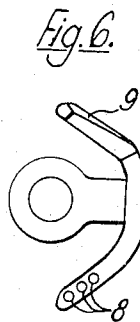
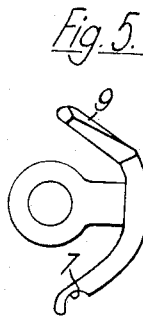
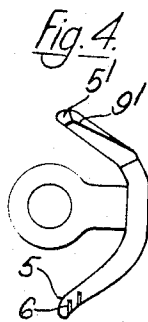
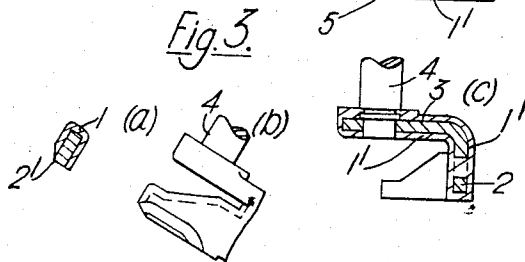
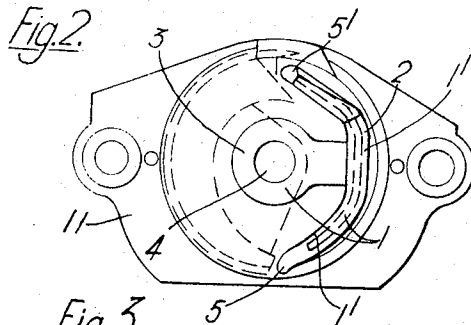
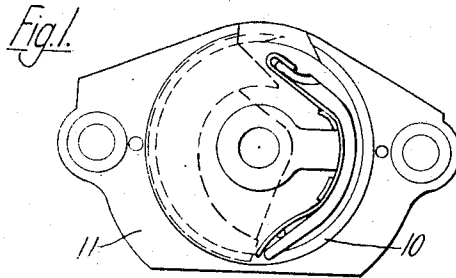


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G. GUSTIN
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Inventor
GIULIANO GUSTIN
By *Irwin D. Thompson*
Attorney

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SHUTTLE DRIVER

Giuliano Gustin, Milan, Italy, assignor to Soc. per Azioni Fratelli Borletti, Milan, Italy, an Italian company

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ABSTRACT OF THE DISCLOSURE

An oscillatable shuttle driver having two ends adapted to come alternately into contact with a shuttle, is plastic coated to reduce noise. The plastic coating is formed on a metal core roughly shaped to the general contour of the finished driver. An end of the driver adjacent its driving surface is recessed to increase flexibility. The plastic material is chamfered away at the contact zone to expose part of the metallic core.

The present invention relates to a device which may be termed a "shuttle driver," for sewing machines of the type having an angularly oscillatory shuttle.

Known types of shuttle driver are generally constituted by an arcuate metal member which is fixed by means of an extension thereon at its center on a shaft that executes an angular oscillatory movement about its axis.

The ends of the arcuate member make contact with the ends of the shuttle, which is guided on a circular runway; the shuttle is thus caused to execute a rocking motion under the impacts of the shuttle driver. The alternating impacts of the metallic shuttle driver on the metallic shuttle produce noise, and various methods of reducing it have been studied; all these methods are based on the interposition of a resilient element, between the shuttle and the shuttle driver, in such manner as to leave play between the shuttle and the shuttle driver sufficient for the free passage of the upper thread used in a sewing operation, but at the same time not excessive, so as to avoid noise. A shuttle driver thus formed is however very expensive, mainly because for the performance of good sewing work its shape does not admit of large tolerances and it must always be given a precise finishing treatment.

It has further to be noted that for functional reasons the shuttle driver is not in the form of a single arc concentric with the axis of the shaft, but is of a known mixtilinear shape, that is, of a shape having portions of different curvature and different degrees of straightness along its length, matching the shuttle and the travel of the upper sewing thread. This increases the difficulty of making it by known technological working and finishing operations.

The device according to the present invention avoids in a complete and ingenious manner the above-mentioned disadvantages of noise and high cost of production. It comprises a metallic core capable of being fixed to the oscillatory control shaft, and is provided, at least at one of the two ends adapted to come into contact with the shuttle, with a covering of plastic material, alone or reinforced, obtained by direct moulding onto the core. In this manner the impact is no longer impact between metallic parts, but between the metal of the shuttle and the softer plastic material, at at least one end of the shuttle driver.

In order further to reduce the noise resulting from the alternate impacts between the shuttle driver and the shuttle, the end of the shuttle driver that strikes the back of the shuttle—the end of the shuttle remote from its

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point—is desirably provided, by molding or by working, with a transverse cut-out or recess, or at least one hole, which renders the said end more resilient.

Preferably, the metallic core is constituted by sheared and bent metal plate and the covering extends over the whole surface thereof. This latter arrangement is provided by molding or injection molding without undercuts, from plastic material, alone or reinforced with glass fibers, the material being one of high mechanical resistance such for example as Delrin, nylon, Nylafil or Makrolon, vulcanized rubber or the like.

The metallic core, made without any separate finishing operation is particularly well adapted to permit the shuttle driver to be fixed on the oscillatory control shaft, and to maintain its shape.

An embodiment of the invention is illustrated in the accompanying drawing, in which:

FIG. 1 shows in front view, for the purpose of illustrating the prior art, a shuttle and a shuttle driver of known type;

FIG. 2 is a view similar to FIG. 1 of a shuttle driver according to the present invention;

FIGS. 3a, 3b and 3c illustrate in detail the chamfering of the zone of contact between the needle and the shuttle driver, and

FIGS. 4, 5 and 6 illustrated three different forms of the shuttle driver showing its end formed with recesses adapted to render it more resilient.

Referring to the drawing, the metallic core 1 that constitutes the armature of the shuttle driver according to the present invention comprises an arcuate member 2 and a radial extension 3 by means of which it is fixed to the control shaft 4 that executes an angular oscillatory motion. The core 1 is mounted in such manner that the center of curvature of the member 2 coincides with the axis of the shaft 4.

The core 1 is preferably formed from sheet metal by shearing and bending, without any other operation. It may however be made in other economical ways, for example by injection molding from zama, silumin or other suitable metallic material.

The core 1 is then covered, by molding or injection molding, with plastic material 1', for example Delrin, nylon, Nylafil or Makrolon, or vulcanized rubber or the like. This operation is effected in such manner that the shuttle driver assumes the required shape without the necessity for further working.

The precision as regards dimensions that is obtained directly by molding or injection molding is sufficient to provide the required tolerance between the shuttle and the shuttle driver.

In this respect the problem is simple because in practice the tolerances permitted are more than are necessary for a metallic shuttle driver, and there is no increase in noise, seeing that the ends 5 and 5' that come into contact with the shuttle are no longer made from metal but from a plastic material that is softer than metal.

In order further to reduce noise the plastic end 5 that strikes the back of the shuttle is provided with at least one transverse recess that renders the end 5 resilient. In FIG. 4 are illustrated two cutouts 6, while in FIG. 5 there is provided, for the same purpose, a recess 7, and in FIG. 6 there are provided holes 8.

In order to avoid contact of the needle with part of the surface of the plastic material covering of the shuttle driver during its travel beneath the needle plate, with a risk of damaging it (as frequently occurs when the resilience of the needle is very similar to that of the shuttle) a simple chamfer is provided over a suitable small zone of the arcuate member 2.

The chamfer 9 (FIGS. 3a and 3b) thus made, exposes

the metallic surface 2' that offers to the needle the same resistance as normal metallic shuttle drivers.

The shuttle is guided in known manner on the runway 10 by a support 11 concentric with the oscillatory shaft 4.

What I claim is:

1. In a sewing machine having an angularly oscillatory shuttle, a shuttle driver of the type having two ends adapted to come alternately into contact with the shuttle to impart oscillations to it, said shuttle driver comprising a metallic core and a generally radial extension by which the driver may be fixed on an oscillatory control shaft, said metallic core having arms that extend in opposite directions from said radial extension, each said arm terminating in one of said ends, and on at least one of said ends a covering of plastic material molded directly onto the core.

2. A shuttle driver as claimed in claim 1, said covering extending over substantially the whole surface of the metallic core.

3. In a sewing machine having an angularly oscillatory shuttle, a shuttle driver of the type having two ends adapted to come alternately into contact with the shuttle to impart oscillations to it, said shuttle driver comprising a metallic core capable of being fixed on an oscillatory con-

trol shaft, and on at least one of the said two ends, a covering of plastic material molded directly onto the core, said at least one end having recesses therein adapted to increase its flexibility.

4. A shuttle driver as claimed in claim 3, in which said recesses are in the form of holes.

5. In a sewing machine having an angularly oscillatory shuttle, a shuttle driver of the type having two ends adapted to come alternately into contact with the shuttle to impart oscillations to it, said shuttle driver comprising a metallic core capable of being fixed on an oscillatory control shaft, and on at least one of the said two ends, a covering of plastic material molded directly onto the core, a chamfer being provided at the zone which makes contact with the shuttle, so as to remove the plastic material from this zone and to expose a part of the surface of the metallic core.

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RICHARD J. SCANLAN, JR., *Primary Examiner*