June 25, 1940. S. WOOD 2,205,612

SHUTTLE

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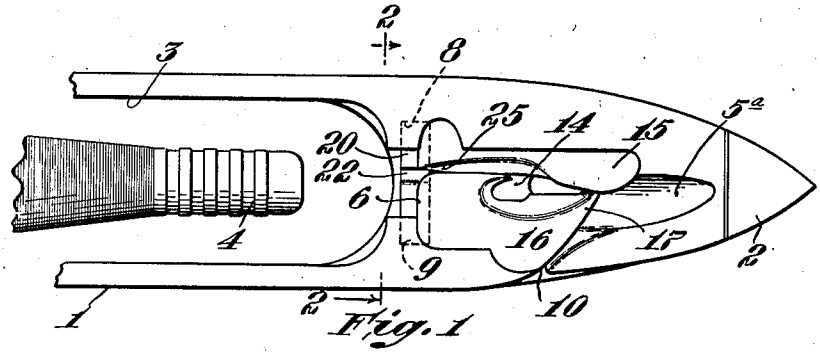


Fig. 1

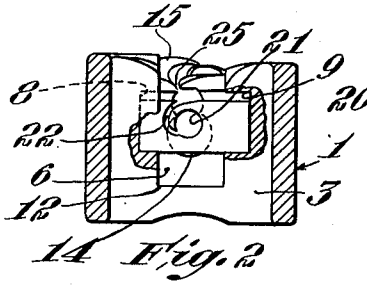


Fig. 2

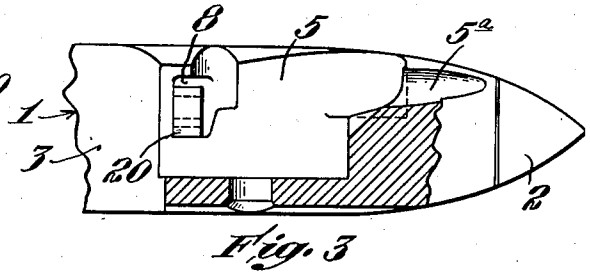


Fig. 3

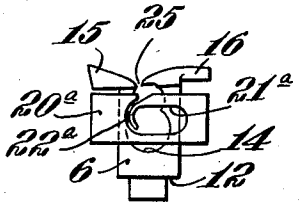


Fig. 5

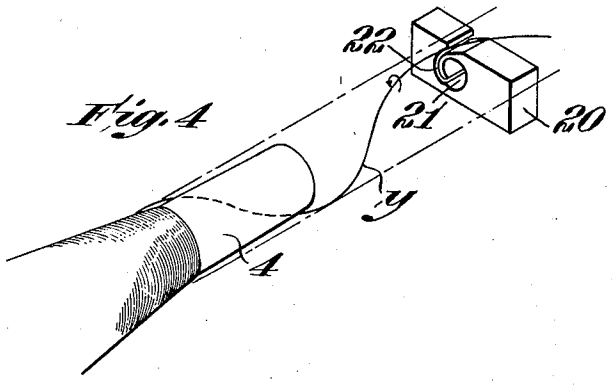


Fig. 4

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SHUTTLE

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9 Claims. (Cl. 139—212)

This invention relates to weaving shuttles of the self-threading type, and more particularly to an arrangement embodying a yarn trap effective to prevent unthreading of the shuttle. In order to attain perfect weaving, it is not only necessary to secure uniformity of yarn tension, but also to provide a reliable and effective thread guiding means, particularly when weaving wiry and hard-twisted yarns, since such yarns exhibit a tendency to kink adjacent to the delivery eye of the shuttle and, in so kinking, to twist and writhe in such a way as to escape from the shuttle eye with resultant miss-picks or breakage of the filling.

The principal objects of the invention are to provide an arrangement which operates satisfactorily on various types of yarns, including rayon, wool, worsted, silk and mohair, and which is effective to prevent misthreading during the weaving operation and at the doff, and to provide an arrangement which is not only effective to maintain the filling in proper alignment in the shuttle eye, thus aiding the operation of the filling cutters, but also to ensure perfect filling control on the first pick, and which prevents the filling from kinking, and which is effective to cooperate with tension means to maintain a substantially uniform tension at all times.

A further object of the invention is to provide a readily removable and replaceable yarn trap in association with the usual threading block, whereby the yarn trap, which receives the wear of the yarn as the latter balloons from the bobbin tip, may be renewed as required, without necessitating renewal of the entire guide block.

Further objects relate to various features of construction and will be apparent from a consideration of the following description and the accompanying drawing, wherein

Fig. 1 is a fragmentary plan view of a shuttle embodying a yarn guiding device in association with a yarn trap constructed in accordance with the present invention;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary longitudinal section through the end portion of the shuttle, but showing the yarn guide block removed;

Fig. 4 is a perspective view illustrating the operation of the improved yarn trap; and

Fig. 5 is a front elevation of a modified type of yarn trap in association with the guide block.

The embodiment chosen for illustration comprises a weaving shuttle 1 of the type commonly used in automatic looms, provided at its end with the usual metal tip 2. The body of the shuttle has an elongate chamber 3 for the reception of a bobbin 4. At its forward end the chamber 3 communicates with a recess or pocket 5 which terminates forwardly in a thread-receiving groove 5a, as shown in Figs. 1 and 3. The pocket 5 is shaped to receive a thread guide block 6 which may be of metal or other suitable material commonly employed for the purpose. Adjacent to the junction of the chamber 3 and the pocket 5, the body of the shuttle is cut away or otherwise suitably shaped to provide a pair of spaced, oppositely disposed, vertically extending guide grooves or slots 8 and 9 (Fig. 2). The wall of the shuttle may be provided with the usual longitudinally extending shallow thread groove (not shown) communicating with the usual yarn delivery passage 10 (Fig. 1) which leads from the pocket 5.

The block 6 has a substantially flat bottom surface 12 which seats on the floor of the pocket 5. The block is formed with spaced walls defining a yarn-guiding passage 14, which is in substantial alignment with the axis of the bobbin 4. The block 6 may also be furnished with the usual guide pin or pins (not shown), for example at the junction of the delivery passage 10 and the guiding passage 14, and in addition the block is also provided with the usual forwardly directed guard member 15 and beak or horn 16 having a narrow pointed tip 17 which underlies the front end of the guard member 15.

A yarn trap, designated by the numeral 20, is slidably mounted for free vertical movement in the guide slots 8 and 9. The trap 20 comprises a block-like member preferably composed of non-metallic material, for instance vulcanized fiber; a rubber or synthetic rubber compound; synthetic resin, or the like, capable of receiving and retaining a smooth finish free from surface irregularities which might interfere with proper guidance of the yarn. This trap 20 is retained in the guides 8 and 9 by the presence of the block 6 in the recess 5, and by removing the block 6, the trap may easily be taken out and replaced by another, either for renewal after excessive wear, or in substitution for a trap designed for use with a different kind or wind of yarn. The trap 20 is formed with a circular opening 21 located approximately at its geometrical center and has a curved or arcuate entrance slot 22 which extends from the lower part of the opening 20 laterally and upwardly to the upper edge of the trap, as shown in Figs. 2 and 4, the slot preferably flaring in width as it approaches the upper surface of the part 20.

The construction and arrangement of the guides 8 and 9 and the size and shape of the trap 20 are such that the center of the opening 21 is at all times maintained in substantially the vertical plane of the axis of the bobbin 4 and also in substantial alignment with the guiding passage 14 of the block. Irrespective of the position of the trap vertically of the guides 8 and 9, the outer or receiving end of the slot 22 is at all times maintained in the vertical plane of the rear end of the threading slot 25 in the block 6 (Figs. 1 and 2), said slot 25 extending forwardly between the proximate upper edges of the guard 15 and the beak 16 and leading down into guide passage 14. Where, as here shown, the yarn Y (Fig. 4) on the bobbin 4 is wound thereon in a clockwise direction, it necessarily follows that the unwinding of the yarn is in a counterclockwise direction, as indicated by the arrow in Fig. 4, and accordingly the curvature and location of the slot 22, relative to the opening 20, is such as to conform with the direction of the whip or ballooning of the yarn Y.

Although the yarn trap illustrated in Fig. 4 is provided with a circular opening, it is to be understood that if desired this opening may be elliptical or elongate, as illustrated for example in Fig. 4, wherein the trap 20^a is formed with an elongate guide opening 21^a having curved ends, one of which communicates with the lower end of the curved slot 22^a which extends laterally and upwardly, terminating at a point in approximate alignment with the threading slot 25 of the guide block 6.

When the yarn is initially received by the shuttle, it engages the upper faces of the guard 15 and beak 16 of the shuttle block and extends along the thread groove 5^a. During the first pick of the shuttle, which is toward the left as viewed in Figs. 1 and 3, the yarn, being held at its free extremity, is drawn downwardly through the threading slot 25 into the guiding passage 14, and as the yarn is simultaneously being unwound from the bobbin that portion of the yarn between the end of the bobbin and the trap 20 whips or balloons in a counterclockwise direction which is effective to carry the moving yarn into and through the slot 22 and so into the opening 21, as illustrated in Fig. 4. During the return movement of the shuttle, that is, the second pick, the yarn Y finds its way downwardly beneath the beak 16 into the delivery passage 10, and thereupon becomes correctly positioned within the guiding channels.

As the shuttle travels back and forth, the ballooning yarn delivering from the end of the bobbin sweeps around the inner surface of the opening 21 in the trap 20, the latter being free to move vertically in the guides 8 and 9 in response to the different forces exerted thereon by the travelling yarn. Although the floating movements or vertical oscillations of the trap 20 are comparatively slight, preferably being of the order of $\frac{1}{16}$ to $\frac{1}{8}$ of an inch, the trap is nevertheless effective not only by inertia effect to minimize or dampen the ballooning movement of the yarn Y and maintain it in proper alignment within the shuttle, but also to prevent unthreading and substantially to eliminate kinking, etc., which might otherwise result. Since, as above pointed out, the trap 20 is free to move within the guides 8 and 9, it tends to respond to the vertical components of motion of the yarn, but with a certain lag, and yieldingly opposes those forces which tend to cause misthreading, kinking, etc. However, as the movement of the trap is limited to a range of the order of $\frac{1}{16}$ to $\frac{1}{8}$ of an inch, the yarn is not permitted to deviate from its normal line of travel sufficiently to cause unthreading.

In practice it has been found that the combination of my improved movable yarn trap with a guide block of the type herein disclosed permits the yarn to be entered into the guiding passage of the shuttle with the greatest ease and certainty, so that proper threading of the shuttle is assured before completing the second pick. It has further been found that with this arrangement, wiry and hard-twisted yarns, such as rayon, wool, worsted, silk and mohair, may readily be woven and the proper tension may be maintained without recourse to specially designed tension devices which are commonly employed in weaving yarns of this character. It has been further found that in weaving yarns of the above-mentioned character and which tend to kink and writhe in the shuttle eye, substantially no unthreading takes place and that filling breakage and misthreading at the doff is substantially eliminated. Moreover, the trap is effective to hold the filling in proper alignment within the shuttle and thus not only aids the operation of the filling cutter, but also gives perfect filling control on the first pick as the filling enters the guide before entering the shuttle eye.

While I have shown and described different desirable embodiments of the invention, it is to be understood that this disclosure is for the purpose of illustration and that various changes in shape, proportion, and arrangement of parts, as well as the substitution of equivalent elements for those herein shown and described, may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A weaving shuttle of the kind which has a bobbin-receiving chamber and a yarn guide block disposed between the end of said chamber and the tip of the bobbin, said block having a yarn-guiding passage and a longitudinally extending threading slot opening into such passage, characterized in having a floating yarn trap independent of the block interposed between the rear end of the block and the adjacent end of the bobbin chamber, said trap having a yarn-receiving opening with its axis in substantial alignment with the axis of the guide passage in the block, and having a curved entrance slot provided with a downwardly tapering entrance throat disposed substantially below the rear end of the threading slot, said entrance slot leading downwardly and to one side of the opening in the trap and entering said opening near its bottom.

2. A weaving shuttle of the kind having a bobbin-receiving chamber and a yarn guide block disposed between the front end of said chamber and the tip of the shuttle, said block having a yarn-guiding passage, characterized in having a yarn trap interposed between said guide block and the bobbin chamber, the shuttle comprising guide elements by which said trap is guided for free vertical movement, said trap having an opening disposed in substantial alignment with the yarn-guiding passage of the block, and having a curved entrance slot leading from the upper part of the trap partially around said opening and entering the latter near its bottom.

3. In a weaving shuttle having a bobbin-receiving chamber and a yarn guide block, said block having a yarn-guiding passage and a

threading slot, in combination, a yarn trap of non-metallic material provided with a central opening whose axis is disposed in the vertical plane of the axis of the yarn guide passage of the block and which has a curved slot leading from its upper part toward its lower part and entering the opening near the bottom of the latter, and means so confining said trap as to permit it to move bodily to a limited extent in response to radial components of pressure exerted by the yarn as the latter balloons from the tip of the bobbin.

4. A weaving shuttle having a bobbin-receiving chamber and a yarn guide block disposed forwardly of the chamber, said block having a longitudinal yarn-guiding passage and a threading slot, characterized in having a vertical guideway located between said chamber and block, and a yarn trap disposed to move freely in said guideway, said trap comprising a non-metallic member having a yarn-receiving opening substantially aligned with the yarn-guiding passage of the block and having an entrance slot leading to the lower part of said opening from a point substantially below the rear end of the threading slot.

5. A weaving shuttle having a bobbin-receiving chamber and a guide block spaced forwardly from the forward end of said chamber, characterized in that the shuttle has a vertical recess between the forward end of the chamber and the rear end of the block and in having a yarn trap comprising a block of compressed fibrous material disposed for free vertical movement in said vertical recess, said trap having a thread-receiving opening in substantially axial alignment with the yarn-guiding passage of the block and having a curved entrance slot leading to the lower part of the opening from a point substantially below the rear end of the threading slot.

6. A weaving shuttle of the kind having a bobbin chamber and a guide block disposed between the end of the chamber and the tip of the shuttle, characterized in having a yarn control element interposed between the point at which the yarn leaves the tip of the bobbin and the rear end of the guide block, said control element having a thread-receiving opening and being designed and arranged to move bodily in response to radial components of pressure exerted by the yarn against the wall of the opening as the yarn balloons from the tip of the bobbin thereby to exert yielding pressure upon the ballooning yarn and thereby reduce the diameter of the balloon as the yarn approaches the guide block.

7. A weaving shuttle of the kind having a bobbin chamber and a guide block disposed between the end of the chamber and the tip of the shuttle, characterized in having a yarn control element interposed between the point at which the yarn leaves the tip of the bobbin and the rear end of the thread block, said control element having a thread-receiving opening for the passage of the yarn on its way from the bobbin to the guide block, and further characterized in that said control element is mounted to float up and down in response to vertical components of pressure exerted by the ballooning yarn.

8. A weaving shuttle of the kind having a bobbin chamber and a guide block disposed between the end of the chamber and the tip of the shuttle, characterized in having a yarn control block interposed between the forward end of the chamber and the guide block, said control block having an aperture through which the yarn passes on its way to the bobbin from the guide block, the block being mounted for free reciprocation in one direction at least and being of such weight as to exert a constraining effect upon the traveling yarn by reason of its inertia.

9. In a weaving shuttle having a bobbin-receiving chamber and a yarn guide block, said block having a yarn-guiding passage and a threading slot, in combination, a yarn trap provided with a central opening whose axis is disposed in the vertical plane of the axis of the yarn guide passage of the block, and means so confining said trap as to permit it to move bodily to a limited extent in response to radial components of pressure exerted by the yarn as the latter balloons from the tip of the bobbin.

SETH WOOD.