July 15, 1969 R. B. GOLOBART 3,455,340

WEFT THREAD LOCATING AND PRESENTING DEVICE IN WEAVING MACHINES, PARTICULARLY OF THE SHUTTLELESS TYPE

Filed Dec. 12, 1966 2 Sheets-Sheet 1

FIG. 1

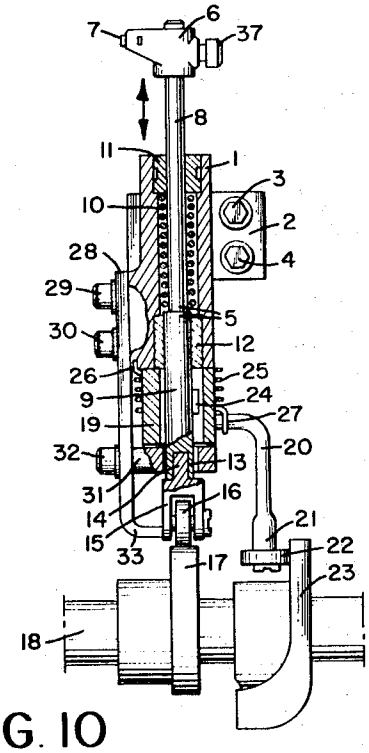

FIG. 2

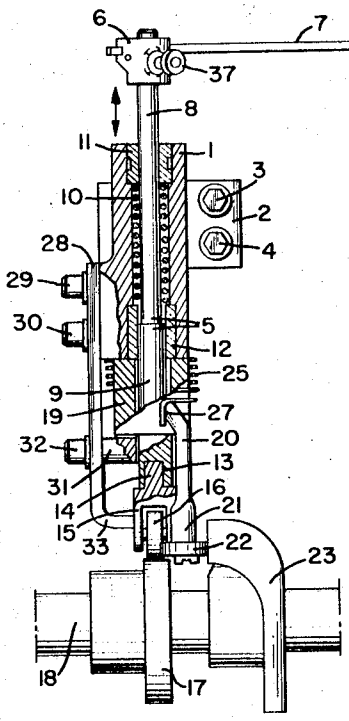

FIG. 10

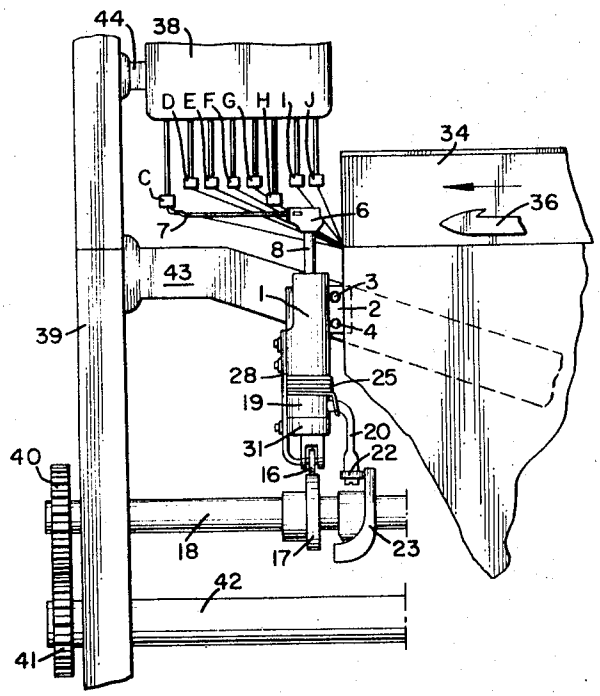

FIG. 11

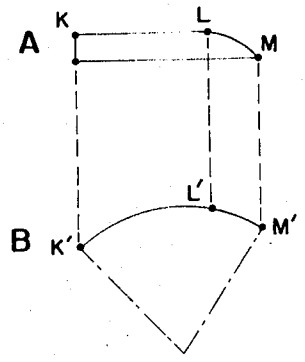

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FIG.3

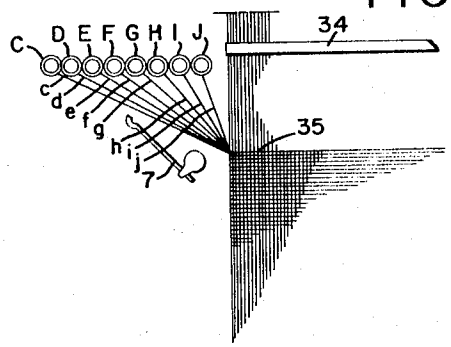


FIG.4

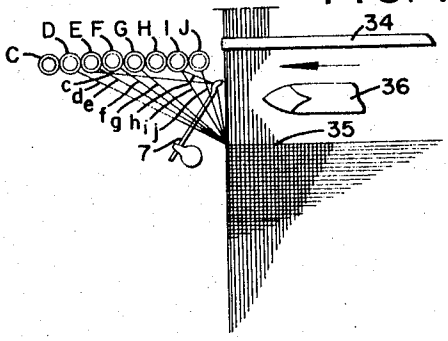


FIG.5

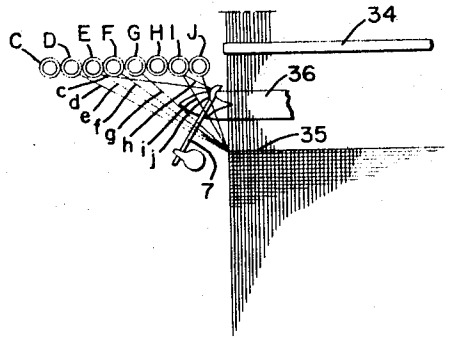


FIG.6

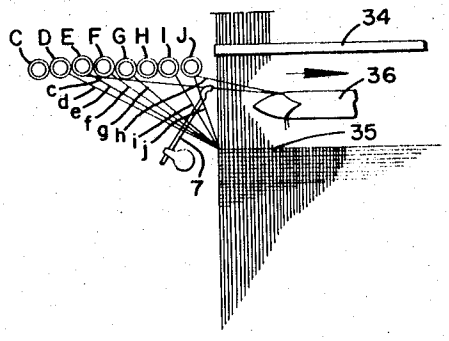


FIG.7

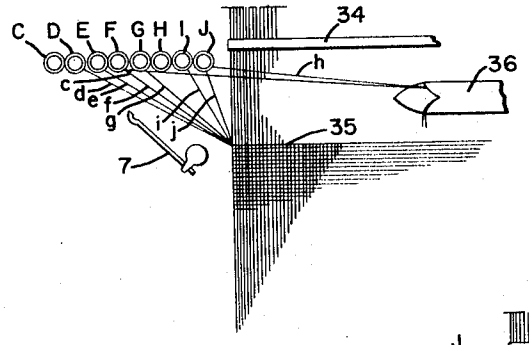


FIG.8

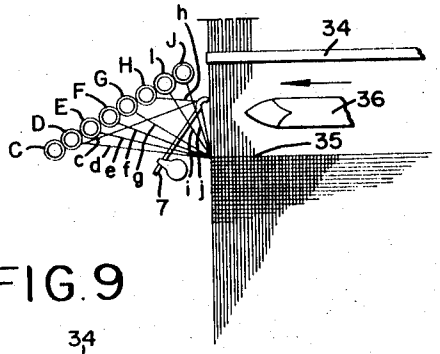
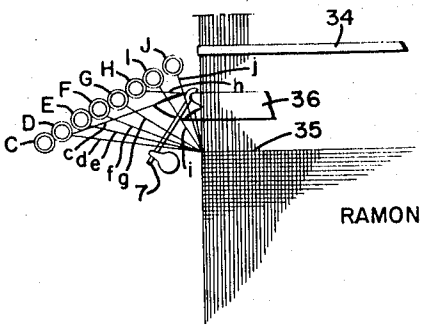


FIG.9



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United States Patent Office

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WEFT THREAD LOCATING AND PRESENTING DEVICE IN WEAVING MACHINES, PARTICULARLY OF THE SHUTTLELESS TYPE

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Claims priority, application Spain, Dec. 21, 1965, 321,302
Int. Cl. D03d 47/20
U.S. Cl. 139—122 6 Claims

ABSTRACT OF THE DISCLOSURE

A weft thread locating and presenting device for weaving machines comprises a weft thread locating arm adapted to conduct the selected weft threads from the different points of presentation by means of an arched swinging movement, in a horizontal plane at the beginning of the movement and in a downwardly inclined direction just before its end, to a common point of all weft threads at a determined level for gripping by the weft thread inserting element.

The present invention relates to a weft thread locating and presenting device in weaving machines, particularly of the shuttleless type.

In shuttleless looms and also in other types of looms which require the arrangement of weft thread selecting elements, the practice has shown that the most suitable types of weft thread selecting elements are those which present all the weft threads in one and the same horizontal plane in a linear position, i.e. one weft thread after another in one rectilinear range parallel to the travel described by the weft inserting element, or by the shuttle having clamping elements, or by an oblique selecting device; such elements may be also arranged in such a manner that the weft threads are presented successively in one rectilinear range parallel to the travel described through the loom shed by the weft thread inserting element, or by the shuttle having clamping members.

However, the travel of every kind of weft thread inserting element must extend to the extreme position of the outer weft thread presenting member of the selecting device with regard to the fabric selvedge. This causes the weft thread inserting element to effect an unnecessarily long path of travel outside of the warp which diminishes the fabric width capabilities of the loom.

On the other hand, the distances from the last to the first weft thread presenting element of the selecting device, with regard to the converging point of the weft threads in the selvedge, vary proportionally to the number of thread guide presenting elements, so that in the case of the existence of a great number of weft threads, there arises the problem of uneven weft tension gripped and inserted by the weft thread inserting element through the shed, thus causing irregularities in each weft thread insertion and, therefore, in the fabric, so that it would be necessary to limit the variety of weft threads of different types and colors to a minimum.

The different types of inserting elements, either being rigid or flexible and having jaws or hooks provided at their extreme ends for gripping the weft thread, or shuttles having jaws or hooks, may give rise to differences in the height, due to the projections of the jaws or hooks. This causes positioning difficulties as to the locating of the weft thread in the thread-guides of the presenting elements, so that many types of fabrics may result defective when a considerable number of weft threads of different types and/or colors is used.

The device according to the invention avoids these inconveniences and allows the production of larger fabrics in the same loom, with the same travel of the inserting element, or of fabrics having the original width but at a higher speed by reducing the travel of the weft inserting element, with uniformity of the tension of all weft thread passages and of the gripping of the weft thread by the inserting element, thus resulting in a greater yield of production.

The device according to the invention ensures that the selected and presented weft threads are conducted to a common conjunction point for all weft threads, where they are gripped by the weft inserting element, either alone or in passages of various weft threads at a time, for insertion through the shed for the formation of the fabric. The device assures complete uniformity of production and the elimination of defects.

Said device comprises a weft thread locating arm adapted to conduct the selected weft threads from the different points of presentation by means of an arched swinging movement, in a horizontal plane at the beginning of this movement and in a downwardly inclined direction just before its end, to a common point of all weft threads at a determined level according to the configuration of the type of jaw, hook or gripping member of the weft thread inserting element.

Said weft thread locating arm is secured to a vertical shaft which receives a double movement, an angular rotating one and an axially descending one, the latter movement starting before the first one has finished. The lower end of said vertical shaft is provided, on the one hand, with a lever-arm carrying on its free end a roller which, sliding on a first cam having an axial bulge, turns the vertical shaft in right or left sense, and, on the other hand, a roller sliding on a second cam actuating on said vertical shaft in axial sense and which, maintaining this shaft in elevated position causes, in cooperation with a helical counter spring and a recess in said second cam, a descending movement of said vertical shaft before the end of the said first movement, thus bringing the weft thread locating arm at the level of the conjunction point of the weft threads to be gripped by the weft thread inserting element; the angular return rotation of the vertical shaft is caused by means of a spring actuating on it in opposition to the swinging movement caused by the said first cam. The weft thread locating arm is arranged on the upper end of the said vertical shaft, and its free end is hook shaped for receiving the selected weft thread or weft threads and pulling them, in consequence of the combined rotating and descending movement of the said shaft, to the aforementioned conjunction point for being gripped at this point by the weft thread inserting element and inserted through the shed. All the further selected weft threads are pulled in the same way, and if more than one weft thread, for example two or more, shall be selected at a time, said weft thread locating arm guides the weft threads to the common conjunction point so that they can be gripped and inserted through the shed by the weft thread inserting element just as in the case of one single weft thread.

Therefore, when the weft thread selecting device causes the descending movement of the selected thread-guide or thread-guides, these are aligned at the level of the hook shaped end of the weft thread locating arm near to the travel level of the weft thread inserting element. There is no doubt that this provision facilitates and simplifies the presentation of the weft thread for being gripped by the weft thread inserting element and reduces the travel of this element, since the weft thread locating arm has guided the weft thread from the presenting point of the selecting device to the conjunction point near the selvedge. Fabrics of the same width may be produced but at a higher

speed in consequence of the diminution of the travel of the weft thread inserting element or, in the case of maintaining the same travel of the weft thread inserting element in looms having a determined weaving range, this may be enlarged at each side corresponding to the width of the thread-guide presenting elements of the selecting device.

In both of said cases the device according to the invention is adapted to the type of selecting device presenting the weft threads in a horizontal plane but in oblique position with regard to the travel described by the weft inserting element.

The movement of the weft thread locating arm as that well as of the thread-guide presenting members of the selecting device and that of the weft thread inserting element are synchronized by adjusting the two cams actuating said weft thread locating arm. In a similar manner, the level of the weft thread locating arm can be adjusted.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a front view of the device with parts in section shown in inoperative position.

FIG. 2 is a front view of the device with parts in section showing their movable elements in the end position of the combined swinging and descending movement.

FIG. 3 is a schematic plan view showing the weft thread locating arm in its inoperative position.

FIG. 4 is a schematic plan view showing the weft thread locating arm in the position that it adopts after having conducted the selected weft threads to their presenting point for being gripped by the weft thread inserting element.

FIG. 5 is a schematic plan view showing the weft thread locating arm in the same position as in FIG. 4, but illustrating the weft thread inserting element in its starting position for beginning the insertion of the selected weft threads through the shed.

FIG. 6 is a schematic plan view showing the beginning of the insertion of the selected weft threads through the shed by the weft thread inserting element, the weft thread locating arm being maintained in the same position as shown in FIG. 5.

FIG. 7 is a schematic plan view showing the weft thread inserting element in a further position during its travel through the shed, the weft thread locating arm having returned to its starting position for initiating a new presentation of the selected weft threads for the following weft thread inserting passage.

FIG. 8 is a schematic plan view showing the weft thread locating arm in the position that it adopts after having conducted the selected weft threads to their presenting point for being gripped by the weft thread inserting element, but this time in connection with an obliquely arranged selecting device.

FIG. 9 is a schematic plan view similar to that of FIG. 8, but showing the weft thread inserting element in its starting position for beginning the insertion of the selected weft threads through the shed.

FIG. 10 is a front view of the device arranged on the left side of a loom, near the reed.

FIG. 11 shows a diagram of the travel of the hook shaped end of the weft thread locating arm.

FIGS. 1 and 2 show the locating and presenting device of the invention including, a support **1** having a projecting part **2** for being fastened by means of screws **3** and **4** to a stationary part of the loom body. Said support **1** is perforated interiorly along its complete length for the passage of a shaft **5**, at the extreme upper end of which there is secured a bush **6** which, fixed by the screw **37**, carries the weft thread locating arm **7**.

Said shaft **5** consists of two parts **8** and **9**, the part **8** having a smaller diameter than part **9** to leave space for the helical reactive spring **10**. Both parts **8** and **9** are guided in the support **1** by the sleeves **11** and **12**, respectively. The lower end **13** of the shaft **5** is provided with an axial bore in which is adjusted the stud **14** of a fork **15** carrying a roller **16** which slides on a cam **17** arranged on a rotating shaft **18** of the loom.

Below the lower end of the support **1** there is arranged axially a movable sleeve **19** carrying a radial and downwardly extending lever-arm **20**, to the lower free end **21** of which there is secured a roller **22**, sliding on a cam **23** which is also fixed on the rotating shaft **18**.

The movable sleeve **19** is united with the part **9** of the shaft **5** through a key **24**, and it is surrounded by a helical spring **25** secured with one end **26** to the support **1** and with the other end **27** to the lever-arm **20**.

A second support **28**, carried by the support **1** and fixed thereto by means of screws **29** and **30**, holds a stationary ring **31** which serves for supporting the movable sleeve **19** by means of the screw **32**. The lower end **33** of the support **28** is curved and serves as an abutment for preventing any rotating movement of the fork **15**.

In operation, the vertical shaft **5** which carries the weft thread locating arm **7** effects two movements, a rotating one and a vertically descending one, the second movement beginning just before the end of the first one, for guiding the selected weft threads to the presenting point for being gripped by the weft thread inserting element.

The rotating movement of the shaft **5** and, therewith, of the weft thread locating arm **7** in a horizontal plane, is caused by the cam **23** which, during its rotation, displaces laterally the roller **22** arranged on the lower free end **21** of the lever-arm **20**, united with the movable sleeve **19**, fixed by means of the key **24** to the lower part **9** of the shaft **5** carrying the weft thread locating arm **7**, so that this arm is moved from the position shown in FIG. 1 to that of FIG. 2, the rotation caused by the cam **23** being effected against the pressure of the helical spring **25** which maintains the roller **22** always in sliding contact with the cam **23**. Before having finished this rotating movement of the vertical shaft **5** carrying the weft thread locating arm **7**, the said shaft effects a descending movement caused by the rotation of the cam **17** in cooperation with the helical reactive spring **10**, as shown in FIG. 2.

During the arched swinging movement of the weft thread locating arm **7**, the fork **15** carrying the roller **16**, does not follow this movement, but is held in position by means of the curved lower end **33** of the support **28** which serves as an abutment.

FIG. 3 shows an example of a rectilinear selecting device with eight weft threads *c, d, e, f, g, h, i, j*, and their corresponding thread-guides C, D, E, F, G, H, I, J, arranged on the side of the loom body near the reed **34**, the said weft threads, *c, d, e, f, g, h, i, j* converging on the line of the selvedge of the fabric **35**, and the weft thread locating arm **7** being illustrated in its inoperative position, prepared to start its combined swinging and descending movement for actuating on the selected weft threads.

FIG. 4 shows the weft thread locating arm in the position that it adopts after having effected its combined swinging and descending movement and conducted the selected weft threads *c* and *h* of the thread-guides C and H to their presenting point for being gripped by the weft thread inserting element **36**.

When the weft thread inserting element **36** has travelled through the shed and reaches the presenting point of the weft threads *c* and *h*, these weft threads are gripped by the hook or jaw of the weft thread inserting element **36** (FIG. 5). Thereafter, this weft thread inserting element **36** initiates its return travel inserting the selected weft threads *c* and *h* through the shed (FIG. 6), and the weft thread locating arm **7** returns then to its inoperative position (FIG. 7), prepared for starting a further cycle of location and presentation of the selected weft threads for the next passage.

In the case of associating the device according to the invention to a loom provided with an obliquely arranged weft thread selecting device (FIGS. 8 and 9), the selected weft threads *c* and *h* are guided to their presenting point in the same way as before described, i.e., the weft thread locating arm **7** conducts the selected weft threads *c* and *h* through its combined swinging and descending movement to the position illustrated in FIG. 8, where they are gripped by the hook or jaws of the weft thread inserting element **36** for inserting them through the shed (FIG. 9), the weft thread locating arm returning to its starting position after the initiation of the weft thread inserting through the shed.

FIG. 10 represents the weft thread locating device arranged on the left side of the loom body near the reed **34**, secured by the screws **3** and **4** to the crossbar **43** of the loom frame **39**. The weft thread locating device receives its movement from the cams **17** and **23** mounted on the shaft **18** through the set of gearings **40** and **41**, driven by the driving shaft **42** of the loom. **38** shows the body of the weft thread selecting device fixed at **44** to the loom frame **39**.

FIG. 11 shows a diagram of the travel of the hook shaped end of the weft thread locating arm, A showing the said travel in horizontal front projection and B in vertical projection. The said travel begins at K and K', respectively in A and B, describing in A a line from K to L in a horizontal plane and in B an arch from K' to L'. From L to M and L' to M' the travel describes a downwardly inclined line in A and an arch in B. M and M' constitute the conjunction point of all the weft threads. The return travel describes the same arch as represented in B and an upwardly inclined line in A to the starting point K' and K, respectively.

It may be easily understood that the invention facilitates and simplifies the location and presentation of the weft threads to the weft thread inserting element **36** by reducing the travel of this element as the weft thread locating arm **7** conducts the weft threads *c* and *h* from the presenting position of the thread-guides C and H of the selecting device to the conjunction point near the selvedge, thus allowing the production of fabrics having the same width but at a greater speed owing to the diminution of the travel of the weft thread inserting element **36**, or, in the case of maintaining the same travel of the weft inserting element **36** in looms having a determined weaving range, the latter may be extended at each side corresponding to the width determined by the number of thread-guides of the selecting device.

Also in both cases there may be used a selecting device of the type which presents the weft threads in a horizontal plane but in an obliquely inclined position with respect to the travel described by the weft thread inserting element **36**, as said weft thread locating arm conducts the selected threads to the conjunction and gripping point of the same by the inserting element **36**.

What I claim is.

1. In a weft thread locating and presenting device for a shuttleless loom of the type having selecting means for a plurality of supplies of weft threads located adjacent one side of the shed of the loom to be selectively presented to an inserting means movable between said one side of the shed and the other side thereof, the combination including shaft means and means for mounting said shaft means on a loom adjacent said selecting means for reciprocatory rotary and axial movement, arm means on said shaft means projecting generally radially therefrom, and drive means connecting said shaft means with a rotating element of the loom in timed relationship with said inserting means for initially moving said arm means in a arcuate path in a generally horiontal plane for intercepting a weft yarn selected by the selecting means and for continuing said arcuate movement of the arm means after said interception in a generally downward direction to present said selected yarn to the inserting means at said one side of the shed.

2. The invention as defined in claim **1**, wherein said arm means includes a generally hook-shaped portion for guiding an intercepted yarn into engagement with the inserting means.

3. The invention as defined in claim **2**, wherein said drive means for the shaft means includes means for moving the arm means in a reverse direction for repeating said interception of a weft yarn.

4. The invention as defined in claim **3**, wherein said drive means includes cam means fixed on said rotating element of a loom, and follower means on said shaft means for imparting said rotary and axial reciprocatory movement.

5. The invention as defined in claim **4**, wherein said shaft means is mounted on a vertical axis and includes a shaft having a sleeve axially slidably mounted on the shaft in circumferentially fixed relation thereto, and said drive means includes a pair of cam surfaces on said rotating element of the loom and also includes a follower on said shaft for engagement with one of said cam surfaces and a follower on the sleeve for engagement with the other of the cam surfaces.

6. The invention as defined in claim **5** wherein said drive means includes spring biassing means for urging said cam followers into engagement with said respective cam surfaces.

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