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54 **Colour selector.**

57 Device for selecting the colour of weft threads in looms, characterized in that the mechanism (M) controlling the weaving programme transmits a mechanical order to a so called colour selector (A) which converts the said order in a first electric signal which is sent to a synchronization device (C) and is momentarily stored therein, whereas a second signal is produced by a damping disc (D) and a contactless switch (S) as a function of the rotation of the axis of the loom, whereby the said first signal is sent by the said synchronization device to a so called colour giver (B) as soon as the said second signal has reached the said synchronization device.

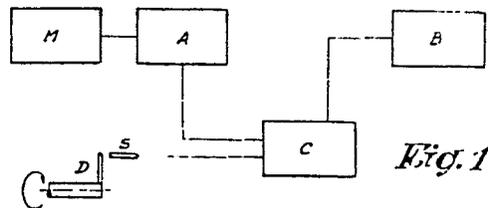


Fig. 1

EP 0 009 840 A1

Colour Selector

The present invention relates to a device for selectively presenting weft threads of different colours to the grippers of a loom which are equipped with a Jacquard or a doobby
5 mechanism.

It is known that the said mechanisms are actuating a series of pulling hooks or levers, whereby as well the weaving pattern as the various colours may be determined in the
10 fabric. Numerous systems are known for selecting weft threads having different colours and for presenting them to the grippers; however, a large number of said systems have important drawbacks resulting from the difficult synchronization between the Jacquard or doobby mechanism and the loom, prin-
15 cipally at the presently applied high weaving speeds.

The object of the present invention is to prevent such drawbacks by providing a new device which has not the above-mentioned shortcomings.

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According to this invention, the control for the colour selection of the Jacquard or doobby mechanism is transmitted to a double pulling hook or lever actuating a contactless switch producing a signal actuating, through a synchroniza-
25 tion device, a device presenting a weft thread of a defined colour to the gripper as soon as the said signal is received.

The scope of this invention will be more clearly apparent

from the following description of a non limitative embodiment given by way of example, reference being made to the enclosed drawings in which :

- 5 Figure 1 is a block diagram of the whole device according to the invention;
 Figure 2 is a cross-section of the device through which the colour is selected;
 Figure 3 is a top view of the double lever according to
10 the arrow F3 in Figure 2;
 Figure 4 is a diagrammatic view of a damping disc and the corresponding contactless switch;
 Figure 5 is a cross-section of the device presenting the thread; and
15 Figure 6 is an operating diagram showing the relation between the opening of the shed and the rotation of the axis of the loom.

The block diagram of Figure 1 gives a general view of the
20 device according to the invention. As known, for each weft, the nature of the weaving pattern and the sequence of the various colours in the fabric are ordered by a Jacquard or a dobby mechanism M. These data are sent to a device consisting of a series of pulling hooks or levers, each lever relating
25 either to the weaving pattern proper or to the colour of the weft thread being presented. However, in the present case, the levers relating to the selection of the colour of the weft thread are only considered. The device in which said levers are disposed is called a colour selector A which
30 additionally comprises also the same number of contactless switches cooperating with the said levers. The signals emitted by said switches are synchronized in a device C with periodical signals produced by a damping disc D mounted on the driving axis of the loom or of the dobby or Jacquard
35 mechanism, and a contactless switch S, whereby the synchronization device C transmits signals to a device B which then presents the thread to the gripper and which is shortly

called "colour giver".

Figure 2 shows a cross-section of a colour selector A in rest position, that is to say in a position in which the concerned colour is not selected. This colour selector A comprises substantially a casing 1 in which are adapted a series of levers 2 and the same number of contactless switches 3. Each lever 2 is actuated by the previously mentioned Jacquard or dobby mechanism M according to the colour selected by the said mechanism for the next following weft. Each lever 2 comprises substantially two individual arms 4 and 5 which are so mounted on a common axis or spindle 6 that a small friction plate 9 made of metal or synthetic material is adapted between their ends 7 and 8 receiving the common axis 6, the said ends 7 and 8 clamping the said small friction plate 9 with a defined force under the influence of a spring 10 mounted on the axis 6. The arm 5 of the lever 2 has a folded plate-shaped end 11, whereas the end 12 of the arm 4 is provided to cooperate with the Jacquard or dobby mechanism M. The casing 1 has a groove-shaped opening 13 in which the arm 4 of the lever 2 may be freely shifted upwardly and downwardly according to the control of the mechanism M. In the casing 1 is provided a stop 14 preventing the small plate 11 of the arm 5 from being spaced too far from the contactless switch 3 when the arm 4 is moved upwardly. Thus, during the upwards movement of the arm 4, the arm 5 is firstly subjected to a corresponding downwards movement under an angle α until the small plate 11 is retained by the stop 14. When the arm 4 is then still moved further upwardly under the influence of the mechanism M, the ends 7 and 8 of the arms 4 and 5 will be displaced relative to each other on the small friction plate 9. However, as soon as the arm 4 is again shifted downwardly, the arm 5 will be immediately subjected to an upwards movement resulting from the constant friction between the ends 7 and 8 of the arms 4 and 5, namely the friction caused by the small friction plate 9 and the pressure of the spring 10. Thus, already after a minimum downwards movement of the

arm 4, the contactless switch 3 will be damped by the small plate 11, which provides a substantial saving of time since it is not necessary to wait until the arm 4 is situated in its lowest position for damping the switch 3. The maximum
5 distance on which the small plate 11 may be moved, corresponds to the angle α and is determined by the localization of the stop 14, on one hand, and of a stationary stop 15 on the other hand. The contactless switch 3 must be so adjusted that, in the highest position of the small plate 11, a free
10 space is always kept between the said plate 11 and the lowermost portion of the contactless switch 3. The distance on which the small plate 11 must be shifted in order to undamp the switch 3, corresponds to the angle β and is characteristic for the used contactless switch.

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When the arm 4 is in its highest position as shown with dotted lines in Figure 2, or, in the same manner, when the small plate 11 is in its lowest position, the contactless switch 3 is undamped, thereby producing the signal indicating
20 that the concerned colour has been selected.

According to the invention, the signal for a colour selection may be produced in two ways.

25 The first way relies on the application of a simple system whereby for each individual colour, there is provided only one double lever and, accordingly, also only one contactless switch. Owing to the fact that this method requires only one lever per colour, some difficulties may be experienced, more
30 particularly when manufacturing multicoloured fabrics which have also an intricated structure pattern since the total number of available levers is anyhow limited.

Nevertheless, this system is advantageous in that, in case of
35 rupture of a lever, no colour is presented and, consequently, after the weft control, the loom is immediately stopped since no weft is presented.

The second way of producing a signal for colour selection comprises using a binary system, whereby n switches are sufficient for selecting 2^n different colours. This method relies on the undamping of the contactless switches according to the binary system, in other words the selection of a colour is, in the present case, depending on the fact that a small number of various switches are damped or not. An example of a binary colour selection is given in the following table, wherein 1 = damped and 0 = undamped.

10

TABLE

<u>Switch</u>	1	2	3
<u>Colour</u>			
Red	1	1	1
Blue	0	1	1
15 Yellow	1	0	1
Green	0	0	1
Purple	1	1	0
Orange	0	1	0
White	1	0	0
20 Black	0	0	0

It is apparent that this system may be readily extended for more than 8 colours. For instance, it is already sufficient to introduce a fourth switch for selecting 16 different colours. This method has a great advantage in that a very small number (n) of levers is only required in order to allow the application of a large number (2^n) colours.

Whatever the used method will be, the colour selector will continuously produce signals corresponding with the colour selected at any moment by the mechanism M. As a consequence of the presently used high weaving speeds, it is necessary to bring these signals for the colour selection in a perfect synchronization with the rotating speed of the loom, in other words, care must be taken so that the pulses produced in the colour selector are perfectly introduced at the exact moment in the colour giver B. It is the reason why each of the said

pulses is firstly stored in a synchronization device C until the said synchronization device receives a pulse coming from the contactless switch S which is periodically damped and undamped by a damping disc D mounted on an axis 16 of the loom or the dobby or Jacquard mechanism. The damping disc D passes periodically before the contactless switch S, thereby producing every time a pulse. The localization of the disc D relative to the zero position of the rotating axis of the loom is very critical with respect to the obtaining of a perfect synchronization for presenting the thread to the gripper.

Figure 6 shows a diagram representing the shed opening, in ordinate, as a function of the rotation, in abscissa, of the axis of the loom. This diagram shows the second half portion of a period P_0 , a full period P_1 and the first half portion of the following period P_2 . The points 18-19 show respectively the beginning and the end point of the full period P_1 .

At the point 20 of the period P_1 , the shed begins to close again and the arm 4 of the lever 2 is in its lowest position when the colour corresponding to said lever 2 has not been selected for the weft corresponding to the preceding period P_0 . However, if said colour is now selected for the following period P_2 , from the moment corresponding to the point 20, the arm 4 of the lever 2 will be shifted upwardly and the arm 5 will follow this movement in the opposite direction. As soon as the arm 5 is rotated downwardly under an angle α , the contactless switch 3 is undamped, thereby producing the signal for the colour selection. This occurs when the axis of the loom is rotated in the period P_0 under an angle corresponding with the point 21 in the diagram of Figure 6. When the arm 4 moves further upwardly, the arm 5 will be further shifted downwardly until this movement is blocked by the stop 14. The maximum distance on which the arm 5 may be moved downwardly, is determined by the angle α .

The arm 4 may then continue moving upwardly, but the arm 5 is kept in rest position against the stop 14. This is possible owing to the already described double construction of the lever 2.

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It is thus apparent that the signal for the colour selection of a weft corresponding to a period P_2 is already produced during the second half portion of the preceding period P_1 . In order to provide the synchronization with the movement of
10 the colour giver B, a pulse must be also produced by means of the already mentioned damping disc D and the contactless switch S which are situated outside the colour selector A, whereby the frequency with which the switch S is damped and undamped, is directly influenced by the angular speed of the
15 axis of the loom. The damping disc D is preferably adapted on about 270° relative to the zero point of the rotating axis of the loom. The so produced pulse is periodically repeated and it coincides at the soonest with the pulse of the colour selector (indicated at the point 21), and essentially a long
20 time before the moment at which the gripper penetrates the shed of the following period P_2 . The moment at which this pulse is generally produced is indicated by way of example in the diagram by the point 22. Simultaneously, the signals coming from the colour selector are then also transmitted to
25 the colour giver B (Figure 5).

The colour giver B comprises substantially a casing 23 in which an electromagnet 24, a hinged armature 25, a cam 26, an intermediate lever 27 and a lever 28 are adapted for each
30 individual colour. When a colour is selected by the mechanism M and via the colour selector A, the pulse produced therein is transmitted at the suitable time, through the synchronization device C, to the colour giver B, thereby energizing the electromagnet 24 and pulling downwardly the hinged armature
35 25.

Through a small wheel 29, a cam 26 imparts a swinging movement

to the intermediate lever 27. When no signal is produced for the colour selection, in other words when the hinged armature 25 is in its highest position, the intermediate lever 27 will be able to move freely round the axis 30 since it is not
5 retained by the hinged armature 26 and the thread of the concerned colour will not be presented to the gripper.

However, if the colour is well selected, the hinged armature 25 is then attracted by the electromagnet 24 and its end 31
10 will prevent the swinging movement of the intermediate lever 27 round the axis 30. As a consequence of the constant movement of cam 26, in the present case, the intermediate lever 27 will be periodically tilted against the end 31 of the hinged armature 25 so that the axis 30 is laterally reciprocated through
15 the small wheel 29 and the guide 32, thereby also driving an intermediate bar 34 connecting the end 35 of the intermediate lever 27 with the lever 28 which is rotatably mounted relative to an axis 36. As a consequence of this movement, the arm 37 fixedly secured on the lever 28 will present periodically the
20 thread of the desired colour to the gripper. It is apparent that a similar device must be provided for each different colour.

It should be noted that numerous modifications may be applied
25 to the device described in the foregoing by way of example without departing from the scope of this invention.

Claims.

- 1.- Device for selecting the colour of weft threads in looms, characterized in that the mechanism (M) controlling the
5 weaving programme transmits a mechanical order to a so called colour selector (A) which converts the said order in a first electric signal which is sent to a synchronization device (C) and is momentarily stored therein, whereas a second signal is produced by a damping disc (D) and a contactless switch (S)
10 as a function of the rotation of the axis of the loom, whereby the said first signal is sent by the said synchronization device to a so called colour giver (B) as soon as the said second signal has reached the said synchronization device.
- 15 2.- Device according to claim 1, characterized in that the colour selector (A) comprises substantially a casing (1) in which are adapted a series of levers (2) and the same number of contactless switches (3), whereby each lever is at least of a double construction and both lever arms (4,5) are
20 rotatably mounted on a common axis (6).
- 3.- Device according to claim 2, characterized in that between the said levers arms (4,5) and at the level of the said common axis (6), is provided a small friction plate (9),
25 e.g. made of metal or synthetic material, said plate being clamped between the said levers arms under the influence of a spring (10) adapted at the level of the said axis.
- 4.- Device according to claim 2, characterized in that only
30 one (5) of the said lever arms is folded back at its end (11) remote from the said axis, whereas the corresponding end of the other (4) lever arm is so provided that it may cooperate with the said mechanism (M) controlling the weaving programme.
- 35 5.- Device according to claim 2, characterized in that the said casing (1) has at least one groove-shaped opening (13) in which the said lever arms (4) may be at least partially

shifted.

6.- Device according to claim 2, characterized in that, in the said casing (1) and per lever arm (5), are provided at
5 least two stops (14,15) which may be adjusted or not and which are defining the distance on which one lever arm (5) may be shifted in order to damp or undamp the said contactless switch (3).

10 7.- Device according to claim 2, characterized in that only one double lever (4,5) is provided in the said device per selectable colour.

8.- Device according to claim 2, characterized in that the
15 colour selection is carried out according to a binary system, whereby n levers (4,5) and the same number of contactless switches (3) allow to select 2^n colours.

9.- Device according to claim 1, characterized in that the
20 signals coming from the colour selector (1) are synchronized with the periodical signals produced by a damping disc (D) fixedly secured on the axis (16) of the loom and a contactless switch (3), whereby said damping disc is displaced on about 270° relative to the zero position of the said axis.

25 10.- Device according to claim 1, characterized in that the said colour giver (B) comprises substantially a casing (23) in which an electromagnet (24), a hinged armature (25), a cam (26), an intermediate lever (27) and a lever (28) are adapted for
30 each colour so that, when a signal for colour selection is introduced into the said colour giver, the corresponding electromagnet (24) is energized, thereby pulling down the hinged armature (25), as a result of which and under the influence of the constant rotating movement of the cam (26),
35 a swinging movement is imparted to the intermediate lever (29) round one end of the said hinged armature (25), whereby this movement is transmitted, through an intermediate bar (31),

to a lever (28) provided with an arm (37) presenting the thread to a gripper.

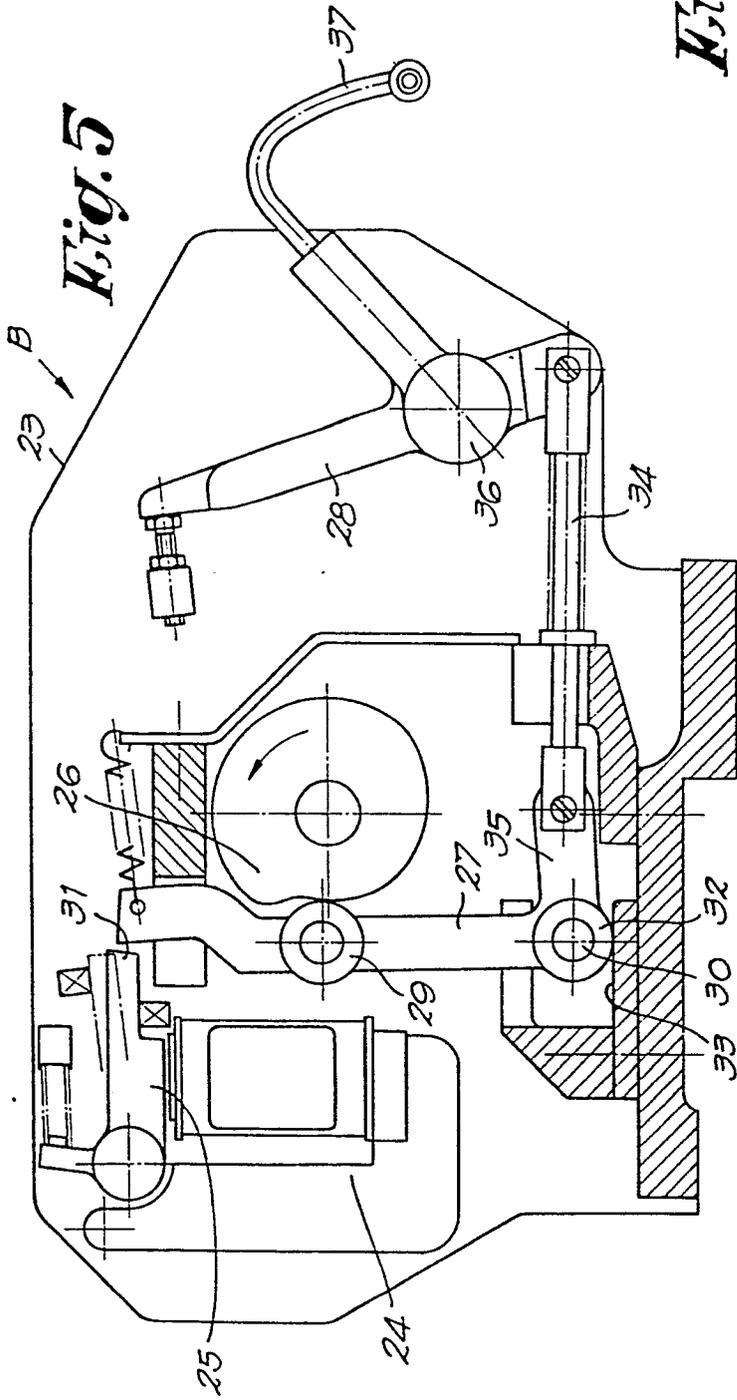
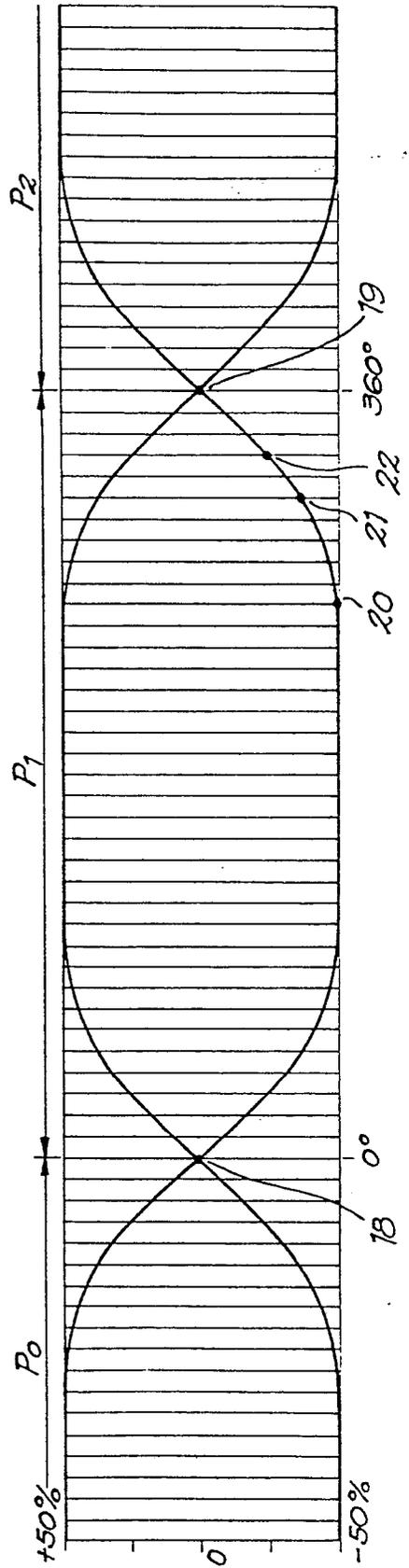


Fig. 6





DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<p><u>US - A - 2 814 315 (LYLE)</u></p> <p>* Figures 2-6; column 2, line 69 - column 3, line 67 *</p> <p>----</p>	1	D 03 D 47/38
			TECHNICAL FIELDS SEARCHED (Int.Cl. ³)
			D 03 D
			CATEGORY OF CITED DOCUMENTS
			<p>X: particularly relevant</p> <p>A: technological background</p> <p>O: non-written disclosure</p> <p>P: intermediate document</p> <p>T: theory or principle underlying the invention</p> <p>E: conflicting application</p> <p>D: document cited in the application</p> <p>L: citation for other reasons</p>
			&: member of the same patent family, corresponding document
<p><input checked="" type="checkbox"/> The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
The Hague	20-12-1979	BOUTELEGIER	