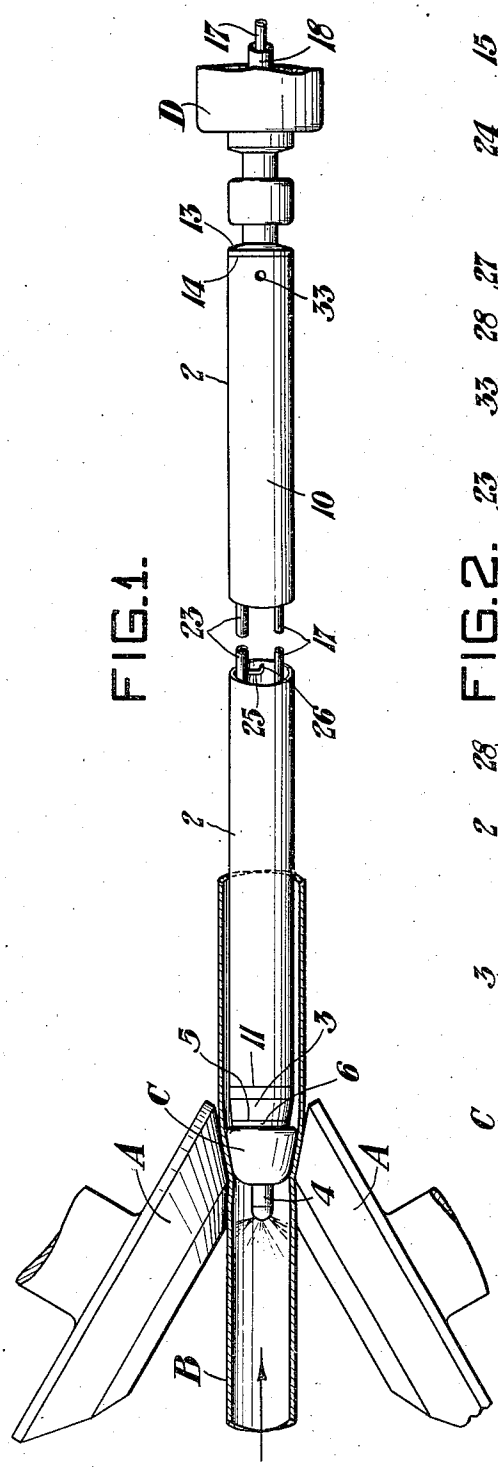


FIG. 1.

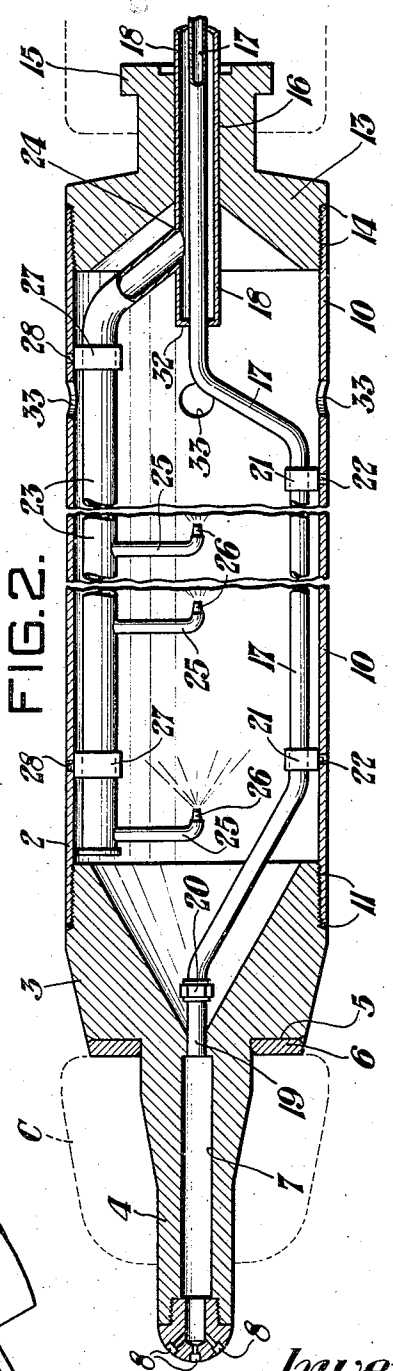


FIG. 2.

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MANDREL BAR

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3 Claims. (Cl. 78—103)

My invention relates to mandrel bars and more particularly to those which are used in the manufacture of pipes and tubes, although not limited thereto.

Mandrel bars for pipe or tube mills have a dual purpose. They provide means for positioning the mandrel plug, which in conjunction with the metal working rolls provides the processing "pass" of the mill and also performs the function of guiding and supporting the work-piece as it leaves the "pass." Consequently, the mandrel bar must be somewhat longer than the work-piece being processed and, in order to prevent binding of the work-piece, have an overall diameter at least slightly less than the inside diameter of the work-piece. Since the work-piece is processed at high temperatures it is necessary to cool the mandrel bar in order to keep it from becoming too highly heated, and also to prevent expansion thereof from moving the mandrel plug too close to the metal working rolls of the mill.

The customary practice has heretofore been either to entirely fill the hollow mandrel bar with a cooling fluid, or to provide a concentric filler interiorly of the hollow mandrel bar and fill the space therebetween with cooling fluid. This has been more or less satisfactory for the smaller diameter work-pieces; but in the larger sizes of expanding mills wherein pipes are expanded to 24 inches and larger sizes, the large volume of fluid required to fill the mandrel bars (which have an overall length that in some instances exceeds 70 feet) makes the fluid-filled mandrel bar excessively heavy. This excessive heaviness necessitates frequent replacement of the thrust bearing which supports the mandrel bar, causes the rotating mandrel bar to "whip" and requires excessive power to reciprocate the mandrel bar in order to remove the processed work-piece.

In order to cut down the weight of such a mandrel bar, and at the same time provide an effective cooling means, I have conceived the spray-cooling of its interior, thereby lightening it to the extent of as much as 15,000 pounds, or more than 50 per cent of the usual weight in the larger sizes above mentioned. As can be readily seen, a considerable portion of the strain is thereby removed from the supporting thrust bearing which is necessarily positioned at the extreme rearward end of the mandrel bar; there will be less tendency toward "whipping"; and less power required to reciprocate the mandrel bar.

The foregoing and further objects will be apparent after referring to the drawing, in which:

Figure 1 is a plan illustrating fragmentarily the metal working rolls of a pipe or tube mill, together with the mandrel bar of the present invention.

Fig. 2 is an enlarged longitudinal section of the mandrel bar of Figure 1.

Referring more particularly to the drawing, the letter A designates a pair of conventional rotary metal-working rolls which expand the work-piece B by rolling it over a mandrel plug C held in the proper position by the mandrel bar 2 of my invention, the latter being supported by the usual thrust bearing D.

The mandrel bar 2 is provided with a bar-cap 3 of suitable conventional shape to hold the mandrel plug C. The bar-cap 3 is provided with an extending point 4 and a shoulder 5 which has a wear-resistant collar 6 welded or otherwise secured thereto. The extending point 4 of the bar-cap 3 has a central bore 7 which extends completely therethrough. The extremity of the extending point 4 on the bar-cap 3 is provided with a nozzle tip having vents, or nozzles, 8 through which compressed air is delivered to the interior of the work-piece B as it is being processed, in a manner to be later described. The bar-cap 3 is secured to the barrel portion 10 of the mandrel bar by screw-threads and/or welding, as at 11. The rearward end of the barrel portion 10 of the mandrel bar 2 carries a thrust member 13 which is secured thereto by screw-threads and/or welding, as at 14. This thrust member 13 is provided with a rearward radial flange 15 of smaller diameter, and is centrally bored, as at 16, to accommodate inner and outer concentric pipes 17 and 18, respectively.

The inner pipe 17 extends forwardly through the barrel portion 10 of the mandrel bar 2 to carry gas under pressure from a suitable source of supply (not shown) to the nozzles 8, and communicates with the central bore 7 of the extending point 4 of the bar-cap 3 by means of a connecting pipe 19 which extends through the bar-cap and is connected to the pipe 17 by a coupling 20. For the greater portion of its length, the pipe 17 is disposed along the inner wall of the barrel portion 10 of the mandrel bar 2, and is secured thereto by collars 21. These collars 21 are secured to the inner wall of the barrel portion 10 of the mandrel bar 2 by weld plugs 22 which are formed from the exterior thereof.

The outer pipe 18 is adapted to carry cooling fluid from a suitable source (not shown) to the interior of the barrel portion 10 of the mandrel bar 2 through a forwardly extending pipe 23,

which is connected thereto, as at 24. This forwardly extending pipe 23 is provided with a plurality of risers 25 extending inwardly to the axial center of the mandrel bar and rearwardly extending nozzles 26 positioned to direct a spray outwardly onto the interior of the barrel portion 18. The pipe 23 is oppositely disposed to the pipe 17 in order to balance the weight of the barrel portion 18, and is secured to the inner wall thereof by collars 27 and weld plugs 28 which are formed from the exterior thereof. The number of risers 25 and spray nozzles 26 provided may be varied to adequately spray the interior of the barrel portion 18 in accordance with the size thereof. It will be noted that the pipe 18 is closed, as at 32, so that all of the fluid delivered thereinto is forced into the pipe 23.

The cooling fluid delivered to the interior of the barrel portion 18 is drained therefrom through apertures 33 adjacent the rearward end thereof. Since the spray nozzles 26 are directed rearwardly towards the apertures 33 there will be no tendency to build up a "head" of cooling fluid in the barrel portion 18, and thus the weight will be reduced to a minimum.

While I have shown and described one specific embodiment of my invention, it will be understood that I do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of my invention, as defined by the following claims.

I claim:

1. A mandrel bar for pipe or tube mill operations comprising a bar-cap, a thrust member, a barrel secured to and disposed between said bar-cap and thrust member, said barrel having at least one aperture adjacent the rearward end thereof, said thrust member having a bore, fluid carrying means disposed in said bore and said barrel, a plurality of risers connected to said fluid carrying means, and rearwardly directed spray nozzles connected to said risers.

2. A mandrel bar for pipe or tube mill operations comprising a bar-cap, a thrust member, a barrel secured to and disposed between said bar-cap and thrust member, said barrel having at least one aperture adjacent the rearward end thereof, fluid carrying means extending through the bore of said barrel and disposed along the inner wall thereof, a plurality of inwardly-extending risers connected to said fluid carrying means, and rearwardly directed spray nozzles connected to said risers, said nozzles being adapted to deliver a spray of cooling fluid onto substantially the entire interior of said barrel and prevent the building up of a head of cooling fluid in said barrel by directing its flow towards said aperture.

3. A mandrel bar for pipe or tube mill operations comprising a bar-cap, a thrust member, a barrel secured to and disposed between said bar-cap and thrust member, said barrel having at least one aperture adjacent the rearward end thereof, said thrust member having a bore, fluid carrying means disposed in said bore and said barrel, and a plurality of rearwardly directed spray nozzles connected to said fluid carrying means.

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