United States Patent

[11] 3,613,740

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[21] Appl. No. **881,118**
[22] Filed **Dec. 1, 1969**
[45] Patented **Oct. 19, 1971**

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[32] Priority **Dec. 3, 1968**
[33] **France**
[31] **176,354**

[54] WEFT-PASSING DEVICE FOR A SHUTTLELESS LOOM

8 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **139/122**
[51] **Int. Cl.** **D03d 47/20**
[50] **Field of Search** 139/122–134

[56] **References Cited**

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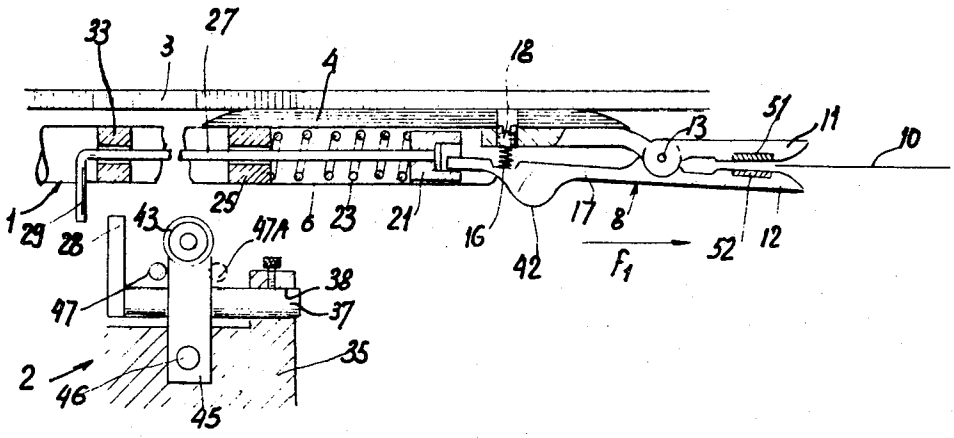
ABSTRACT: A weft-transfer device for a shuttleless loom comprises a needle having at one end a grab with a fixed jaw and a pivotal jaw spring-urged to the closed position, a spring-loaded sliding catch for engaging a tail on the pivotal jaw and holding the latter open, a cam formation on said tail for engaging an abutment to effect engagement of the catch and tail, upon movement of the needle in one direction and near the end of its passage out of the shed, a projection connected to the sliding catch, and a stop which is engaged by said projection to release the catch when the needle moves in the other direction to its position for catching a weft thread.



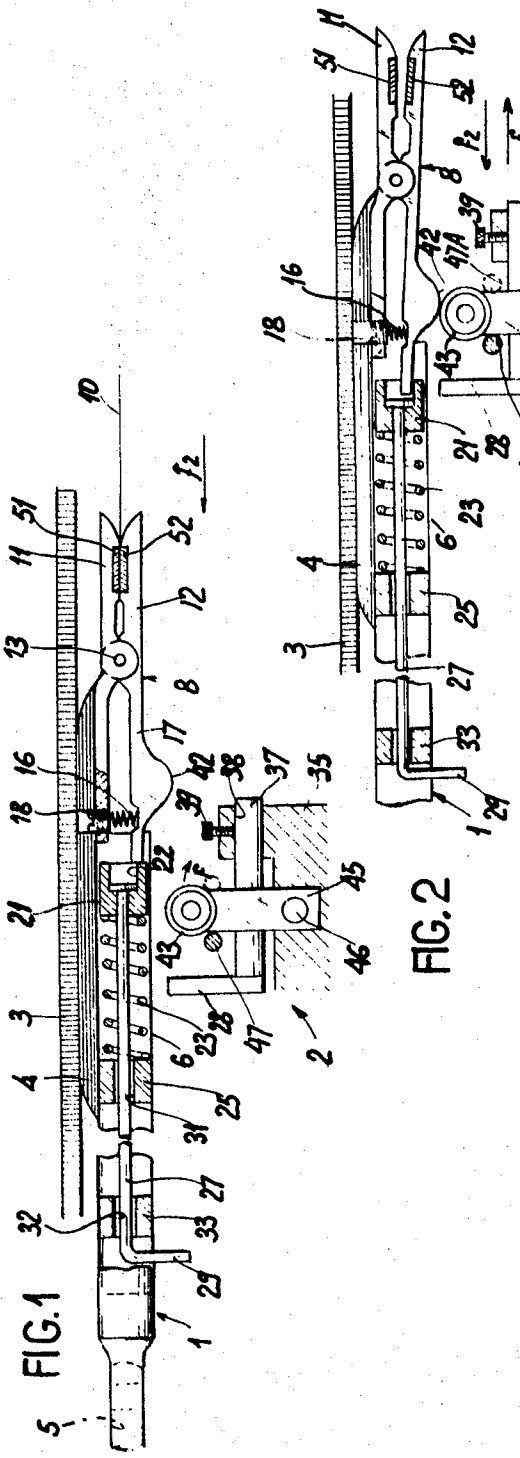


FIG. 1

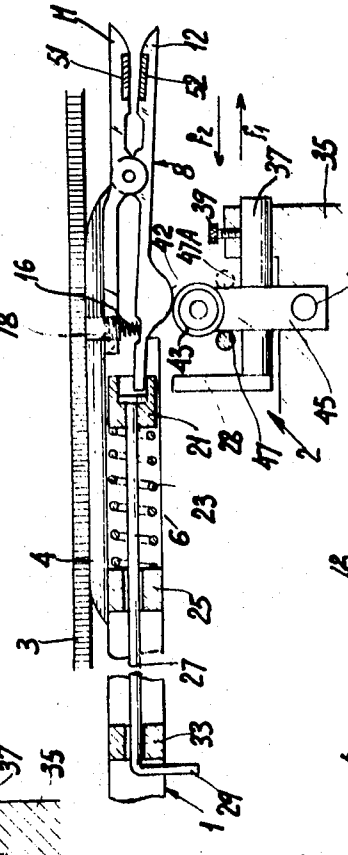


FIG. 2

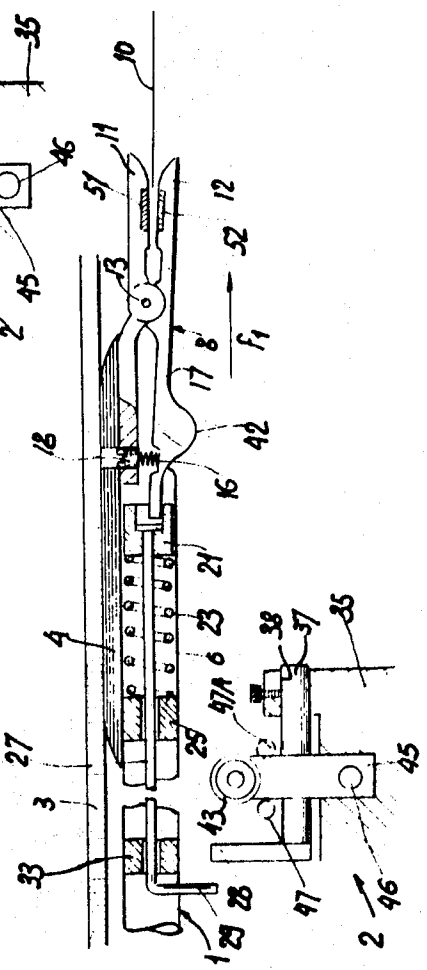


FIG. 3

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WEFT-PASSING DEVICE FOR A SHUTTLELESS LOOM

This invention relates to weft-transfer devices for shuttleless weaving looms, and especially, but not exclusively, exit weft-transfer devices designed to take up, in the middle of the shed, the weft threads passed to them by a feeder weft-transfer device.

More particularly, the invention relates to such a device of the type comprising a needle terminating in a grab having a fixed jaw and a movable jaw urged towards the fixed jaw by elastic return means, means for retaining the mobile jaw in the open position, means for neutralizing the said retaining means when the needle reaches a position for taking up a weft thread, and means for controlling the opening of the movable jaw when the needle is near the end of its passage out of the shed.

Known weft-transfer devices of this type have a disadvantage in that they comprise a large number of moving parts which react on one another so that their functioning is not as precise as is desirable in looms which are being made to operate faster and faster in order to comply with the evolution of a technology whose aim is continuously to increase performance and production. Moreover, such known devices have a further disadvantage, by virtue of their particular structure, in that they seem to have a certain sensitivity to accelerations, whether longitudinal or transverse, with the result that, from a certain speed of operation onwards, untimely occurrence of the opening or closing of the pincers tends to arise.

An object of the present invention is to provide a weft-transfer device of the type aforesaid, in which the above-mentioned drawbacks are obviated or mitigated.

According to the present invention we provide a weft-transfer device for a shuttleless weaving loom comprising a needle terminating in a grab having a fixed jaw and a movable jaw urged by resilient return means towards the fixed jaw, means for retaining the movable jaw in an open condition, means for neutralizing the said retaining means when the needle reaches a position for catching a weft thread, and means for controlling the opening of the movable jaw when the needle is near the end of its passage out of the shed, in which the movable jaw is pivotable on the fixed jaw about a transverse axis, and has an extension beyond said axis, the means for retaining the movable jaw in the open condition comprises a slide movable longitudinally in the needle and resiliently urged against said extension of the movable jaw, said means for neutralizing said retaining means comprises a projection on a bolt which is movable longitudinally of the needle and is secured to said slide, and a stop in the path of said projection, the means for controlling the opening of the movable jaw comprises a stationary abutment located in the path of said extension of the movable jaw.

The device, thus, has only a small number of parts and, apart from its low cost, it is robust and reliable in operation, the more so in that it is substantially insensitive to accelerations, since the movable jaw is mounted on the fixed jaw, and is balanced by the presence of its said extension, and, in addition, the slide and its control bolt can be very light in weight, thus present only a negligible inertia relative to the strength of their return spring. The locking of the grab in the open position and the clamping of the thread in the closed position easily resist forces clearly stronger than those which may arise as a result of the strongest acceleration occurring. Moreover, the opening of the grab is controlled by a stationary abutment against which the extension of the movable jaw bears directly, i.e., under the best circumstances for security and precise operation.

The great simplicity of the device makes it easy to adjust, and the force of applying the slide has no effect on the position of the open grab.

Other features and advantages of the invention will become apparent from the following description, and from the annexed drawings, which show, as a nonlimiting example, an embodiment of a weft-transfer device for a shuttleless loom, especially of the type described and illustrated in French Pat. No. 1,290,867.

In the drawings,

FIG. 1 is a plan view, with certain parts removed, of a weft-transfer device according to the present invention in the position for drawing a weft thread;

FIG. 2 is a view corresponding to FIG. 1 showing the device towards the end of its exit passage; and

FIG. 3 is a view corresponding to FIG. 1 showing the device with the needle near the end of its passage, where it is to catch a weft thread.

A weft-transfer device for a shuttleless weaving loom consists of a needle indicated generally by **1**, and a system indicated generally by **2** controlling the opening and closing of a grab.

The needle **1** reciprocates along reed **3** of the loom, and to this end, is fitted with a skid **4** adapted to run along the front face of said reed. The needle **1** is actuated by means of a ball-and-socket joint **5** at its outer end through an appropriate system which does not form part of the present invention, and a detailed description of which can be found in the above-mentioned French Patent.

The needle **1** carries a grab indicated generally by **8** and consisting of a fixed jaw **11** integral with the skid **4**, and a movable jaw **12** pivotally mounted on the fixed jaw **11** by means of pivot pin **13**.

The grab **8** is resiliently urged towards its closed position, i.e., for clamping a weft thread **10**, by a compression spring **16** of which one end presses against the inner face of a tail **17** on the movable jaw **12**, and the other end presses against a regulating screw **18** located in the skid **4**.

The grab **8** can be maintained in the open condition, as shown in FIG. **2**, by retaining means consisting in this example of a slide **21** which has a recess **22** and which is mounted in a sliding fashion in the tubular body **6** of the needle **1**. The slide **21** is resiliently urged towards the tail **17** of the jaw **12** of the grab by a compression spring **23** which is located in the tubular body **6** of the needle **1**, an of which one end presses against the face of the slide **21** opposite to the face with the recess **22**, while its other end presses against an internal collar **25** in the needle **1**.

The slide **21** can release the tail **17** of the jaw **12** under the action of neutralizing means which consist of a stop **28** belonging to the system for controlling opening and reengaging the grab and indicated by **2**, the stop **28** being located in the path of an angled end portion **29** of a bolt **27** which is slidable in a bore **31** in a collar **25**, and in a bore **32** in another similar collar **33**, both being fixed in the tubular body of the needle **1**, the other end of bolt **27** being fixed to the slide **21**.

The stop **28** is fixed to a bracket **35** on the loom frame, at a point so placed that, when the said stop **28** is struck by the angled end portion **29** of the bolt **27**, the grab is almost at the point at which it is to catch a weft thread, which in this example is passed to it in the middle of the shed by a supply needle.

A diagrammatic illustration is given of a fine adjustment means for positioning the stop **28**, in the form of a rod **37** which is integral with said stop **28**, and is fitted in a bore **38** in a boss **35**, in which it can be secured by a setscrew **39**.

The means controlling the opening of the grab **8** consists of a cam formation **42** formed by an enlargement projecting from the external face of the tail **17** of the jaw **12**, and by a roller **43** which forms part of the system indicated generally by **2**, and which lies in the path of said cam **42**.

The roller **43** is mounted on one end of a lever **45** which can pivot on a pin **46** carried by the support **35**. A stop **47** limits the length of the pivotal movement of the lever **45** in the direction from the interior of the shed towards the outside, so that roller **43** obstructs the path of the cam **42** of the grab **8** when the needle **1** is moving to the left in the drawing, but the pivoting movement of the lever **45** in the direction of arrow *f* is free, so that the roller **43** can move clear of the cam **42** when the latter strikes it from left to right in the drawings, i.e., in the entry direction of the needle into the shed.

The parts of the jaws **11**, **12** of the grab **8** adapted to catch and draw the weft thread **10**, and indicated respectively by **51** and **52**, are chromed or covered for example, by a high-adhe-

sion material, such as that known in the trade by the name "-Vulcolan," or by ceramic plates, or by carbide when abrasive threads such as Verranne or natural silk threads, are to be caught.

The weft-transfer device functions as follows.

It is first assumed that the necessary adjustments have already been made, i.e., the pressure of the clamping spring **16** for the jaws **11, 12** of the grab **8** has been adjusted by means of the screw **18** according to the characteristics of the threads to be caught, so that their tension does not tend to open the pincer, and the stop **28** is suitably positioned to ensure closing of the grab **8** at exactly the right moment.

It is now assumed, for example, that needle **1** is carrying out its return passage into the shed as shown in FIG. **3**, the grab **8** being held open by the slide **21** urged by the spring **23**. At the moment when the grab **8** is about to catch the weft thread **10**, the angled end portion **29** of the bolt **27** strikes the fixed stop **28**, and the adjustment is such that needle **1** is not yet completely at its inner dead point, but must still travel a distance very slightly larger than the depth of the recess **22** in the slide **21**, so that the needle **1**, and thus the grab **8**, continue their movement in the direction of the arrow *f*1, while the slide **21** is retained by the stop **28**. The tail **17** of the jaw **12** is thus disengaged from said slide **21**, and the spring **16** ensures rapid closure of the jaws **11, 12** of the grab **8** on the weft thread **10**.

The return run of the grab **8** takes place in the direction of the arrow *f*2 (FIG. **1**), and the weft thread **10** is carried from the middle of the shed towards the corresponding edge. At the moment when the grab **8** is to release the weft thread **10**, its cam **42** strikes the roller **43** (FIG. **2**), which cannot move, since the lever **45** carrying it is in contact with the stop **47**. The cam **42**, pushed in by the roller **43** against the action of the spring **16**, therefore rapidly opens the grab **8**, which thus releases the weft thread **10**. This occurs in the vicinity of the external dead point of the needle **1**. Simultaneously, as soon as the end of the tail **17** of the jaw **12** is in front of the recess **22** of the slide **21**, the latter is returned by the spring **23** so as to hold the grab **8**, once again in the open condition, as shown in FIG. **2**. The needle **1** continues its outward movement a little longer, and the cam **42** moves past the roller **43**.

When the needle **1** starts again in the reverse direction in order to catch another weft thread in the middle of the shed, the cam **42** pushes back slightly the roller **43**, pivoting the lever **45** in the direction of arrow *f*1 (FIG. **2**), without any modification in the condition of the grab **8** resulting. This completes the cycle.

It will be noted that the stop **47**, on the left-hand side of the lever **45**, retains the roller **42** in the position shown in the drawings, in which it depresses the cam **42** of the grab **8** at the end of the latter's exit passage; the weft thread is thus released exactly at the moment when the needle reaches its forward dead point, i.e., at the moment of beating-up of the weft.

However, if the stop **47** were placed on the other side of the lever **45**, as shown at **47A**, then the roller **43** would be moved clear at the moment when the cam **42** of the grab **8** moved towards the end of the latter's exit passage, so that said grab **8** would remain closed, not only until the very end of its exit passage, but, again, until the moment when, returning in the opposite direction in order to enter the shed again, the cam **42** would meet the roller **43** whose lever **45** would contact the stop **47***a*, this time forcing the grab **8** to open and releasing the weft thread, but the latter would thus have been retained until after the completion of the beating-up of the weft, which may be desirable in certain cases, especially when the weft threads are elastomeric threads. Whatever the positioning of the stop **47** for limiting the pivoting movement of the lever **45**, the latter is resiliently returned against the stop **47** by means (not shown), for example, a spring.

A means of cleaning the grab **8** by a jet of air, for example, can be advantageously provided, using the blower device described in our French Pat. No. 1,563,122, so that the grab **8** is always quite clean at the moment of catching a weft thread.

I claim:

1. A weft-thread passing device for a shuttleless weaving loom, comprising a weft-thread pickup needle provided with a clamp having a fixed jaw and a movable jaw urged by resilient return means towards the fixed jaw, means for retaining the movable jaw in an open condition, means for neutralizing the said retaining condition, means for neutralizing the said retaining means when the needle reaches a position for catching a weft thread, and means for controlling the opening of the movable jaw when the needle is near the end of its passage out of the shed, in which the movable jaw is pivotable on the fixed jaw about a transverse axis, and has an extension beyond said axis, the means for retaining the movable jaw in the open condition comprises a slide movable longitudinally in the needle and resiliently urged against said extension of the movable jaw, the means for controlling the opening of the movable jaw comprises a stationary abutment located in the path of said extension of the movable jaw.

2. A device as in claim **1**, in which said abutment is carried by a support pivotable relative to a fixed stop member so as to engage the same when said support is pivoted to a position in which said abutment lies in said path of the jaw extension.

3. A device as in claim **2**, in which said stop is arranged so as to limit the movement of the support in the direction from the interior of the loom laterally towards the exterior.

4. A device as in claim **2**, in which said stop is arranged so as to limit the movement of the support in the direction from the exterior of the loom towards its interior.

5. A device as claimed in claim **1**, in which said means for neutralizing said retaining means comprises a projection on a rod which is movable longitudinally of the needle and is secured to said slide, and a stop in the path of said projection.

6. A weft-thread passing device for a shuttleless weaving loom comprising a weft-thread pickup needle provided with a clamp having a fixed jaw and a movable jaw urged by resilient return means towards the fixed jaw, means for retaining the movable jaw in an open condition, means for neutralizing the said retaining means when the needle reaches a position for catching a weft thread, and means for controlling the opening of the movable jaw when the needle is near the end of its passage out of the shed, in which the movable jaw is pivotable on the fixed jaw about a transverse axis, and has an extension beyond said axis, the means for retaining the movable jaw in the open condition comprises a slide movable longitudinally in the needle and resiliently urged against said extension of the movable jaw, said means for neutralizing said retaining means comprises a projection on a bolt which is movable longitudinally of the needle and is secured to said slide, and a stop in the path of said projection, the means for controlling the opening of the movable jaw comprises a stationary abutment located in the path of said extension of the movable jaw.

7. A device as claimed in claim **6**, in which said extension of the movable jaw has a cam-shaped enlargement for engaging said abutment.

8. A device as claimed in claim **6**, in which said slide has a recess in which said extension of the movable jaw engaged in the open condition of the clamp.