Oct. 5, 1954 T. RÜTTI 2,690,770

DEVICE FOR AND METHOD OF READING PICKS FROM PATTERN CARDS IN LOOMS

Filed Oct. 15, 1949 4 Sheets-Sheet 1

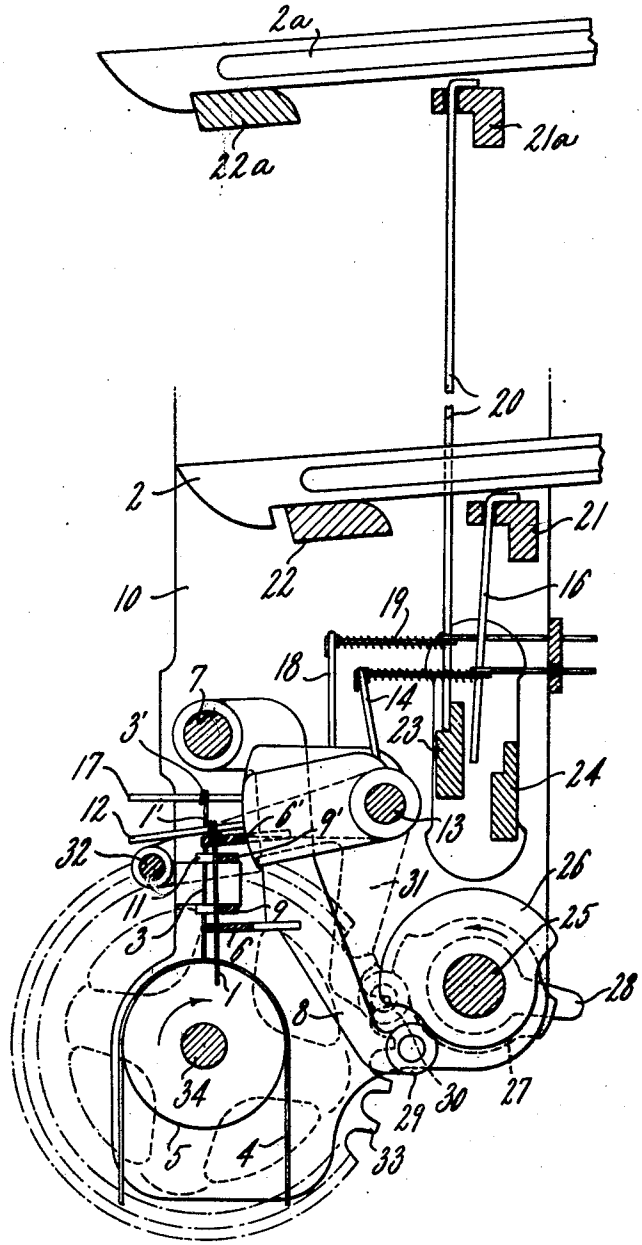


Fig. 1

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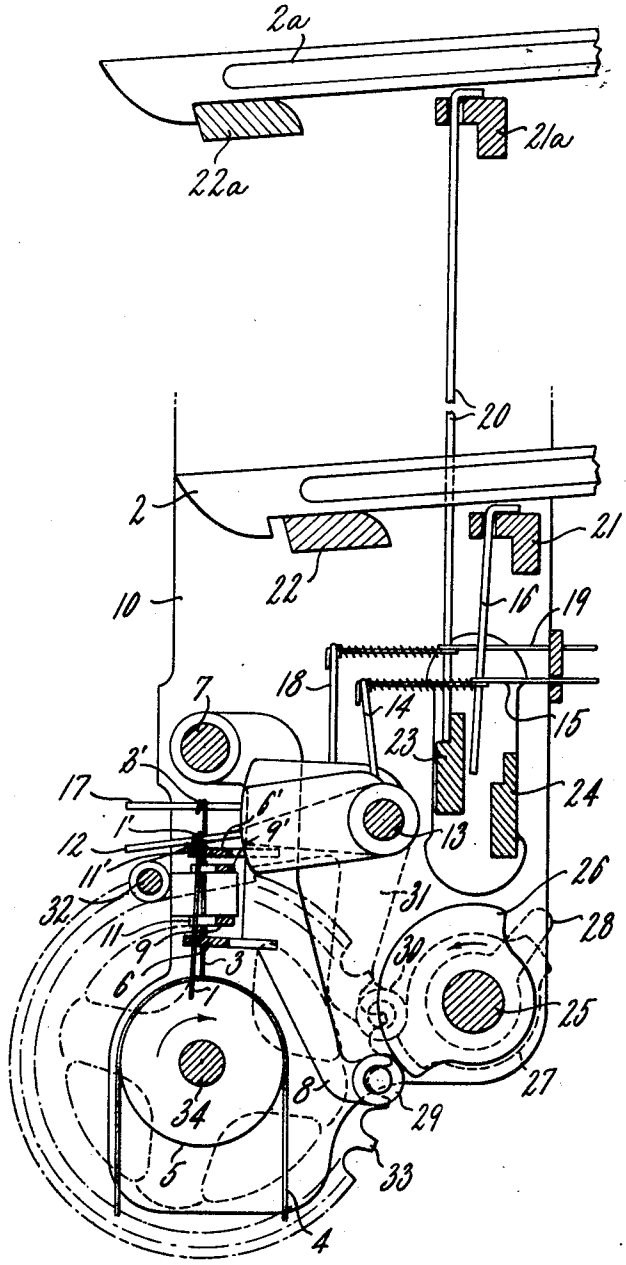


Fig. 2

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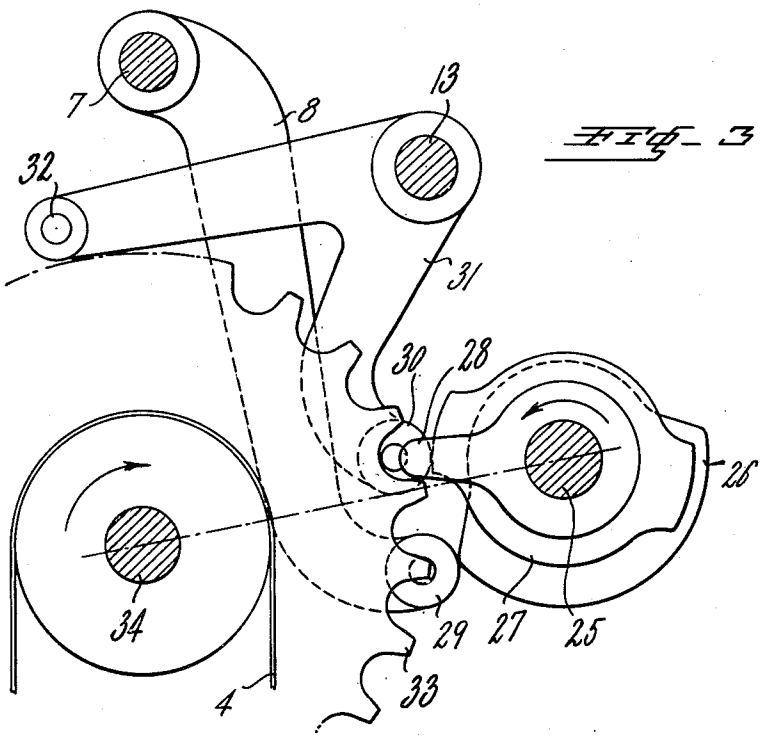


Fig. 3

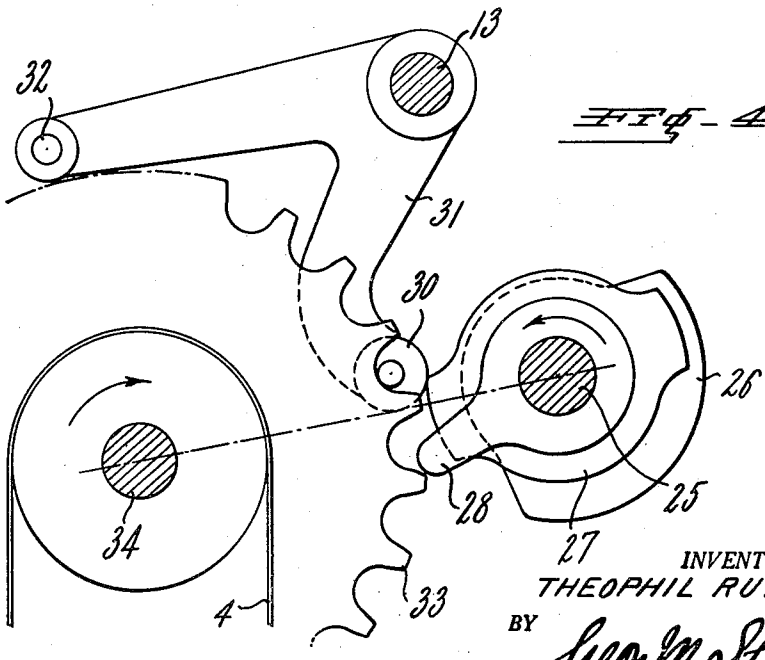


Fig. 4

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DEVICE FOR AND METHOD OF READING PICKS FROM PATTERN CARDS IN LOOMS

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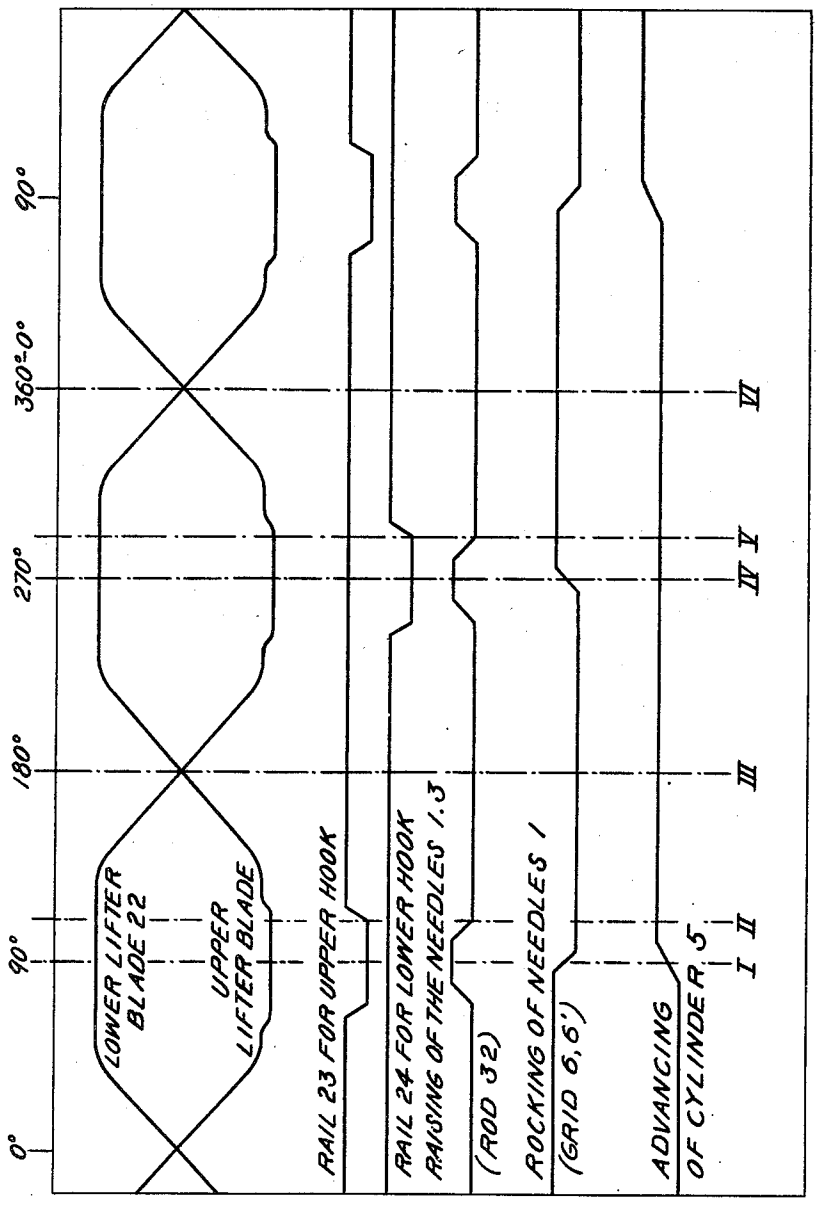


Fig. 5

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DEVICE FOR AND METHOD OF READING PICKS FROM PATTERN CARDS IN LOOMS

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Claims priority, application Switzerland October 28, 1948

6 Claims. (Cl. 139—68)

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This invention relates to reading of the picks from a pattern card in shedding devices and to the control of the shedding device.

The shedding devices used in weaving, such as Jacquards and dobbies, employ cards made of so-called Verdol paper or similar thin material, which are sensed by reading needles. The latter act by way of intermediate members on the lifter hooks of the shedding machine to bring them into or to remove them out of the path of the lifter blades, according to whether the reading needles have or have not dropped into a perforation of the pattern card. It depends on the construction and operation of the said intermediate members, whether the shedding machine operates positively, that is to say, whether it can be put in motion forwards and backwards, without the sequence of the shed openings required for each weft insertion being disturbed. This positive control is highly desirable, in the case of operation of dobbies when the weft thread breaks or when the weft thread is to be relocated, and re-start of dobby operation after repair of the weft thread is in order. This is effected through the lifter hooks controlled in such a manner during the period of idle running of the lifter blade, i. e. during the lost motion of the lifter blade, that in the forward motion of the shedding device those lifter hooks are placed in readiness for being hooked on to the lifter blade, which perform the shedding for the next pick, but in the backward motion the lifter hooks are placed in readiness for hooking on to the lifter blade, which performed the shedding for the preceding pick.

Dobbies of this kind are known, in which there act on each lifter hook two reading needles, one of which ensures the function of the correct reading in for the forward motion and the other that for the backward motion of the dobby.

With the method according to the invention one reading needle is used for each lifter hook, at least one first seriees of reading needles being displaced during the lost motion of the associated lifter blade, according to the direction of rotation of the shedding device out of its position for reading a preceding pick into a position for reading the following pick or vice versa in the direction of motion of the cylinder.

The shedding machine for carrying out the method is provided with means for displacing the reading needles of a first set of such needles during the lost motion of the lifter blade associated with these reading needles according to the direction of rotation of the shedding device out of its position for reading a preceding pick into a position for reading the following pick and vice versa.

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A reading device according to the invention as applied to a double lift dobby is illustrated diagrammatically as a constructional example in the accompanying drawings, in which:

Fig. 1 shows a section through the needle reading device and drive mechanism therefor shortly after the moment, in which during the forward motion the lower lifter blade has released the lower lifter hooks for reading the following pick and

Fig. 2 illustrates the same section, but before the moment, in which after the completion of the reading of the following pick the lower lifter hooks are again placed for being hooked on to the lifter blade.

Fig. 3 shows parts of the drive mechanism of Fig. 1 in position for starting the movement of the pattern card.

Fig. 4 shows parts of the drive mechanism of Fig. 1 in position for starting the movement of the reading needles upon stopping of the movement of the pattern card.

Fig. 5 illustrates a diagram indicating the movements of the reading needles and parts of the drive mechanism in timed relation.

The pattern card reading device shown in the drawings has one set of reading needles **1**, which serve the purpose of controlling the lower lifter hooks **2**, and the second set of reading needles **3**, the function of which is to control the upper lifter hook **2a**.

The free ends of these needles **1** and **3** coact with perforations provided at predetermined locations in the pattern card **4** which travels over the intermittently driven cylinder **5**.

The needles **1** of the first set of reading needles are guided in a needle grid **6**, **6'** which is fixed to a lever arm **8** adapted to rock about a shaft **7**.

The needles **3** of the second set of reading needles are guided in needle grids **9**, **9'** which are attached to the machine frame **10**, so that they can only be displaced in their longitudinal direction. Slots, **11**, **11'** in the needle grids **9**, **9'** permit of the displacement of the needles **1** by means of the needle grids **6**, **6'** on the lever arm **8** transversely to the grids **9**, **9'**.

The upper end of the needles **1** engages by means of eyes **1'** the lifters **12** which are mounted so as to rock on a shaft **13** and by means of arms **14** and push needles **15** control the lower end of the lifter needles **16**.

In the same way the needles **3** are attached

by means of eyes 3' to lifters 17 which are also mounted on the shaft 13 and by means of arms 18 and push bars 19 permit of the lower end of the lifter needles 20 being displaced.

The upper ends of the lifter needles 16 and 20, which are supported so as to be capable of swinging in holes of respective rails 21, 21a, serve the purpose in a known manner of bringing the lower lifter hooks 2 and the upper lifter hooks 2a into or out of the path of the lifter blades 22, 22a which move to and fro periodically and, when a suitable hook has caught the associated lifter blade, displace the heddles.

Rails 23 and 24, which are positioned below the ends of the lifter needles 16 and 20 and are moved up and down by cam discs (not shown), serve the purpose of raising these needles, when the lower ends of the latter are set in the path of these rails.

On a shaft 25 which is supported in bearings in the machine frame 10 are mounted a cam disc 26, a cam disc 27, a tappet 28 and the cam discs (not shown) for moving the rails 23 and 24.

On the periphery of the cam disc 26 rolls a roller 29 supported on the lever arm 8. The cam disc 27 coacts with a roller 30 supported on an arm of a cranked lever 31 mounted on the shaft 13, the other arm of which supports a rod 32 which extends below the lifters 12 and 17. At each revolution of the shaft 25 the tappet 28 shifts a toothed wheel 33, which with the paper cylinder 5 is mounted on a shaft 34, by one tooth. This rotation of the paper cylinder corresponds to the distance between rows of perforations, that is to the pitch on the perforated card 4. Through this movement the pattern card is shifted by two picks, that is from the first and second to the third and fourth pick. The movements of the aforesaid parts in timed relation are apparent from Fig. 5, in which the relative positions of lifter blades, of upper and lower hooks and reading needles during rotation of cylinder shaft 34 and of drive shaft 25 are made clear.

In the following description of the mode of operation of the pattern card reading arrangement illustrated in the drawings it is assumed, that in the preceding pick the harness or heddle associated with the hook 2 had to be lifted and that in the subsequent pick the same harness is to be lifted, that is, that the lifter hook 2 has each time to be hung on the blade. The pattern card 4 thus presents perforations for the lifter hook in question in two successive rows of perforations for acting with the lower lifter hook 2. The change of the lower lifter hooks 2 then takes place in such a manner that, on the lifter hook 2 being released by the blade 22, the rail 24, will descend and with it the lifter needle 16. This position of the parts is shown in Fig. 1, the reading needle 1 having dropped into a perforation of the pattern card, which has produced the shedding required for the preceding pick and has thereby rocked the lower end of the lifter needle 16 out of the path of the rail 24.

During the continued forward motion of the device the ascending portion of the cam disc 27 commences to rock the cranked lever 31, causing the rod 32 to be raised. This also causes the lifters 12 and 17 and the reading needles hanging on them to be raised by the engagement of rod 32 against lifter 12 and 17. After the completion of this lifting motion the cam 26 produces a rocking motion of the lever arm 8 out of the position in Fig. 1 into that of Fig. 2, whereupon

the cam disc 27 brings the cranked lever 31 and with it the rod 32, the lifters 12 and 17 along with the reading needles 1 and 3 into the position for reading the pattern card in accordance with Fig. 2, so that on the pattern card 4 the row of perforations for the shedding to be produced by the lower blade 22 for the next second following pick is read off by the reading needles 1. As it is assumed in the described example, that two lifts of the harnesses are to be produced in succession by the hook 2, the reading needle 1 will drop into the suitable perforation of the paper card 4. The result of this is, that the lifter 12 will move the push needle 15 in such a manner that the lower end of the lifter needle 16 will be moved out of the range of motion of the rail 24. When rail 24 rises, the lifter needles 16 and the lifter hook 2 will therefore remain stationary and the blade 22 will in its motion enter into engagement with the lifter hook which thereby will lift the corresponding heddle or harness of the loom.

The advance of the paper cylinder 5 by the tappet 28 takes place at the moment, in which the upper lifter blade 22a is in its backward or retracted position of its reciprocal movement. Before this motion the cranked lever 31 is rocked by the second swell of the cam disc 27, whereupon the rod 32, the lifters 12 and 17 along with the reading needles 1 and 3 are lifted in the manner above described. Simultaneously with the forward feed of the toothed wheel 33 by the tappet 28 the cam disc 26 allows the roller 29 to descend, which causes the lever 8 and the needle grids 6 and 6' to rock. This rocking motion takes place out of the position according to Fig. 2 into that according to Fig. 1. The needles 1 guided in the holes of these needle grids 6, 6' also take part in this rocking motion and, during the forward motion of the paper card 4 accurately follow with their lower end that perforation in it, out of which they were previously lifted. As soon as the card or cylinder motion and consequently the rocking motion has ceased, the cam disc 27 allows the rod 32 with the lifters 12 and 17 and the reading needles 1 and 3 to drop again. By this means the third and subsequent following pick for the lifter hooks of the upper blade after advancing paper cylinder 5 is read by the finding needles 3 and the previous pick described in the paragraph immediately above is read by the needles 1 while the lower lifter blade is in its backward position.

On the device being reversed, the same procedure is repeated in the reversed sequence.

Accordingly, there has been provided a shedding mechanism for reading picks comprising, in combination, a first set of reading needles displaceable only in their longitudinal direction, a second set of reading needles, lifter blades associated with each of said sets of reading needles and adapted to perform a lost motion at one end of a predetermined path along which each of said lifter blades reciprocates, and means for displacing said second set of reading needles during the lost motion of the lifter blade associated with said second set of reading needles according to the direction of operation of said shedding mechanism, whereby upon forward operation of said shedding mechanism said second set of reading needles is displaced out of the position when said second set of reading needles reads a first pick into the position for reading the following pick and upon operation of said shedding mechanism in the opposite direction

said second set of reading needles is displaced out of the position when said second set of reading needles reads said following pick into the position for reading said first pick.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In a shed forming machine; a rotatable cylinder for a perforated pattern-card, means for intermittently rotating said cylinder, pick reading means comprising reading needles, blade means adapted to perform a lost motion at one end of a predetermined path along which said blade means reciprocates, lifting hook means adapted to be coupled with said blade means, first movable lifter means for controlling coupling said hook means with said blade means during said lost motion of said blade means, actuating means for said first lifter means adapted to be brought into and out of working position, respectively, in accordance with the position of the corresponding reading needles relative to the perforated pattern-card, said actuating means comprising push needle means engaging said first lifter means, second lifter means mounted for pivotal movement, first arm means interconnecting said push needle means with said second lifter means, at least one of said reading needles being supported by said second lifter means and for lateral movement relative to the latter, second arm means mounted for pivotal movement and including means to laterally shift at least one of said reading needles along said second lifter means, lever means for pivoting said second lifter means, whereby at least one of said reading needles is longitudinally shifted, and respective cam means engaging said second arm means and said lever means, whereby actuation of said cam means controls the longitudinal and lateral motions of said reading needles with respect to said pattern-card and the position of said first lifter means with respect to said hook means.

2. In a shed forming machine; a rotatable cylinder for a perforated pattern-card, means for intermittently rotating said cylinder, pick reading means comprising reading needles, blade means adapted to perform a lost motion at one end of a predetermined path along which said blade means reciprocates, lifting hook means adapted to be coupled with said blade means, first movable lifter means for controlling coupling said hook means with said blade means during said lost motion of said blade means, actuating means for said first lifter means adapted to be brought into and out of working position, respectively, in accordance with the position of the corresponding reading needles relative to the perforated pattern-card, said actuating means comprising push needle means engaging said first lifter means, second lifter means mounted for pivotal movement, first arm means interconnecting said push needle means with said second lifter means, at least one of said reading needles being supported by said second lifter means and for lateral movement relative to the latter, second arm means mounted for pivotal movement and including means to laterally shift at least one of said reading needles along said second lifter means, lever means for pivoting said second lifter means, whereby at least one of said reading needles is longitudinally shifted, and respective cam means engaging said second arm means, said lever means, and said means for intermittently displacing said cylinder whereby actuation of said cam means controls the longitudinal and lateral motions of said reading needles with respect to said pattern-card, the position of said first lifter means with respect to said hook means, and the intermittent displacement of said cylinder.

3. In a shed forming machine; a rotatable cylinder for a perforated pattern-card, means for intermittently rotating said cylinder, pick reading means comprising two sets of reading needles, blade means arranged for reciprocal movement and performing a lost motion at one end of a predetermined path of movement, lifting hook means adapted to be coupled with said blade means, first movable lifter means for controlling coupling said hook means with one of said blade means during said lost motion of said one blade means, actuating means for said first lifter means adapted to be brought into and out of working position, respectively, in accordance with the position of the corresponding one set of reading needles relative to the perforated pattern-card, said actuating means comprising push needle means engaging said first lifter means, second lifter means mounted for pivotal movement, first arm means interconnecting said push needle means with said second lifter means, said one set of reading needles being supported by said second lifter means and for lateral movement relative to the latter, second arm means mounted for pivotal movement and including means to laterally shift said one set of reading needles along said second lifter means, lever means for pivoting said second lifter means, whereby said one set of reading needles is longitudinally shifted, and respective cam means engaging said second arm means, said lever means, and said means for intermittently displacing said cylinder whereby actuation of said cam means controls the longitudinal and lateral motions of said one set of reading needles with respect to said pattern-card, the position of said first lifter means with respect to said hook means, and the intermittent displacement of said cylinder.

4. In a shedding mechanism for reading picks comprising, in combination, a first set of reading needles displaceable only in their longitudinal direction, a second set of reading needles, lifter blades associated with each of said sets of reading needles and adapted to perform a lost motion at one end of a predetermined path along which each of said lifter blades reciprocates, and means for displacing said second set of reading needles during the lost motion of the lifter blade associated with said second set of reading needles according to the direction of operation of said shedding mechanism, whereby upon forward operation of said shedding mechanism said second set of reading needles is displaced out of the position when said second set of reading needles reads a first pick into the position for reading the following pick and upon operation of said shedding mechanism in the opposite direction said second set of reading needles is displaced out of the position when said second set of reading needles reads said following pick into the position for reading said first pick.

5. In a shedding mechanism for reading picks comprising, in combination, a first set of reading needles displaceable only in their longitudinal direction, a second set of reading needles, lifter blades associated with each of said sets of reading needles and adapted to perform a lost motion at one end of a predetermined path along which each of said lifter blades reciprocates, and means for displacing said second set of reading needles during the lost motion of the lifter blade asso-

ciated with said second set of reading needles according to the direction of rotation of said shedding mechanism, said means including grids displaceable in a direction substantially perpendicular to the longitudinal direction of motion of said first set of reading needles during the displacement of said second set of reading needles to shift said second set of reading needles laterally in the direction of operation of said shedding mechanism, whereby upon forward operation of said shedding mechanism said second set of reading needles is displaced out of the position when said second set of reading needles reads a first pick into the position for reading the following pick and upon operation of said shedding mechanism in the opposite direction said second set of reading needles is displaced out of the position when said second set of reading needles read said following pick into the position for reading said first pick.

6. In a method for reading picks from a pattern-card adapted to be moved and for use in connection with shedding mechanisms having two sets of reading needles; the steps of moving one set of reading needles along the longitudinal axis thereof, displacing the second set of reading needles along the longitudinal axis thereof, and then shifting the second set of reading needles along an axis substantially perpendicular to said longitudinal axis of said other set of reading needles and in a direction corresponding to the direction of motion of said pattern-card so that

when said pattern-card is moved in one direction said second set of reading needles is displaced from a position in which said second set of reading needles reads a first pick, to another position in which said second set of reading needles reads the following pick, whereas upon movement of said pattern-card in a direction opposite to said one direction the second set of reading needles is displaced from its position in which said second set of reading needles reads a subsequent pick to another position for enabling reading the immediately prior pick by said second set of reading needles.

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