Aug. 7, 1962 A. FINK 3,048,197

SHUTTLE WITH A BOBBIN CLAMPING DEVICE

Filed May 8, 1959

FIG-1

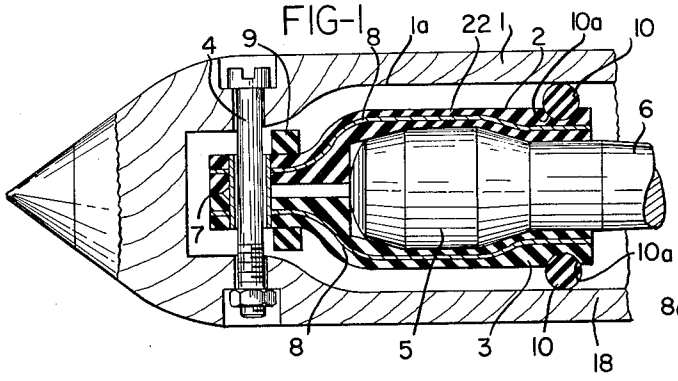


FIG-2

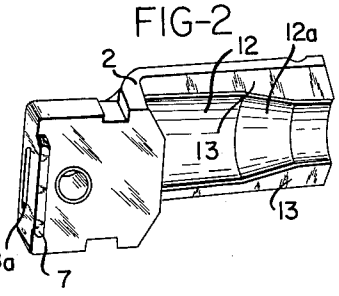


FIG-3

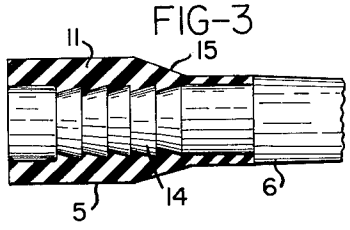


FIG-4

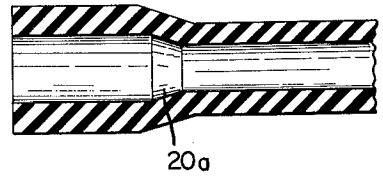
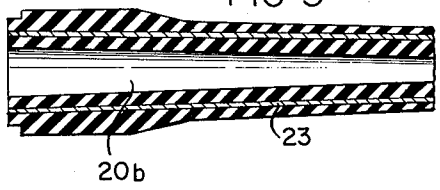


FIG-5



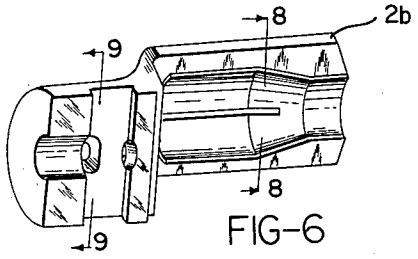


FIG-6

FIG-7

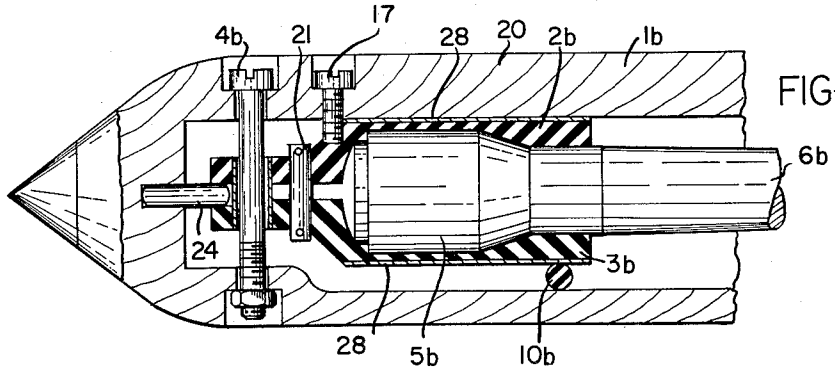




FIG-8



FIG-9

INVENTOR.
ARMIN FINK
BY

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SHUTTLE WITH A BOBBIN CLAMPING DEVICE

Armin Fink, Franzosenstrasse, Diessenhofen, Switzerland

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This invention relates to a shuttle for an automatic loom and more particularly to a bobbin-clamping device comprising two clamping jaws fitted in a weaving shuttle, and a bobbin removably held in said jaws.

It is a first object of this invention to provide a device which will considerably reduce the wear on the individual parts in operation.

It is a further object of this invention to provide a device which will permit the clamping jaws to move parallel to each other when the bobbin is being changed, and will also permit the bobbin to be perfectly centered during operation.

It is a further object of this invention to provide a system which will minimize both the noise and the weight of the reciprocating assemblies.

It is a still further object of this invention to provide a device which will permit the use of a material that is both low-priced and anti-static.

These and other object and advantages of the invention will appear more clearly from the following specification together with the accompanying drawings, in which:

FIG. 1 shows a cross-section through a weaving shuttle including the bobbin-clamping device according to the present invention;

FIG. 2 is a perspective view of a modified individual clamping jaw of the invention;

FIG. 3 illustrates, partly in section, a head of a bobbin for cooperation with clamping jaws according to FIG. 2;

FIGS. 4 and 5 are longitudinal sections through bobbins made of rubber-plastic material;

FIG. 6 is a perspective view of a further form of a clamping jaw of the invention;

FIG. 7 is a longitudinal section through a modified weaving shuttle of the invention;

FIG. 8 is a section through the clamping jaw taken along the line VIII—VIII of FIG. 6;

FIG. 9 is a section through the clamping jaw taken along the line IX—IX of FIG. 6.

The shuttle **1** according to FIG. 1 has a square cross section and is made of wood. The inside of shuttle **1** represents a chamber **1***a* which tapers in the direction toward the tip of said shuttle. Located in said chamber **1***a* are two clamping jaws **2**, **3** which are secured there by means of a bolt or screw **4** extending through said jaws.

These jaws **2**, **3** embrace and center the head **5** of the bobbin **6** which is removably mounted in said jaws **2** and **3**. Said jaws rest against each other at one end by means of their projections **7** which extend inwardly somewhat. The two jaws are identical in design, so that only a single type of mould is required for their manufacture. Cast into each jaw for reinforcing and strengthening purposes is a metal part **8** which follows the general outline of the jaws approximately in their middle. A reinforcing metallic shell **22** is provided, which is arcuate in cross section and which is embedded at the end of the jaw.

In FIGURE 2, the insert, numbered **8***a*, is embedded in the jaw at the end opposite the bobbin end and then extends along inside the jaw.

Wound round the two jaws **2**, **3** near their projections **7** is an endless band **9** made of rubber or other elastic material and which resiliently holds the jaws against each other. Located at the end of each jaw—opposite its projection **7**—between the wall **18** of the shuttle and the jaw is a rubber block **10**. Preferably, recesses **10***a* are provided in the jaws to locate and retain the blocks **10**. Instead of a rubber block, however, metal springs may be used. The special design of the jaws, in conjunction with the resilient parts, permits the clamping action to be adjusted as required through altering the effective lever arms or choosing a rubber grade of different hardness.

The inner shape of the jaws is matched to the outer contours of the head **5** of the bobbin body. The head **5** of the bobbin body according to FIG. 3 presents a cylindrical surface **11**, adjacent to which at one side is a truncated cone **15**. These surfaces of the bobbin head lie against the analogously shaped locking surfaces **12** and **12***a* (FIG. 2) of the jaws **2**, **3**, with the result that the head **5** is efficiently centered and held in the jaws.

According to FIGS. 1 and 8, the locking surfaces of each jaw have an arc-shaped cross-section and comprise a cylindrical surface at **12** and, adjacent to this on both sides, surfaces having the shape of truncated cones. Along each edge of each jaw is a slanting surface **13**. The surfaces **13** of the jaw pair that are adjacent enclose an acute angle and serve to facilitate the insertion of the head **5** of the bobbin into the space between the jaws by lateral movement of the bobbin. These surfaces **13** thus define what can be called an entrance throat for the bobbin.

To insert the head **5** of the bobbin into the jaws and thereby into the weaving shuttle, the bobbin **6** is first caused to lie with its head **5** loosely on the jaws **2**, **3** fitted in the shuttle **1** and against surfaces **13**. Then pressure is exerted, for example by automatic means on the head **5** of the bobbin in direction of the jaws, for instance by means of a second head of a bobbin arranged thereover or thereunder. Owing to the slanting leading surfaces **13** arranged on both jaws which define a tapering entrance throat, the jaws are, as a result of the pressure exerted, forced apart so far that the head **5** clinches in the jaws and the locking surfaces of the jaws lock onto the head. In this position the jaws center and hold the bobbin by virtue of the rubber block or blades **10** and the rubber band **9**. For amplifying this centering effect, a bolt or screw **24** may be provided (FIG. 7).

According to FIG. 7 one of the jaws could also be fixed directly to the wall **20** of the shuttle by a screw **17** for fixing this jaw rigidly to the shuttle which facilitates the exchange of the bobbins. This fixing screw could also be arranged at other places of the jaw or be replaced by one or more other suitable fixing means. The rubber band **9** of FIG. 1 may, according to FIG. 7, be replaced by a pin **21** of rubber, extending through openings in both jaws. Where the parts shown in FIGURE 7 correspond with those of FIGURE 1, a subscript *b* has been applied. An individual jaw **2***b* of the FIG. 7 arrangement is shown in FIG. 6, and FIGS. 8 and 9 are sections on FIG. 6. The reinforcing member in these figures is numbered **28**.

The material used for the jaws and the head is preferably a vulcanizable mixture of rubber and synthetic resin similar to hard-rubber. A suitable vulcanizable rubber mixture would be one containing less sulfur than that required to produce hard rubber. The rubber ingredient may consist of natural rubber or else of silicon rubber, polychloroprene (neoprene) or polybutadiene, etc. In addition to sulfur, the mixture is preferably to incorporate also vulcanization accelerators, anti-aging agents and other substances conducive to vulcanization. Further, the mixture is preferably to contain a reinforcing filler, such as finely distributed silicic acid, through carbon black aluminum silicate, etc., may be used to equal advantage.

A suitable thermoplastic material is polyvinyl acetate, though this may be entirely or partly replaced with polyvinyl chloride.

Preferably, an organic reinforcing substance, such as a styrene butadiene copolymer, is added to the thermoplastic material.

It is also possible to add a softener, such as dibutyl phthalate and raw rubber, to the thermoplastic material before mixing the latter with the vulcanizable rubber mixture.

A feasible procedure is to mix the vulcanizable rubber mixture with the thermoplastic material, possibly containing the above-mentioned additions, while admixing, either simultaneously or immediately after, finely distributed silicic acid or some other reinforcing filler.

Through varying the quantitative proportions of the vulcanizable rubber mixture and of the thermoplastic filler and the additions mentioned, it is possible to adjust to requirements the hardness and stability of the objects produced by the shaping and vulcanizing of the mixture.

After vulcanization, which can be performed at a temperature between 120° and 180° C., the result is a body which is either hard or semi-hard, according to the composition of the mixture, and which permits of easy tooling, such as cutting, drilling, etc. Such bodies are resistant to most chemicals and also antistatic.

This coating is bonded to the head of the bobbin body preferably by vulcanization. The bobbin 6, consisting usually partially of wood, is provided at the area to be vulcanized with securing means which prevent any undesirable lengthwise shift of the coating. As shown in FIG. 3, said securing means consist of sawtooth-like grooves 14 into which the vulcanizable material penetrates, thus producing a locking action which secures the parts against lengthwise shifting. It would also be possible, however, to provide for another type of securing means, such as knurls, ribs or radial bores. Also, it would be conceivable to make the entire bobbin of the rubber/plastic mixture mentioned and provide it partly hollow with a stepped bore 20*a* or a conical stepped bore 20*b* as will be seen from FIGS. 4 and 5 respectively. It is advantageous to reinforce the body of the bobbin by an embedded conical metallic sleeve 23 (FIG. 5).

Also, it is possible to make only the bobbin or only the jaws of the above-mentioned material and use the former or the latter in conjunction with known standard parts.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a hollow shuttle for a loom, a pair of jaws mounted within said shuttle and extending along walls of the shuttle, a bobbin having a head held by said jaws and tending to spread the jaws apart, said head comprising a cylindrical and an adjacent shorter conical portion, each jaw having arched transverse cavities cooperating with the cylindrical and conical portion of the head, connecting means for connecting said jaws to said shuttle passing through one end of both jaws at the ends thereof opposite the bobbin, resilient means spaced from each other and urging said jaws toward each other, each of said jaws being provided with a leading surface extending along the longitudinal edge of the respective jaw, said leading surfaces of a pair of jaws forming an acute angle for facilitating the exchange of bobbins, said resilient means comprising first means located adjacent the ends of the said jaws opposite the bobbin and second means located between the jaws and the shuttle wall at the bobbin end of the jaws.

2. A shuttle according to claim 1, in which said first resilient means consists of an endless band of rubber material wound around the end of the jaws near said connecting means, and said second resilient means comprises a block of rubber interposed between each jaw and the adjacent shuttle wall.

3. A shuttle according to claim 2 in which the outer surfaces of the jaws at the bobbin end are recessed to receive said rubber blocks to retain the rubber blocks in place.

4. In a shuttle for a loom; a pair of jaws in the shuttle connected to each other and to the shuttle at their one end opposite the bobbin end, each said jaw comprising a rubber-like body with a stiffening metal member integral therewith, each said jaw having its side edges formed substantially radially to the axis of the shuttle to provide tapering entrance throats to receive bobbins, first resilient means carried by said jaws at their interconnected ends urging the jaws toward each other, and second resilient means between the wall of the shuttle and at least one of said jaws for urging said jaws toward each other at the the bobbin end thereof, each jaw being concave on its bobbin side with the bobbin end a smaller size followed by a conical portion and then a larger size whereby to receive and grip correspondingly shaped bobbin ends.

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