Oct. 1, 1968 P. SAMSON 3,403,705

DOBBY FOR LOOMS

Filed July 29, 1966 5 Sheets-Sheet 1

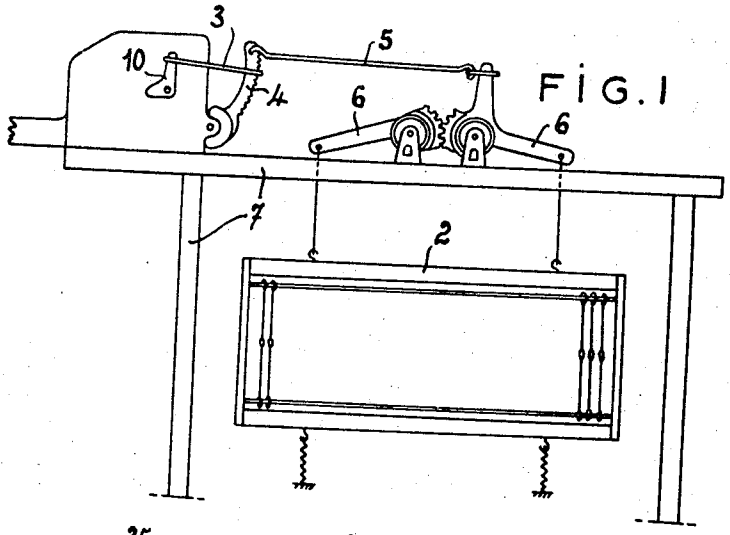


FIG. 1

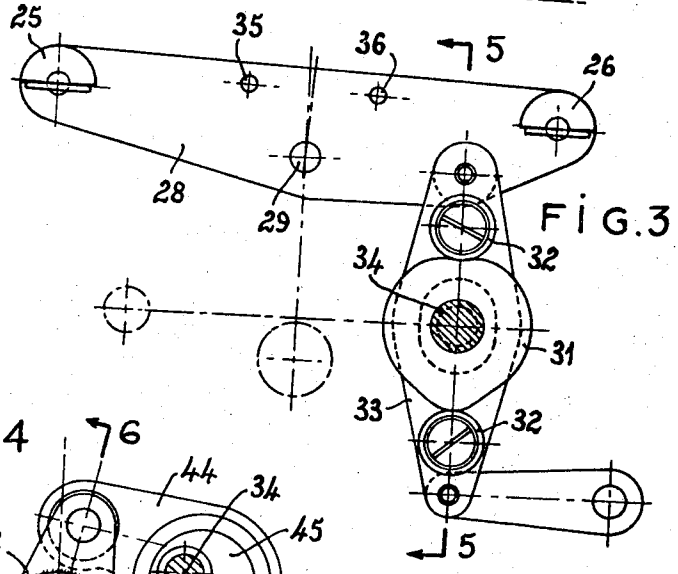
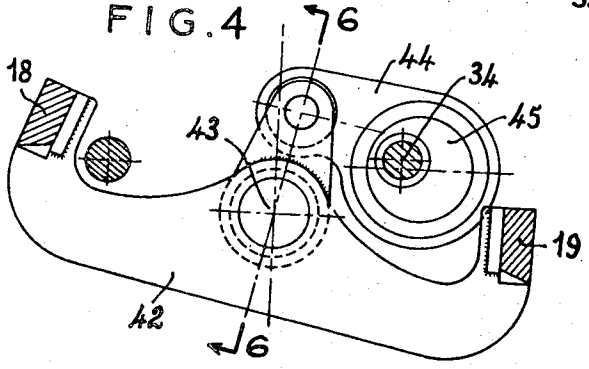


FIG. 3

FIG. 4



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DOBBY FOR LOOMS

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FIG. 2

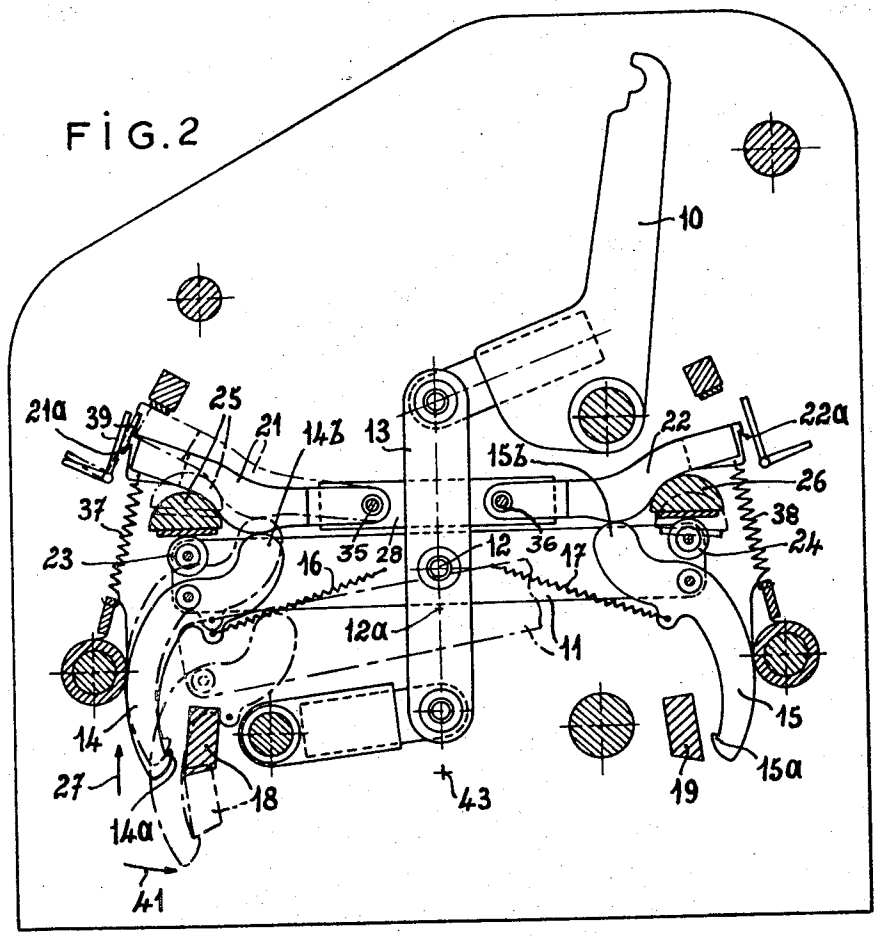

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FIG. 5

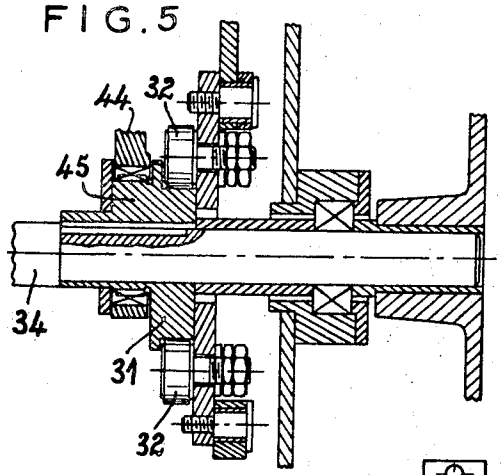

FIG. 6

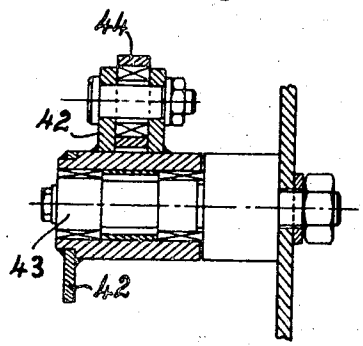

FIG. 9

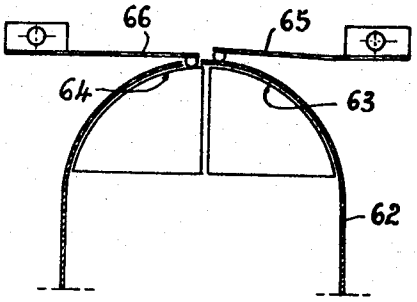

FIG. 10

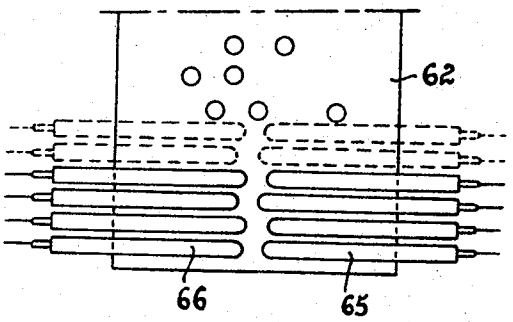

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FIG.7

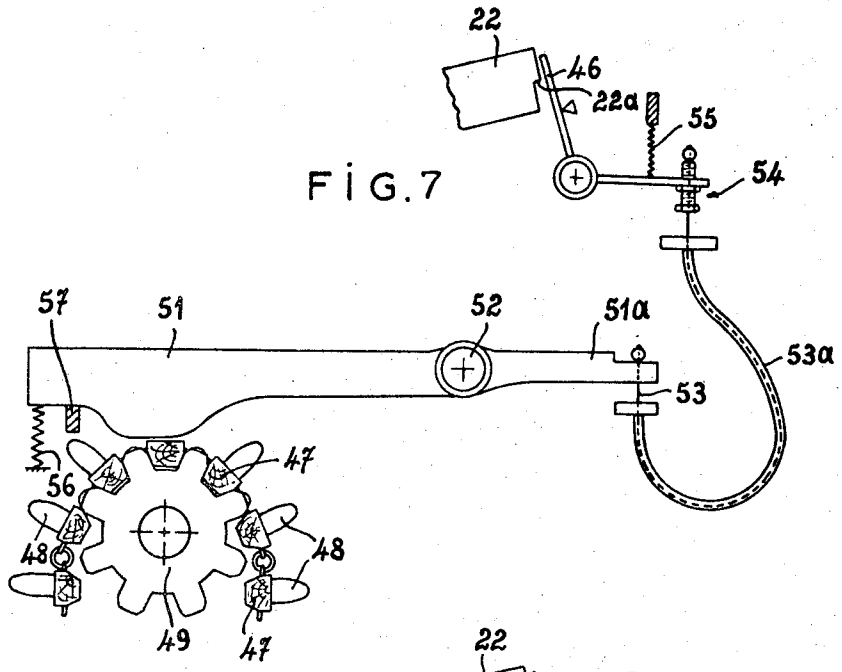

FIG.8

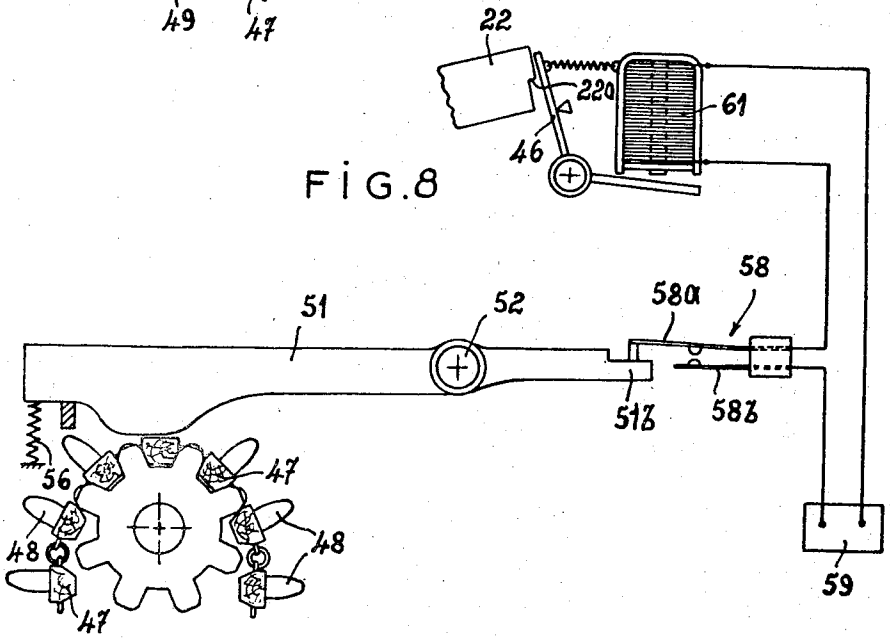

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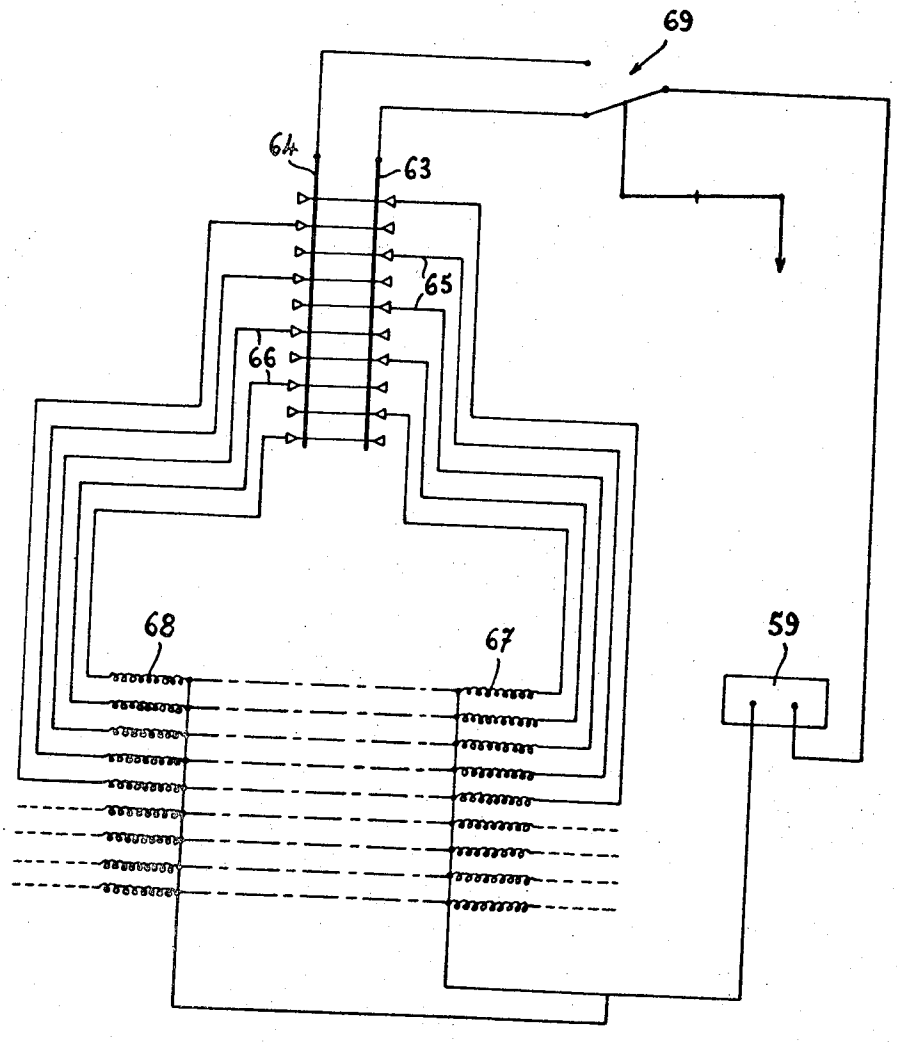
FIG. 11



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DOBBY FOR LOOMS

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Claims priority, application France, July 29, 1965, 46,271
9 Claims. (Cl. 139—68)

ABSTRACT OF THE DISCLOSURE

A dobby having two hooks pivotally secured to each end of a balance the middle point of which is operatively connected with a heald frame and two knives operating in alternation once for every two picks, the ends of the said balance being engaged by abutments. Each abutment is supported on a plate pivotably connected to the center of the balance and the abutments are shifted by the plate in alternation away from and back towards the corresponding end of the balance simultaneously with the forward movement of the associated knife, the rearward movement of each abutment causing movement of the corresponding hook into the path of the cooperating knife to make said hook accompany the knife prior to engagement therewith.

The present invention relates to dobbies for looms. Such dobbies allow the loom shafts to remain in their raised or lowered position for several successive picks without returning each time into their central position or into their lower shed position.

Such dobbies are well known and operate for successive alternating sheds; in other words, they include two sets of wires and two blades operating in alternation once for every two picks, that is once for every two revolutions of the loom.

Each of the levers producing a tractional action on the heald frames is secured to the middle of a member termed the balance. The latter may be actuated in alternation by two hooks secured respectively to the two ends of the balance.

The balance may thus operate under tractional conditions if the nose of a hook is engaged by the blade which is progressing. In contradistinction, the balance is in its lower position when the nose of the hook is not engaged by the blade. In order to produce a predetermined weave, it is necessary to control the hooks by means of a suitable mechanism controlled by small boards provided with keys or perforations or perforated paper. Such control of the hooks should be performed accurately at the moment at which they are released by the blades. To this end, the blade executes a receding movement which is larger than that of the hook which is held fast by a stationary abutment. The distance between the nose of the hook and the edge of the blade when the blade is in its rearmost position is termed the release spacing. Said spacing varies with the design of the dobby. In older dobbies said spacing is as high as 7 mm. It has been sometimes reduced but if it is desired to obtain dobbies operating at high speeds, said spacing should be a minimum. As a matter of fact, when the blade engages the hook so as to draw it forwardly, it subjects the hook to a shock whose intensity is greater with increased spacing. This shock results in a vibration of the heald frame and consequently of the warp threads on the loom.

Heretofore known improvements in reducing the spacing have the drawback of limiting the speed of operation. The present invention has for an object to provide a novel dobby which eliminates the aforesaid drawback. To this end, the invention contemplates the provision of a dobby

for a weaving loom of the type referred to wherein the abutments provided for the balance are shifted reciprocatingly rearwardly and forwardly at the end of each stroke of the blades in a manner such that the hooks carried by the balance accompanying the blades at the moment corresponding to their engagement.

Said movement of the blades accompanied by the hooks at the moment of the engagement not only damps the shocks and vibrations due to the contact between the blades and the hooks, but it allows furthermore reducing considerably the spacing referred to in a fully reliable manner since a sufficient time is available for the execution of the selection. Such a dobby thus allows operating at high speeds.

According to an embodiment of this improved dobby, the abutments of the balance are carried by a plate adapted to pivot around an axis passing through the middle of the balance. Said plate is adapted to pivot in opposite directions, at the ends of the strokes of the blades through the agency of a lever engaging a heart-shaped cam keyed to the same shaft as that which controls the movement of the blades and executes one half revolution for each revolution of the loom.

According to a preferred embodiment of such a dobby, the plate carrying the abutments for the balance also carries two levers which are normally urged by springs into contacting relationship with the rear surfaces of the abutments of the balance, each lever being provided with a boss against which further springs urge the tail-end of the of the hooks of the balance. Said levers are held, when required, in a rear position by a bolt controlled by a reading system, such that during the forward stroke of a corresponding abutment, the tail end of the hook is released and a notch therein is brought by one of the last mentioned springs into the path of the blade.

According to an advantageous embodiment of said dobby, the blades are carried by the ends of the arms of two T-shaped levers of which the central arm, revolvably secured to a stationary pivot, is driven into an oscillatory movement, by a connecting rod controlled in its turn by an eccentric member keyed to a shaft executing one half revolution for each revolution of the loom.

The reading system associated with said dobby and controlling said bolts may be of any known type. However, according to a further feature of the invention said reading system is connected with the dobby through adaptable mechanical or electric means.

This solution has the advantage of allowing a reading of the design with an arrangement whose pitch differs from that of the dobby.

In the case of a reading performed by means of a board and keys, the ends of the associated plates are connected through cables with the corresponding lever-holding bolts which are normally held in a retracted position by further springs.

According to a still further embodiment of said reading system, each of a switch its plates controls such that when a key raises said plate the switch is closed thereby closing a circuit incorporating an electro-magnet which controls in its turn the operation of the corresponding bolt.

If the dobby is to be used for only one direction of operation, the switches can be controlled directly by the keys.

In the case of a reading of the design by a perforated strip of paper progressing over two metal plates under two rows of yielding metal blades forming, for instance, a corresponding member of switches as there are blades, each switch controls an electro-magnet associated with a predetermined bolt.

The invention will be readily understood from a reading of the following description, reference being made

to the accompanying diagrammatic drawings illustrating by way of example and by no means in a limiting sense, a number of embodiments of the improved dobby and of its control system executed in accordance with the invention. In said drawings:

FIG. 1 is an elevational view of the weaving mechanism including a dobby.

FIG. 2 illustrates partly in section and on a larger scale, the improved portion of the dobby in accordance with the invention.

FIG. 3 shows a plate carrying the abutments of the balance and the control means for said plate.

FIG. 4 illustrates a blade-carrying lever and its driving means.

FIG. 5 is a sectional view through line 5—5 of FIG. 3.

FIG. 6 is a sectional view through line 6—6 of FIG. 4.

FIG. 7 illustrates an embodiment of a mechanical connection between the design-reading system and the dobby in the case of a reading through keys.

FIG. 8 illustrates an electric connection as a substitute for the connection illustrated in FIG. 7.

FIGS. 9 and 10 illustrate, respectively in elevational and in plan view as seen from above, a conventional design reading system operating by means of a perforated paper strip as employed by the present invention.

FIG. 11 illustrates an embodiment of an electric circuit connecting the reading system according to FIGS. 9 and 10 with the dobby according to the invention.

In FIG. 1 is shown a weaving mechanism inclusive of a dobby, of which only the lever **10** is shown in detail. The lever **10** is coupled with the heald frames **2** in a conventional manner, that is through the agency of the rods **3**, the notched levers **4**, the connecting rods **5**, and suspension levers **6**, the whole arrangement being carried by the frame **7**.

The improved dobby is illustrated with further detail in FIGS. 2 to 6.

A balance **11** is coupled to a tractionally acting lever **10** at its middle point **12** through the agency of a rigid link system **13**. Said balance carries pivotally at its ends the hooks **14** and **15** which are urged normally into their operative positions by springs **16** and **17**. Each hook **14**, **15** has a nose respectively shown at **14***a* and **15***a* for engagement with the corresponding blade illustrated respectively at **18** and at **19**. Each hook **14** and **15** includes furthermore a tail piece illustrated respectively at **14***b* and **15***b* which tail-piece under the action of the corresponding spring **16** or **17** is urged against a boss provided on a respective selecting lever **21** or **22**. At each end of its rear surface, the balance **11** is provided with a roller respectively illustrated at **23** and at **24**, said rollers engaging each a corresponding abutment **25** or **26**.

As shown by their positions illustrated in dot-and-dash lines and in contradistinction with the conventional dobbies, the abutments **25** and **26** undergo during each complete stroke of the batten displacement parallel with that of the corresponding blade **18**, **19**. Thus, when the blade **18** reaches the end of its rearward travel in the direction of the arrow **27**, abutment **25** is shifted in the same direction into the position illustrated in dot-and-dash lines. At the same time, the abutment **26** is shifted forwardly by an equal distance. The abutments **25**, **26** undergo equal angular movement the center of which registers with the middle point **12** of the balance **11**, so that said movement of the abutments **25** and **26** has no action on the lever **10** which pivots thereby around the point **12** of the balance.

When the blade **19** reaches in its turn the end of its rearward travel, the abutments **25** and **26** are shifted in the opposite directions.

FIG. 3 illustrates an embodiment of the means driving the abutments **25** and **26** in an oscillatory movement. In said FIG. 3, the abutments **25** and **26** are carried by a plate **28** adapted to pivot around a stationary pivot pin **29** registering with the middle point **12** of the balance

11, when the latter bears against its abutments **25** and **26**. The oscillations of the plate **28** are controlled by a heart-shaped cam **31** engaged by two cam followers **32** carried by a lever **33** pivotally secured to the plate **28**. Each revolution of the cam **31** produces two oscillations of the plate **28** in opposite directions, said oscillations having as a result to impart to the abutments **25** and **26** their oscillating movements. The shaft **34**, to which the cam **31** is keyed executes one half a stroke for each revolution of the batten in a manner such that one of the two abutments **25** or **26** recedes for each stroke of the batten. The cam **31** is keyed to the shaft **34** in a manner such that the receding movement of the abutment **25** or **26** is performed exactly at the moment at which the edge of the blade **18** or **19** reaches the level of the nose **14***a* or **15***a* of the hook **14** or **15**.

Each hook **14** or **15** engages through its tail piece a respective selecting lever **21** or **22**. The selecting levers are pivotally secured to pins **35** and **36** on the plate **28** (FIG. 3) and the levers are normally urged against the surface of the corresponding abutments **25** or **26** by the springs **37** and **38**. For the normal positions of the levers **21** and **22**, that is when said levers engages the abutments **25** and **26**, the hooks **14** and **15** are held in their retracted or inoperative position with reference to the paths of the edges of the blades **18** and **19**.

When the plate **28** undergoes a rocking movement, it carries along with it not only the abutments **25** and **26**, but also the selecting levers **21** and **22** associated therewith. For instance, when the abutment **25** occupies the position illustrated in dot-and-dash lines in FIG. 2, the lever **21** occupies also the position illustrated in dot-and-dash lines in said FIG. 2, said position being that corresponding to selection.

When the reading system controls the selection through the lever **21**, for instance, when the latter is in a selecting position, a bolt **39** is rocked into the position illustrated in dot-and-dash lines in FIG. 2 in a manner such that it holds the lever **21** in its selecting position by reason of said bolt engaging a notch **21***a* at the end of said lever. Once the selection is performed and while the blade **18** resumes forward travel, the hook **14** is released to operative position by the lever **21** which cannot follow the abutment **25** so that the spring **16** rocks the hook back in the direction of the arrow **41** and the nose **14***a* of said hook enters the path followed by the edge of the blade **18**. At the end of the forward movement of the abutment **25**, the blade **18** returns into engagement with the nose **14***a* of the hook **14** and carries it along, which causes a rocking of the balance **11** around the cam follower **24** into the position illustrated in dot-and-dash lines in FIG. 2 so as to shift the middle point **12** of said balance into the position illustrated at **12***a*. This shifting causes an actuation of the lever **10** and a raising of the heald frame **2** corresponding thereto. By reason of the simultaneous progression of the blade **18** and of the abutment **25**, the hook **14** moves in parallelism with the blade **18** and enough time is left for it to enter the position defined by the weave design when required. This being performed with a release spacing reduced to a strict minimum. Furthermore, by reason of the blade **18** being accompanied by the hook **14**, the drive of the latter by said blade is performed without any shock and the movement is all the smoother when the release is executed over a shorter spacing.

FIG. 4 shows an advantageous embodiment of the arrangement driving the blades **18** and **19**. The latter are carried by T-shaped levers **42**, said levers being pivotally secured at their middle points to a stationary shaft **43**. These levers **42** undergo a reciprocating movement under the action of a connecting rod **44** carried by an eccentric member **45**; said eccentric member **45** is keyed to the above-mentioned shaft **34** which carries also the cam **31**.

The reading of the weave may be executed either mechanically or electrically.

A mechanical reading allows the dobby to operate with designs executed on boards of wood, nylon or metal provided with keys, whereas electric reading allows operating as desired either with wood, nylon or metal boards or with weaves drawn on perforated paper, metal or plastic material of any type.

In the case of a mechanical reading, as illustrated in FIG. 7, the weaves are executed by means of boards **47** made of nylon, wood or any other suitable material provided with keys **48** made of wood, plastic material, metal or the like conventional material and which may in fact be of a standard type used in present dobbies.

The cylinder **49** carries the small boards **47** controlled conventionally by the shaft controlling the dobby through the agency of a worm gear or of a modification incorporating pinions and a chain. Such arrangements are in fact conventional.

The keys **48** fitted on the boards **47** raise as they pass plates **5** pivotally secured at axles **52**. Said plates are of the type used in conventional dobbies. At their ends **51***a* is secured a cable **53** which serves for controlling the bolt **46** which holds the selecting levers **22** in position. The yielding cable **53** may be fitted in a sheath **53***a* and be associated with adjusting means **54** as illustrated in FIG. 7; it also may be guided in a bare condition by a system of pulleys. A return spring **55** urges the retaining bolt to a position which makes it engage the selecting lever **22**. When a key **48** raises the plate **51**, the latter releases the cable **53**. The retaining bolt **46** urged by the spring **55** pivots and locks the selecting lever **22**. As already mentioned, this leads to an engagement of the hook **15** by the blade **19** and the heald frame **2** is urged into its upper position. In contradistinction, when the board **47** does not carry a key **48**, the plate **51** is urged back by the spring **56** into engagement with the stop **57** so that it rocks around its axle **52**. Its end **51***a* exerts a tractional action on the cable **53** so that the retaining bolt **46** is caused to pivot in a reverse direction and release the selecting lever **22** thereby preventing hook **15** from being engaged by the blade **19**. The heald frame **2** is then in its lower position; the reading is thus identical with that of conventional dobbies.

The electric reading may be executed by different means. One of these is illustrated in FIG. 8 and includes a conventional system of boards **47** and keys **48** cooperating with plates **51** pivoting around axles **52** and urged by springs **56** into positions identical with those obtained with a mechanical control. The rear end **51***b* of each plate **51** is in contact with the movable blade **58***a* of a switch **58**. When the plate **51** does not contact a key **48**, its end **51***b* holds the switch blade **58***a* in a raised position, and consequently the switch **58** opens the circuit. In contradistinction, when the plate **51** is raised by a key, its end **51***b* lowers and allows the blade **58***a* of the switch **58** to engage the cooperating blade **58***b* so as to close the electric circuit.

Said electric circuit including a D.C. supply **59** under a low voltage and an electro-magnet **61** acting directly on one of the arms of the retaining bolt **46** so as to produce, when the circuit is closed, a pivotal movement of said bolt **46** in a direction such that it locks the selecting lever **22**. Consequently, the reading is then identical with that of a mechanical control.

The blades **58***a* and **58***b* forming the switch **58** may be replaced by a mechanical or magnetic microswitch. In the case of a magnetic switch, the end **51***b* of the blade **51** carries a permanent magnet which produces the closing of the circuit by means of a suitable miniature switch.

If the dobby is used for a single direction of operation, and is not necessary to make it revolve selectively forwardly or rearwardly, it is possible to omit the plates **51** and directly control the switch.

As illustrated in FIGS. 9, 10 and 11, the electric control may be performed also from a strip of paper.

The system allows using standard papers wherein the perforation are distributed in uniformly spaced rows arranged in staggered relationship. The use of such a paper and of this conventional reading system, requires a rotation of a cylinder and a two-pick reading.

The weave paper **62** is thus carried along by a conventional cylinder driven by a worm gear in the same manner as in all standard dobbies. The paper slides over the metal plates **63** and **64** which extend each over one quarter of a cylinder and are insulated from each other. Above the plates **63** and **64**, are arranged contact blades **65** and **66** in a manner such that the contact piece of the blade **65** lies above the slideway plate **63** while the contact piece on the blade **66** is located above the slideway plate **64**. The contact blades **65** and **66** are raised by a mechanical member at the moment at which the cylinder driving the paper moves and the shifting of the paper is performed as in conventional dobbies, in other words between two selecting operations; the contact blades **65** and **66** are connected electrically through circuits illustrated in FIG. 11, which circuits lead to electromagnet **67** or **68** identical with the electromagnet **61** illustrated in FIG. 8. Each electro-magnet **67** or **68** plays the same part as that described with reference to the electromagnet **61**.

The slideway plates **63** and **64** are connected electrically with a reversing switch **69** which ensures the closing of the electric circuit either through the plate **63** or through the plate **64** according as to whether the dobby operates in a forward or in a rearward direction. Thus, by a suitable switching of said plates, the order in which the rows are read may be shifted, which ensures a forced integral movement.

In all the reading arrangements described, that is both in the case of the mechanical and of the electrical arrangement, the connections are highly adaptable and consequently, it is possible to resort to conventional reading means such as the boards **47** or the paper designs **62** with a predetermined spacing, say 10 or 12 mm. which is a standard spacing, while the actual dobby is executed with a different subdivision, that is with different intervals between the axes of the hooks, balances and tractionally acting levers. It is, for instance, possible to read the design drawn on a paper subdivided by lines spaced by 12 mm. apart and to execute the dobby with a subdivision of 15 or 20 mm. The adaptability of the connecting means is in all cases sufficient to allow said difference in spacing.

In the case of a reading of a paper design **62** and by reason of the instantaneous control of the retaining bolts by the reading system, the dobby ensures an integral forced movement, which means that it can operate forwardly and rearwardly without any preliminary modification in the position of the cylinder. The arrangement of the bolts **39** and **46** and the part played by them, allows extending the time of reading sufficiently for ensuring a complete reliability for said reading.

What I claim is:

1. In a dobby provided with reading means, the provision of means adapted to control heald frames in a loom and comprising a balance, the middle point of which is operatively connected with a heald frame, abutments adapted to normally engage the ends of said balance, a hook pivotally secured to each end of the balance and movable between operative and inoperative positions under the control of the reading means, a blade associated with each hook and adapted to engage and shift the corresponding hook together with the balance away from the normal location of the cooperating abutment once for every two operative cycles of the loom, means for shifting in alternation each abutment away from and back towards the corresponding end of the balance simultaneously with the forward movement of the corresponding blade, and means whereby the rearward movement of each abutment produces a movement of the corresponding hook into operative position into the path of the cooperating blade, such movement of said hook in a direction to accompany the blade being prior to its engagement therewith.

2. A dobby as claimed in claim **1**, wherein said means

for shifting the abutments in alternation comprises a plate carrying at its ends the two abutments and adapted to pivot about its center which registers with the middle point of the balance when the latter is normally positioned and a lever controlling the angular position of said plate to shift the abutments alternatingly away from the balance.

3. A dobby as claimed in claim 1, wherein said means for shifting the abutments in alternation comprises a plate carrying at its ends the two abutments and adapted to pivot around its center which registers with the middle point of the balance when the latter is normally positioned, a lever controlling the angular position of said plate to shift the abutments alternatingly away from the balance, said means for producing movement of the hooks comprising selecting levers pivotably connected to said plate for cooperating with respective abutments, springs urging the selecting levers into engagement with the respective abutments on the sides thereof facing away from the balance, bolts controlled by the reading means and adapted to hold said selecting levers away from the abutments, said selecting levers including bosses for acting on said hooks to normally hold the same in their inoperative positions out of the paths of the blades, further springs urging the hooks away from the lever bosses upon positioning of the selecting levers where they are held by the bolts to allow said hooks to move to operative position and enter the path of the corresponding blades.

4. A dobby as claimed in claim 1, wherein the means for shifting the abutments includes a shaft executing one half revolution of each complete cycle of the loom, a heart-shaped cam keyed to said shaft and controlling the movements of the abutments, an eccentric member carried by said shaft and a T-shaped lever carrying the blades and coupled to said eccentric member for undergoing oscillatory motion which controls the movement of said blades with reference to the hooks.

5. A dobby as claimed in claim 1, wherein said means for shifting the abutments in alternation comprises a plate carrying at its ends the two abutments and adapted to pivot around its center which registers with the middle point of the balance when the latter is normally positioned, a level controlling the angular position of said plate to shift the abutments alternatingly away from the balance, said means for producing movement of the hooks comprising two selecting levers secured to said plate and provided with bosses normally holding the hooks in inoperative position out of the path of the blades, springs urging said selecting levers into engagement with the abutments on the sides thereof facing away from the balance, bolts adapted to hold said levers away from the abutments, further springs urging the hooks away from the levers bosses upon positioning of the selecting levers where they are held by the bolts to allow said hooks to enter the corresponding blade path and an adaptable connection between the reading means and the bolts.

6. A dobby as claimed in claim 1, wherein said means for shifting the abutments in alternation comprises a plate carrying at its ends the two abutments and adapted to pivot about its center which registers with the middle point of the balance when the latter is normally positioned, a lever controlling the angular position of said plate to shift the abutments alternatingly away from the balance, said means for producing movement of the hooks comprising two selecting levers pivotally secured to said plate and provided with bosses normally holding the hooks in inoperative position out of the path of the blades, springs urging said selecting levers into engagement with the abutments on the sides thereof facing away from the balance, bolts adapted to hold said selecting levers away from the abutments, further springs urging the hooks away from the lever bosses upon positioning of the selecting levers where they are held by the bolts to allow said hooks to enter the corresponding blade path, elastic means normally holding said bolts in their lever engaging position and cables connecting the reading means with the bolts to release same against the action of said elastic means.

7. A dobby as claimed in claim 1, wherein said means for shifting the abutments in alternation comprises a plate carrying at its ends the two abutments and adapted to pivot around its center which registers with the middle point of the balance when the latter is normally positioned, a lever controlling the angular position of said plate to shift the abutments alternatingly away from the balance, said means for producing movement of the hooks comprising two selecting levers pivotally secured to said plate and provided with bosses normally holding the hooks in inoperative position out of the path of the blades, springs urging said selecting levers into engagement with the abutments on the sides thereof facing away from the balance, bolts controlled by the reading means and adapted to hold said selecting levers away from the abutments, further springs urging the hooks away from the lever bosses uopn positioning of the selecting levers where they are held by the bolts to allow said hooks to enter the corresponding blade path, elastic means normally holding said bolts in their lever engaging position, an electromagnet controlling the operation of each bolt to release same against the action of said elastic means, a circuit feeding said electromagnet, and a switch controlling opening and closing of said circuit.

8. A dobby as claimed in claim 1, wherein said means for shifting the abutments in alternation comprises a plate carrying at its ends the two abutments and adapted to pivot around its center which registers with the middle point of the balance when the latter is normally positioned, a lever controlling the angular position of said plate to shift the abutments alternatingly away from the balance, said means for producing movement of the hooks comprising two selecting levers pivotally secured to said plate and provided with bosses normally holding the hooks in inoperative position out of the path of the blades, springs urging said selecting levers into engagement with the abutments on the sides thereof facing away from the balance, bolts controlled by the reading means and adapted to hold said selecting levers away from the abutments, further springs urging the hooks away from the lever bosses upon positioning of the selecting levers where they are held by the bolts to allow said hooks to enter the corresponding blade path, elastic means normally holding said bolts in their lever engaging position, an electromagnet controlling the operation of each bolt to release same against the action of said elastic means, a circuit feeding said electromagnet, a switch controlling opening and closing of said circuit and a pivoting member controlled by the reading means and controlling said switch.

9. A dobby as claimed in claim 1, wherein said reading means includes two part cylindrical metal supports together forming half a cylinder and over which a perforated strip is adapted to move, and a row of contact pieces cooperating with each support, a circuit passing through each contact piece and means whereby the closing of the circuit through the registering of a perforation with the contact piece in said circuit acts on a cooperating balance hook.

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