April 17, 1928. 1,666,581

H. E. RAINAUD

PROCESS AND APPARATUS FOR SPINNING METAL TUBES

Filed May 25, 1927

Fig. 1.

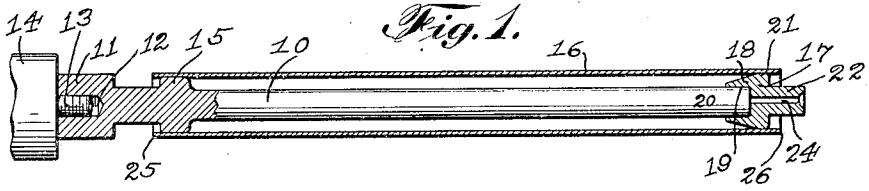


Fig. 2.



Fig. 3.

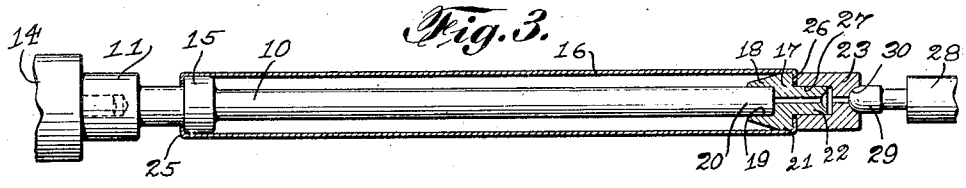


Fig. 4.

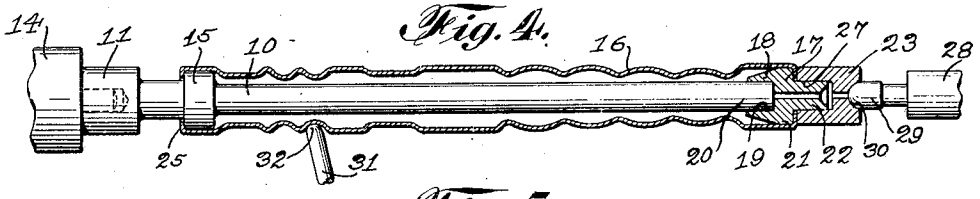


Fig. 5.

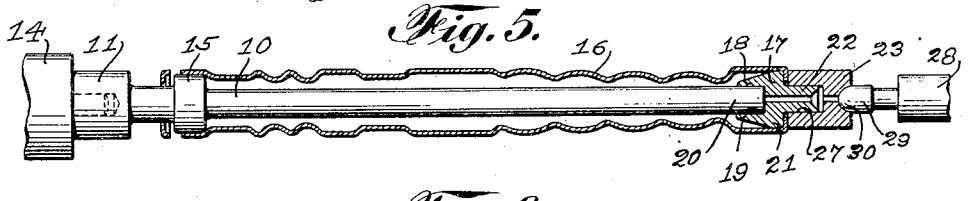


Fig. 6.

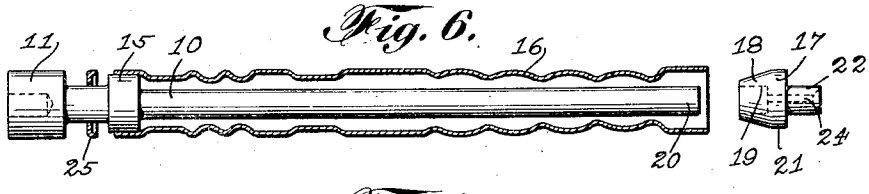
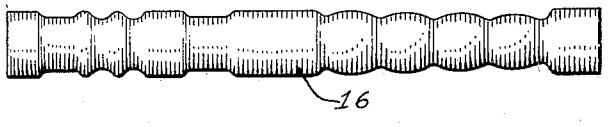


Fig. 7.



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UNITED STATES PATENT OFFICE.

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PROCESS AND APPARATUS FOR SPINNING METAL TUBES.

Application filed May 25, 1927. Serial No. 194,115.

This invention relates to spinning metals, and more particularly to a process and apparatus for spinning metal tubes into ornamental shapes for use as furniture legs, pedestals, electrical fixtures, candlesticks, candelabra, lamp arms, and the like.

One object of this invention is to provide a tube spinning machine operating upon tubular blanks for forming ornamental tubes in a single operation without the necessity of annealing.

A further object is to provide an improved form of mandrel for a tube spinning process, said mandrel being provided with means for locking the tube rigidly thereto.

A further object is to provide a tube spinning apparatus of the above nature which will be simple in construction, inexpensive to manufacture, easy to install and manipulate, compact, and very efficient and durable in use.

With these and other objects in view, there has been illustrated on the accompanying drawings, one form in which the invention may be conveniently embodied in practice.

Fig. 1 represents a longitudinal sectional view of the apparatus showing the tubular blank in position upon the mandrel before starting the spinning operation.

Fig. 2 is a longitudinal sectional view of the apparatus as it appears when the ends of the tubular blank have been spun over into locked position upon the mandrel.

Fig. 3 is a longitudinal sectional view of the apparatus as it appears when the tube clamping block and tail-stock have been assembled in operating position.

Fig. 4 is a longitudinal sectional view of the same showing the spinning tool in operating position.

Fig. 5 is a longitudinal sectional view of the same after the spinning has been completed and the ends of the tube have been cut off from the mandrel preparatory to removal of the tube therefrom.

Fig. 6 is a longitudinal sectional view of the same after the mandrel has been removed from the head-stock and showing the tail-stock holding plug in separated relation.

Fig. 7 is a side view of the finished ornamental tube.

In the former methods of making tubular ornamental metallic articles, it was necessary either to cast the metal by means of a mold and core, to stamp it in a press, or to spin it from a flat blank in a series of operations between which the metal had to be annealed. These former methods were expensive and slow, and required a high degree of skill for their successful operation.

By means of the present invention, the above and other disadvantages have been avoided. This has been accomplished by providing an improved form of tube-holding mandrel having enlarged portions upon which the ends of a tubular blank are adapted to be locked against rotation, and performing the spinning operation by pressing inwardly upon the tube with a spinning tool having a blunt rounded point until the desired ornamental shape has been secured.

Referring now to the drawings in which like reference numerals denote corresponding parts throughout the several views, the numeral 10 indicates an arbor or mandrel preferably constructed from tool steel and having at one end an enlarged cylindrical socket 11 provided with interior threads 12 to fit over the threaded pin 13 extending from the head-stock 14 of a lathe, not shown. Adjacent the enlarged socket 11, the mandrel 10 is provided with an enlarged tube-holding flange 15 for supporting one end of a tubular blank or pipe 16, herein shown as cylindrical, and which may be made of brass, copper, tin, aluminum, zinc, steel, or any other desired metal. The metal to be spun should preferably be soft and easily workable, but may be made of hard metal if only a small amount of working is to be done upon it.

In order to support the tail-stock end of the tube 16, the mandrel 10 has a detachable tube-holding plug 17, said plug having an inwardly tapered conical portion 18 provided with a cylindrical socket 19 for tightly fitting over the tail-stock end 20 of the mandrel 10. The plug 17 has an outer shoulder portion 21 for engaging the inside of the end 20 of the tube 16 and is reduced in diameter at its outer end 22 for detachably receiving a cup-shaped clamping block 23. The plug 17 has an interior bore 24 through which a suitable tool, not shown, may be inserted for facilitating the removal of said plug 17 from the mandrel whenever desired.

The first step in the operation of spinning the ornamental tube is to slip the tubular blank 16 over the mandrel and screw the mandrel upon the head-stock pin 13 in the

position shown in Fig. 1. The blank 16 should preferably be of such a size that it will be held frictionally upon the enlarged flange 15 of the mandrel and the shoulder portion 21 of the tube-holding plug 17.

The next step of the process is to spin the tail-stock end 26 of the blank 16 around the shoulder 21 of the plug 17 and the head-stock end 25 around the inner end of the enlarged flange 15. The tubular blank will then be in the condition as shown in Fig. 2.

The next step in the process is to lock the tubular blank 16 non-rotatively upon the mandrel 10 by means of the cup-shaped clamping block 23. This is accomplished by slipping the socket 27 of said clamping block 23 over the reduced section 22 of the tube-holding plug 17 until its open end abuts against the inturned end 26 of the tubular blank 16.

The clamping block 23 will then be forced tightly against the tube end 26 by moving the tail-stock 28 to the left, as viewed in Fig. 3, by suitable mechanism, not shown, until the blank 16 is secured in non-rotative relation to the mandrel 10. The tail-stock 28 has a spherical head 29 for engaging in the recessed end 30 of the clamping block 23, and said head 29 is preferably swiveled in the tail-stock 28.

The lathe will then be started by applying power to the head-stock 14, as by a pulley, not shown, and the operation of spinning will be performed by the use of a suitable spinning tool 31 having a blunt rounded point 32, as shown in Fig. 4, the shape of said point depending on the ornamental article to be produced. The blunt point 32 of the tool 31 will be pressed inwardly upon the tubular blank 16 either with or without the use of a rest or supporting post, not shown. It will be understood that the work may first be laid out upon the tubular blank in pencil or in any other manner.

After the spinning operation has been completed the inwardly spun ends 25 and 26 will be cut off from the finished tube by means of a sharp-pointed tool, not shown, and the tube will then have the appearance illustrated in Fig. 5.

The tail-stock 28 and clamping block 23 will then be moved to the right, as viewed in Fig. 5, permitting the tube holding plug 17 and the ring 26 on the tail-stock end of the tube 16 to be detached from the mandrel and slipped out of the finished tube. The mandrel 10 may then be readily unscrewed from the head-stock 14, and the parts will then appear as shown in Fig. 6. The finished tube may then be slipped off the mandrel 10 and will have the appearance as shown in Fig. 7. The ring 25 of metal on the mandrel 10 between the socket 11 and the flange 15 may then be removed by cutting pliers or in any other suitable manner. The apparatus will then be ready for spinning the next tubular blank.

During the spinning operation it is preferable to apply soap, tallow, or bees-wax to the tool and blank for lubricating the work and for preventing the tool from scoring or cutting the blank. No cooling liquids, however, are necessary, as the metal does not get hot, any heat which may be developed being rapidly dissipated by the air in the space between the tube 16 and the mandrel 10.

While the invention has been herein disclosed as applied to a tubular blank of cylindrical form, it is to be understood that it is not limited to that form but that the process may be carrier out equally well upon tubular blanks of conical or other shapes.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosure but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. In an apparatus for spinning ornamental metal tubes, a rotary mandrel of relatively small diameter adapted to be connected to the head-stock of a lathe, said mandrel having a pair of enlarged shoulders for supporting the ends only of a tubular metal blank, said enlarged shoulders being substantially of the same diameter as the interior of the metal blank, and means for locking one end of said blank to said mandrel whereby the metal of said blank between said supported ends may be forced inwardly by a spinning tool.

2. In an apparatus for spinning ornamental metal tubes, a rotary mandrel adapted to be connected to the head-stock of a lathe, said mandrel having a pair of enlarged shoulders for supporting the ends of a tubular metal blank, and means for locking said blank to said mandrel whereby the metal of said blank between said supported ends may be forced inwardly by a spinning tool, said finished tube being removable without cutting except outside of said enlarged shoulders.

3. In an apparatus for spinning ornamental metal tubes, a rotary mandrel adapted to be connected to the head-stock of a lathe, said mandrel having a pair of enlarged shoulders for supporting the ends of a tubular metal blank, and means for locking the tail-stock end of said blank to said mandrel whereby the metal of said blank be-

tween said supported ends may be forced inwardly by a spinning tool, said finished tube being removable without cutting except outside of said enlarged shoulders.

4. In an apparatus for spinning ornamental metal tubes, a rotary mandrel adapted to be detachably connected to the head-stock of a lathe, said mandrel having a pair of enlarged shoulders for supporting the ends of a tubular metal blank, and means for locking said blank to said mandrel whereby the metal of said blank between said supported ends may be forced inwardly by a spinning tool, said finished tube being removable without cutting except outside of said enlarged shoulders.

5. In an apparatus for spinning ornamental metal tubes, a rotary mandrel adapted to be connected to the head-stock of a lathe, said mandrel having an enlarged shoulder at its headstock end for supporting one end of a tubular metal blank, an enlarged tube-holding plug detachably mounted on the tail-stock end of said mandrel for supporting the other end of said tubular blank, and a tail-stock engaging clamping block fitted over said tube-holding plug for non-rotatively clamping the end of said tube against said plug, whereby the surface of said blank between said shoulder and plug may be forced inwardly by a spinning tool.

6. The process of spinning an ornamental tube from a tubular metal blank which comprises supporting the ends of said blank upon the enlarged ends of a rotary patternless mandrel, locking one end of said blank to said mandrel, and pressing inwardly upon the outer surface of said blank with a tool having a blunt rounded point.

7. The process of spinning an ornamental tube from a tubular metal blank which comprises supporting the ends of said blank upon the enlarged ends of a rotary patternless mandrel, locking said blank to said mandrel, and pressing inwardly upon the outer surface of said blank with a tool having a blunt rounded point.

8. The process of spinning an ornamental tube from a tubular metal blank which comprises supporting the extreme ends only of said blank upon enlarged portions of a rotary mandrel of smaller diameter than said tube, locking said blank to said mandrel, and pressing the metal of said blank inwardly between said enlarged portions.

9. The process of spinning an ornamental tube from a tubular metal blank which comprises supporting said blank upon the enlarged portions of a rotary mandrel which is of uniform diameter between said enlarged portions, locking said blank to said mandrel, and pressing the metal of said blank inwardly between said enlarged portions.

10. In an apparatus for spinning ornamental metal tubes, a rotary mandrel adapted to be connected to the head stock of a lathe, said mandrel being of relatively small diameter and provided at either end with enlarged shoulders for supporting the ends of a tubular metal blank, one of said shoulders being detachable from the mandrel, and means cooperating with the detachable shoulder for locking the blank in operable position.

11. In an apparatus for spinning ornamental metal tubes, a rotary mandrel adapted to be connected to the head stock of a lathe, said mandrel being patternless and of relatively small diameter and provided with an enlarged shoulder near its secured end, a detachable shoulder mounted on the tail stock end of the mandrel, said shoulders cooperating to support a tubular metal blank in operable position on the mandrel but out of contact therewith, and means for locking the tail stock end of said blank to said mandrel, whereby the metal of said blank between the shoulders may be forced inwardly by a spinning tool.

12. In an apparatus for spinning ornamental metal tubes, a rotary patternless mandrel of relatively small diameter adapted to be connected to the head stock of a lathe, said mandrel having an enlarged shoulder at its head stock end for supporting one end of a tubular metal blank and an enlarged tube holding plug detachably mounted on the tail stock end of said mandrel for supporting the other end of said tubular blank, said enlarged shoulder of the head stock end of the mandrel and the tube holding plug being of relatively large diameter and of substantially the same size as the interior diameter of the blank, and a tail stock engaging clamping means cooperating with the tube holding plug for locking the blank in operable position on the mandrel, whereby the surface of said blank between said shoulder and plug may be forced inwardly by a spinning tool.

13. In an apparatus for spinning ornamental metal tubes from tubular blanks, a rotary mandrel the diameter of which is less than that of the blank to be spun, said mandrel having end shoulders of substantially the same size as the interior diameter of said blank, means for locking the ends of said blank upon said shoulders during the spinning operation, one of said shoulders being removable, there being no obstructions on said mandrel to prevent the finished tube from being withdrawn.

14. The process of spinning an ornamental tube from a tubular metal blank which comprises supporting the ends of said blank upon spaced enlarged ends of a rotary mandrel, spinning the ends of the blank under the outer edges of the enlarged ends of the mandrel, locking said blank to said

mandrel and pressing inwardly upon the outer surface of said blank with a tool having a blunt rounded point.

15. The process of spinning ornamental tubes from a tubular metal blank which comprises supporting a tube at its ends on a plain cylindrical mandrel having enlarged ends, locking the tube to said mandrel and pressing inwardly upon the outer surface of said tube between the enlarged portions of the mandrel.

In testimony whereof, I have affixed my signature to this specification.

HENRY E. RAINAUD.