Sept. 9, 1952 R. G. TURNER 2,609,841

PAPER INDICATED DOBBY

Filed April 7, 1951 2 SHEETS—SHEET 1

FIG. 1

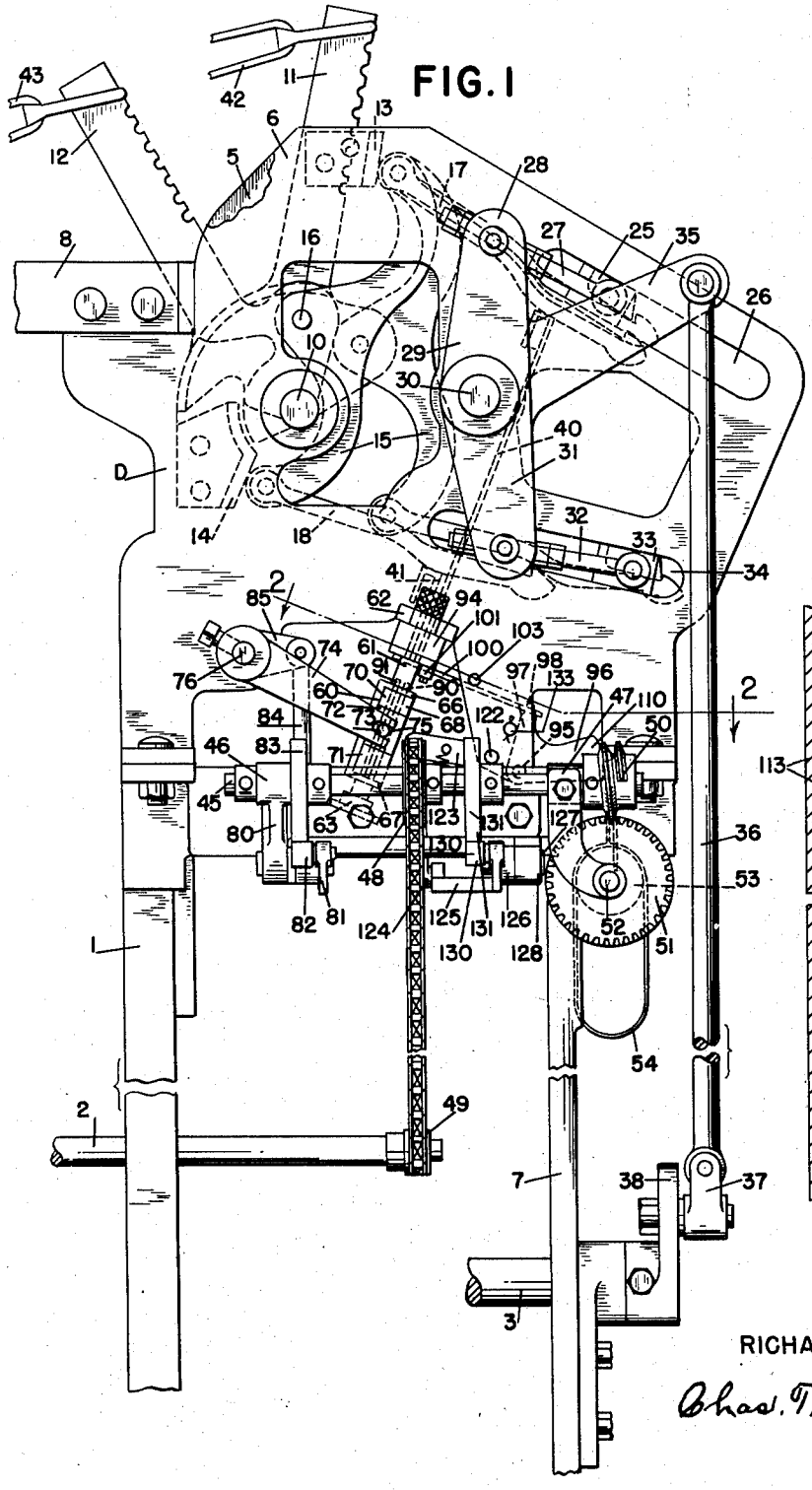
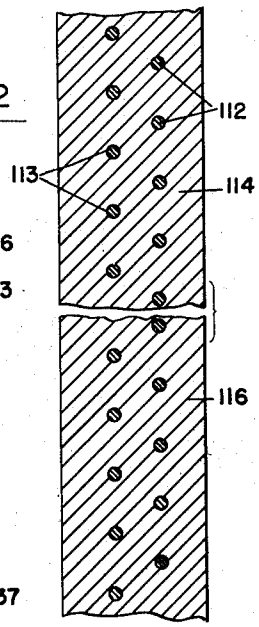


FIG. 6



INVENTOR
RICHARD G. TURNER

Chas. T. Hawley

ATTORNEY

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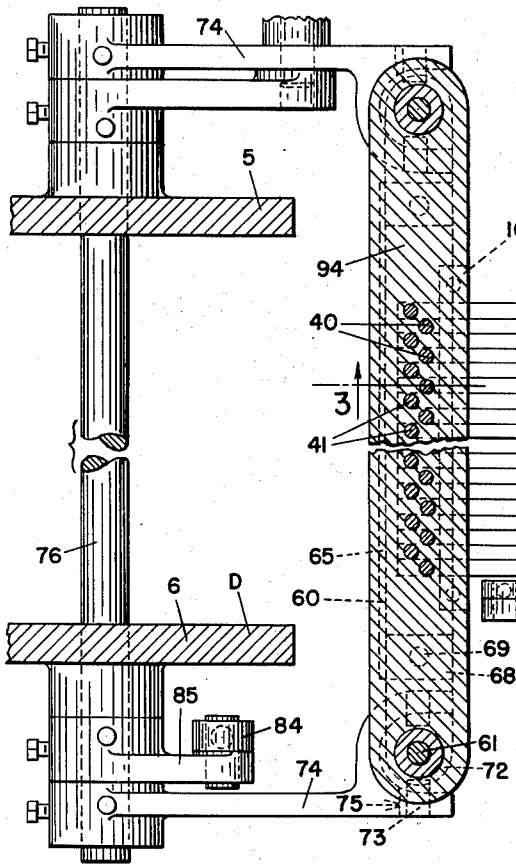


FIG. 2

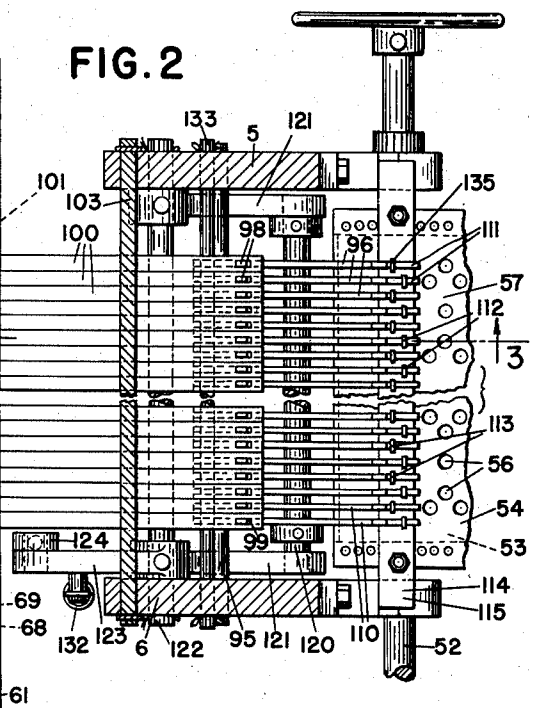


FIG. 4

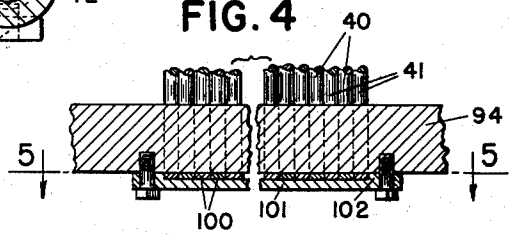


FIG. 3

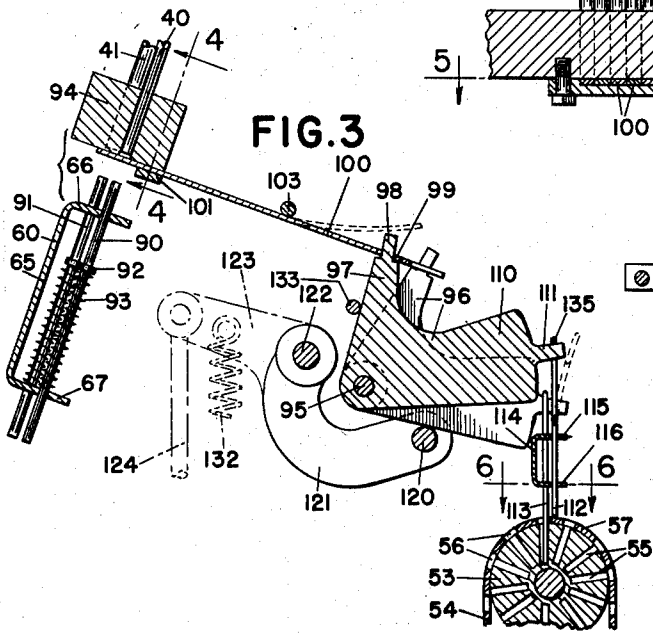
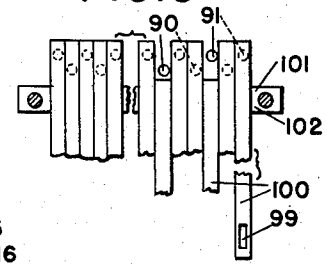


FIG. 5



INVENTOR

RICHARD G. TURNER

Chas. T. Hawley

ATTORNEY

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UNITED STATES PATENT OFFICE

2,609,841

PAPER INDICATED DOBBY

Richard G. Turner, Worcester, Mass., assignor to Crompton & Knowles Loom Works, Worcester, Mass., a corporation of Massachusetts

Application April 7, 1951, Serial No. 219,779

19 Claims. (Cl. 139—68)

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This invention relates to shedding mechanisms for looms more particularly of the dobby type and it is the general object of the invention to provide shedding mechanism indicated by an endless paper pattern.

The usual dobby operating with reciprocating knives and harness jack hooks utilizes a pattern chain including wood bars having finger lifting pegs set therein. When the pattern being woven has a long repeat the usual form of chain becomes cumbersome. To correct this condition it has been proposed heretofore to utilize a continuous paper pattern as a substitute for the wood bar pattern chain and control the dobby hooks by intermediate connections between the paper pattern and the hooks.

It is an important object of the present invention to provide a dobby wherein pattern readers cooperating with the paper pattern position stops intermediate yieldable actuators, such as spring plungers, and the hooks corresponding to them. By such an arrangement the stops when in stopping or preventing position compress a spring or the like forming part of the associated actuator so that the corresponding hook may remain down, or if the stop is in non-stopping position the actuator is then permitted to lift the corresponding hook.

It is a further object of the invention to connect the pattern readers and the aforesaid stops to weighted levers or the like which normally tend to move the stops to inoperative or non-stopping position and to lift these levers periodically at a time in the cycle of dobby operations when the stops can be safely moved with respect to the yieldable actuators. The lifting of the levers ordinarily occurs just before the pattern is moved to present a new control surface thereof into position for cooperation with the readers and at a time when the yieldable actuators have been moved temporarily away from their respective stops.

It is a further object of the invention to provide a dobby of the double index type having two rows of yieldable actuators, one row for one pick of the loom and the other row for the next pick, and stagger the actuators of one row with respect to the actuators of the other row so that the stops will be in position to control only one yieldable actuator. By this arrangement all of the stops may be of the same length, a condition which simplifies repair in the event that it is necessary to replace a damaged stop.

It is a further object of the invention to make the stops in the form of flat sheet metal strips

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lying side by side between end guides which cooperate with the stops to keep the latter in register with their respective yielding actuators. While the stops lie close to each other there is nevertheless enough clearance between them so that they may be controlled by the aforesaid weighted levers connected to them and also to the pattern readers.

A more detailed object of the invention is to provide the weighted levers with lugs which are normally connected to the stops and readers but are readily detachable from them due to resilience of the material of which the stops and readers are made.

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

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

Fig. 1 is a rear elevation of a dobby made according to the present invention, parts being broken away and the driving connections from the two shafts of the loom being indicated,

Fig. 2 is an enlarged horizontal section on line 2—2, Fig. 1,

Fig. 3 is a vertical section on line 3—3, Fig. 2,

Fig. 4 is a vertical section on line 4—4, Fig. 3,

Fig. 5 is a horizontal section on line 5—5, Fig. 4, and

Fig. 6 is an enlarged horizontal section on line 6—6, Fig. 3.

Referring more particularly to Figs. 1 and 2, the loom frame 1 supports the usual top and bottom shafts 2 and 3 which in the present instance will be geared together so that the bottom shaft rotates once for every two rotations of the top shaft. The dobby, designated generally at D, has front and back side plates 5 and 6 which are supported partly on the loom frame 1 and partly by an auxiliary support 7 leading to the floor. The upper part of the dobby is supported by arches one of which is shown at 8.

Extending between the front and back plates 5 and 6 is a harness jack pivot rod 10 on which are pivoted similar harness lifting jacks two of which are shown at 11 and 12. Also extending between the two side plates of the dobby are upper and lower stop or back bars 13 and 14, respectively, for dobby back levers 15. These latter levers are pivoted as at 16 to their respective harness jacks and each lever 15 is pivoted to a hook 17 at its upper end and its lower end is pivoted to a hook 18.

A top knife 25 guided in slots one of which is shown at 26 is attached by a connector 27 to the upper arm 28 of a rocker lever designated at 29 and pivoted as at 30 with respect to the dobby. In similar manner the lower arm 31 of the rocking lever is attached by connector 32 to a knife 33 moving in slots one of which is shown at 34. A driving arm 35 of lever 29 is pivoted to a driving rod 36 the lower end of which is connected by a swivel head 37 to a crank 38 secured to the bottom shaft 3. By these connections the dobby lever 29 will be rocked to the right for one pick of the loom to give the top knife a working stroke and will then be rocked to the left on the next pick of the loom to give the bottom knife a working stroke. It is to be understood that there will be a set of jacks and levers 15 the number of which will depend upon the number of harnesses in the loom and that the levers 15 will have an upper set of hooks and also a lower set, the upper set being for actuation by the top knife and the lower set for actuation by the bottom knife.

The position of the top hooks is determined by lifters 40, each top hook having a lifter 40 under it and the hook normally being down out of the path of the top knife, but being moved upwardly into the path when the lifter 40 is raised. In similar manner the lower hooks are controlled by lifters 41 which when in down position permit their hooks to be out of the path of the bottom knife, but which when raised move their hooks into the path of the knife 33.

The operation of the dobby thus far described is as usual, certain jacks for the harnesses (not shown) being moved to the right to occupy the position of jack 11 in Fig. 1 to lift harness frames by connectors 42 while other jacks will be to the left occupying the position of jack 12 so that their harness frames attached to them by harness connections 43 will be down.

A horizontal shaft 45 is journaled at its left end as viewed in Fig. 1 in a stationary bearing 46 and at its right end in another bearing 47. This shaft has secured thereto a sprocket 48 chain driven by another sprocket 49 of half its diameter secured to the top or crank shaft 2. The shaft 45 is rotated once for each two rotations of the crank shaft.

Secured to the forward end of shaft 45 is a worm 50 having driving relation with a worm wheel 51 secured to a shaft 52 rotating in fixed bearings. Secured to the shaft is a pattern cylinder 53 having driving relation with a paper pattern 54. The cylinder has holes 55 which register with perforations 56 in the paper pattern. These perforations will be arranged in known manner according to the pattern of the fabric being woven and some parts 57 of a pattern will be blank and over certain of the holes 55. The worm 50 is so made that it advances the pattern with a step by step motion, holding the pattern stationary during part of a two-pick cycle of the dobby when one transverse area is in control of the dobby and then moving it at a later time in the two-pick cycle to move another transverse area of the pattern into controlling position for the next two picks.

Except as noted hereinafter the matter thus far described may be of common construction and operate in usual manner. The pattern chain is advanced every second pick of the loom and the dobby operates on the so-called double index principle, that is, one transverse control area of the pattern will correspond to two picks of the loom and each transverse area will include two parallel rows of perforations and blank spaces, one row for one pick of the loom and the other row for the next pick, as is common in double index dobbies.

In carrying the present invention into effect there is provided a carriage designated at 60 which is slidable on two guide rods, one at each side of the dobby, one of these guide rods being shown at 61 in Fig. 1. This guide rod is secured at 61 at its upper end in fixed position to a hub or the like 62 carried by the adjacent dobby side. The lower end of each guide rod 61 is preferably though not necessarily unsupported and has attached to it a stop 63.

The carrier 60 includes a central U-shaped part 65 having top and bottom flanges 66 and 67, respectively, between which at each end of the carriage is a head 68. Each head is secured at 69 to the adjacent end of part 65 and has top and bottom ears 70 and 71, respectively, between which is located a driving collar 72 having opposite gudgeons 73. The associated rod 61 passes through the ears and collar. A bifurcated lever 74 has slots 75 receiving the gudgeons and is secured to a shaft 76 journaled for rocking motion in the two side plates of the dobby. There is a lever 74 for each side of the carriage and each end of shaft 76.

The bearing 46 has a depending arm 80 on which is rockably mounted a carriage actuating lever 81 having a roll 82 for cooperation with a cam 83 secured to the shaft 45. Lever 81 is connected to an upwardly extending rod 84 pivoted to an arm 85 secured to shaft 76. As the shaft 45 rotates the cam 83 will rock the lever 81 to turn shaft 76 in a counter-clockwise direction to raise the carriage. The latter by its weight then descends as the shaft 76 has a reverse or clockwise movement. The rise and fall of the carrier 60 occurs once for each two picks of the loom.

The carrier is provided with two parallel rows of rod-like yielding actuators, the actuators of the right hand row as viewed in Figs. 1 and 3 being indicated at 90 and those for the left hand row being shown at 91. Each yielding actuator has a collar 92 and a compression spring 93 between the collar and the lower flange 67 of the carrier part 65. The top flange 66 guides the upper ends of the yielding actuators. The lower ends of the previously described lifters are guided in a cross bar 94 and each lifter will be in longitudinal alignment with one of the yielding actuators to be lifted by the spring of the latter if the spring is free to act on its lifter as the carriage moves upwardly. The lifters are arranged in two parallel rows registering with the two rows of yielding actuators, the right hand actuators being for the top hooks 17 and the left hand actuators being for the bottom hooks 18 as viewed in Fig. 1, and the actuators rise regularly toward their hook lifters.

Interposed between the pattern 54 and the hook lifters is a control mechanism shown more particularly in Fig. 3. This mechanism includes a pivot rod 95 secured to and extending between the side plates of the dobby and having rockably mounted thereon a series of flat positioning weighted levers 96. Each lever 96 has an upwardly extending arm 97 formed with a lug 98 projecting upwardly through an opening or hole 99 in a stop 100. The stop extends transversely of the carriage and is made in the form of a thin narrow strip of resilient material such as spring

steel and extends from the levers 96 under the guide bar 94 which limits upward motion of the left ends of the stops, see Fig. 3. Secured to the under side of the guide bar 94 is a support 101 on which the left hand ends of the elongated stops rest as viewed in Fig. 3. Shoulders 102 on the opposite ends of the support 101, see Fig. 4, position the stops laterally and thus keep them in register with their yielding actuators. Extending over the stops is a retainer rod 103 secured at its ends to the side plates of the dobby.

The upright arm 97 of each lever 96 is so shaped that it supports the adjacent end of a stop 100, but due to the resilience of the stop its right end as viewed in Fig. 3 can be flexed upwardly for detachment from the lug 98 if this should become necessary to effect replacement of a worn or broken stop.

There will be a stop 100 for each of the yielding actuators 90 or 91 and the hook lifter registered therewith. As shown in Figs. 2 and 5 the yielding actuators of one row are staggered with respect to the actuators of the other rows so that a stop 100 for an actuator 91 will pass between two yielding actuators 90, and in similar manner each stop for an actuator 90 will pass between two of the actuators 91.

Each of the positioning levers 96 has a horizontal arm 110 which is weighted so that this arm tends normally to turn the lever in a clockwise direction as viewed in Fig. 3. Projecting from each arm 110 is a lug 111 supporting a pattern reader. The readers are arranged in two rows, the readers 112 being at the right hand row and the readers 113 being at the left hand row as viewed in Fig. 3. These readers are movable vertically in a U-shaped guide 114 having top and bottom horizontal guide plates 115 and 116, respectively, which guide the readers 112 and 113 in their vertical movements. It is to be understood that each stop 100 and the associated lever 96 and the corresponding reader will constitute a unit mechanism for controlling the corresponding yielding actuator 90 or 91.

Extending under the horizontal arms 110 is a lifter bar 120 mounted on arms 121 secured to a rock shaft 122 mounted for rotation in the side plates 5 and 6 of the dobby. The rock shaft 122 has secured thereto a driving arm 123 which is attached by depending rod 124 to a lever 125 having a hub 126 mounted for rocking on a stud 127 secured to a bearing 128 fixed with respect to the adjacent dobby side plate 6. Lever 125 has a roll 130 for cooperation with a cam 131 secured to shaft 45. As the latter shaft rotates the lever 125 will be rocked and through connector 124 will rock shaft 122 in a clockwise direction as viewed in Fig. 3 to lower the bar 120 the effect of which will be to permit all of the levers 96 to turn in a clockwise direction as viewed in Fig. 3 for the purpose of lowering the readers above the pattern 54 onto the latter. If the readers register with perforations 56 their levers can complete their rocking to normal position with arms 110 fully down.

As cam 131 continues to turn it allows spring 132 to rock shaft 122 counter-clockwise, Fig. 3, to cause bar 120 to lift all of the arms 110 and elevate the readers above the pattern 54 so that the latter can turn. Those readers which engage a blank part 57 of the paper pattern as the levers 96 tend to return to their normal position will be held in up position to arrest further motion of the corresponding levers 96 and the associated stops 100 will therefore be held between their yielding actuators 90 or 91 and the hook lifters above them. The readers which register with perforations in the paper pattern will descend into their corresponding holes 55 so that the corresponding levers 96 can complete their angular motion back to normal position and in doing so move the associated stops 100 to the right as viewed in Fig. 3 transversely of the rows of actuators out of register with their yielding actuators.

The carriage 60 will then be moved upwardly as already described and those stops which have remained in stopping position will arrest upward motion of their actuators and the corresponding springs 93 will be compressed. Under these conditions the hook lifters which register with any of the actuators which are held in down position by their stops will remain down and the corresponding hooks will be below the paths of their knives. During upward motion of the carriage 60 the actuators 90 or 91 which are unobstructed and free to move upwardly due to the fact that their corresponding stops have been moved to the right, Fig. 3, will engage their lifters and raise the latter so that the hooks therefor will be moved into the paths of the knives.

As shown in Fig. 2 a stationary stop rod 133 extends across the dobby and is supported by the front and back dobby plates 5 and 6, respectively. As shown in Fig. 3 this rod 133 is in position to engage the arms 97 of the positioning levers 96 to limit counter-clockwise rocking of these levers as viewed in Fig. 3 and serves as means limiting movement of the stops 100 in a direction toward the lifters 40 and 41.

From Fig. 5 it will be understood that the free ends of the stops in stopping position will be on one side of the parallel rows of actuators and that the ends of the stops in non-stopping position will be on the opposite sides of the rows of actuators. From Fig. 5 it will also be seen that the stop shoulders engaging the end stops of the series of stops hold the stops in register with their actuators. In this connection the stops are of a width substantially equal to the distance between an actuator 90 and an actuator 91 measured lengthwise of or parallel to the parallel rows of actuators. This relationship enables the stops to guide each other and keep themselves in proper register.

The readers are preferably made of spring steel wire with a loop 135 at their upper ends. These loops are held normally over the lugs 111 but can be detached from them by flexing as indicated in dotted lines, Fig. 3. As shown in Fig. 2 the loops of each row of readers are out of alignment with the loops of the other row of readers and adjacent loops do not interfere with each other because of this relation.

From the foregoing it will be seen that the invention sets forth simple means by which a paper pattern controls the position of stops with respect to regularly acting yielding actuators. If a stop 100 is in stopping position the associated actuator is prevented from raising its hook lifter, but if the stop is in non-stopping position the unobstructed actuator raises its lifter to elevate the corresponding hook into the path of its knife. The stops are thin flat strips which are of the proper width so that they can keep each other in register with the actuators. The stop shoulders 102 also assist in maintaining the stops in correct register. Each weighted lever 96 has a stop and a pattern reader attached thereto and is rocked regularly away from its normal position to move the stop into stopping position and the reader clear of the pattern, and after the pattern has

moved the lever tends to return to its normal position. If permitted to do so the stop is moved out of the path of the actuator rising under it as the reader enters a perforation in the pattern. If the reader registers with a blank part of the pattern the stop remains in stopping position. The guide bar 94 for the lifters limits upward motion of the stops, and the latter, and also the readers, can be sprung from their respective lugs on lever 96 because of their resilience. The stops are all of the same length and have a range of movement such that their free ends can move from a position on one side of the two rows of actuators to a position on the opposite side of the rows. Some of the features set forth hereinbefore are similar to parts of the dobby shown in my prior Patent No. 2,305,328, such as the yieldable plungers, but the stops shown herein and not shown in that patent permit the use of a pattern made of a less specialized paper than is necessary for operation of the dobby shown in the patent.

Having thus described the invention it will be seen that changes and modifications of the foregoing specific disclosure may be made without departing from the spirit and scope of the invention.

What is claimed as new is:

1. In a loom dobby having reciprocating lifter knives and a set of harness hooks for each knife, a paper pattern having a step by step feed motion, a set of pattern readers, one for each hook, moving toward the pattern to read the latter and moving away from the pattern preparatory to a feed motion of the latter, a yieldable actuator for each reader and hook moving toward the latter following reading of the pattern by the readers, and a stop for each reader and actuator controlled by the reader therefor positioned in the path of the corresponding actuator when the associated reader engages a blank part of the pattern and positioned out of the path of the actuator if the reader registers with a perforation in the pattern.

2. In a dobby having a reciprocating knife and a harness controlling hook normally out of the path of the knife but moved into the path by a lifter, a yielding actuator aligned with and periodically moving toward the lifter, a stop for the actuator capable of being in stopping position to prevent the actuator from moving the lifter or being in non-stopping position to enable the actuator to move the lifter and hook, a pattern, and control mechanism for the stop intermediate the pattern and the stop determining whether the latter shall be in stopping or non-stopping position relative to the plunger.

3. The structure set forth in claim 2 wherein the pattern is a perforated paper and the mechanism includes a pattern reader operatively connected to the stop.

4. The structure set forth in claim 2 wherein the pattern is perforated paper and the mechanism includes a reader suspended from a weighted lever operatively connected to the stop.

5. In a dobby having two oppositely reciprocating knives and two sets of harness controlling hooks, one set of hooks for each knife, the hooks being normally out of the path of their respective knives but being movable into the paths by lifters which are arranged in two parallel rows, two parallel rows of yieldable actuators moving periodically toward the lifters, each yieldable actuator being aligned with a lifter, a plurality of stops for the actuators, each stop being intermediate the corresponding actuator and the lifter associated therewith, said stops being movable from one side of said rows of actuators to the opposite side of said rows and when on said one side preventing the corresponding actuator from moving the associated lifter and when on said opposite side enabling the corresponding actuator to move the associated lifter, pattern mechanism, and means intermediate the pattern mechanism and the stops determining whether the latter should be on said one side or on said other side of said row of actuators.

6. In a dobby having two oppositely reciprocating knives and two sets of harness controlling hooks, one set of hooks for each knife, the hooks being normally out of the path of their respective knives but being movable into the paths by lifters which are arranged in two parallel rows, two parallel rows of yielding actuators, one actuator for each lifter, stops for the actuators movable transversely of said rows from a position on one side of said rows of actuators to a position on the opposite side of the other row of actuators, each stop when on said one side being in stopping position to prevent the corresponding actuator from engaging the associated lifter, and when on said opposite side enabling the corresponding actuator to move the associated lifter, pattern mechanism, and control means intermediate the pattern mechanism and the stops cooperating with the pattern mechanism to determine whether said stops shall be on said one side or on said other side of said rows of actuators.

7. The structure set forth in claim 6 wherein the actuators of said one row are staggered with respect to the actuators of said other row and adjacent stops control yieldable actuators in different rows.

8. The structure set forth in claim 6 wherein means are provided limiting movement of said stops in a direction toward said lifters.

9. The structure set forth in claim 6 wherein the yieldable actuators of said one row are staggered with respect to the actuators of said other row and said stops are arranged side by side and guide each other when moving from either side of said rows of actuators to the other side of said rows.

10. The structure set forth in claim 6 wherein the yielding actuators of said one row are staggered with respect to the actuators of said other row and the stops guide each other when moving from either side of said rows of actuators to the other side thereof, and guide means are provided for the sides of said stops to hold the latter in register with their respective yieldable actuators.

11. The structure set forth in claim 6 wherein the actuators of said one row are staggered with respect to the actuators of said other row, each actuator being spaced a given distance from adjacent actuators in the other row measured lengthwise of the the rows and said stops are of a width substantially equal to said given distance and guide each other in their transverse motions relative to said rows.

12. In a loom dobby having a paper pattern and a yieldable actuator having regularly recurring movements and capable of moving a harness controlling hook when having a movement, a lever capable of rocking away from and returning to the normal position thereof, a pattern reader connected to the lever, a stop for the actuator operatively connected to the lever and capable of being either in stopping position to prevent the actuator when having a regular movement from moving said hook or in non-stopping position relative to the actuator when the lever is in

normal position to enable the actuator when having a regular movement to move said hook, and means regularly effecting movement of the lever away from the normal position thereof, the lever thereafter tending to return to the normal position thereof, the reader if registering with a blank part of the pattern preventing return of the lever to said normal position thereof and the lever thereupon effecting positioning of the stop in the stopping position thereof and the reader if registering with a perforation in the pattern enabling the lever to return to normal position.

13. The structure set forth in claim 12 wherein said lever has an upwardly extending lug and said stop has an opening therein receiving said lug.

14. The structure set forth in claim 12 wherein said stop has an opening therein and said lever has an upwardly extending lug passing through said opening and the stop is resilient to be capable of flexing away from said lever for detachment from said lug.

15. The structure set forth in claim 12 wherein the lever is provided with a lug detachably fitting the reader and the latter is resilient and capable of flexing away from the lug for detachment from the lever.

16. The structure set forth in claim 12 wherein the dobby has a guide for the reader and the latter is resilient and the lever has a lug detachably connected to the reader, the latter due to the resilence thereof being capable of flexing away from said lever while in said guide for detachment from said lug.

17. The structure set forth in claim 12 wherein the part of the lever connected to the reader is weighted and tends due to weight thereof to move the reader toward said pattern.

18. The structure set forth in claim 12 wherein said lever has an upwardly extending lug and said stop has an opening therein receiving said lug

and the lever supports the adjacent end of the stop.

19. In a dobby having a reciprocating knife and a harness controlling hook normally out of the path of the knife but movable into said path by a lifter when the latter is raised, a yieldable actuator aligned with the lifter and movable periodically toward the latter and capable of raising the lifter, a stop capable of being either in stopping position to prevent the actuator from moving the lifter or in non-stopping position to enable the actuator to raise the lifter, a weighted lever operatively connected to said stop, a pattern reader on said lever, a perforated paper pattern for the reader having a step by step motion, and means periodically moving said lever in one direction to move said stop to stopping position and move said reader away from the pattern while the latter is having a step by step motion, said lever due to being weighted thereafter rocking in the opposite direction corresponding to a reading of the pattern by the reader, said reader if engaging a blank part of the pattern arresting said movement of the lever in said opposite direction and causing the stop to remain in stopping position, and said reader if registering with the perforation in the pattern enabling said lever to move said stop to the non-stopping position thereof.

RICHARD G. TURNER.

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2,305,334	Wakefield	Dec. 15, 1942