The invention relates to a means whereby a shaft and various normally separately made rotary members may all be assembled in essentially a single step. The shaft is inserted into a mold and the other rotary members are molded therearound as a one piece body.
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MAIN SHAFT FOR SEWING MACHINES

The present invention refers to a novel construction of a main shaft for a sewing machine wherein said shaft is integrally constructed with its handwheel and pulleys.

Precedingly, the shaft, handwheel, and pulley were separately manufactured and then assembled. The known procedure is rather costly because each separate piece has to be machined within certain tolerances in order to assure proper assembly of all of them.

An object of the present invention is a novel combination of the aforementioned parts and a process for making same whereby the machining time and cost can be reduced without sacrificing precision of the finished product.

This main object is realized by an arrangement and method whereby the handwheel and various pulleys are integrally molded onto the shaft, the latter of which constitutes the insert in a molding operation.

Detailed features and advantages of the present invention will evolve from the following description of a preferred embodiment of the invention related to the attached drawing whose sole FIGURE is a section view of the intensive assembly formed by the handwheel, the drive members and the sewing machine main shaft.

According to the drawing, a hollow handwheel 11 and a toothed pulley 12 carrying a crown tooting 13 (in mesh with a suitable belt not shown and connected to the pulley of the sewing machine drive motor) are integrally formed on the main shaft 10 by a molding process. A second toothed pulley 14, also provided with a crown tooting 15, is formed adjacent to larger pulley 12 in order to transmit motion by usual means, from main shaft 10 to a driven shaft, not shown. In the area of pulley 14, shaft 10 has knurled radially recessed surface 16 which provides a gripping means between said shaft and the body B formed by handwheel 11 and the driving members 12 and 14, adapted to prevent relative rotation and axial displacement between the said body B and shaft 10.

Said body is made of suitable plastic material, such as Delrin or Nylon, adapted to give each element the function features necessary for its specific use.

In order to make the shown assembly of body B and shaft 10, a steel shaft 10 is introduced into a mold as an insert and then plastic material is injected into the mold spaces surrounding the said shaft. Said spaces define said body B so that the aforementioned process results in the formation of a handwheel and two pulleys and simultaneous assembly thereof on shaft 10 in essentially a single step.

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Particular precautions are taken in order that, during cooling of the plastic material, the prescribed pulley concentricity tolerance is not exceeded and an intolerable slant of crown gear 13 of pulley 12 does not occur relative to a horizontal line.

For this purpose the body B is molded to include thin radial ribs 17 between handwheel 11 and pulley 12 and the axial thickness of pulley 12 is kept as small as possible. Circumferentially spaced, axially extending tightening holes 18 are then bored into pulley 14 to avoid axial and circumferential distortions thereon. The dimensions and structure of said ribs and holes are carefully calculated to balance shrinkage tension effects exerted on pulley 12 which is particularly sensitive to said effects owing to its extension.

Handwheel 11, as said hereinabove, is hollow and open at its free end. It is closed at this end by means of a disc 20, also of plastic material, produced by a separate operation.

Said disc 20 is mounted onto said handwheel 11, by forcing into its cylindrical surface 19, when it has not completely cooled, that is when the assembly has not yet begun to shrink.

In such a way disc 20 is better forced into said surface 19 of handwheel 11.

The configuration of pulleys 12 and 14 is not obviously a fundamental feature of the invention.

Larger diameter pulley, for example, might, otherwise, be provided with a race to be engaged by a "V" or other type belt. This substitution does not concern particular technical modifications and does not change essential features of the invention shown with reference to the embodiment described hereinafter.

Shaft 10 is mounted generally on the sewing machine by means of two bushings one of them is shown in the drawing and pointed out with number 21 placed in a suitable seat provided in the frame 22.

Handwheel 11 and drive elements are mounted overhanging relative to mount bushing 21.

What is claimed is:

1. A sewing machine main shaft to which is rigidly molded as an integral one piece body a handwheel and a pair of pulleys of different diameter, said handwheel and one pulley being axially spaced apart from each other and including therebetween radially extending stiffening ribs, said other pulley containing therewith circumferentially spaced axially extended tightening holes.

2. The combination of claim 1, said handwheel being hollow and being closed by a separate end disc.

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