April 15, 1958 B. MASSON ET AL 2,830,623

INSIDE SELVEDGE MOTION FOR LOOMS

Filed Oct. 27, 1954 6 Sheets-Sheet 1

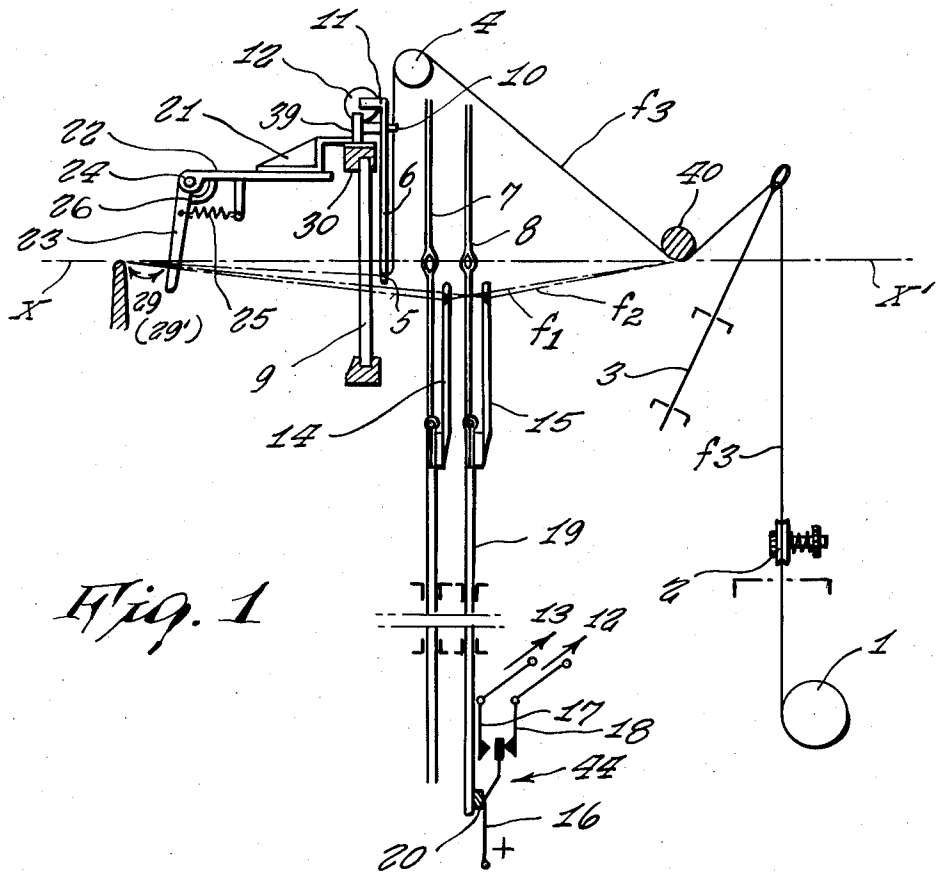


Fig. 1

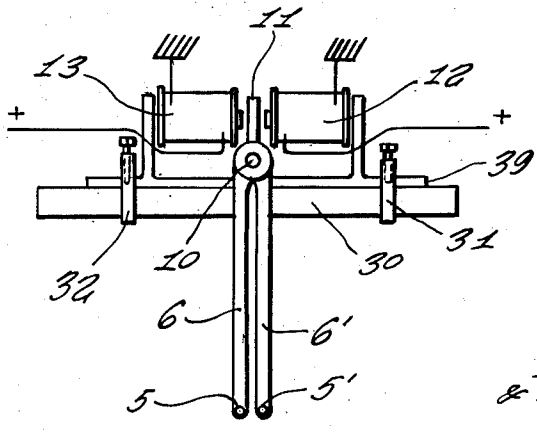


Fig. 2

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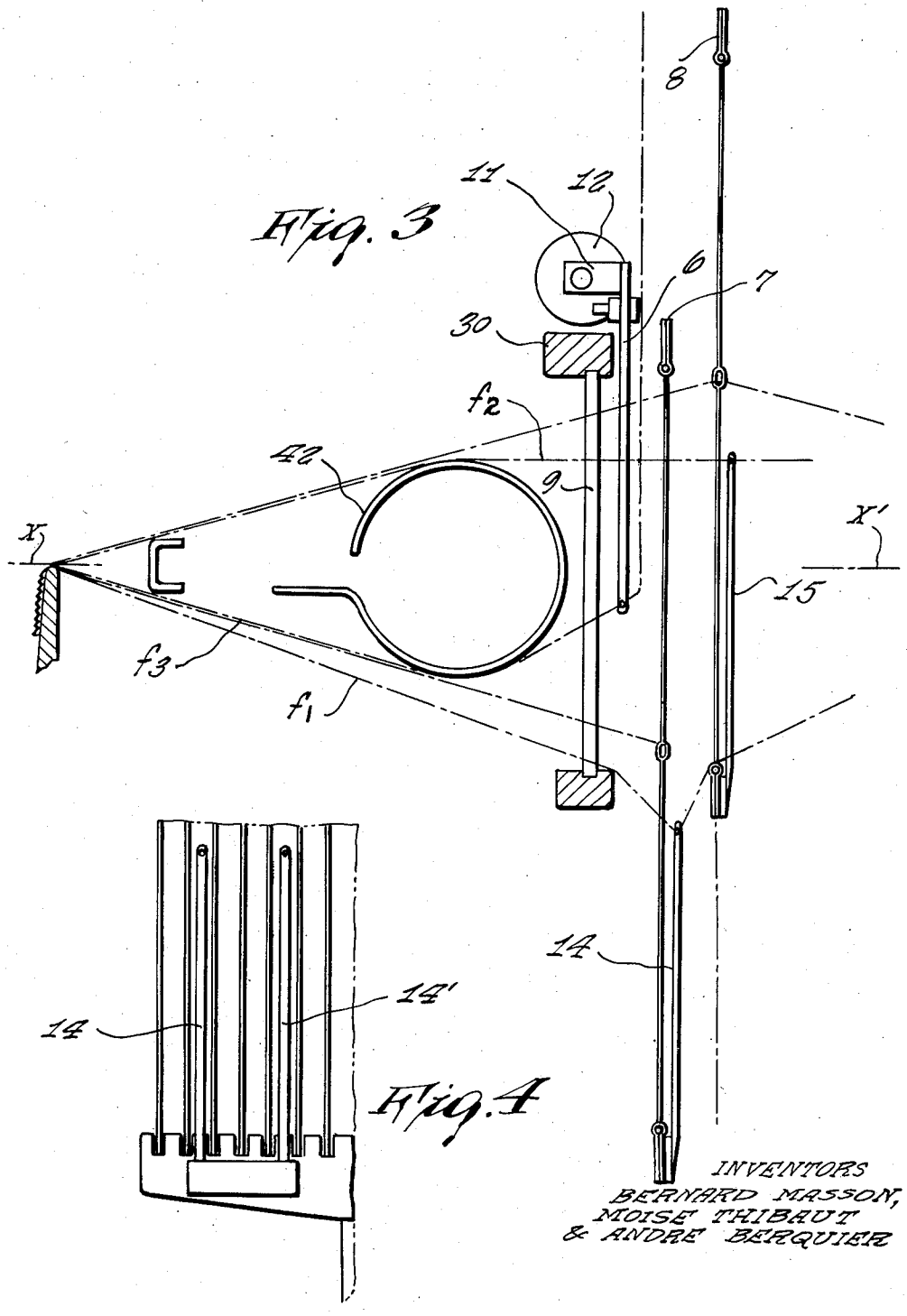


Fig. 3

Fig. 4

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Fig. 7

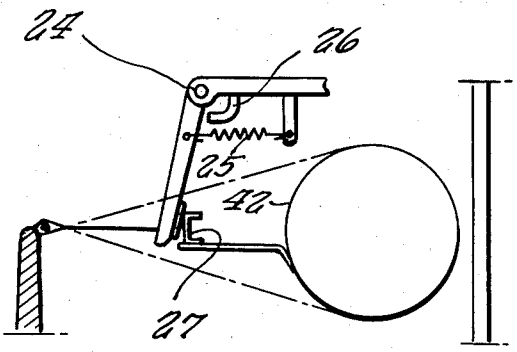


Fig. 8

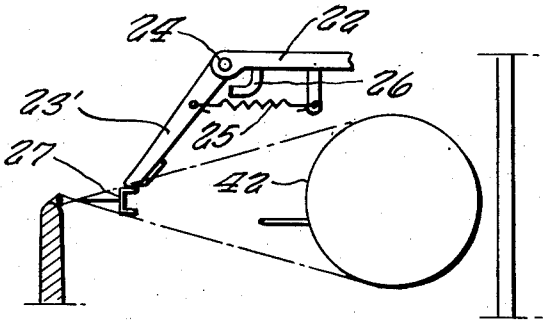


Fig. 9

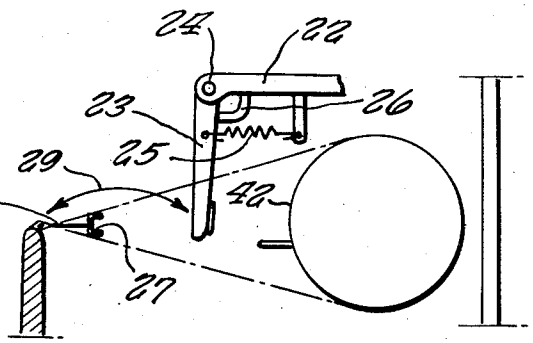


Fig. 5

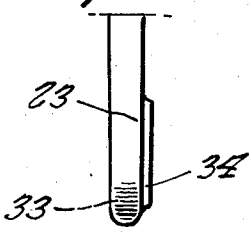
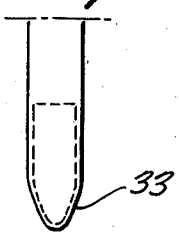


Fig. 6



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INSIDE SELVEDGE MOTION FOR LOOMS

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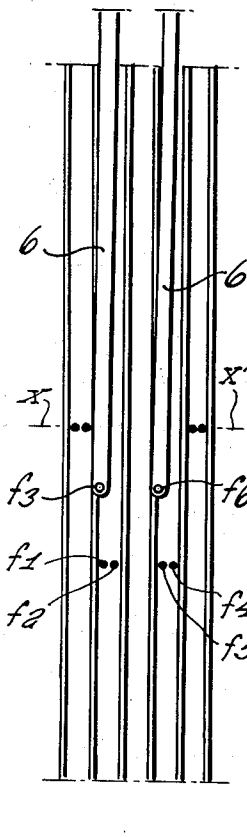


Fig. 11

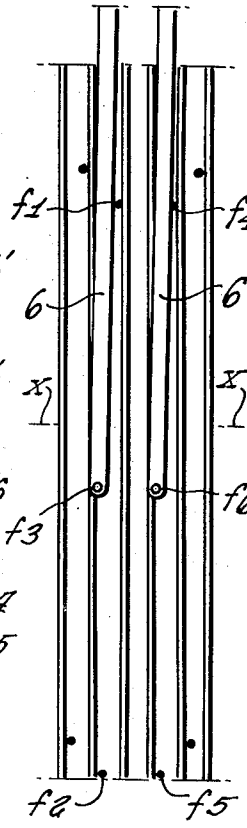


Fig. 12

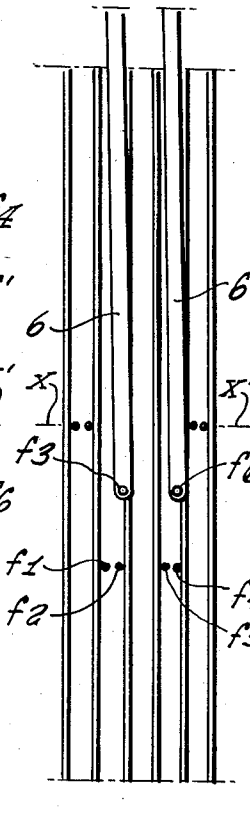


Fig. 13

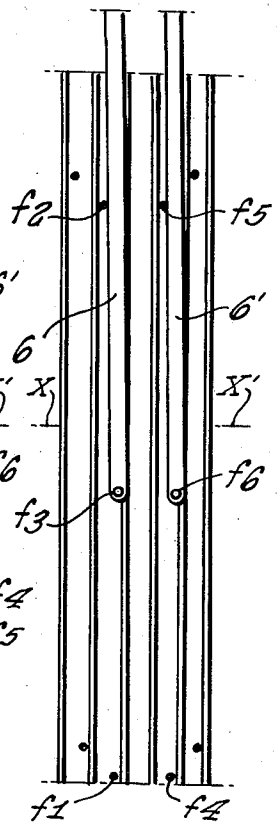


Fig. 14

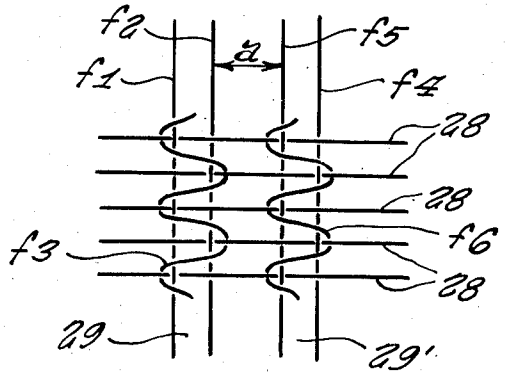


Fig. 10

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Fig. 15

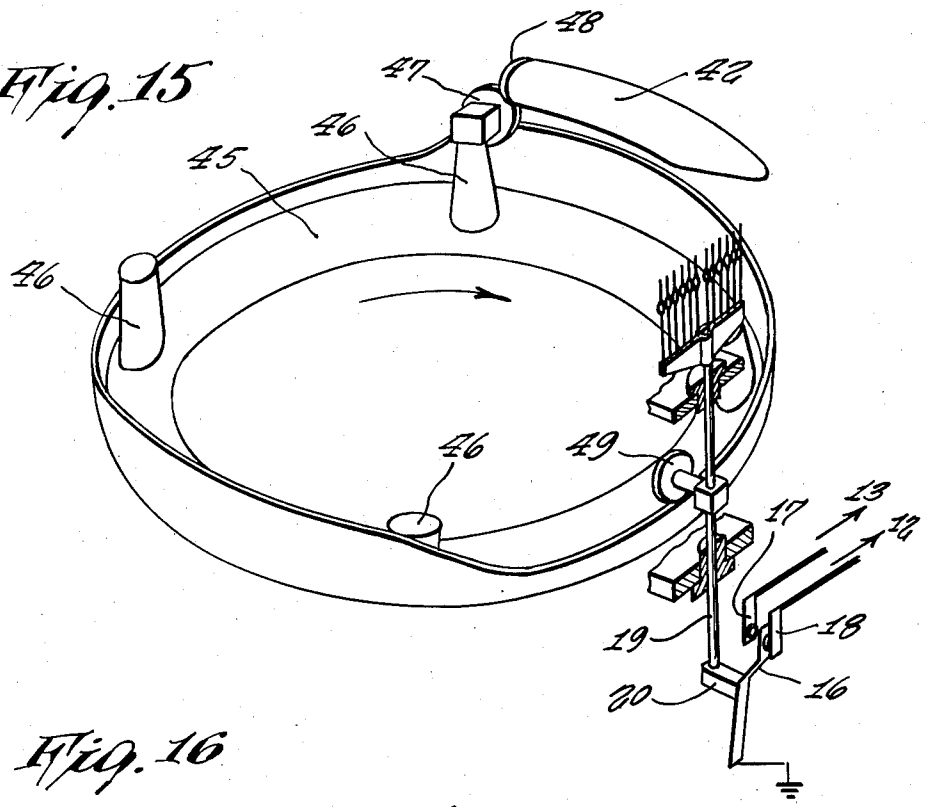
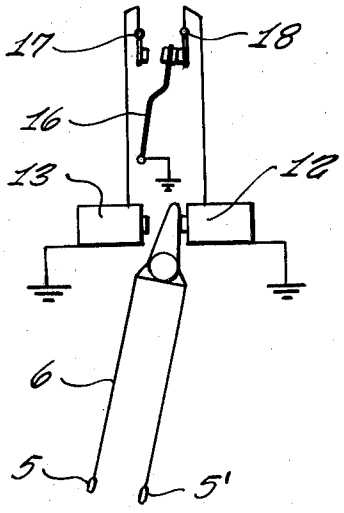


Fig. 16



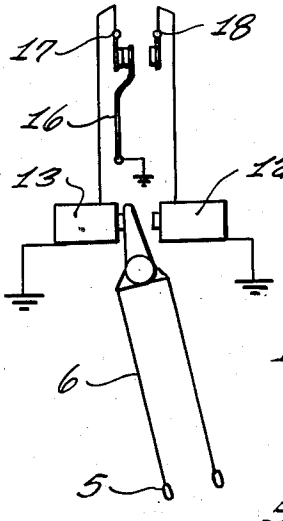


Fig. 17

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Fig. 18

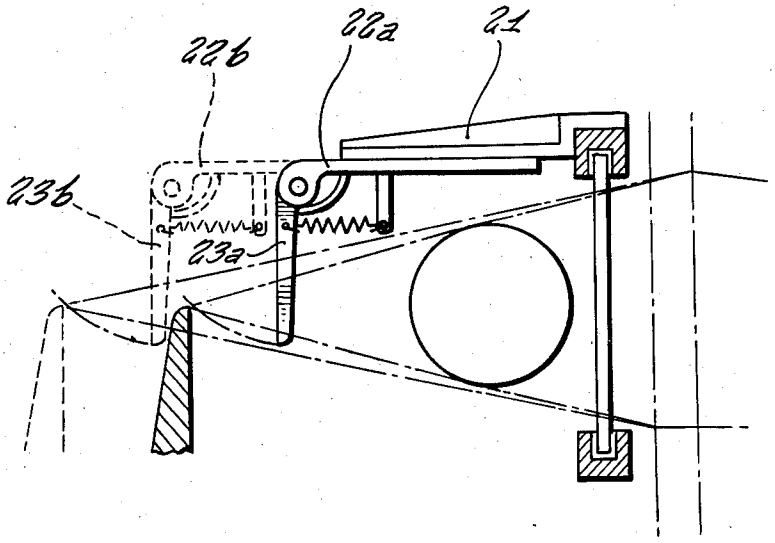
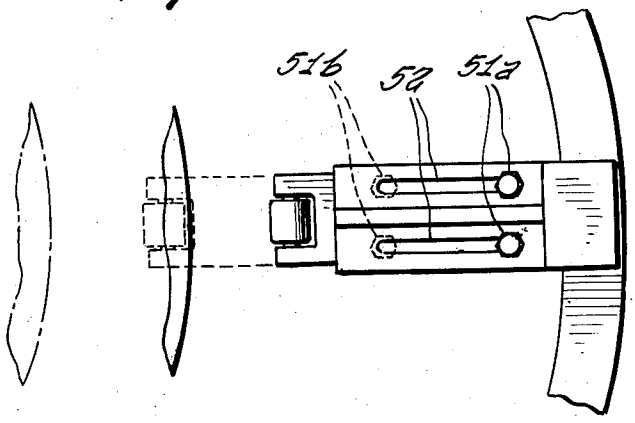


Fig. 19



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United States Patent Office 2,830,623 Patented Apr. 15, 1958

2,830,623

INSIDE SELVEDGE MOTION FOR LOOMS

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Application October 27, 1954, Serial No. 465,045

Claims priority, application France October 30, 1953

13 Claims. (Cl. 139—54)

This invention relates to textile machines, and more particularly to inside selvedge motions for use in looms, especially for use in circular looms having a horizontal shed.

An object of the invention is to improve on the art of inside selvedge motions for use in circular looms, for example of inside selvedge motions for obtaining a chain stitch by means of a combination of particular elements as disclosed in our copending U. S. patent application Serial No. 392,394 filed on November 16, 1953 for "An Inside Selvedge Motion for Use in Looms" and matured into Patent No. 2,704,558 on March 22, 1955, to which application reference is made herewith.

According to the disclosure of said U. S. Patent 2,704,558 the control of the movement of the crossing thread is obtained by means of a system of reciprocable belts engaged with rotatable pulleys. Owing to the delicate operation of said system of belts the speed of operation is limited. Furthermore, said system of belts wears out in a very short time. Moreover, the crossing thread is subjected to extremely great strains causing quite often a breakage.

On the other hand, the inner selvedged motion according to said U. S. Patent 2,704,558 does not permit to obtain a properly located selvedge, as the slightest change in the tension of the selvedge threads causes a displacement of the latter which results in irregularities in the edges of the fabric after the cutting thereof.

An object of this invention is to overcome the disadvantages of the inner selvedge motion according to said U. S. Patent 2,704,558.

For this purpose the system of belts of the inner selvedge motion according to said U. S. Patent 2,704,558 is replaced by a different and sturdier mechanism which may be operated in a simple manner: furthermore, a special member is provided for holding the selvedge in its proper place.

Other objects and structural details of the invention will be apparent from the following description when read in conjunction with the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a vertical sectional view of an inside selvedge motion according to the invention illustrating the general arrangement of its elements (for a weave with 2 ends),

Fig. 2 is an elevational view of a double needle for guiding the crossing threads and of the mechanism for controlling said double needle,

Fig. 3 is a vertical sectional view of the shed at the moment of the passage of the shuttle, illustrating the relative position of the various selvedge threads (for a weave with 2 ends),

Fig. 4 is an elevational view of the rigid warp dividers mounted on each heddle for the control of the movements of the ground threads.

Figs. 5 and 6 are a side elevational view and a front elevational view of a finger for holding the selvedges,

Figs. 7–9 are a vertical sectional view illustrating the position of the holding finger with respect to the various

moving members of the inside selvedge motion and to the laid weft thread,

Fig. 10 illustrates, for a weave with 2 ends, the inside selvedges with a chain stitch made by the inside selvedge motion according to he invention,

Figs. 11–14 illustrate, for a weave with 2 ends, various positions of the crossing thread and the ground thread in relation to the mean plane of the shed during one complete permutation,

Figs. 15–17 illustrate a cam control relating to the synchronization of the shuttles with the needle movement, and

Figs. 18 and 19 illustrate means for controlling the breadth of the weave.

Referring now to Fig. 1, a crossing thread *f3* is unwound from a bobbin **1** for each selvedge. The crossing thread *f3* passing through a disk friction **2** and a tensioning device **3** is trained around a shaft **40** and a roller **4**. After leaving the roller **4**, the crossing thread *f3* passes through the eye **5** of a needle **6**.

The needle **6** guiding the crossing thread *f3* is arranged between the inner heddle **7** and the reed **9**, so that the inside selvedge motion may be mounted on the loom without a modification of the shaft frames.

As best shown in Figs. 1 and 2, the double needle **6**, **6'** swingably mounted on a pin **10** carries an armature **11** at its upper end which, in the course of an oscillation, is attracted by a magnetic circuit of one or the other of the two coils **12** and **13**.

The lateral displacement of the needle **6**, **6'** provides for the right hand position or left hand position of the crossing thread with respect to the ground thread.

The base of the support **39** carrying the pin **10** and the coils **11** and **12** may be readily attached to the frame **30** of the loom by means of clamps **31**, **32**. Preferably, the roller **4** guiding the crossing thread *f3* is also mounted on the support **39**.

Thus, the inner selvedge motion may be readily attached to any point of the frame of the loom by means of the clamps **31**, **32** without requiring the provision of bores or the like.

As best shown in Fig. 1, the eye **5** of the needle **6** is in such a position, that the crossing thread *f3* is always below the mean plane X—X' of the normal shed of the loom. Therefore, as shown in Fig. 3, the crossing thread *f3* depressed by the shuttle **42** upon the passage thereof is always woven below the weft thread.

When during the mean position of the heddles **7** and **8** the crossing of the threads occurs the needle **6**, **6'** is moved from the left to the right by an interruption of the current in the coil **12** and a simultaneous supply of current to the coil **13**. On the other hand, during a subsequent permutation, the needle **6**, **6'** is returned from the right to the left by an interruption of the current in the coil **13** and a simultaneous supply of current to the coil **12**.

The flow of current through the coils **12** and **13** is controlled by a change-over switch **44** (see Fig. 1), the resilient contact element **16** of which is alternatively in contact with the contacts **17** and **18**.

An extension **20** of a guide **19** attached to the heddle **8** causes a closing of the circuit, including the coil **12**, between the contact **16** and the contact **18** of the switch **44** during a half lower course, i. e. during the movement of the threads from the mean position of permutation to the low position and back to the crossing position.

On the other hand, during the upper half course of the heddle **8**, the extension **20** of the guide **19** is disengaged from the resilient contact element **16** of the switch **44**, so that said contact element **16** returns into a position for contact with the contact **17** so as to close the circuit including the coil **13**.

The ground threads *f1* and *f2* delivered by a bobbin

(not shown) are led to the heddles 7 and 8 upon passage through a braking device (not shown) and tensioning device (not shown), said braking device and said tensioning device being similar to the devices 2 and 3 shown in Fig. 1 in cooperation with the crossing thread *f3*. The ground threads *f1* and *f2* may be of the same type and quality as the warp threads.

Said ground threads *f1* and *f2* are threaded through eyelets of special heddles 14 and 15 mounted on the heddles 7 and 8. The eyelets of said special heddles 14 and 15 are arranged at such a level that the ground threads *f1* and *f2* are somewhat offset relative to the mean plane X—X' of the shed when the heddles 7 and 8 are in crossing position, so that the crossing thread *f3* may pass from one side of the ground threads *f1* and *f2* to the other at the moment of permutation.

The special heddles 14 and 15 are designed in such a manner that they may be attached to any suitable point of customary heddles, such as the shafts 7 and 8.

For obtaining two parallel inner selvedges it is sufficient to use a needle having two arms 6 and 6' (see Fig. 2) and two heddles 14 and 14' coupled with each other (see Fig. 4).

The distance between the two arms 6, 6' of the needle and between the two special heddles 14, 14' on one and the same shaft respectively is determined by the distance *a* (see Fig. 10) desired to be obtained between the two inner selvedges 29 and 29'.

Depending on the length of said distance *a* more or less passages of the reed 9 between those two passages thereof receiving each a group of three threads for an inner selvedge 29 or 29' respectively are left empty.

As best shown in Figs. 1, 7, 8 and 9 a finger 23, preferably made of steel, is swingably mounted at 24 on a bar 22 adjustably mounted on a member 21 connected with the support 39 of the mechanism for the formation of an inner selvedge 29. A spring 25 tends to urge said swingable finger 23 against an abutment 26 mounted on the bar 22. The bar 22 carrying the swingable finger 23 may be radially adjusted in accordance with the width of the cloth to be woven.

Each time when the heddles 7 and 8 are in the position of permutation as shown in Fig. 1, i. e. when the shed being closed is free from all members participating in the weaving operation, the finger 23 is in a rear position penetrating into the space between the inner selvedges 29 and 29'. Thus said finger 23 holds the inner selvedges 29 and 29' in proper position and at a proper distance from each other.

As best shown in Figs. 5 and 6, the lower end of the finger 23 is tapered in the shape of a beak 33 so that it may easier penetrate into the space between the two selvedges.

A piece of leather 34 mounted on the inner surface of the beak 33 eliminates a damage to or brutal and noisy shocks on the member of the shuttle which pushes periodically the finger 23 towards the zone of weaving.

Said protection by the piece of leather 34 is also obtained when the shed is open and the finger 23 is lifted by the weft laying member 27 (see Figs. 7 and 8) arranged on a passing shuttle 42.

The member 27 of the advancing shuttle 42 causes a swinging of the finger 23 about the pivot 24 from the position shown in Fig. 7 into the position 23' shown in Fig. 8 whereupon the member 27 is disengaged from the finger 23 and the latter returns into its inactive position, shown in Fig. 9, under the action of the spring 25.

During this time the weft thread 28 (see Fig. 9) has been deposited by the shuttle 42 in its place so that now, after the zone 29 is again free, it may be beaten up by the beat-up mechanism. During its rocking about the pivot 24 the finger 23 is always in engagement with one of the two ground threads *f1* and *f2* although one of the two heddles 14 or 15 may be in a high position.

Thus, the finger 23 maintains permanently the proper position and distance of the selvedges.

The operation of the inner selvedge motion according to the invention is as follows:

As best shown in Fig. 10 each selvedge 29 and 29' respectively is formed by the knotting of two ground threads *f1* and *f2* or *f4* and *f5* respectively and of the crossing thread *f3* or *f6* respectively with each weft thread 28.

The crossing thread *f3* or *f6* respectively passing always below the weft thread 28 is alternatively on the right or on the left of the two ground threads *f1* and *f2* or *f4* and *f5* respectively. During the movement of the crossing thread *f3* or *f6* respectively from the right to the left and from the left to the right, the crossing thread is always above the ground threads *f1* and *f2* or *f4* and *f5* respectively, said ground threads following the movement of the woven weave.

During a complete permutation of the shafts 7 and 8 the following positions occur:

A

Before the passage of shuttle No. I the heddles are in the crossing position whereby the shed is closed as indicated by Fig. 11.

The crossing threads *f3* and *f6* passing through the needle 6, 6' are at the left.

The ground threads *f1*, *f2* and *f4*, *f5* are in the position of permutation, but in a plane below the mean plane X—X' of permutation of the heddles 7 and 8 (not shown in Fig. 11).

The distance between the plane of the ground threads *f1*, *f2* and *f4*, *f5* and the mean plane X—X' of permutation of the heddles 7 and 8 is large enough that, at the moment of their crossing, the position of said ground threads does not disturb the movement of the needle 6, 6' for bringing the crossing thread from one side to the other.

B

During the passage of the shuttle No. I the heddles 7 and 8 are in their extreme positions whereby the shed is opened as indicated by Fig. 12.

The crossing threads *f3* and *f6* are at the left of the ground threads *f1*, *f2* and *f4*, *f5*.

The ground threads *f1* and *f4* are in their high positions.

The ground threads *f2* and *f5* are in their low positions.

C

Before the passage of the shuttle No. II the heddles 7 and 8 are again in their crossing position whereby the shed is closed as indicated by Fig. 13.

The ground threads *f1*, *f2* and *f4*, *f5* are in their position of permutation below the mean plane X—X' of the heddles 7 and 8.

The crossing threads *f3* and *f6* are brought to the right of the ground threads by means of the needle 6, 6'.

D

During the passage of shuttle No. II the heddles 7 and 8 are in their extreme positions whereby again the shed is opened as illustrated by Fig. 14.

The crossing threads *f3* and *f6* are at the right of the ground threads *f1*, *f2* and *f4*, *f5*.

The ground threads *f1* and *f4* are in their low positions.

The ground threads *f2* and *f5* are in their high positions.

Thus, during a complete permutation, the only movement in addition to the normal movement of the shafts is the displacement of the needle from the left to the right which is followed by a return movement to the left at the time of the permutation following the passage of the shuttle.

An inner selvedge motion according to the invention may be applied to looms of any type at any point of the width of the woven goods.

The new system for controlling the movements of the crossing thread has the following characteristics:

(1) A particular movement:

In contrast to hitherto customary inner selvedge motions, the path of the crossing thread is not in the shape of a U having an amplitude larger than that of the shed.

The crossing thread is threaded into a needle reciprocating at a small amplitude parallel to the mean plane of the shed.

The crossing thread delivered by a bobbin subjected to a braking action and placed in a suitable position for obtaining the most direct path passes through a compensating system including a tensioning device, whereupon the crossing thread being trained around a roller is supplied to the needle between the shafts and the reed.

(2) A particular position of the ground threads:

The ground threads are pulled downwardly so that the crossing thread may pass above them when they are in position of permutation.

(3) The means for controlling the movement:

Owing to the small amplitude of movement of the needle and owing to the small amount of energy required for the movement of the needle, the control of the movement of the needle may be obtained in a simple manner by different means:

For example, the control of the needle movement may be obtained mechanically from the movements of the shafts by means of cams or linkages.

Furthermore, the control of the needle movement may be obtained from any member of the loom operating in synchronism with the movement of the shuttles. In such a case, the movement may be transmitted in different ways, for example by means of a fluid transmitting the energy of a driving piston to the inner selvedge motion or by means of an electrical system or by any other suitable means.

According to the embodiment shown in the drawings and described above in detail the electric control of the needle is obtained by means operating in synchronism with the movement of the shuttles. A switch actuated by a member attached to a shaft alternatively excites one or the other of two electromagnets causing an oscillation of the needle.

(4) The use of a movable finger operating in synchronism with the passage of the shuttles:

This finger is used for holding the inner selvedge in its place.

The inner selvedge must be guided during its formation as the inner selvedge motion according to the invention is mounted on a loom without a slay as is the case in most of the circular looms.

An inner selvedge motion comprising such a finger produces two inner selvedges which are held at a predetermined distance from each other and parallel to each other by means of said finger.

The finger of suitable shape is swingably mounted on the support carrying the device for controlling the movement of the needle.

The finger may be adjusted in radial direction in accordance with the width of the cloth woven on the loom.

The finger enters into the space between the two selvedges so as to hold the threads in their place which form the chain stitch at the moment of their knotting with the weft thread. Thereafter, the finger moves away at the moment of the passage of the shuttle and the deposit of a new weft thread so that the fabric may advance and the weft thread may be beaten up at the bottom of the shed. This displacement of the finger may be obtained by different means, for example by making use of the passage of one of the members rotating in synchronism with the shuttles or of the movement of the shafts, or by making use of an exterior action of a motor or an electromagnet acting in synchronism with the movement of the shuttles.

Said arrangement of a movable finger could also be used for holding in place inner selvedges which are produced by an inner selvedge motion other than that described above.

If the weave is not a plain weave, the inner selvedge is always formed by:

A crossing thread, the movement of which is the same as in the case of a plain weave: a displacement in one direction or the other at each passage of a shuttle,

As many ground threads as there are ends in the weave.

The synchronization between the displacement of the shuttles and the balancing of the needle which guides the turning thread may be realized as in the example illustrated by Fig. 15.

The cam **45** which controls the upwardly and downwardly motion of one of the circular rows of heddles is firmly connected to the center portion of the loom, the rotation of which constitutes the normal motion of any circular weaving loom.

The cam shown operates with a loom having four shuttles **42**. Each of the shuttles is driven by a column **46** rigidly connected to the cam. The drive is provided for example by means of two friction rollers, one roller **47** being supported by the column **46** and the other roller **48** being fixed to the back portion of the shuttle; these two rollers roll on the lower sheet of the shed according to a principle known per se.

The cam communicates the upward and downward motion to the post **19** of each heddle by way of the rollers **49**. In Fig. 15 the frame is in its low position and the insulating lug **20** applies the contact **16** and **18** one on the other so that the electric circuit of the coil **12** is supplied with power and so that the needle inclines towards the right as shown in Fig. 16.

The needle **6** will remain in this position as long as the frame **19** remains in its low position, i. e. during the entire passage of a shuttle. Subsequently, the cam **45** will raise the frame **49** before the next shuttle **42** driven by the column **46** appears. As the frame rises, the lug **20** draws away. The contact blade **16** leaves the contact **18** and is applied against contact **17**. The circuit of coil **12** is opened and that of coil **13** is being closed so that the needle **6** swings according to the inclination shown in Fig. 17. Thus, between the passage of two shuttles the needle **6** swings and displaces the thread in relation to the ground threads. The needle **6** remains inclined to the left during the entire passage of the shuttle.

Thereafter, during the following permutation of the frames the coil **13** is no longer fed whereas coil **12** is fed once again and the needle **6** returns to the position shown in Fig. 16.

In Figs. 18 and 19 the member **22** which receives the finger **23** is fixed on the support **21** by means of two bolts **51**. The support **21** is provided with two longitudinal openings or slots **52** wherein the bolts **51** which are firmly connected to the cap **22** can slide. Thus, the cap can be displaced and fixed as desired.

If weaving with a maximum breadth, the members which carry the finger **23** are placed in position *a* indicated by a solid line in Figs. 18 and 19. To permit weaving with a minimum breadth, they are fixed in position *b* shown by the dotted line. It is evident that they can be arranged between these two extreme positions in any position corresponding to any intermediate breadth whatsoever.

We have described a preferred embodiment of our invention, but it is understood that this disclosure is for the purpose of illustration and that various omissions or 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.

What we claim is:

1. An inside selvedge motion for looms having a reed

and a pair of reciprocable heddles, comprising: stationary supporting means for attachment to the frame of a loom, a needle having an eye for engagement with a crossing thread, guiding means for guiding said crossing thread above the heddles of the loom to the eye of said needle, said needle being rockably mounted on said stationary supporting means and extending into the space between the reed and the adjacent heddle of the loom, the eye of said needle reciprocating in a plane below and substantially parallel to the mean plane of the shed, a first reciprocable guide for engagement with a first ground thread, a second reciprocable guide for engagement with a second ground thread, said first and second guides holding said first and second ground threads in a plane below the plane of said eye of said needle when they are in their position of permutation, and means for actuating said needle and first and second guides in predetermined relationship to each other.

2. In combination with an inside selvedge motion as claimed in claim 1, a member attached to said supporting means, a finger swingably mounted on said member for engagement with the inside selvedge produced by the inside selvedge motion so as to hold said inside selvedge in its place, an abutment on said member, and resilient means engaged with said finger for urging same against said abutment.

3. In combination with an inside selvedge motion as claimed in claim 1, a member adjustably attached to said supporting means, a finger swingably mounted on said member for engagement with the inside selvedge produced by the inside selvedge motion so as to hold said inside selvedge in its place, an abutment on said member, and resilient means engaged with said finger for urging same against said abutment.

4. In combination with an inside selvedge motion as claimed in claim 1, a swingable finger for engagement with the inside selvedge produced by the mechanism of the loom so as to hold said inside selvedge in its place.

5. An inside selvedge motion for looms having a plurality of shuttles, a reed and a pair of reciprocable heddles, comprising: stationary supporting means for attachment to the frame of a loom, a needle having an eye for engagement with a crossing thread, guiding means for guiding said crossing thread above the heddles of the loom to the eye of said needle, said needle being rockably mounted on said stationary supporting means and extending into the space between the reed and the adjacent heddle of the loom, the eye of said needle reciprocating in a plane below and substantially parallel to the mean plane of the shed, a first reciprocable guide for engagement with a first ground thread, a second reciprocable guide for engagement with a second ground thread, said first and second guides being attached to the reciprocable heddles of the loom for participtating in the movements of the latter in opposite directions, said first and second guides holding said first and second ground threads in a plane below the plane of said eye of said needle when they are in their position of permutation, and means for subjecting said needle to reciprocating rocking movements in predetermined relationship to the reciprocating movements of said first and second guides.

6. In an inside selvedge motion as claimed in claim 5, said means for subjecting the needle to reciprocating rockng movements including electric means operated in synchronism with the movement of the shuttles of the loom.

7. In an inside selvedge motion as claimed in claim 5, said means for subjecting the needle to reciprocating rocking movements including electromagnetic means operated in dependence on the reciprocating movement of a heddle of the loom.

8. An inside selvedge motion for a loom, comprising: means for producing a pair of inside selvedges spaced from each other at a predetermined distance, and a swingable finger for entering into the space between the inside selvedges so as to hold same in their proper places.

9. In an inside selvedge motion as claimed in claim 8, a member carrying said swingable finger, and means for adjusting said member in dependence on the width of the cloth to be woven.

10. In a loom the combination of: a reed, a pair of reciprocable heddles, a stationary member, a needle having an eye for engagement with a crossing thread, said needle being rockably mounted on said stationary member, guiding means for guiding said crossing thread above the heddles of the loom to the eye of said needle, said needle extending into the space between the reed and the adjacent heddle of the loom, the eye of said needle reciprocating in a plane below and substantially parallel to the mean plane of the shed, a first reciprocable guide for engagement with a first ground thread, a second reciprocable guide for engagement with a second ground thread, said first and second guides holding said first and second ground threads in a plane below the plane of said eye of said needle when they are in their position of permutation, and means for actuating said needle and first and second guides in predetermined relationship to each other.

11. In a loom the combination of; a reed, a pair of reciprocable heddles, a stationary member, a needle having an eye for engagement with a crossing thread, said needle being rockably mounted on said stationary member, guiding means for guiding said crossing thread above the heddles of the loom to the eye of said needle, said needle extending into the space between the reed and the adjacent heddle of the loom, the eye of said needle reciprocating in a plane below and substantially parallel to the mean plane of the shed, a first riciprocable guide for engagement with a first ground thread, a second reciprocable guide for engagement with a second ground thread, said first and second guides being attached to the reciprocable heddles of the loom for participating in the movements of the latter in opposite direction, said first and second guides holding said first and second ground threads in a plane below the plane of said eye of said needle when they are in their position of permutation, and means for subjecting said needle to reciprocating rocking movements in predetermined relationship to the reciprocating movements of said first and second guides.

12. In a loom as claimed in claim 11, said means for subjecting the needle to reciprocating rocking movements including electric means operated in synchronism with the movement of the shuttles of the loom.

13. In a loom as claimed in claim 11, said means for subjecting the needle to reciprocating rocking movements including electromagnetic means operated in dependence on the reciprocating movement of a shaft of the loom.

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