April 21, 1931. A. G. SCHURICHT 1,802,188

CARTRIDGE SHELL AND METHOD OF MAKING THE SAME

Filed June 20, 1924

Fig. 1.

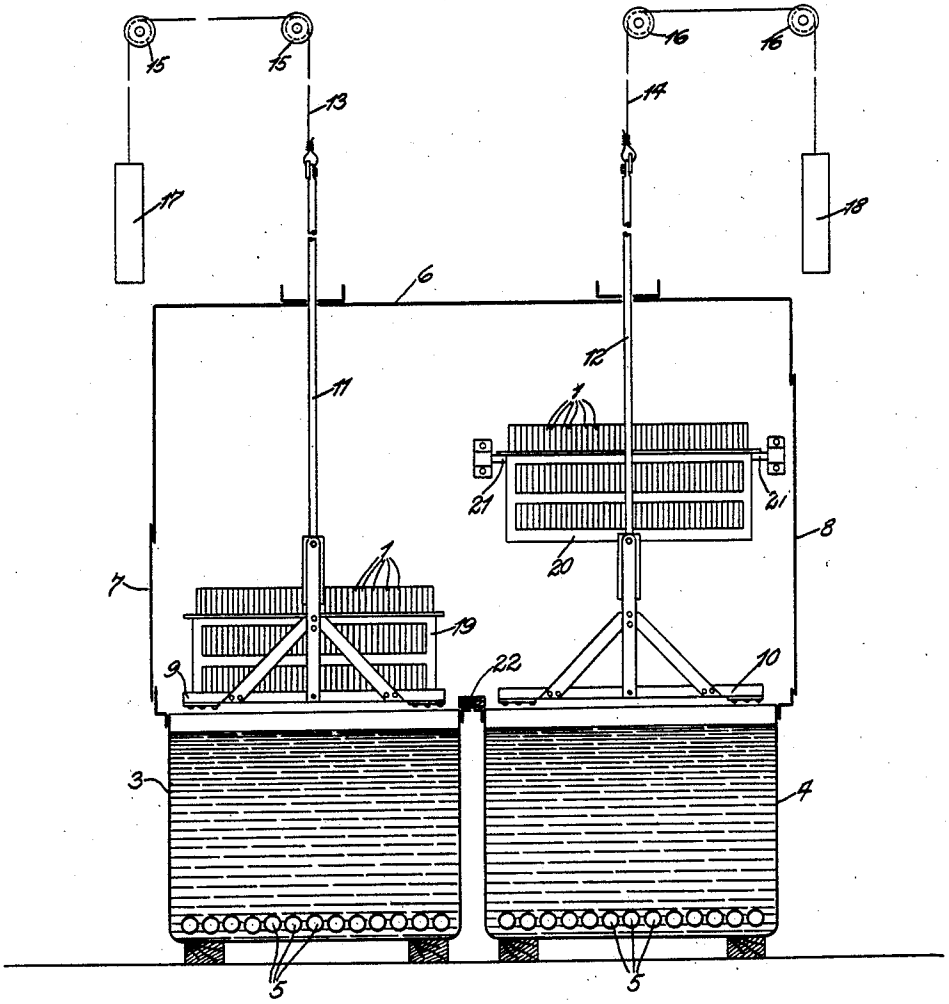
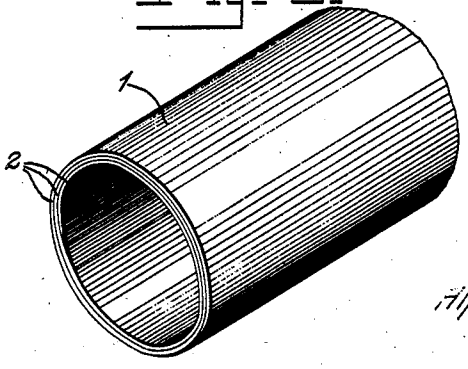


Fig. 2.



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Patented Apr. 21, 1931

1,802,188

UNITED STATES PATENT OFFICE

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CARTRIDGE SHELL AND METHOD OF MAKING THE SAME

Application filed June 20, 1924. Serial No. 721,312.

This invention pertains to shell tubes such as are used in the manufacture of shot gun shells.

One of the objects of this invention is to provide a water-proof shell tube.

Another object of this invention is to provide a method of manufacturing shell tubes which shall render the same proof against deterioration due to moisture.

Another object is to provide a shot shell tube and a process of manufacturing the same, in which the adhesion of the wrappings is such as to prevent breaking of the bond between the convolutions.

Further objects will appear from the following description in connection with the accompanying drawing, in which—

Figure 1 is a diagram illustrating a method of impregnating shell tubes in accordance with this invention; and

Figure 2 is a perspective view illustrating a shell tube embodying this invention.

In the manufacture of the ordinary shot gun shell tube water-proofing has been attempted by coating the finished tube with a water-proof coating such as wax or similar material. Such tubes have in many cases proved inadequate to withstand exposure to moisture in spite of the so-called water-proof coating. Such a coating, even when the water-proofing material penetrates the tube material to some extent, is not usually sufficient to completely shut out all moisture from the shell. Consequently moisture will penetrate to the glue which is used in the manufacture of such tubes. The tubes are ordinarily constructed by wrapping successive layers of paper or other suitable material one upon the other and binding the same together with glue. When the moisture reaches this glue, the soluble ingredients thereof become softened and the adhesive qualities of the glue are destroyed. Consequently such a tube will open or unwrap when exposed to moisture.

In accordance with this invention, the tube is constructed by wrapping a plurality of layers of paper or like material and binding the same together with an insoluble glue. Such a glue may be produced which will be practically proof against the softening effect of moisture when hardened. After the tube has been made up with such a water-proof glue, the same may be impregnated with a suitable water-proof impregnating material such as paraffin or similar material. Thus the pores of the material are completely charged with the moisture-proof compound so as to exclude all moisture. In addition to this, the glue with which the layers are secured together is insoluble and therefore water-proof so that it will not soften upon exposure to moisture. A practical water-proof shell tube is thus obtained.

In the employment of glue generally, and more particularly in the employment of a water-proof glue such as casein, while the bond between the convolutions or wrappings is secured by the glue, the latter is frequently brittle, so that the tube is unable to withstand to the extent desired the strains to which it is subjected. This is particularly true where the tube forms a part of the shell of the cartridge. In such a shell not only is the tube secured by machinery in the base, but the end is also turned over and in to form the crimp. This may have the effect of loosening the bond between the wrappings. Moreover, a shot shell is loaded in the machine, and during the process of loading, the shell is subjected to the operation of mechanism which may have the effect of subjecting the tube to such action as may loosen the bond.

In accordance with this invention, therefore, the glue has added thereto a plasticizer, the purpose of which is to impart to the glue in its interposed relation between the wrappings a characteristic which is the opposite of brittleness. A suitable plasticizer for such purpose is china-wood oil. China-wood oil, when mixed with the adhesive and interposed between the wrappings, will become polymerized. The polymerization of china-wood oil is hastened by heating, although at ordinary temperatures china-wood oil will polymerize over a period which is, however, extended when no heat is employed.

In the manufacture of glue, casein may be used as a principal ingredient for a water-proof glue. A glue which is practically in-

soluble when hardened contains as ingredients casein, hydrated lime, sodium silicate, and cupric chloride. A formula which has been found to give good results contains these ingredients in the following proportions:

	Per cent
Water	82.38
Casein	13.16
Hydrated lime	2.46
Sodium silicate	1.64
Cupric chloride	0.36

These percentages may, however, be varied considerably with good results. It has also been found that the water-proofing and other qualities may be further improved by the addition to the above formula of about one (1%) per cent. of china wood oil. The addition of this china-wood oil, moreover, acts, as previously described, as a plasticizer to avoid brittleness of the adhesive.

Referring now to the drawing, the shell tube 1 may be constructed by building up a plurality of layers 2 of paper or other suitable material. This may be accomplished by wrapping the same on a mandrel in a manner well known in the art. The successive spiral layers are secured together by means of the casein glue such as described above. When the tubes have thus been completely formed and the glue set or hardened, the tubes may be impregnated with water-proofing material. The impregnation of the tubes may be carried out by means of the apparatus illustrated in diagrammatic form in Figure 1. In this figure, 3 and 4 designate tanks, each of which is heated by any suitable means such as steam coils 5, these tanks being arranged to receive the impregnating material and providing respectively hot and cooler baths. These tanks are placed adjacent to one another and open into a casing 6 forming a chamber above and connecting the baths, and this chamber is provided with doors 7 and 8. Arranged within the chamber, and above the respective baths, are carriers 9 and 10 which are suspended by rods 11 and 12 and clables 13 and 14 from pulleys 15 and 16, these carriers being provided with counterweights 17 and 18. These carriers are arranged to receive baskets 19 and 20 which carry the tubes 1 to be impregnated. Suitable latching devices 21 are provided for holding the basket 20 in elevated position and between the tanks is a suitable support 22.

In the operation of this device, the tank 3 is maintained at a higher temperature and the tank 4 at a lower temperature. The impregnating material is preferably molten paraffin with or without a small percentage of a higher organic acid or a natural wax or gum. The bath 3 is maintained at a temperature above the boiling point of water, preferably from 230° F. to 260° F. The bath 4 is maintained at a lower temperature, about 160° F. to 185° F.

The basket 19 with its load of tubes 1 is placed on the carrier 9 by inserting it through the door 7 which is then closed and the carrier lowered to immerse the basket and its contents in the tank 3. The heat of this bath causes the air enclosed within the cells of the tube material to expand and leave the same until the maximium expansion is reached. After ebullition has ceased, the carrier 9 is again raised until level with the carrier 10 and the basket 19 is moved to the carrier 10. The carrier 10, its basket and contents are then immersed in the bath 4 in which the impregnation of the tubes is completed. The carrier 10 is then raised and the basket placed on the latches 21 and allowed to drain, after which it may be removed through the door 8. This process of impregnation is fully described in Patent No. 1,594,375, August 3, 1026, to which reference may be had for a more detailed description thereof. As stated in said patent, it is important that the material remain immersed in the hotter bath until ebullition ceases, in order that the air and other volatile matter, which does not readily condense will be driven off and replaced by vapor which will condense, since otherwise the desired reduction of pressure below atmospheric pressure in the cells or voids will not be obtained, so that the impregnation will not properly flow into and fill these voids. After this has, however, been accomplished the material should not be allowed to stand in the hot bath, for if this is permitted, the liquid pressure in the bath, which is higher than the vapor pressure in the material, will allow some of the paraffin to enter the same. This is undesirable since the flow in the colder bath will then be somewhat obstructed.

It will be seen therefore that in accordance with this invention, a shell tube is produced which is thoroughly water-proof in all respects. The component layers of the tube are secured together by an insoluble and therefore a water-proof glue which will not soften when exposed to moisture. In addition the material of the tube is thoroughly impregnated with a moisture-proofing compound which fills the pores thereof so as to thoroughly and completely exclude all mositure. This is accomplished by the process described in said patent; for by carrying out the impregnation until ebullition ceases, and in the manner described, the tube will become impregnated with the water-proofing throughout, as distinguished from a mere surface impregnation or of impregnation of the outer and inner layers of the tube. Moreover, the provision of the plasticizer not only enhances the water-proof qualities, but serves to maintain the bond in that it overcomes the brittleness of the glue. Such a tube can be dipped

in water for an extended period without danger of its opening or unwrapping.

It is obvious that various changes may be made in the details of construction without departing from the spirit of this invention; it is therefore to be understood that this invention is not to be limited to the specific details shown and described.

Having thus described the invention, what is claimed is:

1. A cartridge shell having a wrapped tube in which the wrappings are secured by a water-proof adhesive containing china-wood oil as a plasticizer.

2. A cartridge shell having a wrapped tube in which the wrappings are secured by a water-proof adhesive containing china-wood oil as a plasticizer, the wrapped tube being impregnated with paraffin.

3. In the art of making cartridge shell tubes, the process comprising, wrapping the tube with an interposed adhesive containing china-wood oil, as a plasticizer, and impregnating the wrapped tube at a high temperature.

4. A cartridge shell having a wrapped tube the wrappings of which are secured by a glue containing a plasticizer.

5. A cartridge shell having a wrapped tube the wrappings of which are secured by casein glue containing a plasticizer.

6. A cartridge shell having a wrapped tube the wrappings of which are secured by a glue containing a plasticizer, the wrapped tube being impregnated with a water-proofing compound.

7. In the art of making cartridge shell tubes, the process comprising, wrapping the tube with an interposed glue containing a polymerizable oil as a plasticizer and treating the wrapped tube to polymerize the oil.

8. In the art of making cartridge shell tubes, the process comprising, wrapping the tube with an interposed glue containing china-wood oil as a plasticizer and treating the tube to polymerize the oil.

9. In the art of making cartridge shell tubes, the process comprising, wrapping the tube with an interposed glue containing a plasticizer and impregnating the wrapped tube with a water-proofing compound.

In testimony whereof I affix my signature this 28th day of May, 1924.

ALFONS GUSTAV SCHURICHT.