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METHOD AND APPARATUS FOR TREATING DRAWN TUBES

Filed July 29, 1929

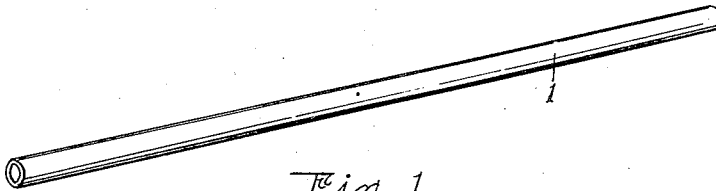


Fig. 1

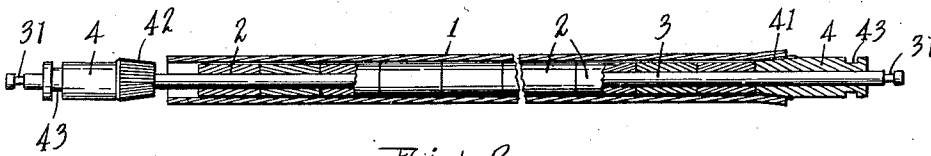


Fig. 2

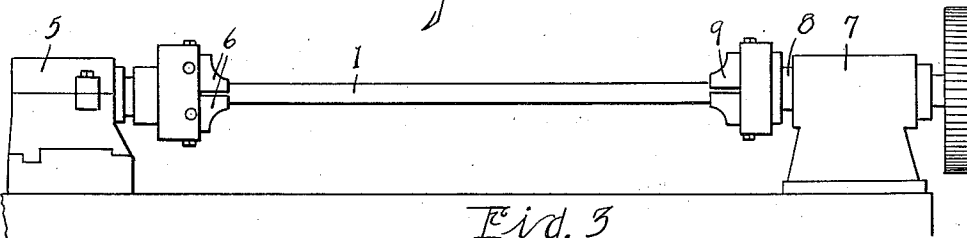


Fig. 3

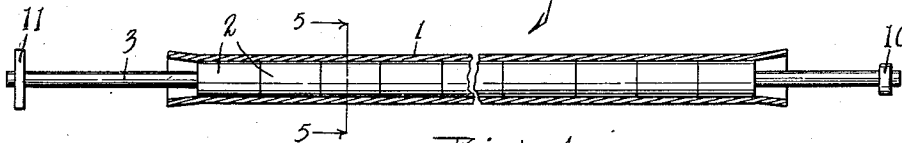


Fig. 4

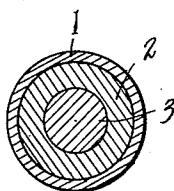


Fig. 5

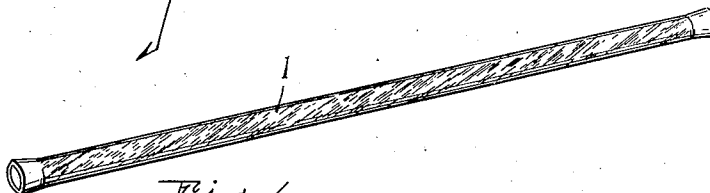


Fig. 6

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METHOD AND APPARATUS FOR TREATING DRAWN TUBES

Application filed July 29, 1929. Serial No. 381,849.

This invention relates to an improved process and mechanism for changing the direction of the grain of metal in a drawn tube from straight to spiral.

The objects of the invention are:

First, to provide an improved process of changing the grain of a metal tube from straight to spiral.

Second, to provide an improved apparatus for carrying out the process.

Objects pertaining to details and economies will appear from the description to follow. A preferred embodiment of the apparatus and mechanism is illustrated in the accompanying drawings, in which:

Fig. 1 is a detail view of a drawn metal tube with longitudinal grain.

Fig. 2 is an enlarged detail longitudinal central sectional view through a tube with my improved sectional mandrel with the parts disposed in spaced relation, showing the method of assembling the structure preparatory to twisting the tube to spiral form.

Fig. 3 is a view of a lathe, with proper jaws with a tube introduced for twisting.

Fig. 4 is a longitudinal sectional view with the gripping plugs removed preparatory to withdrawing the sectional mandrel.

Fig. 5 is an enlarged detail cross-section on line 5—5 of Fig. 4 showing the relative size of the tube, the diameter of the sectional mandrel, and the central supporting rod after the twisting operation.

Fig. 6 is a detail perspective view showing in the rough the appearance of the grain of the metal after the tube has been twisted.

The spiral disposition of the grain of the tube is of very great importance in the manufacture of valve assembly for wind instruments having the cupped mouthpiece. When made in accordance with the description of the structures appearing in my patent application filed March 25, 1929, Serial No. 349,542, the relative movement of the piston and tube is spiral and if the grain of the metal is straight the result is crosswise movement, friction and abrasion of the parts, and the rapid manipulation of the valve, which is so necessary in such instruments, is interfered with.

The parts will be identified by their numerals of reference.

1 is a drawn tube seen in Fig. 1 with the grain straight, in the condition in which it is taken for treatment. I introduce into the interior of this tube 1 of one inch diameter, a series of hollow sectional mandrels 2 which are cylindrical in form, $2\frac{1}{2}$ inches long and having a one-half inch longitudinal bore and a clearance of .002 in. all the way around. 3 is the half inch rod on which these are supported and adapted to journal. The rod is provided with a neck 31 at each end which projects two or three inches beyond the end of the tube for pulling connections.

Into the ends of the tube 1 I drive the turning plugs 4 which are tapered at 41 at their inner ends and are provided with longitudinal serrations 42. Each plug is also provided with a neck 43 for the engagement of the draw tool. The inner end of the plug enters the end of the tube 1 and the tapered portion is driven in so that the serrations engage the inner surface of the tube and expand the same slightly to afford a very firm grip throughout the entire periphery of the serrated portion 42 which penetrates the metal and retains and engages it very securely.

I then place the assembled parts in a lathe providing the tail-stock 5 with a pair of fixed jaws 6 and the head-stock 7 with a spindle 8 carrying the twisting jaws 9. These jaws are clamped onto the end of the pipe about the turning plugs and serrated parts and engage the same very securely. I then twist the pipe by turning the lathe spindle 8. With an inch tube 6 ft. long the pipe is twisted twelve times over, which turns the grain to an angle of about forty degrees with the axial line of the tube.

The sectional mandrels 2 are about four thousandths of an inch less in diameter than the bore of the tube 1, giving two thousandths of an inch clearance. They are free to turn and, as the tube is twisted, it contracts in its diameter and engages these sections of mandrel which, being free to turn on each other, permit the entire tube to be twisted until it grips the sectional mandrels from end to end. The tube is then removed from the jaws and

because of its slight resiliency the tube tends to twist backward and slightly release the sectional mandrels within, which, however, are still quite securely gripped.

5 I then apply a pulling instrument to the necks 43, 43 of the turning plugs 4 and pull them out. I then insert a notched round pulling plate 10 on one end of the rod 31 adapted to pass through the tube, and engage the opposite end by pulling plate 11 and very readily withdraw the sectional mandrel, leaving the tube in perfect form but with the fiber of the metal twisted to the angle indicated.

15 I am aware that my apparatus can be very considerably modified without departing from my invention. I have shown the same in its most convenient form and the method or process is very effectively carried out by the use of the same.

20 I desire to claim both the process and apparatus broadly and also specifically as described and pointed out in the appended claims.

25 Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. An apparatus for turning the grain of a drawn tube, consisting of sectional cylindrical mandrels with hollow bore loosely fitting within the tube, a longitudinal tie rod fitting loosely the said mandrels with neck at each end, a turning plug with tapered longitudinal serrated end adapted to drive into each end of the said drawn tube, and each having a neck at the outer end, a lathe means for chucking the ends of the said tube with the said turning plugs therein and to twist said tube, and a draw plate adapted to engage the neck of the said central rod of such dimension as to pass through the tube to enable the withdrawing of the said sectional mandrels.

2. An apparatus for turning the grain of a drawn tube, consisting of sectional cylindrical mandrels with hollow bore loosely fitting within the tube, a longitudinal tie rod fitting loosely the said mandrels with neck at each end, a turning plug with tapered longitudinal serrated end adapted to drive into each end of the said drawn tube and each having a neck at the outer end, a lathe means for chucking the ends of the said tube with the said turning plugs therein and to twist said tube, and means to withdraw said sectional mandrel.

3. An apparatus for turning the grain of a drawn tube, consisting of sectional cylindrical mandrels with hollow bore loosely fitting within the tube, a turning plug with tapered longitudinal serrated end adapted to drive into each end of the said drawn tube and each having a neck at the outer end, a lathe means for chucking the ends of the said tube with the said turning plugs therein, and to twist

said tube, and means to withdraw said sectional mandrel.

4. An apparatus for turning the grain of a drawn tube, consisting of sectional cylindrical mandrels with hollow bore loosely fitting within the tube, a turning plug with tapered longitudinal serrated end adapted to drive into each end of the said drawn tube, a lathe means for chucking the ends of the said tube with the said turning plugs therein and to twist said tube, and means to withdraw said sectional mandrel.

5. An apparatus for turning the grain of a drawn tube, consisting of sectional cylindrical mandrels with hollow bore loosely fitting within the tube, a turning plug, a lathe means for chucking the ends of the said tube with the said turning plugs therein and to twist said tube, and means to withdraw said sectional mandrel.

6. An apparatus for turning the grain of a drawn tube, consisting of sectional cylindrical mandrels for disposition within the tube, and means for clamping the ends of the tube throughout the periphery and turning the same.

7. An apparatus for turning the grain of a drawn tube, consisting of cylindrical mandrels for disposition within the tube, and means for clamping the ends of the tube throughout the periphery and turning the same.

8. The method of twisting the grain in a drawn tube, consisting in filling the interior with sectional cylindrical supports, grasping the opposite ends of the said tube and twisting the same until they grip on the said central supports.

9. The method of twisting the grain in a drawn tube, consisting in filling the interior with a sectional cylindrical support, grasping the opposite ends of the said tube and twisting the same until they grip on the said central support.

10. The method of turning the grain of a drawn tube, consisting in filling the said tube to support it, and clamping the ends thereof and twisting relatively in opposite directions.

In witness whereof I have hereunto set my hand.

ALFRED J. JOHNSON.