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Porter

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[54] **YARN HOLDING DEVICE FOR A PICKING ELEMENT OF A LOOM**

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[52] **U.S. Cl.** ..... **139/122 N**, 139/125

[51] **Int. Cl.** **D03d 47/20**, D03d 47/24

[58] **Field of Search** ..... 139/1, 122 N, 125, 126; 223/102, 103, 104

[56] **References Cited**

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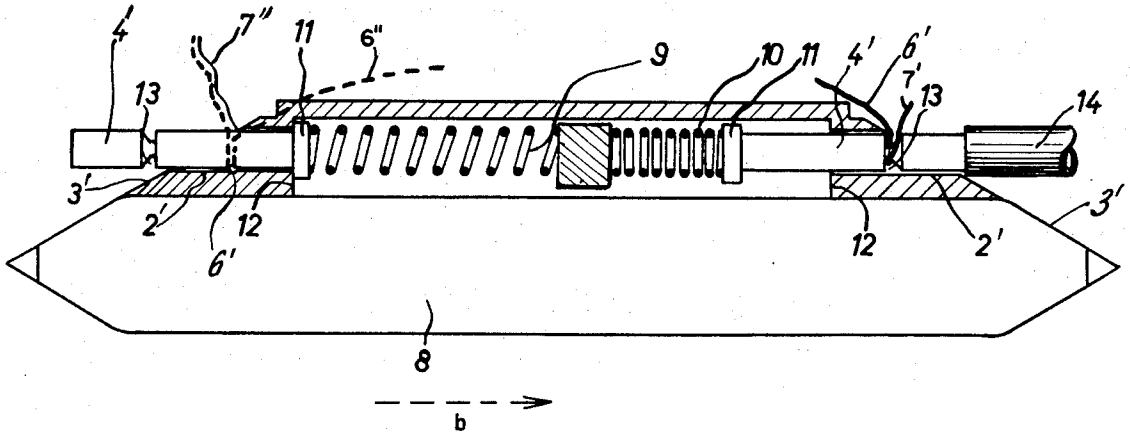
[57] **ABSTRACT**

A yarn gripping device on a weft-inserting element of a loom is operable to pick weft yarn from a stationary weft yarn supply arranged outside the loom. The weft-inserting element has at least one cylindrical tubular end part with a running plane surface which is inclined at the front end for the weft yarn. A cylindrical bar is located in a bore of the cylindrical end part which terminates at the inclined running surface. The bar protrudes beyond the running plane surface and there is a radial clearance between the bar and the bore on all sides which is at least as great as the yarn thickness. The weft yarn forms a loop around the bar as it runs up the inclined running plane surface to form a loop which increases as more of the weft yarn is wrapped around the bar due to the running up on the inclined surface. The bar is advantageously resiliently mounted within the cylindrical tubular end part so that it may be displaced in a radial direction. The weft-inserting element may take the form of a loom shuttle having inclined running surfaces at each end and with a bar projecting through the bore which terminates at the inclined running plane surface at each end.

5 Claims, 6 Drawing Figures



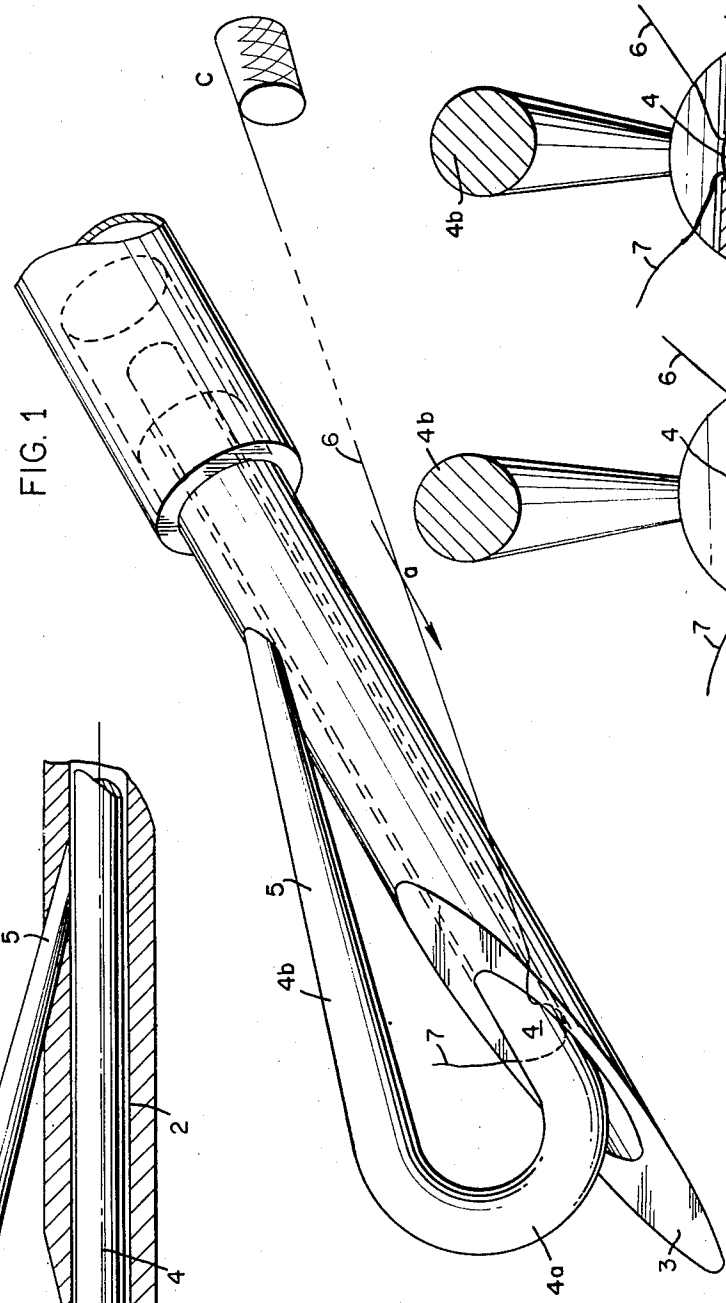


FIG. 1

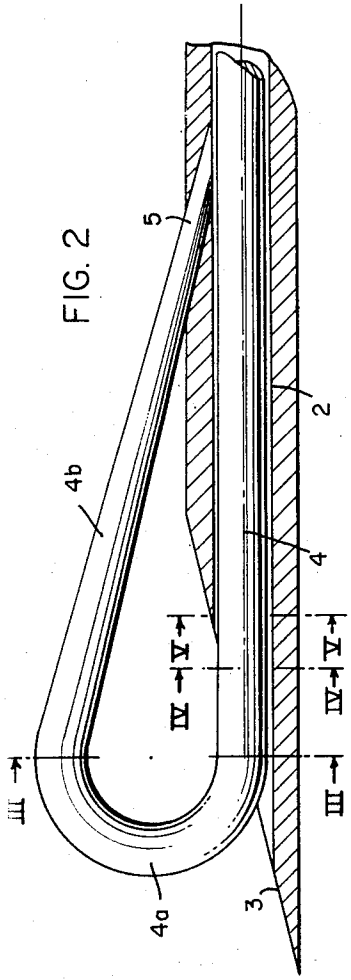


FIG. 2

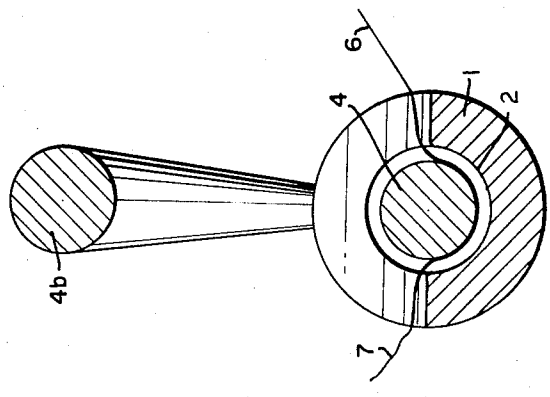


FIG. 3

FIG. 4

FIG. 5

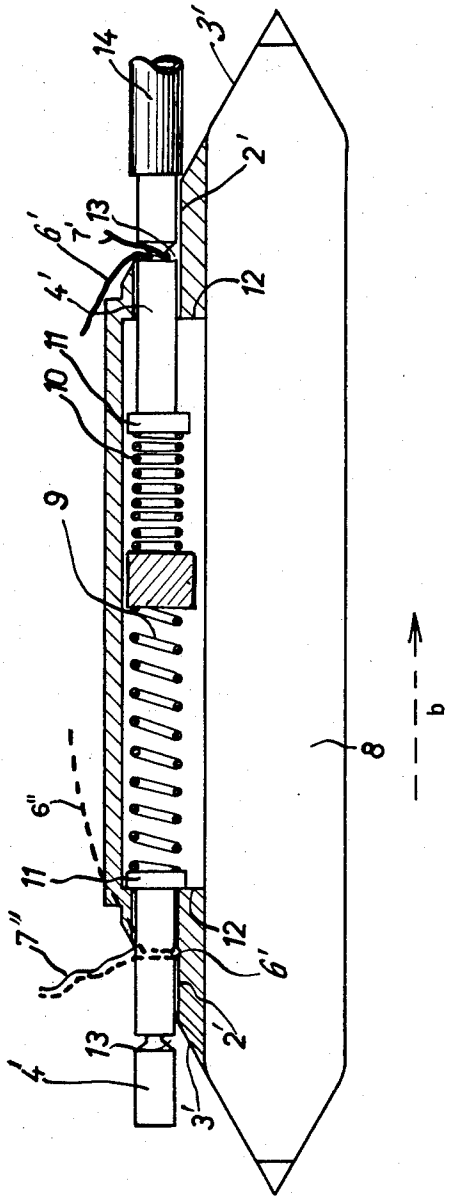


Fig.6

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YARN HOLDING DEVICE FOR A PICKING ELEMENT OF A LOOM

SUMMARY OF THE INVENTION

This invention relates in general to yarn gripping devices and, in particular, to a new and useful device for holding yarn on a weft-inserting element of a loom by means of which the weft yarn which is unwound from a stationary delivery spool arranged outside the loom, or which is stored to a measured length, is picked.

Various yarn holding devices on weft-inserting elements of a loom are known where the yarn is clamped between members pressed resiliently against each other. Such devices take the form of spring tongues or rigid pincers which are provided with rubber-like resilient coatings. They have the disadvantage that they stress the yarn at the clamping point and the tongues or pincers must be operated from the outside by means of complicated and large mechanisms when the yarn is to be gripped or released.

Another known arrangement utilizes the friction force between the yarn and the deflecting members superposed in a scissor-like fashion in a distance from each other as a holding force for the yarn. The size of the friction force depends on the resulting total looping angle. The retaining of the yarn is ensured by the deflection with a corresponding increase of the looping angle of the yarn at the end issuing from the device in a selected direction of motion of the device. In a reversal of the direction of motion the yarn ends are no longer conducted about the deflecting members so that the looping angle and the friction force connected with it are correspondingly reduced. The yarn can be withdrawn from the device with little tension. The device has the disadvantage that the deflecting members interlocking in the manner of scissors to receive the yarn must be spread from the outside; this requires additional precision operating mechanisms.

In accordance with the present invention, there is provided a simple device which does not have the disadvantages of the above mentioned devices and which provides an adequate means for holding the yarn. This is achieved by forming a weft-inserting element with at least one cylindrical tubular end part having an inclined or bevelled running plane surface at the end of a through bore. A bar protrudes out through the running plane surface at the end of the bore and the radial clearance between the bar and the bore is sufficient on all sides to accommodate the yarn thickness. The weft yarn to be picked up engages on the running plane surface and loops the bar as it runs up along the running plane surface. The yarn is engaged in the bore around the bar with ever increasing loop area due to the delivery resistance of the weft yarn supply on the one weft yarn end part and the resistance of a holding device on the other weft yarn end part. The friction between bar and weft yarn increases by increasing loop to an amount at which sliding of the yarn around the bar is excluded.

Accordingly, it is an object of the invention to provide an improved yarn gripping device for a weft-inserting element of a loom in which the weft yarn is picked from a stationary supply arranged outside the loom which is characterized by at least one cylindrical tubular end part with a running plane surface which is

inclined at the front end for receiving the yarn thereon and which includes a bore terminating in the running plane surface which carries a bar which protrudes outwardly from the surface, the clearance between the bar and the bore on all sides being at least as great as the yarn thickness so that the yarn moving up on the running plane surface loops the bar to an increasing extent and is thus retained.

A further object of the invention is to provide a gripping device in the form of a loom shuttle which includes at least one end having an inclined plane surface with a bar member protruding outwardly from said surface of a diameter to define a weft receiving clearance therebetween and provided with an annular undercut which bar includes spring means urging the bar member in an axial direction to extend outwardly from said inclined plane surface leaving the annular undercut outside of said surface.

A further object of the invention is to provide a yarn gripping device which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference should be made to the accompanying drawing and descriptive matter in which there are illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a front end perspective view of a weft-inserting element constructed in accordance with the invention;

FIG. 2 is a longitudinal sectional view of the device indicated in FIG. 1;

FIGS. 3, 4, and 5 are emphasized sectional views taken along the lines III—III, IV—IV, and V—V, respectively of FIG. 2; and

FIG. 6 is a partial side elevational and longitudinal sectional view of a loom shuttle of another embodiment of the invention.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in particular, the invention as embodied in FIGS. 1 to 5, comprises a weft-inserting element including a cylindrical portion 1 having an inner wall 2 of a through bore which opens on a running plane surface 3 which is inclined or extends obliquely. A round bar 4 extends through the bore and it is of a size so that there is a clearance between it and the wall 2, on all sides, which is at least equal to the thickness of a weft thread or yarn 6. The bar 4 includes a curved front portion 4*a* and a backwardly bent portion 4*b* which is engaged in the wall of the tube 1. The backwardly bent portion 4*b* acts as a spring for the radial movement of the bar in the bore 2.

The weft yarn 6 having a free end 7 is drawn from a delivery spool *c* or storage devices for yarn previously measured to length (not shown) and it lies, when running, on the running surface 3 below the curved portion 4*a* of the rod 4.

The operation of the device is as follows:

The yarn 6 extends transverse to the path of the weft-inserting element and, during the initial movement of the weft-inserting element in the direction indicated by the arrow a, lies upon the running surface 3 while the free yarn end 7 is held by a holder (not shown). With the further advance of the picking element in the direction *a*, the yarn moves higher and higher on the inclined plane surface 3 due to the delivery resistance of the weft yarn supply on the weft yarn end part 6 and the resistance of the holder on weft yarn end part 7, developing progressively a loop curved around the bar 4 as it is moved therealong to an ever increasing extent as shown by FIGS. 3, 4 and 5 corresponding to cross-sections III, IV, and V in FIG. 2.

In accordance with the tension on the yarn 6, the free yarn end 7 is released automatically or by the opening of the yarn holder which may be actuated in synchronism with the movement of the weft-inserting element. Due to the air friction on this free yarn end and the resistance on the other yarn end exerted by the stationary weft supply, the yarn moves higher and higher on the inclined running plane surface 3 so that the looping angle of the yarn about the bar increases and becomes so great that the yarn cannot slide off longitudinally around the bar. The bar 4 is displaced toward the tube inner wall 3 in an amount corresponding to the spring force exerted by the portion 4*b* of the bar.

When the direction of motion of the weft-inserting element takes place after insertion of the weft in the shed, the yarn 6 becomes detached from the loop engagement around the bar 4 and runs down the surface 3 in the reverse direction.

In FIG. 6, there is indicated a loom shuttle 8 having an inclined plane surface or running surface 3' at each end. In this construction, a central cylindrical cavity 9 with end faces 12 opens up at each end to cylindrical bar members 4' which have a clearance with the associated wall 2' by an amount at least comparable to the thickness of weft yarn 6'. In this construction, each bar 4' includes a cylindrical head portion 11 of a diameter greater than bar 4', which is urged by a compression spring 10 in a direction to cause the bar members 4' associated therewith to project beyond the running plane surface 3' and to move axially along the associated bore and project beyond the running plane surface 3' and rest on the faces 12 acting as limit stop for the outward movement of the bar members 4'. Each of the bar members 4' also have an annular undercut surface 13 wider than the diameter of the weft yarn and positioned at a distance along the axis of bar members 4' so that when cylindrical head portion 11 rests against limit stop surface 12 of cavity 9, the annular undercut surface 13 lies axially above and outside of the running plane surface 3' of shuttle 8. The loom frame (not shown) carries fixed stops 14 and each bar member 4' is alternatively pushed back by each stop 14, against the associated spring 10 carried in shuttle 8, into each bore bounded by the wall surfaces 2' as the shuttle 8 moves from left to right as indicated by slotted arrow *b* and by this motion, the weft yarn is engaged in the annular undercut 13 which, because of the relative motion between the fixed stop 14 with bar member 4' and the shuttle 8, has now passed axially along bore 2' through and inside the inclined plane surface 3' engaging the weft yarn 6' in the annular chamber formed by the undercut 13 and wall surfaces 2' of the bore. The looping angle of the weft yarn is thus reduced so that the weft yarn could be pulled with less tension out of the gripping device.

Depending upon the direction of weft insertion as indicated by arrow *b* from left to right followed alternatively by weft-insertion from right to left in the reverse direction as is the normal procedure in weaving machines so can a weft yarn 6' and subsequently weft yarn 6'' at the opposite end of shuttle 8 be looped and gripped by the bar member 4' and inclined running plane surface 3', for weft-insertion, to be subsequently released by the movement of the bar member 4' with annular undercut 13 into the bore 2' and through the inclined plane surface 3' under the action of end stop 14 against the spring 10. At least a portion of the shuttle 8 includes a tubular part defined by the walls 2' at each end.

While specific embodiments of the invention have been made and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A weft yarn holding device for a weft-insertion element of a loom which includes a stationary weft yarn supply arranged outside the loom from which weft yarn is picked, comprising at least one end part with an inclined running plane surface at its front end over which the weft yarn is adapted to run, said end part having a bore terminating in said inclined plane surface; a bar extending through the bore of said inclined plane surface and protruding outwardly past the inclined plane surface and having a radial clearance in the bore on all sides at least as great as the yarn thickness; the weft yarn being displaceable during the movement of the picking element in the direction of engagement with the yarn to cause it to run up along the running surface and to form an increasing loop around the bar and be retained between the bar and the bore of the picking element.

2. A weft yarn holding device, according to claim 1, wherein said bar is resiliently mounted on said end part.

3. A weft yarn holding device, according to claim 1, wherein said bar can move longitudinally in said end part and includes an annular undercut part in which the yarn is engageable which reduces the looping size of the yarn when the bar is positioned to cause engagement of the yarn in the undercut portion.

4. A weft yarn holding device, according to claim 1, wherein said weft-inserting element comprises a shuttle of a loom having at least one end with an inclined running surface said bar comprising a straight bar member projecting outwardly beyond the running surface from the bore of said tubular element, and means biasing said bar in a direction toward extension outwardly beyond the running surface, said bar being movable by deflection inwardly and including an annular undercut surface which is located beyond the running surface when said bar projects outwardly by a maximum amount and which is moved within the bore to come into engagement with the yarn when said bar is deflected inwardly.

5. A weft yarn holding device, according to claim 4, including a bar member projecting outwardly from each end and spring means urging of said bar members outwardly from each end, each bar including an undercut part which may be shifted into the bore to engage the yarn there around and relieve the tension and holding engagement due to the reduction of the yarn loop size to facilitate removal of the yarn from the weft-inserting element.

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