June 17, 1941. H. E. ENGELBAUGH ET AL 2,245,656

WATER-COOLED GUIDE SHOE FOR PIERCING MILLS

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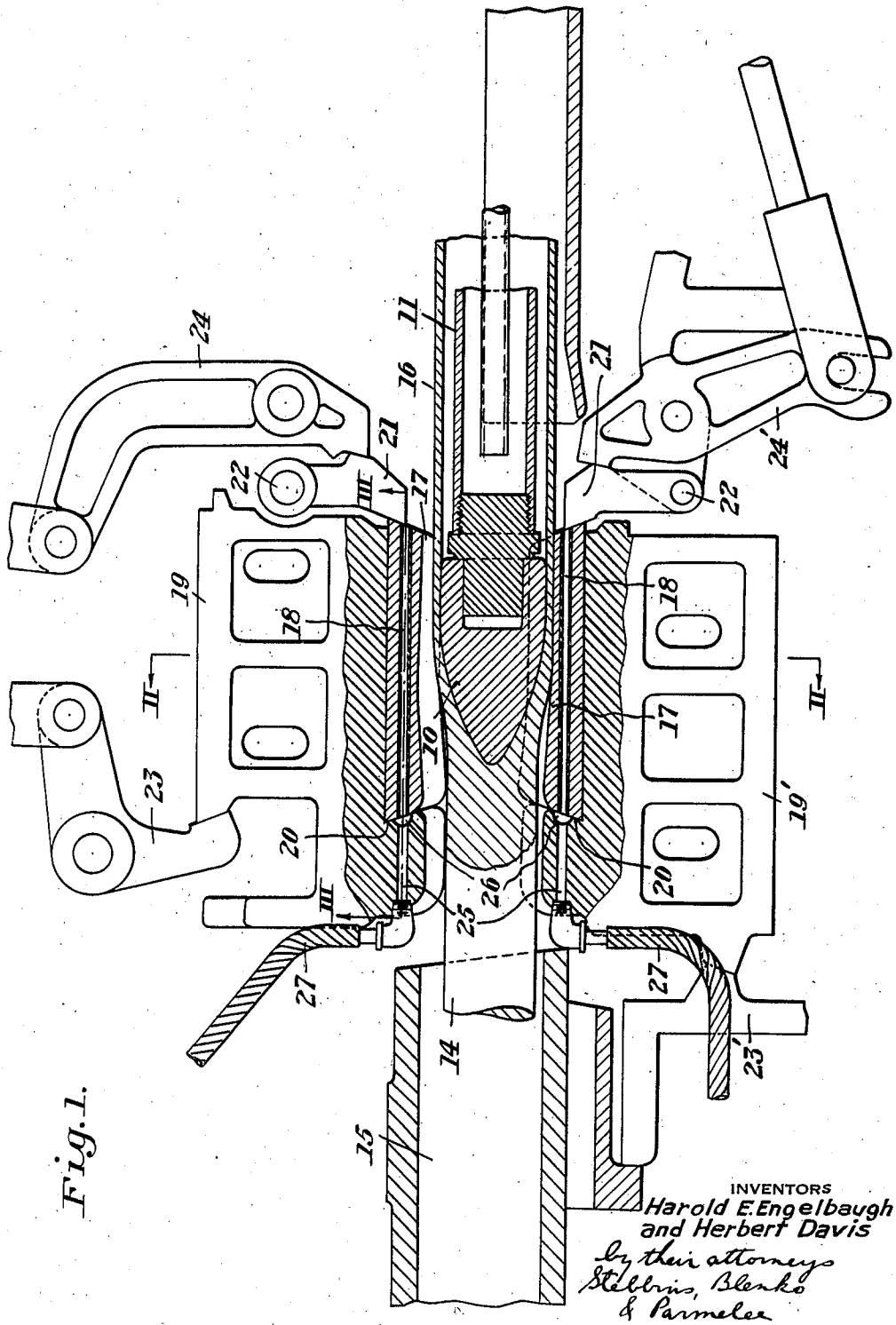

Fig. 1.

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Fig. 2.

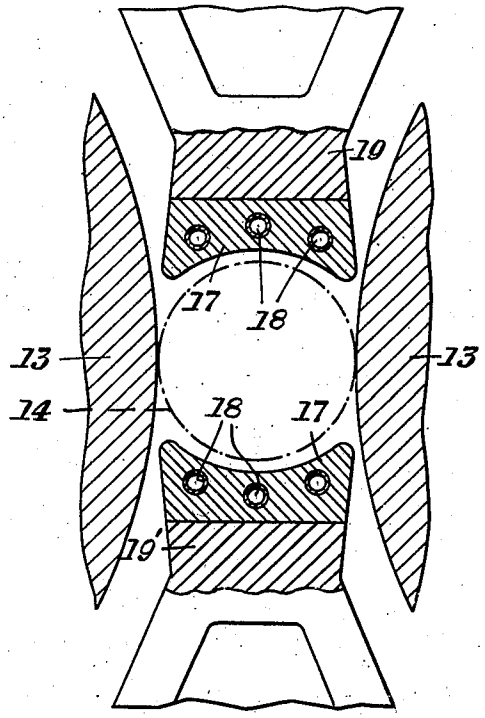
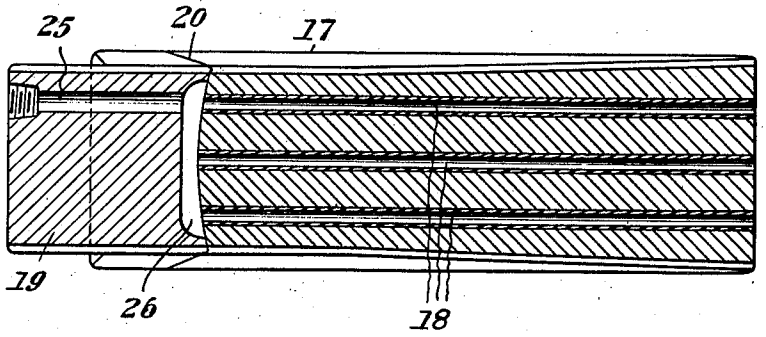


Fig. 3.



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WATER-COOLED GUIDE SHOE FOR PIERCING MILLS

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Application September 27, 1939, Serial No. 296,748

4 Claims. (Cl. 80—51)

This invention relates to the manufacture of seamless tubes and particularly to the billet-piercing stage of such manufacture.

The initial operation in the manufacture of seamless tubes is the forcing of a heated cylindrical billet over a piercer point carried on a mandrel and disposed between the crossed rolls forming a piercer mill. Guide shoes are employed to direct the billet accurately onto the piercer point. It has been found that the shoes used heretofore have a tendency to pick up scale and other metallic particles. These particles stick to the shoes, actually becoming welded thereto and by building up, form projections which scratch and otherwise mar the billet passing therebetween. The defects thus introduced into the billet persist throughout the subsequent operations and appear in the finished product. Such defects are highly objectionable from the standpoint of appearance and for the further reason that any scratch is potentially an incipient line of failure.

We have invented a novel apparatus for overcoming the foregoing objections and accomplishing further new and useful results. According to our invention, we maintain the guide shoes at a temperature such that scale and other particles do not tend to adhere or become welded thereto. The building up of projections is thus prevented and the scratching and other marring of the billets is eliminated. A preferred embodiment of the apparatus comprises a pair of opposed guide shoes having conduits formed therein for the passage of cooling fluid. Each shoe is mounted on a holder. A manifold in the holder communicates with the passages in the shoe and a source of cooling fluid is connected to the holder.

The following detailed description of the embodiment above-mentioned refers to the accompanying drawings illustrating such embodiment. In the drawings,

Fig. 1 is a central, longitudinal, vertical section through the guide shoes of our invention and the supporting means therefor;

Fig. 2 is a transverse sectional view taken substantially along the plane of line II—II of Fig. 1 showing the piercer mill rolls diagrammatically; and

Fig. 3 is a sectional view taken substantially along the plane of line III—III of Fig. 1.

Referring now in detail to the drawings, a piercer point 10 is mounted at the end of a mandrel 11 supported in any convenient or known manner at its opposite end. The point 10 together with crossed rolls 13 constitute a piercer mill of well-known construction so it is unnecessary to disclose any further details thereof herein. A billet 14 heated to the proper temperature is adapted to be pushed through an entering guide 15 and over the point 10 for piercing and expansion to a tube blank 16.

Opposed guide shoes 17 are mounted in spaced relation between the rolls 13 and are shaped and positioned as shown, to center the billet and direct it accurately onto the point 10. As shown in Fig. 2, the opposed faces of the shoes are of arcuate form.

The shoes 17 have cooling fluid passages 18 extending therethrough and open at each end thereof. These passages may conveniently be formed by casting the shoes around lengths of pipe suitably positioned in a mold.

The shoes 17 are supported in holders 19 and 19'. Each holder has a dove-tailed seat 20 near its entering end. The ends of the shoes 17 are inclined whereby they are adapted to cooperate with the seats 20 and dogs 21 for holding them against the seats. The dogs are pivoted as at 22 on any suitable or convenient support. As shown in Figs. 1 and 2, the holders 19 are hollow castings. They are supported in any desired manner, preferably on the housings of the piercer mill, and are adapted to be fixed in position by clamps 23, 24, 23' and 24'. The clamps 24 and 24' engage the dogs 21.

The holders 19 and 19' have longitudinal passages 25 therein, each communicating with a transverse passage 26 formed in the face of the seat 20 and adapted to act as a manifold in supplying cooling fluid to the passages 18 in the shoes. A fluid-supply connection 27 extends from each of the holders 19 and 19' to a suitable source of cooling fluid, e. g. water. Suitable control valves may be employed in the supply lines for varying the flow therethrough. It will be apparent from the foregoing description that fluid delivered through the connections 27 flows through the passages 25 to the manifolds 26 and thence through the passages 18 in the shoes. After traversing the shoes, the fluid is discharged from the open rear ends thereof whence it flows to any convenient drain or into the sewer.

The guide shoes of our invention operate in the conventional way to center the billet accurately relative to the point 10. In addition, they exhibit a characteristic which is entirely novel, i. e., freedom from the tendency to pick up scale and other particles. The scratching and marring of the tube which has resulted from

the building up of such particles on the shoes known heretofore is eliminated and the finished product is thus provided with a superior surface.

A further advantage of the invention is that the shoes of my invention have a useful life about twice as long as the shoes used previously. The cost of the shoes, furthermore, is not materially greater than those now in use. The shoes may be of any suitable alloy. A typical alloy which has given very satisfactory results is composed of 22% chromium, 4% nickel, .6% molybdenum, 1% carbon and the balance iron. Such alloy is highly resistant to heat and abrasion. Low carbon steel pipe serves very well for the passages 18.

A still further advantage of the invention is that there is not as much likelihood of breakage of the shoes shown herein as has been characteristic of piercer mill guide shoes generally, because the shoes are maintained at substantially uniform temperature throughout, thereby avoiding serious differential thermal expansion and contraction. Breakage of the guide shoes generally scores the piercer rolls and this causes marks on the surface of the pipe which may be sufficient to require their rejection when inspected.

Although we have illustrated and described but a preferred form and practice of the invention, it will be recognized that changes in the structure and procedure disclosed may be made without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. Piercer mill guides for directing a heated billet onto a piercer point, said guides including opposed shoes adapted to be engaged by the billet and subject to heating by contact therewith, said shoes being cast from an alloy which is highly resistant to heat and abrasion, and having a plurality of cast-in conduits distributed across the billet-engaging faces of the shoes, means for supporting said shoes in spaced relation adjacent the pass of the mill, and connections for supplying cooling fluid to said conduits, whereby to maintain the shoes at substantially uniform temperature throughout and prevent spalling or breakage of the shoes resulting from differential thermal expansion and contraction thereof.

2. Piercer mill guides as defined by claim 1 characterized by shoe holders supporting the shoes adjacent the mill pass, and passages in said holders communicating with the conduits in said shoes.

3. Piercer mill guides as defined by claim 1 characterized by shoe holders supporting the shoes adjacent the mill pass, and a manifold in each of said holders communicating with the conduits in said shoes.

4. In a seamless pipe mill, opposed guides for directing a billet over a mandrel, said guides including shoes elongated axially of the mandrel, adapted to be engaged by the billet, and holders supporting said shoes, said holders having seats against which the ends of the shoes abut, cooling-fluid passages in said shoes extending along said mandrel, and passages formed in said seats communicating with said first-mentioned passages.

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