March 26, 1935. D. L. DERROM 1,995,419

METAL WORKING

Filed Jan. 26, 1931

Fig. 1

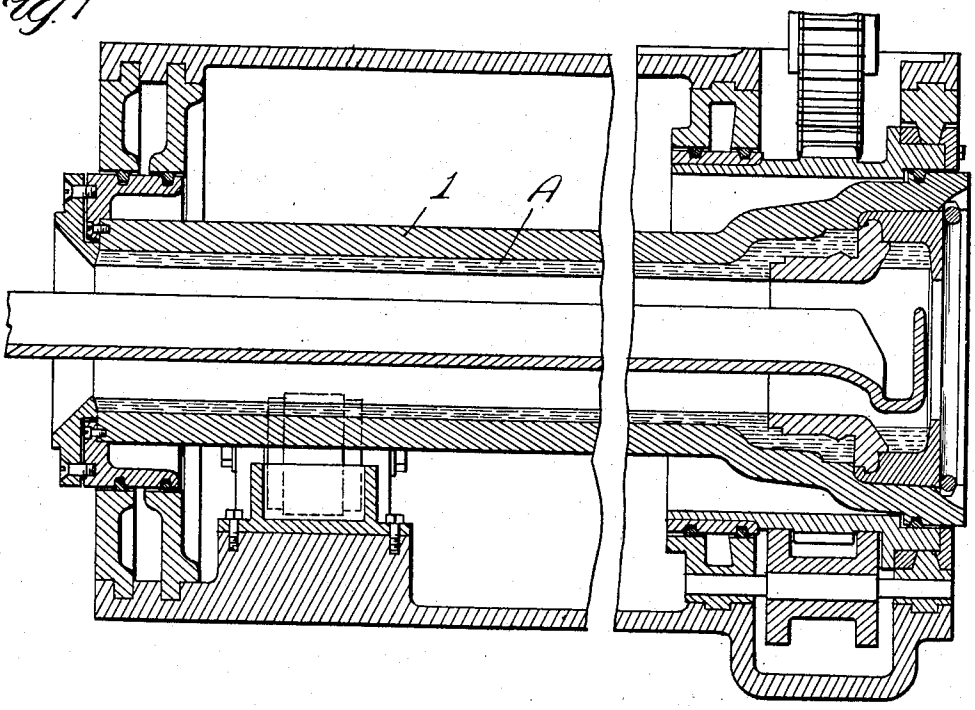


Fig. 2

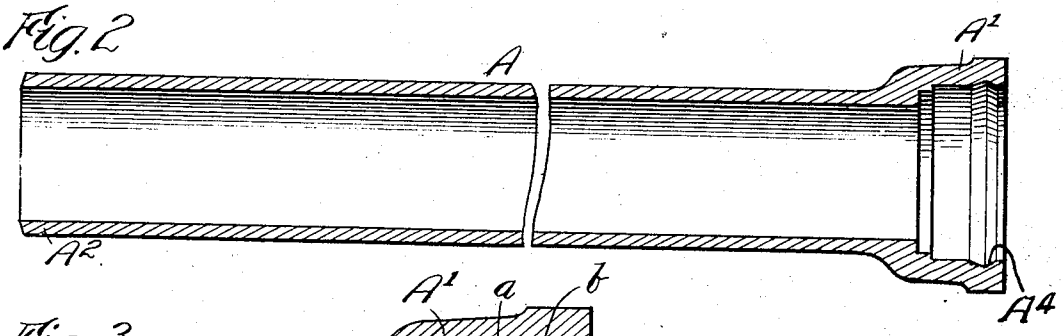


Fig. 3

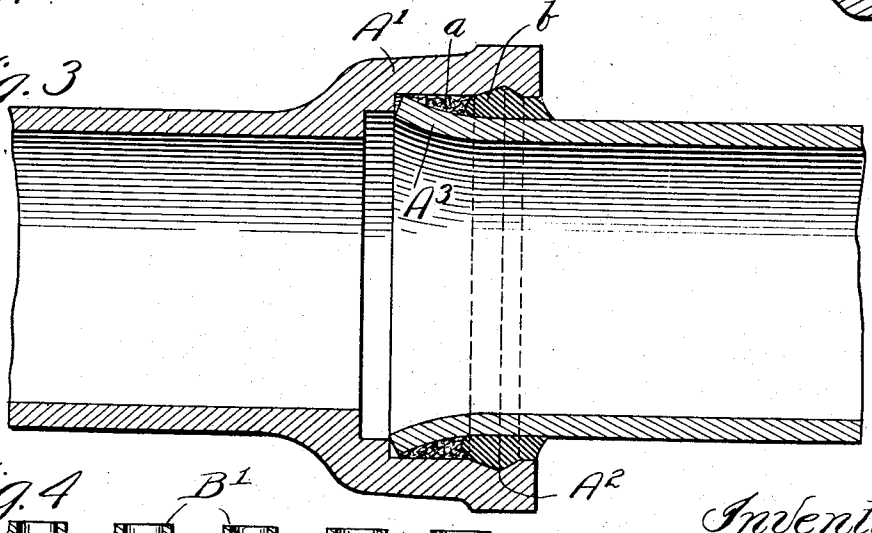
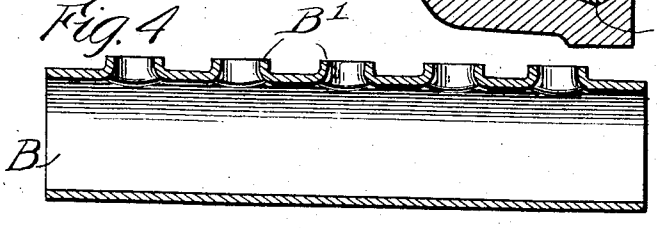


Fig. 4



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UNITED STATES PATENT OFFICE

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METAL WORKING

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Application January 26, 1931, Serial No. 511,292

3 Claims. (Cl. 29—148.2)

I have discovered that the metal of an iron casting is of such nature that the casting can be forged if the forging be undertaken promptly after solidification and while the casting still retains much of the temperature of casting.

This discovery may be utilized in various ways, as, for example, in the forging of nipples, flanges and analogous formations upon cast iron articles.

For the purpose of explaining the invention, reference may be made to the manufacture of cast grey iron pipe.

All flow-cast or pit-cast pipe are cast with a bead on the spigot end. Among the advantages attending the use of such a bead is that when pipe sections are connected together the bead provides resistance against slippage in the joint and thus helps to insure against leakage. Such a bead cannot be cast on pipe which are centrifugally cast in non-split or permanent molds, as the bead would prevent withdrawal of the casting from the mold. The present invention makes possible the provision of the equivalent of such a bead by subjecting the spigot end of the pipe to an expanding or forging operation, preferably while the pipe still contains the initial heat.

The invention also embraces the manufacture of pipeheaders and analogous parts by producing nipples, flanges and the like upon centrifugally formed tubular castings.

The invention also contemplates the forging of castings produced in stationary molds.

In the accompanying drawing:

Figure 1 is a fragmental longitudinal sectional view of one form of a centrifugal pipe-casting machine which may be employed in connection with the invention.

Fig. 2 is a fragmental longitudinal sectional view of a centrifugally cast pipe.

Fig. 3 is a fragmental longitudinal view showing the joint between two pipes, the spigot end of one of the pipes having been forged to produce the equivalent of the bead hereinbefore referred to.

Fig. 4 is a longitudinal sectional view of a pipe header formed in accordance with my invention.

Figure 1 illustrates a conventional form of centrifugal casting machine. The reference number 1 in the drawing refers to a permanent, non-split pipe mold. The product A of the machine is illustrated in Fig. 2, A^1 being the bell end and A^2 the spigot end. I have found that while the metal is in the cherry red or annealing stage, it is quite malleable. I therefore remove the pipe from the mold while the pipe is still at a relatively high temperature and as soon as possible after solidification. If necessary I raise the temperature of the spigot end to a forging heat, and then forge or flare out the spigot end by means of any suitable appliance or machine so as to impart to the spigot end the form indicated generally at A^3 in Fig. 3. Preferably the forging operation is completed before the pipe has cooled below 1400° F. from its molten condition.

It will be seen that when the spigot end of one pipe is inserted into the bell end of another pipe and the space surrounding the spigot end is packed with suitable material, as, for example, oakum *a* and lead *b*, a joint is produced which is very strong and resistant to longitudinal failure. The inner surface of the bell A^1 is preferably formed with an inclined surface which may partake of various forms, but which is herein shown as having the form of an annular groove A^4. The lead or other packing material is wedged between one wall of said groove and the outwardly flaring surface of the spigot end A^3 and thus serves to resist withdrawing movement of the spigot end from the bell end. It will be understood that the use of oakum may be dispensed with and that the parts may be so proportioned that a minimum amount of lead will suffice.

My invention is also applicable to the formation of nipples, bosses and outlets on pipe headers and analogous parts. In Fig. 4 there is shown a pipe header, the body B of which may be cast in a centrifugal or a stationary mold and the nipples B^1 of which may be forged or extruded from the cylindrical wall of the header before the casting has cooled much below the initial heat and while the metal is at a forging temperature.

I claim as my invention:

1. The method of manufacturing grey iron pipe having a bell end and a flared spigot end which consists in centrifugally casting the pipe with a straight spigot end and promptly after solidification and while still hot working the metal at the spigot end of the pipe to increase its external diameter and thereby produce a flared shape.

2. The method of manufacturing grey iron tubular elements having both ends outwardly flanged which consists in centrifugally casting the body of the element with at least one end straight to permit withdrawal from the mold and promptly after solidification and while still hot forging an annular outwardly extending flange on the straight end.

3. The method of manufacturing a grey iron tubular element which consists in centrifugally casting the body of the element and promptly after solidification and while still hot forging an annular outwardly extending flange on said element by stretching the metal.

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