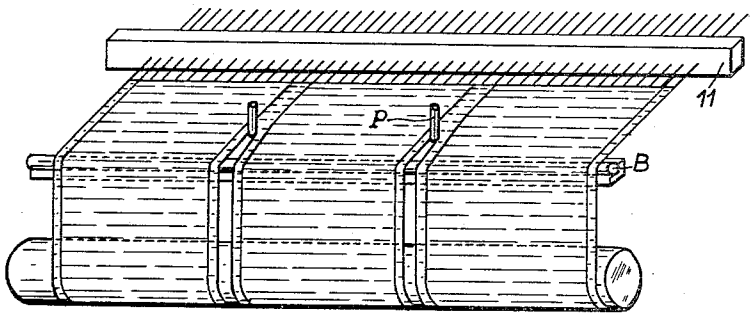
April 11, 1967 F. CALEMARD 3,313,323

AUTOMATIC CONTROL DEVICES FOR CONTROLLING THE OPERATION OF SEPARATING THERMO-FUSIBLE FABRICS

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Fig.1



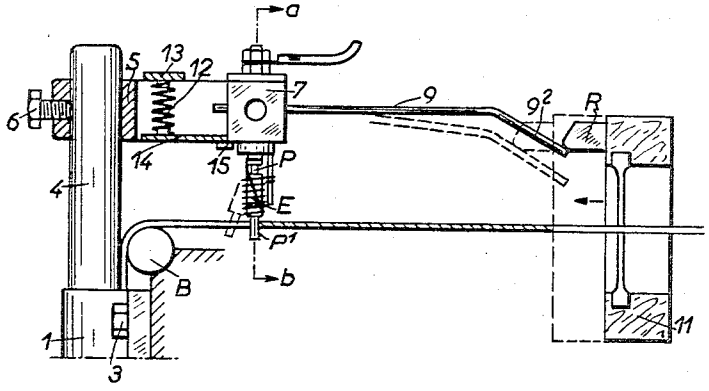


Fig.2

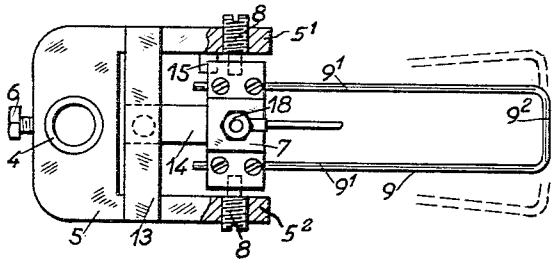


Fig.3

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Fig.5

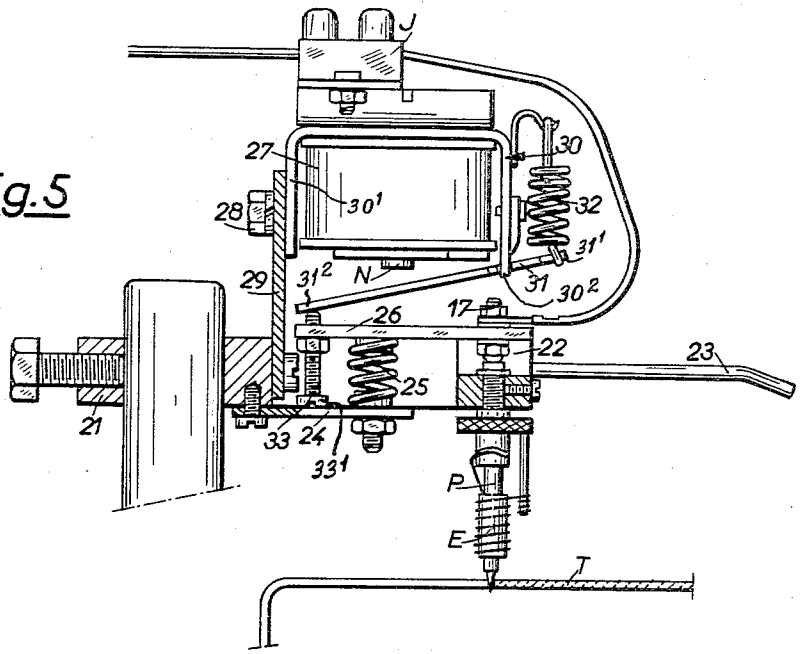
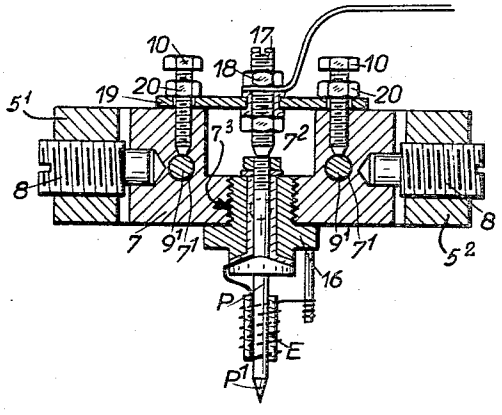


Fig.4



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AUTOMATIC CONTROL DEVICES FOR CONTROLLING THE OPERATION OF SEPARATING THERMO-FUSIBLE FABRICS

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Fig.6

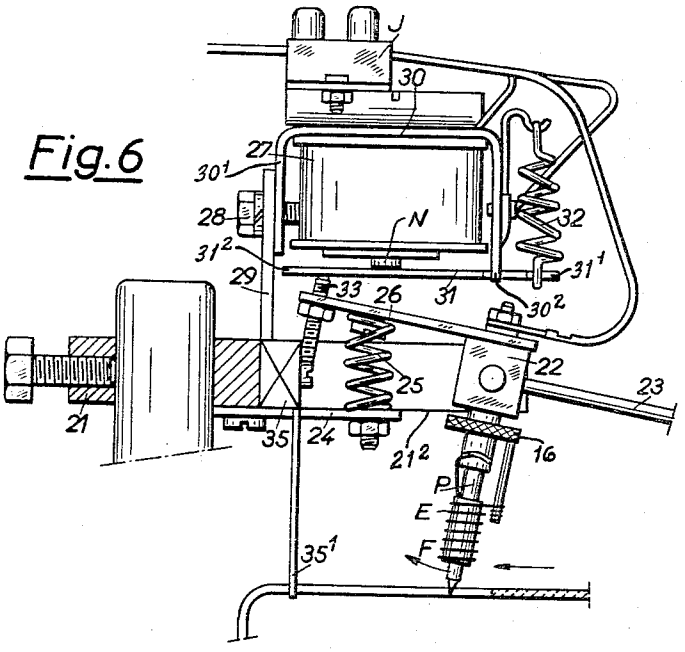
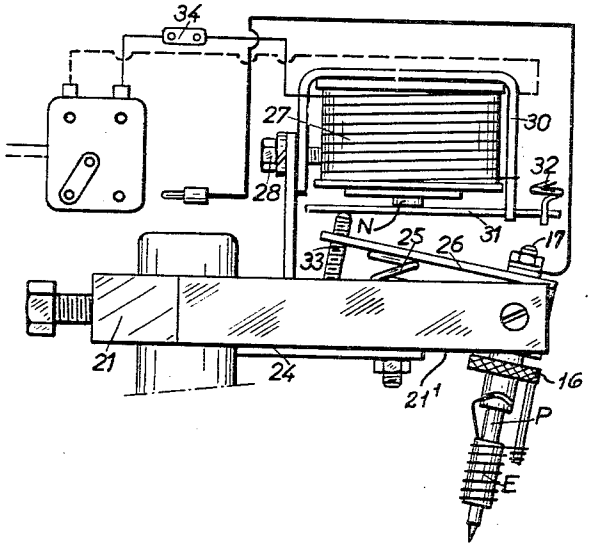


Fig.7



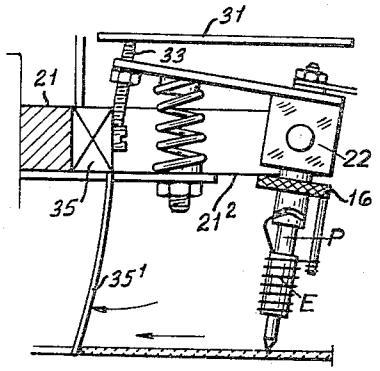


Fig.8

United States Patent Office 3,313,323 Patented Apr. 11, 1967

3,313,323

AUTOMATIC CONTROL DEVICES FOR CONTROLLING THE OPERATION OF SEPARATING THERMO-FUSIBLE FABRICS

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Claims priority, application France, Dec. 5, 1963, 8,314, Patent 1,376,400; Feb. 19, 1964, 8,372
14 Claims. (Cl. 139—291)

The present invention concerns automatic control devices for controlling the separation of thermo-fusible fabrics.

It is well known to effect such separation of the fabrics by hot-cutting, through the agency of heated pins and blades mounted on looms which produce the fabric. By the term "pins or blades" is meant any device of a similar nature and suitable for carrying out this process, by which, it is possible to obtain selvedges which are perfectly welded and flawless.

This separation has hitherto been effected on appropriate machines, but this has disadvantages in the case of fabrics of considerable width, and also in the case of fabrics of light texture, such as voile, muslin, etc., in consequence of the difficulty experienced in guiding the material on or under the heated blades.

In order to overcome these disadvantages, the separation has been effected directly on the looms, through the intermediary of fixed heating pins disposed opposite the material in such manner as to cut it as it is woven. The latter process yields mediocre results, due to the permanent formation of irregular selvedges which are carbonized or badly welded, resulting from the contact of the pin with the fabric to be cut during the repulsion or withdrawal of the fabric under the effect of the blows of the sley.

It has thus become necessary to design an automatic device for controlling the withdrawal of the heated pins on looms.

An object of the present invention is to provide an automatic control device for controlling the operation of separating thermo-fusible fabrics and adapted to be mounted on a loom having a sley, said device comprising:

(i) A pin arranged to be heated;

(ii) Means for heating said pin;

(iii) A member arranged to receive said pin;

(iv) Means for mounting said pin in said member;

(v) Means for adjustably mounting for rotation said member on the weaving loom in such a manner that said pin is movable between an operative position, wherein said pin is capable of separating fabric to be cut, and an inoperative position wherein said pin is incapable of cutting the fabric;

(vi) Resilient means arranged to urge said pin into its operative position;

(vii) A control arm having a bearing surface adapted to engage in operation the sley of the weaving loom; and

(viii) Means for adjustably mounting said control arm in said member whereby pivotal movement of said control arm by engagement of said bearing surface by the sley causes said pin to move between its operative positions.

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

FIG. 1 is a diagrammatic perspective view showing the inter-relationship of certain parts of one embodiment of the present invention;

FIG. 2 is a side elevation, drawn to a larger scale in

longitudinal section, of the embodiment illustrated in FIG. 1;

FIG. 3 is a plan view corresponding to FIG. 2;

FIG. 4 is a section drawn to a larger scale, taken on the line *a*—*b* of FIG. 2;

FIG. 5 is a fragmentary side elevation similar to FIG. 2 of a further embodiment of the invention;

FIG. 6 is a view similar to FIG. 5 showing the device in a further working position;

FIG. 7 is a circuit diagram of the circuit employed in the embodiment illustrated in FIG. 5; and

FIG. 8 is a fragmentary side elevation in longitudinal section showing a detail of the embodiment illustrated in FIG. 5 in a further working position.

In FIG. 1 of the drawings, there is shown a plurality of automatic devices for the control of the withdrawal of heating pins P mounted on a loom and intended for separating thermo-fusible fabrics. There is provided a plurality of supports 1, the number of which depends upon the number of cuts to be effected in the fabric. The supports 1 are fixed on a breast beam B of the loom through the agency of a screw 3. Alternatively they may be fixed thereto by any other appropriate means.

Each support 1 is made fast with a column 4 (FIG. 2) vertically disposed so as to permit the sliding engagement therewith of a movable supporting block 5 which is retained in position by a screw 6 mounted in said block engaging the peripheral surface of the column 4. Each of the supporting blocks 5 is formed with arm positions 5^1 and 5^2. A pivotable block 7 is pivotally mounted between two screws 8 which in turn are mounted in end portions of the arm portions 5^1 and 5^2 and which form articulation pivots for the block 7.

Formed in the transverse direction of the block 7 are two bores 7^1 (FIG. 4), the purpose of which is to permit the engagement of the ends of limbs 9^1 of a control arm or fork 9 by the block 7. Screws 10 secure the fork limbs 9^1, after adjustment, in position in the block 7. The control arm or fork 9 is, at its end portion remote from the block 7, bent downwardly so as to constitute an inclined bearing face 9^2, the purpose of which is to co-operate with a ramp R which is disposed longitudinally on, and is intergral with, or fitted to, a sley 11 of the loom.

With this arrangement, it will be clear that when the sley 11 is moved to the position shown in broken lines in FIG. 2, the ramp R will act on the inclined bearing face 9^2 of the fork 9 forcing it downwardly. This in turn causes the block 7 to pivot about the screws 8, and consequently the heating pin P which extends downwardly from the block 7 and is arranged to separate the fabrics as illustrated in FIG. 1, is withdrawn from the operative position shown in full lines in FIG. 2, in which the fabrics are separated, to the inoperative position shown in broken lines in which the pin is remote the uncut fabric portion so that the heating pin is no longer able to cut the fabric.

A compression coil spring 12 is interposed between a fixed plate 13, secured fast with the supporting block 5 so as to extend across the space between the arm portions 5^1 and 5^2 and a tongue 14, which extends from the block 7. This arrangement permits the return of the block 7 into its normal operative or utilization position as illustrated in full lines in FIG. 2. For this purpose, a support finger 15 secured to the arm portion 5^1 of the supporting block 5 forms a fixed abutment at the end of recall travel of the block 7.

In its median portion (see FIG. 4), the pivotable block 7 is formed in its base with a screw-threaded bore 7^3 into which is screwed a shouldered ring 16 supporting the pin P. A wire E constituting an electrical resistance is wound around the pin P, the purpose of the resistance E being to heat the pin P to a temperature at which the pin, in

operation, separates the fabric. The screw-threaded bore 7^3 leads to a cavity 7^2 formed in the pivotable block 7. The pin P extends through the ring 16 and into the cavity 7^2. An adjustable electrical terminal 17, which is suitably insulated and maintained by nuts 18 on a cover plate 19, is arranged to contact the top of the pin P. The wire E is connected at one end to pin P and at the other end to ground through ring 16 which is insulated from the pin. The screws 10, which are disposed at right angles to the axis of the bores 7^1 serve a dual purpose: on the one hand they secure the fork limbs 9^1, after adjustment, in position in the block 7, and on the other hand, through the intermediary of nuts 20, they secure the cover plate 19 in position on the block 7.

It will also be seen (from FIG. 5) that the terminal 17 is connected by an electrical wire to a feed circuit which may comprise a thermostat device for adjusting the temperature of the pin P.

In the device described above, each pin P presents an exposed end portion P^1 (FIG. 4) which is arranged in its operative position, to extend through the thickness of the fabric to be separated (see FIG. 2).

During the stroke of the sley 11, the fabric is withdrawn in the direction of the arrow in FIG. 2 by an amount of several millimetres, and taken-up by the loom beam, and the block 7, urged by the control fork 9, (which is pivoted by movement of the ramp R on the sley 11), entrains the pin P so as to displace the same and move it rearwardly by the same distance as the fabric, as illustrated in broken lines in FIG. 2. When the sley again travels forwardly, the pin is urged back to its operative position by the coil spring 12 to sever the withdrawn fabric.

With the aid of the device described above, it becomes possible to obtain a *constant* distance between the exposed end portion P^1 of the heating pin P and the separating point of the fabric, despite the successive withdrawal movements of the fabric due to the movements of the sley 11. This feature thus permits cutting or separation by radiated heat without any contact between the pin and the fabric.

This factor eliminates the carbonization of the selvedges and also any irregularities due to sudden movements of the sley.

It should also be pointed out that, with this device, the magnitude of inclination of the pin P, and also its positioning, are made adjustable by the longitudinal displacement of the fork limbs 9^1 relatively to the block 7.

On the other hand, the transverse adjustment of the pins relatively to the fabric is obtained by orientation of the angular position supporting blocks 5 on their respective columns 4.

It will be clear that the securing of the device in position in relation to the loom may vary depending on the type of loom involved.

In the embodiment illustrated in FIGS. 5, 6, 7 and 8, the device is constructed similarly to that described above, a support block 21 having two arm portions 21^1 and 21^2 between which a block 22 is pivotally mounted. The latter permits the adjustable securing of a control fork 23 which is arranged to co-operate with the loom sley, as described above in connection with the embodiment illustrated in FIGS. 1 to 4.

The heating pin P is mounted in the pivotally mounted block 22 which is arranged to pivot in a clockwise direction as indicated by the arrow F in FIG. 6. For this purpose, a tongue 24 secured to the support block 21 provides for the supporting and centering of a coil spring 25 which exerts a thrust on a plate 26 secured by screws or by any other means on the upper face of the pivotable block 22. The said spring 25 thus constantly urges the block 22 into a position of disengagement for the pin P relative to the un-cut fabric T.

An electro-magnet 27 is secured adjustably by screws 28 on a support plate 29 screwed fast with the support block 21. The electro-magnet 27 is mounted in a U-shaped

support member 30 having two limbs 30^1 and 30^2. The limb 30^1 is connected to the support plate 29, but the limb 30^2 has a free end portion at which is pivotally supported a plate 31. The plate 31 is disposed in the magnetic field of a core N of the electro-magnet 27, but is constantly urged, by a coil spring 32, into a position in which it is disengaged from said core N. The coil spring 32 engages a projecting edge portion 31^1 of the plate. An end portion 31^2 remote from the limb 30^2 and the spring 32 abuts one end of an adjustment screw 33 screwed into the plate 26.

It must be pointed out that the spring 32 is appropriately calibrated so as to actuate the pivotally mounted plate 21 and also, through the intermediary of the screw 33 and in conjunction with the spring 25, the plate 26. The spring 32 thus maintains the block 22 in its operative position so that the heating pin P is operatively positioned to effect cutting of the fabric T, as illustrated in FIG. 5. It should also be noted that the adjustment of the positioning of the pin P is effected through the agency of the screw 33, the head 33^1 of which bears on the plate 24.

On the upper portion of the support member 30 of the electro-magnet 27 is mounted the junction terminals J, adapted for the electrical connection of the independent feed circuits of the electro-magnet 27 and of the heating pin P.

The circuit for controlling the electro-magnet 27 (FIG. 7) is connected to a micro-switch 34 which closes automatically when the loom stops and permits the control of the lifting movement of the pin P in order that it may be moved to inoperative position, from the fabric T as seen in FIG. 6. In fact, the connection in the circuit of the electro-magnet 27 provides, by magnetic action, for the pivotal control of the plate 31 and for the bearing thereof on the core N, against the tension of the coil spring 32. During displacement of the plate 31, the moving plate 26, urged by the coil spring 25, causes the block 22 to pivot about the axis of the screws 8, the plate 26 thus following the movement of the plate 31 in such manner as to bring about the movement of the heating pin P to the inoperative position relative to fabric T, as illustrated in FIG. 6. This disengagement is automatically effected when the loom stops and thus prevents the formation of irregular selvedges. During the starting up of the loom, the control circuit for the electro-magnet 27 is automatically opened by the opening of micro-switch 34 and the heating pin P returns to its operative position (FIG. 5).

It should also be noted that the separate electrical circuits for the electro-magnet 27 and the heating pin P are connected to a common ground, as illustrated in FIG. 7.

A multiplicity of microswitches may be employed in cases wherein the stopping of the loom can be brought about without the functioning of a clutch, for example in an automatic shuttle-changing loom.

Finally, according to a subsidiary feature of the invention, a micro-switch 35 (or other contact or switching apparatus) is provided on the support 21, and has a trip rod 35^1 which is adapted to engage in the aperture in the fabric formed by the separating operation, and which is arranged in operation to be downstream of the heating pin P. The said micro-switch 35 is connected in an electrical circuit (not shown) for controlling a warning means (which may be an acoustic means or an electrical means) the purpose of which is to warn the user in the case of non-operation of the device. The said micro-switch 35 may also bring about the stopping of the weaving loom.

As illustrated in FIG. 8, any non-functioning of the heating pin P will become readily apparent by the absence of separation in the fabric T which is displaced in the direction of the arrow R past the pin P. During this displacement of the fabric T past the pin P, the point in the fabric at which separation has stopped lies at the apex of a V-shaped slit in the fabric and the apex of this slit engages or abuts trip rod 35^1, which operates a micro-switch 35 which in turn actuates the stopping or warning

Thus, the operator is warned of the non-functioning of the heating action of one or more heating pins P and can act accordingly.

What is claimed is:

1. A device for controlling the operation of separating thermo-fusible fabrics and adapted to be mounted on a loom having a sley, said device comprising:
(i) a pin arranged to be heated;
(ii) means for heating said pin;
(iii) a member arranged to receive said pin;
(iv) means for mounting said pin in said member;
(v) means for adjustably mounting for rotation said member on the loom in such a manner that said pin is movable between an operative position, wherein said pin is capable of separating fabric, and an inoperative position;
(vi) resilient means arranged to urge said pin into its operative poistion;
(vii) a control arm having a bearing surface adapted to engage in operation the sley of the loom; and
(viii) means for adjustably mounting said control arm in said member whereby pivotal movement of said control arm by engagement of said bearing surface by the sley causes said pin to move between its operative and inoperative positions.

2. A device according to claim 1, wherein the control arm, when said pin is in its operative position, is arranged to extend substantially parallel to the fabric, the bearing surface of said arm being formed by a downwardly extending end portion of said arm which is adapted to co-operate with a ramp portion of the sley.

3. A device for controlling the operation of separating thermo-fusible fabrics and adapted to be mounted on a loom having a sley, said device comprising:
(i) a pin arranged to be heated;
(ii) means for heating said pin;
(iii) a block formed with a bore for receiving said pin;
(iv) means for mounting said pin in said block;
(v) means for adjustably mounting for rotation said block on the loom in such a manner that said pin is movable between an operative position, wherein said pin is capable of separating fabric, and an inoperative position;
(vi) resilient means arranged to urge said pin into its operative position;
(vii) a control arm having a bearing surface adapted to engage in operation the sley of the loom; and
(viii) means for adjustably mounting said control arm in said block whereby pivotal movement of said control arm by engagement of said bearing surface by the sley causes said pin to move between its operative and inoperative positions.

4. A device for controlling the operation of separating thermo-fusible fabrics and adapted to be mounted on a loom having a sley, said device comprising:
(i) a pin arranged to be heated;
(ii) means for heating said pin;
(iii) a block formed with a bore for receiving said pin;
(iv) an annular element having an exterior screw-threaded surface which engages the bore of the block, said pin being inserted in a bore of said annular element;
(v) means for adjustably mounting for rotation said block on the loom in such a manner that said pin is movable between an operative position, wherein said pin is capable of separating fabric, and an inoperative position;
(vi) resilient means arranged to urge said pin into its operative position;
(vii) a control arm having a bearing surface adapted to engage in operation the sley of the loom; and
(viii) means for adjustably mounting said control arm in said block whereby pivotal movement of said control arm by engagement of said bearing surface by the sley causes said pin to move between its operative and inoperative positions.

5. A device for controlling the operation of separating thermo-fusible fabrics and adapted to be mounted on a loom having a sley, said device comprising:
(i) a pin arranged to be heated;
(ii) means for heating said pin;
(iii) a block formed with a bore for receiving said pin;
(iv) a shouldered ring having an exterior screw-threaded surface which engages the bore of the block, said pin being inserted in a bore of said ring;
(v) a support column arranged to be mounted on the loom;
(vi) a support block having two arm portions which extend therefrom and between which said first mentioned block is mounted for rotation in such a manner that said pin is movable between an operative position, wherein said pin is capable of separating fabric, and an inoperative position;
(vii) means for adjustably mounting said support block on said support column;
(viii) resilient means arranged to urge said pin into its operative position;
(ix) a control arm having a bearing surface adapted to engage in operation the sley of the loom; and
(x) means for adjustably mounting said control arm in said first mentioned block whereby pivotal movement of said control arm by engagement of said bearing surface by the sley causes said pin to move between its operative and inoperative positions.

6. A device for controlling the operation of separating thermo-fusible fabrics and adapted to be mounted on a loom having a sley, said device comprising:
(i) a pin arranged to be heated;
(ii) means for heating said pin;
(iii) a block formed with a bore for receiving said pin;
(iv) means for mounting said pin in said block;
(v) a support column arranged to be mounted on the loom;
(vi) a support block formed with two arm portions which extend therefrom and between which said first-mentioned block is mounted for pivotal movement in such a manner that said pin is movable between an operative position, wherein said pin is capable of separating fabric, and an inoperative position;
(vii) two screw axle means for mounting said first mentioned block for pivotal movement located on the same axis and arranged to engage oppositely disposed journalled surfaces of said first mentioned block, one screw axle extending from each arm portion of said support block;
(viii) means for adjustably mounting said support block on said support column;
(ix) resilient means arranged to urge said pin into its operative position;
(x) a control arm having a bearing surface adapted to engage in operation the sley of the loom; and
(xi) means for adjustably mounting said control arm in said first mentioned block whereby pivotal movement of said control arm by engagement of said bearing surface by the sley causes said pin to move between its operative and inoperative positions.

7. A device according to claim 6, wherein the control arm, when said pin is in its operative position, is arranged to extend substantially parallel to the fabric, the bearing surface of said arm being formed by a downwardly extending end portion of said arm which is adapted to co-operate with a ramp portion of the sley.

8. A device according to claim 7 wherein the control arm comprises a generally U-shaped frame, the means for adjustably mounting said control arm in said member comprising two further bores formed in said pivotable block and arranged to receive the limbs of said U-shaped frame, there being screws co-operating with said

further bores for adjustably securing said limbs therein.

9. A device for controlling the operation of separating thermo-fusible fabrics and adapted to be mounted on a loom having a sley, said device comprising:

(i) a pin arranged to be heated;

(ii) a block formed with a bore for receiving said pin;

(iii) means for mounting said pin in said block;

(iv) a support column arranged to be mounted on the loom;

(v) a support block formed with two arm portions which extend therefrom;

(vi) means for mounting said first mentioned block between said arm portions of said support block for pivotal movement relative thereto in such a manner that said pin is movable between an operative position wherein said pin is capable of separating fabric, and an inoperative position;

(vii) means for adjustably mounting said support block on said support column;

(viii) a cover plate secured to said first mentioned block;

(ix) an electrical filament wound around said pin for the heating thereof, the pin being so mounted in said first mentioned block that an end portion of said pin extends into a cavity in said first mentioned block in such a manner as to be in permanent contact with an adjustable electrical terminal mounted on said cover plate;

(x) resilient means arranged to urge said pin into its operative position;

(xi) a control arm having a bearing surface adapted to engage in operation the sley of the loom; and

(xii) means for adjustably mounting said control arm in said first mentioned block whereby pivotal movement of said control arm by engagement of said bearing surface by the sley causes said pin to move between its operative and inoperative positions.

10. A device for controlling the operation of separating thermo-fusible fabrics and adapted to be mounted on a loom having a sley, said device comprising:

(i) a pin arranged to be heated;

(ii) means for heating said pin;

(iii) a block formed with a bore for receiving said pin;

(iv) means for mounting said pin in said block;

(v) a support column arranged to be mounted on the loom;

(vi) a support block formed with two arm portions which extend therefrom and between which said first mentioned block is mounted for pivotal movement in such a manner that said pin is movable between an operative position, wherein said pin is capable of separating fabric, and an inoperative position;

(vii) means for mounting said first mentioned block between said arm portions of said support block for pivotal movement relative thereto;

(viii) means for adjustably mounting said support block on said support column;

(ix) further support means secured to said support block;

(x) an electro-magnet adjustably mounted on said further support means for permitting automatic lifting of the pin when the loom stops;

(xi) a micro-switch also secured on said further support means and adapted for being operatively connected to warning means;

(xii) a trip rod operatively connected to said micro-switch and arranged to extend, in operation, into an aperture made in the fabric by the pin, said trip rod being further arranged down stream of the pin in the direction of travel of the fabric, the arrangement being such that if the trip rod is contacted by fabric which has not been separated by the pin, the trip rod actuates said micro-switch which in turn activates said warning means;

(xiii) resilient means arranged to urge said pin into its operative position;

(xiv) a control arm having a bearing surface adapted to engage in operation the sley of the loom; and

(xv) means for adjustably mounting said control arm in said first mentioned block whereby pivotal movement of said control arm by engagement of said bearing surface by the sley causes said pin to move between its operative and inoperative positions.

11. A device according to claim 10, wherein said further support means upon which the electro-magnet is mounted comprises a plate which is secured fast with the means for mounting the pivotable block, the electro-magnet having a core which is adapted to co-operate with a pivotally mounted plate, the resilient means arranged to urge said pin into its operative position comprising a coil spring which constantly urges said pivotally mounted plate into a lower position where it retains in position a further plate secured to the pivotable block supporting the pin, thus retaining the pin in its operative position, said further plate bearing permanently against the pivotally mounted plate under the action of a further coil spring interposed between the said further plate and a support tongue which is secured fast with the means for mounting the pivotable block.

12. A device according to claim 11, wherein there is further provided an adjustment screw screwed on the further plate, its head constituting an adjustable stop which, in the operative position of the pin, abuts the support tongue, the arrangement thereby providing for adjustment of the operative position of the pivotable block and pin.

13. A device according to claim 12 wherein the control arm, when said pin is in its operative position, is arranged to extend substantially at right angles thereto, the bearing surface of said arm being formed by a downwardly extending end portion of said arm which as adapted to co-operate with a ramp portion of the sley.

14. A device according to claim 13 wherein the control arm comprises a generally U-shaped frame, the means for adjustably mounting said control arm in said member comprising two further bores formed in said pivotable block and arranged to receive the limbs of said U-shaped frame, there being screws co-operating with said further bores for adjustably securing said limbs therein.

References Cited by the Examiner

UNITED STATES PATENTS

1,792,460	2/1931	Davis	139—291
1,835,556	12/1931	Brown	139—291
2,508,348	5/1950	Anderson	66—147
2,995,912	8/1961	Payne et al.	66—147

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