Fig. 3

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JACQUARD MACHINE WITH AN OPEN SHEED CARRYING HOOK NEEDLES, PROVIDING A DOUBLE POSITIVE ACTION

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3 Claims. (Cl. 199—63)

The increase in the speed of modern looms makes it more and more necessary to incorporate Jacquard machines of the open shed type, which spare to the utmost both the harness and the warp threads in spite of the high speed of operation.

Such machines have been in existence for a long time, but their intricate structure limits their use. Various simpler structures have already been proposed.

The first embodiment with a front pattern cylinder carrying the cards for the odd picks and a rear cylinder carrying the cards for the even picks, which cylinders act alternately on the opposite ends of the needles, have led the way to machines with a single cylinder so that it was possible to resort without any modification to the extant card systems provided for ordinary mechanisms.

However, these improvements led to an intricate structure for the single selecting means since it was necessary for the hook needles or needle heads controlling the double hooks with two noses to be provided with springs and to be associated with a movable needle box or else it was necessary for the main needles to control two simple hooks of which the action was controlled in unison by a pulley block system for a given group of harness cords.

My invention has for its object improvements in the means for selecting the needles, which permits eliminating the control of the needles by springs and pulley block arrangements.

According to the invention, the needles are actuated by double positive action, the main needles forming with the support needle action a single member long enough to be subjected, without any permanent deformation, to a slight bending bending under the action of the vertical needle, controlled by the card, a part of the needle being bent at a right angle so that the needle is pushed in the horizontal direction by one series of vertical bars and drawn back by another series.

Furthermore, according to the invention, the double elastic hook provided with two operative arms includes two upper noses facing each other, which may lie in their inoperative position outside the path of the knives, each of said arms of the hook carrying at its lower end an auxiliary nose directed outwardly and adapted to engage arresting bars and to hold in their raised inoperative position the hooks which are not to recede onto the bottom board during the following stage.

A further feature of the invention consists in deflecting members secured to the upper part of the machine and adapted to urge into the upwardly directed path of the knives the free noses of those hooks of which the lower nose has engaged a lower arresting bar and to release the said lower nose with reference to the arresting bar whereby to allow the hook in question to recede.

Further features of my invention will appear from the following description, reference being made to the accompanying drawings illustrating diagrammatically the operation of the arrangement, in which:

FIG. 1 represents the respective positions of the different members of the machine at the beginning of the first stage of a complete cycle; and

FIG. 2 represents the positions of said members during one-half revolution of the machine; and

FIG. 3 represents the positions of the members at the beginning of the second stage of a complete cycle.

As shown in the drawings, the main needles A are unitary and are sufficiently long that they may be subjected, without any permanent deformation, to a slight bending in a vertical direction under the conventional action of a vertical needle G. Each of their front sections, as shown at D, terminates in a short right-angle bend.

A double series of bars is provided; in other words, it includes two vertical series P and T which are spaced apart by a gap. The needle bends D extend in their inoperative or starting position (FIG. 2) medially of said gap. Said two series of bars P and T execute in unison a horizontal reciprocation as seen at P1 and T2. The over-all cycle of movement of the loom is the same as in other types of Jacquard machines with an open shed.

At the beginning of the first stage and after action of the wire pins or needles G on the needles A in accordance with the distribution of the perforations forming a pattern on the surface of the cylinder Z (FIG. 1), the main needles A1 and A3 have their bends D unshifted so that said bends lie in the path of the bars of the series P of bars. Said bars moving then towards the right hand side, that is towards the rear of the machine in the direction of the arrow P1 (FIG. 1) urge rearwardly all the main needles assuming the same position as A1 and A3 so that at the end of the stroke (FIG. 1) the front arms of the hooks with which they are rigid are urged back into their extreme rear position. The needles such as A3 and A4 of which the bend has been raised cannot be operated by the bars of the series P so that they remain stationary together with their hooks.

After one revolution of the loom, that is after one half revolution of the Jacquard machine, the second stage of the cycle begins. During said second half-revolution and as soon as the knives M1 and M2 (FIG. 1) have ensured through their movement their engagement with the two corresponding noses carried by the desire heads, the double series of bars has returned to its starting position illustrated in FIG. 2 and the knives M1 and M2 continue moving and reverse their relative positions. Then and shortly after the beginning of said second stage, the double series of bars moves forward, that is in the direction of the arrow T2 of FIG. 3 while the bends of the main needles such as A1 and A4 which have not been raised by their vertical needles because they lie in front of perforations in the second patterned surface of the Jacquard cylinder which has been brought into operation upon rotation by one angular shifting through 60° of the cylinder Z, are drawn towards the left and their rear heads carry along the rear arms of their hooks. After the shifting of the knives M1 and M2 in the direction of the arrows illustrated in FIG. 3 has ensured the engagement of the desired hook noses such as C4, the double series of bars returns to its original position (FIG. 2) while the cylinder as it rotates through one further angle of 60° brings a third patterned surface into a horizontal position, so that the machine has returned to a position corresponding to the beginning of its first stage after it has executed one complete revolution.

As in all other types of Jacquard machines with an open shed, my improved machine includes two griffes or lifting bars constituted respectively by the system of odd-numbered knives M1 and by the even-numbered knives M2. During the operative stage described previously, the griffes carrying the knives M1 rise vertically
so as to occupy the position illustrated in FIG. 3, whereas
the griffe carrying the knives M 2 has descended to the
position illustrated also in FIG. 3. Subsequently during
the second stage, the griffe boxes execute the reverse
movement and return to the position illustrated in FIG.
As is well known in the art, the reciprocatory move-
ments of the two griffe boxes in opposite directions are
obtained by means of connecting rods, rocking levers
and a crank and, in certain cases, by means of cams the
outline of which is designed in accordance with the spe-
cial Jacquard machine required for a predetermined fabric
or loom, but in any event in timed sequence with the
loom cycle.
During their vertical reciprocatory movements in op-
opposite directions, the two griffe boxes have their knives
M 1 and M 2 lying at the same level (FIG. 5) twice dur-
ing each revolution of the machine. In other types of
machines with an open shed, the hooks receding with a
griffe box engaging one of their noses meet the other
noses in the path of the other rising griffe box. In order
to avoid any interengagement between such nose, which
would make said hooks rise untimely, special members
act on the desired arm of the hooks or more generally
the series of bars continues its action on the presser
nearly or else the needle box lying to the rear is movable
and shifts the needles in the desired direction so as to
prevent said interengagement between the hooks. In all
these cases, this leads to an intricate structure and, in the case
where one has to execute a compensating action through
the needles, this leads to a speedier wear of the needle
heads by the hook arms moving at maximum speed.
Now, the present invention eliminates this drawback
by resorting to a double hook or lifting wire of a novel
design having two operative arms. Its two upper noses
or catches are directed inwardly and towards each other,
while in their inoperative position as illustrated for C 2
(FIGS. 1 and 3), said noses lie outside the path of the
knives, the two arms of the hooks being shifted apart by
reason of their elasticity or selectively individually
moved toward each other by the oppositely acting de-
tents A' and A" on the main needles. Said spacing apart
is limited by stationary bars B. It will therefore be
readily understood that when the griffe boxes cross each
other as illustrated in FIG. 2, the nose of the hooks such
as C 4 which are not engaged by the knives move auto-
matically out of the path of the rising knives and away
against the bars B without any risk of wearing the heads
of the needles and without requiring the interference of
special members such as movable bars or the pro-
tected action of the pressure exerted by the main
needles.
Furthermore said hooks carry at their lower ends two
lower noses C' facing outwardly. These latter noses are
adapted to engage the inoperative bars R so as to hold
in their raised position the hooks which, during the fol-
owing stage of the cycle should be prevented from de-
sending onto the bottom board L (FIGS. 1 to 3).
Furthermore, in order to ensure during the following
stages the reengagement of the free noses of the hooks
which have remained raised during the preceding stage,
through the engagement of their lower noses by the in-
operative bars R, deflecting members V (FIGS. 1 to 3)
hold said free noses, on the path of the lifting knives
which move up, so that a slight raising of the hooks may
ensure thus a release of the lower nose C', with refer-
cence to the inoperative bars R. Accordingly, hooks such
as C 4 (FIG. 2) may fall, since they are not subjected
to any action of their needle, the two lower noses being
no longer engaged by the inoperative bars R.
It is thus apparent, in contradistinction with other types
of open shed machines, that the needles when urged for-
wardly or drawn back raise their hooks or else hold them
in a raised position whereas the needles which remain
stationary allow the hooks remaining in a raised pos-
tion to fall, or else hold in their lowered position over
the contact with the bottom board. It is also apparent that, al-
though the operation of the needles is reversed, a perfora-
tion in the pattern provides as in the usual machines a
raising of the hooks or the maintenance of said hooks
in a raised position, whereas a solid section of the de-
cign card operates in the opposite manner.
This particular feature of a reversed operation of the
selecting system has for its object the use of the above-
described hooks the chief feature of which consists in
that no special operation or member is required any
longer for the crossing of the griffe boxes (FIG. 2).
However, it is obvious that the double positive action
of the main needles, which simplifies considerably the
machines of the open shed type, may be applied to the
extent type of machines including double hooks with two
noses facing outwardly, which hooks are adapted to be
held in a raised position by any known means.
It is also possible to make the ends of the needle
bonds D extend upwardly and to arrange the bars of the
doing double series P and T in a manner such that the rais-
ing of the auxiliary vertical needles G by the solid sec-
tions of the pattern brings said bonds into registry with
the bars of either series so as to provide for advancing
or retracting the main needles.
With the hooks having inwardly facing noses and while
retaining the deflecting members V, it is also possible
to eliminate the lower noses and the lower bars, and to
ensure the holding of the hooks in a raised position by
means of a movable locking grid at the upper end of the
arrangement.
What I claim is:
1. In combination in a Jacquard machine of the open-
shed type:
(A) pattern delivery means;
(B) a plurality of vertical needles operated by said
pattern delivery means;
(C) a plurality of flexible, selectively reciprocating,
superimposed needles, each being in contact with
one of said vertical needles, each having a front and a
back end, said front end terminating in a right-
angle bend, said needles being adapted to bend
slightly in a vertical direction under the action of
a respective one of the said vertical needles;
(D) a plurality of lifting knives having a vertical path
of travel;
(E) a plurality of resilient, reciprocating, double-
armed hooks actuated by said knives, each of said
hooks terminating (1) in its upper part in a laterally
extending nose; (2) said noses facing one another
and in the inoperative position lying outside the path
of said knives; (3) each arm of said hooks having a
retaining nose at its lower end;
(F) a plurality of arresting bars for supporting said
hooks in a raised position by engaging said retain-
ing noses;
(G) a plurality of stationary bars for limiting the
spacing apart of said arms of said hooks;
(H) a plurality of fixed deflecting members for caus-
ing said hooks to engage said lifting knives only
when these meet therewith in their raised position;
(I) double reciprocatory drive means for said super-
imposed needles consisting of two horizontally re-
ciprocating rows of spaced bars one row serving
for pulling and the other for pushing said main
needles by engaging said right-angle bends thereof
in response to selection by said vertical needles.
2. Apparatus as claimed in claim 1, wherein said pat-
ttern delivery means consist of a perforated card.
3. Apparatus as claimed in claim 1, wherein said de-
fecting members have a generally triangular shape.

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