

Aug. 8, 1939.

H. L. AMRHEIN

2,168,465

FLAT QUILL OR BOBBIN

Filed April 3, 1937

2 Sheets-Sheet 1

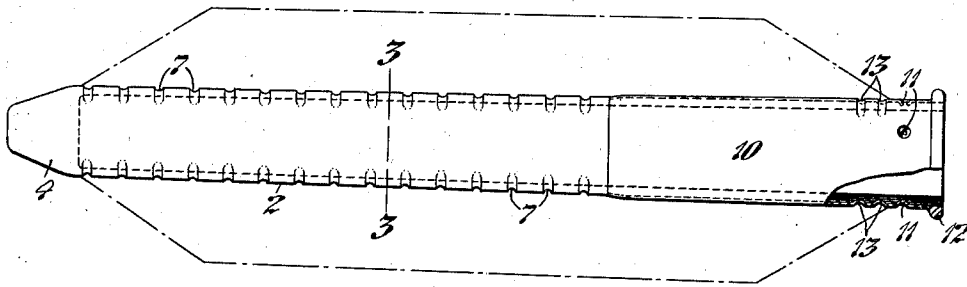


Fig. 1.

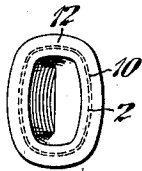


Fig. 2.

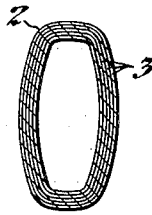


Fig. 3.

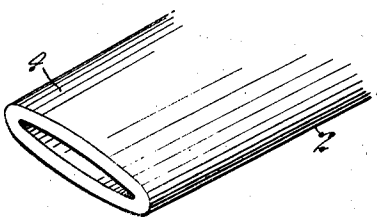


Fig. 4.

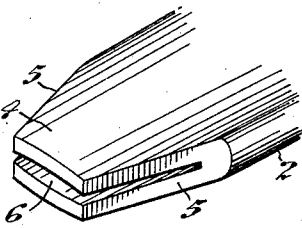


Fig. 5.

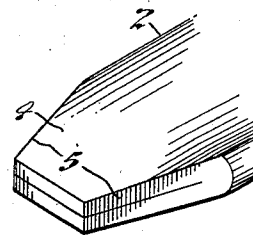


Fig. 6.

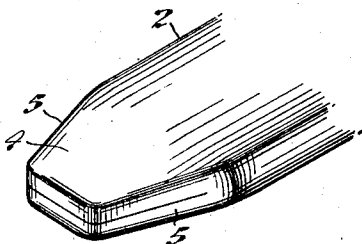


Fig. 7.

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2 Sheets-Sheet 2

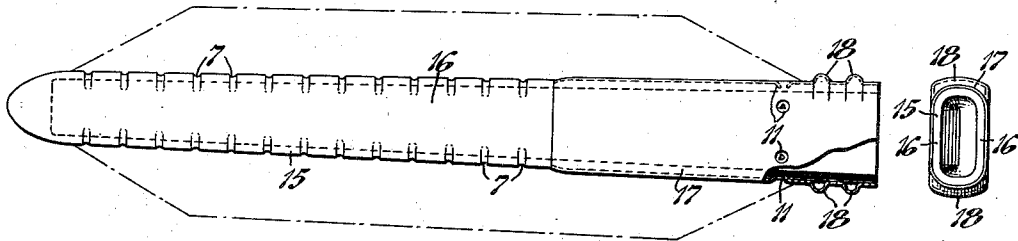


Fig. 8.

Fig. 9.

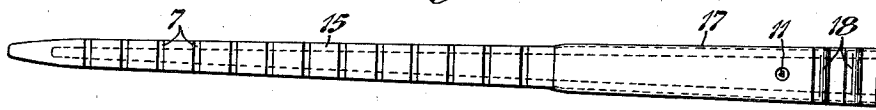


Fig. 10.

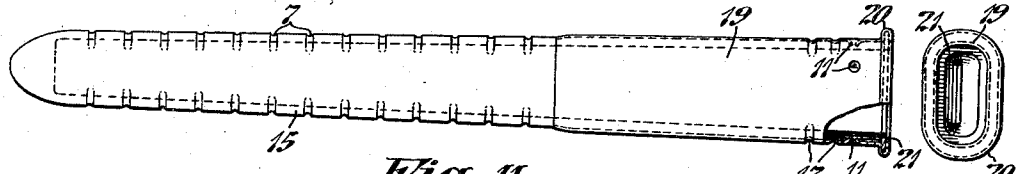


Fig. 11.

Fig. 12.

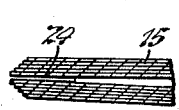


Fig. 13.

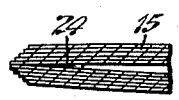


Fig. 14.

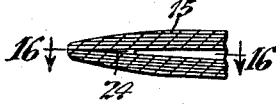


Fig. 15.

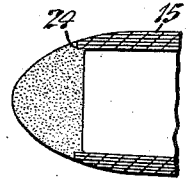


Fig. 16.

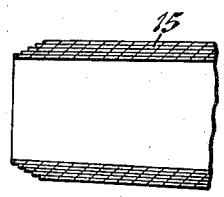


Fig. 17.

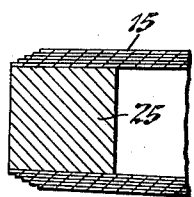


Fig. 18.

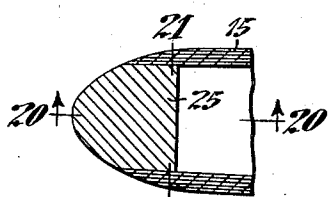


Fig. 19.

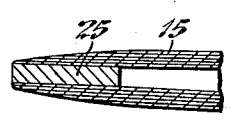


Fig. 20.

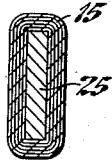


Fig. 21.

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UNITED STATES PATENT OFFICE

2,168,465

FLAT QUILL OR BOBBIN

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Application April 3, 1937, Serial No. 134,890

8 Claims. (Cl. 93—1)

This invention relates to improvements in bobbins or quills for carrying yarn in the shuttles of looms, and particularly to a paper or fiber bobbin of the so-called "flat" type and the method of producing the same.

In accordance with a recent development in the art of weaving, the flat type of quill has come into use as providing certain advantages; for example, increasing the amount of yarn which can be contained in the shuttle by from 50 to 100 per cent. The usual type of bobbin or quill has a cylindrical or slightly conical barrel on which the yarn is wound and in some cases it has been constructed of paper in the form of a slightly tapered tube. The present invention contemplates the provision of a tubular quill of flat contour, that is, having a substantially rectangular or oval contour in cross-section with its major axis considerably greater than its minor axis. Bobbins and quills of this type have heretofore been constructed mostly of wood or plastics such as molded phenolic condensation products known by the trade-name "Bakelite". The wooden and molded plastic quills are expensive to manufacture and, moreover, they cannot be made in the form of tubes adapted to be received upon the spindles of winding machines and on the relatively long skewers of conventional shuttles. That is to say, it has been found impracticable to make such previous types of bobbins or quills of hollow form while giving them the necessary strength and durability.

One object of the present invention is to provide a hollow or tubular flat bobbin or quill constructed of paper with relatively thin walls to accommodate an axial spindle or other support extending substantially throughout the length of the quill.

Another object of the invention is to provide a bobbin or quill of the type indicated which is less bulky and lighter in weight than bobbins or quills made of wood or plastics, whereby to further increase the yarn capacity of the shuttle.

Another object of the invention is to provide a bobbin or quill of the type indicated which may be treated with a varnish or other suitable protecting coating to render it resistant to moisture, and steaming and other processes to which the yarn on the quill may be subjected.

Another object of the invention is to provide a bobbin or quill of the type indicated which is less costly to manufacture and more durable in use over long periods of time than similar types of bobbins and quills now in use.

Further objects of the invention are set forth

in the following specification which describes several forms of the present improved flat paper bobbin or quill, and examples of different methods for its manufacture, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a plan view of one form of the improved flat paper quill shown as having a metal sleeve or sheath applied thereto at its butt end and indicating the shape of the cop or bobbin of yarn which may be wound on the quill;

Fig. 2 is a butt end view of the quill shown in Fig. 1;

Fig. 3 is an enlarged cross-sectional view of the quill on line 3—3 of Fig. 1 illustrating the several plies or laminations of paper forming its walls;

Fig. 4 is an enlarged perspective view of the smaller or tip end of the quill tube before it is finally shaped;

Fig. 5 illustrates a step in the shaping of the tip end of the quill by beveling off the sides of the tube;

Fig. 6 illustrates a further step in the forming of the quill with the wider flat sides of its tip end compressed and cemented together with an adhesive;

Fig. 7 shows a preferred form of the pointed tip end of the quill after it has been smoothed and rounded on its edges;

Fig. 8 is a view similar to Fig. 1 showing a slightly different form of construction of the paper quill with its wider sides formed in flat planes;

Fig. 9 is a view of the butt end of the quill shown in Fig. 8;

Fig. 10 is an edge view of the quill shown in Fig. 8;

Fig. 11 illustrates this latter form of quill with a slightly different type of metal sleeve or sheath at its butt end;

Fig. 12 is a view of the butt end of the quill shown in Fig. 11;

Fig. 13 is a partial sectional view through the tip end of the quill tube showing the method of slitting its side edges as a step in the manufacture;

Fig. 14 shows the flat sides of the tip of the quill pressed together and cemented with an adhesive;

Fig. 15 is a sectional view showing the tip ground off and rounded in its final form;

Fig. 16 is a sectional view of the same on line 16—16 of Fig. 15 showing the shape of the tip of the quill in plan view;

Fig. 17 is a sectional plan view of the tip end of the quill tube;

Fig. 18 is a similar view showing a plug or paper filler inserted within the walls of the tip end of the quill;

Fig. 19 is a similar sectional plan view showing the plugged end of the quill ground down or shaped in its final form;

Fig. 20 is a sectional view on line 20—20 of Fig. 19; and

Fig. 21 is a sectional view on line 21—21 of Fig. 19.

The present invention contemplates forming a relatively flat, tapered quill of oval or rectangular cross-section from a paper or fiber sheet or sheets wound or wrapped about a mandrel of suitable form with the superimposed layers cemented or glued together with an adhesive to provide a laminated structure. The quill may be formed in different lengths, in accordance with the size of the shuttles in which it is to be used, with a bore extending substantially throughout its whole length to adapt it to receive a flat or oval spindle or skewer. Means are provided at the larger or butt end of the quill for securing it in the shuttle and, preferably, a metal sleeve or sheath encloses this end of the quill to form an electrical contact-element, adapting the quill for use in looms having electrical feeler-devices for changing the filling in the shuttles. The tip end of the bobbin or quill is preferably pointed with its edges rounded and smoothed to permit the yarn to be drawn thereover without catch or hindrance; the present invention contemplating several methods of forming the end of the paper shell for this purpose.

Figs. 1 to 7 of the present drawings illustrate a preferred construction of paper or fiber quill and the steps in the method of manufacturing it in the form of a relatively flat tube. In some cases the wider sides of the quill may be formed in flat planes, but in accordance with one feature of the present improvement it is preferred to form its wider side walls of slightly concavo-convex shape. That is to say, the relatively flat sides of the quill are slightly convexed or arched which has the advantage of permitting a somewhat wider axial opening or bore within the quill to accommodate a spindle of correspondingly enlarged dimensions having greater strength and rigidity than a flat spindle or thin blade. It has also been determined that such a contour of the sides of the quill provides better holding surfaces for the yarn wound thereon in forming the cop or bobbin.

In manufacturing quills of the preferred form shown in Figs. 1 to 7 a tapered tube 2 is first produced by winding or wrapping a sheet or web of paper or like fibrous material around a mandrel having a contour corresponding to the desired bore of the tube as indicated in Fig. 3 of the drawings. The sheet or web is cut to such shape that it will wind smoothly about the tapered periphery of the mandrel and the overlying layers 3 of the paper are cemented together by a suitable adhesive to form laminated walls as shown in Fig. 3. The smaller end 4 of the tube 2, shown in Fig. 4, is then beveled at its side edges by cutting or grinding away the walls at 5, 5 as illustrated in Fig. 5. A suitable adhesive is inserted in the opening 6 between the relatively flat projections of the walls of the tube 2 and the tip of the tube is then compressed to cement the walls together as shown in Fig. 6.

Finally, the pointed end of the tube is ground down or otherwise finished to round the corners and smooth the edges as illustrated in Fig. 7.

Preferably, a series of peripheral grooves or indentations 7 are formed on the lateral edges of the tube throughout a portion of its length extending from its smaller or tip end, these indentations being made by scoring or compressing the paper material as indicated in Fig. 1.

A metal sleeve or ferrule 10, formed to the shape of the larger end of the tube, is then applied thereto to provide means for holding the quill or bobbin in the shuttle; and also to serve as a contact-element for the electrical feeler-devices of the loom filling-changing mechanism. The sleeve or sheath 10 may be constructed of relatively thin metal and after it has been slipped onto the paper tube it is indented or punched at points indicated at 11 to secure it to the paper tube, while at its opposite end the edge is rolled inwardly to further incorporate it in the material of the tube 2. As shown in Fig. 1, the sleeve or sheath 10 may be provided with an end flange 12, preferably constructed by swaging or forming up the metal in a solid bead or rim. The end flange or bead 12 provides means for gripping the quill in the shuttle to hold the bobbin from displacement on the spindle or skewer. If desired, the sleeve 10 may be indented or grooved as indicated at 13 to assist in holding the first coils of yarn wound onto the tube in the form of a bunch or reserve winding as sometimes provided for cooperation with the filling-changing mechanism.

Figs. 8 to 10, inclusive, illustrate a similar form of paper or fiber quill 15 having its sides 16 of greatest width formed in flat planes instead of being convexed or arched. The metal sheath or sleeve 17 is also of slightly different form having a plurality of raised beads or ribs 18 on its periphery by which it may be gripped in the shuttle.

Figs. 11 and 12 illustrate the flat paper quill 15 as provided with a still different form of sleeve or sheath 19 having a flange or bead 20 at its larger end formed by folding the metal over the edge of a flat ring or washer 21 shaped to the general contour of the quill and sleeve.

Figs. 13 to 16 illustrate the steps in a somewhat different method of forming the pointed tip of the quill. As shown in Fig. 13, the lateral walls of the pointed end of the quill tube 15 are slitted longitudinally at 24 with a thin saw or other suitable tool, after which the flat sides of the tube are compressed and cemented together as indicated in Fig. 14. After the walls of the tip end of the tube are thus amalgamated the edges are rounded off by cutting or grinding away the paper material to the form shown in Figs. 15 and 16.

Figs. 17 to 21 illustrate a still different method of forming the tip end of the quill. The smaller end of the tube, illustrated in Fig. 17, is provided with a paper plug or filler 25 of any suitable material inserted between the flat walls of the tube and cemented in place by a suitable adhesive as shown in Fig. 18. The side edges of the tip are then cut or ground down to provide a rounded contour, as illustrated in Fig. 19, and the top and bottom walls are also ground away as shown in Fig. 20 to form a smooth tapering point.

With any of the above described methods of manufacture the present improved quill may be produced economically from fiber or paper stock and after its completion it is usually coated or impregnated with a resinous or other water-insoluble varnish to render it moistureproof and resistant to the action of steam used in treating

the yarn on the quill. The coating or impregnation also has the effect to stiffen and strengthen the walls of the quill to render it proof against damage during use in the mill. It has been determined that quills manufactured in accordance with the present invention have substantially the same strength and durability as quills made of plastics and, in fact, they are more durable than wooden quills or bobbins.

It will be observed that with the present method of constructing the hollow, flat quill its walls may be made relatively thin to conserve space in the shuttle while yet giving the necessary strength, particularly if the wider or relatively flat sides of the quill are slightly convexed. By forming the improved quill hollow throughout its length it is adapted to receive a suitably formed spindle or cop-holder on the winding machine and likewise an extended skewer or spindle in the shuttle. Consequently, the quill may be more rigidly supported on the winding machine without the use of end-centers as is necessary with the solid type of flat quill. The quill will thus run true with the rotation of the winding-spindle and therefore the cop or bobbin will be more perfectly wound than where the quill runs out as is liable when it is supported on end-centers or trunnions.

As another advantage of the present improved bobbin or quill, its light weight saves expense in handling and shipment of yarn wound on the quills. Moreover, the paper quill is not liable to chip or split as is common with wooden bobbins or quills and therefore it has a longer life and better adaptability to commercial use.

While the invention is herein shown as embodied in several different forms of construction, it is to be understood that various other changes may be made in the structure of the quill and its method of manufacture without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. An improved method of manufacturing flat quills or bobbins consisting in winding a sheet of paper on itself to form laminated walls of substantially rectangular shape in cross-section, slitting the narrower sides of the tube at one end, compressing the slitted portion of the tube and securing its sides together with an adhesive, and finally rounding off said end to form a tapered tip for the quill.

2. An improved method of manufacturing flat quills or bobbins consisting in winding a sheet of paper on a mandrel of substantially rectangular

shape in cross-section, cementing the layers of paper together with an adhesive, beveling one end of the tube by cutting away its narrower sides, cementing together the wider sides of the tube at this end of the quill, and finally rounding off the edges to form a tapered tip.

3. An improved method of manufacturing quills or bobbins consisting in providing a fiber tube of relatively flat contour having a major and a minor axis in cross-section, compressing and securing the flat sides of the tube together at one end, and finally smoothing and rounding this end of the tube to form a tapering tip for the quill.

4. An improved method of manufacturing quills or bobbins consisting in providing a fiber tube of substantially rectangular form in cross-section with relatively flat sides, inserting a plug in one end of the tube and securing it in position with an adhesive, and finally forming the plugged end of the tube with a rounded tapering contour to provide a pointed tip for the quill.

5. An improved method of manufacturing quills or bobbins which comprises forming a fiber tube of relatively flat contour having a major and minor axis in cross-section, compressing and securing the flat sides of the tube together at one end, and shaping the compressed end of the tube to provide a reduced tip for the quill.

6. An improved method of manufacturing quills or bobbins consisting in winding a sheet of paper on itself to form laminated walls of substantially rectangular shape in cross-section, slitting the narrow sides of the tube at one end, compressing the slitted portion of the tube, and curing the compressed sides of the slitted portion together with an adhesive.

7. An improved method of manufacturing quills or bobbins which comprises forming a fiber tube of relatively flat contour having a major and minor axis in cross-section, closing the tube at one end, and cutting away the sides of the tube at the closed end to provide a tapered tip for the quill.

8. An improved method of manufacturing flat quills or bobbins which comprises winding a sheet of paper on a mandrel of substantially rectangular shape in cross-section to form a tube, cementing the layers of paper together with an adhesive, closing one end of the paper tube, and cutting away the opposite sides of the tube at its closed end to provide a tapered tip for the quill.

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