July 17, 1934. A. O. WAHLSTEEN 1,966,602

PROCESS OF MANUFACTURING HOLLOW OBJECTS FROM INGOTS HAVING BIG DIMENSIONS

Filed Dec. 26, 1931

Fig. 1.

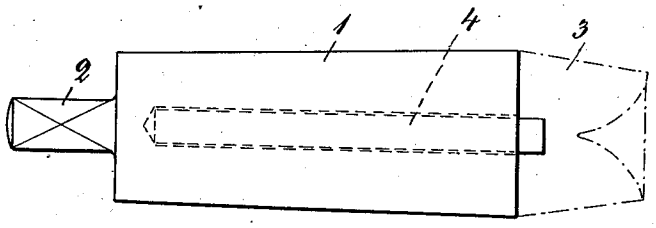


Fig. 2.

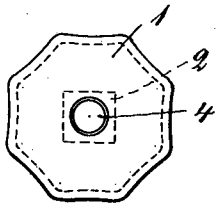


Fig. 3.

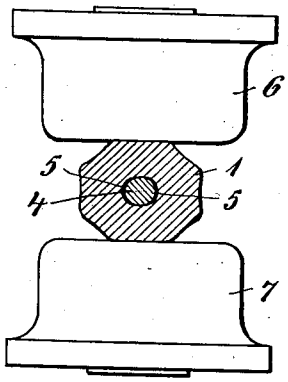


Fig. 4.

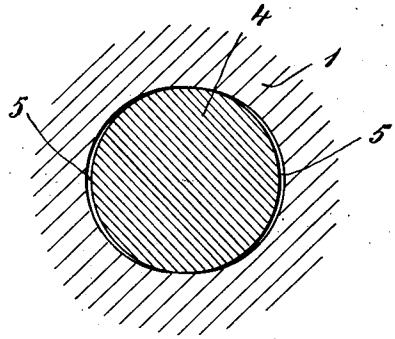


Fig. 5.

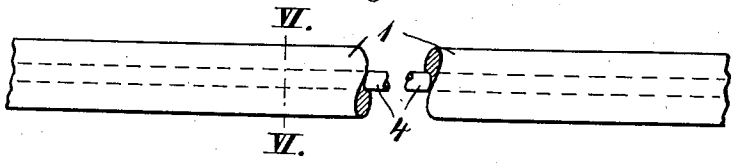
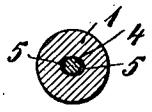


Fig. 6.



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1,966,602

PROCESS OF MANUFACTURING HOLLOW OBJECTS FROM INGOTS HAVING BIG DIMENSIONS

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Application December 26, 1931, Serial No. 583,390
In Sweden June 16, 1931

2 Claims. (Cl. 29—148.2)

The present invention relates to a process of manufacturing hollow objects from ingots having big dimensions, such as cylinders, shafts, tubes of guns, breech pieces, jackets, brake cylinders and the like, by means of forging and pressing and the like.

When manufacturing, for instance, tubes of guns, the ingot is, as well known, forged to the desired shape and is afterwards, bored so as to give the object in question the required hollow. At this operation it has been found that the objects sometimes show interior cracks or feeble surfaces, "cooling cracks", apparently inexplicable, causing the rejection of the objects, as these cracks have proved to have a particularly detrimental influence upon the strength of the objects.

The cause of this cracking is not known, and several scientists have given different statements. The cracking has been proved in steel qualities of the most different kind, pure carbon-steels as well as high-percentage alloy steels, such as chromium-nickel-steel, nickel-tungsten-steel and nickel-chromium-molybdenum-steel and others.

As a natural consequence of this circumstance the means proposed to avoid the arising of the cracks have been varying, but no sure remedy has been found hitherto.

The manner in which the improved method is carried out is illustrated in the accompanying drawing, in which,

Fig. 1 is a side view of an ingot provided with an axially extending bore in which a core has been inserted;

Fig. 2 is an end view of the ingot shown in Fig. 1;

Fig. 3 illustrates the ingot and core in transverse section between a forging hammer and anvil;

Fig. 4 shows the core in transverse section on a large scale and emphasizing the widening of the bore of the ingot in a direction at right angles to the line of pressure of the hammer;

Fig. 5 is a broken away side view of the ingot after completion of the forging operation; and

Fig. 6 is a transverse section taken on the line VI—VI of Fig. 5.

Referring to the drawing, 1 designates the ingot provided with a squared stern or shaft 2 which affords a gripping place for a pair of tongs with which to manipulate the ingot during the forging operation. The dotted line portion 3 indicates the metal head which will be cut off from the ingot. The ingot is provided with an axially extending bore in which a core 4 is inserted. When the ingot, with the core therein, is subjected to the action of the hammer 6 and anvil 7, as shown in Fig. 3, the bore becomes elongated in a direction at right angles to the direction of the pressure, the core 4 being also somewhat elongated in the same direction but to a slightly smaller extent whereby a space is formed between the wall of the bore and the opposite sides of the core, as indicated at 5. These small spaces provide "breathing" channels and prevent the formation of internal cracks.

According to the present invention these cooling cracks may now be entirely avoided by providing the ingot before the forging operation, or after an inconsiderable forging, with a longitudinal hole, and the forging of the ingot is effected with or without using an iron or metal core inserted into said longitudinal hole. The core may also consist of sand or similar matter.

In making the hole many different ways may be used so, for instance, the ingot may be bored before being exposed to the forging operation or the hole may be pressed out in the ingot. The hole may also be produced by subjecting the ingot first to an inconsiderable forging and, then, boring before the final forging operation takes place.

The result, aimed at by this invention, may also be obtained by casting the ingot with a longitudinal hole.

By a forging, carried out according to the invention, it has been found that objects quite free from cooling cracks are obtained.

From an economical point of view the invention is of a very great importance, because, as will be easily seen, a rejection of a big forged blank means a very great loss on account of the particularly high costs in connection with the manufacture of such objects.

Having now particularly described the nature of my invention and the manner of its operation, what I claim is:

1. The process of manufacturing hollow articles of large dimensions from ingots, which consists in forming a longitudinal cavity in said ingot, inserting a core of an easily machinable metal into said cavity, forging the ingot to the shape of the finished product and then removing the core by boring.

2. The process of manufacturing gun barrels from ingots, which consists in forming a longitudinal hole in said ingot, inserting a core of iron into said hole, forging the ingot to the shape of the finished product, removing said core by boring and subjecting the piece to necessary finishing operations.

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