Nov. 7, 1933. G. A. ANDERSON 1,934,652

METHOD OF MAKING COP TUBES

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Fig. 1.

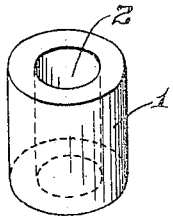


Fig. 2.

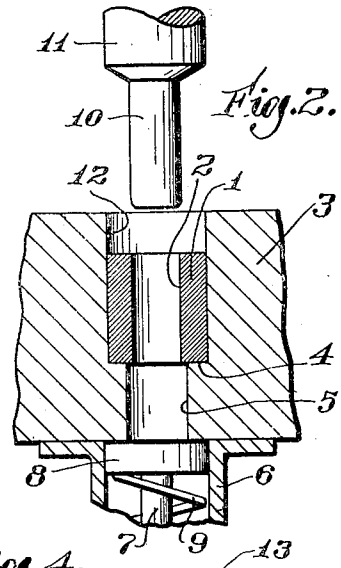


Fig. 3.

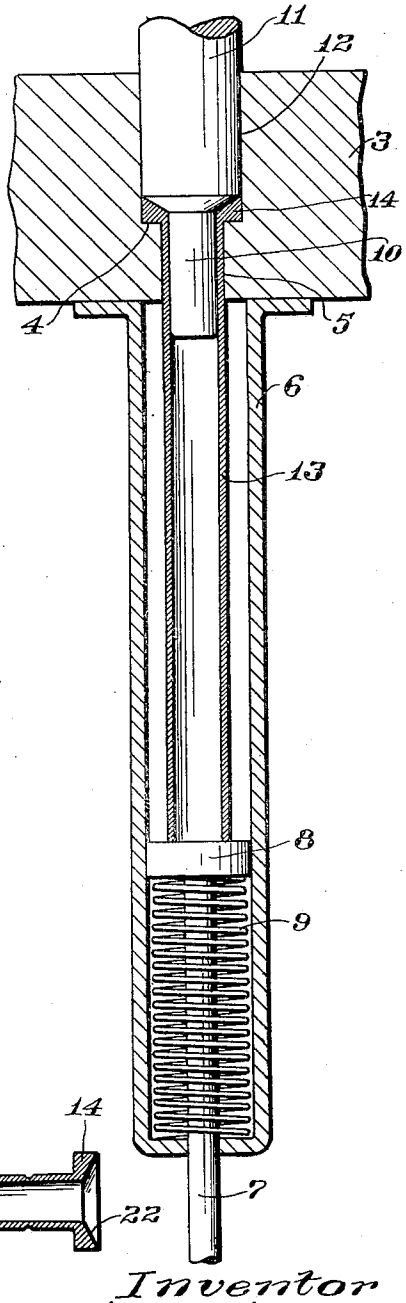


Fig. 4.

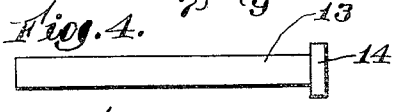


Fig. 5.

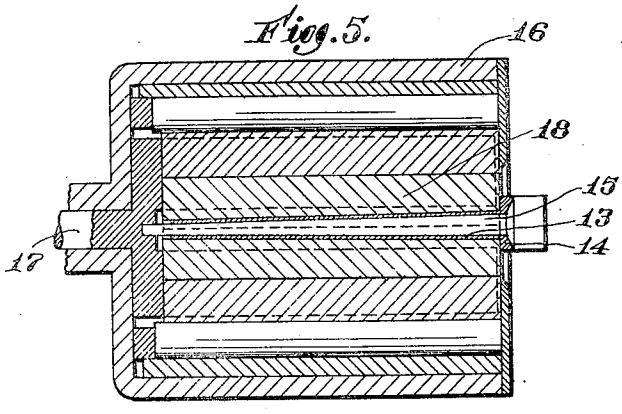


Fig. 6.

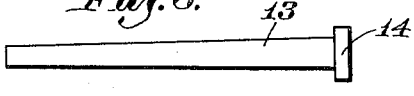
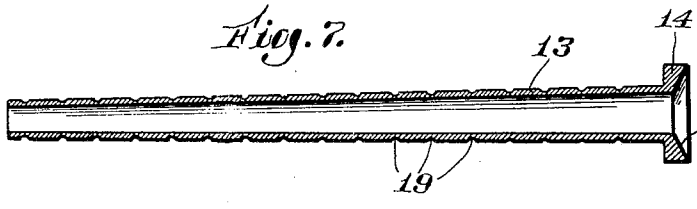


Fig. 7.



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Fig. 9.



Fig. 11.

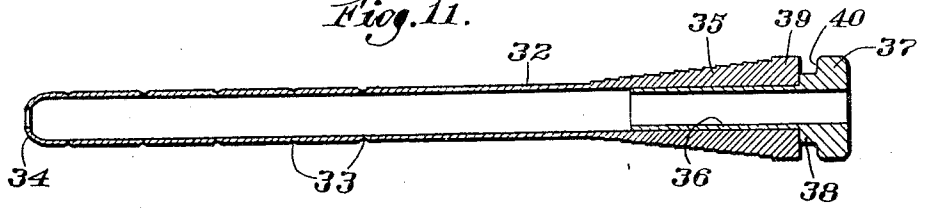


Fig. 12.

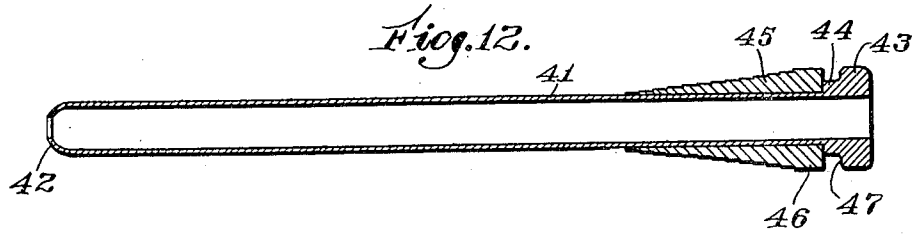


Fig. 10.

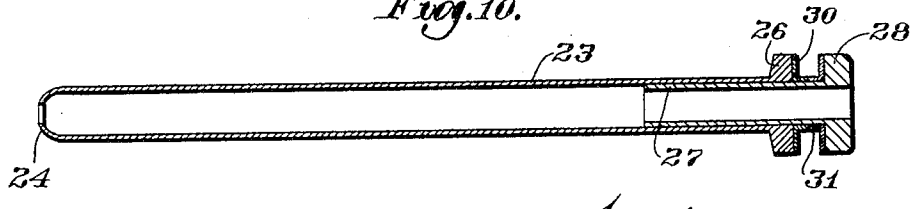


Fig. 13

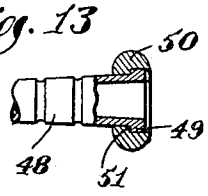
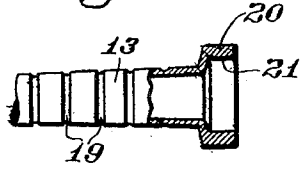


Fig. 8.



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UNITED STATES PATENT OFFICE

1,934,652

METHOD OF MAKING COP TUBES

Gustave Albert Anderson, Attleboro, Mass., assignor to Lewis R. Smith, receiver of Apco Mossberg Corporation, Attleboro, Mass., a corporation of Massachusetts

Application August 1, 1930. Serial No. 472,419

1 Claim. (Cl. 29—170)

My present invention relates to cop tubes for use in loom shuttles, and includes a novel method of manufacturing the same.

Many different types of cop tubes are in use at the present time, including wooden tubes, paper or cardboard tubes, seamed metal tubes, cast tubes, and others. All of these present tubes, of which I am aware, have many disadvantages. For example, the wooden tubes are susceptible to splitting, and to swelling under steaming. The paper tubes are very fragile, and are capable of use but a very few number of times, frequently only once. The seamed tubes are weak, are easily bent, and can not, as a general rule be restored to normal condition. Cast tubes are thick and bulky, and are not desirable for general commercial use.

In present day weaving work electric feeler devices are coming into common use, a finger of these devices being located adjacent to the cop, to apprise the operator when a cop is empty, or unwound.

Thus, when these electric feeler devices are utilized the wooden and paper cop tubes are useless, as the feeler devices can not close a circuit through the same.

An important object of the present invention, therefore, resides in the provision of a metallic cop tube which will be thin and light, and yet of great strength, being preferably composed of metal of high conductivity.

Another object of the invention resides in the provision of a cop tube which will be seamless and will, therefore, have no points of inherent weakness.

Another object of my invention resides in the particular process or method by which my novel cop tubes are produced or manufactured.

In carrying out the present invention, I utilize a slug or billet of current conducting metal, preferably having a central bore or aperture therethrough. This billet is placed in an extruding die, and the extruding punch will force the metal of the billet out of the die away from the punch. The dieing operation is continued until the major portion of the billet has been extruded, sufficient material being left at the die end to constitute a head on the extruded cop tube. The dieing operation results in strengthening the metal, due to the working thereof while cold, by the punch and die. The extruded tube contacts with a spring-pressed plunger, depressing the same, so that upon removal of the punch from the die said spring-pressed plunger will eject the extruded headed cop tube upwardly through the die. The extruded tube, at this stage of manufacture, is cylindrical in contour, and for many types of cop tubes it is desirable that the same shall be tapered or reduced in diameter from the head portion to the open end.

As the next step in my novel process, therefore, when desirable, I subject the extruded cop tube to a swaging operation, which will result in tapering the cop tube about an arbor, while simultaneously lengthening the said cop tube. I may also provide the cop tube, whether swaged or cylindrical, with a plurality of concentric or parallelly arranged grooves to assist in holding the thread wound on the cop tube.

The head which is formed on the cop tube is adapted to be confined in the shuttle by the usual fingers to prevent longitudinal displacement of the cop tube in the shuttle. The headed end of the cop tube is the end which is most subjected to wear and distortion, and it is, therefore, highly desirable to have this headed end reenforced in order to withstand such wear and distortion.

As a further step in my method I may provide the cop tube as above described with a tubular sleeve member pressed into the headed end of the cop tube, said pressed member also having a head which is preferably spaced from the head on the cop tube to provide an annular groove between the two heads, within which groove the shuttle fingers above referred to will seat.

I may also desire to provide a collar or ferrule within said annular groove, of harder material than the material of the cop tube itself, in order to prevent damage to the cop tube by the shuttle fingers during the reciprocation of the shuttle and the blows and shocks to which the same is subjected.

Other features of the invention reside in the particular construction and arrangement of parts of the cop tubes, and the above and other features of the invention, details of construction, and advantages, will be hereinafter more fully pointed out as the description of the invention progresses.

Referring to the drawings, illustrating preferred embodiments of the present invention,

Fig. 1 is a perspective view of the billet or slug utilized;

Fig. 2 is a cross sectional fragmentary view of the slug in an extruding die preparatory to the extruding operation;

Fig. 3 is a fragmentary cross sectional view illustrating the completion of the extruding operation;

Fig. 4 is a side elevation of the extruded cop tube;

Fig. 5 is a fragmentary cross sectional view of

the swaging operation being performed in a conventional swaging machine;

Fig. 6 is a side elevation of the swaged and lengthened cop tube;

Fig. 7 is a longitudinal sectional view of the swaged tube with the concentric grooves formed therein;

Fig. 8 is a fragmentary side elevation, partly in section, illustrating a modified type of head;

Fig. 9 is a longitudinal sectional view of a cop tube with a separate headed member pressed therein;

Fig. 10 is a longitudinal sectional view similar to Fig. 9, but with the addition of the reenforcing strengthening collar or ferrule;

Fig. 11 is a longitudinal sectional view of a modified form of cop tube;

Fig. 12 is a longitudinal sectional view of a still further modification; and

Fig. 13 is a fragmentary side elevation, partly in section, illustrating a modified type of reenforced head.

Referring now to the drawings for a particular description of the invention, and the method of carrying out the same, 1 designates a billet or slug of suitable current conducting metal, such as aluminum, having a central bore or aperture 2 therethrough. This slug is placed in an extruding die 3 having shoulders 4 on which the slug rests, the bore 5 of the die being of a greater diameter than the punch 10, this difference in diameter representing the thickness of the extruded tube.

Fixed to the under side of the die 3 is a cylindrical housing 6, within which is slidably mounted a plunger 7 having a head 8 normally held against the bottom of the die 3 by a coiled spring 9. A punch 10 is forced downwardly by any suitable power means, the punch 10 entering the bore 2 of the slug 1 and being of substantially the same diameter as said bore. The body 11 of the punch 10 is of substantially the same diameter as the bore 12 of the die 3 in which the slug 1 is positioned. Pressure on the punch 10 will, therefore, result in an extrusion of the metal of the slug 1 downwardly through the bore 5, and hence away from the punch 10, resulting in the production of a tubular cylinder 13. As the tube 13 is extruded it will depress the plunger 7 against the tension of the spring 9 and the dieing operation is continued until only sufficient metal is left in the bore 12 to form a head 14 on the tube 13. Thereupon the punch 10 is retracted, and the pressure of the coiled spring 9 will then force the tube 13 upwardly, ejecting it from the die 3. The cop tube as thus formed is clearly illustrated in Fig. 4, and it may now be desirable to subject the tube 13 to a swaging operation to taper the same. This may be accomplished in a conventional swaging machine, wherein the tube 13 is placed on an arbor 15 in a swaging head 16. Rotation of the shaft 17 will cause repeated impacts of the hammers 18 against the tube 13, and will conform said tube to the shape of the arbor 15, resulting not only in tapering the tube 13, but in lengthening the same, as clearly illustrated in Fig. 6. The tube 13 is then preferably provided with a plurality of concentric or parallelly arranged grooves 19 to assist in holding the thread wound thereon.

The tube as illustrated in Fig. 7 is now ready for use in a shuttle, the head 14 cooperating with the usual retaining fingers in the shuttle to prevent longitudinal displacement of the cop tube in said shuttle. The tube 13 being constructed of current conducting material, adapts itself readily to cooperation with the electric detecting fingers to indicate when the cop tube 13 is empty or unwound. Cop tubes constructed according to my invention are light in weight, and are possessed of considerable strength, and will not warp or swell under varying conditions of moisture or dryness.

In Fig. 8 I have illustrated a cop tube 13 formed with the grooves 19, but having a slightly modified form of head 20 which is constructed with a larger recess 21 than the recess 22 in the head 14, thus resulting in a saving of material, and requiring merely a slight change in the shape of the punch body 11.

In Fig. 9 I have illustrated a cylindrical cop tube 23 turned down at the end as illustrated at 24 and provided with the parallelly arranged grooves 25. The tube 23 has a head 26, and a separate tubular member 27 is pressed into the headed end of the tube 23, the tubular member 27 also having a head 28 thereon, the two heads 26 and 28 forming therebetween an annular groove 29 within which the shuttle fingers will seat. When constructed of aluminum, forcibly pressing the tubular member 27 into the tube 23 will unite the two tubular members 23 and 27 in a permanent union, it being impossible to retract the member 27 without destruction of the tube 23.

In Fig. 10 I have illustrated the tube 23 without the grooves 25, and have also illustrated a ferrule or collar 30, preferably comprising two identical sections, as illustrated, surrounding the tubular member 27 and interposed between the heads 26 and 28, being held in firm position by the pressing of the member 27 into the tube 23. These two sections 30 will form an annular groove 31 for the reception of the shuttle fingers, and preferably of a metal of considerably greater hardness than the metal of the members 23 and 27. Thus the shuttle fingers will not have a deterrent effect upon the cop tube, since said fingers will engage the hard collar 30 instead of the relatively soft metal of the tubes 23 and 27 and heads 26 and 28.

In Fig. 11 I have illustrated a modified type of cop tube 32 provided with the parallelly arranged grooves 33 and turned at the end as illustrated at 34. The tube 32 is provided with a thickened conical stepped portion 35, which may be formed in the swaging die without difficulty, the tubular member 36 being pressed therein and having a head 37 and a shoulder portion 38 adapted to bear against the head 39 of the tube 32, to positively determine the width of the annular groove 40 formed by the heads 37 and 39. This tapered portion of the tube 32, in cooperation with the electric detecting fingers, will apprise the operator in ample time before complete unwinding of the thread on the cop tube 32, so that a new cop tube may be in readiness for replacement instantly upon emptying of the cop tube in the shuttle.

In Fig. 12 I have illustrated a cop tube 41 turned at its outer end as at 42, and having a head 43 and a shouldered portion 44, a conical stepped sleeve 45 being pressed over the sleeve 41 from the end 42 thereof, until the head 46 of the sleeve 45 abuts against the shouldered portion 44 of the head 43, the heads 43 and 46 thus forming an annular groove 47 for the reception of the shuttle fingers. The tube 41 with its head 43 and shouldered portion 44 may be extruded in the same manner as above described.

In Fig. 13 I have illustrated a slight further modification wherein the cop tube 48 is pro-

vided with a small head 49, and a separate head 50 of hardened steel or other metal is pressed over the said tube, the head 50 having a shouldered recess 51 in which the head 49 will seat when the cop tube is in completed assembly.

Since it is the headed end of the cop tube which must withstand the greatest wear and distortion, this reenforced head 50 will result in longer life of the cop tube 48.

I believe that my method of manufacturing cop tubes, as above described, is novel, and I have, therefore, claimed said method in this application.

I also believe that a cop tube produced according to my invention, and possessed of the advantageous features above described, is novel, and I have, therefore, also claimed said tubes in this case.

While I have necessarily described my present invention somewhat in detail, it will be appreciated that I may vary the size, shape and arrangement of parts, within reasonably wide limits, without departing from the spirit of the invention.

My invention is further described and defined in the form of a claim as follows:

The improved method of manufacturing metallic cop tubes having a relatively soft metal portion for the cop tube, and a relatively hard metal portion for the collar, which consists in positioning a billet of metal in a die, subjecting said billet to pressure by a plunger, extruding the metal of said billet from said die and away from said plunger to form a cylinder, stopping the pressure on said billet at a predetermined point to provide a head on said cylinder of greater diameter than said cylinder, then pressing a tubular sleeve into said cylinder from the headed end thereof, said sleeve being provided with a head of substantially the same diameter as the head on said cylinder, then applying a collar of harder metal than said cylinder or said sleeve on said sleeve, and thereupon clamping said collar between the said heads to provide an annular groove of predetermined width.

GUSTAVE ALBERT ANDERSON.