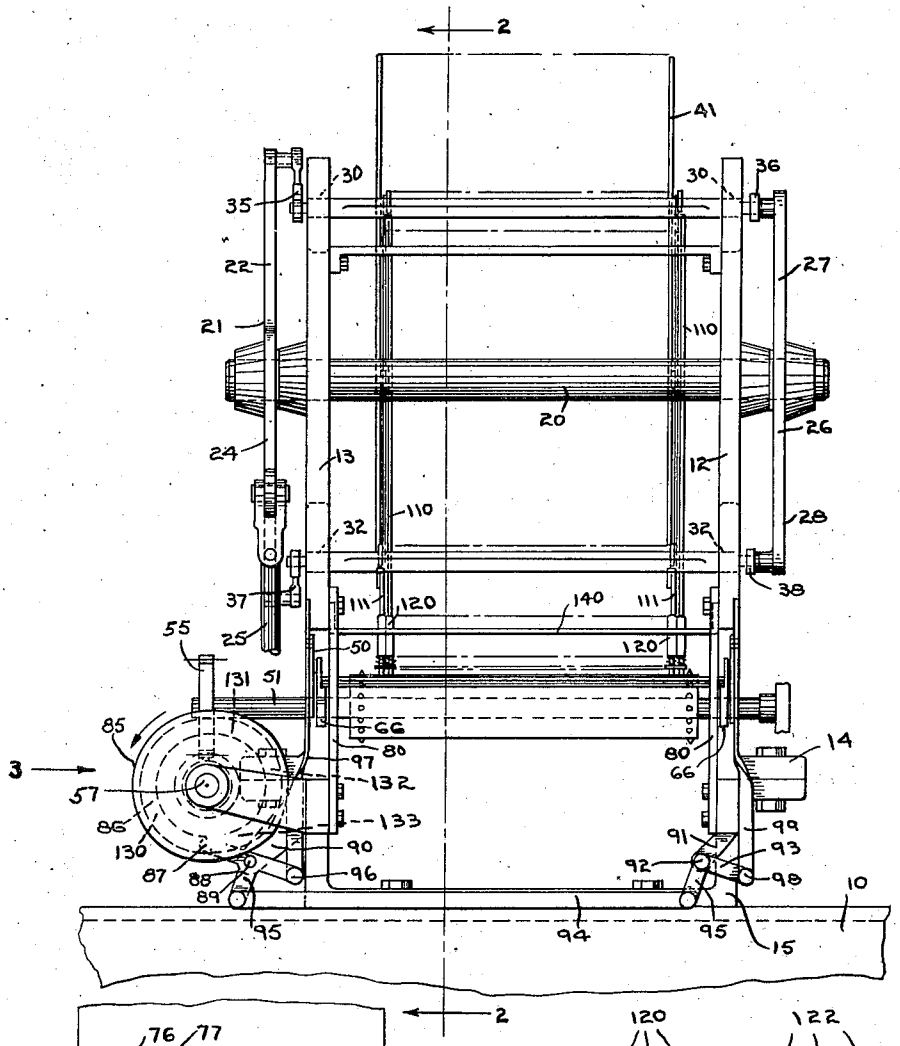
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PAPER INDICATED DOUBLE INDEX DOBBY FOR LOOM

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FIG. 1



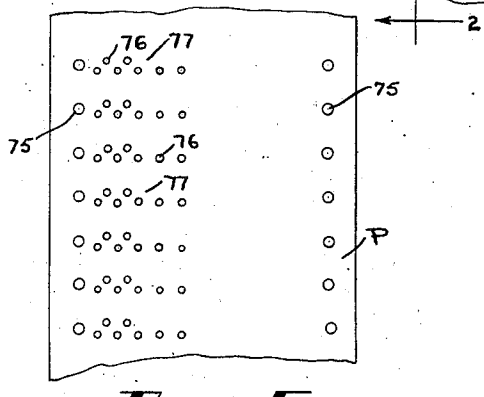


FIG. 6

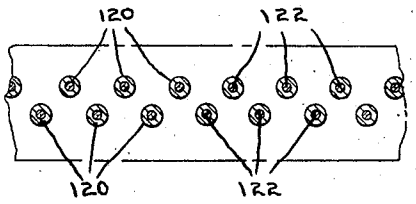


FIG. 5

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PAPER INDICATED DOUBLE INDEX DOBBY FOR LOOM

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FIG. 2

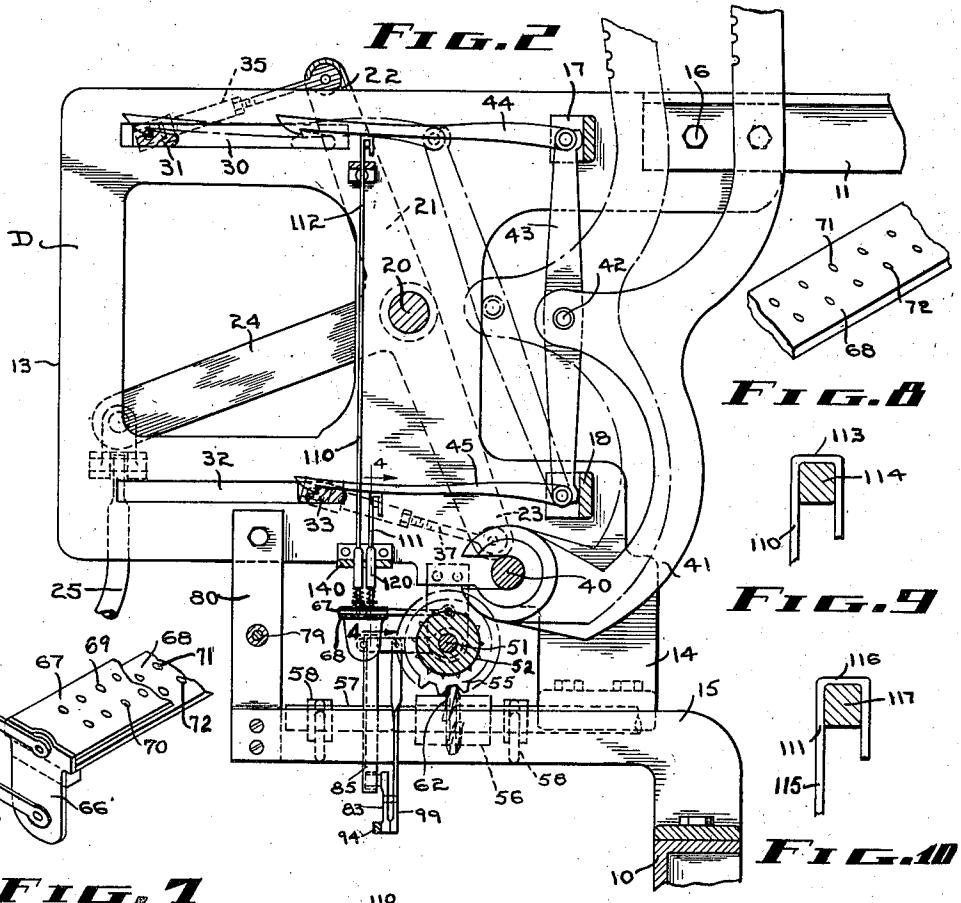


FIG. 8

FIG. 9

FIG. 10

FIG. 7

FIG. 3

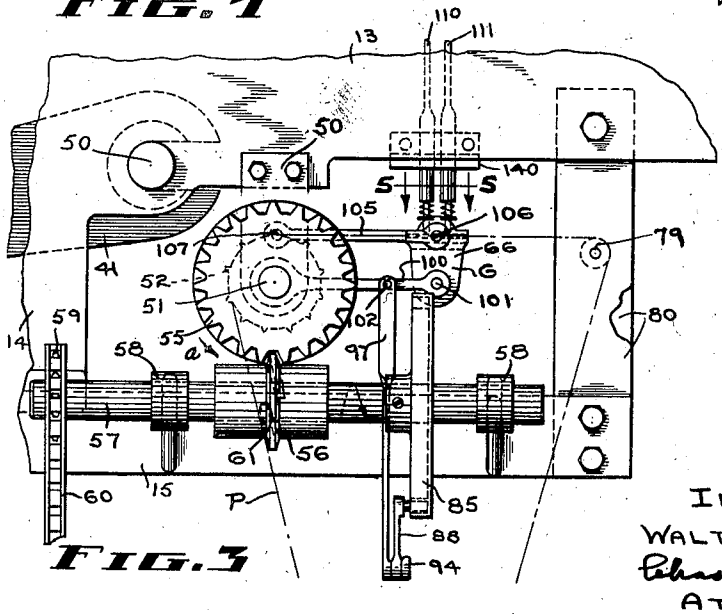
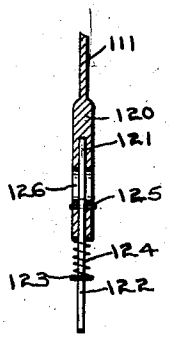


FIG. 4



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2,305,334

PAPER INDICATED DOUBLE INDEX DOBBY FOR LOOM

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Application February 2, 1942, Serial No. 429,198

11 Claims. (Cl. 139—68)

This invention relates to improvements in loom dobbies and it is the general object of the invention to provide a dobby so constructed that it can operate on the double index principle when indicated by a paper pattern.

It has been proposed heretofore to provide a dobby with a sheet paper pattern which is moved toward and from the dobby hooks for the purpose of indicating the latter with respect to the lifter knife. In such instances, however, the loom has operated on the so-called single index principle and the paper pattern has been moved every pick of the loom and therefore subjected to considerably more wear than exists in double index dobbies wherein the pattern is indicated only every second pick of the loom.

In the usual double index dobby the pattern moves on alternate picks and sets the hooks or hook lifters for two picks in each of its pattern reading positions. If a hook is down in engagement with its lifter knife on the first of these picks and is to be raised clear of the knife on the second pick, provision must be made for receiving the indication for the second pick while the hook is still engaged with the lifter knife on the first pick. In known paper pattern indicated dobbies in which the hooks descend to engage their lifter knives it has not been possible to indicate for the second pick of a pair of picks if a hook is engaged with a lifter knife on the first pick, due to the fact that the paper pattern would be punctured by the lifter wire of a hook engaged with its knife. It is for this reason that paper indicated dobbies of the type to which my invention more particularly relates have in the past been used on single index dobbies.

It is an important object of my present invention to provide the dobby with a sheet paper pattern which is moved every second pick of the loom and move the pattern toward lifter wires which include a yieldable element in their construction. The yieldable feature of the lifter wire prevents damage to the paper pattern when engaging a blank part of the latter, but is sufficiently strong to lift the hook to non-indicating position after release of its hook from the knife when the latter reaches the end of its return or non-working stroke.

It is another object of my present invention to provide advancing mechanism to feed the successive pattern zones to pattern reading position and then move the zones so placed toward the lifter wires while the feeding mechanism is stationary.

It is another object of my invention to provide a combined pattern reader and hook lifter unit in which the reading element is slidable along the lifter against spring action when a blank part of the pattern engages a unit the lifter part of which is unable to rise because its hook is still engaged with a lifter knife.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is an end view of a dobby made according to my present invention,

Fig. 2 is a vertical longitudinal section on line 2—2 of Fig. 1,

Fig. 3 is a detailed enlarged rear elevation taken in the direction of arrow 3, Fig. 1,

Fig. 4 is a vertical section through the lower part of one of the pattern reading and hook lifting units,

Fig. 5 is an enlarged horizontal section on line 5—5 of Fig. 3, showing the arrangement of the pattern lifting units,

Fig. 6 is a plan view of a portion of the sheet pattern,

Fig. 7 is a perspective view of one end of the pattern lifter,

Fig. 8 is a perspective view of a portion of one of the plates forming part of the pattern lifter, and

Figs. 9 and 10 are enlarged detail sections through the support girts for the long and short lifter units, respectively.

Referring particularly to Figs. 1 and 2, I have shown a loom frame 10 and arches 11 which afford support for the dobby D. The dobby has front and back side plates 12 and 13, respectively, the feet 14 of which rest on a support 15 mounted on the frame 10. The upper part of each side plate is secured as at 16 to the corresponding arch, and the plates may be held together by top and bottom cross girts 17 and 18.

Extending between and mounted for rocking movement on the side plates is a shaft 20 to the rear end of which is secured a lever 21 having upper and lower arms 22 and 23 and having also an intermediate arm 24 connected to a rod 25. The front end of shaft 20 has secured thereto a lever 26 having upper and lower arms 27 and 28, respectively, similar to but shorter than the arms 22 and 23. Each of the plates 12 and 13 is provided with a top slot 30 for an upper knife 31 and a bottom slot 32 for the lower knife 33. These knives extend between the plates and

slide in their respective slots. The rear end of the upper knife is attached by connector 35 to the upper end of arm 22 while the forward end of the upper knife is attached by connector 36 to arm 27. In similar manner the rear end of the lower knife is attached by connector 37 to the lower arm 23 while the forward end of the lower knife is attached by connector 38 to the arm 28.

The rod 25 operates on a two-pick cycle, rising on one pick to give the lower knife a working or outward stroke and falling on the next pick to give the upper knife a working stroke. Any approved form of driving mechanism not shown may be employed to actuate the rod 25, preferably though not necessarily from the bottom shaft of the loom.

Extending between the dobby sides is a bar 40 on which are pivoted a plurality of harness jack levers 41 the upper ends of which are formed for attachment to harness frame lifting mechanism not shown. Each jack 41 has pivoted thereto as at 42 a vertical jack lever 43 the upper and lower ends of which are pivoted, respectively, to top and bottom hooks 44 and 45. These hooks are adapted for actuation by the knives, and when any hook is disengaged from its knife the adjacent end of the corresponding jack lever will be held against one or the other of the top and bottom girts 17 or 18, respectively. The hooks are raised when they are to clear their knives, and are left lowered when they are to be actuated by their knives.

The matter thus far described is of common construction in double index dobbies and of itself forms no part of my present invention.

In order that the hooks 44 and 45 may be selectivly positioned with respect to their knives to form a pattern in the fabric being woven I employ a paper sheet pattern designated generally at P. This pattern will have perforated and unperforated portions to determine the location of the hooks and the pattern will be advanced every second pick of the loom by feed mechanism. Depending from each of the plates 12 and 13 is a bearing 50 to afford rotational support for a cylinder 51 having pegs 52 by means of which the pattern sheet is fed through the dobby. In order that the cylinder may be advanced I secure to the rear end thereof a worm gear 55 which is driven by a worm 56 secured to a horizontal shaft 57 rotatable in bearings 58 mounted on the rear part of the bracket 15.

A sprocket wheel 59 secured to shaft 57 is driven by a chain 60 geared to the loom in such a way as to cause a rotation of shaft 57 every second pick of the loom. The worm 56 has a dwell 61 which terminates in inclined cam portions 62 which act to give the cylinder an angular motion in the direction of arrow *a*, Fig. 7, every second pick of the loom. Between actuations the cylinder is held stationary by the dwell 61.

In order that a portion of the pattern sheet may be caused to rise and fall for the purpose of positioning the hooks I provide a guide G shown in Figs. 1, 2 and 7. This guide has front and back brackets 65 and 66, respectively, between which extend vertically spaced top and bottom flat elongated guide plates 67 and 68, respectively. These guides are attached to the end brackets to form with the latter a rising and falling unit. The top plate 67 is provided with two parallel transverse rows of perforations 69 and 70, the perforations of one row preferably being staggered transversely of the dobby with respect to the perforations of the other row. In similar manner the lower plate 68 is provided with two rows 71 and 72 of perforations each of which is in vertical alignment with the corresponding perforation in the top plate 67. The plates are spaced sufficiently to permit the pattern P to pass between them.

As shown in Fig. 6 the pattern P comprises a sheet of paper having marginal perforations 75 to receive the pegs 52 and the sheet P is also provided with a series of pattern zones each comprising a pair of blank or unpunched portions and perforations which are arranged according to the desired pattern. The perforations 76 determine which of the hooks shall be engaged by their knives, while the blank portion determine which of the hooks shall be above their knives. The distance between each pair of transverse rows is equal to the longitudinal feed of the pattern as determined by the cam portions 62 of the worm. During dobby operation, therefore, the pattern will be advanced every second pick of the loom to present a new pattern zone between plates 67 and 68 and in pattern reading position to control the hooks with perforations 76 and blanks 77 in alignment with the perforations in the top and bottom plates 67 and 68. An idler support 79 for the sheet pattern may be supported on hangers 80 secured to the dobby sides and the bracket 15, as shown in Fig. 3.

In order that the unit G may be caused to reciprocate vertically I mount a cam 85 on the shaft 57 and provide the same with a groove 86 to receive the roll 87 of a three arm lever 88 pivoted as at 89 to a bearing 90 extending rearwardly from the bracket 15. A second bracket 91 at the front of the dobby has pivoted thereto at 92 a second lever 93, and a link 94 connects the downwardly extending arms 95 of levers 89 and 93 to cause said levers to move in unison. Lever 88 is connected as at 96 to an upright link 97 and lever 93 is similarly pivoted as at 98 to a front upright connector 99.

At each end of the cylinder shaft adjacent the bearings 50 I pivot a carrier arm 100 and extend the same horizontally to the right, see Fig. 3, to be pivoted as at 101 to the lower part of the corresponding end bracket of the unit G. The connector 97 is attached as at 102 to the rear carrier arm, while the front connector 99 is pivoted as at 103 to the front carrier arm. In order that the plates 67 and 68 may have a parallel motion and remain substantially horizontal throughout their vertical reciprocation I use additional links 105, one for each side plate of the unit G. Each link 105 is connected as at 106 to the corresponding end bracket of unit G and has its other end pivoted as at 107 to the corresponding bearing 50. The links 100 and 105 are so proportioned as to give the desired parallel motion of the unit G. Pivots 107 are preferably located at a distance from the axis of cylinder 51 equal to the cylinder radius, as shown in Fig. 3 and pivots 106 are horizontally aligned with the pattern zone in reading position.

In order that the lifting force derived from the rising pattern zone between plates 67 and 68 may be communicated to the hooks 44 and 45, I employ pattern reading and hook lifter units shown particularly in Figs. 2, 3 and 4. These lifters are of two different lengths, the long and short units 110 and 111, respectively,

being for the top and bottom hooks. The lifter 110 has an elongated rod or wire 112 the upper end of which is hooked as at 113 to fit over a comb 114 secured to and extending between the plates 12 and 13 of the dobby. There will be a hooked head 113 for each of the upper hooks 44. In similar manner the shorter lifter 111 comprises a wire or rod 115 having a hooked head 116 which extends over and is guided and supported by a comb 117 similar to comb 114. The wires 112 and 115 are supported by their respective combs when free to descend to their lowest position by gravity.

The lower end of each lifter unit is provided with pattern readers shown particularly in Fig. 4. Since these readers are the same for both the long and short lifters I will describe the reader of a short lifter 111, shown in Fig. 4. The lower end of each wire 111 has an enlarged head 120 provided with a vertical longitudinal bore 121 extending thereinto from the lower end. This bore receives a pattern reading plunger or rod 122 having a collet 123 between which and the head 120 is located at light compression spring 124 the purpose of which is to hold the reader 122 in down position with respect to the head 120. In order to limit action of the spring 124 I provide a cross pin 125 slidable in a slot 126 extending diametrally through the head between the top and bottom thereof. A guide plate 140 on the dobby frame holds the heads 120 to align the readers with the perforations 69, 70, 71 and 72.

In operation, the shaft 57 will cause the worm cam 61 to advance the sheet pattern while the low dwell 130 of the cam groove 86 controls the roll 87 to hold unit G in down position. As soon as the cylinder has completed its angular motion to present a new pattern zone in reading position between the plates 67 and 68, incline 131 of the groove 86 will cause rocking of lever 89 and 93 to start up motion of the unit G. The latter will ordinarily start up before the lower knife completes its return stroke in order that the bottom hooks may be subject to pattern control as soon as knife 33 has reached the end of its right hand stroke as viewed in Fig. 2. When unit G is in high position the unperforated portions 77 thereof will engage and raise the reading rods 122. Any hooks which are disconnected from their knives will be free to rise at this time and the corresponding springs 124 will not be compressed but will transmit a lifting force from the pattern to the free hooks. If, on the other hand, certain of the hooks are attached to their knives so that they are not free to rise, the corresponding springs 124 will be compressed as their readers 122 rise, and the associated lifter wires 112 and 115 remain down. As soon as the hooks are free their springs 124 will lift them clear of the knives. Those rods which align with the perforations in the sheet pattern will pass through the aligned holes 69, 70, 71 and 72 of the plates 67 and 68 and also the sheet pattern, and the corresponding hooks will remain down.

The cam groove 86 has a dwell 132 which maintains the unit G in high position for an interval starting prior to completion of the return stroke of the bottom knife and continuing until after the top knife has been able to engage the indicated hooks on its ensuing working stroke, after which decline 133 of the groove 86 acts to lower the unit G to permit a pattern zone to move to reading position.

From the foregoing it will be seen that I have provided a loom dobby wherein a sheet pattern may be used for double index indication. The hook lifters which are located between the sheet pattern and the hooks include a yieldable element, such as the spring 124, which is compressed by an unperforated part of the sheet pattern should the corresponding hook be engaged with its knife. It will also be seen that the unit G is spaced from the feeding cylinder and is caused to rise and fall with a parallel motion which preserves correct angular relation between that part of the sheet pattern in reading position and the lifters 110 and 111. Furthermore, it will be seen that all of the operating mechanism for the hooks is above the sheet pattern where it can be inspected and lubricated. While I have shown the particular form of motion absorbing mechanism for the lower end of each of the lifters I do not wish necessarily to be limited to the specific construction shown in Fig. 4, inasmuch as it is sufficient if each lifter includes in its construction a yieldable pattern reader which is sufficiently strong to raise a hook. Also, the structure shown in Fig. 4 is a combined hook lifter and pattern reader useful in the form of dobby set forth hereinbefore.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a double index dobby having lifter knives each requiring two successive picks of the loom for a complete reciprocation and each knife having a working stroke while the other knife has a return stroke, a sheet pattern having pattern indicating zones of perforated and unperforated portions moved successively and at two pick intervals to pattern reading position, means to move a pattern zone in reading position toward said hooks to indicating position and maintain said zone in indicating position for the greater part of two successive picks, and lifter units between the sheet pattern and hooks, each unit comprising a lifter element for a hook, a pattern reader for the sheet mounted on and movable relatively to the element, and a resilient member tending to resist relative movement of the pattern reader and element.

2. In a double index dobby having top and bottom knives each requiring two picks for a complete reciprocation and each knife having a working stroke as the other knife has a return stroke, a set of vertically movable hooks for each knife, each hook when down being in the path of the corresponding knife and when up being out of said path, a sheet pattern having zones of perforated and unperforated portions, means operative every second pick of the loom to feed the pattern to move the zones one at a time to pattern reading position, a set of hook controlling units between each set of hooks and the zone in reading position, each unit comprising a hook lifting element, a pattern reader slidable on the element in a direction from the sheet pattern toward the hooks, a resilient means to resist sliding of the reader on the element, and means to move a pattern zone in reading position toward the readers at two pick intervals.

3. In a double index dobby having top and bottom knives each requiring two picks for a complete reciprocation and each knife having a working stroke as the other knife has a return stroke,

a set of vertically movable hooks for each knife, each hook when down being in the path of the corresponding knife and when up being out of said path, a sheet pattern having zones of perforated and unperforated portions, means operative every second pick of the loom to feed the pattern sheet to move the zones successively to pattern reading position, a set of hook controlling units between each set of hooks and the zone in reading position, said units each comprising a hook lifting element, a pattern reader element slidably mounted on the element and a spring to move the reader with respect to the element toward the sheet pattern, and means to move the pattern zone in reading position toward said readers at two pick intervals to determine the position of said lifters and hooks.

4. In a double index dobby having top and bottom knives each requiring two picks for a complete reciprocation and each knife having a working stroke as the other knife has a return stroke, a set of vertically movable hooks for each knife, each hook when down being in the path of the corresponding knife and when up being out of the path, a sheet pattern having zones of perforated and unperforated portions, means operative every second pick of the loom to feed the pattern to move the zones progressively to pattern reading position, a set of indication transmitting units for each set of hooks, each unit comprising a hook engaging lifting element at the upper end thereof, a pattern reader movably mounted on the lower end of the element and resilient means to move the reader relatively to the lifting element and toward the sheet pattern, means to support each set of units in a position corresponding to the down position of the associated set of hooks, and means to move the sheet pattern toward the readers to indicating position at two-pick intervals of the loom to cause said reading zone to determine the position of the hooks, those readers aligning with perforations remaining in down position, those readers engaging unperforated portions of the sheet and corresponding to hooks disengaged from their knives lifting said hooks, and those readers engaging unperforated portions of the pattern corresponding to hooks engaged with a knife stressing the corresponding resilient means, the latter acting to lift the last named hooks when the same become disengaged from their knives.

5. In a double index dobby having two sets of hooks and a reciprocating knife having working and return strokes for each set of hooks, said knives requiring two successive picks for a complete reciprocation and being out of phase by one pick with respect to their return strokes, a sheet pattern having zones of perforated and unperforated portions, means to move said zones successively and at two-pick intervals to reading position, means to move a pattern zone in reading position toward the hooks to indicating position while one of the knives is having a return stroke, and a force transmitting element between each hook and the pattern zone in reading position, each element including a pattern reader movably mounted on the element and a spring to resist relative movement of the pattern reader on the element, said pattern reader moved by the pattern sheet with respect to the element against the resistance of said spring when an unperforated part of the pattern sheet moves to indicating position and attempts to raise an element corresponding to a hook engaged with said knife having a return stroke, the last named element effective to disengage the corresponding hook from knife therefor when said return stroke is completed.

6. In a double index dobby having two sets of hooks and a reciprocating knife having working and return strokes for each set of hooks, said knives requiring two successive picks for a complete reciprocation and being out of phase by one pick with respect to their return strokes, a sheet pattern having zones of perforated and unperforated portions, means to move said zones successively and at two-pick intervals to reading position, means to move a pattern zone in reading position toward the hooks to indicating position while one of said knives is having a return stroke, and a force transmitting unit between each hook and the pattern zone in pattern reading position, each unit comprising a hook lifter, a pattern reader movable thereon for engagement with the sheet pattern and a spring to resist relative movement of the lifter and reader, each reader movable relatively to the corresponding lifter when the latter engages a hook engaged with the knife having a return stroke as an unperforated part of the zone moves to indicating position under said reader, the latter effective upon completion of said return stroke to cause said lifter to move the corresponding hook out of the path of the knife therefor.

7. In a double index dobby having two sets of hooks and a reciprocating knife having working and return strokes for each set, said knives requiring two successive picks for a complete reciprocation and said knives being out of phase by one pick with respect to their return strokes, any hook engaged with its knife at the start of a working stroke thereof remaining so engaged until the end of the following return stroke of the knife, a sheet pattern having pattern zones comprising perforated and unperforated portions, means to move said zones progressively and at two-pick intervals to reading position, means operative while certain of the hooks are engaged with one of the knives to move a pattern zone in reading position toward the hooks to indicating position, and a force transmitting unit between each hook and the pattern zone in reading position including an indication storing means, engagement of any unperforated pattern portion with a unit corresponding to any of said certain hooks causing the corresponding storing means to store an indication and deliver said indication at the end of said return stroke to cause the corresponding hooks to move clear of their knife.

8. In a double index dobby having two sets of harness lifter hooks and a reciprocating knife having working and return strokes, said knives requiring two successive picks of the loom for a complete reciprocation and said knives being out of phase by one pick with respect to their return strokes, each set of hooks being momentarily disengaged from the knife therefor at the end of a return stroke of the latter and any hook engaged with its knife during the start of a working stroke thereof remaining engaged therewith until disengaged at the end of the following return stroke, a pattern sheet having pattern zones of perforated and unperforated portions of the sheet, means operative at two pick intervals to move said zones successively to pattern reading position, means operative while certain of said hooks are engaged with one of said knives to move the zone in reading position toward said hooks to indicating position, and a

force transmitting unit between each hook and the zone in indicating position, each unit including an indication storing means, engagement of any unit corresponding to a hook engaged with said one knife by an unperforated portion of the zone in indicating position causing the corresponding storing means to store an indication, said last named storing means subsequently communicating indication to their respective hooks when the latter are momentarily disengaged from their knife.

9. In a dobby having a lifter hook indicatable for engagement with or disengagement from a lifter knife and periodically disengaged from the knife, a sheet pattern having perforated and unperforated portions, means to move the sheet pattern toward the hook to indicating position while the hook is engaged with said knife, and a force transmitting member between the sheet pattern and the hook including an indication storing element moved relatively to the member by an unperforated portion of the pattern moving to indicating position when the hook is in engagement with the knife to store an indication for the hook, said element subsequently effective to communicate the stored indication to the hook when the latter is next disengaged from said knife.

10. In a loom dobby provided with a lifter knife having a working stroke on one pick of the loom and a return stroke on the next pick and having also a lifter hook which when down is in the path of the knife and when up is out of said path, said hook being engageable with the knife during a working and subsequent return stroke, a sheet pattern having perforated and unperforated portions, means operative at two pick intervals to raise said sheet pattern to indicating position, an indication transmitting unit between the sheet pattern and the hook comprising a hook lifter and a pattern reader moved relatively to the lifter by an unperforated portion of the sheet pattern when the latter moves to indicating position and the hook is engaged with the knife, and a delay indication transmitter on said unit tending to move said lifter and reader apart and effective when the hook is disengaged from the knife to cause said unit to raise the hook.

11. In a loom dobby provided with a lifter knife having a working stroke on one pick of the loom and a return stroke on the next pick and having also a lifter hook which when down is in the path of the knife and when up is out of said path, said hook being engageable with the knife during a working and subsequent return stroke, a sheet pattern having perforated and unperforated portions, means operative at two pick intervals to raise said sheet pattern to indicating position, an indication transmitting unit between the sheet pattern and the hook comprising a hook lifter and a pattern reader moved relatively to the lifter by an unperforated portion of the sheet pattern when the latter moves to indicating position and the hook is engaged with the knife, and a delay indication transmitter comprising a spring operatively connecting said lifter and reader on said unit tending to move said lifter and reader apart and effective when the hook is disengaged from the knife to cause said unit to raise the hook.

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