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MECHANISM FOR JACQUARD LOOMS

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2 Sheets-Sheet 1

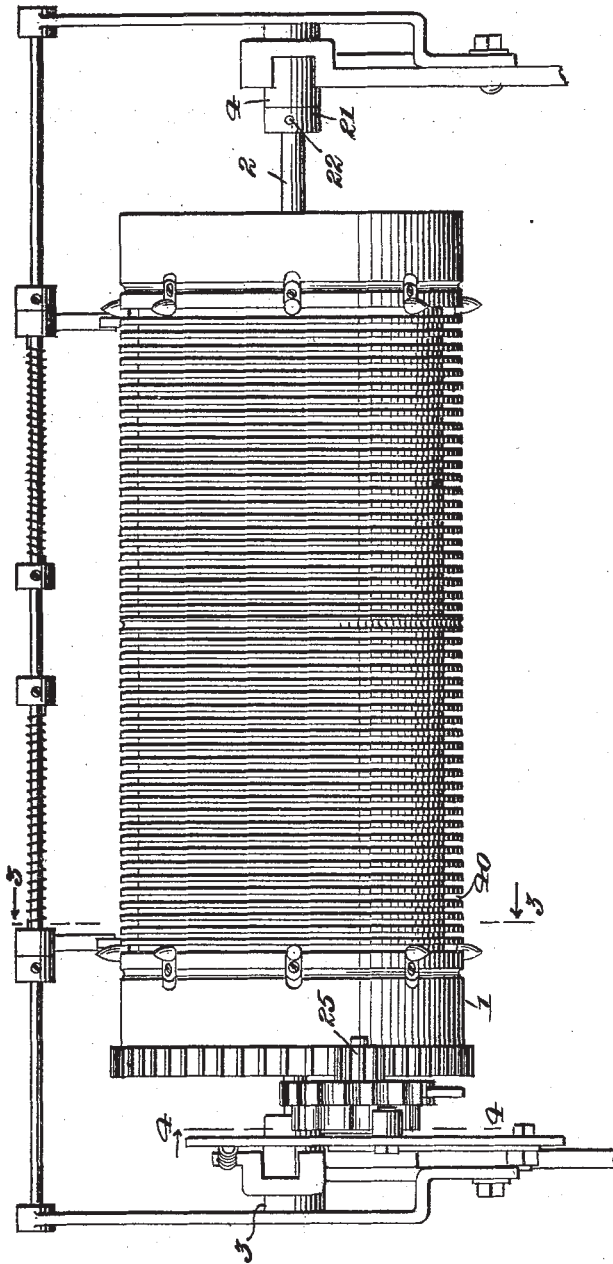


Fig. 1.

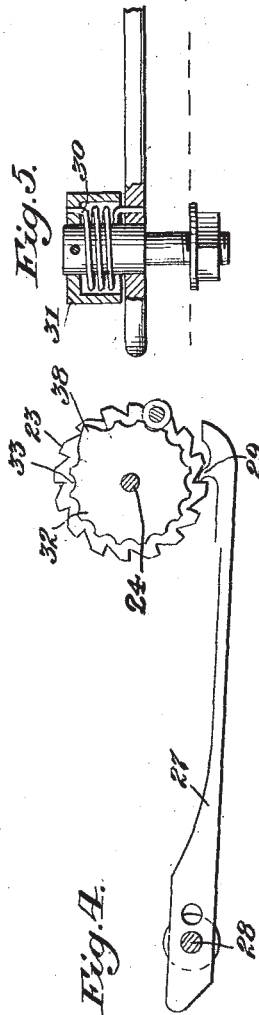


Fig. 5.

Fig. 4.

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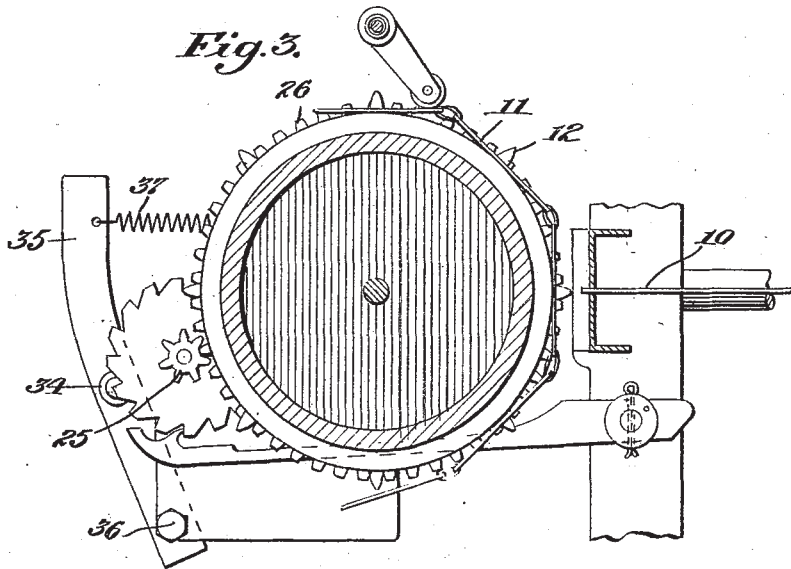
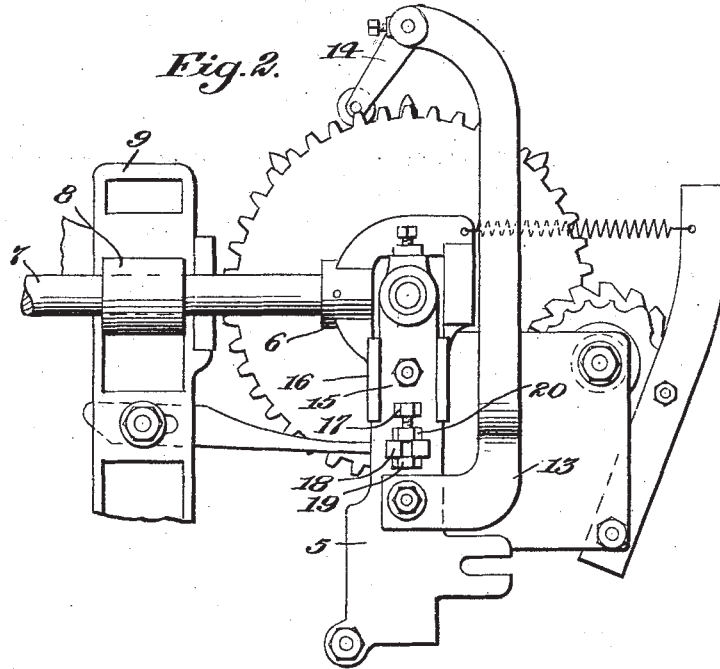
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MECHANISM FOR JACQUARD LOOMS

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# UNITED STATES PATENT OFFICE

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## MECHANISM FOR JACQUARD LOOMS

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This invention relates to weaving machines and particularly to improvements in mechanism for Jacquard looms. The invention is especially designed for the weaving of narrow figures or patterns, the width of which does not require that all of the perforations of the pattern card be employed in a single pick.

One of the objects of the invention is the provision of a card cylinder in combination with means for controlling the angular movement thereof by advancing the cards at each step a distance equal to the space between adjacent rows of perforations on the cards so as to make each card serve for as many picks as there are rows of perforations on the cards, thus materially reducing the number of cards required for producing the pattern or figure.

Another object of the invention is the improvement of the cylinder itself, by substituting for the usual series of circumferential holes, a series of continuous circumferential grooves, thereby avoiding defects in the weaving caused by the perforations in the cylinder misaligning with the needles of the jacquard so that the needles strike against the cylinder above or below the perforations, such as frequently occurs through improper vertical adjustment of the cylinder with respect to the needles.

Other objects of the invention will appear as the following description of a preferred embodiment thereof proceeds.

In the drawings, in which similar characters of reference are used to designate the same or similar parts, wherever shown,

Fig. 1 is a side elevation of a jacquard cylinder and its appurtenant operating mechanism, embodying the principles of the invention.

Fig. 2 is an end view taken from the left hand side of Fig. 1.

Fig. 3 is a cross section taken along the line 3—3 of Fig. 1, viewed in the direction indicated by the arrows.

Fig. 4 is a side elevation, partly in section taken along the line 4—4 of Fig. 1, showing the construction of the cylinder actuating pawl, and the mechanism by which the step

by step movements of the cylinder are determined.

Fig. 5 is a plan view partly in section of the attached end of the pawl shown in Fig. 4, showing the spring construction which biases the pawl against the cylinder ratchet wheel.

Referring now in detail to the several figures and adverting first to that which is old and well known in jacquard mechanism, the numeral 1 represents a jacquard cylinder, the shaft 2 of which is journaled in bearings 3 and 4 carried by a frame 5, perhaps best shown in Fig. 2, which frame is provided with sockets 6 at the opposite sides fitting over sliding rods 7 and solely supported by the latter.

The rods 7 slide in hollow boxes 8 carried in the fixed frame 9 of the jacquard.

The cylinder 1 is positioned in juxtaposition to a row of needles 10. A chain of cards 11 passes over the cylinder 1, said cards being provided peripherally with holes which pass over permanent cogs or pins 12 arranged peripherally of the cylinder near its opposite ends, said cards being provided with rows of perforations, and being advanced successively into operative position through the agency of said cogs or pins. The fixed frame of the jacquard is provided with brackets 13 at opposite sides, from which depend spring-pressed arms 14 carrying rollers which bear slightly upon the cards and prevent them rising from the pins.

The cylinder is provided with two adjustments, one for raising or lowering it vertically and comprising the sliding block 15 movable vertically in guides 16 upon which the bearings 3 and 4 are mounted, similar sliding blocks being used on opposite sides of the machine. Threaded lugs 17 and 18 formed respectively on the block 15 and on the fixed frame of the machine afford a means for adjusting the sliding block vertically through the screw bolt 19 having the usual lock nut 20. The cylinder is adjusted horizontally by suitable means such as the collar 21 secured to the shaft by a set screw 22 and which may be shifted on the shaft by loosening the set-screw.

All that has been described up to this point

relates to that which is known, it being understood that in the ordinary Jacquard loom there are a plurality of horizontal rows of needles and an equal number of rows of perforations on the parts. It will also be understood that the cylinder is rotated by suitable advancing mechanism which ordinarily rotates the cylinder step by step through an angle equal to the width of a card. For the purpose of the present invention as illustrated all but one row of needles has been dispensed with although it is within the purview of the invention to retain two or even more than 2 rows of needles should the width of the design or pattern require such a capacity.

The present invention contemplates using the regular commercial size cards having 8 or 12 rows of perforations, but it begins to deviate from that which is known in rotating the cylinder at each step only through such an angle as will bring successive rows of perforations into alignment with the row of needles, the cylinder being advanced and retracted at each step in the usual manner by means of the sliding rods 7 so that only a single row of perforations on the card are employed in conjunction with the single row of needles for a single pick. In the operation of the known Jacquard loom mechanism all the rows of perforations on the card and an equal number of rows of needles are utilized for a single pick. Since as has been stated the usual commercial cards contain either 8, 12 or more rows of perforations, it is obvious that in carrying out the specific purpose for which the present invention is designed, that is, the weaving of narrow patterns or figures, there are 8, 12 or more picks to the card as the case may be resulting in a saving of about 90% of the cards in the use of an 8-row card and over 90% of the cards if a 12-row card is used.

The means by which this step by step movement of the cylinder is produced consists of a ratchet wheel 23 rotatably mounted upon a pin 24 secured to the frame of the jacquard and approaching within operative distance of the periphery of the cylinder at one end. The ratchet 23 is keyed or otherwise suitably secured to a pinion 25 meshing with a gear ring 26 on the adjacent end of the cylinder, by means of which gear connection movement is transmitted from said ratchet wheel to said cylinder. A pawl 27 is pivotally mounted upon the fixed frame of the jacquard by means of a pivotal connection 28 and has a tooth 29 engageable with the teeth of the ratchet wheel. A spring 30, Fig. 5, preferably suitably housed in a casing 31 is arranged to bias said pawl into yielding engagement with the ratchet wheel. When the cylinder with those parts which move unitarily therewith is reciprocated back and forth by means of the sliding rods 7, it is ob-

vious that the pawl 27 rides over the teeth of the ratchet wheel when the cylinder moves toward the needles and engages the teeth of the ratchet wheel so as to rotate the same when the cylinder recedes from the needles. The length of the pawl 27 and the extent of movement of the sliding rods 7 are so determined that the pawl moves the ratchet one tooth at a time. The gear ratio between the pinion 25 and the gear ring 26 is such that for each step of angular movement of the ratchet wheel 23 the cylinder moves a distance equal to the space between two rows of perforations on a card.

In order to definitely allocate the position of the cylinder at each step of its movement and to ensure that there will be no retrogressive movement of the same through friction of the pawl 27 as it rides over the teeth of the ratchet wheel 23, a detent cam 32 is provided which is keyed or suitably secured to the ratchet wheel 23 and which is provided with a series of dwells 33 corresponding to the stationary positions of the cylinder 1 between its steps of movement. These dwells are engaged by a suitable detent or roller 34 carried by a lever 35 pivoted to the fixed frame of the jacquard as at 36. This lever is provided with a spring 37 which biases the roller 34 into contact with the cam 32. Said roller normally resides in one of the dwells, but is withdrawn from the same against the pressure of the spring 37 by the force transmitted by the pawl 27 to the ratchet wheel 23 in its turning effort on the cylinder.

It will be observed from Fig. 3 that the cards are laced together into a chain and that there is a certain space or freedom of movement between the cards. The perforations are so arranged with respect to the space between the cards that the distance between the last row of perforations on one card and the first row of perforations on the next card is greater than the distance between adjacent rows of perforations on the same card. This inequality in the spacing of the perforations occurring at constant intervals of a card's width apart, is taken care of by the cam 32 which it will be noted, from Fig. 4, has one of the elevations as at 38 somewhat higher, and considerably broader at the base than the elevations between the other dwells. This has the effect of spacing the dwells adjacent the elevation 38 on either side thereof at a greater distance apart than the other dwells on the cam, and it is this elevation which causes the cam to be actuated by the spring-pressed lever 35 to carry the cylinder across from the last row of perforations on one card to the first row on the adjacent card.

It is apparent from the construction as shown and described that the pinion 25, ratchet wheel 23 and cam 32 form a unitary assemblage normally keyed together. When it is desired to have the cylinder rotate at



each step through a different angle, as for instance, when two rows of needles are employed at a pick, this unitary assemblage is taken apart and another ratchet wheel substituted for the ratchet wheel 23, having a number of teeth necessary to produce the required alteration in the step by step angle of rotation of the cylinder.

The ordinary jacquard cylinder is provided with a plurality of circumferential series of individual holes which are adapted at each step of movement of the cylinder to be aligned with the needles of the jacquard. This arrangement is subject to the defect that in case the vertical adjustment of the cylinder is not exact the needles come into contact with the surface of the cylinder either above or below the perforations, this having the same effect as if the needles engaged imperforate parts of the card, producing defects in the weaving, as well as mutilating the edges of the perforations. The present invention avoids this by substituting in the cylinder for the plurality of series of individual perforations, a plurality of series of continuous grooves 40. This makes the exact vertical adjustment of the cylinder unimportant for it is of course impossible for the needles to engage with any part of the outer surface of the cylinder through vertical misalignment, the only necessity for a vertical adjustment being to align the perforations in the cards, with the needles in the event that the openings in the cards with which the pins or cogs 12 engage, become worn oval through long use so that the cards hang slightly below their normal positions. Where ordinary jacquard cylinders are employed such excessive wear of the cards could not be taken up by vertical adjustment but new cards would have to be substituted therefor. In the present invention by reason of the continuous grooves back of the perforations in the cards, there is no limit to the amount of wear in the cards which can be compensated for by vertical adjustment of the cylinder up to the point where one row of perforations would begin to encroach upon the adjacent row.

While we have in the above description endeavored to disclose what we believe to be a preferred, and what we know to be a practical embodiment of our invention, it is to be understood that the specific details of construction as shown and described are merely by way of example and not to be considered limitative in their relation to the scope of the invention.

What we claim as our invention is:—

1. In loom mechanism of the jacquard type, a card cylinder adapted to cooperate in the usual manner with the usual chain of cards, each of said cards having a plurality of rows of perforations therein, and means for advancing said cylinder by angular steps of

movement equal to the distance between adjacent rows of perforations on each card.

2. In loom mechanism of the jacquard type, a card cylinder, means on said cylinder engaging with the cards of a chain of cards for bringing them successively into operative position relative to the needles of the jacquard, and pawl and ratchet means for advancing said cylinder by angular steps of movement less than the angular distance between said card engaging means.

3. In loom mechanism of the jacquard type, a card cylinder adapted to cooperate with a chain of cards having a plurality of rows of perforations in each card reciprocable to and from the needles of the jacquard, and means for advancing said cylinder by angular steps of movement equal to the distance between adjacent rows of perforations on each card, said means including a ratchet operatively connected to said cylinder and a pawl engaging the teeth of said ratchet upon reciprocatory movement of said cylinder away from said needles for imparting step by step motion to said ratchet.

4. In loom mechanism of the jacquard type, a card cylinder adapted to cooperate with a chain of cards having a plurality of rows of perforations in each card reciprocable to and from the needles of the jacquard, and means for advancing said cylinder by angular steps of movement equal to the distance between adjacent rows of perforations on each card, said means including a ratchet operatively connected to said cylinder and a pawl engaging the teeth of said ratchet upon reciprocatory movement of said cylinder away from said needles for imparting step by step motion to said ratchet, a cam rotating with said ratchet having a plurality of dwells corresponding to the positions of rest of said cylinder and a detent resiliently biased toward said cam engageable successively in said dwells to hold said cylinder in definite position during its movement toward said needles.

5. In loom mechanism of the jacquard type, a card cylinder reciprocable to and from the needles of the jacquard, and means for advancing said cylinder by angular steps of movement equal to the distance between adjacent rows of perforations on said cards, said means including a ratchet operatively connected to said cylinder and a pawl engaging the teeth of said ratchet upon reciprocatory movement of said cylinder away from said needles for imparting step by step motion to said ratchet, a cam rotating with said ratchet having a plurality of dwells corresponding to the positions of rest of said cylinder and a detent resiliently biased toward said cam engageable successively in said dwells to hold said cylinder in definite position during its movement toward said needles, all of said dwells except two being uniformly spaced

and said two dwells being spaced apart a greater distance than the other dwells to determine the rest positions of said cylinder for the last row of perforations on one card and the first row on the next adjacent card, said  
5 cam being provided with an elevation between said dwells of such shape and height as to determine in conjunction with said detent a correspondingly increased step of angular movement of said cylinder.

10 6. In loom mechanism of the jacquard type, a card cylinder adapted to cooperate in the usual manner with the usual chain of cards, means for moving said cylinder to and  
15 from the needles of the jacquard, means for advancing said cylinder as it recedes from said needles by angular steps of movement equal to the distance between adjacent rows of perforations on each card, and means for  
20 holding it against rotation as it approaches said needles, including a cam having a portion so formed as to permit a definite increased step of movement at that point in the rotation of said cylinder corresponding  
25 to the space between the last row of perforations on one card and the first row of perforations on the next card.

7. In loom mechanism of the jacquard type, a card cylinder having peripheral circumferential grooves for the needles, means  
30 on said cylinder engaging with the cards of a chain of cards for bringing them successively into operative position relative to the needles of the jacquard, and means for advancing said cylinder by angular steps of  
35 movement less than the angular distance between said card engaging means.

In testimony whereof we have signed our names to this specification.

40 CHARLES A. FISHER.  
CLETUS J. KETNER.

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