United States Patent [19]

Sermet

[11] **3,731,712**

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[54] WEFT DISTRIBUTOR AND SELECTOR FOR POWER LOOMS

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[73] Assignee: **Ateliers Diederichs,** Bourgoin-Jallieu, France

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[52] **U.S. Cl.** ..... **139/122 W**

[51] **Int. Cl.** **D03d 47/38**

[58] **Field of Search** ..... 139/55, 59, 122 W; 66/125

[56] **References Cited**

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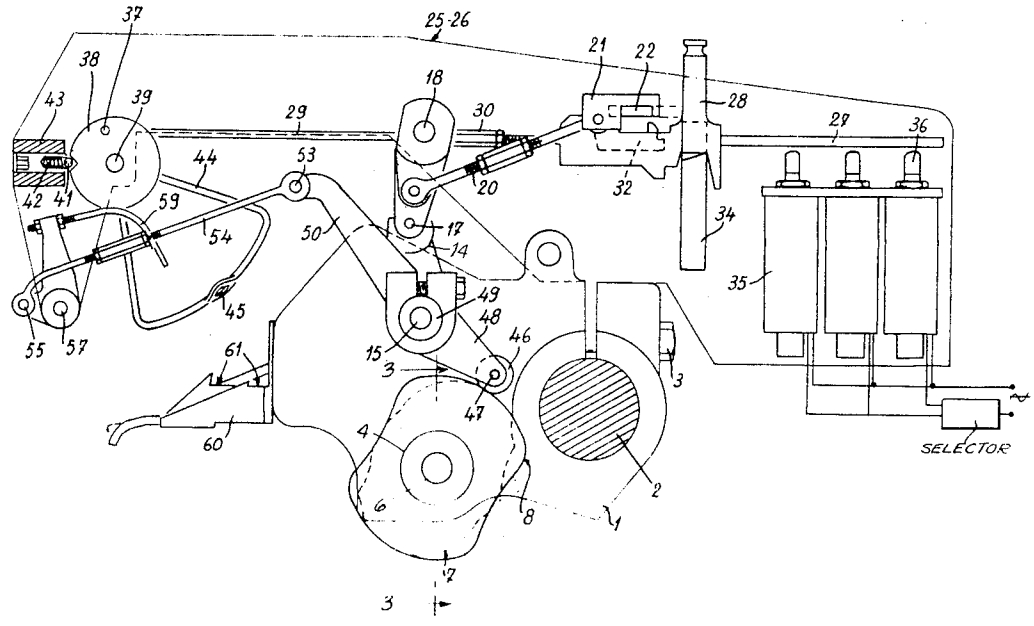
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Primary Examiner—Henry S. Jaudon
Attorney—Eric H. Waters et al.

[57] **ABSTRACT**

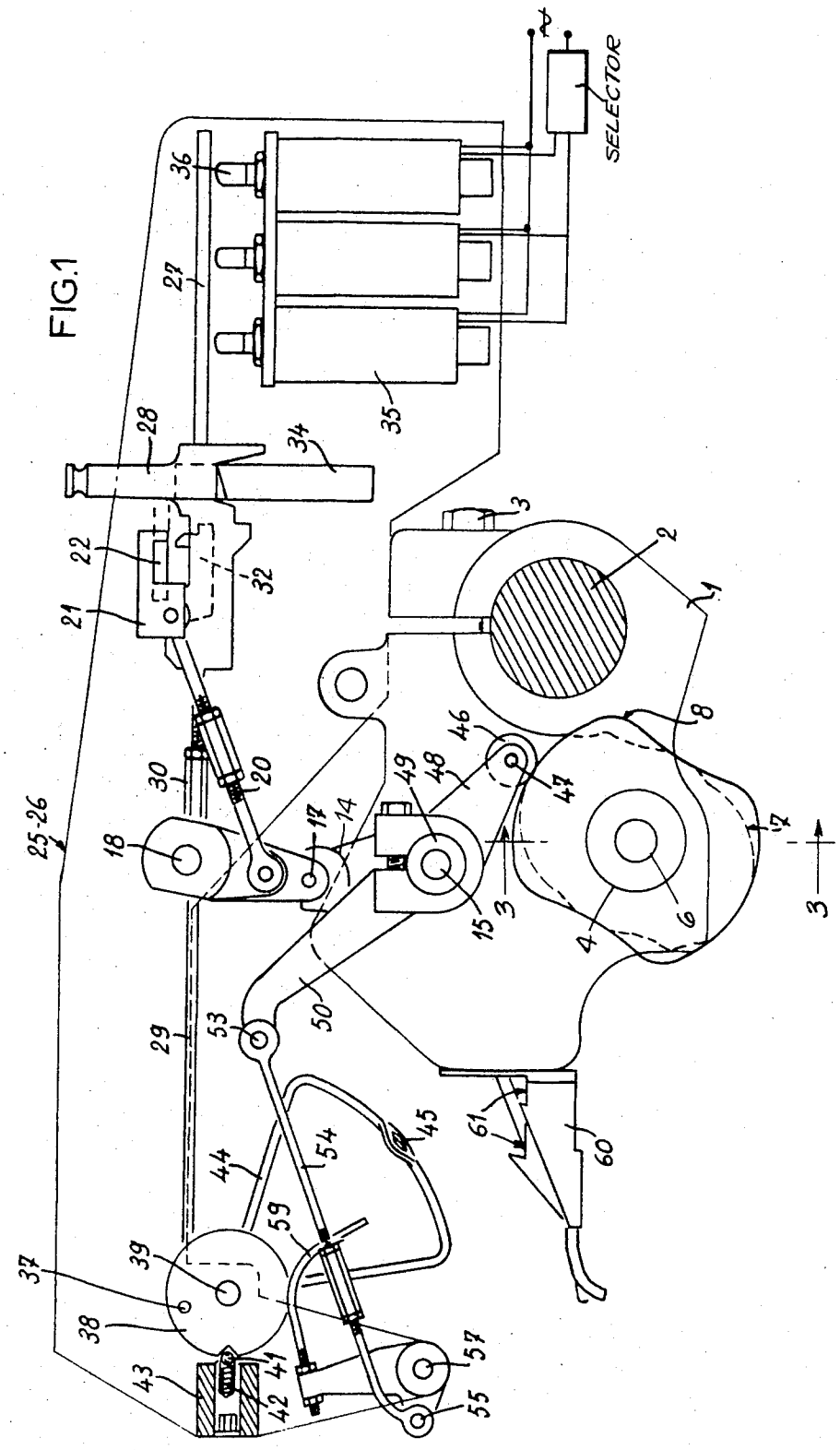
In a power loom a distributor-selector device for selecting multi-color wefts among a plurality of weft threads and presenting the selected weft thread to the insertion member. Each weft thread is engaged permanently in a guide independent of the guides receiving the other threads, all the guides being mounted in side by side relationship and adapted to oscillate about a common shaft, the oscillation of the selected guide resulting from the movement of a pull rod to which it is connected and which is adapted, when selected, to become locked to a blade to which a rectilinear reciprocating motion is imparted. The thread movement caused by the oscillation of its guide is completed by the downward pivotal movement of a fork bending said thread across the path of the insertion member. The selected pull rod is lifted by the thrust exerted directly against it by the core of an electromagnet so as to cause its locking engagement with said blade controlling the pull rod, this locking engagement being obtained by using a pivoted catch formed with a notch and responsive to a return spring.

3 Claims, 15 Drawing Figures



9 Sheets-Sheet 1

FIG.1



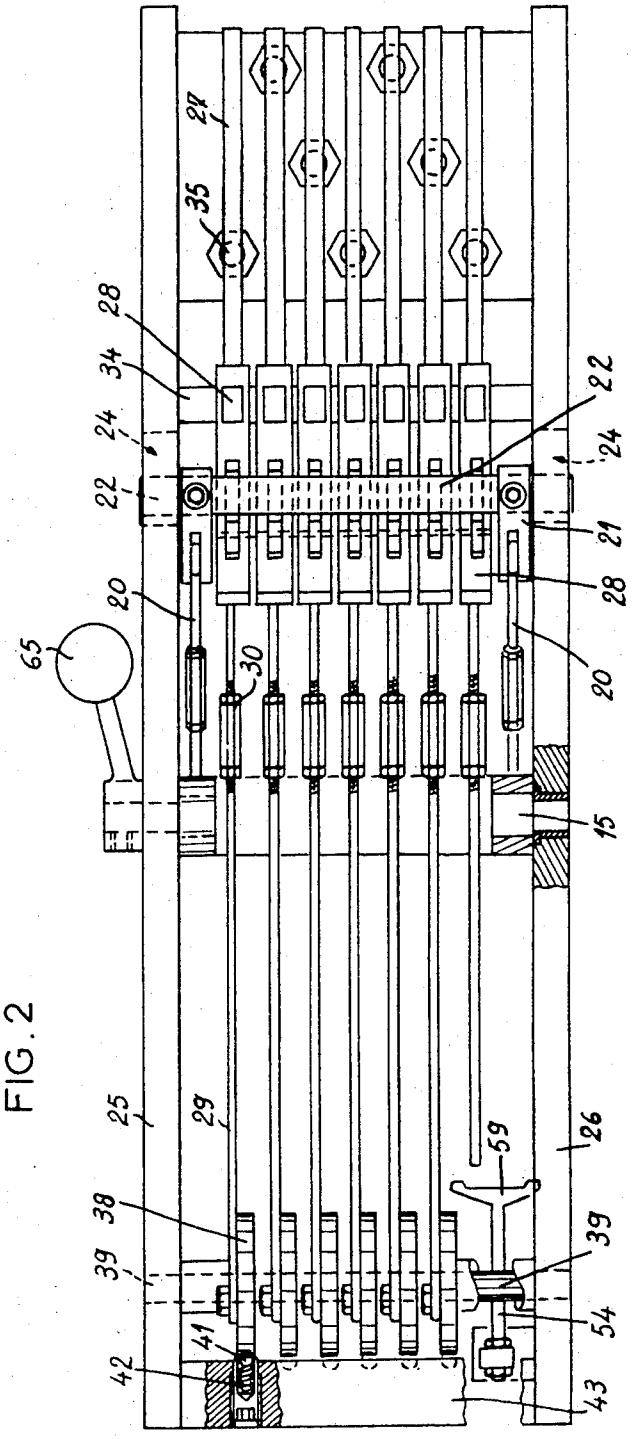

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FIG. 2

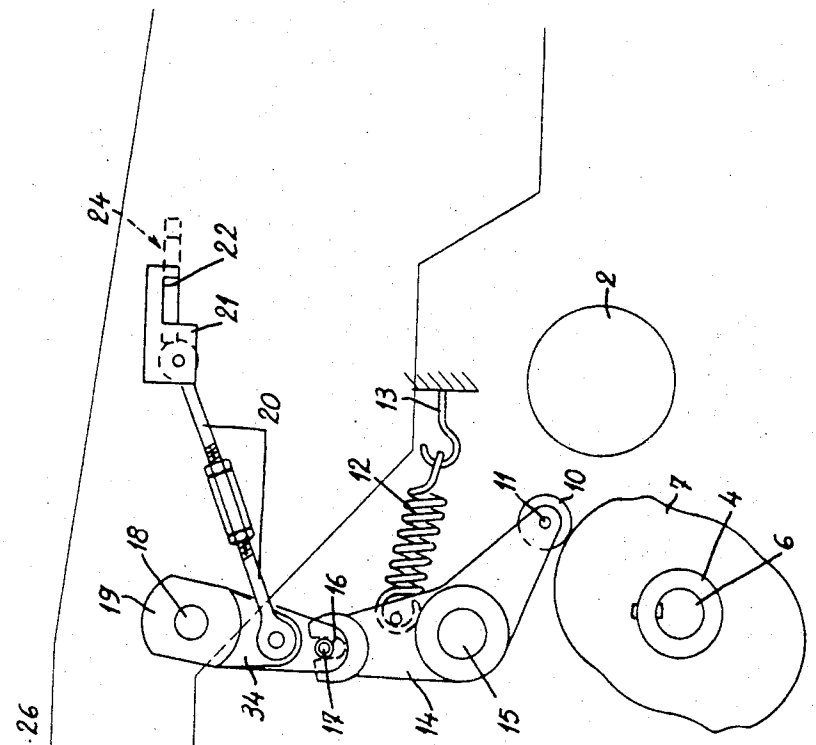


FIG. 4

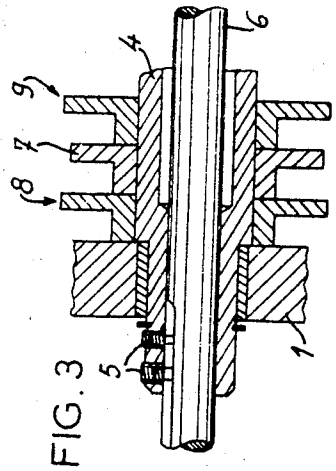


FIG. 3

FIG. 5

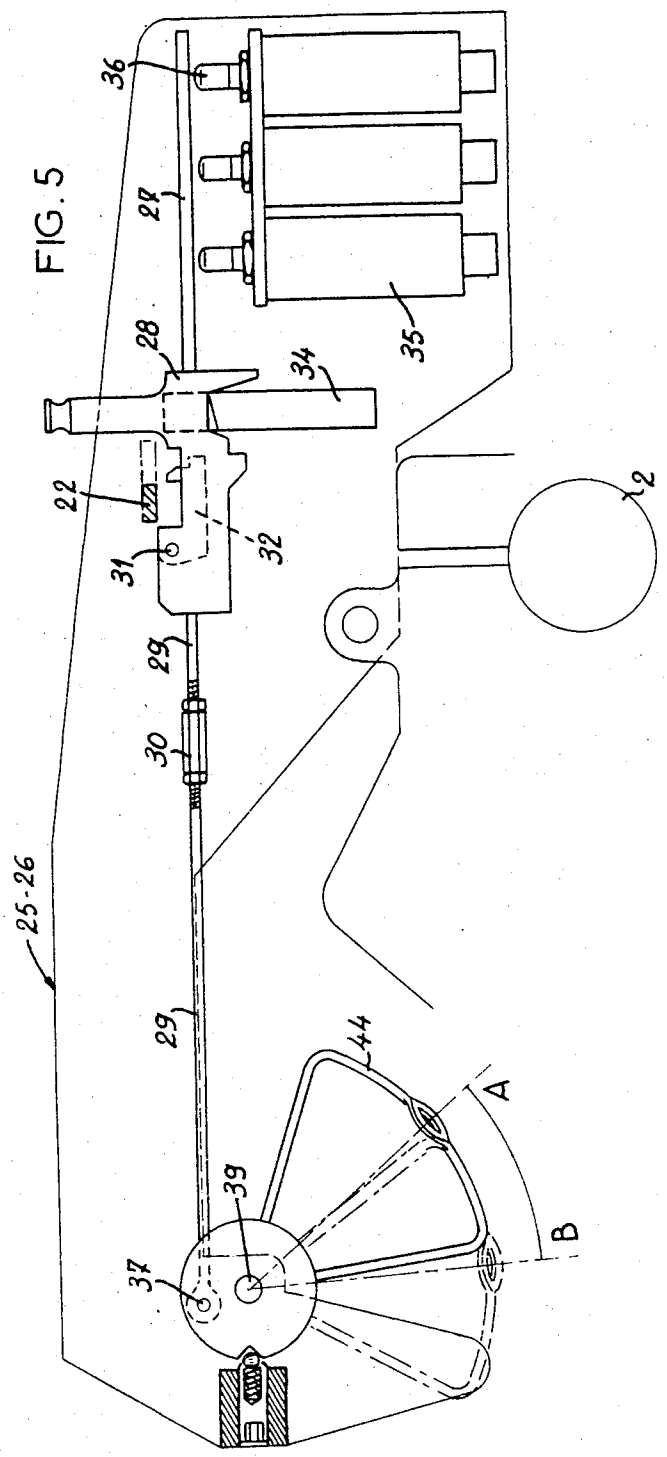
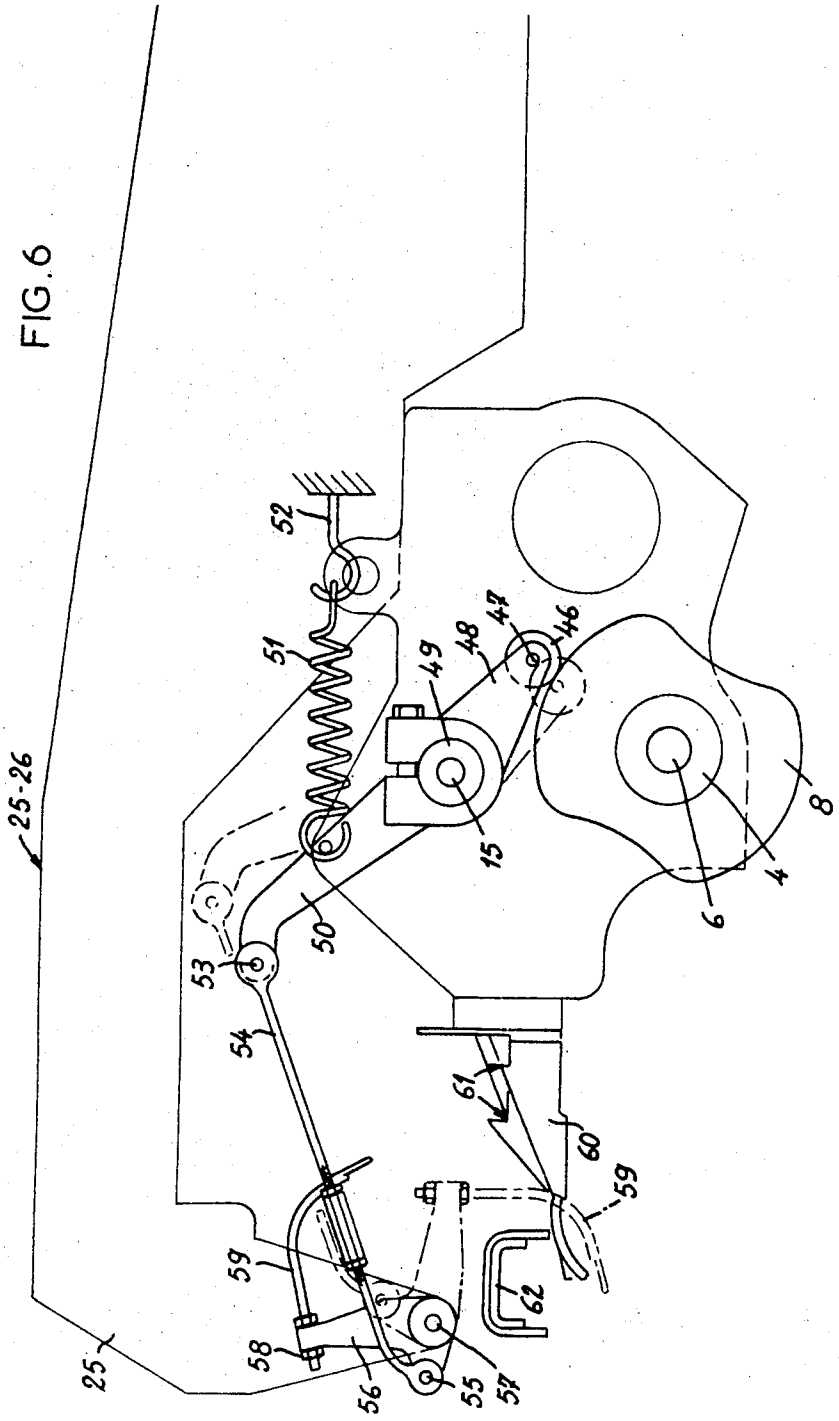


FIG. 6



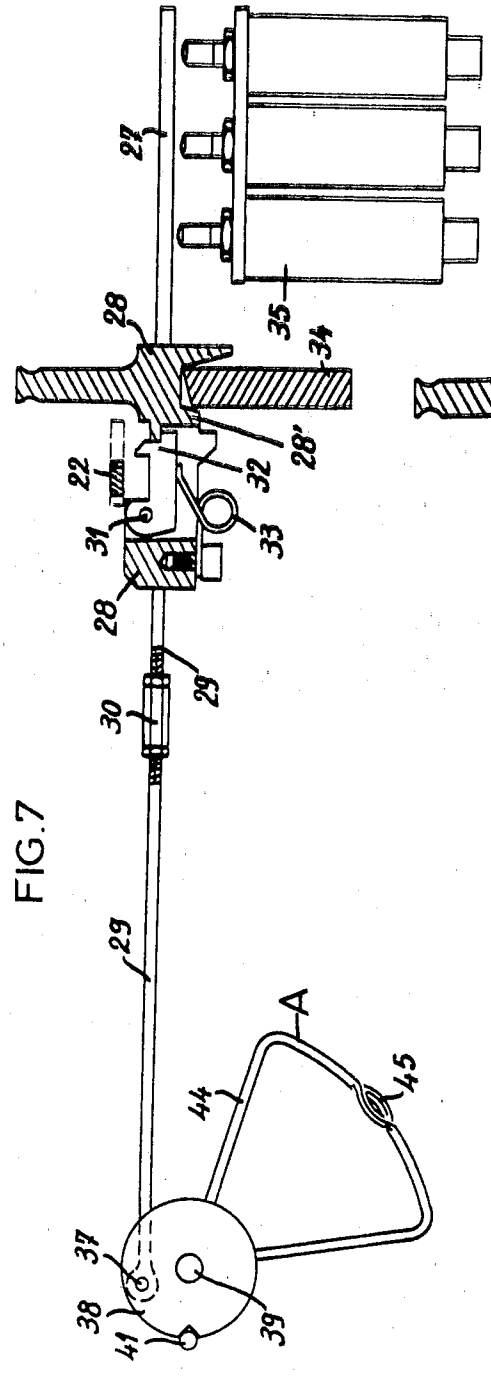

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FIG.7

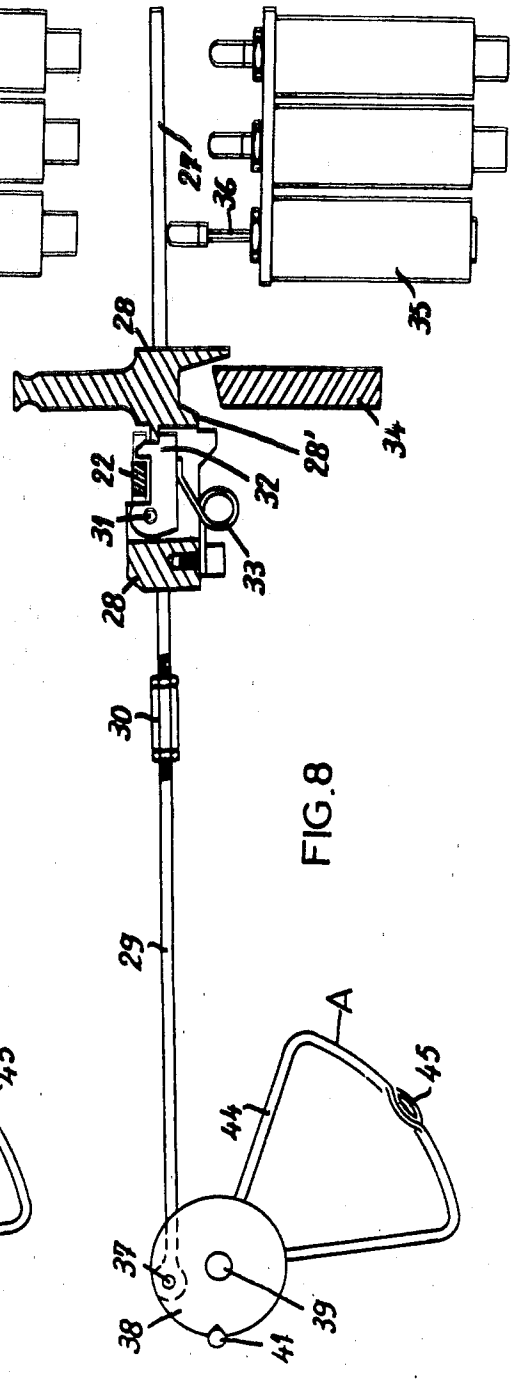

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FIG.8

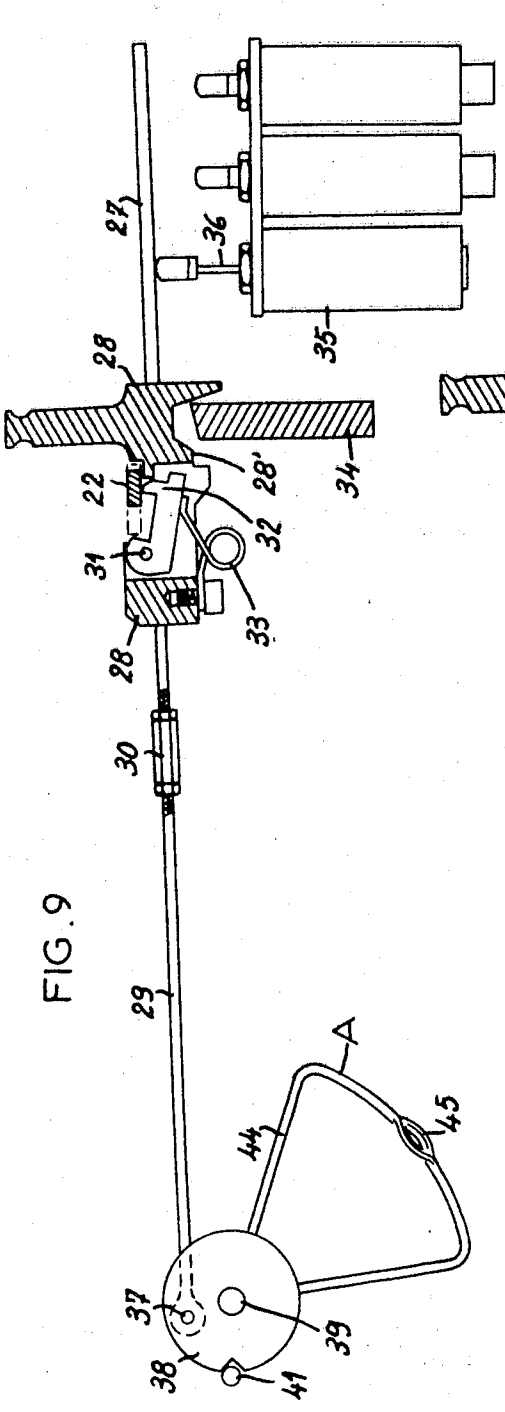

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FIG. 9

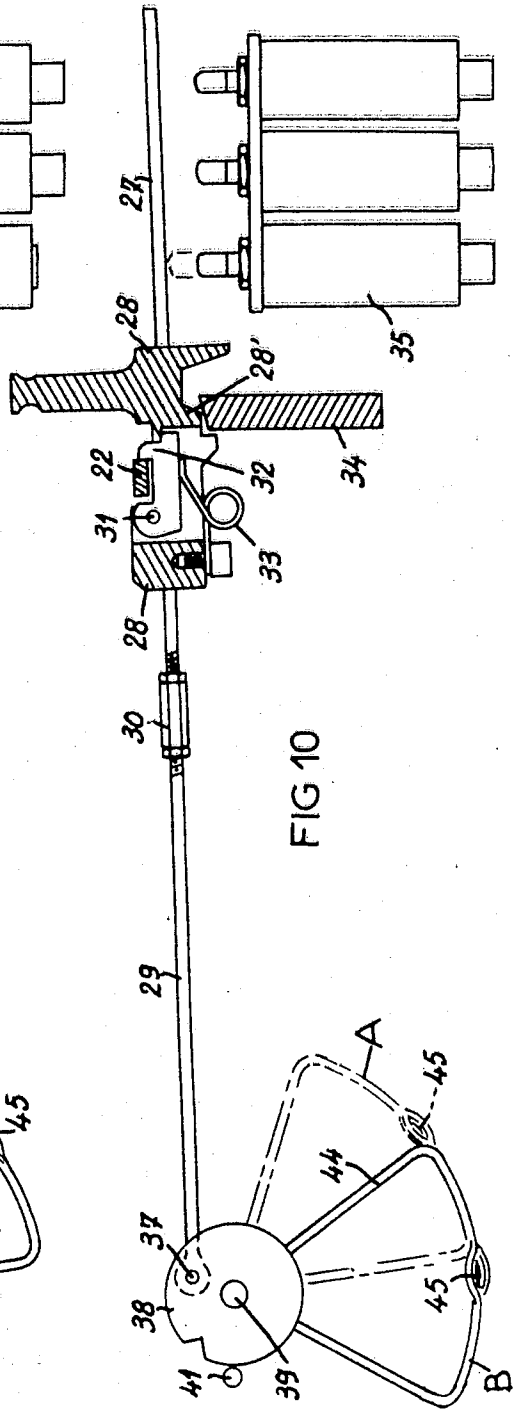

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28'
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FIG 10

FIG.13

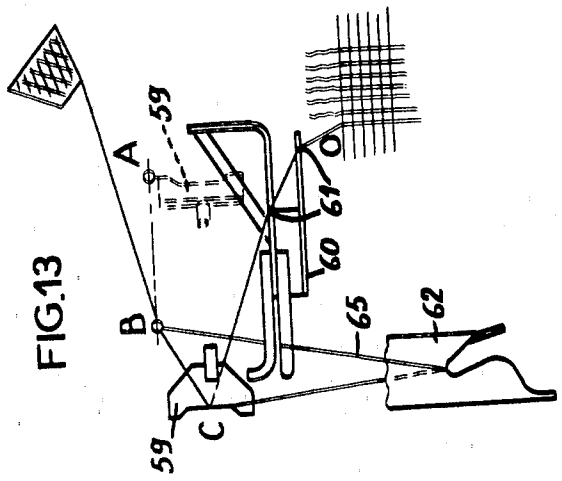


FIG.11

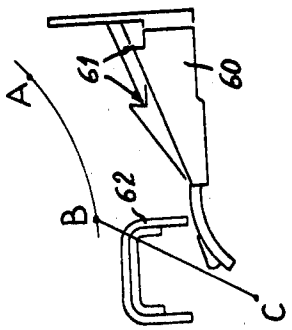


FIG.12

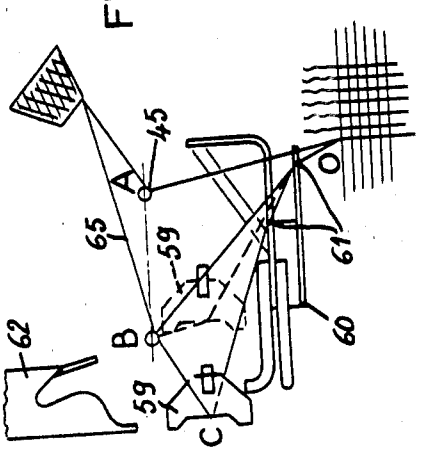


FIG.15

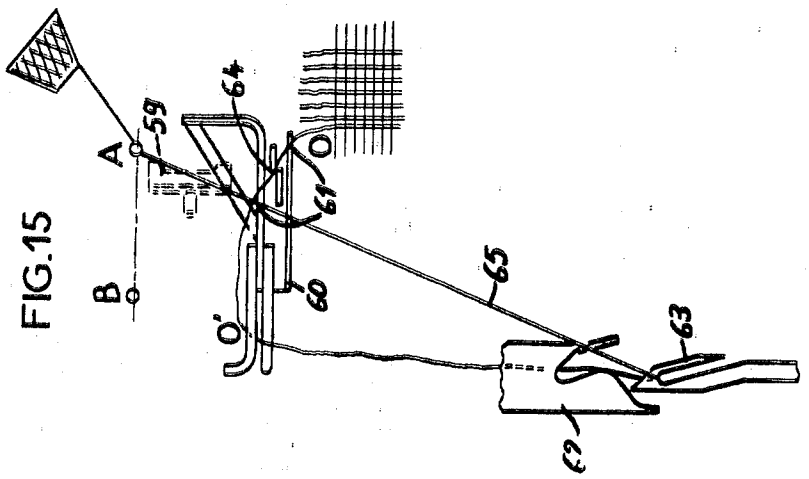
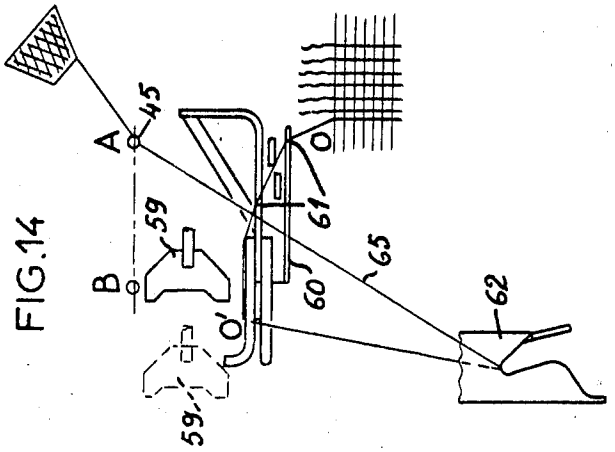


FIG.14



WEFT DISTRIBUTOR AND SELECTOR FOR POWER LOOMS

FIELD OF THE INVENTION

The present invention relates in general to power looms and has specific reference to means for selectively presenting one of a plurality of available wefts to the insertion member of the loom, from a fixed reserve.

These means permit any desired succession of the various wefts per any number of picks, whether in even or odd number.

DESCRIPTION OF THE PRIOR ART

In this field various devices are already known, inter alia:

devices comprising large thread-guides, disposed vertically or obliquely, of substantial cross-sectional area and having therefor a considerable inertia,

devices requiring the use of sheathed wires; their efficiency is impaired by a substantial frictional contact,

devices forming an integral part of a tape of plate information reading system; they are consequently cumbersome,

devices wherein the thread guides are held in the vertical plane of the insertion member, thus promoting frictional contacts, detrimental to the weft, with this insertion member and,

devices of which the mechanical connections with the loom prevent a lateral positioning consistent with the fabric width.

SUMMARY OF THE INVENTION

The new distribution-selector distributor is of the type wherein each weft thread to be selected is constantly engaged in a thread guide independent of that of the other threads, all these guides being pivotally mounted in side by side relationship on a common shaft. The oscillation of the selected guide results from the movement of a pull rod to which it is connected, said pull rod, when selected, being caused to engage a blade to which a rectilinear reciprocating movement is impressed.

An essential feature characterizing this invention lies in the fact that the selected pull rod is lifted as a consequence of the upward thrust exerted directly thereagainst by the core of an electromagnet in order to throw it against the blade controlling its movement, this engagement being obtained through the intermediary of a spring-urged notched catch.

Moreover, all the pull rods, except the selected one which is thus put into service, are locked in their inoperative position by engagement with a fixed transverse support.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the selector,

FIG. 2 is a plane view from above of the same device,

FIG. 3 is a fragmentary section taken along lines 3-3 in FIG. 1, through the axis of the control shaft,

FIG. 4 is a side elevational view of the control mechanism of the blade for driving the selected pull rod,

FIG. 5 is another side elevational view showing the mode of actuation of a weft thread guide sector,

FIG. 6 illustrates the means for actuating the device for presenting the selected weft in front of the insertion member,

FIG. 7 shows one of the pull rods in its inoperative position, locked on the support,

FIG. 8 shows a pull rod selected by its electromagnet just before the blade has attained its hooking position,

FIG. 9 shows a pull rod selected by its electromagnet when the blade has not yet reached its hooking position,

FIG. 10 shows the pull rod selected by its electromagnet and driven by its blade,

FIG. 11 is a diagram showing in elevation the zone in which the weft insertion member is caused to move, and

FIGS. 12, 13, 14 and 15 are other diagrams showing in plan view from above the successive steps of a weft insertion movement.

DESCRIPTION OF THE PREFERRED EMBODIMENT

This multi-color selector assembly is carried by a main support 1 mounted on a bar 2 extending across the machine and on which the device can be mounted without difficulty as a function of the fabric width. A screw 3 is provided for tightening the assembly in the proper position.

Mounted for free rotation in this main support is a cam-supporting hub 4 (FIG. 3) fastened by a screw 5 to a shaft 6 rotating in synchronism with the power loom and driving a set of cams 7, 8 and 9 having the individual functions set forth herein after:

Cam 7 is adapted (FIG. 4) to control through a roller follower 10 mounted on a pivot pin 11 a bell-crank lever 14 fulcrumed to a shaft 15 and urged for constant engagement with cam 7 by a tension spring 12 anchored at 13 to a fixed structure. The upper arm of this lever 14 carries another roller 16 by means of a pin 17. This lever 14 is adapted to control the oscillation, about a shaft 18, of a cradle 19 coupled through axially adjustable rods 20 to slides 21 rigid with a blade 22 adapted to slide freely in horizontal grooves 24 formed in a pair of parallel vertical plates 25, 26 (FIG. 2).

Beneath this blade 22 a plurality of pull rods (FIG. 7) corresponding in number to the wefts to be controlled are disposed in side by side relationship, each pull rod comprising: an extension 27, a body 28 and a pair of shanks 29 having their adjacent ends screw-threaded, one with a left-hand pitch and the other with a right-hand pitch, to permit the adjustment of their length by means of a common connecting nut 30.

Pivoted to said body 28 at 31 is a catch 32 responsive to a thrust or return spring 33. Said body 28, in each pull rod assembly, is notched at 28' and adapted, in its inoperative position, to bear on a fixed transverse support or comb 34.

Beneath each extension 27 (FIG. 8) is an electromagnet 35 electrically connected to a selector device (FIG. 4). The core 36 of each electromagnet is adapted when lifted as a consequence of the electromagnet energization, to rock the relevant pull rod.

During this upward core movement the pull rod oscillates at its opposite end about the crankpin 37 of a hub 38 adapted to rotate freely about a shaft 39 carried by said lateral plates 25 and 26. This shaft 39 is com-

mon to all the separate hubs, i.e. for all each pull rod assemblies.

Each hub **38** (FIG. **1**) is positioned by a ball **41** urged by a spring **42** of a detent-positioning device **43**.

Moreover, each hub **38** carries a thread guide sector **44** formed with an eyelet **45**.

It will be noted that when a pull rod body **28** is in its lower position (FIGS. **1**, **5** and **7**) the pull rod assembly is locked as a consequence of the engagement of its notch **28'** with the fixed comb **34**, this condition being obtained by virtue of the adjustment permitted by the nut **30**.

The cam **8** (FIG. **6**) is engaged by the roller follower **46** mounted through a pin **47** to another lever **48** clamped on a sleeve **49** rotating freely about the shaft **15**, another lever **50** being likewise clamped to said sleeve **49** the pair of lever **48**, **50** thus constituting a rigid assembly responsive to a tension spring **51** anchored at **52** and constantly urging the roller follower **46** for engagement with the contour of cam **8**.

A link **54** of adjustable length is pivoted through a pin **53** to the opposite end of lever **50**. The other end of link **54** is pivotally connected in turn at **55** to an arm **56** adapted to rotate freely about a fixed shaft **57**. Secured to the end of this arm **56** by means of nuts **58** is a curbed fork **59**.

Disposed at a fixed location beneath this fork **59** and in close proximity of the path of the weft insertion member **62** is a hollow U-sectioned member **60** constituting an inclined ramp in which a double stop notch **61** is formed.

The third cam **9** FIG. **3** controls through means (not shown) a blade which, according to the conventional practice, cuts the weft at **64** close to its point of attachment to the fabric selvedge at the end of the first phase of its insertion into the shed and after the exchange of the hairpin-shaped thread loop has occured on the pull member **63** (FIG. **15**), this pull member consisting as usual of a hook-shaped element.

A hand lever **65** (FIG. **2**) is provided for manually actuating the blade **22** when the machine is in its inoperative condition.

Thus, cam **7** controls the rectilinear reciprocating movements of blade **22** and, consequently, the movements of the pull rods and thread guides. On the other hand, cam **8** controls the pivotal movements of fork **59** in a vertical plane, i.e. up and down. As to the plunger core **36** of the energized electromagnet **35**, it lifts the corresponding and thus selected pull rod **27**, **28**, **29** for engagement with the blade **22**.

The above-described distributor-selector operates substantially as follows:

First of all, stress should be laid on the fact that when a weft is selected two possibilities arise, namely:

either the blade **22** is in the position shown in FIG. **8** in relation to the notch of catch **32**, and in this case the engagement of said blade on said catch, and therefore on the pull rod body **28**, takes place immediately,

or the blade **22** is not aligned with the aforesaid notch (FIG. **9**) of catch **32** and the latter abuts against the underface of the moving blade **22**. In this case, due to the thrust exerted by the plunger core **36** of electromagnet **35**, the catch **32** will temporarily recede by pivoting about its pin **31** while loading the return spring **33** associated therewith. However, as this spring **33** is weaker than the electromagnet, the electromagnet core can nevertheless complete its stroke. Thus, when the blade **22** (to which a reciprocating motion is imparted by the mechanism of FIG. **1** and **4**) registers with the notch of catch **32**, this catch is caused to engage the blade as a consequence of the elastic pressure of spring **33**.

In either case the blade **22** after engaging the notch of catch **32** drives the pull rod **27**, **28**, **29**, thus causing the hub **38** of thread guide sector **44** to rotate about its shaft **39** through the crankpin **37**, so that the thread-engaged eyelet **45** moves over the path of insertion member **62** (FIG. **10**);

Referring to this FIG. **10** it will be seen that from the very beginning of its movement the pull rod cannot drop back to its initial position, even if its electromagnet were deenergized, since the catch heel bears on the support **34**.

If a change in the weft thread shall take place, the electromagnet **35** is deenergized automatically. Its core **36** falls by gravity and when the blade **22** resumes its inoperative position the pull rod drops back in turn, by gravity, and becomes locked in relation to the aforesaid support **34** (FIG. **7**).

During this time the thread guide sector **44** is restored to its inoperative position A, and simultaneously another electromagnet is energized and another pull rod is lifted and subsequently locked to select another weft thread, and so forth.

In case no weft thread change shall occur, the electromagnet remains energized, its core **36** remains in its upper position (FIG. **8**) and keeps the pull rod in locking engagement with blade **22** which, through its reciprocating motion, actuates again the thread guide **44**.

FIGS. **11** and **12** illustrate the travel of weft thread **65** when it is selected and folded down by the fork **59**.

As shown in FIG. **12**, the weft thread **65** still attached to the fabric selvedge at a point O constantly passes through the eyelet **45** of thread guide **44** in position A. When selected, this thread guide transfers the weft thread to position B. During this travel, the weft thread slips along the ramp rigid with the hollow piece **60**. Thus, it engages the notch **61** and is properly positioned for being bent and folded down to point C by fork **59**.

When this fork **59** has completed its downward movement controlled by cam **8** (as shown in dash and dot lines in FIG. **6**) the weft thread is properly positioned for engagement by the insertion member **62** which bends the thread to the necessary hairpin configuration (FIG. **13**) and carries it into the shed until the exchange takes place in the middle of the shed. FIG. **14** illustrates the backward movement of the thread guide eyelet **45** from position B to position A to permit the gradual receding of this thread guide. Thus, the insertion member cannot under any circumstances, during its return stroke, withdraw or damage said weft thread. Upon completion of the thread exchange operation (FIG. **15**), i.e. when the transfer of the weft loop or hairpin takes place on hook **63**, the fork **59** moves upwards, the taut thread section O to O', is cut at **64** and can be carried along to the opposite fabric selvedge by said hook-shaped pull member **63**, according to the well known principle of the "GABLER" system.

It may be noted that the contour of cam 7 is so designed that it provides a very gradual, soft movement to avoid any interference with the weft thus obtained. Furthermore this cam contour is such that when the weft thread has been caught by the insertion member 62 (FIG. 13) and released from the folding fork 59, this thread can be moved gradually away from this insertion member to prevent the former from being damaged or carried along by the latter during the return movement of said member (FIG. 15).

The device is illustrated in the drawings as comprising single-acting cams, but it will readily occur to those conversant with the art that it would not constitute a departure from the basic principles of this invention to use double-acting cams permitting of dispensing with the use of return springs.

It is also obvious to those skilled in the art that various modifications may be brought to the specific form of embodiment disclosed and illustrated herein without departing from the scope of the invention as set forth in the attached claims.

What I claim as new is:

1. A selector device for a multicolor power loom of the type wherein each of a plurality of thread guide means engages one weft thread of a certain color, for cyclic movements of engaged threads between a distribution position thereof, where a fork moves to engage such a thread and to place it across the path of movement of a member for insertion of the thread into the fabric, and a non-distribution position; said selector device comprising:

a plurality of pull rods in side by side relationship, each having one end connected to one of the thread guide means to move said means between said positions thereof;

a plurality of electromagnets, each energizable to lift the opposite end of one of the pull rods;

blade means extending across the pull rods and shiftable along the pull rods in synchronism with the movements of the fork and of the member for insertion; and

a catch on each pull rod, between said ends, with spring means to lock the catch of a pull rod lifted by its electromagnet onto said blade means, to cause the latter to shift that pull rod and thereby to effect the movements of the corresponding thread guide means between said positions thereof.

2. A selector device for a multicolor power loom of the type wherein each of a plurality of thread guide means engages one weft thread of a certain color, for cyclic movements of engaged threads between a distribution position thereof, where a fork moves to engage such a thread and to place it across the path of movement of a member for insertion of the thread into the fabric and a non-distribution position; said selector device comprising:

a plurality of pull rods in side by side relationship, each having one end connected to one of the thread guide means to move said means between said positions thereof;

a plurality of electromagnets, each energizable to lift the opposite end of one of the pull rods;

blade means extending above and across the pull rods and shiftable along the pull rods in synchronism with the movements of the fork and of the member for insertion;

fixed support means extending below and across the pull rods for locking all pull rods, except one lifted by its electromagnet, against shifting by the blade; and

a catch on each pull rod, between said ends, with means to lock the catch of a pull rod lifted by its electromagnet onto said blade means, to cause the latter to shift that pull rod and thereby to effect the movements of the corresponding thread guide means between said positions thereof.

3. A selector device according to claim 2, additionally, including means for initiating the movement of said thread guide means away from its distribution position upon the movement of said member for insertion, engaging the thread, to avoid any frictional contact between said thread and said member.

* * * * *