Jan. 21, 1941. A. PIVETZ 2,229,421

JACQUARD WEAVING MACHINE

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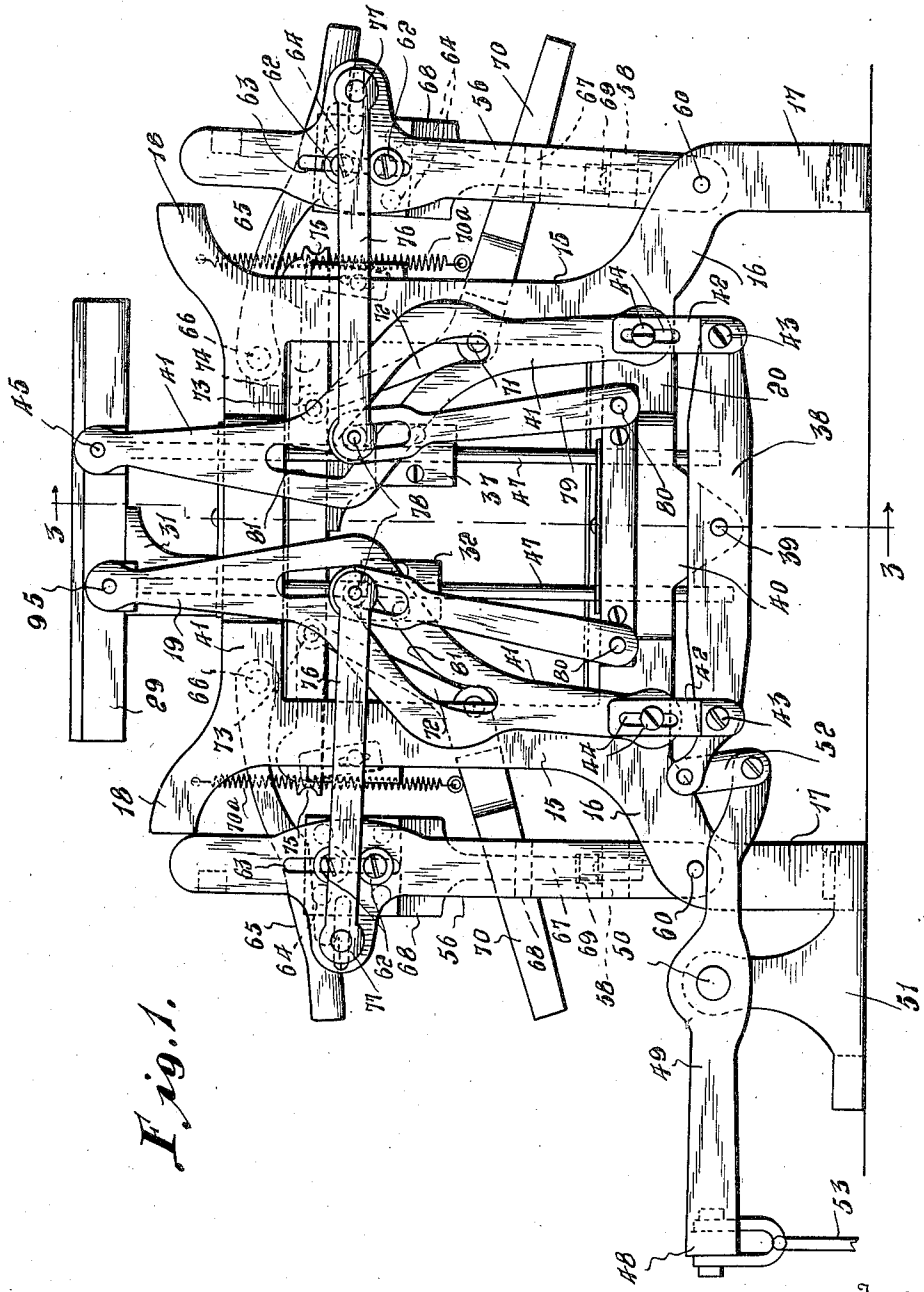


Fig. 1.

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Fig. 2.

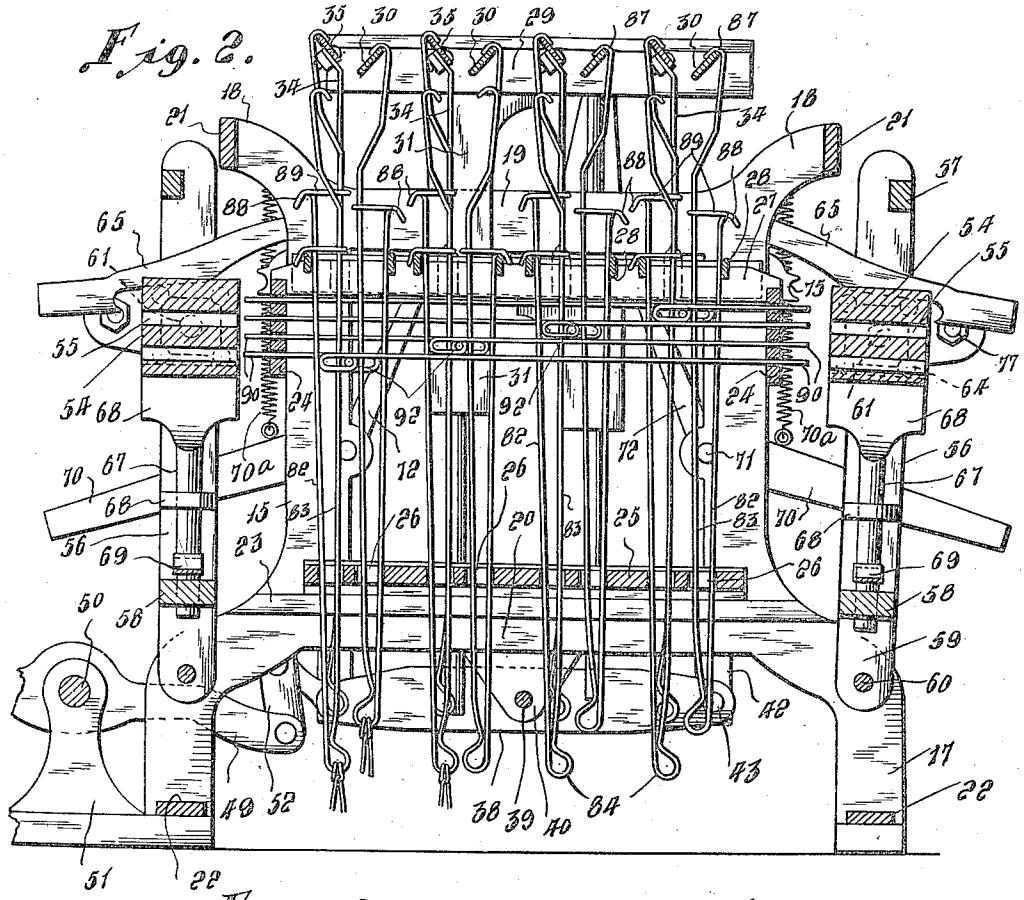


Fig. 9.

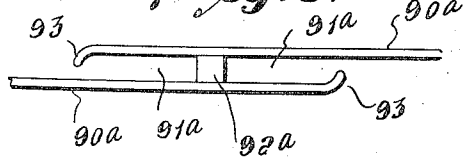


Fig. 8.

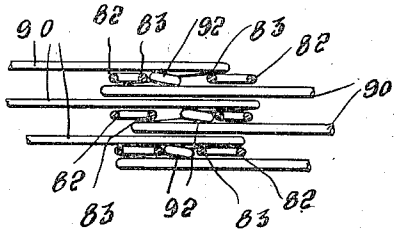
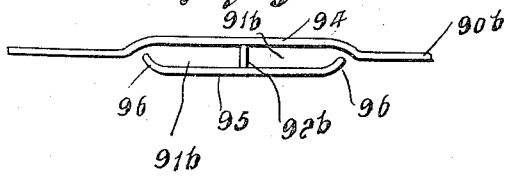


Fig. 10.



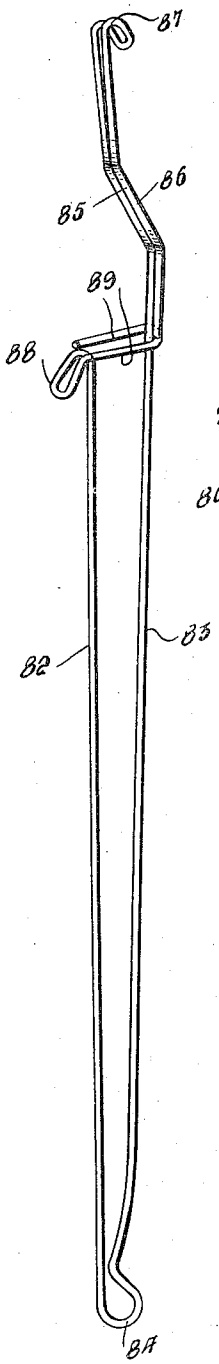
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Fig. 7.



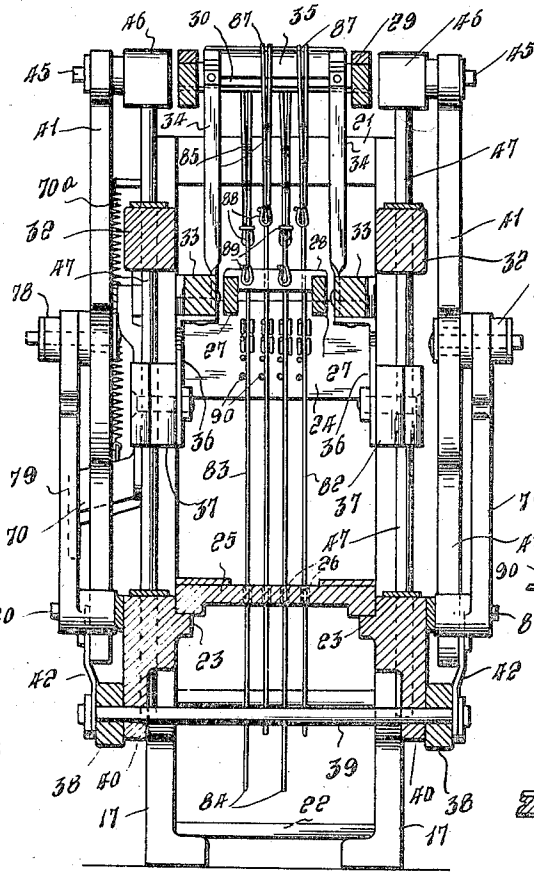
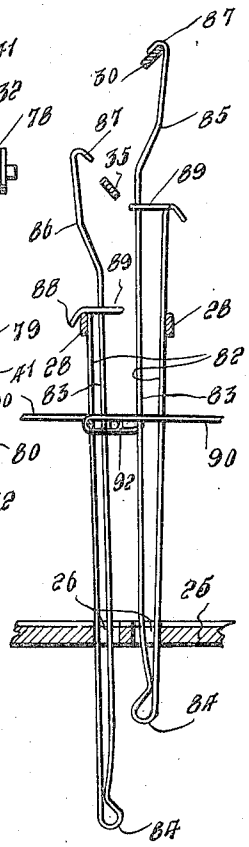


Fig. 3.

Fig. 4.



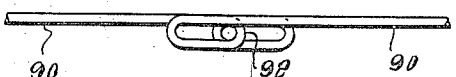


Fig. 5.

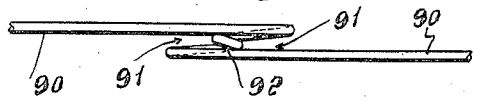


Fig. 6.

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JACQUARD WEAVING MACHINE

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Application December 5, 1939, Serial No. 307,700

9 Claims. (Cl. 139—59)

This invention relates to certain new and useful improvements in jacquard weaving machines and more particularly to jacquard mechanism used in connection with a double lift and double cylinder machine.

The primary object of the invention is to provide a jacquard weaving machine wherein the machine construction combined with the construction of the hooks and needles results in maximum elimination of friction, especially with reference to the cooperative actions of the hooks and needles and providing a smoother operating machine.

A further object of the invention is to provide a jacquard weaving machine wherein the usual needle springs and needle spring-boards which normally act upon the hooks will be eliminated, with the needles for the operation of the hooks being operative only during the period when the hooks are disengaged from the griff knives.

A further object of the invention is to provide an improved construction of hook for use in a jacquard machine wherein a laterally directed arm carried by the hook at a point well above the median line of the hook and in proximity of its upper end normally supports the hook on a grating in a pendulous manner, resulting in a minimum of vibration being imparted to the hook during the operation of the machine.

A still further object of the invention is to provide an improved type of needle wherein a single needle operates either of two hooks from either cylinder of a double lift, double cylinder machine.

With the above and other objects in view that will become apparent as the nature of the invention is better understood, the same consists in general of certain novel details of construction and combination of parts hereinafter more fully described, illustrated in the accompanying drawings and specifically claimed.

In the accompanying drawings:

Figure 1 is a side elevational view of a jacquard machine constructed in accordance with the present invention, with the vertical lift hooks and cooperating horizontal needles removed for more clearly illustrating the frame construction,

Figure 2 is a vertical longitudinal sectional view of the jacquard machine shown in Figure 1, with the hooks and needles therein and with the knife carrying portions of the two griff frames illustrated in substantially the same horizontal plane with some of the hooks disengaged from the knives and pendulously supported on the upper grating or bridge,

Figure 3 is a vertical cross sectional view taken on line 3—3 of Figure 1, showing similar devices at the opposite side of the machine frame for the operation of the vertically movable griff frames,

Figure 4 is a fragmentary sectional view showing the upper and lower stationary gratings with which the hooks are associated, one of the hooks being illustrated in a raised position while the other hook is supported on the bridge or upper grating with the upper knife engaging end thereof laterally displaced with respect to its supporting knife by the needle,

Figure 5 is a fragmentary side elevational view of a needle showing the construction between the ends thereof for the operation of two hooks,

Figure 6 is a fragmentary top plan view of the needle shown in Figure 5,

Figure 7 is a perspective view of the hook,

Figure 8 is a fragmentary horizontal sectional view showing three needles of the type illustrated in Figures 5 and 6 with two hooks associated with each needle for operation thereby, and

Figures 9 and 10 are fragmentary top plan views of two other forms of needle construction for dual operation of two hooks.

The jacquard machine comprises a frame structure of substantially rectangular formation having spaced side portions including vertical posts **15** carrying outwardly directed angularly extending lower end portions **16** that terminate in depending legs **17**. The upper ends of the posts **15** are angularly bent otuwardly and upwardly as at **18** and said posts **15** are connected together at their upper and lower ends by horizontal bars **19** and **20**, respectively. The upper ends of the post extensions **18** of the two side frame members are connected by cross bars **21**, while the lower ends of the legs **17** are connected by cross bars **22** for holding the frame structure in rectangular formation. The frame structure is braced by means of a rib **23** extending longitudinally of each loweer side bar **20** as shown in Figure 2.

The jacquard machine being of the double lift, double cylinder type, there is provided at each end of the frame adjacent the upper ends of the posts **15** a perforated or apertured guide plate **24** secured at its ends to the outer sides of the posts **15** adjacent the upper ends thereof and below the upper horizontal side bar **19** for guiding the horizontally shiftable needles. A lower grating **25** having slotted openings **26** therein is connected at opposite side edges thereof to the inner sides of the posts **15** above the reinforcing rib **23** as shown in Figure 2 and an upper

bridge or grating is supported on the apertured guide plates 24 and comprises a pair of side bars 27 having interfitting connections at their ends with the upper edges of the guide plates, with the side bars 27 carrying a series of spaced transversely extending strips or rods 28 for the pendulous support of the vertically movable hooks in a manner to be presently described.

A pair of griff frames with griff knives is provided for raising the hooks and the griff frames are alternately raised and lowered, one of the griff frames comprising a pair of side bars 29 connected by spaced transversely extending griff knives 30 arranged at inclinations as shown in Figure 2, and each side bar 29 carries transversely alined depending plates 31 at one side of the transverse median line of said griff frame with a block 32 secured to the outer side thereof for purposes presently to appear. The other griff frame, as shown in Figure 3, comprises a pair of side bars 33 from which pairs of transversely alined arms 34 rise for the support of transversely extending griff knives 35 at the upper ends thereof that are inclined at angles opposite the inclination of the griff knives 30 and are alternately arranged with respect to said griff knives 30. The side bars 33 carry transversely alined depending plates 36 at one side of the transverse median line of said side bars and opposite the plates 31 carried by the side bars 29 of the griff frame, each side plate 36 carrying at the outer side of the lower end thereof a bearing block 37 for purposes presently to appear.

Supporting and operating means are associated with the frame structure at each side thereof, said means being of identical construction and, as shown in Figure 1, includes a rocker arm 38 pivotally mounted intermediate its ends as at 39 on a bracket 40 depending from the lower side bar 20 of the frame with each end of the rocker arm 38 pivotally connected to the lower end of a lift arm 41 including a link 42 pivotally connected at its lower end as at 43 to the rocker arm 38 while the upper end of each link 42 has a pivotal pin and slot connection 44 with the lower end of the adjacent lift arm 41. The upper end of each lift arm 41 has a pivotal connection 45 with a laterally disposed block 46 arranged above the upper side bar 19 of the side frame and each block 46 is rigidly secured to the upper end of a guide rod 47 vertically reciprocable in vertically alined bars therefor in the upper and lower side bars 19 and 20 of the frame structure. The guide rods 47 respectively extend through the blocks 32 and 37 respectively carried by the plates 31 and 36 depending from the griff frames and are anchored to said blocks 32 and 37 to effect vertical reciprocatory movements of said griff frames, while corresponding movements are imparted to said lift arms 41 by the rocker arm 38.

The operating means for the rocker arm 38 at each side of the frame structure includes a U-shaped frame lever having a cross head 48 and side legs 49 pivoted intermediate their ends as at 50 upon standards 51. The frame lever is arranged at one end of the frame structure as shown in Figures 1 and 2 and the free ends of the side lugs 49 have link connections 52 with adjacent ends of the two rocker arms 38, the lever frame having a link or pitman rod 53 depending from the cross head 48 thereof for association with and operation by the cam shaft of the loom.

The jacquard machine being of the double-lift, double-cylinder type, there is provided a cylinder 54 at each end of the machine, the cylinders being of the usual construction, substantially rectangular in cross section and having on each side thereof a plurality of needle-receiving sockets 55 and the support for each cylinder includes a rectangular frame having vertical side bars 56 connected by upper and lower cross bars 57 and 58 respectively, the lower cross bar carrying a pair of spaced depending lugs 59 that are pivotally mounted at their lower ends upon a cross rod 60 mounted at its ends in the angular extensions 16 at the lower ends of the side posts 15 of the frame structure. Each cylinder 54 is journaled at its ends as at 61 in a plate disposed at the inner side of the side bars 56 of the cylinder-supporting frame and said plates are vertically adjustable by means of screws 62 carried thereby and extending through slotted openings 63 in the side bars 56 as shown in Figure 1. One end of each cylinder 56 is provided with relatively short corner ribs 64 shown by dotted lines in Figures 1 and 2 to be engaged by the latch lever 65 having its inner end pivotally mounted as at 66 on the outer side of the adjacent upper horizontal frame bar 19 of the frame to effect a step-by-step rotation of the cylinder 54 when the supporting frame therefor moves on its pivotal mounting 60 towards and away from the adjacent end of the frame structure. To hold the cylinder in position against accidental movements, there is provided a vertically moving plunger rod 67 guided in its movements by passage through an apertured lug 68 carried by the inner side of the adjacent side bar 56 of the cylinder-supporting frame, the upper end of the plunger rod 67 carrying a head 68 having an upper flat end for engagement with a flat side of the end of the cylinder 54. The plunger rod 67 is maintained in a normal upper position and engaged with the cylinder 54 by means of a leaf spring 69 anchored at one end to the cross bar 58 of the cylinder-supporting frame with the upper end of said leaf spring engaged in a side notch in the plunger rod 67 adjacent the lower end thereof. Should it be desired to reverse the position of the cylinder with respect to the needles to another design of card, there is provided a bell-crank lever and latch rod for each cylinder including a hand-operated lever arm 70 tensioned as at 70^a and pivoted as at 71 on the adjacent post 15 of the frame structure and carrying an angularly extending arm 72 to the free end of which there is pivotally connected as at 73 a horizontally disposed cylinder reversing arm 74 having a notched end 75 to engage a corner rib 64 and also to move into engagement with the latch arm 65 to elevate the same to an inoperative position for effecting a reverse rotation of the cylinder 54.

The operating devices for effecting pivotal movements of the rectangular frames that carry cylinders 54 comprise a substantially horizontally disposed link 76 for each cylinder supporting frame that is pivotally connected as at 77 to the adjacent side bar 56, while the inner end of each link 76 has an adjustable pin and slot connection 78 with the upper end of a lever arm 79 that is pivotally mounted at its lower end as at 80 upon the adjacent lower horizontal side bar 20 of the frame structure. The adjustable pivotal connection 78 between the link 76 and the lever arm 79 includes a bearing pin freely movable through a swan neck slot 81 formed in the adjacent lift arm 41, the lift arms 41 and slots 81 being of the

general formation shown more clearly in Figure 1 as to effect substantially horizontal reciprocatory movements of the links 76 for moving the cylinder supporting frames on their pivot rods 60 and carrying therewith the cylinders 54 in directions toward and away from the needle guide plates 24.

The improved construction of hook is of a character to reduce vibration thereof during operation of the jacquard machine and the construction and operation of the machine is such as to reduce frictional wear on the hooks, the hooks being shown in detail in Figures 4 and 7 and are formed of a single strand of resilient wire bent to provide a pair of relatively long leg portions 82 and 83 with a harness tie and loop 84 at the lower end thereof. The leg 83 extends above the upper end of the leg 82 and is bent upon itself as at 85 and 86 to form a reinforcing head portion that is angularly bent to the desired formation with a griff knife engaging hook member 87 at the upper terminal end thereof. The upper end of the leg portion 82 of the hook in proximity of the lower end of the wire section 86 is bent to provide a supporting hook 88 directed laterally of the upper end of the leg portion 82 that engages a cross arm 28 of the bridge or upper grating. The terminal end of the supporting hook 88 is bent to provide a loop 89 to which the upper end of the leg 83 is freely movable. As illustrated in Figures 4 and 7, the supporting hook 88 that is engageable with the upper grating is located considerably above the intermediate length of the hook so that the hook has a pendulous support on the upper grating with the major length thereof below said grating to reduce vibratory movements of the hook. When the hook is shifted by the needle associated therewith for disengaging the hook member 87 from a griff knife, the lower end of the head portion of the hook and the upper end of the leg 83 move through the loop 89 toward the supporting hook 88.

The needle for the operation of the hook is shown in detail in Figures 5, 6 and 8 and is formed of a wire having end leg portions 90 with an intermediate loop portion that disposes the end leg portions 90 in offset parallel planes as shown in Figure 5 providing a pair of alined pockets 91 with a separating abutment 92. As shown in Figure 4 two hooks are associated with each needle, the two legs 82 and 83 of one hook being received in one pocket 91 while a single leg of another hook is received in the other pocket 91. It will also be observed from an inspection of Figure 4 that the leg 83 of the hook is engaged by the abutment 92 of the needle to move said leg toward the hook leg 82 when the supporting hook 88 is engaged with the supporting arm 28 of the upper grating or bridge. The same intermediate abutment 92 of the needle is likewise engageable with the leg 83 of the other associated hook and the single abutment 92 for the operation of the two hooks is at the inner or adjacent ends of the two hook-receiving pockets 91. The foregoing operation is illustrated in Figure 8 with three needles and six hooks.

The hooks have the supporting hook members 88 thereof normally resting on the cross arms 28 of the upper grating, while the lower ends of the legs 82 and 83 of the hook extend downwardly through a slotted opening 26 in the lower grating 25, the latter restraining lateral movements of the hooks while the upper grating or bridge pendulously supports the hooks when they are disengaged from the knives of the griff frames. The bank of needles is horizontally mounted below the upper grating and extends through the openings in the guide plate 24 as shown in Figure 2 for cooperation with the card carrying cylinders 54. The devices are so proportioned and related as to effect disengagement of the hook members 87 from the griff knives only when the supporting hooks 88 are engaged with the cross arms 28 of the upper grating. A single connecting rod worked from the main crank-shaft of the loom operates as a vertical reciprocating motion for driving the lever frame that operates the rocker arm 38 and the latter effects operation of all of the moving parts of the jacquard machine. The rocker arm 38 operates the lift arms 41 which in turn operate the guide rods 47 that move the griff frames carrying the knives 30 and 35, respectively, in up and down movements. The vertical movements of the lift arms 41 move the links 76 for operation of the rectangular frames carrying the card cylinders 54. The shafts or rods 47 effect a smooth and even operation of the mechanism. There is no fulcrum action upon the hooks as they lift which results in the automatic elimination of any tendency to vibration. The needles do not engage the hooks when the latter are engaged with or being moved by the griff frame and the needles only engage the hooks when the latter are supported on the upper grating. Such an arrangement eliminates needle friction and wear. It has heretofore been the general practice to employ two spring boards and two banks of needles operating on successive picks of the loom when two cylinders are employed. With the present invention the spring boards are eliminated and a single needle in every instance operates two hooks from either cylinder, this method resulting in smoother operation of the machine.

It has heretofore been pointed out that the abutment shoulder 92 is disposed at the inner adjacent ends of the hook-receiving pockets 91 of each needle 90, said abutment being formed by the bending of the wire material of the needle and modifications of this needle structure embodying the same principle are illustrated in Figures 9 and 10. In Figure 9 the inner ends of the leg portions 90^a of the needle overlap each other in laterally spaced relation with the inner terminal ends of the legs 90^a bent inwardly as at 93 in a direction toward the opposite leg. The overlapped inner end of the legs 90^a are secured together in spaced relation by an intermediate block 92^a equi-distantly spaced from the bent ends 93 to provide hook leg-receiving pockets 91^a with the central or intermediate abutment block 92 operating on two hooks. In Figure 10 the needle 90^b has a laterally offset portion 94 intermediate the ends thereof and cooperating with said offset portion in opposed relation thereto there is provided a wire section 95 having bent ends 96 directed toward the offset portion 94, the wire 95 carrying an abutment block 92^b intermediate the ends thereof that is spot-welded or otherwise secured to the offset portion 94 intermediate the ends thereof to provide a pair of pockets 91^b for the respective reception of the legs of two hooks. In both forms of the invention, as shown in Figures 9 and 10, the intermediate abutment 92^a and 92^b operate in connection with two hooks.

While there are herein shown and described the preferred embodiments of the invention, it

is to be understood that minor changes may be made in the details of construction, such as will fall within the scope of the invention as claimed.

I claim:

1. A jacquard needle comprising a needle shank, two alined and adjacent hook pockets carried by the needle shank between the ends thereof and opening at their outer ends in the longitudinal direction of the needle shank and a hook engaging abutment between the pockets for effecting lateral motion of the hooks.

2. A jacquard needle comprising a needle shank, two alined and adjacent hook pockets carried by the needle shank between the ends thereof and opening at their outer ends in the longitudinal direction of the needle shank and a hook engaging abutment between the pockets for effecting lateral motion of the hooks, said needle shank being coiled to provide said pockets and said hook engaging abutment.

3. A jacquard needle comprising a needle shank, two adjacent hook pockets carried by the needle shank between the ends thereof and a hook engaging abutment between the pockets for effecting lateral motion of the hooks, said needle shank being formed of two sections overlapping at adjacent ends and said abutment including a block interposed between said overlapped end and secured thereto to provide said pockets and intermediate hook engaging abutment.

4. A jacquard needle comprising a needle shank, two adjacent hook pockets carried by the needle shank between the ends thereof and a hook engaging abutment between the pockets for effecting lateral motion of the hooks, said needle shank having an offset portion between its ends and a wire section having a lateral projection secured to and overlying the offset portion to provide said pockets and hook engaging abutment.

5. A jacquard hook comprising a resilient wire bent upon itself to provide a lower elongated spaced leg portion and an upper double relatively short head portion, the upper end of one lower leg terminating at the lower end of the head portion and formed with a loop through which the head portion and other leg are movable and a supporting hook for upper grating engagement carried by said loop.

6. A jacquard hook as set forth in claim 5, wherein the supporting hook is well above the transverse median line of the hook.

7. A jacquard needle comprising a needle shank, hook-operating means on the needle shank between the ends thereof, said means comprising a pocket extending lengthwise of the needle shank and open at opposite ends and a hook-engaging abutment intermediate the ends of the pocket for effecting lateral motion of a pair of hooks.

8. A jacquard hook comprising a resilient wire bent upon itself to provide a lower elongated leg having spaced leg portions, one of said leg portions having an upper extension bent upon itself in contacting relation to form a relatively short head portion, the upper end of the other leg being formed with a loop inclosing the longer leg and a supporting hook for upper grating engagement carried by the loop at the end thereof spaced from the longer leg portion.

9. A jacquard hook formed of resilient wire and having an elongated lower spaced leg portion and an upper relatively short double head portion, the upper end of the lower leg portion having a loop through which the head portion is movable and a supporting hook for upper grating engagement carried by the loop.

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