F. LEEMING.

LOOM DOBBY.

APPLICATION FILED FEB. 15, 1917.

1,371,564.

Patented Mar. 15, 1921.

5 SHEETS—SHEET 1.

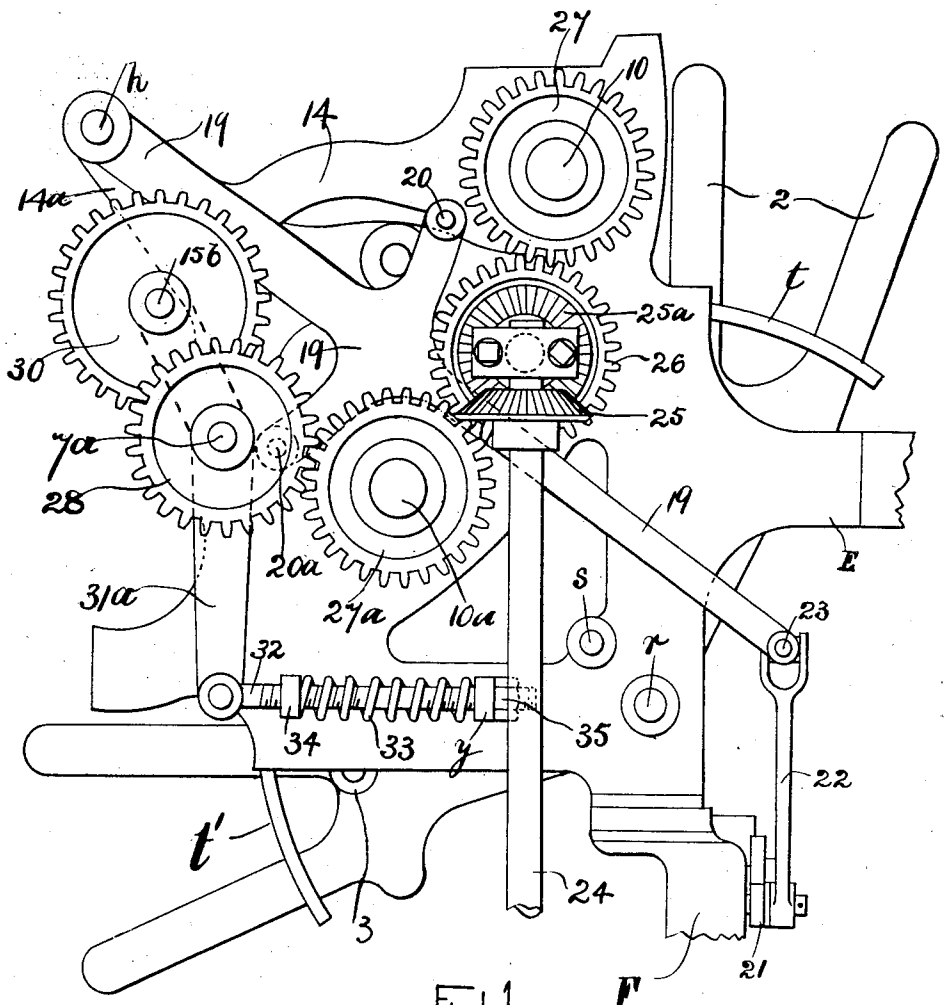


Fig. 1

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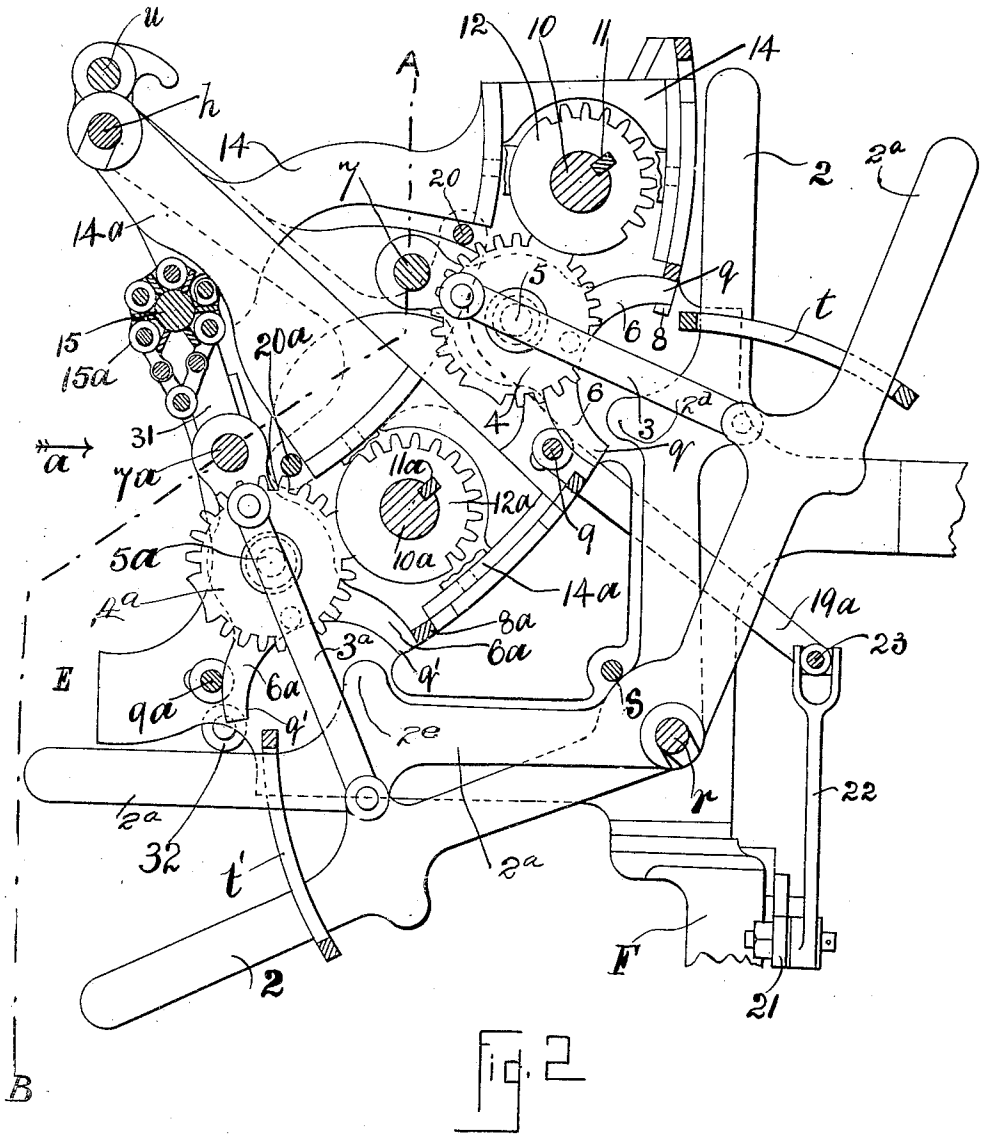


Fig. 2

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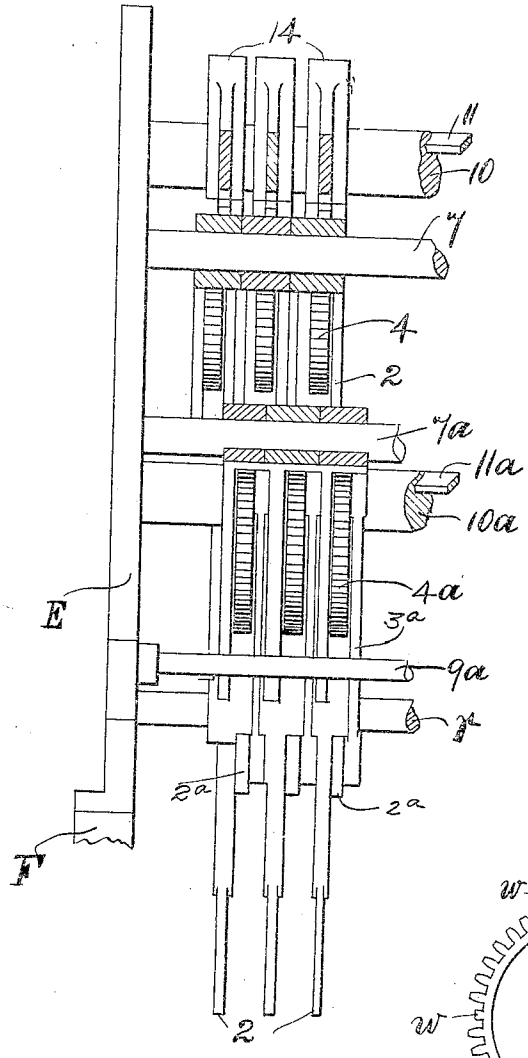


Fig. 3

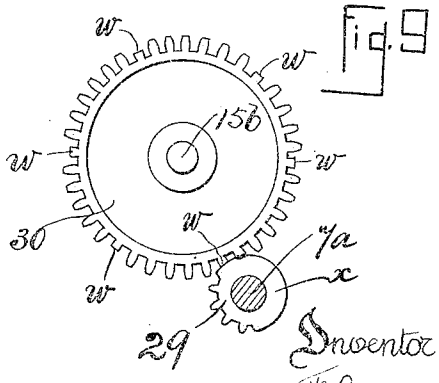


Fig. 9

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5 SHEETS—SHEET 4.

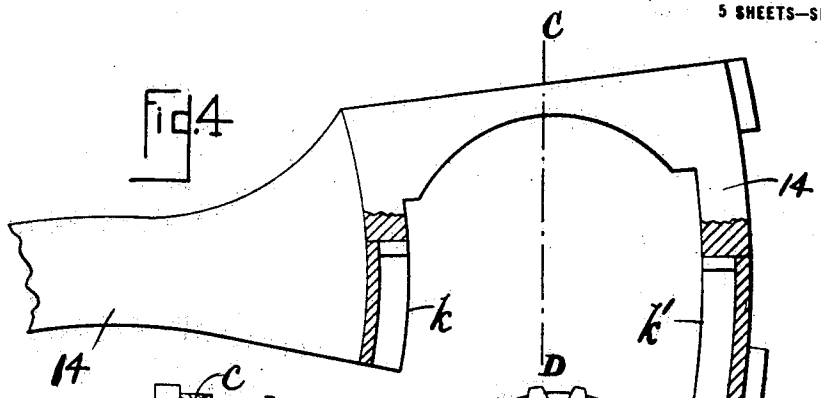


Fig. 4

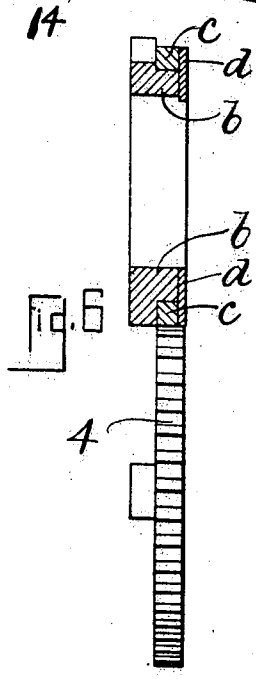


Fig. 6

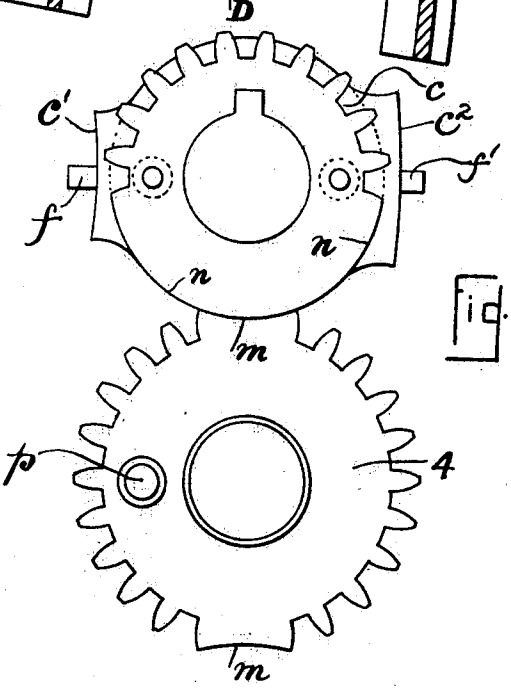


Fig. 5

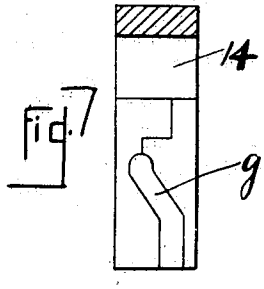


Fig. 7

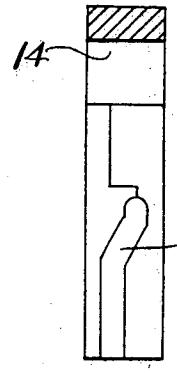


Fig. 8

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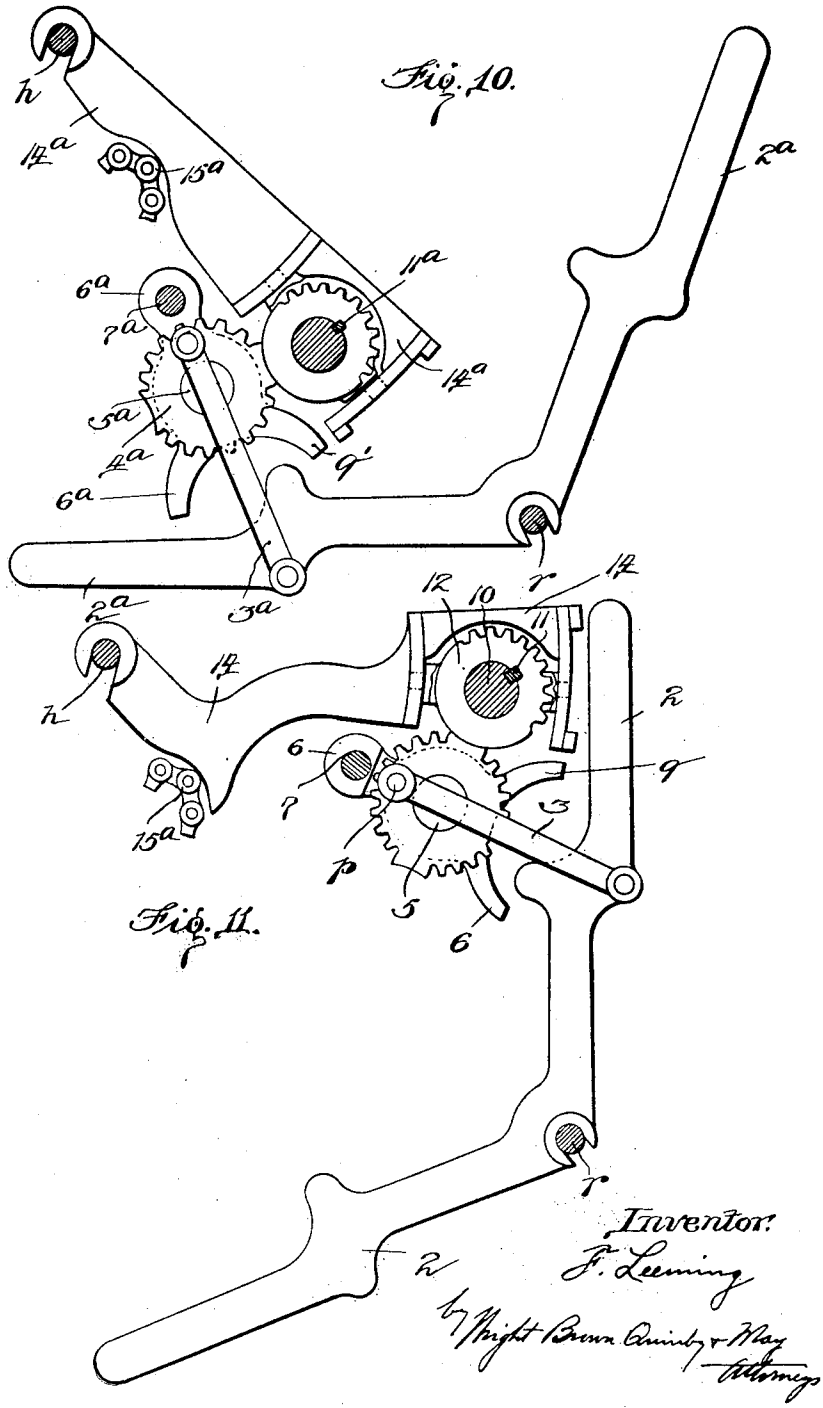
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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LOOM-DOBBY.

1,371,564. Specification of Letters Patent. Patented Mar. 15, 1921.

Application filed February 15, 1917. Serial No. 148,848.

To all whom it may concern:

Be it known that I, FRANK LEEMING, a subject of the King of Great Britain, and resident of Guiseley, near Leeds, in the county of York, England, have invented a certain new and useful Improvement in Loom-Dobbies, of which the following description, having reference to the accompanying sheets of drawings, is a specification.

My invention relates to dobbies wherein toothed crank wheels are made use of for transmitting motion to the healds or heddles in looms for weaving. Heretofore these toothed crank wheels have usually been arranged with their operating part and connections thereto, so that their change of position has been effected by the pattern surface mechanism moving said toothed crank wheels into gear with their operating partly toothed barrels. In such cases, therefore the said movements of the crank wheels by the pattern surface have had to be effected while yet said toothed crank wheels were sustaining the weight of the healds and warp threads which they had to operate, hence said weight of the healds and warp threads and other forces acting thereon had a detrimental effect upon the pattern surface which controls and moves their said operating crank wheels as is well known.

To overcome this objectionable feature it has been proposed to arrange said crank wheels to rotate about fixed centers and in my invention I use this arrangement and I provide improved devices for controlling and carrying out the rotary motions of said crank wheels. No weight of warp or healds or any force in connection therewith in any way interferes with the free movement of the pattern surface mechanism which controls the actions of said crank wheels.

In order that my said invention may be readily understood, I have hereunto appended sheets of drawings illustrative thereof to which by figures and letters, reference is made in the following description:—

Figure 1 is a back elevation of dobby mechanism produced in accordance with my invention.

Fig. 2 is a back sectional elevation of the parts illustrated by Fig. 1.

Fig. 3 is a sectional end elevation as seen in the direction indicated by the arrow *a* and as taken on line A—B of Fig. 2.

Fig. 4 is a sectional front elevation of a lever actuated by the pattern surface mechanism the same being shown in detail and hereinafter more particularly described.

Fig. 5 is a front elevation of a partly toothed wheel and parts in connection therewith mounted within and operated by the lever shown by Fig. 4. Engaging with said partly toothed wheel is illustrated a partly toothed crank wheel.

Fig. 6 is a sectional end elevation of the partly toothed wheel and crank wheel shown by Fig. 5.

Figs. 7 and 8 are sectional end elevations taken on line C D of portions of the lever illustrated by Fig. 4 and as seen in opposite directions in order to illustrate inclined formations made edgewise in said levers for the purposes hereinafter described.

Fig. 9 illustrates parts in detail hereinafter explained.

Fig. 10 is an elevation of the front jack lever and the several parts operating in connection with it, while Fig. 11 is a similar elevation of the next jack lever behind it also with the several parts in connection with it. In both cases the frame-work is omitted for the sake of clearness.

E indicates the framesides of a dobby and F a portion of the framework of a loom upon which said dobby mechanism is mounted.

The type of dobby mechanism to which my invention relates is the one in which toothed crank wheels are made use of for operating the jack levers.

In the usual mechanism these crank wheels are operated by continuously rotating partly toothed drums, however instead of making use of said partly toothed drums I make use of the devices hereinafter fully described.

The jack levers 2 and 2*a* in the dobby are, (as in the ordinary manner) pivoted upon a cross shaft *r* which extends from one frameside to the other frameside E of said dobby. These jack levers 2, 2*a* are connected in alternate positions to the toothed crank wheels 4 and 4*a* in such order that the series of crank wheels 4 are connected to the vertical arms 2*b* of the levers 2 by their connecting rods 3 while the crank wheels 4*a* are connected to the horizontal arms 2*c* of the levers 2*a* by the connecting rods 3*a*. The shape or formation of the curved parts on the levers 2 and 2*a* where the pivotal connections for their respective rods 3 and 3*a*

are situated, is as shown by Fig. 2 so that the extending parts 2*d* and 2*e* respectively may cover said pivotal connections in position as is well known to the makers of dobbies. The arrangement of the crank wheels 4 and 4*a* to occupy alternate position is made use of in order to give space for the altered or new construction of operating devices for the crank wheels 4 and 4*a* while yet keeping all of the said operating devices within the width of the series of jack levers 2 and 2*a*, that is to say, by placing the two sets of crank wheels 4, 4*a* in the two positions described I have in each case the full width of two levers 2, 2*a* in which to place the operating devices for the crank wheels 4 and in like manner I can again have two sets of operating devices for the crank wheels 4*a* thus the width or pitch of the jack levers 2, 2*a* is not increased by the employment of my improved mechanism, but said width is kept within the width of the healds that the jack levers have to operate as though the ordinary devices were employed for operating said crank wheels 4 and 4*a*.

In cases where the width of the healds is not limited, then only one set of crank wheels may be used for operating the jack levers each of which in such circumstances might be equal in width to the full width of its operating crank wheel and the parts which rotate said crank wheel.

As is well known in dobby mechanism of this type, as heretofore constructed, it is usual to make use of partly toothed drums for operating the toothed crank wheels, said partly toothed drums being rotated continuously during the movements of the dobby mechanism. In place of these drums I now make use of the continuously rotating cross shafts 10, 10*a* which have mounted upon them the series of partly toothed wheels 12 and 12*a* respectively. These wheels 12 and 12*a* have each an annular piece *c* which is mounted upon a hub *b* extending laterally therefrom. The series of partly toothed wheels 12. 12*a* are arranged to slide longitudinally over their respective shafts 10, 10*a* but have the continuous motion of said shafts 10, 10*a* transmitted to them by means of the keys 11 and 11*a* which are secured to said shafts 10, 10*a* and which take through keyways in the wheels 12, 12*a*.

The continuous rotary motion of the shafts 10, 10*a* is derived from any motor shaft of the loom through the medium of the vertical shaft 24, bevel gears 25 and 25*a*, intermediate wheel 26 (which is fixed to so as to rotate with the bevel wheel 25*a* and run loosely upon their supporting shaft or pin) and wheels 27 and 27*a*, the latter being fixed upon the shafts 10 and 10*a* respectively.

The series of crank wheels 4, 4*a* are respectively mounted upon studs 5, 5*a* carried by appropriate brackets 6, 6*a* so that they may revolve freely upon said studs 5, 5*a* when actuated by their respective partly toothed wheels 12 and 12*a*. The brackets 6, 6*a* are mounted upon the supporting shafts 7, 7*a* which extend from the frame side E on one side of the dobby to that on the other in order to support said brackets 6, 6*a*; while the extending and the forked ends *g*, *g*¹ of the bracket 6, 6*a* respectively enter supporting grids 8 and 8*a* which retain them in their proper positions laterally. The adjustable cross shafts or bars 9, 9*a* are employed to secure and support the brackets 6, 6*a* in position relatively with their operating partly-toothed-wheels 12 and 12*a*.

As hereinbefore stated each partly toothed wheel 12 and 12*a* has its respective annular piece *c* mounted upon a hub *b* (see Fig. 6) which is formed laterally upon each of said wheels 12, 12*a* and this annular piece *c* is retained in position thereon by a flange *d* fixed on the outer end of the hub *h* so that while the wheel 12 taking within said annular piece may freely rotate therein it may yet have motion transmitted to it by its annular piece *c* to cause it to move longitudinally over its shaft 10 or 10*a*.

Each of the annular pieces *c* has pins or projection *f*, *f*¹ extending radially or diametrically from it (as shown by Fig. 5) so that they (said pins *f*, *f*¹) may take into slots *g*, *g*¹ formed in their respective lever 14 or 14*a*, while the outer edges *c*¹, *c*² of the annular pieces *c* are curved as shown by Fig. 5 in order to take against the curved surfaces *k*, *k*¹ formed in each of the aforesaid levers 14 and 14*a* as shown by Fig. 4. The fitting of these surfaces *c*¹, *c*² against the surfaces *k*, *k*¹ is to permit freedom of motion for the levers 14, 14*a* while yet holding the annular pieces *c* against rotation.

As will be observed the slots *g*, *g*¹ are of the inclined formation illustrated by Figs. 7 and 8 in order that the actions of said inclines (as the lever 14 or 14*a* upon which they are formed is being raised or lowered, that is to say is being moved radially about its respective shaft 10 or 10*a*) will have the effect of causing the pins *f*, *f*¹ to move in a direction longitudinally over the shaft 10, 10*a* thus the said actions will transmit motion in a lateral direction to the partly toothed wheels 12 and 12*a*.

This lateral motion of the wheels 12 and 12*a* takes them into and out of gear (as the case may be) with their respective crank wheels 4 and 4*a* in order to transmit motion thereto or to leave same inoperative as may be desired and as is controlled by the pattern surface mechanism.

The two series of levers 14 and 14*a* which

actuate the annular pieces *c* are shaped in the two forms illustrated by Fig. 2, so that the pattern surface mechanism 15 may act thereon causing said lever 14 or 14*a* to rise or fall as the case may be and as is well understood. The rising movement of the levers 14 or 14*a* is arranged to have the effect of sliding their partly toothed wheels 12 or 12*a* upon their respective shafts to cause them to engage with its respective crank wheel 4 or 4*a* thereby giving motion to its jack levers and their respective healds in manner well known. This rising movement of the levers 14 and 14*a* is preferably employed for putting the partly toothed wheels into effective operation with their crank wheels, since by this arrangement a bowl 15*a* (or if peg lags are employed then a peg in the lag) on the pattern surface mechanism 15 will indicate to bring about a movement of the heald either causing said heald to rise or to descend from its raised position as the case may be. By this arrangement it is always remembered that to give motion to any heald at any time, a bowl (or a peg) must be placed in the pattern surface to effect this, whereas when the heald has to remain stationary then its pattern surface is blank or has no bowl (or peg).

The toothed crank wheels 4, 4*a* have certain parts of their peripheries *m* (see Fig. 5) formed to fit upon or take against the toothless parts *n* of the partly toothed wheels 12 or 12*a* so that on each engagement of these teeth with the teeth on the crank wheels 4 or 4*a* these are rotated through half a revolution and are then arrested and held from further movement by thus fitting against the said toothless parts of the wheels 12 or 12*a*. The crank pins *p* when their wheels 4 or 4*a* are thus stationary are arranged so that the forces acting through their connecting rods 3, 3*a* do so in a direct line through the center of the crank wheel thus said forces are withstood by the axial studs of the crank wheels 4 or 4*a* on account of their "dead center" positions.

When the partly toothed wheels 12 or 12*a* are moved laterally out of gear with their crank wheels 4 or 4*a* then the annular pieces *c* are brought into position so that the parts *m* on said crank wheels 4 or 4*a* may take against the properly curved or semicylindrical part formed upon said annular pieces *c* thereby to be held against rotation as they are when in contact with the toothless parts *n* of their operating wheels 12, 12*a*.

The cross shafts 9, 9*a* are held in position by springs when it is desired to have such means of release in order that should the partly toothed crank wheels not properly engage with their partly toothed driving wheels then said springs yield to prevent breakages. As such yielding spring devices are not absolutely necessary they are not illustrated by the drawings.

To permit the jack levers 2, 2*a* to be readily detached or removed from position in the machine their pivotal openings are made to span their shaft *r* upon which they are mounted and upon which they are retained by the cross bar *s* in manner well known. The said jack levers 3 are also guided in their paths by their vertical and horizontal arms respectively taking through the grids or guiding parts *t*, *t*¹.

The levers 14, 14*a* are made to span their pivotal shaft *h* upon which they are mounted so that by turning the holding bar *u* out of the position shown by Fig. 2 into a position beneath the shaft *h* any one or all of said levers 14, 14*a* may be freely removed from the machine.

As means for enabling the healds to be brought to a central position I make use of levers 19 and 19*a* which are pivoted upon the cross bar *h* so that I may mount upon lateral arms extending from said levers 19, 19*a* other cross bars 20, 20*a* which will take beneath the two series of levers 14, 14*a* respectively in order that when the hand lever 21 (which extends from the front to about a central position in the loom) is operated by the weaver it would cause the levers 19, 19*a* to rise by being coupled thereto through the medium of the connecting rod 22 and across shaft 23 which extends between said levers 19, 19*a* (which are situated at the back and front of the machine) thus when said bars 20, 20*a* are raised the series of partly toothed wheels 12 and 12*a* will be moved laterally and will be caused to engage with their respective crank wheels 4 and 4*a*. When the wheels 12, 12*a* and 4, 4*a* are thus brought into gear, the weaver will throw out of gear the well known clutch which couples the vertical driving shaft 24 to the motor shaft of the loom, at which time all the rotary parts of the machine, including the vertical shaft 24 are free to be rotated by hand. To enable the weaver to manually rotate said rotary parts a hand-wheel (of well known formation and therefore not shown in the drawings) is fixed upon the front outer end of the shaft 10*a*, hence when said hand wheel is rotated by the weaver all the crank wheels are also rotated and on these latter being turned a quarter of a revolution all the threads of warp are brought to a central position.

The pattern barrel 15 has intermittent rotary motion transmitted to it from the shaft 10*a* through the medium of the wheel 27*a* and the wheel 28 which latter is mounted to revolve loosely upon the end of the fixed shaft 7*a*. To the rear of this wheel 28 is fixed a partly toothed wheel 29 (see Fig. 9) which is arranged to transmit motion to a wheel 30 mounted upon the shaft 15*b* of the

pattern barrel 15. This wheel 30 has certain of its teeth at *w* made shorter than the others so that when brought into the position shown by Fig. 9 the two teeth adjoining one or other of the short teeth *w* will come into contact with the toothless part *x* upon the partly toothed wheel 29 by which means as the wheel 29 rotates it transmits intermittent motion to the wheel 30 and after such motion locks said wheel in position as will be understood.

The pattern barrel 15 is mounted upon the arms of levers 31 and 31*a* which are also loosely mounted upon the fixed shaft 7*a* in order that by the connecting rods 32 at the lower ends of said levers 31 taking through openings in fixed projections *y* extending from the framework E a spring 33 may be mounted on each to yield provided for any cause it is desirable that the pattern barrel 15 should move away from the levers 14, 14*a* rather than cause damages thereto or to other parts.

The adjusting of the tension of the springs 33 is effected by the nut 34 while the adjustment of the position of the pattern barrel 15 is effected by the nut 35.

Since dobby mechanism constructed as hereinbefore described is of a substantial character and occupies comparatively little space, portions of same may be made use of to carry out the movements of change shuttle boxes as will be understood.

Such being the nature and object of my said invention what I claim is:—

1. In a loom dobby, jack levers, a support for said jack levers, toothed-crank-wheels, connecting rods, mounted upon said jack levers, to connect same to said toothed-crank-wheels, brackets for supporting said toothed-crank-wheels, partly toothed wheels engaging with said toothed crank-wheels, shafts upon which said partly-toothed wheels are splined, annular pieces mounted upon the hubs of said partly toothed wheels, levers having inclined slots to receive projections extending from said annular pieces and pattern surface mechanism for operating said levers.

2. In a loom dobby, jack levers, a support for said jack levers, toothed crank-wheels, horizontally disposed connecting rods coupled to the vertical arms of certain of said jack levers and vertically disposed connecting rods coupled to the horizontal arms of the other jack levers, two series of toothed crank wheels one series having the horizontally disposed connecting rods coupled to them while the other series have the vertically disposed connecting rods coupled to them, partly toothed wheels for engagement with said crank wheels, rotary shafts upon which said partly toothed wheels are mounted, means for moving said partly toothed wheels longitudinally over said shafts and means for controlling said movements.

3. In a loom dobby, jack levers, a support for said jack levers, toothed crank wheels, connecting rods mounted upon said jack levers to connect same to said toothed crank wheels, a separate fixed support for each of said toothed crank wheels, partly toothed wheels for engaging with said toothed crank wheels, shafts for supporting and rotating said partly toothed wheels, annular pieces mounted upon the hubs of said partly toothed wheels, levers having inclined slots to receive projections extending from said annular pieces, and pattern surface mechanism for operating said levers.

4. In a loom dobby, jack levers, a support for said jack levers, toothed crank wheels, connecting rods for coupling said jack levers to said toothed crank wheels, fixed supports for said toothed crank wheels, partly toothed wheels for engaging with said toothed crank wheels, said toothed crank wheels having hubs or parts adjoining them which will engage with the toothed crank wheels to hold same against rotation, shafts upon which said partly toothed wheels are splined, annular pieces mounted upon the hubs of said partly toothed wheels, levers having inclined slots to receive projections extending from said annular pieces and pattern surface mechanism for operating said levers.

5. In a loom dobby, jack levers, a support for said jack levers, toothed crank wheels, connecting rods for coupling said jack levers to said toothed crank wheels, fixed supports for said toothed crank wheels, partly toothed wheels for engaging with said toothed crank wheels, said toothed crank wheels having hubs or parts adjoining them which will engage with the toothed crank wheels to hold same against rotation, shafts upon which said partly toothed wheels are splined, annular pieces mounted upon the hubs of said partly toothed wheels, levers having inclined slots to receive projections extending from said annular pieces, cross bars for engaging the levers which have inclined slots, levers upon which said cross bars are mounted and a hand lever and connecting rod device for operating said levers.

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