Jan. 11, 1966 R. HONEGGER 3,228,427

DOBBIES

Filed May 3, 1962 3 Sheets-Sheet 1

Fig. 1

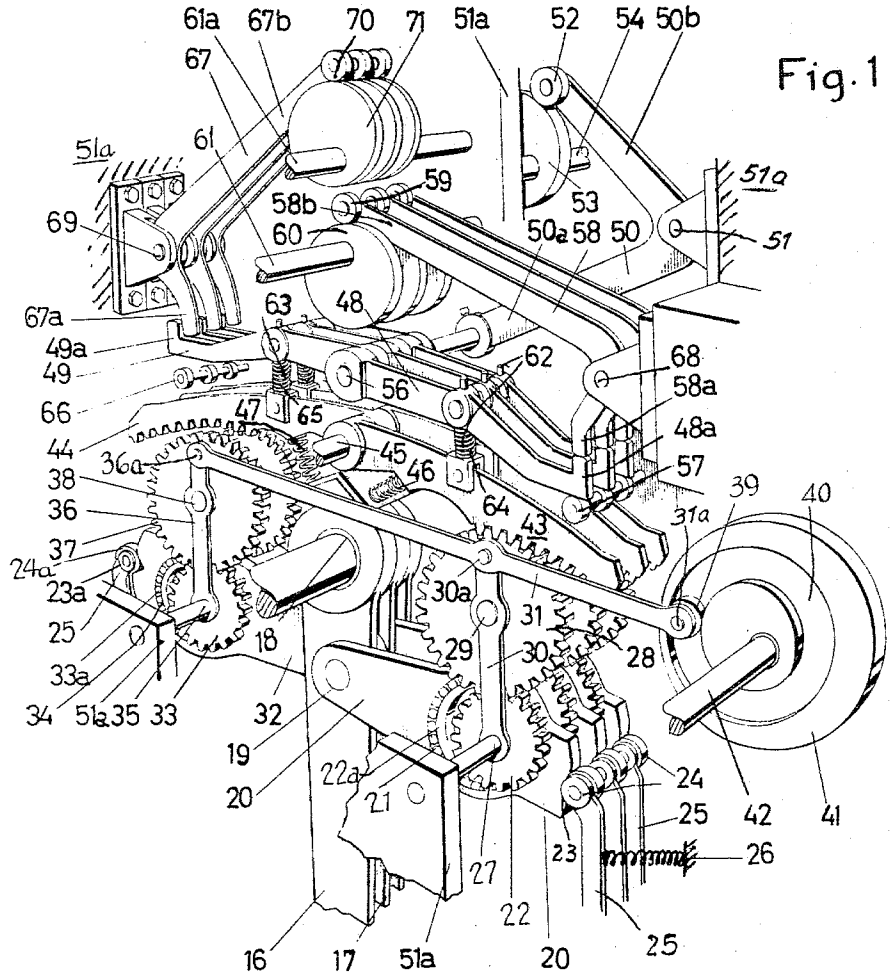
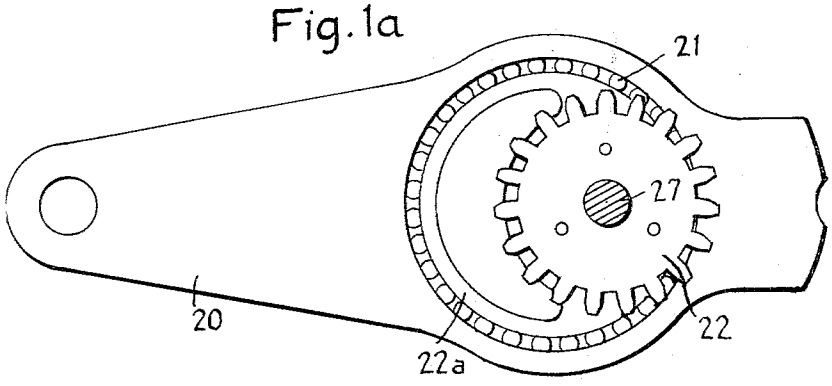


Fig. 1a



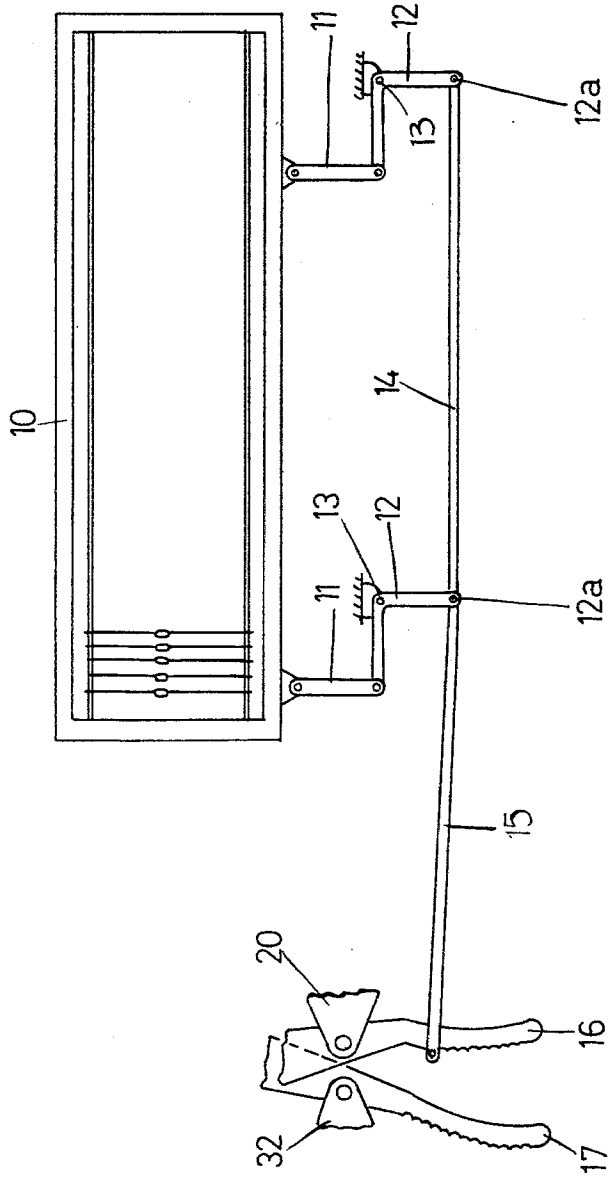


Fig.2

Jan. 11, 1966 R. HONEGGER 3,228,427

DOBBIES

Filed May 3, 1962 3 Sheets-Sheet 3

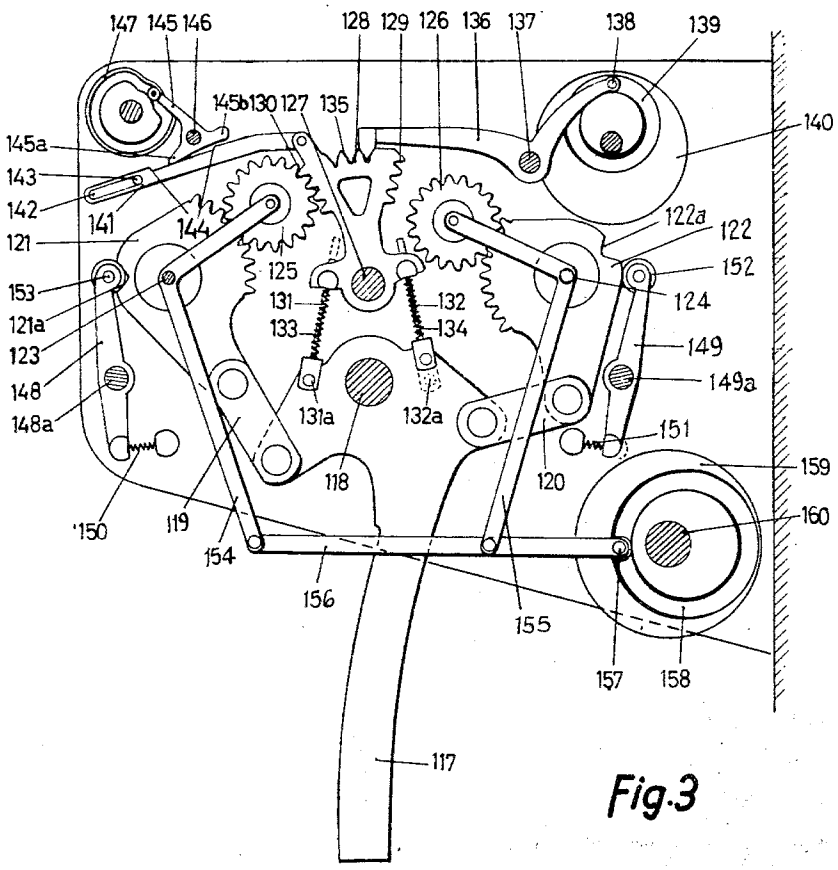


Fig.3

United States Patent Office

3,228,427
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3,228,427

DOBBIES

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Claims priority, application Switzerland, May 5, 1961, 5,353/61
16 Claims. (Cl. 139—66)

This invention relates generally to looms and more particularly to dobbies.

Dobbies for looms with harness motion control mechanism operated by means of paper pattern cards in most cases are equipped with a blade or knife driving device for operating a number of lifting hooks on pattern card sensors which must be engaged by the knife or disengaged from the knife at each working cycle of the loom. In very fast operating looms this results in breakdowns when the lifting hooks of the sensors are not engaged or disengaged quickly enough. In this type of dobby the blade driving device is subject to a great deal of wear and tear.

A principal object of the present invention is the complete elimination of the need of blade driving devices in loom dobbies.

Another object is to provide a new and novel dobby for positive control of harnesses, through a positive linkage system, for shed forming on looms.

A feature of the dobby according to the invention is the provision of a continuous drive connection between the dobby and the individual healds, which are capable of being raised and lowered to two operative positions. At least one planetary gear train is arranged on the dobby in which a planetary gear is driven by a continuously driven member of the dobby. Another gear of the train is operably connected with a harness for motion control thereof in response to actuation of this other gear by the planetary gear. A third part of the train, in the form of a gear-toothed member or rack, is operated into contact with the planetary gear selectively and its teeth held stationary to render the planetary gear effective to actuate the first-mentioned gear member angularly at preselected intervals in timed relationship with the loom operation cycle.

Other features and advantages of the dobby in accordance with the present invention will be better understood as described in the following appended claims, in conjunction with the drawings, in which:

FIG. 1 is a perspective view of a first embodiment of a dobby according to the invention;

FIG. 1*a* is a fragmentary view of a part of the embodiment in FIG. 1;

FIG. 2 is a diagrammatic elevation view of a heald or harness of a loom and is illustrative of the operating connections of the dobby in FIG. 1 to the individual harnesses of a loom; and

FIG. 3 is a diagrammatic elevation view of a portion of a dobby according to the invention.

According to the drawing, FIG. 2, a heald or harness **10** of a loom, not shown, is connected adjacent opposite ends to two rods or links **11** which are connected to cranks **12** pivoted on fixed pins **13**. The lower ends **12***a* of the two arm levers or cranks **12** are connected with one

another by means of a rigid connecting rod **14**. The cranks **12** are connected by means of a power transmission rod **15** with a rocker arm **16** of a dobby illustrated in detail in FIG. 1. It will be understood that the dobby hereinafter described operates a plurality of loom harnesses, not shown. Only one harness is shown in order to simplify the drawing.

As may be seen in the drawing, FIG. 1, the rocker arm **16** and another rocker arm **17** rockably swing about a fixed pivot shaft **18** mounted in the dobby frame. Only two rocker arms, **16** and **17** are shown in FIG. 1, in order to simplify the drawing, however, each heald or harness has a rocker arm associated with it and the dobby has as many rocker arms as the looms have healds or harnesses. The rocker arms are actuated in a manner substantially similar to the manner in which arms **16** and **17** are actuated. Below the pivot shaft **18** pivoted on a pin **19** is disposed a lever **20** pivotally secured to the rocker arm **16** for rocking it to reciprocate the rod **15** and lower and raise the harness **10** in response to intermittent angular rotation of a sun gear **22** as hereafter described. An eccentric ring or bushing **22***a* rotatable with gear **22** is set within a ball bearing **21** in the eccentric lever **20**, FIGS. 1 and 1*a*. The rotation of the bushing **22***a* reciprocates the lever **20** to the left and right so that the rocker arm **16** is reciprocably actuated intermittently.

The eccentric lever **20** has a free end opposite to that pivoted on the pivot pin **19**. The free end has a recess **23** which functions in conjunction with a cam follower or roller **24** fixed to the free end of a jack lever **25**. The jack lever **25** presses the roller **24** into contact with the free end of the lever **20** and into the recess **23** in the lever **20** as the lever is pivoted and in response to the urging of a biasing spring **26**. The jack lever **25** is actuated by the free end of lever **20** which is configured as a camming surface and when the roller **24** enters recess **23** a terminal position of the harness is reached. The sun gear **22** is mounted on a shaft **27** which is fixed in the machine frame and is engaged with the planetary gear **28** which is rotatably mounted by means of a pivot pin **29** on a planetary gear-supporting lever **30** pivoted at one end on the shaft **27**. The end of the planetary gear-supporting lever **30** opposite to the shaft **27** is pivotally secured eccentrically to a reciprocably actuated rod **31** by means of a pin **30***a*.

In a like manner the rocker arm **17** is connected to a lever **32** reciprocably actuated intermittently by a sun gear **33** rotatably driving an eccentrically disposed bushing **33***a* in a ball bearing **34** (FIG. 1). The sun gear **33** is rotatable about a shaft **35** which is fixed in the dobby frame and on which a planetary gear-support lever **36** pivots. The support lever **36** supports a planetary gear **37** mounted to rotate about a pin **38**. The upper end of the support lever **36** is pivotally secured on one end of the reciprocably actuated rod **31** by means of a pin **36***a*. The opposite end of the rod **31** is provided with a roller or cam follower **39** pivotally mounted on a pin **31***a*. The roller is disposed in an eccentric cam groove **40** of an eccentric rotatably driven disc **41**. The eccentric disc **41** is fixed on a drive shaft **42** of the loom continuously rotatably driven during operation of the loom.

The free end of the lever **32** is provided with a recess **23***a* in the manner of the lever **20**. A cam follower or roller **24***a* is pivotally mounted on the free end of a jack lever **25***a* pressing the roller into the recess in response to

a biasing spring, not shown. The arrangement functions as heretofore described with reference to the lever **20**. It will be understood that since the dobby has as many rocker arms as the loom has harnesses there are as many levers comparable to the levers **20, 32** as there are rocker arms. Moreover, for these last-mentioned levers there are respective jack-levers as shown in the drawing each of which is provided with a cam follower such as the end cam follower **24**.

The two planetary gears **28** and **37** are engageable with two arcuate gear racks **43** and **44** respectively. The teeth of these two racks **43** and **44** form a circular segment of internal gear teeth. The gear racks **43** and **44** are mounted to pivot about a fixed pivot shaft **45**. Two springs **46** and **47**, constantly urge the gear racks, **43** and **44** respectively upwardly out of engagement with the planetary gears **28** and **37**.

Since the operation of only two harnesses is being described only the two gear racks **43, 44** bear reference numerals. Actually as shown in the drawing a plurality of gear racks are mounted on the shaft **45**. These gear racks are engageable individually with the planetary gear of a respective planetary gear train with which they are associated for controlling the positive movement of respective harnesses, not shown. Some of the gears of the various planetary gear trains are visible in FIG. 1. A plurality of pivoted control levers are mounted above the arcuate gear racks for controlling engagement of the gear racks with respective planetary gears of the various planetary gear trains. For example, two control levers **48, 49** are mounted above the two arcuate gear racks **43, 44**. A two-arm lever **50** is pivotally mounted on a pin **51** secured to the dobby frame **51***a*. The lever **50** has an arm **50***b* carrying a roller or cam follower **52** on a free end thereof.

The roller **52** bears on the peripheral surface of an eccentric disc or cam **53** which is fixed on a shaft **54** which is driven from the loom and revolves continuously together with the drive shaft **42**. The control levers are pivotally mounted on a common pivot pin or shaft **56** connected to the arm **50***a* of the lever **50**. Each control lever has a short arm on a free end positionable in a position for carrying out control functions in conjunction with other control members of the control mechanism of the dobby as hereafter explained. For example, the control lever **48** has an arm **48***a* on its free end opposite to the end pivoted on pin **56**. This free end lies on the one hand against a stop **57** which is one of a plurality of stops cooperative with the other control levers and which are fixed on the machine frame. On the other hand upwardly extending portions of the free ends of the control levers engage an end of an arm of a set of actuating levers which are pivotally mounted on a shaft **68** fixed in the machine frame. For example, the arm **48***a* of the control lever **48** engages an arm **58***a* of the angle lever **58**. The lever **58** has another arm **58***b* which carries a roller or cam follower **59** which is cooperative with the periphery of an eccentric cam or disc **60**. This eccentric disc **60** is fixed on a shaft **61** of which is rotatably driven.

The control levers above the plurality of arcuate control gear racks are each provided with pins or strikers **62, 63** axially movable on a respective lever and are each connected to a yoke which is secured to a respective arcuate gear rack **43, 44**. Between the arcuate gear racks and the associated control levers are disposed compression springs, for example, two compression springs **64, 65** between two control levers **48, 49** and the associated gear racks **43, 44**. These compression springs are disposed circumferentially of the pins **62, 63** axially guided for axial travel relative to the control levers. The springs tend to move the gear racks and control levers apart. It is to be remembered that other springs, for example, the springs **46, 47** bias the gear racks upwardly.

The control levers to the left of the pivot shaft **56**, for example control lever **49**, lie on the one hand against one of a plurality of stops which are fixed in the machine frame and on the other hand cooperate with actuating levers later explained and described. The control levers to the left are shown in a raised condition since the arcuate gear racks associated therewith are in an ineffective condition, i.e. disengaged from their respective planetary gears. The control levers have upwardly bent arms on their free ends engageable individually with an individual actuating lever when they are being controlled. For example, the lever **49** is positionable against a stop **66** and at the same time works together with an arm **67***a* of an actuating lever **67** which is pivotally mounted on a pivot shaft **69** fixed in the machine frame. The actuating lever **67** has another arm **67***b* which carries a roller or cam follower **70** which bears on the periphery of an eccentric cam disc **71**. The eccentric disc **71** is fixed on a shaft **61***a* which is turned, at the same time as the shaft **61** through a determined angle of rotation with each operation of the control system, that is to say, with each desired alteration in the position of a heald. Thus either the arms **67***a* or **58***a* of the actuating levers, **67** and **58** lie in the zone of contact of the arms **49***a* and **48***a* of the control levers **48, 49** or out of their zone of contact as later described. There are actually a plurality of actuating levers such as actuating lever **67** mounted on the pivot **69** each actuated by an individual cam disc on the driven shaft **61***a* as illustrated. The mode of operation of the mechanism described for moving two of the harnesses is as follows, it being understood that similar mechanisms function similarly at the proper time to move the other harnesses:

The eccentric disc **41**, which is mounted on the drive shaft **42** of the loom, rotates in accordance with the speed of the loom, and with each rotation actuates the rod **31**, by means of the eccentric groove **40**, to the right and to the left. At the same time, the two planetary gear-supporting levers **30, 36** are moved to the left and to the right about their pivot shafts **27, 35** respectively so that pivot pins **29, 38** on which the planetary gears **28, 37** rotate freely, describe an oscillatory arcuate movement relative the shaft **27, 35** of the sun gears **22, 33**. Since the planetary gears **28, 37** rotate freely on their pivot pins **29, 38**, they roll on the sun gears **22, 33** without rotating the latter. Only when the racks **43, 44** are engaged with the planetary gears **28, 37** are the planetary gears forced to roll on the racks while following the oscillatory movement of their pivot pins **29, 38** and thereby rotating the sun gears **22, 33** through 180°, because of their continuous engagement with the sun gears. As a result of this rotation of the two sun gears **22, 33** on their fixed shafts **27, 36** the two levers **20, 32** are shifted in an axial direction by means of the eccentric bushings in their bearings **21, 34** respectively mounted eccentrically to the sun gear wheels **22, 33**.

The axial shifting of the eccentric levers **20, 32** causes the two rocker arms **16** and **17** to be rocked on their common fixed pivot shaft **18** and the respective transmission rods **15**, which are attached to each rocker arm, moves an individual heald which is operably associated therewith. The rocker arm **16**, shown in FIG. 2, moves the heald **10** means of the rod **15** and the arm **17** moves its heald or harness, not shown. In the extreme position of the eccentric levers **20, 32** the rollers **24** and **24***a* enter the recesses **23, 23***a* in the two eccentric levers, **20, 32** each time and thereby ensure that the healds attain their respective terminal positions.

Should it be desired that a given harness be neither raised nor lowered during the next working cycle, the proper one of the gear racks, for example gear racks **43, 44**, is disengaged from its planetary gears, for example, the planetary gears **28, 37**. For example, when the planetary gear **28** is disengaged from the gear rack **43**, then when the lever **30** is pivotally actuated the planetary gear **28** simply turns or rolls on the sun gear **22** without, however, causing this sun gear to rotate. The rocking of the rocker arm **16** on its pivot **18** is also thereby pre-

vented and raising or lowering of the heald **10** is obviated. The raising and lowering of the gear racks **43**, **44** in order to disengage them from the planetary gears **28**, **37** and engage them therewith takes place as follows:

To lower the gear rack **44**, the actuating lever **67** is displaced by the eccentric disc **71** into the position shown in FIG. 1, so that the control lever **49** is between the the stop **66** and the arm **67***a* of the actuating lever **67**. As the eccentric disc **53** rotates to the position shown in FIG. 1, the lever **50** is rotated counter-clockwise on its pivot pin **51**. The pivot shaft **56** common to the control levers is thereby lowered and the control lever **49** is brought into a position where the upwardly extending free end **49***a* can be engaged and held by the lever **67** as the shaft **61***a* rotates and the cam disc **53** actuates the arm **50** to depress the control lever **49** and thereby compress the spring **65** and move the rack **44** downwardly into engagement with the planetary gear **37**.

In order to raise the gear rack **43** thereby to disengage it from its engaged position with planetary gear the actuating lever **58** is rotated by turning the eccentric cam disc **60**, so that the arm **58***a* is moved clear of the engaged position to a position comparable to that assumed by the actuating lever **71** illustrated in FIG. 1 so that it is moved from the zone of engagement of the arm **48***a* of the control lever **48**. The spring **46** then lifts the gear rack **43** out of engagement with the planetary gear **28**. With the arms **48***a* and **58***a* out of the zone of engagement raising and lowering of the pivot shaft **56** which is common to the control levers **48** and **49** has no effect on the gear rack **43**. The control lever **48** is only moved up and down relative to the striker or pin **62** on the gear rack **43**.

If, on the other hand, the gear rack **43** is to be engaged with the associated planetary wheel **28**, then the actuating lever **58** must first be pivoted clockwise as far as it can go by the eccentric disc **60** as it turns so that the arm **48***a* of the control lever **48** is between the arm **58***a* and the stop **57**. The pivot shaft **56**, common to the two control levers **48** and **49**, is moved continually upwardly and downwardly by the driving shaft **54** by means of the eccentric disc **53** and the operating lever **50**. As the pivot shaft moves upwardly and downwardly the control lever arm **48***a* will engage the actuating lever arm **58***a* only with the actuating arm **58** in the position illustrated in FIG. 1 and when the shaft **56** is lowered rack **43** is engaged with the planetary gear **28**.

It can be seen in FIG. 1 that the movement of the shaft **56** has no effect if the actuating levers are rotated out of the zone of engagement as illustrated in the drawing with respect to the set of the actuating levers to the left of the shaft **56**, for example actuating lever **67**. Moreover, as can be seen in FIG. 1 of the drawing the control cams **60**, **71** controlling the two sets of actuating levers are out of phase by 180° so that the groups of actuating levers are controlled alternately and the associated gear racks are actuated into engagement with their planetary gears alternately.

The dobby as described, therefore, controls the loom harnesses positively and carries out control of the harnesses in moving them from a raised to a lowered position and a raised position in timed relationship with the operation cycle of the loom. It will be understood that the profile of the control cams **53**, **60**, **71** can be made to carry out control at high speeds or lesser speeds and the principles of the invention applied to dobbies for all types of looms. The invention eliminates complex pattern card control mechanism in loom dobbies.

A second embodiment of the invention is shown in FIG. 3. It will be understood that the mechanism illustrated in FIG. 3 is that for operating a single heald. The dobby of the invention has as many of the mechanisms shown in FIG. 3 as the loom to which the dobby is applied has harnesses or healds. In the drawing a rocker arm **117** is mounted to pivot about a pivotal axis **118** which is fixed in the machine frame. The rocker arm **117** is connected with a heald or harness, not shown, in a like manner to that by which the rocker arm **16** is connected with the heald **10** illustrated in FIG. 2. The rocker arm **117** is connected through two links **119**, **120** with two gear segments or sectors **121**, **122**. The two gear sectors **121**, **122** are mounted to pivot about pins **123**, **124** fixed in the machine frame and are in engagement with one of two planetary gears **125** and **126** respectively.

The dobby comprises a shaft **127** fixed in the machine frame pivotally mounting a lever **128** which has formed thereon two gear racks **129**, **130** which can each be placed in engagement with one of the two planetary gears **125**, **126**. The lever **128** is connected to the rocker arm **117** through two pins **131**, **132** secured to yokes mounted on the rocker arm by respective pins **131***a*, **132***a*. The pins **131**, **132** serve as guides for two springs **133**, **134** disposed circumferentially thereof and having opposite ends abutting the rocker arm and gear rack lever **128** as shown.

The gear rack lever **128** has three notches **135** on a free end thereof. These notches **135** are engaged by a tooth mounted on the end of a lever **136** which is mounted pivotally on a fixed shaft **137** and which has on an end opposite to the tooth a cam follower or roller **138** which slides in the eccentric cam groove **139** of an eccentric disc or cam **140**. A control lever **141** is pivotally secured to the gear rack member **128** which is guided axially, when the member **128** moves, by means of an elongated slot **142** in which pin **143** is on a free end of the control lever. This control lever **141** has two stops **144** which work in conjunction with another lever **145**. The lever **145** is pivotally mounted on a fixed pin or shaft **146** and is actuated by a control cam **147** as later described.

The two gear segments or sectors **121**, **122** each have a recess or notch **121***a*, **122***a* respectively in which rollers **152**, **153** respectively are intermittently and alternately engaged. The two rollers are mounted on two respective levers **148**, **149** pivotally operable on two pins **148***a*, **149***a* fixed in the machine frame. The levers press their respective rollers **152**, **153** against the outer edge surfaces of the gear sectors under control of biasing springs **150**, **151**. The roller-carrying levers are cammed as the gear sectors move angularly as later described so that the rollers **152**, **153** are inserted into the recesses or notches **121***a*, **122***a* or withdrawn therefrom as illustrated in FIG. 3. When a roller enters a corresponding notch the gear sector cooperative with that roller is held or braked in its angular movement and the corresponding terminal position of the rocker arm **117** is determined so that the corresponding raised or lowered terminal position of the harness being controlled is accurately determined.

The two planetary gears **125** and **126** are pivoted on two crank levers **154**, **155** which pivot on pins **123**, **124** fixed in the machine frame. The lower ends of the two crank levers **154**, **155** are connected with one another by means of a rigid rod **156**. The rod **156** has on a free end thereof a roller or cam follower **157** which follows an eccentric groove **158** of an eccentric disc or cam **159**. The eccentric disc **159** is fixed on a continually rotating drive shaft **160** of the loom, not shown.

The mode of operation of the mechanism described is as follows:

The eccentric disc **159**, which is fixed on the driving shaft **160** of the loom, turns according to the speed of the loom and at each revolution swings the two cranks **154**, **155** on their pivots **123**, **124** so that the planetary gears **125**, **126**, which are fixed to the angle levers **154**, **155**, are also swung on their pivots **123**, **124**. When a gear rack of the gear rack lever **128** is in engagement with a planetary gear, the planetary gear turns itself upon the gear rack and thereby swings the associated gear sector about its pivot so that the rocker arm **117** is rocked about the pivot **118**. For example, when the planetary gear **125** is engaged with the gear rack **130** and the gear rack lever is

held stationary by the lever **136** the planetary gear **125** will pivot or actuate the gear sector **121** so that the rocker arm **117** is actuated through the link **119** in response to the angular movement of the gear sector and the harness is thus moved to one of its operative positions. The angular movement of the rocker arm **117** causes the other gear segment **122** to be pivoted about the pin **124** by means of the link **120**. It being understood the two links **119**, **120** are pivotally secured to the rocker arm. The movement of the gear sector **122** is possible because the planetary gear **126** is not in engagement with the gear rack **129**. Moreover, as a result of the rocking motion of the rocker arm **117**, the spring **133** is compressed and the spring **134** is relaxed. The pins **131** and **132** move axially in the gear rack lever so that the compression and relaxation of the springs is carried out between the gear rack lever **128** and the yokes **131***a*, **132***a* which serve as abutments. The energy stored in spring **133** makes it possible to move the lever **128** clockwise and to engage with the planetary gear **126** when the stop lever **136** is swung out of the notch **135** of the gear rack lever **128** under the control of the eccentric groove **139**.

Whether the gear racks **129**, **130** of the gear rack lever **128** should be engaged with the planetary gears **125**, **126**, can be controlled from a control cam groove **147** in the following manner. In the position shown in FIG. 3, the stop **144** of the control lever **141** strikes against a projection **145***a* of the lever **145** when the gear rack lever **128** is swung clockwise and a complete swing of the lever **128** into engagement with the planetary gear **126** is thereby prevented. The gear rack lever remains centered between the two planetary gears **125**, **126** and is not engaged with either of the two planetary gears **125**, **126**. The rocker arm **117** is in this case not rocked in the course of the next working cycle. A projection **145***b* of the lever **145** is provided for ensuring that the tipping lever **128** does not come into engagement with the planetary gear **125**. The cam groove **147** controls the lever **145** to carry out the stopping function and the release of the control lever **141** so that the gear rack lever **128** can be actuated to the left or right under control of the compression spring **133**, **134** and rocker arm **117** as later described.

At each working cycle the toothed lever **136** is actuated by the continually driven eccentric disc **140** and is disengaged from one of the notches **135** of the gear rack lever **128** so that this can be swung to the left or right according to which of the springs **133** or **134** is compressed and can actuate the gear lever **128** to its alternate position.

The heald, not shown, connected to the rocker arm **117** cannot move from its extreme upper position when its weight is supported on the rocker arm **117** and the gear rack lever is disengaged from both of the planetary gears. The pivotal points of the links **119**, **120** and the centers of the crank pins **123**, **124** lie in a straight line and, therefore, in a dead center position so that no turning moment can develop when the harness or heald is in its terminal raised operative position.

The force for operating the gear rack lever **128** is produced by the rocker arm **117** so that the control mechanism **141**, **145**, **147** does not need to generate this force but solely serves the purpose of control. The tooth pressure which the planetary gears **125**, **126** exert on the gear racks **129**, **130** of the gear rack lever is taken up by the stop lever **136** so that the control mechanism **141**, **145**, **147** is relieved of this pressure also and the control function is easily and accurately carried out.

While preferred embodiments of the invention have been illustrated and described, it will be understood that the invention is in no way limited to these embodiments, and that many changes may be made within the true spirit and scope of the invention, as defined by the following claims.

What I claim and desire to secure by Letters Patent is:

1. A dobby for operating a loom harness operable to two operative positions corresponding to a raised position and a lowered position comprising, a rotatable member driven continuously during operation, a pivotally mounted first member having gear teeth, a planetary gear engaged at least in operation with said first member, means operable by said driven member for rolling said planetary gear on said first member, means for rendering said planetary gear effective to move said first member angularly at preselected intervals in timed relationship with the operation cycle of the loom, and means responsive to the movement of said first member to move said harness to at least one of said operative positions in response to the angular movement of said first member.

2. A dobby for operating a loom harness operable to two operative positions corresponding to a raised position and a lowered position comprising, a rotatable cam driven continuously during operation, a pivotally mounted sun gear, a planetary gear engaged with said sun gear, means operable by said driven cam for rolling said planetary gear on said sun gear, means for rendering said planetary gear effective to drive said sun gear angularly at preselected intervals in timed relationship with the operation cycle of the loom, and means responsive to the movement of said sun gear to move said harness to at least one of said operative positions in response to the angular movement of said sun gear.

3. A dobby for operating a loom harness operable to two operative positions corresponding to a raised position and a lowered position comprising, a rotatable member driven in timed relation with the operation cycle of said loom during operation, a pivotally mounted first member having gear teeth, a planetary gear engaged with said first member, means operable by said driven member for rolling said planetary gear on said first member, means for rendering said planetary gear effective to move said first member angularly at preselected intervals in timed relationship with the operation cycle of the loom, and means responsive to the movement of said first member to move said harness to said operative positions alternately in response to the angular movement of said first member.

4. A dobby for operating a loom harness operable to two operative positions corresponding to a raised position and a lowered position comprising, a rotatable cam driven continuously from the loom during operation, a pivotally mounted sun gear, a planetary gear engaged with said sun gear, means operable by said driven cam for rolling said planetary gear on said sun gear, means for rendering said planetary gear effective to rotate said sun gear at preselected intervals in timed relationship with the operation cycle of the loom, and means responsive to the rotation of said sun gear comprising means to move said harness to said operative positions in response to the angular rotation of said sun gear.

5. A dobby according to claim **4**, in which said means responsive to rotation of said sun gear comprises a pivotally mounted rocker arm, a lever operably actuated by said gear to rock said rocker arm, and a linkage system positively linking said rocker arm to said harness for positive movement to said two operative positions.

6. A dobby according to claim **5**, including a shaft driven from the loom for driving said cam, said cam having means defining eccentric means, means connected to the last-mentioned eccentric means for rolling said planetary gear on said sun gear.

7. A dobby according to claim **5**, in which said means for rendering said planetary gear effective to rotatably drive said sun gear comprises a gear rack selectively engageable with said planetary gear in a stationary position, and control means to control engagement and disengagement of said gear rack with said planetary gear in timed relationship with the operation cycle of the loom.

8. A dobby for operating a harness on a loom comprising, a continuously driven member, a pivotally mounted angularly movable first member having gear teeth, a

planetary gear engaged with said first member, connections from said driven member for rolling said planetary gear on the gear teeth of said first member, a third member having gear teeth selectively engageable with said planetary gear to cause said first member to move angularly, means connected to said harness operably connected to said first member for actuating said harness to an operative position in response to the angular movement of said first member, control means to selectively engage the gear teeth of the third member with said planetary gear in timed relationship with the operating cycle of said loom.

9. A dobby for operating a harness on a loom operable to two operative positions corresponding to a raised position and a lowered position comprising a continuously driven member, a pivotally mounted first member having gear teeth comprising at least one pivotally mounted angularly movable gear sector, a planetary gear engaged with said gear selector, means operable by said driven member comprising connections from said driven member for rolling said planetary gear on the gear teeth of said gear sector, a third member having a gear rack selectively engageable with said planetary gear to cause said gear sector to move angularly, means connected to said harness operably connected to said first member for actuating said harness to at least one operative position in response to the angular movement of said gear sector, and control means to selectively engage the gear rack of said third member with said planetary gear in timed relationship with the operation cycle of said loom.

10. A dobby for operating a harness on a loom comprising, a continuously driven member, a pivotally mounted sun gear, a planetary gear engaged with said sun gear, connections from said driven member for rolling said palnetary gear on said sun gear, a third member having a gear rack selectively engageable with said planetary gear and held stationary relatively thereto to cause said planetary gear to cause said sun gear to move angularly, means connected to said harness operably connected to said sun gear for actuating said harness to an operative position in response to the angular rotation of said sun gear, and control means to selectively engage the gear teeth of said third member gear rack with said planetary gear in timed relationship with the operation cycle of said loom.

11. A dobby for operating a plurality of harnesses on a loom comprising, a member continuously driven in operation, a plurality of planetary gear trains, each planetary gear train comprising a pivotally mounted sun gear having gear teeth, a planetary gear engaged with said sun gear, connections from said driven member for rolling said planetary gear on the gear teeth of said sun gear, for each gear train a third member having gear teeth selectively engageable with said planetary gear and held stationary relatively thereto to cause said planetary gear to move said sun gear angularly, for each harness means connected to said harness and operably connected to said sun gear for actuating said harness to two operative positions corresponding to a raised position and a lowered position in response to the angular movement of said sun gear, and control means to selectively engage the gear teeth of said third members with said planetary gears in timed relationship with the operation cycle of said loom.

12. A dobby for operating a plurality of harnesses on a loom comprising, a member continuously driven in operation, a plurality of planetary gear trains, each gear train comprising a pivotally mounted sun gear having gear teeth, a planetary gear engaged with said sun gear connections from said driven member for rolling said planetary gear on the gear teeth of said sun gear, for each gear train a third member having a gear rack having gear teeth selectively engageable with said planetary gear and held stationary relatively thereto to cause said planetary gear to move said sun gear angularly, for each harness means connected to said harness and operably connected to said sun gear for actuating said harness to two operative positions corresponding to a raised position and a lowered position in response to the angular movement of said sun gear, control means to selectively engage the gear rack teeth of the third members with said planetary gears in timed relationship with the operation cycle of said loom.

13. A dobby for operating a harness on a loom operable to two operative positions corresponding to a raised position and a lowered position comprising, a member continuously driven in operation, a plurality of planetary gear trains each comprising a pivotally mounted gear sector having gear teeth, a planetary gear engaged with said gear sector connections from said driven member for rolling said planetary gear on the gear train of said gear sector, a third member having two gear racks having gear teeth selectively engageable alternately with one of said planetary gears and held stationary relatively thereto to cause the planetary gear engaged to move a respective gear sector angularly, means connected to said harness operably connected to said gear sectors for actuating said harness to two operative positions corresponding to a raised position and a lowered position in response to the angular movement of said gear sectors, and control means to selectively engage the gear teeth of said third member with said planetary gears in timed relationship with the operation cycle of said loom.

14. A dobby for operating a loom harness operable to two operative positions corresponding to a raised position and a lowered position comprising, a rotatable member driven rotatably continuously during operation, a pivotally mounted first member having gear teeth comprising at least one pivotally mounted gear sector, a planetary gear engaged with said gear sector, means operable by said driven member for rolling said planetary gear on said gear sector, means for rendering said planetary gear effective to move said first member angularly at preselected intervals in timed relationship with the operation cycle of the loom and means responsive to the movement of said first member to move said harness to at least one of said operative positions in response to the angular movement of said first member. means comprising a gear rack for rendering said planetary gear effective to move said gear sector angularly at preselected intervals in timed relationship with the operation cycle of said loom, and means responsive to the movement of said gear sector to move said harness to at least one of said operative positions in response to the angular movement of said gear sector.

15. A dobby for operating a loom harness operable to two operative positions corresponding to a raised position and a lowered position comprising, a rotatable cam driven continuously during operation, a pair of pivotally mounted gear sectors each having peripheral teeth, a pair of planetary gears each engaged with one of said gear sectors, means comprising a pair of cranks pivotally mounting said planetary gears and operable by said driven cam for rolling said planetary gears on said gear sectors, means comprising pivotally mounted means having two gear racks engageable alternately with a respective planetary gear for rendering said planetary gears effective alternately to move said gear sectors angularly alternately at preselected intervals in timed relationship with the operation cycle of said loom, and means responsive to the movement of said gear sectors to move said harness alternately to said operative positions in response to the angular movement of said gear sectors.

16. A dobby for operating a loom harness operable two operative positions corresponding to a raised position and a lowered position comprising, a rotatable cam driven continuously during operation, a pair of pivotally mounted gear sectors each having gear teeth, a pair

of planetary gears each engaged with one of said gear sectors, means comprising a pair of cranks pivotally mounting said planetary gears operable from said driven cam for rolling said planetary gears on said gear sectors, means comprising means having two gear racks engageable alternately with a respective gear for rendering said planetary gears effective to move said gear sectors angularly alternately at preselected intervals in timed relationship with the operation cycle of said loom, means for holding said gear racks stationary when engaged with said planetary gears, and means responsive to the movement of said gear sectors to move said harness alternately to said operative positions in response to the angular movement of said gear sectors.

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