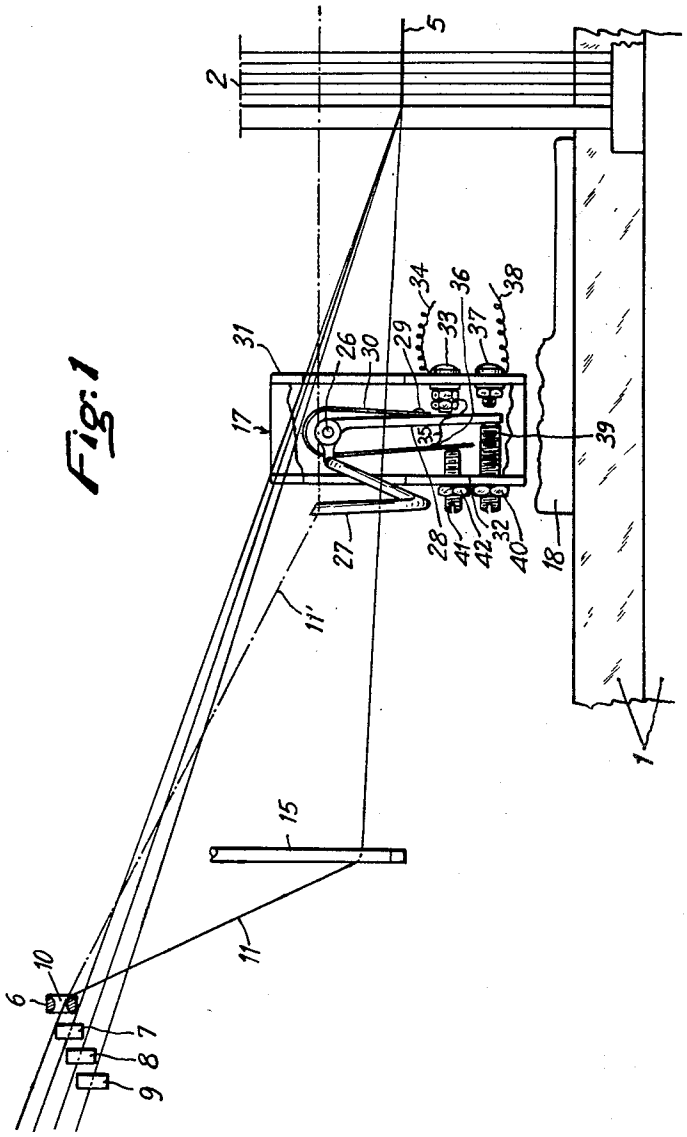
Nov. 24, 1964 R. DEWAS 3,158,182

DEVICE FOR CONTROLLING THE WEFT IN CONTINUOUS-FEED WEAVING MACHINES

Filed Sept. 5, 1962 8 Sheets-Sheet 1

Fig. 1



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Nov. 24, 1964 R. DEWAS 3,158,182

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Filed Sept. 5, 1962 8 Sheets-Sheet 2

Fig: 2

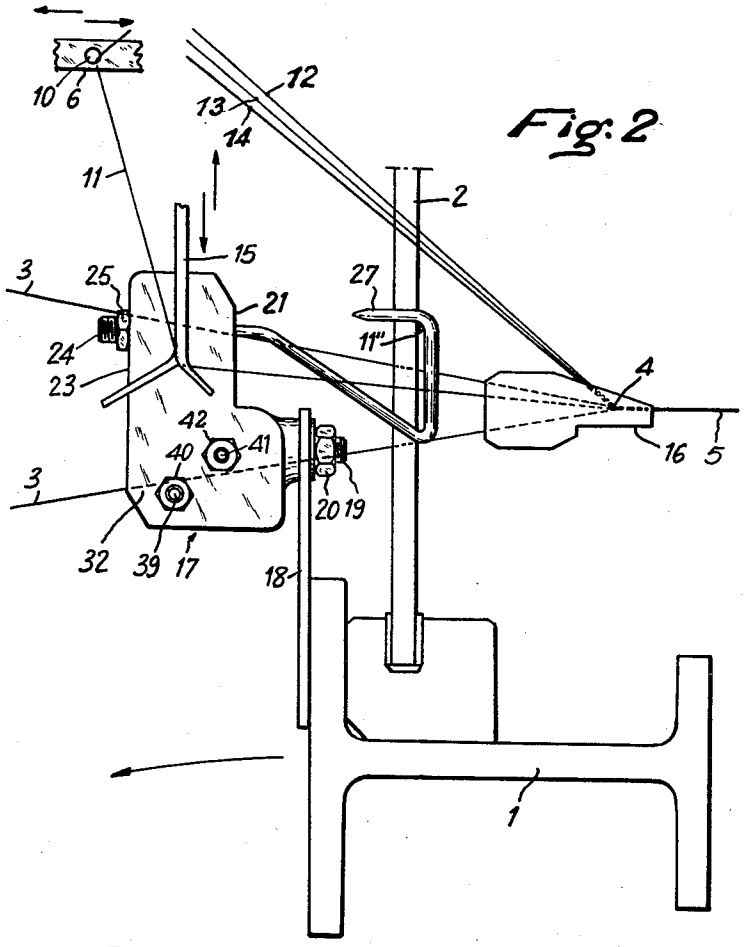


Fig: 4

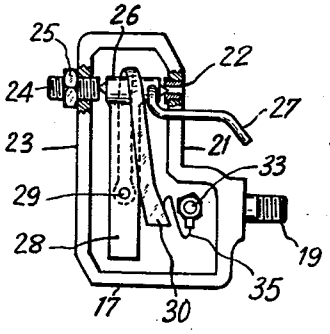
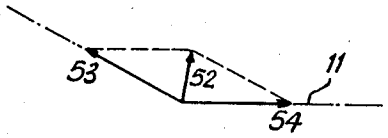


Fig: 5



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DEVICE FOR CONTROLLING THE WEFT IN CONTINUOUS-FEED WEAVING MACHINES

Filed Sept. 5, 1962 8 Sheets-Sheet 3

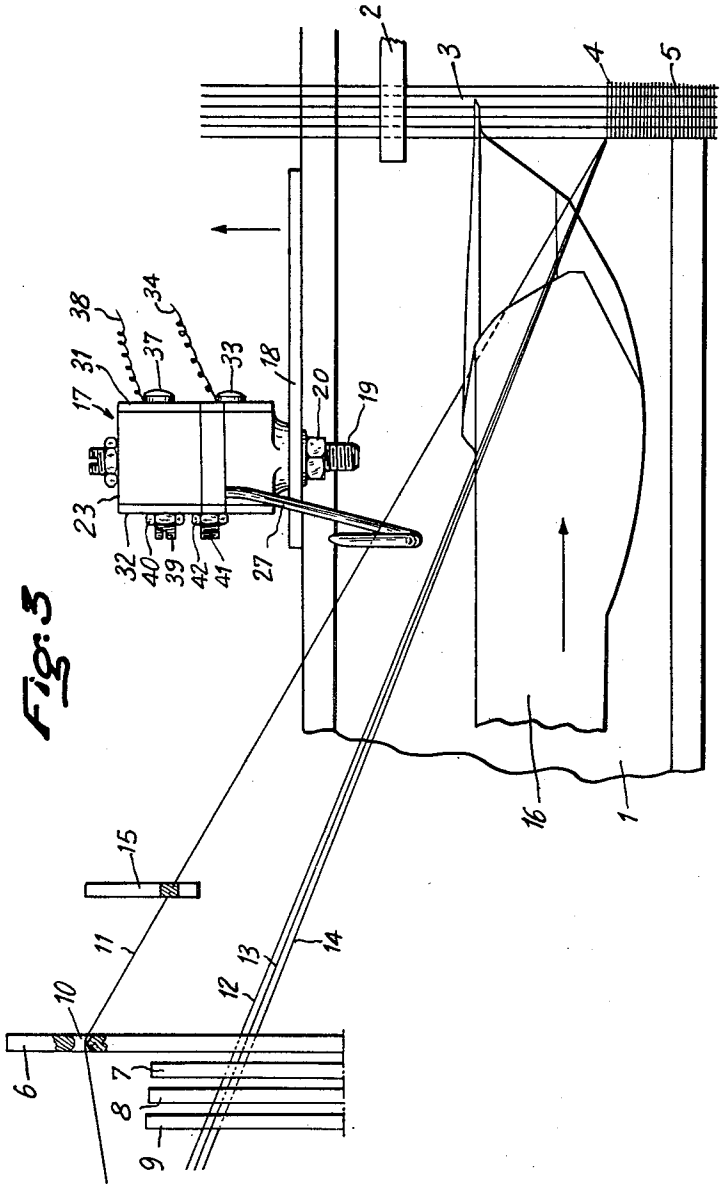


Fig. 3

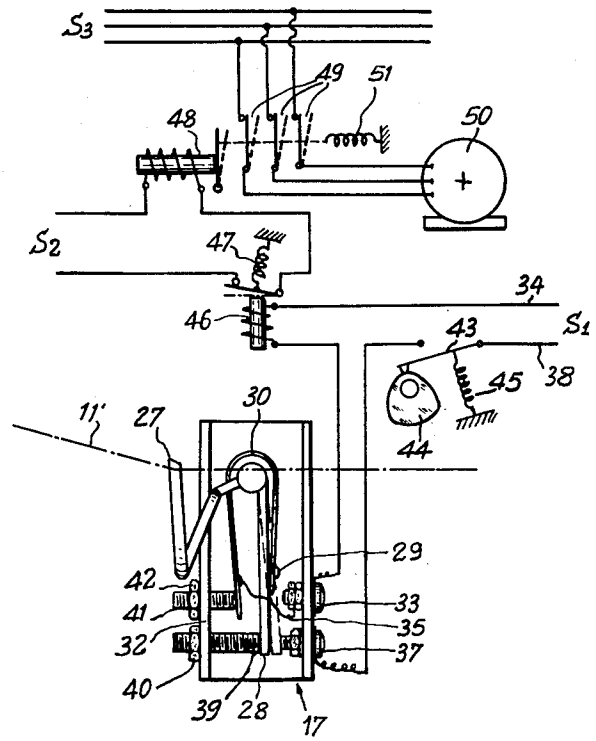
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DEVICE FOR CONTROLLING THE WEFT IN CONTINUOUS-FEED WEAVING MACHINES

Filed Sept. 5, 1962 8 Sheets-Sheet 4

Fig. 6



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DEVICE FOR CONTROLLING THE WEFT IN CONTINUOUS-FEED WEAVING MACHINES

3,158,182

Filed Sept. 5, 1962

8 Sheets-Sheet 5

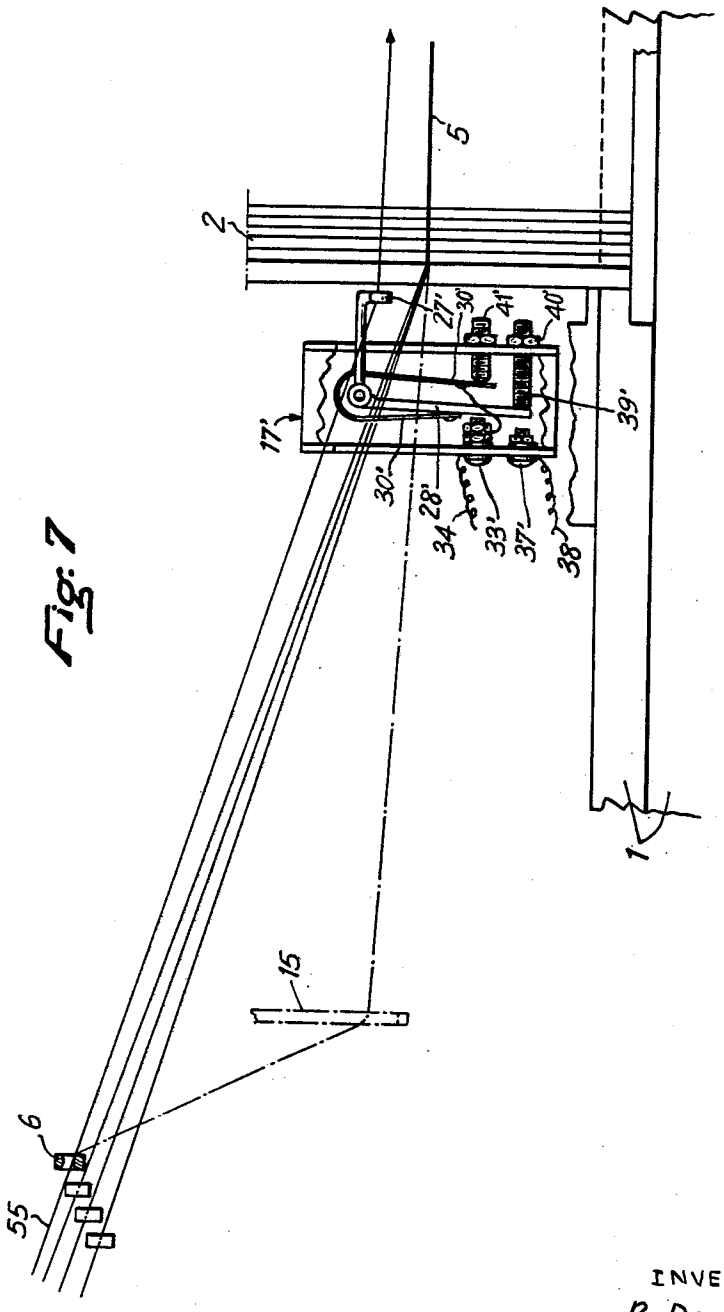


Fig. 7

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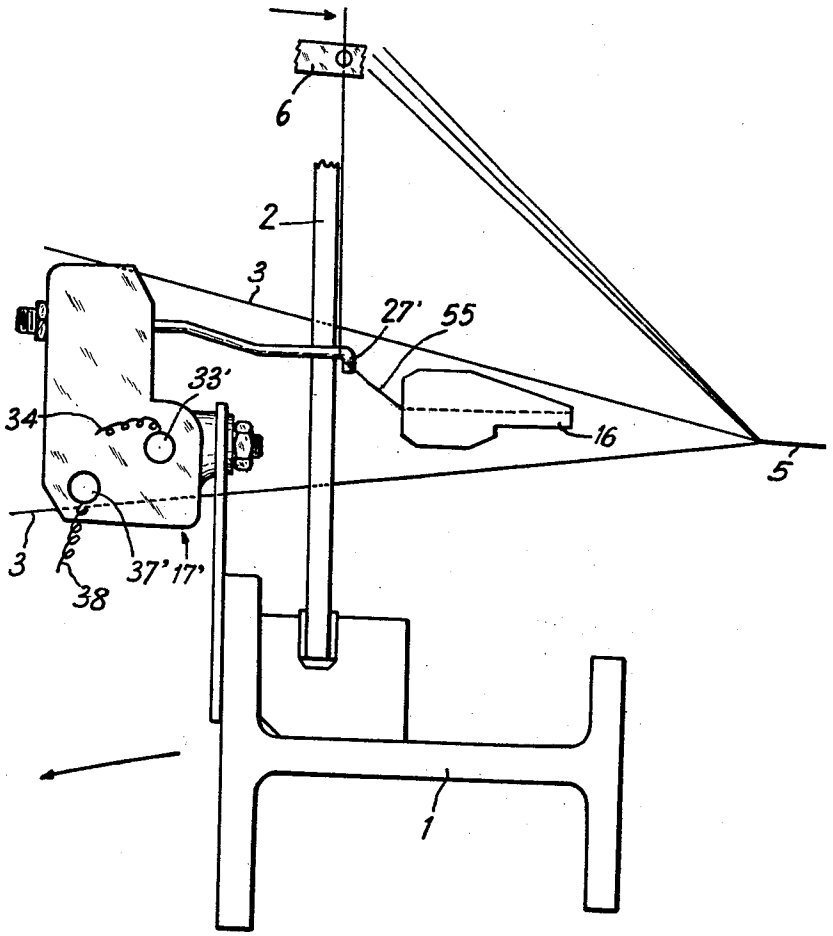
DEVICE FOR CONTROLLING THE WEFT IN CONTINUOUS-FEED WEAVING MACHINES

3,158,182

Filed Sept. 5, 1962

8 Sheets-Sheet 6

Fig. 8



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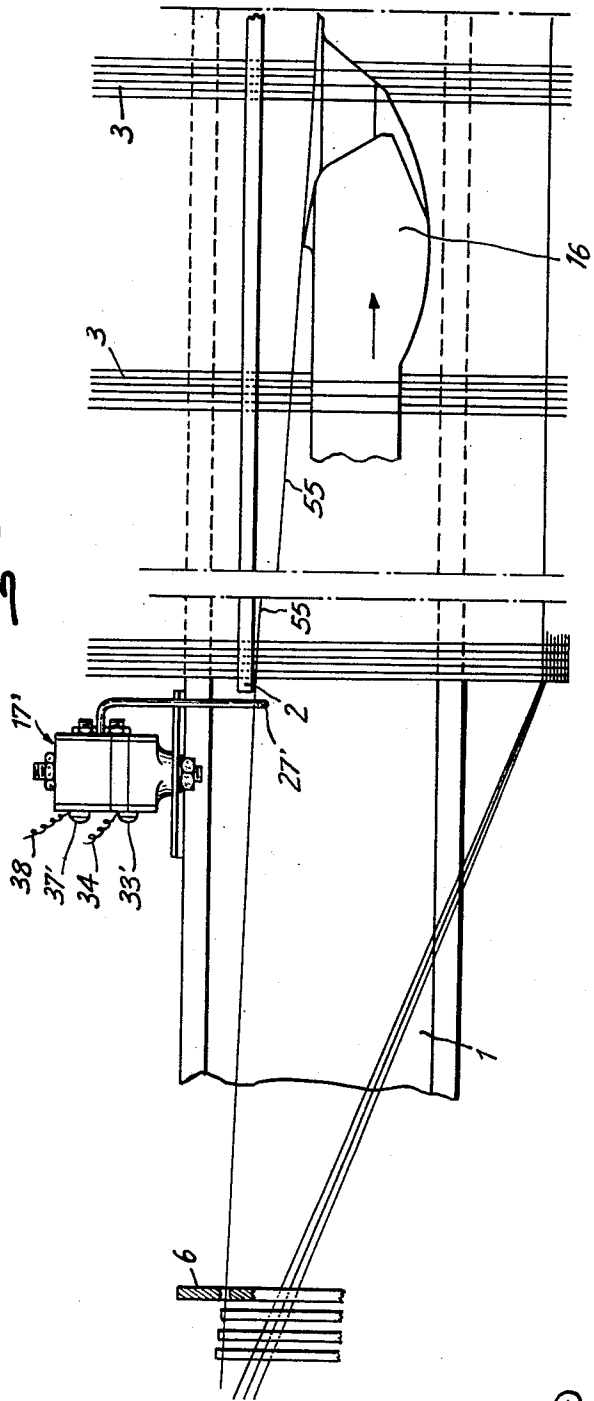
DEVICE FOR CONTROLLING THE WEFT IN CONTINUOUS-FEED WEAVING MACHINES

3,158,182

Filed Sept. 5, 1962

8 Sheets-Sheet 7

Fig. 9



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DEVICE FOR CONTROLLING THE WEFT IN CONTINUOUS-FEED WEAVING MACHINES

3,158,182

Filed Sept. 5, 1962

8 Sheets-Sheet 8

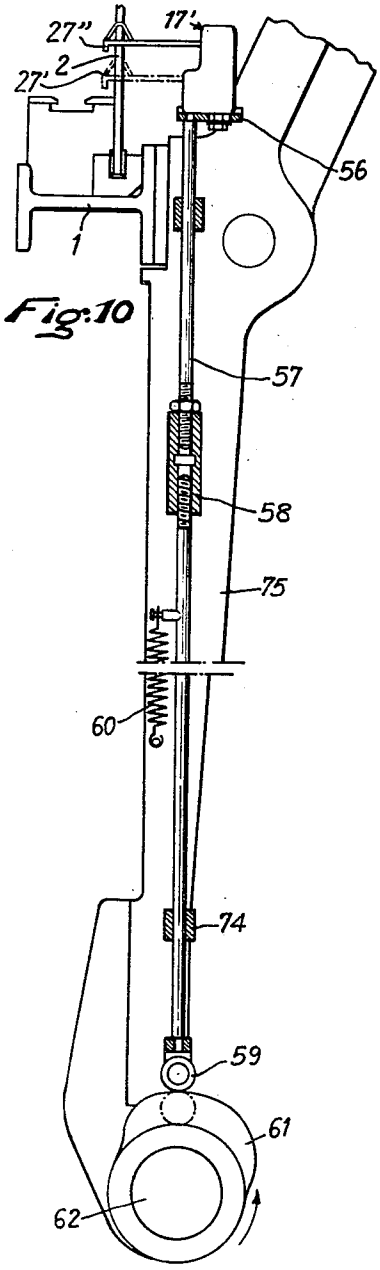


Fig. 10

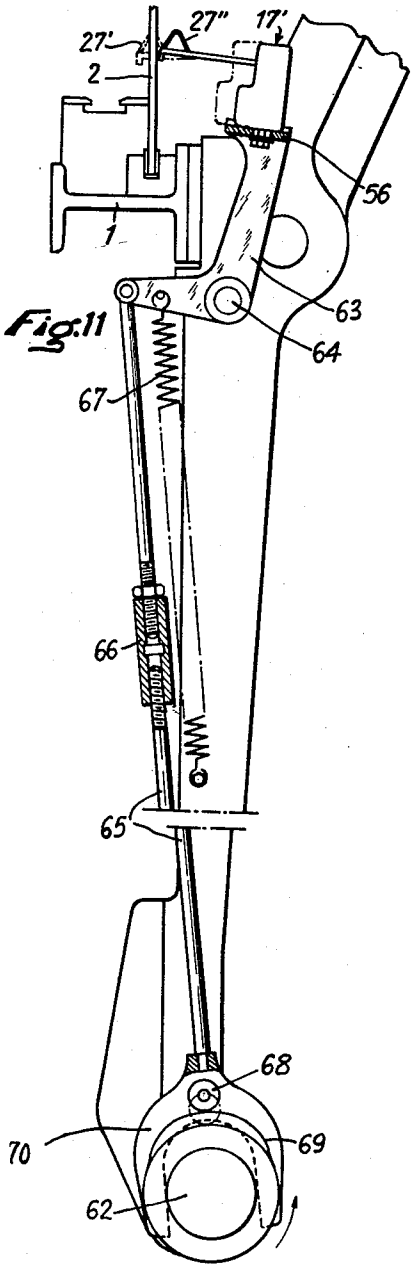


Fig. 11

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3,158,182

DEVICE FOR CONTROLLING THE WEFT IN CONTINUOUS-FEED WEAVING MACHINES

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Claims priority, application France Sept. 8, 1961
8 Claims. (Cl. 139—370)

This invention relates to the insertion of the weft in weaving machines of the type in which the weft is continuously fed from large bobbins located outside the shed and which is fitted with pirnless left-inserters.

The present invention is more particularly concerned with those machines which comprise, between the device for selecting and presenting the weft on the one hand and the adjacent selvedge of the cloth on the other hand, a positioning unit which is carried by the lay and the function of which, among others, is to make it necessary for the weft thread, in spite of the back movement of the lay, to continue to pass between the reed and the weft-inserter or weft-inserters.

An object of this invention is the provision of a device which makes it possible to control the weft thread during insertion, and which is simple in construction and reliable in operation.

Another object is the provision of a device of this type which will act as a stop motion device upon the failure of any weft thread.

In its general principle, the device in accordance with the present invention is characterized in that the positioning unit forms part of an assembly which is pivotally mounted on an axis substantally parallel to the warp threads, said assembly being used in combination with electric contact elements in such manner that in the event of a break or shortage of weft, the assembly closes a circuit and thus causes the stoppage of the loom.

The above-mentioned device has the essential advantage of being unaffected by the inertia of its component parts created by the movement of the lay while nevertheless remaining responsive to the presence of a weft thread in the normally stretched condition as well as to the absence or slackness of the weft. This absence of inertia permits of fine adjustments. Furthermore, control of the thread is achieved without any further friction other than that which results from the presence of the positioning unit.

According to one embodiment, the positioning unit is constituted by a finger-like member or hook which is mounted on a pivotal spindle extending in the direction of displacement of the lay, said spindle being also provided with an arm forming a switch for the auxiliary electric circuit, the closure of this circuit in the event of absence or slackness of the weft resulting in the stoppage of the loom.

Two embodiments of the invention as applied to a needle-type weaving machine and given solely by way of examples without implied limitation, will be described below and illustrated diagrammatically in the accompanying drawings, in which:

FIGURE 1 is a view in front elevation showing the device for controlling the weft in a first embodiment as well as the device for selecting and presenting the weft threads;

FIGURE 2 is a view in side elevation of the same device;

FIGURE 3 is a plan view of the devices shown in FIG. 1;

FIGURE 4 is a view in side elevation of the device for controlling the weft thread with the side plates removed;

FIGURE 5 is a diagram showing the composition of forces applied to the device by the weft thread during its insertion;

FIGURE 6 is a diagram of the electrical installation;

FIGURES 7, 8 and 9 are views which are similar, respectively, to FIGS. 1, 2 and 3 and show a second embodiment of the device for controlling the weft threads;

FIGURES 10 and 11 are views in side elevation of the inner face of the left hand sword of the lay showing two systems which serve to impart a receding motion to the device of the second embodiment.

As regards the first embodiment shown in FIGS. 1 to 5, the reference numeral **1** designates the lay and **2** designates the reed. The reference numeral **3** designates the warp threads which form the shed, **4** is the fell of the cloth and **5** is the fabric. Weft thread selectors **6, 7, 8, 9** are provided in any number desired, and have an eyelet **10** through which are threaded, respectively, weft threads **11, 12, 13, 14** which are connected to the selvedge of the fabric **5**. These weft threads may be of different nature, colors, or types and are fed from bobbins which have not been illustrated in the drawings.

A device **15** presents the selected thread to the needle **16** when the latter is about to enter the shed. A box **17** which contains a device for controlling the presence and the tension of weft thread, is secured to a plate **18** fastened to the lay **1** rearward of the reed at a certain distance from the selvedge of the fabric by means of a threaded stud **19** of said box and a nut **20**.

The front wall **21** of the box **17** is provided with a fixed bearing bush **22** (as shown in FIG. 4) and the rear wall **23** is provided with an adjustable coaxial bearing-bush **24** which is locked by means of a nut **25**.

A spindle **26** pivoted in the bearing bushes **22** and **24**, carries a finger or hook **27** extending toward the rear and constituting the weft thread positioning member, and an arm **28** on which is riveted at **29** a leaf spring **30** which is passed around and above the spindle **26** and which is bent downwardly.

The swinging unit **27, 28** together with its spindle **26** is insulated from the box **17** which is made of a non-insulating material; to this end, therefore, the bearing bushes **22** and **24** are made of an insulating material.

The box **17** is closed by means of two side plates **31** and **32** of insulating material. Two screws **33** and **37** are fitted on the plate **31**. The screw **33** is connected to one terminal **34** of a low voltage current supply source **51** and to the free end of the spring **30** by means of a flexible lead **35** which is welded to said spring at **36**. The screw **37** is connected to the other terminal **38** of the current supply source and is so mounted that its end limits the travel of the arm **28** in one direction. A first grub screw **39** mounted through the plate **32** and provided with a locking nut **40**, serves as an adjusatble stop to limit the travel of the arm **28** in the other direction. A second screw **41** also mounted through said plate and provided with a locking nut **42**, serves as an adjustable abutment applied against the free end of the spring **30**, for adjusting the tension of said spring.

Voltage is applied to the screws **33** and **37** at each operating cycle of the loom during a certain time which is predetermined by the closure of a switch **43** (FIG. 6) under the action of a cam **44** against which said switch is pressed by a spring **45**.

The coil is a relay **46** is connected in series in the low-voltage auxiliary circuit which supplies current to the screws **33** and **37**. When the coil of this relay is not energized, the action of a spring **47** of this relay causes the latter to close a circuit to a source **52**, thus energizing the coil of a relay **48**, provided with main contacts **49** adapted to energize a loom driving motor **50** from the source **53**.

The operation of the device takes place as follows:

The weft thread **11** which has been selected by the weft-selector **6**, is brought by the fork-shaped presenting lever **15** into the path of the needle **16** which is about to enter the shed. As a result of the backward movement of the lay **1**, the hook **27** catches the weft thread **11**. As seen as the thread **11** is caught and conveyed by the needle **16**, the presenting lever **15** moves upwards, with the result that the thread takes up the position **11'** (as shown in FIG. 1), then the position **11''** (as shown in FIG. 2), while applying to the hook **27** a force **52** which results from the tensions **53** and **54** as shown in FIG. 5; this has the effect of lifting said hook.

Immediately after this step has been completed, the switch **43** (FIG. 6) closes under the action of the cam **44**, thereby applying voltage to the screws **33** and **37**.

In the insertion of the weft thread **11** takes place in a normal manner inside the shed formed by the warp threads **3**, the arm **28** is pivoted against the screw **39** and the auxiliary circuit is open.

If, on the contrary, the weft is slack as a result of a break, for example, or if the weft thread has run out, the hook **27** is not lifted, with the result that the arm **28**, under the action of the spring **30**, remains in contact with the screw **37**. The closure of auxiliary circuit then energizes the relay **46** which cuts off the supply to the relay **48** whereupon the contacts **49** which are acted upon by their spring **51** open the circuits supplying the motor **50**, thereby causing the stoppage of the machine.

At the end of the insertion, the weft thread is released from the hook **27** solely as a result of the forward movement of the lay **1**. Before the thread ceases to carry out its action on the hook **27**, however, the cam **44** has permitted the switch **43** to open under the action of its spring **45**.

FIGS. 7 to 9 show a second embodiment of the device for controlling the weft threads, in which the positioning unit as constituted by a hook **27'** is distinguished from the hook **27** of the first embodiment, in that the hook **27'** is located in immediate proximity to the reed **2** and in that it is directed towards the front, instead of being directed rearwardly. The arrangement of the members within the box **17'** is, therefore, reversed and said box is accordingly mounted adjacent to and rearwardly of the reed and adjacent the selvedge of the cloth.

The operation of this second embodiment is as follows:

The weft thread **55** which has been selected by the weft-selector **6**, is brought by the presenting lever **15** into the path of the needle **16** and is conveyed by this latter into the shed.

As a result of the rearward position of the presenting lever **15** with respect to the reed **2** and also of the selector **6**, the progressive upward movement of said presenting lever and the continuous motion of the needle **16** through the shed cause the weft thread **55** to come into contact with and progressively move upward the edge of the reed **2** so as to come of its own accord in position inside the hook **27'**.

If the insertion of the weft thread **55** is carried out in a normal manner inside the shed, the arm **28'** is pivoted into engagement with the screw **39'** and the auxiliary circuit is left open even though the switch **43** (as shown in FIG. 6) closes immediately under the action of the cam **44**, thereby applying voltage to the screws **33'** and **37'**.

If, on the contrary, the weft has slackened as a result of a break in the thread, for example, or if the weft thread has run out, the hook **27'** is not lifted, with the result that the arm **28'** remains in contact with the screw **37'** under the action spring **30'**. The closure of the auxiliary circuit then energizes the relay **46** (as shown in FIG. 6) which interrupts the supply to the relay **48** whose contacts **49** are acted upon by their spring **51** and open the circuits supplying the motor **50**, so that the machine is brought to a standstill.

Towards the end of the insertion of the weft, the top layer of the warp threads which is moving downwardly to close up the shed, lowers the weft thread **55**, and snaps it out of the hook **27'**. Before the thread ceases to urge the hook **27'** upwardly, however, the cam **44** has permitted the switch **43** to open under the action of its spring **45**.

The hook **27'** can move through a slot formed in the guard or end rod of the reed, or alternately between the guard which has a smaller width over a portion of its height and the first blade.

This device of the second embodiment can be made movable by making use, for example, of one or the other of the means which are illustrated, respectively, in FIGS. 10 and 11.

In the first of these figures, the box **17'** is mounted on a base plate **56** which is supported by a rod **57**, adapted to slide in guides **73**, **74** secured to the corresponding sword **75**. The length of the rod **57** can be adjusted by means of the opposite-thread sleeve **58** so as to permit the height adjustment of the device.

The bottom end of the rod **57** carries a roller **59** which is urged by a spring **60** against a cam **61** which is keyed on the shaft **62**, said shaft being designed to perform one revolution for each operating cycle of the weaving machine. The foot of the swords supporting the lay **1** oscillates freely on the shaft **62**.

This arrangement makes it possible, for example, first to lift the device prior to beating up the weft thread, if the hook **27'** has to move clear of a temple cover to position **27''** and then, after the lay **1** has already moved back over a certain portion of its travel, to lower the device so that the hook when in this lowered position, is operative to encounter the weft thread **55** when this latter is in contact with the edge of the reed **2**. The downward movement of the device can be stopped in this position, or else it can be continued so that at the time of the forward movement of the lay, the weft thread **55** having nearly reached the end of its insertion, is guided in the middle plane of the shed as this latter is being closed again, thereby ensuring that said weft thread remains as long as possible inside the hook and, therefore, under the control of the device. Upon completion of this step, the device moves up into its initial position.

The system of FIG. 11 is useful if it is only desired that the hook **27'** should move away to position **27''** so as not to interfere with an element such as, for example, a temple cover. This system makes it possible to cause the device to swing backwardly. To this end, the base-plate **56** forms part of a bell-crank **63** which is pivotally mounted on a spindle **64** and is actuated by a rod **65**, the length of which can be adjusted by means of the opposite-thread sleeve **66** so as to make possible the adjustment of the distance of travel of the device.

A roller **68** is mounted at the bottom end of the rod **65** and is urged by a spring **67** against a cam **69** which is keyed on the rotary shaft **62**.

A fork **70** straddling the shaft **62** is also mounted at the bottom end of the rod **65**.

It is understood that alternative forms, detail improvements and uses of equivalent means can be devised without thereby departing either from the scope or the spirit of the present invention.

It follows, therefore, that the positioning of the weft thread and the control of said weft thread can be carried into effect by means of two different devices, instead of only one device, provided that at least the control device be mounted for pivotal movement on an axis which is substantially parallel to the warp threads.

The positioning unit can be either stationary or movable and can have other shapes.

It will be readily understood, that when a weaving machine is employed having a clutch system which connects this machine to the source of energy, the closure of the auxiliary circuit which energizes the relay **46** can be em-

ployed for the purpose of stopping the machine by disengagement of the clutch system.

I claim:

1. In a loom wherein a shed is formed in the warp to receive each weft, said loom having a reciprocating lay, a reed, weft inserting means carried by said lay for inserting a weft thread into the shed, and power means for driving said loom; a weft guiding and detecting device comprising a finger-like member, means carried by said lay and supporting said member for movements of short amplitude thereon in a plane at right angles to the direction of movement of said lay, said member being adapted to guide said weft thread between the weft supply and the shed, spring means resiliently opposing the movement of said member in response to traction exerted on the weft thread drawn into the shed, the force of said spring means permitting movement of said member during normal traction, and electrical circuit means including a switch actuated by said member when action of said spring means exceeds action of tension of the weft thread on said member due to absence of weft thread or insufficient tension thereof, a relay energized by said switch, and a loom control actuated by said relay to make said power means inoperative upon actuation of said switch.

2. A device in accordance with claim 1, wherein said member-supporting means support said member for pivotal movement about an axis extending substantially in the direction of movement of said lay.

3. A device in accordance with claim 1, wherein said member has the shape of a hook directed toward the rear of the loom and located at a predetermined distance from the reed.

4. A device in accordanc with claim 1, wherein said member has the shape of a hook directed toward the front of the loom and having a downwardly curving end portion, said member being located in immediate proximity to the reed.

5. A device in accordance with claim 1, comprising means for moving said member in a vertical direction.

6. A device in accordance with claim 1, comprising means for moving said member in a substantially horizontal direction, whereby said member is moved back after the lay has begun its rearward movement.

7. In a loom wherein a shed is formed in the warp to receive each weft, said loom having a horizontal rotary shaft, a sword having its lower end pivotally mounted on said shaft, a reciprocating lay having one end supported by the upper end of said sword, weft inerting means carried by said lay for inserting a weft thread into the shed and power means for driving said loom; a weft guiding and detecting device comprising a casing, a rod mounted for longitudinal sliding movement on said sword, said casing being carried by the upper end of said rod, a cam secured to said horizontal shaft, a cam follower mounted on the lower end of said rod and cooperating with said cam for longitudinally reciprocating said rod, a finger, means located in said casing for supporting said finger

for movements of short amplitude therein in a plane at right angles to the direction of movement of said lay, said finger being adapted to guide said weft thread between the weft supply and the shed, spring means resiliently opposing the movement of said finger in response to traction exerted on the weft thread drawn into the shed, the force of said spring means permitting movement of said finger during normal traction, and electrical means including a switch actuated by said finger, when action of said spring means exceeds action of tension of the weft thread on said finger due to absence of weft thread or insufficient tension thereof, a relay energized by said switch and a loom control actuated by said relay to make said power means inoperative upon actuation of said switch.

8. In a loom wherein a shed is formed in the warp to receive each weft, said loom having a horizontal rotary shaft, a sword having its lower end pivotally mounted on said shaft, a reciprocating lay having one end supported by the upper end of said sword, weft inserting means carried by said lay for inserting a weft thread into the shed and power means for driving said loom; a weft guiding and detecting device comprising a casing, a bell crank lever pivotally mounted on the upper portion of said sword, and having a substantially vertical arm and another arm extending substantially in the horizontal direction, said casing being carried by said vertical arm, a cam secured to said horizontal shaft, a connecting rod having one end pivoted to the end of said horizontal arm of the bell crank lever, the other end of said rod being operatively connected to said cam for moving said casing horizontally, a finger, means located in said casing and supporting said finger for movements of short amplitude therein in a plane at right angles to the direction of movement of said lay, said finger being adapted to guide said weft thread between the weft supply and the shed, spring means resiliently opposing the movement of said finger in response to traction exerted on the weft thread drawn into the shed, the force of said spring means permitting movement of said finger during normal traction, and electrical means including a switch actuated by said finger, when action of said spring means exceeds action of tension of the weft thread on said finger due to absence of weft thread or insufficient tension thereof, a relay energized by said switch and a loom control actuated by said relay to make said power means inoperative upon actuation of said switch.

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