

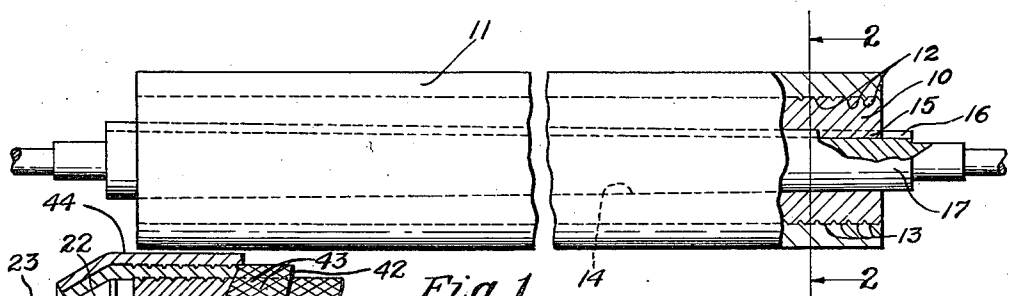
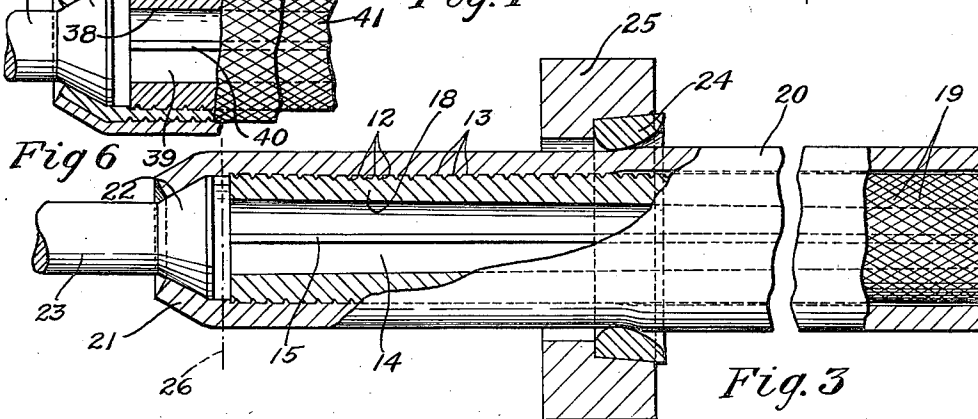
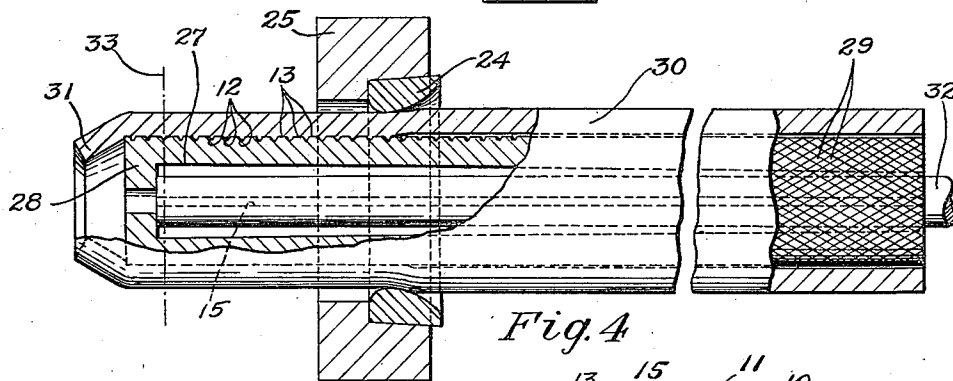
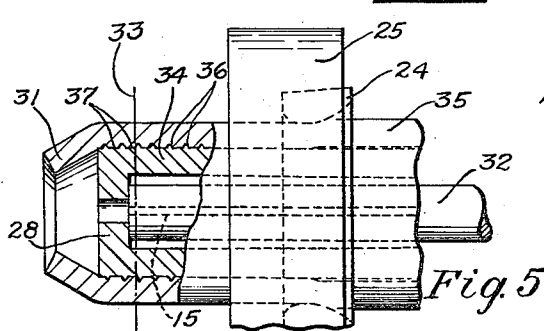
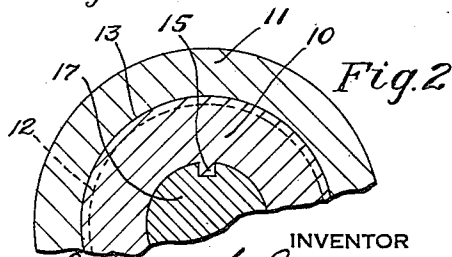
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C. F. COOPER

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METHOD OF MAKING PRINT ROLLS

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INVENTOR
Charles F. Cooper
BY
Wooster & Davis
ATTORNEYS.

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METHOD OF MAKING PRINT ROLLS

Charles F. Cooper, Torrington, Conn., assignor to
The American Brass Company, Waterbury,
Conn., a corporation of Connecticut

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4 Claims. (Cl. 29—148.4)

This invention relates to new and useful improvements in printing means such as are used for printing textile fabrics, wall paper, oil cloth, linoleum and the like, and has particular relation to a print roll and method of making the same.

Heretofore, in practice these rolls have been substantially solid having only a longitudinal tapered opening therethrough to receive a mandrel. Such rolls are expensive and when one etched or engraved design is to be discarded the roll is turned off in a lathe and another design etched or engraved thereon. When the roll has been reduced to a certain diameter or thickness it is no longer adapted for printing and although it still includes considerable metal it is merely sold as scrap. This results in a waste of material and has other disadvantages.

An object of the invention is to provide a printing roll of economical construction and which can be used and renewed or rebuilt to its original condition with a minimum of expense.

Another object is to provide an improved method of making printing rolls and of renewing or rebuilding such rolls.

Other objects and advantages will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawing wherein satisfactory embodiments of the invention are shown. However, it will be apparent that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawing:

Fig. 1 is a view partly in elevation and partly in section and showing a completed printing roll according to the present invention;

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1, the view being on an enlarged scale;

Fig. 3 is a view partly in section and partly in elevation and illustrating the method;

Fig. 4 is a view similar to Fig. 3 but illustrating a slightly different method;

Fig. 5 is a view similar to Fig. 4 and showing a slight variation in the method; and

Fig. 6 is a view illustrating a further variation.

Referring in detail to the drawing, a complete printing roll constructed according to the present invention is shown in Fig. 1 and includes a core 10 and an outer shell 11 secured to the core. This shell 11 may have any suitable design engraved or etched in its outer surface and provides the printing surface of the roll. As shown at 12,

portions of the shell 11 are pressed into the core 10 and as shown at 13, portions of the core are forced into the shell. It will thus be evident that the two members are completely and thoroughly interlocked so there is no liability of their moving in relation to each other or the shell becoming loose on the core. They are in effect a solid unitary structure. The core is provided with the usual tapered mandrel receiving opening 14 and the usual key 15 in said opening and which key is to be received in a keyway 16 provided in the usual mandrel 17. The tapered mandrel 17 with the keyway 16 is standard construction and it is also standard construction to provide the roll with a tapered mandrel receiving opening therein and with a key to fit into the keyway of the mandrel. The roll is assembled on the mandrel by hydraulic press so the mandrel fits tightly in the opening in the roll.

The present invention includes the method of applying the shell 11 to the core 10 and this method will later be fully explained. Core 10 may comprise the center portion of a larger printing roll the said core representing what remains after the roll has been repeatedly turned down and which would ordinarily be discarded and sold as scrap metal. Also, the core may be especially constructed for the formation of the printing roll of the present invention. In the use of the roll of Fig. 1 any design in the outer surface of the shell 10 may be removed whenever it is desired, it simply being necessary to turn down the roll. When this operation has been repeated to the point where the shell is too thin it may be stripped from the core and a new shell applied.

In this way the core need not be discarded and it will be appreciated that quite a saving results since the forming of the tapered mandrel receiving opening 14 and the key 15 in the core is an expensive operation. Also, it will be seen that the core contains a considerable quantity of metal even though the diameter of the core is such that it is useless as a printing roll. Since the shell contains portions embedded in the core and since the core contains portions embedded in the shell it will be readily appreciated that the shell and core are immovable relatively and are in effect a solid unitary structure. It is desirable that the shell and core be of materials having the same or substantially the same coefficient of expansion whereby when they heat up in use they will not work loose from one another. Preferably each part is formed of substantially pure copper or of some alloy of copper.

Fig. 3 illustrates one method which may be employed for forming the improved roll. In this figure a suitable core is shown at 18 and this core is provided with the tapered mandrel receiving opening 14 and the key 15. On its outer surface core 18 is knurled, corrugated or otherwise roughened as at 19 whereby it is provided with a series of grooves and a series of projections or high places between said grooves. A shell 20 of any desired or suitable wall thickness is next provided and this shell is of an inside diameter to be passed over the core. At one of its ends the shell may include an inturned portion 21 to embrace a head 22 on a plunger 23 of any suitable hydraulic cylinder and piston construction (not shown).

At 24 is shown a die ring mounted in a suitable bed or holder 25 and according to Fig. 3 the core 18 and shell 20 have been drawn partially through this die 24. The core and shell are drawn through the die by the piston and cylinder construction above referred to and it will be noted that the inside diameter of the die is such as to reduce the diameter of the shell and force the shell against the core during the drawing or working of the metal in the die. To the left of the die in Fig. 3 it is apparent that portions 12 of the shell have been forced into the grooves 19 of the core and that the portions 13 of the core (such portions representing the projections or high places between the grooves) have been forced into the inner peripheral surface of the shell. Therefore, the parts are securely interlocked and when the core and shell have completed their movement through the die these parts will for their entire length be rigidly secured together. When the operation has been completed the end portion 21 of the shell is removed as by cutting the shell along the broken line 26 and a completed printing roll is ready for use.

Fig. 4 illustrates a slightly different method and in this figure the core is designated 27 and may be separately formed for this purpose. It may or may not be the center of an old print roll. This core 27 includes a head or end wall portion 28 and on its outer surface the core is knurled or otherwise roughened as at 29. A shell 30 of substantially the same construction as the shell 20 of Fig. 3 is applied to core 27 and includes an inturned end portion 31 overlying the wall or end 28 of the core. When the shell 30 is disposed on the core 27 these parts are passed through the die 24 and according to Fig. 4 these parts are pushed through the die rather than being drawn through it as in Fig. 3.

In Fig. 4 a rod or plunger 32 is passed into the core so as to abut the end wall 28 thereof and when pressure is applied to this rod as by a hydraulic piston, the core and shell are forced through the die. The action of the die is that previously described and portions 12 of the shell are forced into the grooves in the core and the portions 13 of the core between the grooves are forced into the shell so that the shell and core are securely interlocked. This is as shown to the left of the die in Fig. 4 and when the assembly has passed entirely through the die the resultant structure may be severed as along the broken line 33, and this will result in removal of the end wall 28 of the core and the inturned end portion 31 of the shell.

It is to be understood that the core 27 is provided with the usual tapered manual receiving opening 14 and with the usual key in said opening. Also, it will be understood that when the

shell 30 becomes too thin, owing to being repeatedly turned down to remove designs therefrom, the said shell may be stripped off the core and a new shell applied in the manner described, the core always being retained.

Fig. 5 suggests a slight modification of the procedure outlined in Fig. 4 and where possible the same reference characters have been applied. In this figure the core is generally designated 34 and the shell is generally designated 35 and the only difference between the methods of Fig. 4 and that of Fig. 5 is that in Fig. 5 the inner periphery of the shell is knurled, corrugated or roughened and the outer periphery of the core is left plain or smooth. Therefore, it is the inner periphery of the shell that is provided with the grooves and when the core and shell are passed through the die portions 36 of the core are forced into the grooves in the shell and portions 37 between the grooves of the shell are forced into the core. Therefore, the parts are securely interlocked.

From the foregoing it will be apparent that either the outer surface of the core or the inner surface of the shell or both may be grooved, corrugated, knurled or otherwise roughened and that when the core and shell are passed through the die, either by being drawn through it or by being pushed through it, the core and shell will be interlocked and rigidly connected over their entire adjacent surfaces, since portions of the core will enter the shell and portions of the shell will be forced into the core. As this is done as the metal of the shell is being drawn or worked as it passes through the die it results in a roll which is in effect a solid unitary structure. Also, it will be understood that whenever the shell becomes thin after being repeatedly turned down it may be stripped from the core and a new shell applied as above explained.

In the figures thus far described but one shell or one thickness has been applied to a core. However, it will be apparent that the shell may be applied in a series of layers or thicknesses as illustrated in Fig. 6. In this figure the core is designated 38 and is provided with the usual tapered mandrel receiving opening 39 and the usual key 40. The outer surface of the core is knurled or roughened as at 41 and a shell 42 is then provided about the core and the assembly drawn through a die as by the rod or plunger 23 connected with a suitable cylinder and piston construction (not shown) or the assembly may be pushed through a die as will be understood.

When this operation has been completed the outer surface of shell 42 is knurled or otherwise grooved or roughened as at 43 and then a second shell 44 is applied and the assembly again passed through a die. Obviously, portions of the shell 42 have been pressed into the core 38 and portions of said core have been pressed into the shell and portions of shell 42 have been pressed into shell 44 and portions of the latter have been pressed into portions of the former. If an additional shell is required then the outer surface of shell 44 is roughened or knurled and the additional shell applied to it.

From this it will be seen that if a roll of quite large diameter is to be built up a number of shells may be applied thereby rendering it unnecessary to work with extremely heavy shells. Further, when the roll comprises a plurality of shells all of the shells except the outermost or that last applied may be considered as the core so that when the outermost shell becomes too thin as a

result of being repeatedly turned down it alone may be stripped off and replaced. One advantage of this arrangement would be that the outermost shell could be comparatively thin so that the diameter of the roll would be held or maintained within narrow limits, the shell being frequently replaced without serious loss of material.

From the foregoing it will be understood that either the outer peripheral surface of a core or the inner peripheral surface of a shell to be applied to the core, or both surfaces, may be roughened as by knurling or otherwise corrugating it to produce an irregular or roughened surface. When the core and shell are passed through the die the diameter of the shell is reduced so that the shell and core are drawn hard together and a portion of each enters the other so that the resultant structure may be considered a single solid roll. The drawing or working of the metal in the die improves its texture and makes it of more uniform and better condition for use as a printing roll. In other words it gives a forged or worked metal roll. This roll is claimed in my divisional application Serial No. 743,226 filed September 8, 1934.

In each instance when the applied shell becomes thin it is stripped from the core and a new shell secured to the core. With this arrangement the core having the tapered and keyed mandrel receiving opening is not discarded but is repeatedly used. According to the present invention it is not necessary to discard the central portion of a roll after the roll has been repeatedly turned down and since this center portion already includes the tapered mandrel receiving opening and the key it will be apparent that a considerable saving results when this portion is repeatedly used. The relative heavy core acts as a support for the shell during the passage of the parts through the die and during such passage the adjacent surfaces of the parts are pressed, worked and drawn together, making in effect a solid roll. Further, during the operation of drawing the shells through the die the metal of the shells is worked or wrought and is therefore stronger and of better grain than cast metal.

Having thus set forth the nature of my invention, what I claim is:

1. The method of making a printing roll comprising providing a core having a keyed mandrel receiving opening therein, providing a shell disposable over said core, roughening the outer surface of said core to form recesses therein throughout this surface, disposing the shell over the core,

and then reducing the diameter of the shell to force portions of the metal thereof into the recesses of the roughened outer surface of the core whereby to rigidly interlock and connect the core and shell together throughout their contacting surfaces.

2. The method of making a printing roll comprising providing a core member having a keyed mandrel receiving opening therein, providing a shell member disposable over said core member, roughening a peripheral surface of one of said members to form recesses therein throughout its length, disposing the core member within the shell member with the said roughened surface of one member in opposing relation to a peripheral surface of the other member, and then working the metal of the shell member to force this metal against the core member and force portions of one of said members into the recesses of the roughened surface of the other to interlock and rigidly secure said members together throughout their contacting surfaces.

3. The method of making a printing roll comprising providing a core member having a keyed mandrel receiving opening therein, providing a shell member disposable over said core member, roughening a peripheral surface of one of said members to form recesses therein throughout said surface, disposing the core member within the shell member with the said roughened surface of one member in opposing relation to a peripheral surface of the other member, and then passing the core and shell through a die to force the shell against the core and at the same time work the metal to press portions of one of said members into the recesses in the roughened surface of the other to interlock and rigidly secure said members together throughout their contacting surfaces.

4. The method of making a printing roll comprising providing a core having a mandrel receiving opening therein, providing a shell disposable over said core, grooving the outer surface of said core to form spiral grooves crossing each other through the surface of the core, disposing the shell over the grooved core, and then passing the core and shell through a die to force the shell against the core and at the same time work the metal of the shell to press portions of the shell into the grooves of the core and press portions of the core between said grooves into the shell to interlock the core and shell throughout the contacting surfaces.

CHARLES F. COOPER.