No. 782,918. PATENTED FEB. 21, 1905.

H. B. MORRIS.

ARTIFICIAL REED AND THE PROCESS OF MAKING IT.

APPLICATION FILED JAN. 22, 1904.

Fig. 1

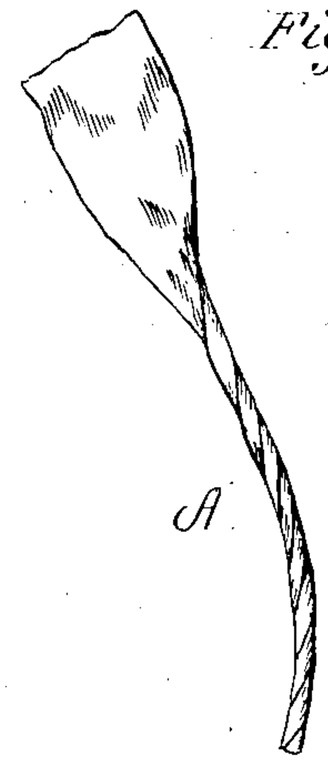

Fig. 2.

Fig. 3.

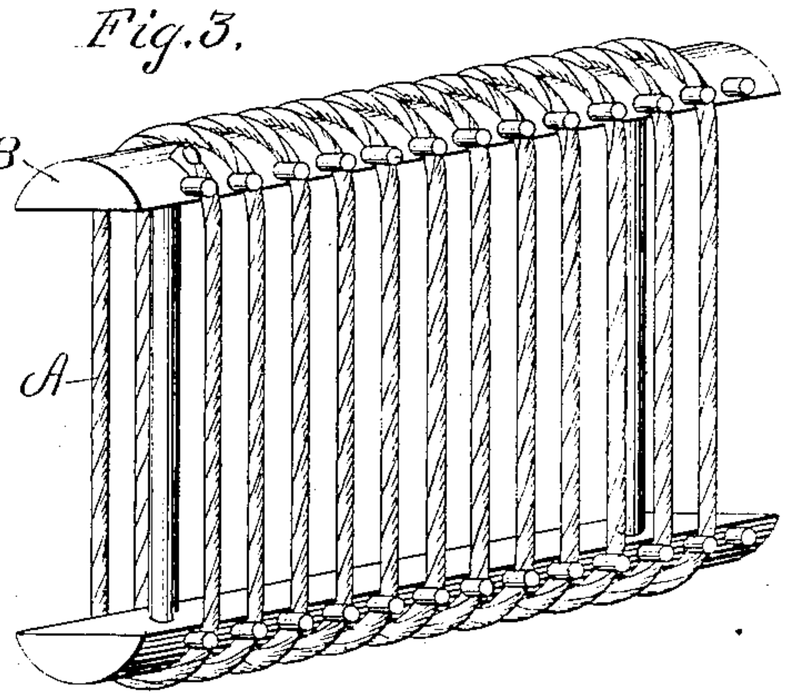

Fig. 5.

Fig. 6.

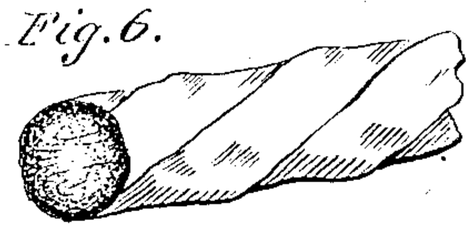

Fig. 7.

Fig. 10.

Fig. 4.

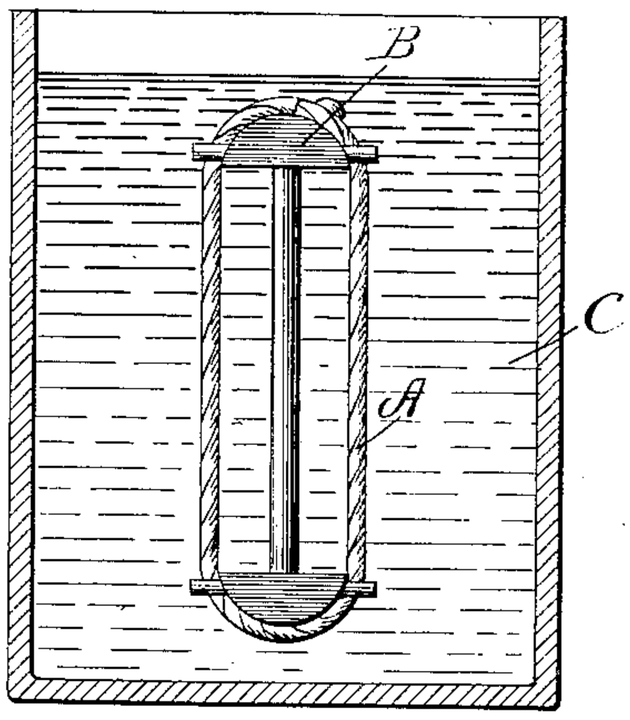

Fig. 11.

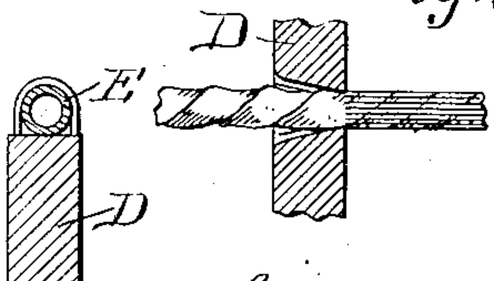

Fig. 8.

Fig. 12.

Fig. 9.

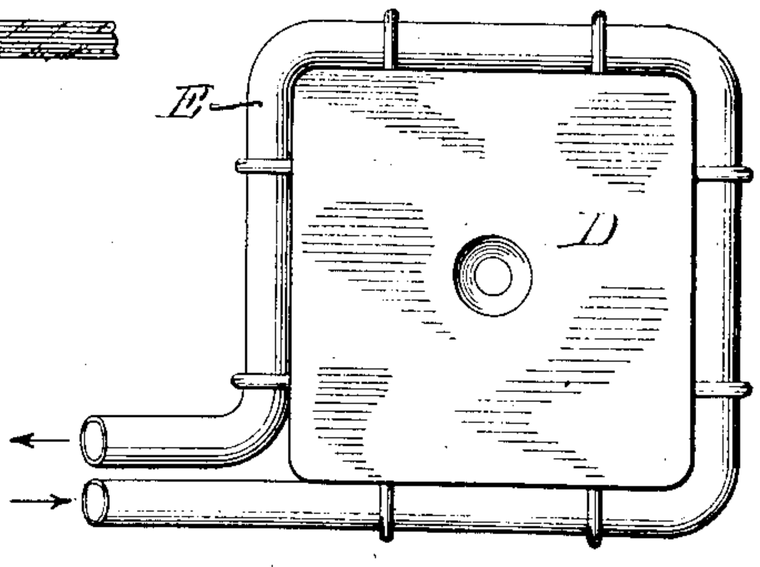

Fig. 13.

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No. 782,918. Patented February 21, 1905.

UNITED STATES PATENT OFFICE.

HENRY B. MORRIS, OF MICHIGAN CITY, INDIANA.

ARTIFICIAL REED AND THE PROCESS OF MAKING IT.

SPECIFICATION forming part of Letters Patent No. 782,918, dated February 21, 1905.

Application filed January 22, 1904. Serial No. 190,214.

To all whom it may concern:

Be it known that I, HENRY B. MORRIS, a citizen of the United States, residing in Michigan City, in the county of Laporte and State of Indiana, have invented certain new and useful Improvements in Artificial Reeds and the Process of Making Them, of which the following is a specification.

In my Patent No. 723,006, of March 17, 1903, I have shown a chair comprising a frame covered with braided paper cord impregnated with a hardening substance, such as glue or shellac. In constructing the frame or skeleton of the chair shown in said patent some parts were described as being made of wood, while other parts were described as being made of "reeds," meaning thereby the central portion of canestalks, which have been very extensively used for such purposes and which experience has shown serve most admirably for such frames, as they are sufficiently stiff, strong, and elastic to form a skeleton frame which will preserve the shape of the chair under various conditions. Such reeds are, however, somewhat expensive, and the primary object of my invention is to provide a cheaper substitute therefor. I have discovered that if paper is suitably twisted and hardened it may be substituted for the natural reeds in many places where reeds have heretofore been generally used.

In carrying out my invention I first form a twisted paper cord in substantially the same manner as that described in my patent above mentioned, and I then subject the cord to a hardening process, which makes it stiff, strong, and elastic. This process in general consists in first dipping the paper cord in heavy glue-size or similar material and allowing it to remain in the bath until the glue has penetrated part way to the axis or core of the cord. The cord is then dried and is then dipped in the glue-bath again, and, if necessary, several times in order that the outer portion of the cord may be more thoroughly impregnated or saturated than the inner portion thereof. When the twisted paper is first immersed in the glue-bath, it is allowed to remain there a considerable time—say half an hour; but when it is again dipped into the bath it is allowed to remain but a few minutes, care being taken to cause more glue or hardening material to be deposited in the outer part of the cord than in the inner part, my object being to preserve a relatively soft or yielding core, while at the same time producing a hard, stiff, and elastic outer portion. In this way I am enabled to produce a paper reed which is sufficiently strong and elastic to use in the construction of the skeleton bodies or frames of chairs, tables, baskets, baby-carriages, and other articles. The reason why the outside of the cord is made harder and stiffer than the core is that if too much hardening substance is absorbed by the cord and it is made hard and stiff both at the core and at the outer portion it is rendered somewhat brittle; but where the core is left soft and yielding the reed may be bent considerably without breaking it or even cracking it, as the core yields to accommodate bends in the reed. In the accompanying drawings I have shown diagrammatically the manner of carrying out my invention.

Figure 1 illustrates the manner in which a ribbon of paper may be twisted to form a paper cord. Fig. 2 shows an enlarged cross-section of a twisted paper cord. Fig. 3 shows a length of twisted paper cord wound upon a dipping-frame. Fig. 4 illustrates the manner in which the cord may be dipped in a bath of melted glue or similar hardening material. Fig. 5 illustrates how the cord is partially impregnated during the first dipping. Fig. 6 shows how the cord may be further impregnated at its outer portion by subsequent dipping. Fig. 7 illustrates how the cord may be further impregnated by repeated dippings. Fig. 8 illustrates how the cord may be smoothed down by a heated die when it has been impregnated to the desired extent. Fig. 9 is another view of one of the heated dies which may be employed. Fig. 10 is a view of a completed reed with a smooth surface produced by the

die shown in Figs. 8 and 9. Fig. 11 illustrates how the cord may be formed with fine longitudinal marks on its surface to cause it to resemble more closely in appearance the natural reed, and Fig. 12 is a detail view of the die which may be used for this purpose. Fig. 13 illustrates the appearance of the artificial reed after passing through the die shown in Fig. 12.

The paper cord A (illustrated in Figs. 1 and 2) is made in the manner described in my before-mentioned patent. The diameter of the cord will of course depend upon the thickness and width of the paper. A length of cord is first wound on a dipping-frame B in the manner indicated in Fig. 3, and this frame, with the cord thereon, is immersed in a bath C of glue-size, such as illustrated in Fig. 4. The glue-size is made thin enough to penetrate the paper and impregnate or saturate the outer portion of the cord. The longer the paper remains in the bath the further the glue-size will penetrate and the greater will be the degree of saturation. I designedly, however, withdraw the cord before the core thereof has become impregnated with the glue.

The time required for the proper saturation of the cord will depend upon the thickness of the cord and the consistency and temperature of the bath. Preferably the temperature is about 150° Fahrenheit. After the outer portion of the cord has been sufficiently impregnated the cord is removed and dried, and after careful examination it will be found that the cord has absorbed a considerable quantity of glue, but that the degree of saturation is greatest at the outer portion of the cord; while at the core scarcely any glue has been absorbed. This is illustrated diagrammatically in Fig. 5. Usually insufficient glue has been absorbed by the cord in the first dipping to produce the desired hard, stiff, and elastic quality required in the outer portion of the cord, and it is desirable to cause this outer portion of the cord to absorb more glue, so as to render the cord harder and more elastic. The cord is therefore, while on a frame such as shown in Fig. 3, again dipped into the glue-bath, but it is allowed this time to remain there only a few minutes. The outer saturated portion of the cord is of course heated by the bath, and the glue is softened a short distance inward, an additional quantity of glue being taken up or absorbed by the outer portion of the cord, and more glue being deposited on the surface thereof. When this is accomplished, the cord is withdrawn from the bath and again thoroughly dried, the appearance of the cord at this time being illustrated diagrammatically in Fig. 6. To make the cord still stiffer and stronger and more elastic, it may have several successive dippings and dryings and will then appear as illustrated diagrammatically in Fig. 7. During the third dipping while some of the glue is absorbed by the outer portion of the cord nearly all that is taken by the cord is deposited on the outside thereof, and this is true of all subsequent dippings. By this process a cord with an unsaturated core and with a saturated or impregnated outer portion is produced. The core is relatively soft, yielding, or pliable, while the outer portion of the cord is comparatively hard. If the cord were thoroughly saturated with hardening material, it would be made somewhat brittle and would be apt to crack or break off sharply, but by preserving an unsaturated core this is avoided. After the cord has been impregnated with the desired amount of hardening material its surface will be somewhat rough, and in order to smooth down this rough surface I preferably pass it through a heated die D in the manner illustrated in Fig. 8. This die may be of any suitable kind. As shown, it is a perforated plate surrounded by a steam-pipe E, which will heat it to the desired extent. When the bore of the die is made smooth, the cord or reed produced will have the general appearance shown in Fig. 10.

The natural reed has a grain running longitudinally which produces distinct longitudinal marks on its outside. In order to imitate this appearance, the die may be formed in the manner indicated in Figs. 11 and 12, where the bore of the die is shown as being surrounded with ribs *d*, which will make small longitudinal grooves in the cord and corresponding ribs producing an effect on the surface of the artificial reed quite closely resembling that of the natural reed. Fig. 13 shows a reed treated in this way. Other forms of dies may be employed, and while I prefer to produce a round reed other shapes may be given thereto.

I have specified glue-size as the hardening material; but other substances, such as suggested in prior patents granted to me and such as are well known to those skilled in the art, may be used.

I claim as my invention—

1. The process herein described of making paper reeds consisting in twisting paper to form a cord, impregnating the outer portion of the cord with hardening material without saturating or hardening the core of the cord to so great an extent and then smoothing down the coated and saturated cord and producing longitudinal grooves and ribs thereon to cause it to resemble the natural reed.

2. A hard, stiff and elastic twisted-paper reed the core of which is comparatively soft and yielding while the outer portion is impregnated with hardening material.

3. A twisted-paper reed, the core of which

is comparatively soft and yielding while the outer portion is rendered hard, stiff and elastic by hardening material with which it is saturated, and which also forms a coating on its surface.

4. A twisted-paper reed the core of which is comparatively soft and yielding while the outer portion is rendered stiff and elastic by hardening material with which it is saturated, and which is compressed and formed with longitudinal grooves or ribs to resemble the natural reed.

In testimony whereof I have hereunto subscribed my name.

HENRY B. MORRIS.

Witnesses:

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HARRY W. MILLER.