April 30, 1957 L. W. ROPER 2,790,473

METHOD FOR HEADING ARROWS

Filed Aug. 18, 1954

FIG_1

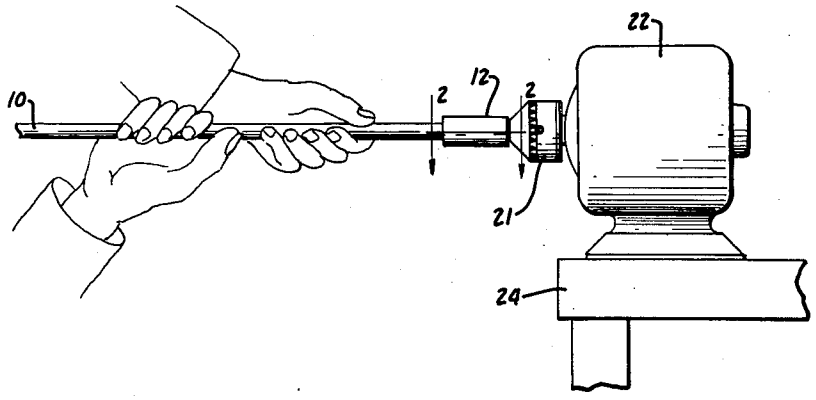


FIG_2

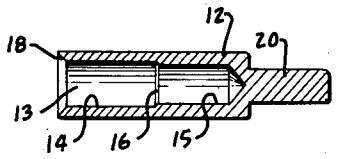


FIG_3

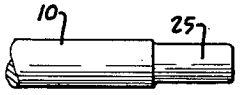
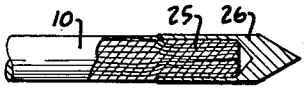


FIG_4



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METHOD FOR HEADING ARROWS

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2 Claims. (Cl. 144—309)

This invention relates to a method of applying heads or ferrules to wooden shafts and to apparatus for carrying out the improved method in an efficient and effective manner.

It is among the objects of the invention to provide an improved method for tipping or heading shafts of compressible material, such as wooden arrow shafts, which method comprises compressively and coaxially reducing the diameter of an end portion of such a shaft without the removal of any material from the shaft, and applying a tip, head or ferrule to the reduced end portion; and further comprises compressively reducing the end portion of a shaft of compressible material by inserting an end of the shaft into a rotating die or tool having a bore at least a portion of which has a diameter less than the diameter of the shaft; and which apparatus comprises a tool having a bore open at at least one end and including a portion the diameter of which is less than the diameter of a shaft to be provided with a head or tip and substantially equal to the internal diameter of the shaft receiving portion of the head or tip, and mechanism for rigidly supporting the tool and rotating it rapidly coaxially of the bore thereof.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawing wherein:

Figure 1 is a somewhat diagrammatic elevational view showing the method of reducing an end portion of a shaft, such as an arrow shaft, to receive a tip or head, and suitable apparatus for carrying out the method;

Figure 2 is a cross sectional view on an enlarged scale of a die or tool by means of which the method may be expeditiously carried out, and is taken substantially on a plane indicated by the line 2—2 of Figure 1;

Figure 3 is a fragmentary elevational view of a shaft, such as an arrow shaft, having an end portion thereof reduced by the method of the present invention; and

Figure 4 is a fragmentary elevational view of a shaft having a reduced end portion and a hollow tip applied to the reduced end portion of the shaft with the tip shown in longitudinal medial cross section.

With continued reference to the drawing, the numeral 10 indicates an elongated shaft of compressible material, such as a wooden arrow shaft to which it is desired to apply a head or tip.

While a wooden arrow shaft has been illustrated for the purpose of disclosing the invention, it is to be understood that the method may be applied to other shafts such as wooden pencil stocks, to which it is desired to apply eraser holding ferrules, and that the method can be used with equal facility regardless of whether the shafts are circular or polygonal in cross section.

The numeral 12 indicates a die or tool which is shown as of elongated cylindrical shape, having a coaxial bore 13 open at one end and closed at the opposite end of the cylindrical body 12. The bore 13 is longitudinally divided into two parts 14 and 15, shown in the drawing as of substantially equal length, separated by an internal, beveled shoulder 16. The portion 14 of the bore between the open end of the body 12 and the internal shoulder 16 is somewhat larger than the portion 15 between the internal shoulder 16 and the closed end of the body. When the die or tool is used to prepare arrow shafts for receiving arrow heads or tips, the diameter of the portion 14 of the bore is made slightly larger than the diameter of the shafts to be prepared for receiving heads or tips and the diameter of the portion 15 is substantially the same as the diameter of the shaft receiving portion of the arrow heads or tips, and the open end of the body is annularly beveled, as indicated at 18 to facilitate the insertion of the arrow shafts into the bore of the tool.

A shank 20 of reduced diameter extends longitudinally from the closed end of hollow body and coaxially of the bore 13 and this shank is received in a chuck 21 mounted on one end of the shaft of an electric motor 22 rigidly mounted on a table or bench 24.

While a small electric motor has been found to provide an entirely satisfactory device for supporting and turning the tool 12, other equivalent apparatus, such as a lathe head stock, may be used for this purpose without exceeding the scope of the invention.

In carrying out the method, with the tool 12 rapidly rotated by the motor 22 about the axis of the bore 13, a shaft is held with one end adjacent the open end of the tool 12 and with its longitudinal center line substantially coincident with the rotational axis of the tool 12. The shaft is then moved longitudinally until the end thereof nearest the tool is received in the larger portion 14 of the tool bore 12 and brought to bear against the annular internal shoulder 16. As the shoulder 16 is uniformly beveled it centers the end of the shaft relative to the axis of the bore 13. The shaft 10 is then held firmly against rotation and the end thereof within the bore is gradually forced into the smaller portion 15 of the bore until its end engages the closed end of the bore.

As the end of the shaft is forced into the smaller portion of the bore this end portion of the wooden shaft is compressively reduced in diameter without removing any material therefrom. The reduced end portion 25 is thus as strong structurally as any other portion of the shaft and, as the tool is made of a hard and rigid material and is given a smooth internal finish, the reduced end portion of the shaft is smooth as well as strong and coaxial of the remainder of the shaft.

After an end portion of a shaft has been reduced in the manner indicated above, a head or tip 26 may be applied to the shaft by forcing the reduced end portion of the shaft into the hollow tip or into the socket portion of an arrow head first, if desired, applying a coating of adhesive material to the reduced end portion of the shaft. Preferably, but not necessarily, the difference in radius between the reduced and unreduced portions of the shaft is substantially the same as the wall thickness of the hollow tip or of the socket portion of an arrow head so that a continuous, smooth outer surface is provided for the tip or head socket and the portion of the shaft adjacent thereto.

Arrows produced by the above described method and apparatus have the head or tip receiving portions of the shafts of such strength that the shafts are not readily broken, even when the arrows are shot against hard or solid objects and an important economy is obtained in the use of the arrows as well as improved economy and increased facility in their manufacture.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not re-

strictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed is:

1. The method of providing heads on shafts of compressible material which comprises compressively and coaxially reducing the diameter of the end portion of a shaft without the removal of material therefrom by progressively forcing an end of the shaft into a bore of smaller diameter than the shaft while relatively rotating the bore and the shaft, and inserting the reduced shaft end portion into the shaft receiving portion of a head.

2. The method of preparing a shaft of compressible material to receive a tip and providing a tip thereon which comprises compressively and annularly reducing an end portion of the shaft coaxially thereof and without the removal of material therefrom and providing an annular shoulder at the proximal end of the reduced portion by forcing an end of a shaft into the bore of a hollow rotating tool having a bore of less diameter than the shaft while supporting the shaft against rotation with its longitudinal center line substantially coincident with the axis of rotation of the tool, and then removing the reduced end portion of the shaft from the tool and inserting it into a hollow tip having an internal diameter substantially equal to the diameter of the bore of the tool.

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