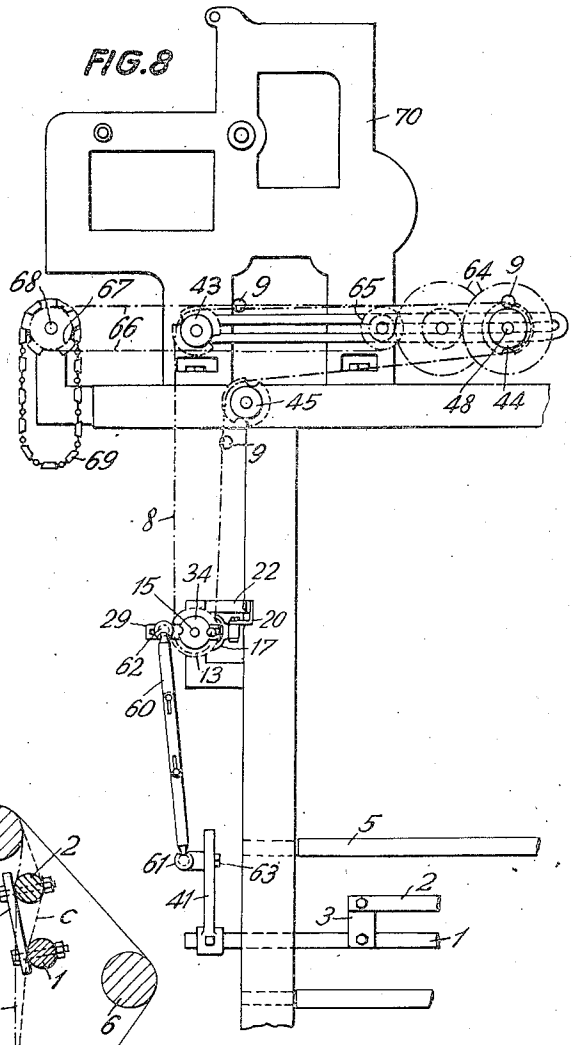
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VARIABLE WARP TENSIONING MEANS

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FIG.8



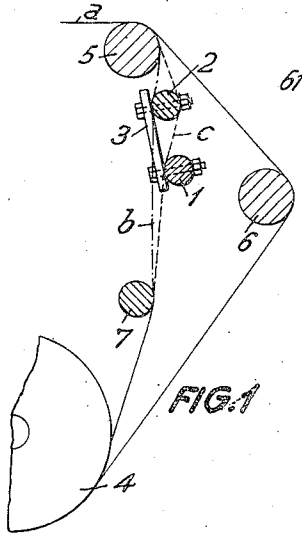


FIG.1

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FIG. 6

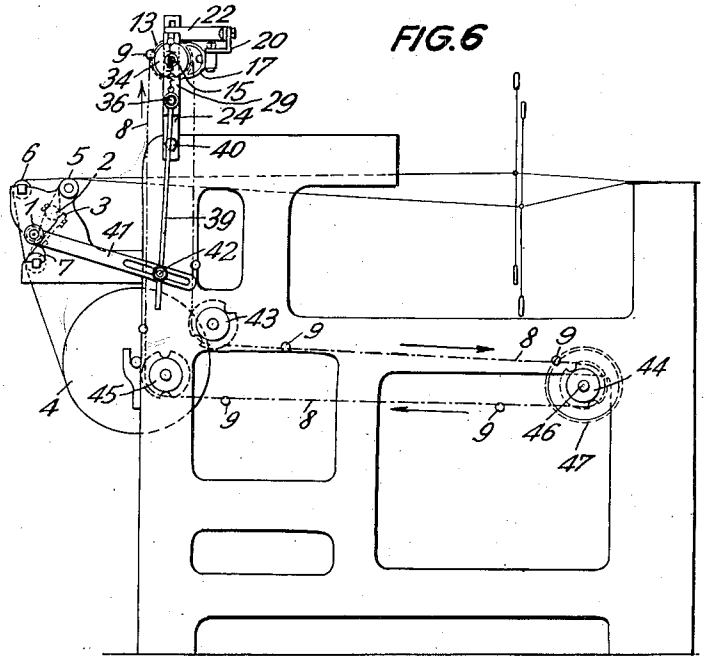


FIG. 2

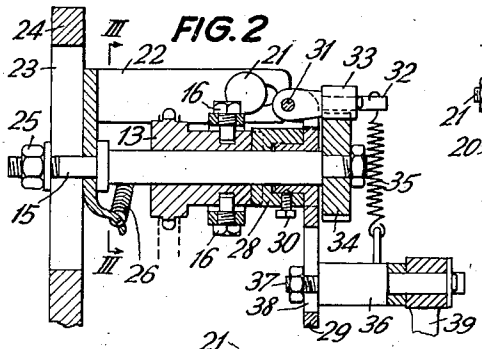


FIG. 3

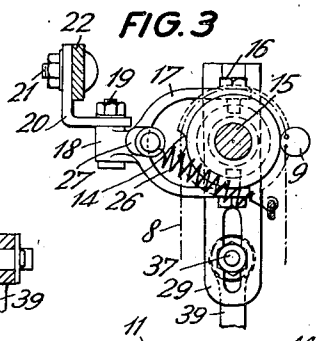


FIG. 4

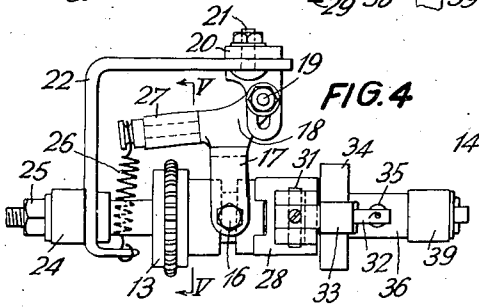
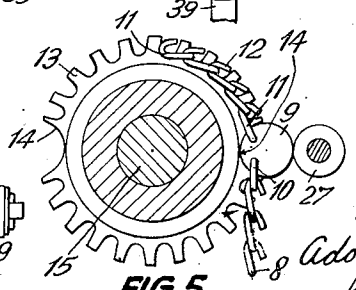


FIG. 5



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FIG. 7

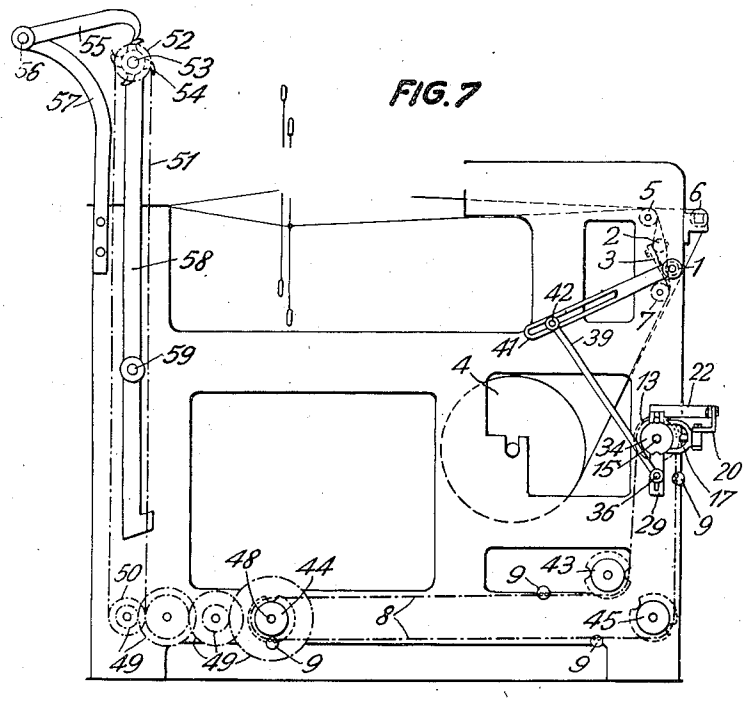


FIG. 9

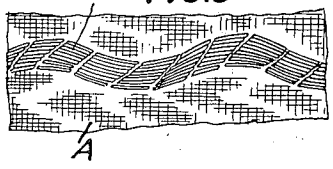
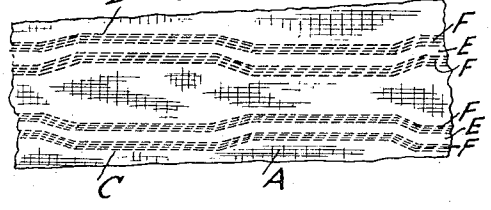


FIG. 10



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Patented Feb. 1, 1949 2,460,512

UNITED STATES PATENT OFFICE

2,460,512

VARIABLE WARP TENSIONING MEANS

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Application June 29, 1945, Serial No. 602,205
In Switzerland June 26, 1944

2 Claims. (Cl. 139—24)

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The invention relates to an arrangement for use on looms for producing woven effects by conducting threads separated out from the warp over an oscillatory member operated during the weaving, so as to subject the separated threads to an alternating tension and so that effects corresponding thereto will be produced in the fabric, the appropriate selection of threads deflected out of the normal web of the remaining warp serving to effect a more or less pronounced wavy form of the weft wherein the wavy portions may be of uniform or non-uniform configuration. The oscillatory member is preferably disposed between the upper warp beam that carries all of the warp threads and a lower beam which serves solely for guiding the threads deflected out of the warp, said threads passing separately from the warp beam to the upper warp beam, so that operative conditions suitable for producing woven effects can remain unchanged from full to empty beam, an advantage accruing from the arrangement being that the weaving zone remains unencumbered by the supplementary means used, and another advantage being that the supplementary arrangement can be applied without difficulty to already existing modern looms, for example, those provided with automatic warp thread stop devices.

In the arrangement according to the invention, the operation of the oscillatory member is effected by a shifting, endless operating means which is positively connected in operative relation with another operating member that serves to control the weaving operation.

The chief advantage is that when a suitably long, endless operating means is used, it makes for appreciably increasing the number of patterns that can be produced, in contrast, for example, to the use of a ratchet and pawl arrangement. Due to the positive operative connection of the shifting, endless operating means with another operating arrangement that controls the weaving operation, any adjustment of said second operating arrangement will also simultaneously adjust the shifting endless operating means so that the latter will remain adjusted for the particular operation under progress in the loom. The shifting endless operating means, for example, a chain, is preferably provided with removable stop members for controlling the operation of the oscillatory member so that by changing the number of stop members it is possible to control the operation of the oscillatory member accordingly, that is, to vary the same.

An embodiment of the invention is shown in

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the drawing, partly in diagrammatic form.

Fig. 1 serves to explain the weaving procedure in its fundamental aspects and shows the parts necessary for the purpose, in vertical section;

Fig. 2 is an axial section of the operating device, provided with the operating chain and intended for operating the oscillatory member;

Fig. 3 is a vertical section on line III—III of Fig. 2;

Fig. 4 is a top view corresponding to Fig. 2;

Fig. 5 shows, on enlarged scale, a partial section along line V—V of Fig. 4 but considered as turned about at right angles to the latter figure;

Figs. 6, 7 and 8 each depict a different exemplification of the combination of the control device with a loom, and

Figs. 9 and 10 serve for explaining two different samples of goods having been effected by the method according to the present invention.

In Fig. 1, the numeral 1 designates a shaft which is mounted at both ends in bearings that are stationarily arranged on the frame of the loom. A round rod or rail 2 extends parallel with the shaft 1 at a certain distance apart from this shaft and has its ends fixed to the shaft 1 by means of connecting arms 3 (see also Fig. 8). By rocking the shaft 1 back and forth about its axis the round rod 2 is correspondingly swung about said axis, thereby to act as a rocking rod. The warp beam is designated by 4, the usual back rest or rail by 5, an additional back rest or rail by 6 and a thread guiding roll which is situated near to the warp beam by 7.

From the warp *a* thread groups *b* are divided or leased off as indicated in chain dotted lines in Fig. 1, said thread groups passing away from the warp beam 4 across the roll 7 to the rocking rod 2 and the back rest 5. On the oposite side of the rocking rod 2 thread groups *c* which also had been leased off the warp *a* bear against said rod, as indicated in chain-dotted lines in Fig. 1, said thread groups passing away from the warp beam 4 across the roll 7, the rocking bar 2, and the back rest 5. The thread groups *b* and *c* are, therefore, diverted from the normal course of the warp threads *a* in different ways between the warp beam 4 and the weaving position, the warp threads passing away from the warp beam 4 across the additional back rest 6 and the usual back rest 5, as indicated in Fig. 1.

The rocking movement of the rocker bar 2 is initiated by the endless control chain 8 which is provided for this purpose with a limited number of stops 9 which are in the form of round discs

and constitute links of the control chain 8 at the same time. Each stop 9 has two cross bores extending therethrough one of which receives the turned over ends of the arms of a stirrup 10 and the other receives the yoke of one of the normal links 11 of the control chain 8. The chain links 11 also have the form of stirrups but the ends 12 of the arms of these stirrups are bent up in such fashion that the links can be loosely hooked to each other. A chain link 11 of this kind is hooked to the stirrup 10 mentioned above which as well as the stop 9 replaces a normal chain link 11.

As will be seen from Fig. 5, the control chain 8, of which in this figure only a short piece is shown, passes round a chain wheel 13 which is provided at two diametrically opposed circumferential points with concave recesses 14 which serve the purpose of receiving individual stops 9 of the control chain 8. The chain wheel 13 is loosely mounted on a fixed axle 15. Into a circumferential groove in the chain wheel 13 project two relatively opposed clutch shifting studs 16 (Figs. 2, 3 and 4) which constitute clutch shifting members and are held by the two arms of a fork 17 which are connected to a swivelling member 18. This member 18 is carried by means of a bolt 19 by a leg of a connecting angle 20, the other leg of which is secured to an angular holder 22 by means of a connecting screw 21. The bolt 19 and the connecting screw 21 are each adjustably arranged in a separate slot in the angle 20 and the holder 22 respectively.

As shown in Fig. 2, the holder 22 receives by means of a depending arm the axle 15 carrying the chain wheel 13. This axle projects through a slot 23 in a support 24. A screw connection 25 serves for adjusting the axle 15 in said slot 23 as to height. The depending arm of the holder 22 engages with a tension spring 26 which is connected with a side arm on the swivelling member 18 (Fig. 3). This member carries a roller 27 which serves for cooperating with the stops 9 on the control chain 8. The tension spring 26 tends to maintain coupling engagement by means of a clutch element which is provided at one end of the hub of chain wheel 13 (Fig. 4) and a mating clutch element 28 which is mounted on the hub of a control lever 29 and is secured against displacement relative to said lever by means of a screw 30 (Fig. 2).

The clutch element 28 is provided on the engaging end thereof with a cross groove in which the control lever 29 which is rotatably mounted on the axle 15 of the chain wheel is arranged and is consequently connected for rotation together with the clutch element 28. In a forked end portion of the control lever 29 is mounted by means of a cross pin 31 an auxiliary lever 32 which carries a roller 33 and serves for cooperation with a locking disc 34 which is fastened to the axle 15 of the chain wheel. To this end the locking disc 34 is provided on its circumference with two diametrically opposed rounded kerfs which are adapted to receive the roller 33, when the control lever 29 is correspondingly positioned, so as to have a locking effect on the rocker when at rest.

The auxiliary lever 32 is maintained in engagement with the circumference of the locking disc 34 by means of a tension spring 35. The spring 35 is connected with a bolt 36 which is adjustable along the length of a longitudinal slot 38 in the control lever 29 by means of a screw connection 37. As shown in Fig. 2, a reduced portion which is provided on the projecting end of the bolt 36 serves as a support for a connecting rod 39.

The described control device is secured to the top of the side shield of the weaving loom by means of the support 24 and a screw 40, as shown in Fig. 6. The connecting rod 39 is connected with an arm 41 which is fastened to the shaft 1 carrying the rocker bar 2, and by means of a screw connection 42 the rod 39 is adjustable along a longitudinal slot in the arm 41. The endless control chain 8 in addition to passing round the precedingly mentioned chain wheel 13 passes also over chain wheels 43, 44 and 45 (Fig. 6) each of which is likewise provided with two circumferential recesses which serve for receiving stops 9 provided on the control chain 8. The chain wheels 43 to 45 are arranged on the loom frame, the chain wheel 44 being specifically mounted on the driving shaft 46 of the weft supply means of the loom.

The loom is assumed to be a single weft binding loom including an eccentric appurtenance and a shaft motion. In the operation of the loom the driving chain 8 which is actuated from the driving shaft 46 by means of the chain wheel 44 runs continually uniformly in the direction as indicated by arrows. In the condition of the control device as shown in Figs. 2 to 4 the clutch element 28 and consequently also the control lever 29 is rotated by means of the chain wheel which is being actuated by the chain 8. By action of the control lever 29 the arm 41 is accordingly moved by means of the connecting rod 39 and this movement is transmitted to the rocker bar 2 via the shaft 1 so that the warp thread groups being passed over said bar are correspondingly influenced.

As soon as a stop 9 on the control chain 8 then passes round the chain wheel 13 this stop begins to cooperate with the roller 27 being carried by the swivelling member 18, whereby such a pivotal displacement of the swivelling member 18 against the effort of the tension spring 26 takes place that the chain wheel 13 is disconnected from engagement with the clutch element 28 by means of the shifting studs 16. At this time the control lever 29 is in a position in which the auxiliary lever 32 carried thereby has been moved into engagement with a kerf in the locking disc 34 by means of the roller 33 associated with said auxiliary lever. By this means the control lever 29 remains locked in position for the time being.

The chain wheel 13 then keeps on rotating for half a turn free from engagement with the clutch element 28 until, due to corresponding axial displacement of the chain wheel 13 by action of the spring loaded swivelling member 18, the dogs on the chain wheel 13 enter between the dogs on the clutch element 28. Thereupon the clutch element 28 is turned along with the chain wheel 13 again and the control lever 29 is further pivotally displaced until by means of another stop 9 on the control chain 8 the chain wheel 13 is disconnected anew in the above-described manner.

If in the control chain 8 two or more stops 9 follow each other only at a distance apart equalling that between two consecutive circumferential recesses 14 in the control chain wheel 13 the result is obtained that the chain wheel 13, after having been disconnected by means of a stop 9 from the clutch element 28, remains disconnected on having continued to rotate through half a turn, for the reason that another stop 9 on the control chain 8 then influences, that is, retains the swivelling member 18 in a correspondingly pivotally displaced position.

Therefore, by accordingly choosing the rela-

tive distances between successive stops 9 as well as varying the length of the control chain 8 more or less, one is enabled to determine the alternate connecting and disconnecting of the chain wheel 13 and the corresponding movements of the rocker bar 2 at variable periods apart, as desired. After the chain wheel 13 is disconnected the rocker bar 2 is kept from moving. The duration of inoperation of the rocker bar 2 depends upon the relative arrangement of the stops 9 on the control chain 8 so that the time of inoperation can be selected to be shorter or longer dependent upon the patterning effect to be obtained in the weave. By this means more or less pronounced patterns can be effected, as required.

If for any purpose of manufacture, for example, if weft thread breakage arises or if faulty weaving must be eliminated from the weave so that the person attending to the loom must turn the handwheel 47, which is arranged on the driving shaft 46 (Fig. 6), for readjusting the weft supply control means, the control chain 8 is adjusted in the same direction and in a proportional amount. By this means the relative adjustment of the chain wheel 13 and of those parts, the movement of which depends on said wheel, to the driving shaft 46 and thus to the weft supply control means is maintained. The readjustment of the weft supply control means thus has the effect that without any further provisions the rocker bar 2 is correspondingly adjusted with the result that the adjustment of this bar to the picking of the weft remains unchanged.

In Fig. 7 the control device being influenced by the control chain 8 is shown to be situated within the embrace, that is, immediately laterally of the side shield of the loom illustrated, which operates by means of several shuttles, that is, by changing of color, and thus represents a multiple box loom. Accordingly, the chain wheel 44 of the control chain 8 is mounted on a shaft 48 which is positively operatively connected with a chain wheel 50 by means of a train of interchangeable spur gears 49. Round the chain wheel 50 passes an endless chain 51 which further passes round a chain wheel 52 which is fixed to a shaft 53 which further carries a ratchet wheel 54 which is secured to said shaft and cooperates with a pawl 55 which is rotatably mounted on a bolt 56 being fastened on a stationary support 57. The shaft 53 constitutes the so-called shuttle changing cylinder, that is, the color changing cylinder and is arranged on a rockable lever 58, in conventional manner, and rotatably mounted by means of a bolt 59 on the loom side shield illustrated and actuated by a cam drive (not shown).

The shaft 53 is advanced by one tooth division in time with each rocking movement of the rocking lever 58, thereby to rotate by a quarter of a turn for accordingly advancing the pattern chain which controls the shuttle changing, that is, the color changing of the weft thread. Commensurate with the advancing of the shaft 53 the feeding, that is, the movement of the control chain 8 and thus that of the control device of the rocker bar 2 is positively effected via the chain 51 and the train of gears 49.

On the shaft 53 is fixed a handwheel (not shown) which serves for appropriately adjusting the shaft 53 and thus the pattern card. In adjusting the shaft 53 the control chain 8 is positively adjusted at the same time as to direction as well as proportionately to this adjusting movement. By interchanging of gears in the gear train 49 the speed of movement of the control chain 8 is varied together with that of the rocker bar 2 by which means the patterning of the weave is accordingly effected.

In Fig. 8 the arm 41 being fastened to the shaft 1 is connected to the control lever 29 by means of a connecting rod 60. This connecting rod 60 is adjustable as to length and terminates at both of its ends in spherical heads for engagement with spherical sockets 61 and 62 respectively, the former being adjustable by means of a screw connection 63 in the longitudinal slot in the arm 41 and the latter in the longitudinal slot in the control lever 29 by means of a screw connection also. Positively operatively connected with the shaft 48 carrying the chain wheel 44 for the control chain 8 is a chain wheel 65 by means of a train of interchangeable gears 64.

Round this chain wheel 65 passes an endless chain 66 which further passes round a chain wheel 67 which is firmly mounted on a shaft 68. This shaft 68 is constructed in a manner similar to the build of a card cylinder round which passes an endless patterning card 69 in a manner similar to that of a patterning strip. The loom is assumed to be provided with a dobby 70 to which is correlated the abovesaid card cylinder with which is connected the control contrivance for the shuttle changing means, that is, the color changing means. The card cylinder can be adjusted by the person attending to the loom by means of a hand-wheel which is carried by the shaft 68 (not shown). At the same time the control contrivance for the shuttle changing means, that is, the color changing means as well as the control device for the shaft 1, that is, the rocker bar are positively adjusted to the required extent by the relevant provisions as made. Consequently the card cylinders, the control device for the weft changing means and that for the rocker bar 2 remain properly coordinated with each other for joint operation.

Instead of a single rocker for thread groups having been diverted from the normal path of travel several rockers may be employed. In certain circumstances the control chain 8 may be replaced by any suitable endless traveling control member.

The woven piece shown in Fig. 9 is provided with a one-colored, for example, a green ground A which is provided by influence of the abovesaid rocker bar with wavy weft threads as well as with a strip B of a different, for example, a grey color which has the form of a uniform wave line. Obviously a greater or lesser number of such strips B may be provided in the woven piece, which may be uniformly or non-uniformly spaced apart and may extend parallel or be staggered relative to each other in regard to the wave elevations and the depressions between waves.

The woven piece shown in Fig. 10 displays, on a one-colored, for example, a red ground A which contains wavily entered weft threads, partly-colored strips C and D which are each provided with a median part E that may, for example, be formed of brown threads and bordered on both of its sides with a marginal portion which is, for example, formed of grey threads. The two strips C and D are provided with occasional straight portions and follow such a course that the straight portions of the two strips alternately approach on the recede from each other. This

striped constellation may be repeated in the woven piece in the manner of a repeat of pattern.

I claim:

1. A control arrangement for looms for producing woven effects comprising, an oscillatory member over which threads deflected out of the warp are conducted, a chain provided with abutment stops constituting members of the chain and serving for controlling the oscillatory member, said chain being in operative relation with another operating device which controls the weaving operation, and a clutch for controlling the movement of the oscillatory member, one part of said clutch being formed as a sprocket wheel over which the chain passes.

2. An arrangement on looms for producing woven effects, said looms having a back rest over which the warp threads pass and a guiding roll over which a divided out part of the warp threads pass, an oscillating rail over which the divided out warp threads pass, an endless travelling chain having stop members connected thereto, a clutch having two engaging parts, one of which parts is controlled by said stop members to disengage the clutch for controlling the movement of said oscillating rail, a further

operating arrangement for controlling the weaving, said oscillating rail operating means and the other operating arrangement being positively connected in movement imparting relation.

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