Dec. 9, 1969 M. RIHA ET AL 3,482,608

WEFT STOP MOTION FOR WEAVING MACHINES

Filed March 13, 1968

Fig.3

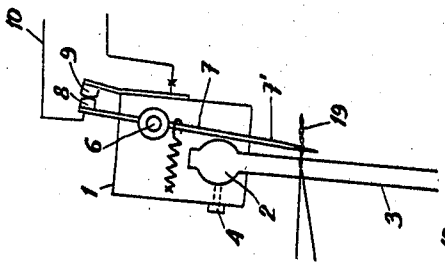


Fig.4

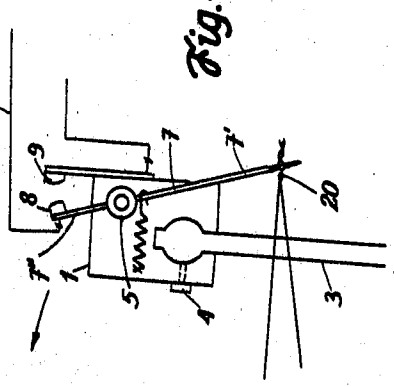


Fig.2

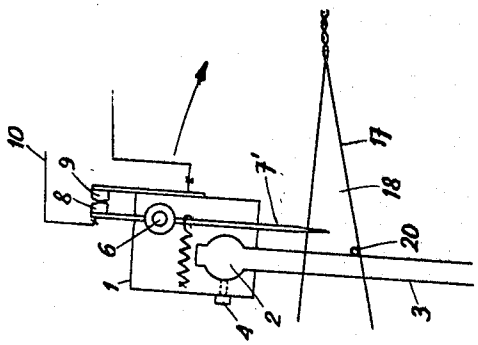


Fig.6

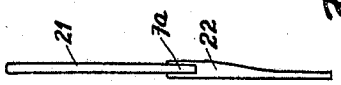
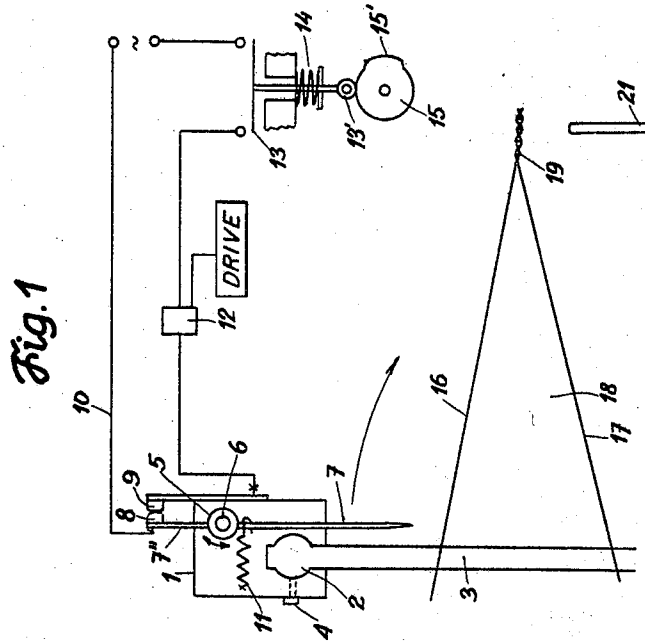


Fig.5

Fig.1



BY

INVENTORS
Miloslav Řeha
Jiří Cerucha
Josef Martinec
by Michael J. Striker
Atty

United States Patent Office 3,482,608 Patented Dec. 9, 1969

3,482,608

WEFT STOP MOTION FOR WEAVING MACHINES

Miloslav Riha, Jiri Cernocky, and Josef Martinec, Vsetin, Czechoslovakia, assignors to Elitex, Zavody Textilniko Strojirenstvi, Liberec, Czechoslovakia

Filed Mar. 13, 1968, Ser. No. 712,751
Claims priority, application Czechoslovakia, Mar. 16, 1967, 1,895/67
Int. Cl. D03d 51/34, 51/38
U.S. Cl. 139—370 8 Claims

ABSTRACT OF THE DISCLOSURE

A weft stop motion for a weaving machine includes a signal-generating arrangement associated with the drive for the machine and being movable between two positions and one of which stops the drive. A reed means is arranged for movement between a back-up position and a beat-up position in which it moves relative to a warp shed for beating up a newly inserted weft thread to a predetermined location with reference to a previously inserted weft thread. A sensing arrangement is carried by the reed means for movement therewith and is associated with the signal-generating arrangement. The sensing arrangement is so constructed and arranged that it will effect movement of the signal-generating arrangement to the aforementioned one position thereof if it senses the absence of the newly inserted weft thread from the aforementioned predetermined location when the reed means moves from the beat-up position to the back-up position thereof.

BACKGROUND OF THE INVENTION

The present invention relates generally to textile machines, and more particularly to weaving machines. Still more specifically, the invention relates to a weft stop motion for weaving machines.

Weaving machines are classified in various different ways, for instance as pneumatic looms, as jet looms or as gripper shuttle looms. They all, however, have in common that weft threads must be inserted into the warp shed, regardless of how this insertion is accomplished. A problem which has been encountered with the insertion of the weft threads, or more particularly with the correctness of the weft thread insertion, resides in the fact that malfunctions can and do occur where the weft thread will either break or, as another example, not be properly positioned with respect to the previously inserted weft thread. This, of course, is then visible as a fault in the woven fabric and hence is to be avoided.

To avoid such problems, or more specifically to detect them as they occur so that they can be corrected, it is known to provide weft stop motions with sensors capable of detecting the absence of a weft thread or the incorrect insertion thereof. In arrangements of this type which are known from prior art the sensor is provided with a special attachment mechanism which imparts to the sensor a movement towards the newly inserted weft, that is a movement in the direction in which the slay of the reed moves to its back position. However, such mechanisms are very complicated and hamper servicing of the loom when corrections must be made to remove a weft insertion failure, or to eliminate problems caused by yarn breakage in the vicinity of these known stop motion devices.

It is thus a general object of the present invention to overcome these disadvantages known from the prior art.

A more particular object of the present invention is to provide a very simple but highly effective weft stop motion.

A still more specific object of the invention is to provide such a weft stop motion which does not require a separate control mechanism for the sensor.

An additional object of the invention is to provide a weft stop motion of the type here under discussion which permits completely unobstructed access to all warp threads.

Yet a further object of the invention is to provide such a weft stop motion which permits ready adjustment into an arbitrary position in the direction of movement of the inserted weft thread so that the weft stop motion according to the present invention can be readily adapted to changes in the width of the fabric being woven.

A concomitant object of the invention is to provide such a weft stop motion which can be mounted anywhere across the width of the fabric being woven so that, utilizing two or several of such weft stop motions disposed at various distances from the weft inserting device, the weft thread can be checked at several points across the width of the fabric at the same time.

SUMMARY OF THE INVENTION

In accordance with our invention we provide, in a weaving machine having a drive, a weft stop motion which includes signal-generating means associated with this drive and adapted for movement between two positions in one of which it affects stopping of the drive. Reed means is arranged for movement between a back-up position in which it is partly withdrawn from a warp shed preparatory to insertion of a new weft thread thereinto, and a beat-up position in which the reed means moves relative to the warp shed for beating up the new weft thread to a predetermined location with reference to a previously inserted weft thread. Sensing means is carried by the reed means for movement therewith and is operatively associated with the signal-generating means. This sensing means includes a sensing portion which is positioned so as to extend into the warp shed between a previously-inserted weft thread and the new weft thread when the reed means is in the aforementioned beat-up position thereof. Then sensing means is constructed and arranged for effecting movement of the signal-generating means to the aforementioned one position in the absence of the new weft thread from its predetermined location and in response to movement of the reed means from the beat-up position to the back-up position thereof.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagrammatic side view of an arrangement embodying the present invention showing the reed in its back position and prior to weft insertion;

FIG. 2 is a view similar to FIG. 1, with parts of FIG. 1 omitted, illustrating movement of the reed from the back position towards the beat-up position thereof subsequent to weft insertion;

FIG. 3 is a view similar to FIG. 2 but illustrating the reed in the beat-up position;

FIG. 4 is a view similar to FIG. 3 but illustrating the reed during its return movement from the beat-up position into the back position thereof;

FIG. 5 is a front-elevational view of a sensing member for use in accordance with the present invention; and

FIG. 6 is a side-elevational view of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the drawing in detail, and firstly FIG. 1 thereof, it will be seen that this figure illustrates only such components of the weaving machine and the stop motion as are germane to the present invention. Thus, a reed is identified generally with reference numeral **3** and comprises a top or upper portion **2**. Mounted on this upper portion **2** by means of the screw **4** is a supporting or mounting body **1** which may be simply slipped onto the upper portion **2** of the reed **3**. It need of course not be emphasized that a reed is a generally comb-like device set into the slay of the loom and operative for beating the loose filling pick into its component place in the cloth and for keeping the warp ends even, uniformly straight and true.

A pin or shaft **5** is rotatably mounted on the body **1** for turning movement in the direction of the double headed arrow associated with the pin **5**. Secured to the pin **5** for turning movement therewith is a sensing member **7**. Such securing can be effected in any known manner, for instance by means of the screw **6** which assumes that the pin **5** is provided with a radial bore and with an axial bore communicating with this radial bore so that the front end of the screw **6** presses against the sensing member **7** which extends through the radial bore. However, this is only mentioned by way of example.

The configuration of the sensing member is needlelike as illustrated in FIG. 1 and a lower portion **7'** extends downwardly below the rotatable pin **5** whereas an upper portion **7''** extends upwardly above the pin **5**. The upper portion **7''** carries the movable contact **8** of an electric switch whose stationary contact **9** is also mounted on the body **1**. The contacts **8** and **9** are interposed in an electric circuit **10** and a suitable biasing means, for instance a spring **11**, acts upon the sensing member **7** in a sense tending to turn it and the pin **5** in a direction in which the contacts **8** and **9** will be in current-conductive engagement.

An interrupting relay **12** is interposed in the circuit **10** and controls the electric circuit of a known mechanism for stopping the drive of the weaving machine. This is not specifically illustrated because it is well known in the art and further because it does not form a part of the invention. Further interposed in the circuit **10** is an additional switch **13** which is illustrated diagrammatically and which is subjected to the action of a biasing spring **14** which urges the switch **13** to open position. A rotatable control cam **15** wih a cam face **15'** cooperates with a roller or other engaging portion **13'** of the switch **13** for periodically closing the same against the action of the spring **14**. This will be explained in more detail subsequently.

It may be pointed out here that, while FIGS. 1–4 illustrate one possible embodiment for the elongated sensing member **7**, another embodiment is illustrated in FIGS. 5 and 6. These figures show that, rather than being of one-piece construction as shown in FIGS. 1–4, the sensing member **7*a***, as it is designated in FIGS. 5 and 6, may be of two-part construction and may consist of a rod-shaped upper portion **21** corresponding to the portion **7''** in FIG. 1, and a flat spring portion **22**. The reasons for this will become obvious later.

Returning now to FIG. 1, it will be seen that a warp shed **18** consists of an upper system of warp threads **16** and a lower system of warp threads **17**. This is of course conventional. Into this warp shed the weft threads **20** are to be inserted so as to form, together with the warp threads of the warp shed **18**, the woven fabric which is indicated in FIG. 1 with reference numeral **19**.

FIG. 2 illustrates how a new weft thread **20** has been introduced or inserted into the warp shed **18** between the reed dents and the already woven fabric **19**. The non-illustrated slay of the weaving machine, which carries

the reed **3** and the associated components thereof, now moves from the back position illustrated in FIG. 1, in which the lower portion **7'** of the sensing member **7** is moved upwardly out of the warp shed **18**, downwardly towards the beat-up position. As FIG. 2 illustrates, the lower portion **7'** of the sensing member **7** now extends into the warp shed **18** and, during continued downward and forward movement of the reed dents in the direction towards the already woven fabric **19**, the reed dents move the newly introduced weft thread **20** towards the previously introduced weft thread so that it assumes a predetermined position with reference to the same. The movement toward the right in FIG. 2, that is the "beating-up" of the new weft thread **20** to its predetermined position with reference to the preceding weft thread, results in capturing or "weaving-in" of the lower portion **7'** of the sensing member **7** between the new weft thread **20** and the preceding weft thread.

During the movement from the position shown in FIG. 1 to the position shown in FIG. 3 the contacts **8** and **9** continue to bear against one another under the influence of the biasing spring **11**.

When the beat-up movement of the reed **3** is completed, that is when the position shown in FIG. 3 has been reached at which the lower portion **7'** of the sensing member **7** is woven into the fabric, the slay carrying the reed **3** and the associated components thereof returns to its back position in the manner which is well known from the art. During the initial phase of the movement from the beat-up position illustrated in FIG. 3 to the back position, the woven-in lower portion **7'** of the sensing member **7** is retained in the woven fabric **19**. As FIG. 4 illustrates, this acts as a restraint on the lower portion **7**, provided that the weft thread **20** was originally properly inserted and has been beaten up to its proper position, and the sensing member **7** now turns about the pin **1** in counter-clockwise direction, as illustrated in FIG. 4. Such movement results in movement of the movable contact **8** away from the stationary contact **9**.

The electrode circuit **10** is interrupted during most of the working cycle of the weaving machine by the fact that, while the contacts **8** and **9** are in engagement during the operative stages shown in FIGS. 1–3, the switch **13** is open. However, at the time at which the slay with the reed **3** returns from the position shown in FIG. 3 to its back position, that is at the time at which the contacts **8** and **9** should become separated if the weft thread **20** is properly inserted and positioned, the cam face **15'** of the control cam **15** presses against the roller **13'** of the switch **13**, effecting closing of the same and thereby of the circuit **10**. The operative connection of the control cam **15** with the control means provided for this purpose is of no consequence for the present invention inasmuch as such connections are well known in the art. The important fact is only that movement of the switch **13** to the closed position, that is the opposite position from what is illustrated in FIG. 1, take place upon arrival of the reed **3** in the position illustrated in FIG. 3.

Thus, as the contacts **8** and **9** separate from one another in the manner illustrated in FIG. 4, the circuit **10** is otherwise closed by the switch **13**. It would now be completed, were it not for the fact that contact **8** has moved away from current-conducting engagement with contact **9**. Thus, the circuit is still interrupted.

If, however, the weft thread **20** has not been properly inserted, or has not been beaten up to its proper position, there will be nothing to effect the pivoting movement of the sensing member **7** as illustrated in FIG. 4. Consequently, such pivoting movement will not take place during the return movement of the slay (not illustrated) and the reed **3** carried thereby to the back position, and contact **8** will remain in current-conducting engagement with contact **9**. Thus, closing of the switch **13** will now complete the circuit **10**, activating the relay **12** and resulting in stoppage of the weaving machine.

Of course, it will be appreciated that if the device does not detect a fault, the lower end portion 7' of the sensing member 7 will eventually slide from the fabric 19 during continued movement of the slay and reed 3 to the back position. This will then result in clockwise pivoting movement of the sensing member 7 and engagement of the movable contact 8 with the stationary contact 9. At this point, however, control cam 15 has already allowed the switch 13 to open again so that the circuit remains interrupted. This is the position illustrated in FIG. 1.

It will be appreciated, of course, that two or more of the weft stop motions set forth herein can be mounted on the reed 3, it being appreciated that the reed extends across the width of a fabric which is being woven. Inasmuch as it is possible to adjust the body 1 in longitudinal direction of the reed 3, simply by loosening the screw 4 and sliding the body longitudinally of the reed 3, that is across the width of the fabric which is being woven, any one of these weft stop motions can be positioned at any point across the width of the fabric which it is desired to check. Thus, the distance between adjacent ones of such weft stop motions can be arbitrarily changed at the will of the machine operator, and accordingly the distance of the stop motions from the weft inserting device can similarly be changed. In fact, this possibility of adjustment makes it possible to use a single such stop motion even when fabrics of various different widths are being woven, assuming that the quality requirements for such fabrics are such that short-insertion faults in the selvedges are of no importance so that, if they do occur, loom stoppage is not necessary.

As pointed out before, the sensing member can be constructed and configurated as shown in FIGS. 5 and 6. This is an advantageous construction inasmuch as the spring portion 22, corresponding to the lower portion 7' of the member 7 shown in FIG. 1, enables a sidewise swinging motion of the portion 2 during weaving of the fabric. This results in narrowing the fabric. With a rigid lower woven-in portion (corresponding to the portion 7' of the sensing member 7), which was not easily laterally displaceable, tracing resulted in the fabric.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a weft stop motion for weaving machines, particularly jet weaving machines, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehend within the meaning and range of equivalence of the following claims.

What is claimed as new and described to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. In a weaving machine for weaving a fabric having a drive, a weft stop motion comprising elongated reed means arranged for movement between a back-up position which it assumes preparatory to insertion of a new weft thread into a warp shed, and a beat-up position in which said reed means moves relative to said warp shed for beating up the new weft thread to a predetermined location with reference to a previously inserted weft thread; mounting means mounted on said reed means for movement with the same and also along the same across the width of the fabric being woven to a plurality of different positions in accordance with the will of an operator; signal-generating means carried by said mounting means for displacement therewith, said signal-generating means being associated with said drive and adapted for movement between two positions in one of which it effects stopping of said drive; and sensing means carried by said mounting means for movement therewith and being operatively associated with said signal-generating means, said sensing means including a sensing portion positioned so as to extend into the warp shed between a previously inserted weft thread and the new weft thread when said reed means is in said beat-up position, and being constructed and arranged for causing said signal-generating means to be located in said one position in the absence of the new weft thread from said predetermined location and in response to movement of said reed means from said beat-up position towards said back-up position thereof.

2. In a weaving machine as defined in claim 1, wherein said signal-generating means comprises an electric circuit and a switch interposed in said circuit.

3. In a weaving machine as defined in claim 2, wherein said switch comprises a stationary contact and a movable contact associated with said sensing means and adapted to be moved thereby to said one position.

4. In a weaving machine as defined in claim 1, wherein said weft threads are inserted into said warp shed in a predetermined direction, and wherein said sensing means comprises an elongated sensing member carried by said reed means and mounted for pivotal movement about an axis coincident with said predetermined direction, said sensing portion constituting a part of said sensing means.

5. In a weaving machine as defined in claim 1, wherein said reed means has a lower portion adapted to move into said warp shed, and an upper portion; and wherein said mounting means is mounted on said upper portion of said reed means.

6. In a weaving machine as defined in claim 4, wherein at least said sensing portion of said sensing member consists of a length of flat spring material.

7. In a weaving machine as defined in claim 3, wherein said weft threads are inserted into said warp shed in a predetermined direction, and wherein said sensing means comprises an elongated sensing member mounted for pivotal movement about an axis coincident with said predetermined direction and having a first section constituting said sensing portion and being located at one side of said axis and a second section comprising said movable contact and being located at the opposite side of said axis; and further comprising biasing means biasing said sensing member for pivotal movement about said axis in a sense effecting movement of said movable contact to the other of said positions.

8. In a weaving machine as defined in claim 2, wherein said signal-generating means comprises an additional switch interposed in said electric circuit and operative for movement between an open and a closed operative position, and actuating means associated with said additional switch for effecting periodic movement of said additional switch from said open to said closed position; and wherein said signal-generating means operates for generating a signal which effects stopping of said drive when said one position of said first-mentioned switch and said closed position of said additional switch coincide.

References Cited

UNITED STATES PATENTS

2,819,737	1/1958	Opletal	139—370
3,237,656	3/1966	Haupt	139—370 X
3,260,283	7/1966	Svaty et al.	139—370

FOREIGN PATENTS

1,019,724	2/1966	Great Britain.
1,072,207	12/1959	Germany.

JAMES KEE CHI, Primary Examiner