June 17, 1930. E. J. GULICK 1,764,561

METHOD AND THE MEANS FOR SHAPING TUBES

Filed Feb. 8, 1928

Fig. 1.

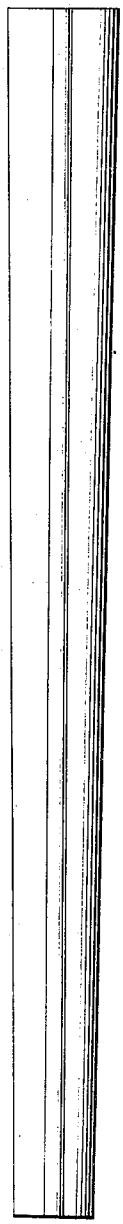


Fig. 4.

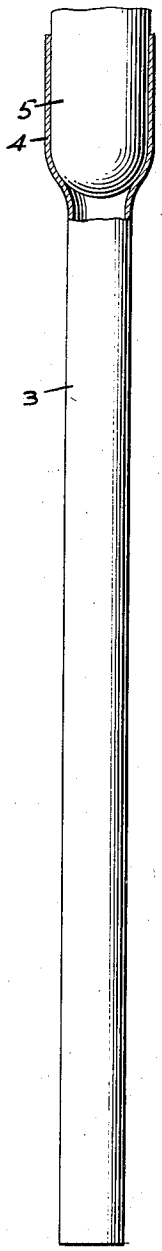


Fig. 5.

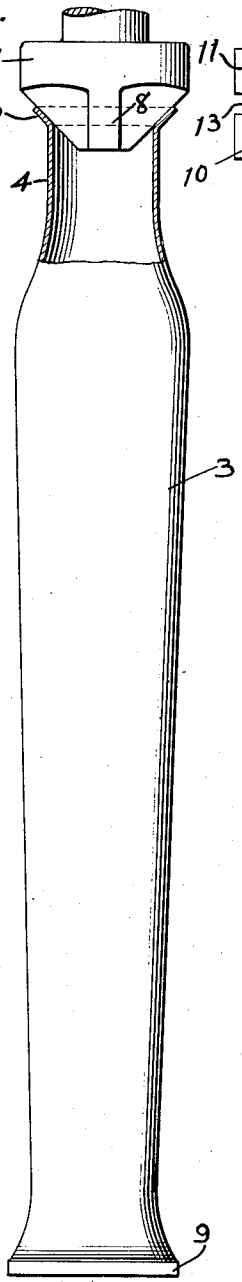


Fig. 6.

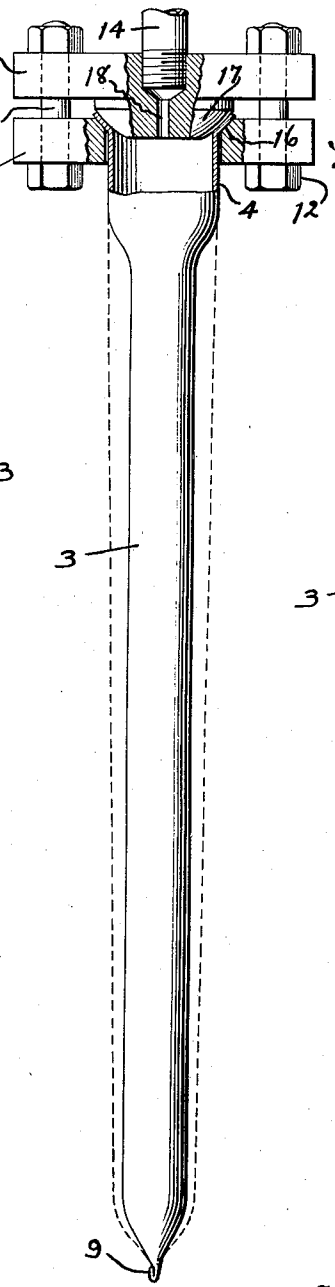


Fig. 7.

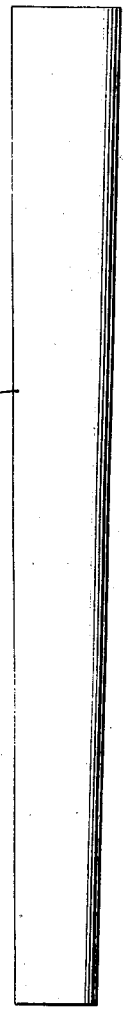


Fig. 2.

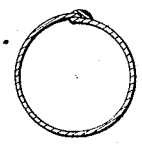
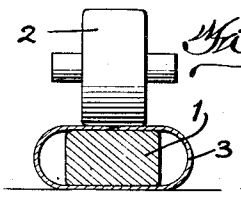


Fig. 3.



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UNITED STATES PATENT OFFICE

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METHOD AND THE MEANS FOR SHAPING TUBES

Application filed February 8, 1928. Serial No. 252,709.

The present common method for the manufacture of metal tubing for use in wind musical instruments, such as horns, and the like, consists in the formation of a tube body from a flat sheet of ductile metal, the joint being welded or brazed, and rolled, the tube being then cylindrically shaped in cross-section by the application of a mandril to the tube interior and by hammering the tube exterior. This method is slow and costly.

The principal object of my invention is to provide means and a method for shaping a deformed ductile metal tube by fluid pressure on the interior of the tube.

Another object of the invention is to provide the means and method for cylindrically shaping a deformed ductile metal tube, previously made from a flat sheet, by fluid pressure uniformly applied to the tube interior.

Other objects are mentioned and described herein.

The preferred embodiment of the invention is illustrated in the accompanying drawing wherein,

Figure 1 is a side view of a tapered tube made from a flat sheet of ductile metal;

Fig. 2 is a cross-section thereof;

Fig. 3 illustrates the tube and an interior mandril in cross-section, and the application of a roller for rolling the tube joint;

Fig. 4 illustrates the tool for cylindrically shaping one end of the deformed tube;

Fig. 5 illustrates the tool for flaring the tube end, and illustrates the opposite end of the tube when sealed;

Fig. 6 shows the tube and the tool for introducing fluid under pressure to the interior of the tube; and,

Fig. 7 illustrates the finished tube.

Similar numerals of reference indicate like parts throughout the several views on the drawing.

In the manufacture of brass tubing used in horns, and some other musical instruments, it is common practice to form a tube from a flat sheet of ductile metal, such as brass, the tube having a brazed lap joint, as illustrated in Figures 1 and 2. It is also well known in the same art that the longitudinal joint of such a tube must be rolled flat and substantially flush by the use of an interior mandril 1 and the roller 2 applied exteriorly thereof, as illustrated in Fig. 3. It is this rolling of the tube joint which leaves the tube in a deformed condition, and it must be reformed cylindrically in cross-section to enable its use in the musical instrument art. In the various figures of the drawing a tapered tube is illustrated only for convenience.

To enable the use and application of the shaping tool to the tube 3, which is more or less oval and deformed in cross-section after the joint thereof has been rolled, one end thereof is first cylindrically formed at 4 by the introduction to the interior thereof, for a short distance, of a blunt nosed cylindrical tool 5. Then, the outer end of this tube section 4 is slightly belled at 6 by the introduction of the pointed tool 7 which may be rotated to produce the flare at 6. The tool 7 may have a plurality of shaping ribs 8 on its point to facilitate the flared formation of the tube at 6. The lower or opposite end of the tube 3 is then closed and sealed at 9 in any suitable manner, as by folding the end upon itself and soldering the fold. The tube is then in condition to receive the tool which applies the fluid under pressure to the tube interior, and this tool may comprise the head 10, the gland 11, and the clamping bolts 12 and 13, together with the pipe 14 which may be screw threaded into the gland.

The tool head 10 is provided with an aperture 15 which is engaged by the tube section 4, and an annular beveled seat portion 16 which encompasses the edge of the opening 15 and upon which the outer surface of the tube flare 6 may seat to seal against leakage of fluid under pressure. The gland 11 is provided with a boss 17 which may be somewhat coniform to correspond with the inner surface of the tube flare 6 and against which said boss is adapted to engage to close the tube end and to seal the same when the tube flare is clamped snugly between said head and gland by tightening the bolts 12 and 13.

The pipe 14 may be placed in communication with the interior of the tube 3 by a passsage 18 formed centrally of the gland boss, and said pipe may be connected with

any suitable source of supply of either air or water under pressure, which, when introduced to the interior of the tube 3, exerts a uniform pressure thereon and spreads the tube walls, thereby effecting a perfect cylindricity thereof in cross-section. Thereafter, the head and gland are removed from the tube and the latter is then completed by removing the closed end 9 and the flared section 6.

I claim:

1. The method of cylindrically shaping a deformed hollow ductile metal tube which is exteriorly un-reenforced, which consists of closing one end of the tube by folding it upon itself, then flaring the opposite end of the tube, then closing said flared tube end by a tool which is clamped on both sides of the wall of the tube flared portion, then introducing fluid under pressure through said tool to the tube interior to spread the walls thereof, and then removing any deformation remaining in the tube ends including the folded end.

2. A tool for shaping a deformed unreenforced ductile metal element having an opening therein which comprises a ring-like head encompassing the tube end and provided with a flared end, a gland element provided with a ribbed boss adapted to flare and close the end of the tubular element by pressing same snugly against the flared portion of said head, screw means for clamping the end of the tubular element between the ribbed boss of said gland element and said flared end of the ring-like head, and means for introducing fluid under pressure through said gland element to the interior of the tubular element to spread the walls of the latter.

In witness whereof I affix my signature this 6th day of February, 1928.

EDWARD J. GULICK.