United States Patent

[11] **3,587,665**

[72] Inventor **Antonio Camarasa Monge**
Calle General Mola 36, Madrid, Spain

[21] Appl. No. **845,340**
[22] Filed **July 28, 1969**
[45] Patented **June 28, 1971**
[32] Priority **July 31, 1968**
[33] **Spain**
[31] **356,720**

[54] WEFT THREAD SELECTING DEVICE FOR WEAVING MACHINES WITH A FIXED WEFT SUPPLY

6 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **139/122**
[51] **Int. Cl.** **D03d 47/34**
[50] **Field of Search** ..... 66/125; 139/122—127

[56] **References Cited**

UNITED STATES PATENTS

3,249,127	5/1966	Payne	139/122
3,299,909	1/1967	Golobart	139/122

FOREIGN PATENTS

1,480,838	4/1967	France	139/122

Primary Examiner—Henry S. Jaudon
Attorney—Christen & Sabol

ABSTRACT: A series of weft thread presenting elements are arranged in a pendular supply means for rectilinear movement on respective downwards divergent paths. the said supply - means being hinged to an angular support connected to a housing adapted to be mounted on a weaving machine with a fixed weft supply adjacent one side of the ways and containing mechanical means, governed by a single control means, for tilting the pendular supply means to a position in which one of the presenting elements is in a vertical position and for operating this selected element.

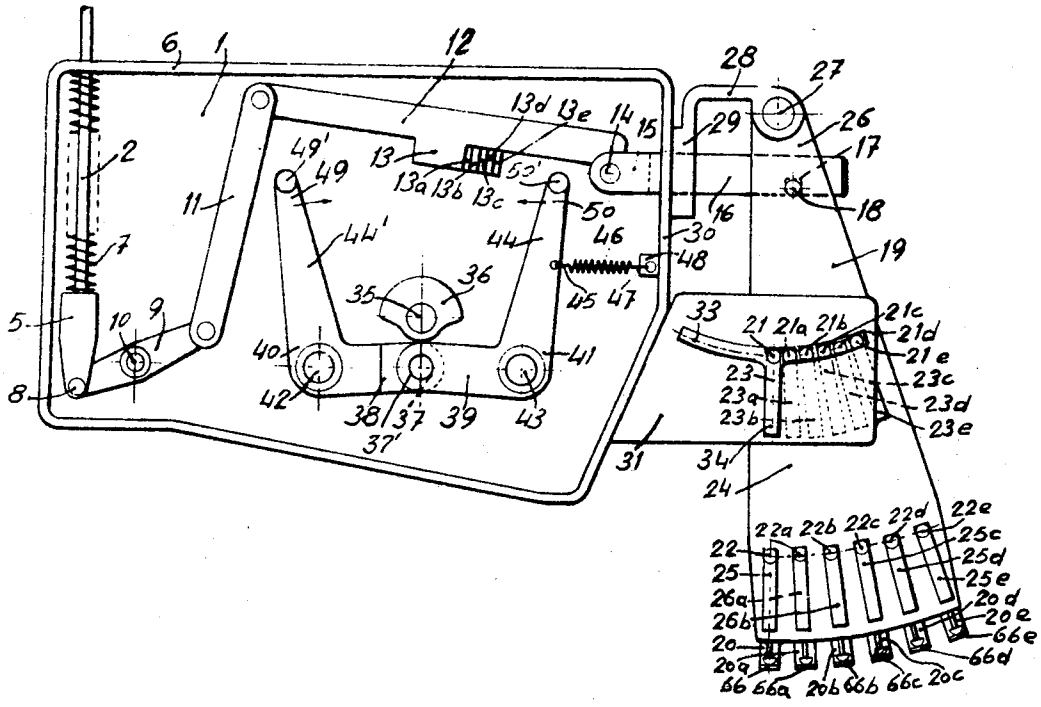


Fig 1

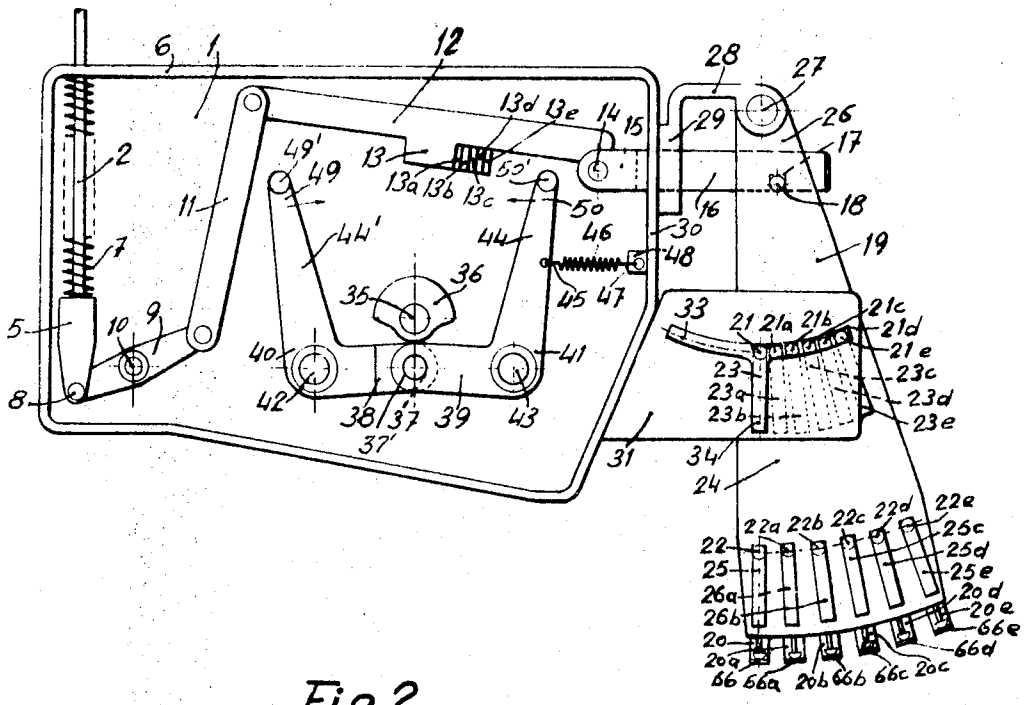

6
1
12
28
27
29
26
17
2
13d 13e
14
15
49'
49
13
13a 13b 13c
52'
50
18
16
11
44'
44
46
30
48
19
7
36
35
45 47
33
21 21a 21b
21c
21d
21e
5
10
9
40
41
23
23a
23b
23c
23d
23e
8
42
38 37 39 43
37'
31
34
24
22
22a 22b 22c 22d
22e
25
25c
25d
25e
26a
26b
20d
20e
66e
20
66d
20a
66 66a 20b 66b 66c 20c

Fig 2

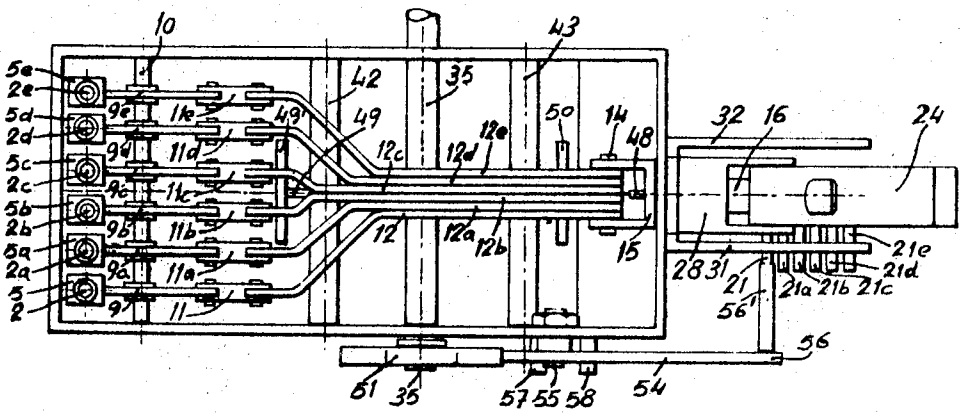

10
43
5e
2e
5d
2d
5c
2c
5b
2b
5a
2a
5
2
42
35
49'
49
12c
12d
12e
50
14
48
32
16
24
12
12a
12b
15
28
31
21
21e
21d
21a 21b 21c
56'
56
61
35
57
55
58
54

Fig 3

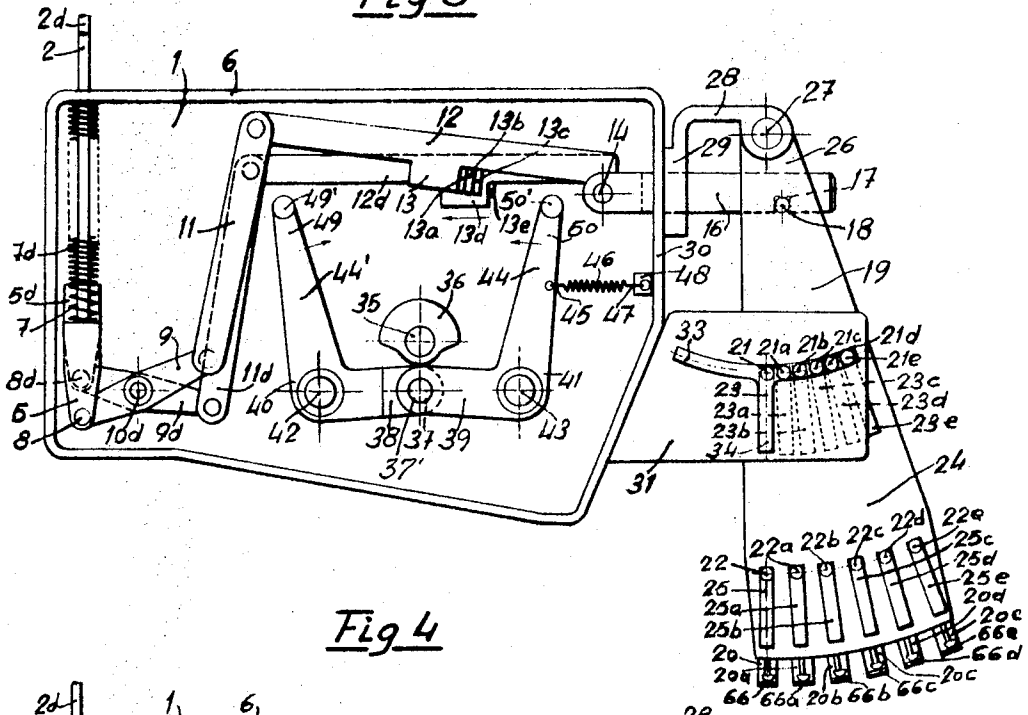


Fig 4

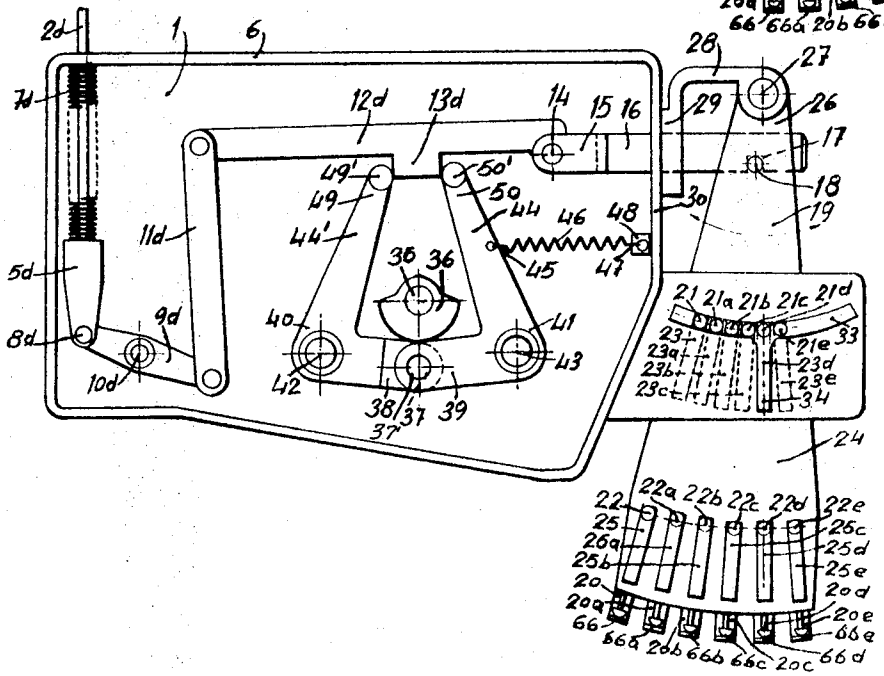


Fig 5

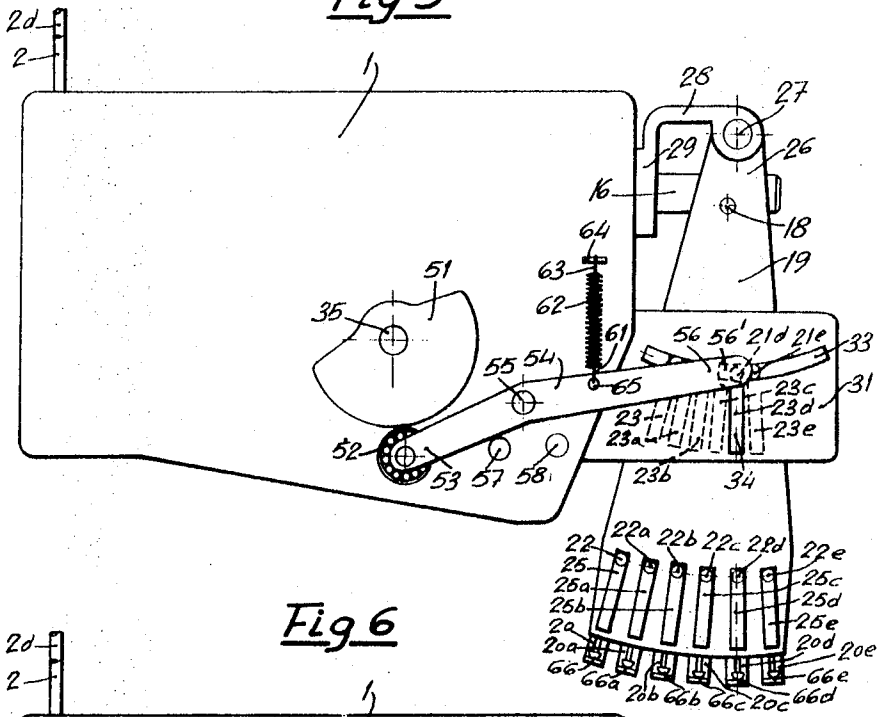

2d
2
1
28
27
29
26
16
18
64
19
63
51
62
35
61
56
56'
21d
21e
33
55
54
65
23c
31
23d
23
23e
23a
52
53
57
58
23b
34
22
22a
22b
22c
22d
22e
25
25a
25c
25b
25d
25e
2a
20d
20a
20e
66
66a
66e
20b
66b
66c
20c
66d

Fig 6

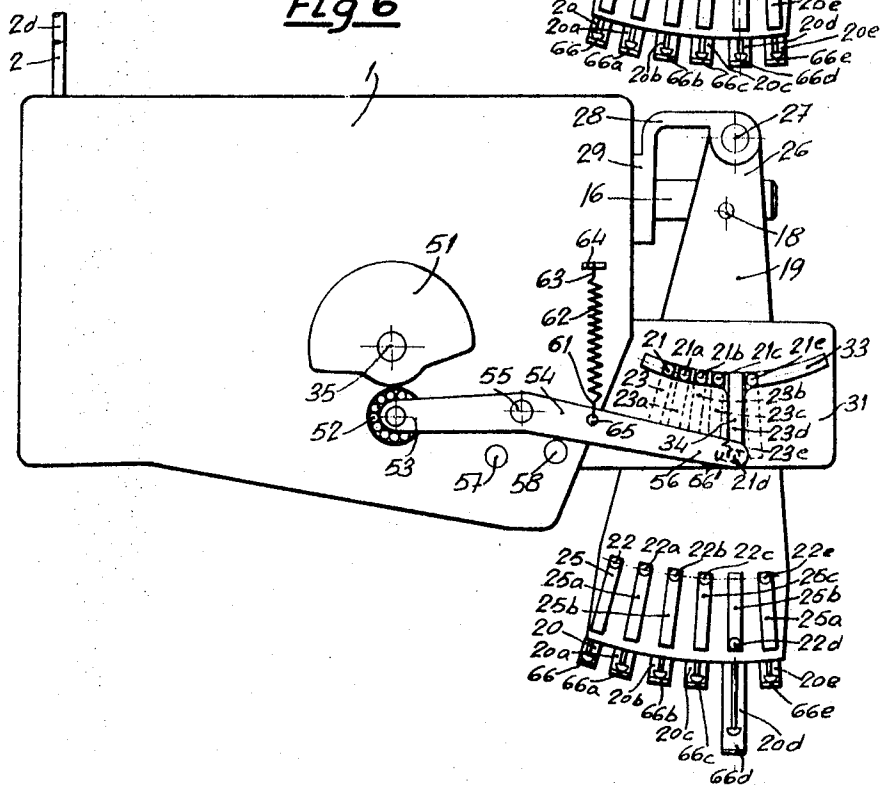

2d
2
1
28
27
29
26
16
18
64
19
63
51
62
61
21
21a
21b
21c
21e
33
23
23a
23b
23c
31
23d
35
55
54
65
34
23e
52
53
57
58
56
66'
21d
22
22a
22b
22c
22e
25
25a
26c
25b
26b
20
25a
20a
22d
66
66a
20e
20b
66e
66b
20c
20d
66c
66d

Fig 9

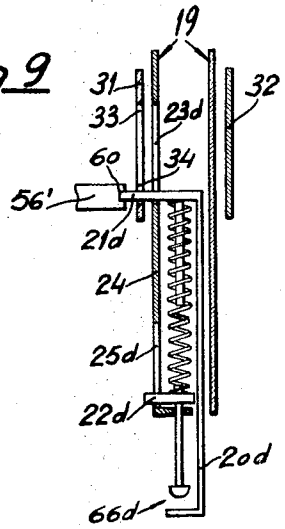


Fig 10

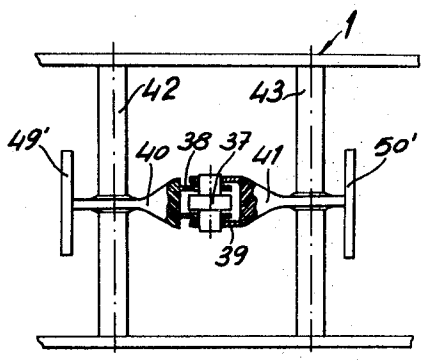


Fig 8

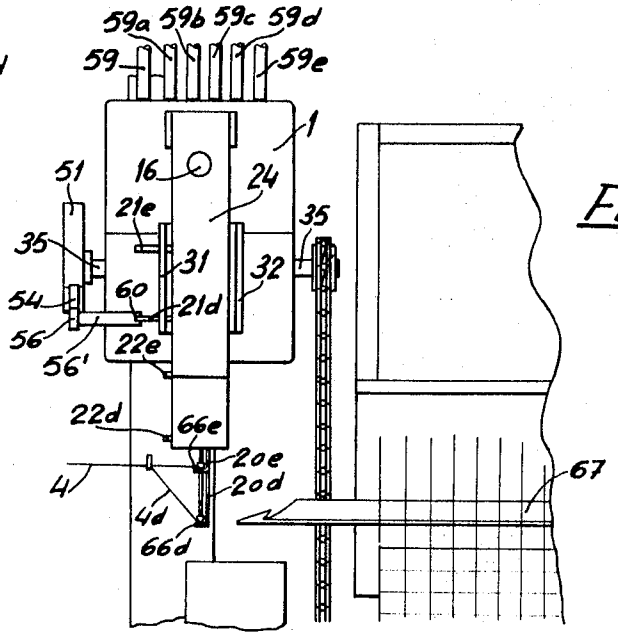
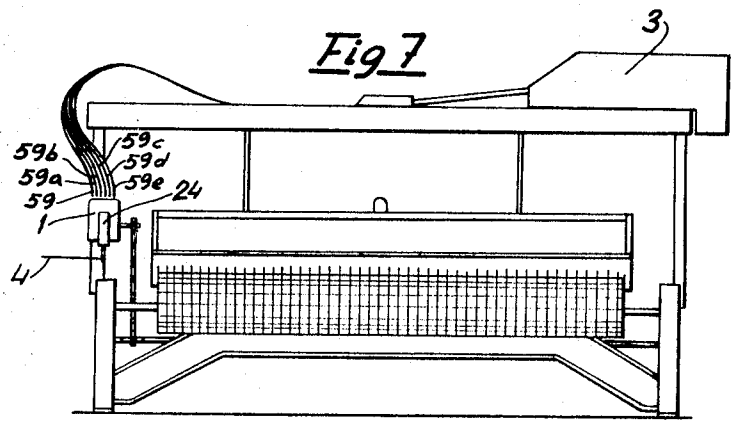


Fig 7



WEFT THREAD SELECTING DEVICE FOR WEAVING MACHINES WITH A FIXED WEFT SUPPLY

The present invention relates to a weft thread selecting device for weaving machines with a fixed weft supply, in which the selected weft threads are guided to a position adjacent one edge of the warp in the shedding area of the weaving machine and presented to a weft-inserting element movable between said one edge of the warp and the other edge thereof.

Various systems of weft thread selectors are known which are suitable for looms with a fixed weft reserve, including those which consist of an aligned succession of weft thread presenting elements, in an assembly situated outside of the weaving machine in the same path as that utilized by the inserting element and close to the selvedge of the fabric. These devices make it necessary for the inserting element to perform a maximum travel in order to allow for the case where the weft thread selected is that situated most remotely from the said selector in relation to the selvedge of the fabric, which has the drawback of not only requiring an unnecessary travel of the inserting element with the result of waste of time, but that the point at which the weft thread is taken up is in any case never the same, which gives rise to different gripping actions and consequently deficiencies therein.

In order to remedy this drawback, in the majority of cases an independent thread-presenting element is provided which carries the thread selected to a point of presentation, the said presenting element being operated by an independent mechanism synchronized on the one hand with the movement of the inserting element and on the other with the weft thread selector mechanism, all of which complicates the mechanisms as a whole.

Other known systems of weft thread selectors are those which consist of a block carrying weft thread presenting elements, so that the position of selection of each of them is the same, in other words they converge at one and the same point of presentation. These systems have the drawback that the ends of the presenting elements are fitted with thread guides which do not retain the weft thread, the said thread instead remaining linked to the fabric, necessitating additional gripping operations, one for each thread, by tongs situated close to the selvedge, which mean that the length of weft thread selected must be cut at the right time before insertion of the weft thread is commenced, which gives rise to errors in cutting.

Also known are selector devices which perform horizontal movements so that the selected thread is always presented at the same point. These selectors have the drawback of requiring guides which give rise to needless friction and mechanical complications and of requiring a drive for displacement of the carriage carrying the presenting elements, together with an independent drive so that the element selected can be presented.

The weft thread selecting device according to the present invention entirely resolves all the above-mentioned disadvantages, requiring no needless travel of the inserting element nor the application of additional elements to present the selected weft thread at one and the same point.

At the same time, the said weft thread selecting device is able to select a greater number of weft threads than the systems mentioned, by virtue of the particular arrangement of the presenting elements, which have at their free ends tongs for gripping the weft threads, so that the weft threads must not remain joined to the fabric nor are there necessary independent additional tongs close to the selvedge of the fabric.

With the thread-selecting device which is the object of the present invention, it is possible perfectly to synchronize the movements of selection and presentation of the weft thread at one and the same point, since all the movements start from a single control, the whole of the said device being of considerable simplicity, no special adjustments or combinations being required in connection with the previous pass, due to the existence of one control for each presenting element, which makes it possible to achieve all kinds of combinations of selection, the component elements of the device being capable of correct location should any of the weft threads break.

The thread-selecting device according to the present invention consists of a housing inside which there is a series of flat bars connected at one end and by means of articulated mechanical elements to respective rods which receive the command of a selecting member outside the housing, and articulated at their other end on a common hinge pin which passes through a fork rigid with a rod which, passing through the wall of the housing, is connected to a pendular supply means outside the housing, carrying weft thread presenting elements and supported by an angular support integral with the said wall and likewise having passing through it the aforesaid rod and, furthermore, the said housing comprising a pair of arms for centering respective angled levers operated symmetrically by a cam secured to a rotary shaft which passes through the housing and carries, disposed on the outside of this latter, a second cam which operates an arm which controls the presenting element selected.

For better understanding of the invention, a nonrestrictive exemplary embodiment is described hereinafter, reference being made to the attached drawings, in which:

FIG. 1 is a front view of the thread-selecting device which is the object of the present invention, the drawing not showing the front cover of the housing, in order that the mechanism for situating the presenting element selected may be the more clearly illustrated;

FIG. 2 is a plan view of FIG. 1 and includes the front cover and external presenting mechanism;

FIG. 3 is a view similar to that in FIG. 1, in the position of selection of one of the flat bars;

FIG. 4 is a view similar to FIG. 3 and in which the selected flat bar has been moved horizontally in order to locate the corresponding weft thread presenting element at the point of presentation, this drawing not showing the other flat bars and elements connected thereto, for greater clarity of illustration;

FIG. 5 is a front view of the outside of the device showing the presentation elements as they are when in the position shown in FIG. 4;

FIG. 6 is a view similar to FIG. 5 in the position of presentation of the presenting element selected;

FIG. 7 is a diagrammatic front view of a weaving machine on which is fitted the selecting device which is the object of the present invention;

FIG. 8 is a partial view on an enlarged scale showing the attachment of the thread selecting device according to FIG. 7;

FIG. 9 is a fragmentary sectional view of one of the selected presenting elements;

FIG. 10 is a fragmentary plan view, partially in section, of the mechanism for situating the presenting element selected in FIGS. 1 to 4.

In these drawings, reference numeral 1 denotes the housing with, projecting from it, the rods 2, 2*a*, 2*b*, 2*c*, 2*d* and 2*e* connected to the dobby 3 for the selection of weft threads 4, FIG. 8. Each rod 2, 2*a*, 2*b*, 2*c*, 2*d* 2*e* carries at the bottom a fork 5, 5*a*,5*b*, 5*c*, 5*d*, 5*e* and is enclosed, between its corresponding forks 5, 5*a*, 5*b*, 5*c*, 5*d* and 5*e* and the upper face 6 of the housing 1 by an opposing helical spring 7, of which only one is visible in FIG. 1 and 7*d* in FIGS. 3 and 4, these springs tending to maintain the said rods 2, 2*a*, 2*b*, 2*c*, 2*d* and 2*e* always in the down position.

Each fork, 5, 5*a*, 5*b*, 5*c*, 5*d* and 5*e* is hinged at 8, only one connecting point being visible in FIG. 1 and 8*d* in FIGS. 3 and 4, on a small lever 9, 9*a*, 9*b*, 9*c*, 9*d* and 9*e* adapted to pivot about a common axis 10 secured to the housing 1, the other ends of the said levers 9, 9*a*, 9*b*, 9*c*, 9*d* and 9*e* being hinged on tie members 11, 11*a*, 11*b*, 11*c*, 11*d* and 11*e*, and each of these in turn, at its other end, is connected to flat bars 12, 12*a*, 12*b*, 12*c*, 12*d* and 12*e* which have bottom rectangular projections 13, 13*a*, 13*b*, 13*c*, 13*d* and 13*e*. The other ends of the said flat bars 12, 12*a*, 12*b*, 12*c*, 12*d*, 12*e* are connected to a common hinge pin 14 of a fork 15. This fork 15 is rigid with a rod 16 which passes through the wall 30 of the housing 1 and is provided with a groove 17 to house a pivot 18 rigid with a pendular supply means 19 which supports the weft thread presenting elements 20, 20*a*, 20*b*, 20*c*, 20*d* and 20*e*. Each of the said

presenting elements 20, 20*a*, 20*b*, 20*c*, 20*d* and 20*e* is provided with two aligned pins 21 and 22, 21*a* and 22*a*, 21*b* and 22*b*, 21*c* and 22*c*, 21*d* and 22*d*, 21*e* and 22*e* respectively, the upper pins 21, 21*a*, 21*b*, 21*c*, 21*d*, 21*e* sliding along slides 23, 23*a*, 23*b*, 23*c*, 23*d* and 23*e* in the front wall 24 of the supply means 19, and the lower pins 22, 22*a*, 22*b*, 22*c*, 22*d* and 22*e* sliding in slides 25, 25*a*, 25*b*, 25*c*, 25*d* and 25*e* also in the front wall of the supply means 19. This supply means 19 is hinged and supported in its upper part 26 on a shaft 27 secured to an angular support 28 connected to the housing 1, and the rod 16 passes through both the part 29 of the support 28 and the wall 30 of the said housing 1.

From the wall 30 of the housing 1 and underneath the support 28 project two plates 31 and 32, between which the supply means 19 reciprocates, the front plate 31 being traversed by a T-shaped slide with the upper portion 33 arcuate, with its center on the shaft 27, so that the pins 21, 21*a*, 21*b*, 21*c*, 21*d* and 21*e* can slide in a curvilinear path along the said slide 33, the T-shaped slide also having a vertical portion 34 allowing a downwards movement of the corresponding pins 21, 21*a*, 21*b*, 21*c*, 21*d* and 21*e* of the presenting element 20, 20*a*, 20*b*, 20*c*, 20*d* and 20*e* selected.

The housing 1 is traversed transversely by a movable shaft 35 which is connected through a chain drive comprising a sprocket wheel 69, a chain 70 and a second sprocket wheel 71, to a rotating shaft 72 (FIGS. 7 and 8) of the weaving machine and on which is mounted to a cam 36 which causes vertical displacement of a freely rotating roller 37 situated between the forked arms 38 and 39 of two angled levers 40 and 41, and connected thereto with lateral clearance through the respective axle 37' (FIG. 10). Each of the levers 40 and 41 oscillates on a shaft 42 and 43 secured to the housing 1 and parallel with the moving shaft 35. On the arm 44 of the angled lever 41 is engaged the end 45 of a traction spring 46, the other end 47 of which engages at a fixed point 48 on the wall 30 of the housing 1. The upper ends 49 and 50 of the arms 44' and 44, which will henceforth be referred to as centering arms, have cylindrical rods 49' and 50' projecting perpendicularly on both sides of the centering arms 44' and 44 of the angled levers 40 and 41.

Externally of the housing 1, FIGS. 2, 5 and 6, is secured on the said moving shaft 35 a cam 51 which is in contact with a rotating roller 52 arranged at the end 53 of a lever 54 hinged at a point 55 on the housing 1, the other end 56 of which carries a rod 56' projecting perpendicularly towards the housing 1, FIG. 8, provided with an arcuate groove 60 at its free end, coincident with the slide 33 for housing of the corresponding pin 21, 21*a*, 21*b*, 21*c*, 21*d* and 21*e* of the weft presenting element 20, 20*a*, 20*b*, 20*c*, 20*d* and 20*e* selected. The contact of the roller 52 with the cam 51 is ensured by the action of a spring 62, which, in the embodiment illustrated is a compression spring, the end 61 of which engages in the orifice 65 in the lever 54 while its end 63 engages at a stationary point 64 rigid with the housing 1. Projecting perpendicularly from the said housing 1 are two stops 57 and 58 which limit the oscillating movement of the lever 54, 56. Reference numerals 59, 59*a*, 59*b*, 59*c*, 59*d* and 59*e* designate the cables which make the connection between the rods 2, 2*a*, 2*b*, 2*c*, 2*d*, and 2*e* with the dobby 3. 66, 66*a*, 66*b*, 66*c*, 66*d* and 66*e* are the tongs or grippers of the weft-presenting elements 20, 20*a*, 20*b*, 20*c*, 20*d* and 20*e*. One of these presenting elements, 20*d*, is shown in detail in FIG. 9. As can be seen, the upper end of the presenting element 20*d* is rigidly connected to the pin 21*d*, while its lower end is bent in a right angle and constitutes one of the jaws 66'*d*, of the tong or gripper 66*d*. The other jaw, 66''*d*, is rigidly connected to the pin 22*d* and guided for vertical movement in a bore of the lower edge portion 24' of the front wall 24 bent in a right angle. Between the pins 21*d* and 22*d* there is arranged a helical compression spring 68*d* which tends to maintain the jaw 66''*d* applied against the jaw 66'*d*. 67 is the weft-inserting element and 73 is a conventional stationary thread guide.

The apparatus functions in the following manner:

From a position of rest, FIG. 1, in which the presenting element 20 has presented its thread, the dobby 3, FIG. 7, carries out a new selection which, for example via the cable 59*d*, transmits a vertical ascending movement to the rod 2*d*, FIG. 3, which operates the small lever 9*d* which imparts a downwards movement to the tie member 11*d* and consequently to the flat bar 12*d*, the rectangular projection 13*d* of which assumes a position in the alignment of the cylindrical ends 49' and 50' of the centering arms 44' and 44 of the angled levers 40 and 41.

Meanwhile, the shaft 35 has rotated and consequently the periphery of the cam 36 compels the roller 37 to descend vertically, causing the angled levers 40 and 41 to oscillate at the same time and symmetrically, also symmetrically bringing towards each other the ends 49' and 40' of the centering arms 44 and 44' until the cylindrical end 50' encounters the rectangular projection 13*d*, displacing it until it is centered in the vertical alignment of the geometric center of the shaft 35, FIG. 4, and thus remaining positioned between the two cylindrical ends 49' and 50' of the centering arms 44' and 44.

The said displacement of the flat bar 12*d* has given rise to a horizontal displacement of the fork 15, the rod 16 of which, through the intermediary of its notch 17 and the pivot 18 of the suspended supply means 19, has caused the said supply means 19 to be tilted towards the housing 1, positioning the presenting element 20*d* in a vertical alignment with the geometric center of the oscillating shaft 27, that is to say in the position of presentation, FIG. 4. In this position, the top pin 21*d* of the presenting element 20*d* has become inserted in the groove 60, FIG. 8, of the end 56 of the lever 54.

As the cam 36 rotates, the outer cam 51, FIG. 5, also rotates and, by virtue of the synchronization between them and as the shaft 35 continues to rotate, the periphery of the cam 51 and the spring 62 compels the roller 52 to ascend, tilting the lever 54 and causing the end 56 thereof, FIGS. 6, 8 and 9, to descend, this latter at the same time pushing the pivot 21*d* and with it the presenting element 20*d*. The pin 22*d* follows this descending movement under the action of spring 68*d* and when it comes in contact with the bottom part of the slide 25*d* and as the lever 56 continues to descend until the pin 21*d* strikes the bottom pins 66' *d* and 66''*d* of the gripper or tongs 66*d* of the said presenting element 20*d* open, FIG. 9 releasing the weft thread 4*d*, which previously has been gripped by the inserting element 67.

The said position of presentation of the element 20*d* is also reflected in FIG. 8, in which the presenting element 20*d* has brought down the corresponding weft thread 4*d* which, therefore, follows the inclined path shown in FIG. 8 between the stationary thread guide 73 and the gripper 66*d*. In this position, the weft thread 4*d* may be subsequently gripped by the inserting element 67 and introduced into the shed for formation of the fabric, the cycle of operations necessary to a fresh selection of the weft thread following thereon.

I claim:

1. In a weft thread selecting device for weaving machines of the type having weft-inserting means movable through the shed across the war threads, a plurality of fixed weft supplies to be selectively presented to the weft-inserting means, means to select weft threads to be presented, and a rotating element driven in synchronism with said weft-inserting means, the combination including a pendular supply means comprising a plurality of weft-presenting means movable with respect to the pendular supply means between a retracted position and an extended position to present a weft thread, means to mount said pendular supply means on a weaving machine for movement between a plurality of supply positions to arrange a selected one of said weft-presenting means for presenting a weft thread in said extended position to the weft-inserting means at one side of the warp threads, a plurality of elongated bar means connected at their one ends to said pendular supply means for selective shifting between an inactive and a active position, lever means including rod means connected between said means to select weft threads and each of the respective other ends of said bar means for selectively shifting the bar

means between said active and inactive positions, centering arm means including first cam means connected with said rotating element of a weaving machine for moving the arm means between open and closed positions, means for engagement between each of said bar means and said centering arm means when a bar means is in said active position to move the pendular supply means to a selected one of said plurality of supply positions in response to movement of the centering arm means to said closed position, and second cam means connected with said rotating element of the weaving machine to move the selected one of the weft-presenting means to said extended position to present the selected weft thread to the weft-inserting means at one side of the warp threads.

2. In a weft thread selecting device as defined in claim 1, wherein said lever means includes a plurality of oscillating levers mounted on a common shaft, one end of each said oscillating lever being connected to a tie rod, the other ends of the oscillating levers being connected with respective vertically disposed rods, and spring means for each of said rods to urge said bar means to their inactive positions.

3. In a weft thread selecting device as defined in claim 1, wherein said elongated bar means includes a plurality of bars pivotally connected in side-by-side relationship at their one ends to said pendular supply means, each of said bars having a lateral projection, the respective projections being arranged in longitudinally staggered relationship, said centering arm means includes a pair of opposed angled levers each pivotally mounted on spaced parallel axes, one end of each of said angled levers being connected together for engagement with said first cam means, the other ends of the angled levers being disposed to engage with the respective opposite sides of a respective one of said lateral projections when a selected bar means is shifted to said active position.

4. In a weft thread selecting device as defined in claim 1, wherein said pendular supply means includes a first wall movable with said supply means provided with a plurality of pairs of aligned slots in spared relationship, each of said weft presenting means includes a pair of pins slidably received in respective pairs of said slots for guiding the presenting means between retracted and extended positions, a second wall spaced from said first wall and fixed with respect thereto, said second wall being provided with a generally T-shaped slideway for operative engagement with a respective one of each of said pairs of pins, all of the respective pins being slidable in the horizontal portion of the T-shaped slot during movement of the pendular supply means, only one of said pins being slidable in the vertical portion of the T-shaped slot during movement of a selected presenting means between retracted and extended positions.

5. In a weft thread selecting device as defined in claim 4, wherein said second cam means includes a pivoted lever, one end of said last named lever being movable in response to actuation of a rotary cam mounted on the rotating element of the weaving machine, said one end of the lever having a projection for engagement with a pin of a weft-presenting means when positioned in alignment with the vertical portion of said T-shaped slot for moving the weft-presenting means between retracted and extended positions.

6. In a weft thread selecting device as defined in claim 5, wherein said projection on said last-named lever extends laterally towards said T-shaped slot, and the free end of said projection is provided with a groove to receive the pin of a weft presenting means.