No. 691,608. Patented Jan. 21, 1902.

E. W. DAVENPORT & H. BARDSLEY.

PATTERN MECHANISM FOR LOOMS.

(Application filed Sept. 25, 1901.)

(No Model.) 3 Sheets—Sheet 1.

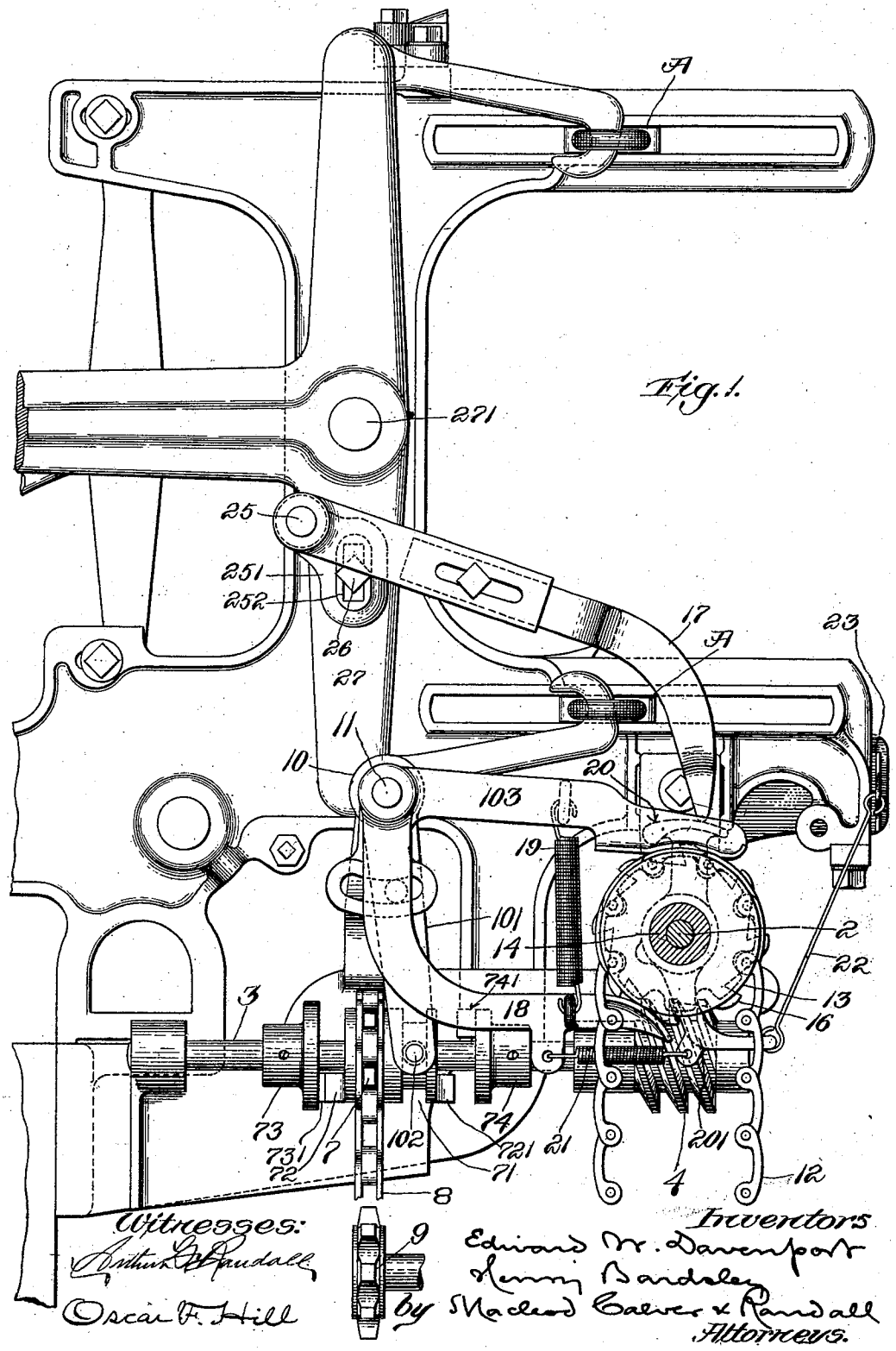


Fig. 1.

Witnesses:
Arthur L. Randall
Oscar F. Hill

Inventors
Edward W. Davenport
Henry Bardsley
by Macleod Calver & Randall
Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.) 3 Sheets—Sheet 2.

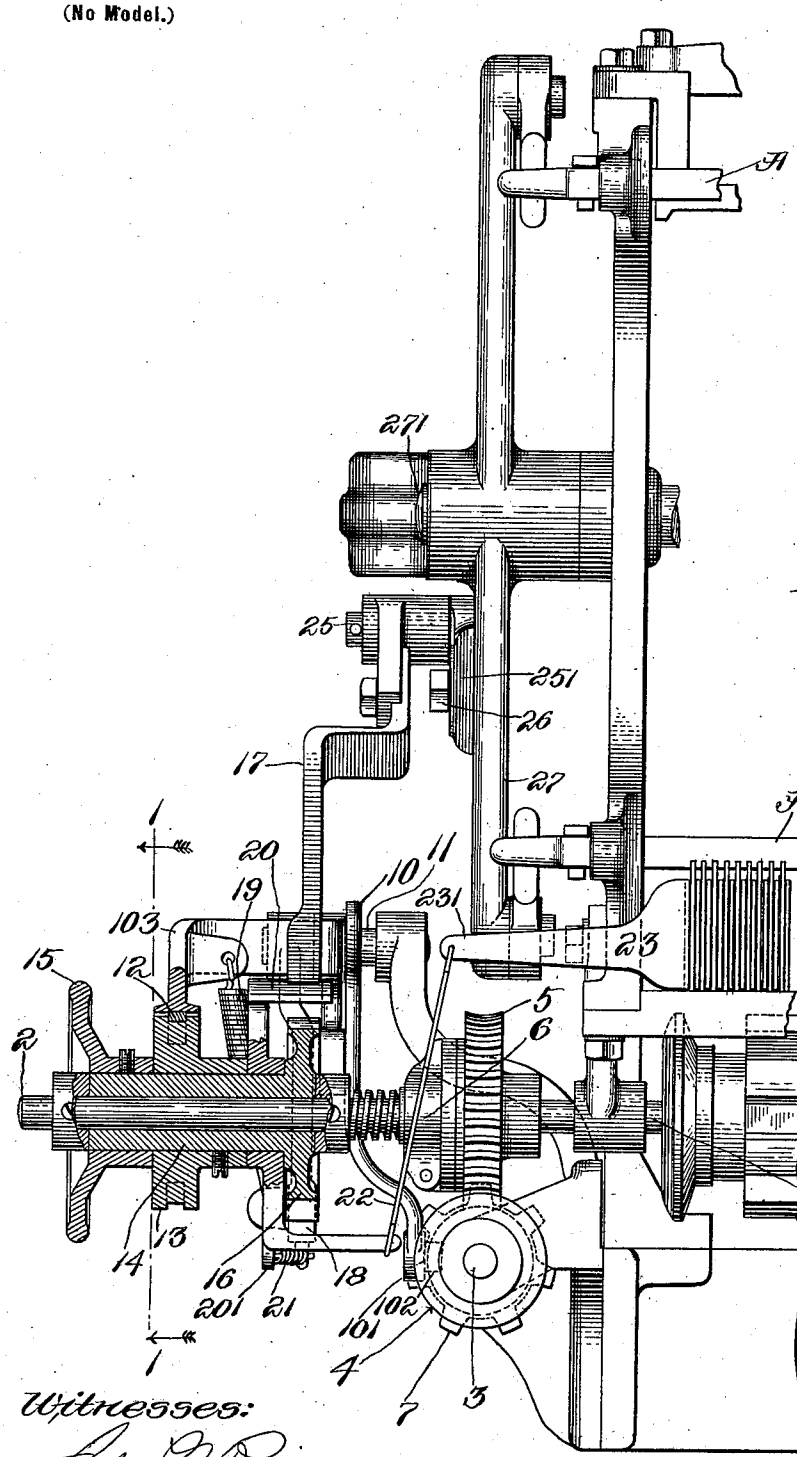


Fig. 2.

Witnesses:
Arthur D. Randall
Oscar F. Hill

Inventors
Edward W. Davenport
Henry Bardsley
by Macleod Calver & Randall
Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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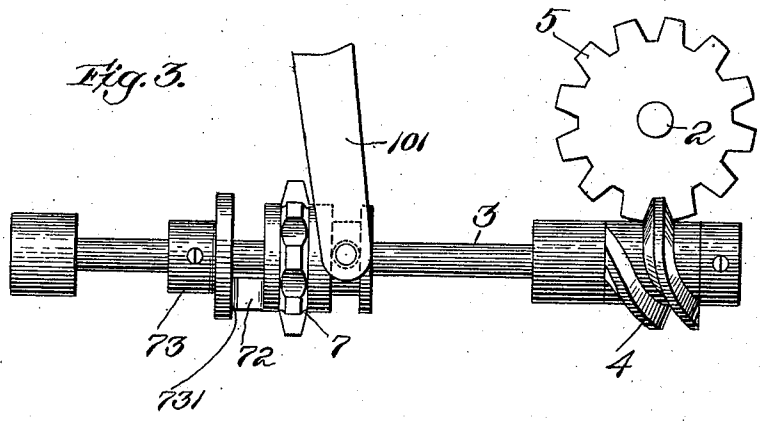
E. W. DAVENPORT & H. BARDSLEY.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 3.



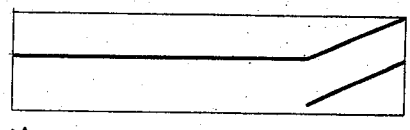


Fig. 4.

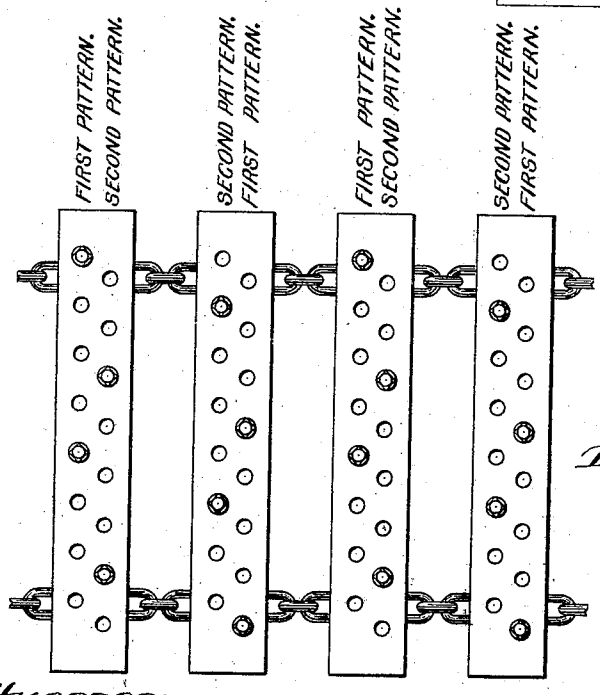


Fig. 5.

Witnesses:
Arthur G. Randall
Oscar F. Hill

Inventors
Edward W. Davenport
Henry Bardsley
by Macleod Calver & Randall
Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWARD W. DAVENPORT AND HENRY BARDSLEY, OF PROVIDENCE, RHODE ISLAND, ASSIGNORS TO CROMPTON & KNOWLES LOOM WORKS, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

PATTERN MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 691,608, dated January 21, 1902.

Application filed September 25, 1901. Serial No. 76,463. (No model.)

To all whom it may concern:

Be it known that we, EDWARD W. DAVENPORT and HENRY BARDSLEY, citizens of the United States, residing at Providence, in the county of Providence, State of Rhode Island, have invented a certain new and useful Improvement in Pattern Mechanism for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 shows in side elevation, partly in section on line 1 1 of Fig. 2, a portion of a dobby for looms and represents an embodiment of our invention applied thereto. Only such parts of the dobby are shown as are required for the purpose of making clear the nature and relations of the invention. Fig. 2 shows in end elevation the parts which are represented in Fig. 1, the master pattern devices being partly in vertical transverse section. Fig. 3 is an elevation of certain parts showing them arranged to act as a multiplier. Fig. 4 is a diagram of the worm which is employed in the multiplier. Fig. 5 shows in plan a number of bars of the main pattern-chain and illustrates the arrangement of the indicators of the two weaves or patterns upon the said bars.

At 1 is represented part of a loom pattern-cylinder and at 2 the shaft thereof. The said pattern-cylinder is actuated by means of a "worm-drive," comprising, essentially, a worm-shaft 3, a worm 4 upon the worm-shaft 3, and a worm-wheel 5 upon the shaft 2. The said worm-wheel 5 is shown as connected with the shaft 2 by means of a clutch 6, so that the worm-wheel and shaft shall rotate in unison normally. The said clutch is of the character of the clutch which usually is employed in the like connection, it being, as heretofore, arranged to yield and permit relative movement of the shaft and worm-wheel—as, for instance, when power is applied by the weaver by hand to the usual hand-wheel (not shown) of the pattern-cylinder in manually effecting a rotary shift of the pattern-cylinder. Worm-shaft 3 has in connection therewith a power-receiving wheel 7. The said wheel 7 is in practice arranged to be rotated by power transmitted through suitable connections from one of the rotating parts of the loom in connection with which the invention is employed. Herein the said wheel 7 is represented as a chain-wheel or sprocket-wheel, and in connection therewith we have shown part of a sprocket-chain 8, which latter is shown as actuated by a driving chain-wheel or sprocket-wheel 9. For the purposes of the invention the wheel 7 is mounted upon the worm-shaft 3 with capacity to turn independently of the latter; but in connection therewith we employ clutching devices, by means of which the wheel 7 and worm-shaft 3 are connected normally, so as to cause them to turn in unison.

The clutching of the wheel 7 with the worm-shaft 3 occurs under the control of auxiliary or master pattern devices, as we will now proceed to explain. The wheel 7 itself is constructed to constitute one member of a clutch, the remainder of the clutch being connected with the shaft 3. In the illustrated embodiment of the invention the said wheel is mounted on shaft 3 with capacity to move lengthwise of the shaft, while the remainder of the clutch is fast with the said shaft. Hence movement of the wheel 7 lengthwise of the shaft will open and close the clutch.

For the actuation of the movable clutch member constituted by wheel 7 we form the hub of the said wheel with a circumferential groove 71, and we provide a shifter or shifter-lever 10, which we hang or pivot upon a fixed supporting-stud 11, one arm 101 of the said shifter or shifter-lever depending from the said pivotal stud 11 and being provided with a pin or pins 102, entering the said groove 71 in the hub of the wheel 7. The other arm 103 of the said shifter or shifter-lever extends horizontally into position to be acted upon by the indicators of the auxiliary or master pattern. In the present embodiment of the invention the auxiliary or master pattern is shown constituted by a pattern-chain 12.

13 is a pattern-cylinder by means of which the master pattern-chain 12 is supported and operated. The said pattern-cylinder is attached to or forms part of a sleeve 14. The said sleeve is fitted to an outward prolongation of the shaft 2 of the pattern-cylinder 1

and is intended to turn independently upon the said shaft 2. The sleeve 14 is provided with a hand-wheel 15, by means of which the cylinder 13 may be turned manually in effecting rotary shift of the master pattern-chain 12. In order to enable the cylinder 13 of the master pattern-chain 12 to be rotated automatically during the working of the mechanism, we attach to the said cylinder 13 or to the sleeve 14 a ratchet-wheel 16 and employ a reciprocatory pawl 17, which by its engagement with the teeth of the ratchet-wheel 16 turns the pattern-cylinder 13 and advances the master pattern-chain 12 intermittingly.

18 is a check-finger or check-lever hung loosely upon the pivotal stud 11 and projecting into proximity to the teeth of the ratchet-wheel 16. The free extremities of the horizontal arm 103 of the shifter or shifter-lever and the check-finger or check-lever 18 are located at opposite sides of the axis of the shaft 2, and they are connected with each other by means of a contracting spiral spring 19, which latter holds the check-finger or check-lever in contact with the teeth of the ratchet-wheel (or it may be with the face of a check-wheel of usual form applied to the sleeve 14) and also holds the horizontal arm 103 of the shifter or shifter-lever in contact with the indicators of the master pattern-chain 12.

We provide means for controlling the actuation of the pattern-cylinder 13 and master pattern-chain 12, the said means including a pawl rest or shield 20. When in position, the said shield holds the pawl 17 out of engagement with the ratchet-wheel 16. While this is the case, the pawl in its movements is ineffective to advance the master pattern-chain 12. The shield 20 is held normally in position to render pawl 17 inoperative by means of a contracting spiral spring 21, which latter at its opposite extremities is connected with the check-finger or check-lever 18 and with the downwardly-extending arm 201 of the shield 20. For the purpose of enabling the shield 20 to be moved from its normal position, in which it prevents the pawl 17 from engaging with the teeth of the ratchet-wheel 16 into a position which will permit of the engagement of the pawl with the teeth of the said ratchet-wheel, we connect the arm 201 of the shield 20 by means of a wire or other connector 22 with a movable piece 23, which is under the operative control of the indicators on the pattern-chain passing around the main pattern-cylinder 1.

From the foregoing description it will be apparent that we have employed for the actuation of the main pattern-cylinder a worm-drive, which is desirable and advantageous in practice, as will be understood by those who are skilled in the art, and have provided the same with a clutch having the shipper or shifter therefor under the operative control of an auxiliary or master pattern, and for the actuation of the said auxiliary or master pattern have employed pawl-and-ratchet devices, the latter including a pawl-shield under the operative control of the indicators of the pattern-chain, which is applied to the main pattern-cylinder 1.

Our invention has been designed more especially for employment in connection with dobbies, although some of the features thereof are not in all cases necessarily restricted to use in this connection, and in the accompanying drawings we have shown certain portions of a dobby with the invention combined therewith. In carrying the invention into effect we have hung the pawl 17 upon a pivotal stud 25, projecting from a bracket 251, which is held by a bolt 26 to one arm of the usual rocker 27, from which the lifter-knives A A are actuated. The bracket 251 is slotted, as at 252, for the purpose of permitting of adjustment of the pivotal stud 25 toward and from the axis of oscillation 271 of the rocker 27 in order to secure the required length of stroke of the pawl 17. The movable piece 23, from which the pawl-shield 20 is operated, is constituted herein by one of the usual pattern-fingers of the dobby, the said pattern-finger having a lateral extension 231 for the attachment of the connector 22.

In some cases the auxiliary or master pattern and its connections may be used as a multiplier only—that is to say, for the purpose of reducing the length of the main pattern-chain by occasioning dwells in the movement of the latter on the desired lines of indicators in the usual and well-known manner. When the same is thus used, there will be required to be employed on the worm-shaft 3 only the two clutch members which are represented in Fig. 3—namely, the loose wheel 7, with its engaging projection 72, and the clutch-hub 73, fast upon the said shaft 3 and provided with projection 731 for engagement with the said projection 72 of the wheel 7. The main pattern-cylinder will then be driven only when the two clutch members 7 73 are in engagement with each other and at other times will remain without advancement. A roll or equivalent projection on the auxiliary pattern-chain will move the shifter or shifter-lever 10 to separate the clutch members, unclutch the worm-drive, and suspend the advance of the main pattern-cylinder. When a low portion of the auxiliary pattern-chain is presented to the shifter or shifter-lever, the spring 19 will be permitted to act to move said shifter or shifter-lever reversely to close the clutch members together, whereby the worm-drive will be rendered operative again to operate the main pattern-cylinder. When the parts are arranged to secure the multiplier action, the worm 4 used is of the character usually employed in a double-index dobby—namely, constructed to advance the main pattern-cylinder the distance between one bar of the pattern-chain and the next after every two picks of the loom, as shown in Fig. 4.

The invention in its most complete form

has been especially designed with the object in view not only of being adapted with slight change of the working parts for use as a multiplier, but in addition of providing an improved two-weave motion for double-index dobbies—that is to say, of providing for the use in a double-index dobby of a main pattern-chain having applied thereto the indicators pertaining to two different patterns which are to be woven in the goods being produced, the lines of indicators pertaining to the two patterns being arranged on the said pattern-chain in an alternating succession, and the said pattern-chain having combined therewith devices by means of which the respective patterns may be caused to control in the desired alternation in the weaving.

In using our invention as a two-weave motion we employ a worm 4, which is shaped to advance the main pattern-chain a bar after every pick. In pegging for said two-weave motion we place upon each bar of the pattern-chain one line of pegs or pins pertaining to one pattern and one line of pegs or pins pertaining to the other pattern. In so pegging the bar we utilize the two rows of holes with which the pattern-chain bars for a double-index dobby ordinarily are provided. It is of course well understood that in the case of an ordinary double-index dobby the respective lines of pegs or pins which are placed in the said two rows of holes constitute indicators for two picks of the loom. The first of said lines coöperates with certain of the pattern-fingers to indicate the hooks of one series of the hooks to engage with the corresponding lifter or knife (for example, the upper lifter or knife) for the shed formation for one pick. The other line coöperates with the remaining pattern-fingers to indicate the other series of hooks to engage with the second lifter or knife (*i. e.*, the lower lifter or knife) for the shed formation for another pick. The said lines of indicators, however, ordinarily both pertain to the same weave or pattern and come into action in immediate succession to indicate for successive picks of the said weave or pattern, the pattern-cylinder being advanced only after every two picks. As is well known, the dobby mechanism comprises two series of hooks connecting with the harness-operating levers and two lifters or knives operating alternately at the successive picks of the loom. It will be understood that in the ordinary operation of a dobby after each bar of the pattern-chain has been presented in position for action both of the lines of indicators upon the same will be utilized before the pattern-chain is again advanced, one indicating for the outgoing movement of one lifter or knife and the other indicating for the outgoing movement of the other lifter or knife. When, however, a bar of the pattern-chain is presented in position for action in the working of our double-weave motion, one of the lines of indicators thereof will indicate for the outgoing movement of the corresponding lifter or knife; but inasmuch as the pattern-chain is advanced after every pick the next bar of the pattern-chain will be presented in position for action prior to the outgoing of the other lifter or knife in order that a line of indicators upon the said next bar may indicate for the second pick. In pegging two weaves or patterns upon the pattern-chain it is necessary, on account of the fact that one lifter or knife coöperates with one bar and the other lifter or knife coöperates with the next bar, and in consequence of the fact that the pattern-chain is advanced a bar after every pick, and also of the alternation in the working of the respective lifters or knives, to peg the consecutive lines of one pattern alternately in the first row of holes of one bar, (to secure coöperation with the one lifter or knife,) the second row of holes of the second bar, (for coacting with the other lifter or knife,) and so on, regularly—that is to say, the third line of indicators is placed in the first row of holes in the third bar and the fourth line of indicators is placed in the second row of holes of the fourth bar, &c. This alternating arrangement of the successive lines of indicators pertaining to the first pattern is represented in Fig. 5 and will cause them to control in the weaving in their order so long as no break occurs in the regularity of the timing of the advancing movements of the pattern-chain. The indicators for the consecutive lines of the second weave or pattern are similarly alternated upon the successive bars of the pattern-chain, the indicators for one line of the weave or pattern being placed in the second row of holes of the first bar, (see Fig. 5,) those of the next line of the said pattern being placed in the first row of holes of the second bar, those of the third line of the said second weave or pattern being placed in the second row of holes of the third bar, and those of the fourth line being placed in the first row of holes of the fourth bar, and so on regularly.

The weaving in conformity with one pattern or weave having been begun the indicators of such pattern or weave will continue to control in the weaving so long as the main pattern-chain is advanced regularly a bar after every pick of the loom. When, however, a change from one pattern or weave to the other is desired, this may be brought about by causing a reversal of the time relations of the respective bars of the main pattern-chain with reference to the movements of the respective lifters or knives—in other words, by presenting for the action of the lower lifter or knife the bars which before were presented for the action of the upper lifter or knife, and vice versa. The result of this will be that the successive lines of indicators pertaining to the second pattern or weave will be presented for action with the proper timing to control in the weaving, while those of the first pattern will be thrown out of timing and will no longer control. We have shown the

principle carried into effect by providing means for causing a dwell of the pattern-chain for one pick at the time of effecting the change from one pattern to the other. Thus, assuming that a given bar has been presented in position for action and that the upper lifter or knife has acted upon the hooks of the upper series, which were indicated by the first line of pegs or pins thereof, (such line pertaining to the pattern or weave in process of production,) we arrange to allow the pattern-chain to dwell for a pick, so that the lower lifter or knife is permitted to act upon the hooks of the lower series of hooks, which were indicated by the second line of pegs or pins upon the said bar, (such line pertaining to the second pattern.) Thereby the production of the second weave or pattern is begun, and so long as the main pattern-chain continues to be advanced one bar after every pick the said second weave or pattern will be produced.

Having reference more especially to Figs. 1 and 2, for our two-weave motion we employ in the illustrated embodiment of our invention a clutch comprising two fast clutch members upon the worm-shaft 3, the said fast clutch members being located at opposite sides of the loose chain-wheel or sprocket-wheel 7. These fast clutch members in Figs. 1 and 2 are designated, respectively, 73 and 74. Clutch member 73 and the manner and means of its interengagement with wheel 7 are as described above. Clutch member 74 is substantially identical with clutch member 73, and it is provided with a tooth or projection 741 for engagement with a corresponding tooth or projection 721 on the wheel 7. The fast clutch members 73 74 are located at such a distance apart on shaft 3 that when wheel 7 is fully clutched with one of said fast clutch members it is unclutched from the other thereof. The interengagement of wheel 7 with either of the fast clutch members will cause worm-shaft 3 to be rotated in the direction to advance the main pattern-cylinder. The two sets of interengaging clutch projections, however, are arranged to act with a difference of timing which corresponds with the interval between two picks of the loom. This difference of timing is attained in the present instance by setting the two projections 731 741 of the fast clutch members 73 and 74 in positions at an angular distance of one hundred and eighty degrees apart around the axis of the worm-shaft 3. When, therefore, wheel 7 is shifted lengthwise of shaft 3 out of engagement with one fast clutch member into position for engagement with the other fast clutch member, a change is caused to occur in the timing of the movement of the main pattern-cylinder relative to the movements of the respective lifters or knives, this change of timing corresponding to the interval occurring between two picks of the loom. The said change of timing involves in the present case a dwell of the worm-shaft 3, which permits the latter and the main pattern-cylinder to remain stationary for one pick and until after both of the lifters or knives have acted upon the hooks indicated by the pegs or pins of the bar which was last brought into operative position. Thereby a given bar of the main pattern-chain having been presented in position for action in connection with the pattern-fingers it is permitted to remain in such position until after both of the lifters or knives have acted. The lifter or knife first to operate after the presentation of said bar will engage with the hooks of the corresponding series of hooks of the dobby and form a shed in conformity with the indication of the line of indicators on said bar which pertains to the pattern which has been in process of production. The other lifter or knife will engage with the hooks of the remaining series of hooks of the dobby and form a shed in conformity with the indication of the line of indicators on said bar which pertains to the other pattern. Thereafter the successive bars of the pattern-chain will be presented in position beneath the pattern-fingers with a timing relative to the working of the lifters or knives which will cause the lines of indicators pertaining to the second pattern to control the weaving. In other words, the worm-drive will be caused to advance the pattern-chain one bar after every pick, but the timing of the bars relative to the movements of the respective lifters or knives will be changed, so that the bars which before were presented prior to the outgoing movement of the upper lifter or knife will now be presented prior to the corresponding movement of the lower lifter or knife, and vice versa.

We claim as our invention—

1. In pattern mechanism for looms, in combination, a pattern-cylinder, a worm-drive therefor having a clutch in its operative train, a second pattern-cylinder, a shipper or shifter for said clutch controlled by the indicators of said second pattern-cylinder, pawl-and-ratchet devices for operating said second pattern-cylinder, and a pawl-shield under operative control of the indicators of the pattern-cylinder first mentioned, substantially as described.

2. In pattern mechanism for loom-dobbies, in combination, a pattern-cylinder, a worm-wheel in connection therewith, a worm engaging said worm-wheel, a worm-shaft provided with a clutch, a second pattern-cylinder, a shipper or shifter for said clutch controlled by the indicators of said pattern-cylinder, a ratchet connected with said second pattern-cylinder, a pawl to actuate said ratchet, the lifter-actuating rocker having said pawl connected therewith, the pawl-shield, and a pattern-finger operated by the indicators of the pattern-cylinder first mentioned and connected with said pawl-shield, to control the position of the latter, substantially as described.

3. In a two-weave motion for double-index dobbies, in combination, the two lifters, ac-

tuating means for the same, the pattern-chain, a worm-drive for operating said pattern-chain, and controlling means for said worm-drive to effect a reversal of the time relations of the advance of the respective bars of the said pattern-chain with reference to the movements of the respective lifters or knives, substantially as described.

4. In a two-weave motion for double-index dobbies, in combination, the two lifters, actuating means for the same, the pattern-chain, a worm-drive for operating said pattern-chain, and controlling means for said worm-drive to cause a dwell of the pattern-chain for one pick in order to effect the change from one pattern to the other, substantially as described.

5. In a two-weave motion for double-index dobbies, in combination, the two lifters, actuating means for the same, the pattern-chain, a worm-drive for operating said pattern-chain, and controlling means for said worm-drive operating to occasion a change in the timing of the movements of the pattern-cylinder relative to the movements of the respective lifters or knives corresponding with the interval between two picks of the loom, substantially as described.

6. In a two-weave motion for double-index dobbies, in combination, the two lifters, actuating means for the same, the pattern-chain, operating means for said pattern-chain including a clutch having two sets of interacting clutch projections arranged to act with a difference of timing corresponding with the interval between two picks of the loom, and controlling means to occasion the operation of said clutch, substantially as described.

7. In a two-weave motion for double-index dobbies, in combination, the two lifters, means for actuating the same, the pattern-chain, operating means for said pattern-chain including a clutch having two sets of interacting clutch projections arranged to act with a difference of timing corresponding with the interval between two picks of the loom, and master pattern devices in operative control of the said clutch, substantially as described.

8. In a two-weave motion for double-index dobbies, in combination, the two lifters, means for actuating the same, the pattern-chain, operating means for said pattern-chain including a clutch having two sets of interacting clutch projections arranged to act with a difference of timing corresponding with the interval between two picks of the loom, a shipper or shifter for said clutch, and master pattern devices for operating the said shipper or shifter, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

EDWARD W. DAVENPORT.
HENRY BARDSLEY.

Witnesses:
H. E. STAFFORD,
E. NISBET.