

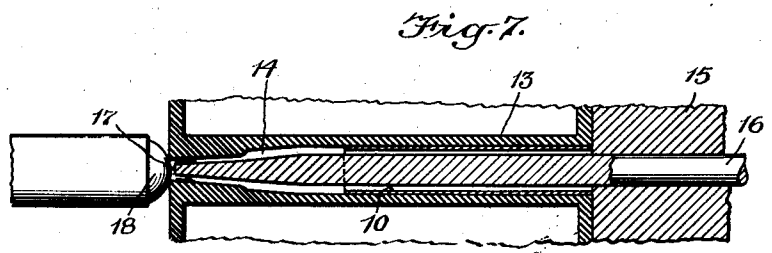
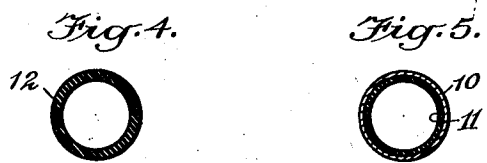
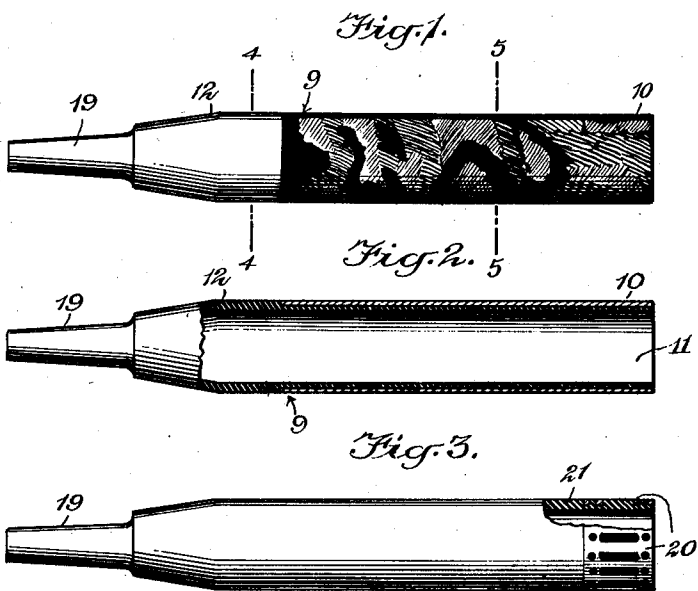
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2,200,042

TUBULAR ARTICLE AND METHOD OF MAKING THE SAME

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## UNITED STATES PATENT OFFICE

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TUBULAR ARTICLE AND METHOD OF  
MAKING THE SAME

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2 Claims. (Cl. 18—59)

This invention relates to improvements in tubular members and the method of making the same.

My invention is particularly applicable to pencil and fountain pen barrels but it should be understood that it may also be applied to the production of other similar tubular articles. In the manufacture of barrels for pencil or fountain pens and similar tubular articles it is frequently desirable that the barrel be provided with an attractive, ornamental design or with an attractive finished surface. To provide the barrel with the desired design or finish increases the cost of production because it necessitates more costly methods, material or labor.

It is an object of the invention to overcome these difficulties and to provide a fountain pen or pencil barrel or similar tubular article having an attractive, ornamental design or an attractive finished surface but which is nevertheless inexpensive to manufacture.

A further object is the provision of an improved barrel or tubular article of the above character which is preferably made of plastic material and is of rugged, strong construction.

A further object is the provision of an improved method for forming tubular members such as pencil and pen barrels which enables the production at a minimum of expense, of strong, rugged tubular articles having an ornamental and attractive appearance which heretofore has been confined to the more expensive types of tubular articles.

With these and other objects in mind reference should be had to the accompanying drawing, in which

Fig. 1 shows a tubular article made in accordance with my invention;

Fig. 2 is a longitudinal, sectional view of the article;

Fig. 3 shows another tubular article made in accordance with my invention, with portions thereof broken away so as more clearly to disclose the construction;

Fig. 4 is a sectional view on the line 4—4 of Fig. 1;

Fig. 5 is a sectional view on the line 5—5 of Fig. 1;

Fig. 6 is a view of a shell of the type used in forming the outer surface of a tubular article made in accordance with my invention; and

Fig. 7 is a longitudinal, sectional view of a die which may be employed in carrying out my invention.

In the manufacture of tubular articles such as pencil and fountain pen barrels it is desirable to have an attractive, ornamental design on the surface thereof or to employ an attractive, ornamental material such as the material which is known as "pearl" in the trade. Tubular articles

of this character have heretofore been relatively expensive and accordingly could not be employed to advantage in inexpensive fountain pens, pencils and the like.

In carrying out my invention I employ a tubular shell having the same external diameter as the desired tubular article but having a relatively thin wall. By placing the shell in a die and depositing plastic material on the inner surface thereof and, if desired, at one or both ends thereof of a tubular article of the desired thickness and size can be produced. The distinctive finish or ornamentation of the shell however is preserved as the outer surface of the barrel.

As a specific example of one method of carrying out my invention, in the accompanying drawing a tubular shell made of "pearl" is illustrated at 10. As shown most clearly in Fig. 1 the shell has an attractive mottled ornamentation thereon and is characterized by a distinctive, attractive, finished surface. The material known as "pearl" in the trade is a thermo-plastic material similar to pyroxylin, cellulose acetate or the like. It should be understood that in carrying out my invention a shell of any material having the desired ornamentation or appearance may be employed, although the best results are obtained by employing thermo-plastic materials such as cellulose acetate, pyroxylin, or cellulose nitrate.

The shell 10 illustrated in the accompanying drawing is of the same external diameter as the finished barrel 9 which it is desired to produce. However, its wall thickness is considerably less than that of the desired finished barrel. The barrel or other tubular article 9 is produced by depositing a layer of plastic material on the inner surface of the shell as indicated at 11, which may be extended laterally from one or both ends of the shell as indicated at 12. The layer of plastic material is of such a thickness as to produce a barrel of the desired strength and thickness. The plastic material which is thus deposited is preferably a thermo-plastic material such as cellulose acetate, pyroxylin, or cellulose nitrate and is deposited on the shell in plastic condition, preferably in a die or mould.

One form of die which may be used in thus forming the barrel is shown at 13 in Fig. 7 and is provided with a die cavity 14 formed in the desired shape and size of the barrel. At the righthand side as viewed in Fig. 7 a stripping plate 15 is provided through which the core 16 projects into the cavity 14. The core should be of the size and shape of the desired opening through the barrel or other tubular article. The stripping plate and core 16 can move towards and away from the die 14 and the core 16 can move relative to the stripping plate 15 so that the finished barrel or tubular article can automatically be released from the core. The left-

hand end of the cavity 14 as viewed in Fig. 7 communicates through a tapered opening 17 with a nozzle 18 having communication with the source of supply of the thermoplastic material employed in making the barrel.

In making the barrel or other tubular member, the shell 10 is placed in the die cavity 14. If it is desired that the shell extend the entire length of the barrel it should extend the entire length of the cavity. In the illustrated embodiment the shell is not as long as the finished barrel and accordingly it is somewhat shorter than the die cavity. The thermo-plastic material is heated so that it is in workable or plastic condition and it is then introduced under relatively high pressure through the nozzle 18 into the die cavity 14 where it is forced around the core 16 and inside of the shell 10 which has relatively tight engagement with the walls of the die so as to prevent any of the material from entering between the die and the outer surface of the shell. It will be appreciated that the thickness of the barrel wall is determined by the space between the core and the cavity walls and the thickness of the barrel may be varied by varying the diameter of the core. The thermo-plastic material being in plastic condition at the time it enters the die forms close and intimate engagement with the shell 10. It is then permitted to set or harden and this action may be hastened by air- or water-cooling the die. As the plastic material sets or hardens it adheres to the shell 10. When the shell 10 is made of a thermo-plastic material the entering heated plastic material at first renders the inner surface of the shell plastic or workable and when the barrel sets or hardens it forms a unitary structure with definite cohesion between the shell and the thermo-plastic material deposited thereon. When the barrel has properly set or hardened the plate 15 and core 16 are drawn away from the die and the core 16 is then drawn through the stripping plate to release the barrel from the die. It should be understood however, that the die that is illustrated and described in connection with this method forms no part of this invention but is merely one well known form of die which may be employed in carrying out my method.

The shell 10 may extend the entire length of the tubular article, or, as shown herein, may extend only a portion of the length of the article, and in the latter case the remainder of the length of the article is formed entirely of the thermo-plastic material. This is most clearly illustrated in Figs. 2, 4 and 7, where the portion of the thermo-plastic material extending beyond the shell 10 is indicated by the numeral 12. It will be seen that the material at the point 12 is preferably equal to the combined thickness of the shell 10 and layer of thermo-plastic material 11.

The tapered projecting end 19 which is shown at the end of the barrel results from the shape of the inlet to the die cavity and may be removed from the article when it is formed into a fountain pen barrel or pencil barrel or the like.

In Fig. 3 I have illustrated another use to which my invention may be applied. Thus, a metal band 20 may be formed around and embedded in a barrel by means of the method herein described. In accomplishing this result the band 20 is placed in the die in the same manner as the shell 10, and the thermo-plastic material is

deposited through the nozzle 18 into the die cavity, forming intimate engagement with the band. The thermo-plastic material is then caused to set or harden and is removed from the die. It should be understood however, that while my invention may be employed in applying metallic or other ornamentations to a barrel it is particularly suited to the production from plastic materials of tubular articles such as pencil and pen barrels, particularly articles of this character having an attractive finish or ornamentation. When a shell of a plastic material such as indicated at 10 is thus employed in forming a barrel, a unitary structure in which the several parts have close cohesion is produced. It will thus be seen that by means of my invention an improved tubular article, particularly a fountain pen or pencil barrel having an attractive, ornamental appearance and of rugged, durable construction is produced at a minimum of expense.

It should be understood that modifications may be made in the illustrated and described embodiment of my invention without departing from the invention as set forth in the accompanying claims. It should also be understood that the term "fountain pen or pencil barrel" as used herein means not only the body portion of a pencil or pen but also the cap.

I claim:

1. The method of forming a tubular article such as a fountain pen or pencil barrel having a pearl finish which comprises first providing a thin tubular shell of a plastic pearl material composed of a cellulose derivative and having an attractive ornamental outer surface, the shell having an external diameter equal to the external diameter of the member to be formed, rendering workable and fluid by heat a mass of thermo-plastic material composed of a cellulose derivative which is relatively less expensive than the material of the shell, placing the shell in a die provided with a bore of substantially the same internal diameter as the external diameter of the shell but of greater length, the die being provided with a centrally disposed mandrel closing one end of the die and passing axially of the shell, forcing the heated fluid mass of thermo-plastic material through the other end of the die and filling the space between the die, mandrel and shell, the temperature of the fluid thermo-plastic being such that the surfaces of the shell which are exposed to the heated thermo-plastic material will become plastic and fuse with the contacting thermo-plastic material, then permitting the thermo-plastic material to harden by cooling so that the fused contacting surfaces of the shell and material will form a homogeneous hardened mass.

2. A barrel for fountain pens or the like comprising a molded hollow body formed of thermo-plastic material, a thin tubular shell embracing part of the body and formed of a plastic pearl material composed of a cellulose derivative and relatively more expensive than the material forming the hollow body, the shell forming an ornamental outer surface which is flush with the outer surface of that part of the body which projects beyond the shell, the inner wall of the shell and the wall of the body which is confined within the shell being fused into a homogeneous unitary mass.

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