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METHOD OF MANUFACTURING PIPES AND TUBES

Original Filed Jan. 14, 1941

FIG. 1.

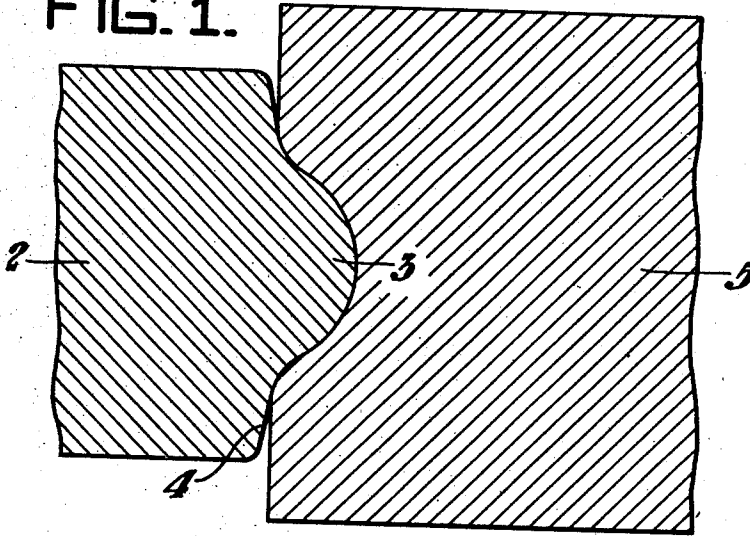
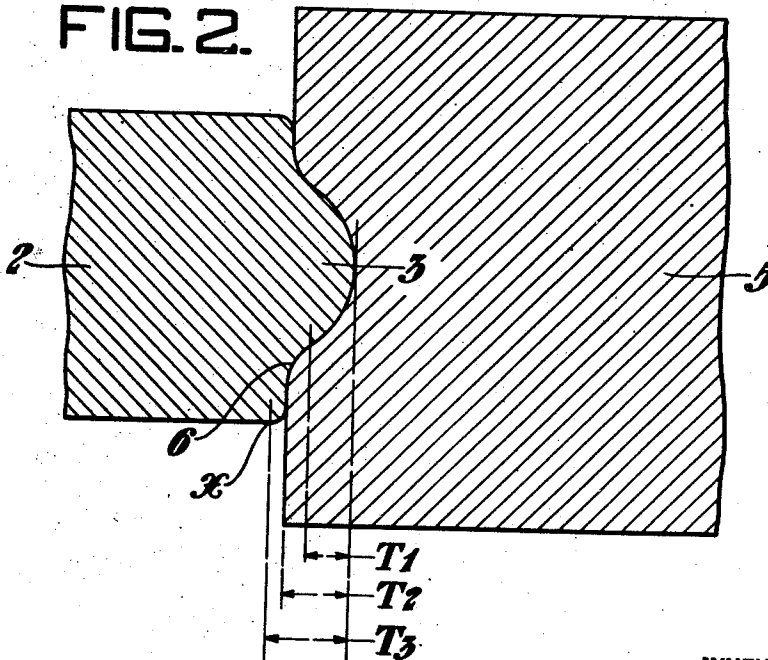


FIG. 2.



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## UNITED STATES PATENT OFFICE

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METHOD OF MANUFACTURING PIPES  
AND TUBESKeith C. Hamilton, McKeesport, Pa., assignor to  
National Tube Company, a corporation of New  
JerseyOriginal application January 14, 1941, Serial No.  
374,378. Divided and this application July 9,  
1943, Serial No. 494,088

2 Claims. (Cl. 80-62)

1

This invention relates to the manufacture of metallic pipes and tubes and more particularly to that type of practice which is identified as "seamless." The present invention is a division of my copending application, Serial No. 374,378, filed January 14, 1941, and now abandoned.

According to the standard practice of manufacturing seamless pipes and tubes, the molten metal, such as steel, is teemed into molds of substantial size and the solidified ingots removed therefrom and delivered to the soaking pits where the temperature thereof is equalized. After the temperature of the ingots is equalized, they are rolled into solid cylindrical billets which are subsequently heated and pierced to produce metallic workpieces from which pipes and tubes of the desired size and length are rolled. The piercing process comprises the forcing of the billet between a plurality of metal-working rolls which rotate and helically advance the billet over an immediately disposed piercing point, whereby the tubular workpiece is obtained. In order that the piercing point be properly introduced to the center of the solid cylindrical billet, it is customary to center punch the entering end thereof by the use of a punch which is substantially egg-shaped so as to produce a conical or cylindrical hole in the end of the billet having an undesirable sharp edge or corner which will be positioned between the end of the mandrel bar and the hole during the piercing operation.

This center punch locates the point on the center of the billet and thus aids in producing concentric piercing which prolongs the life in service of the piercing point. In addition, it may be pointed out that by providing a center punch in the entering end of the solid cylindrical billet, there is thereby enabled an action exerted by the rolls to draw the metal away from the center of the billet to form a cavity preparatory to the entry of the piercing point.

The egg-shaped center punch of standard practice is actuated by an air cylinder which functions in the manner of a pneumatic hammer.

According to conventional practice, a workpiece after it has been pierced by helically advancing it over a mandrel plug reveals a peculiar physical condition on the inside wall near the end of the tube. The surface at this point is found to be folder or lapped along an irregular circumferential line running completely around the interior. In a 12 $\frac{3}{4}$ " O. D. diameter tube the lap may be as much as 12" from the end, while in a smaller tube, for example 6" in O. D. diameter, the lap may be 6" from the end of the tube. It is be-

2

lieved that in order to remove this lap and thereby make the workpiece acceptable, the lap must be removed, and this involves the loss of much material or scrap. It has been found that this lap was caused by the sharp edge or corner formed around the center hole punched in the billet for initially receiving the piercing point.

It is among the objects of the present invention to provide a method of manufacturing metallic pipes and tubes by the seamless process which will result in the complete elimination of lap and substantial reduction of the length of the cropped end whereby material is conserved.

According to the present invention, it has been found that the more obtuse this corner is, the less the loss is, due to inside laps or seams at the end of the pipes.

Another object is the provision of a center punch which is operated in the manner of the devices of the prior art and one which is characterized by providing a recess which is so shaped that the subsequent piercing operation may be performed with the entire elimination of, or substantial reduction in the folding or lapping of the surface of the inside wall which is characteristic of the center punches of the prior art.

The foregoing objects will be made more apparent after referring to the following drawings, in which:

Figure 1 is a fragmentary view of a tool made in accordance with the teachings of the present invention and illustrating the manner in which it performs upon the end of a solid billet used in the manufacture of seamless pipes or tubes; and Figure 2 is a view similar to Figure 1 but disclosing a modification.

Referring more particularly to the drawings, the numeral 2 designates a center punch employing a dome-shaped end 3, the edge of which is connected to the body portion of the tool by a frusto-conical portion 4. This construction produces a fillet at the edges of the center punch and face of the billet 5 and has a marked influence on the location of the lap, in that it produces a displacement of lap and causes it to move closer to the end of the pipe, or eliminates it entirely. With this design of tool any variation in the depth of center punch in the end of the billet will still maintain a fillet at the edges of the center punch.

Referring more particularly to Figure 2, there is disclosed a modification according to which the edge of the dome-shaped end 3 is connected to the body portion of the tool by a concave portion 6. Such design is excellent, but it is essential

3

that the impression made by the tool should not be as shallow as the depth  $T_1$ , and should not exceed the depth  $T_2$ . Should the tool reach the depth  $T_3$ , a sharp corner will be formed at point X. This will cause a lap to form in the manner of the devices of the prior art.

From the foregoing, it is believed evident that the form of the tool and the consequent center punch on the end of the billet has a marked influence on the location of the lap formed on the interior wall of the pipe and that a center punch that is devoid of sharp corners will keep this lap closer to the end of the pipe, or cause it to disappear entirely, than a center punch making a sharp corner with the face of the billet.

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

I claim:

1. In the manufacture of seamless tubes and the like by the rotary piercing method wherein the billet to be pierced is first center punched and then pierced by helically advancing it over a mandrel plug, the steps of forming a cavity in the end of a billet centrally thereof, said cavity having a contour substantially the same as that of the nose of the piercing point to be used in the piercing process with a circumferential convex shoulder arranged around the edge of the cavity between the end wall of the billet and the side walls of the cavity so as to prevent lapping

4

of the surface of the inside wall of the cavity in the billet during the piercing thereof and then rotary rolling said center-punched billet to pierce the same.

2. In the manufacture of seamless tubes and the like by the rotary piercing method wherein the billet to be pierced is first center punched and then pierced by helically advancing it over a mandrel plug, the steps of center punching the end of a billet by means of a center punch so as to form a cavity therein having a contour substantially the same as that of the nose of the piercing point to be used in the piercing process, said center punch adapted to form a circumferential convex shoulder around the edge of the cavity between the end wall of the billet and the side walls of the cavity whereby lapping of the surface of the inside wall of the cavity in the billet is eliminated during the piercing thereof and then rotary rolling said center-punched billet to pierce the same.

KEITH C. HAMILTON.

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