

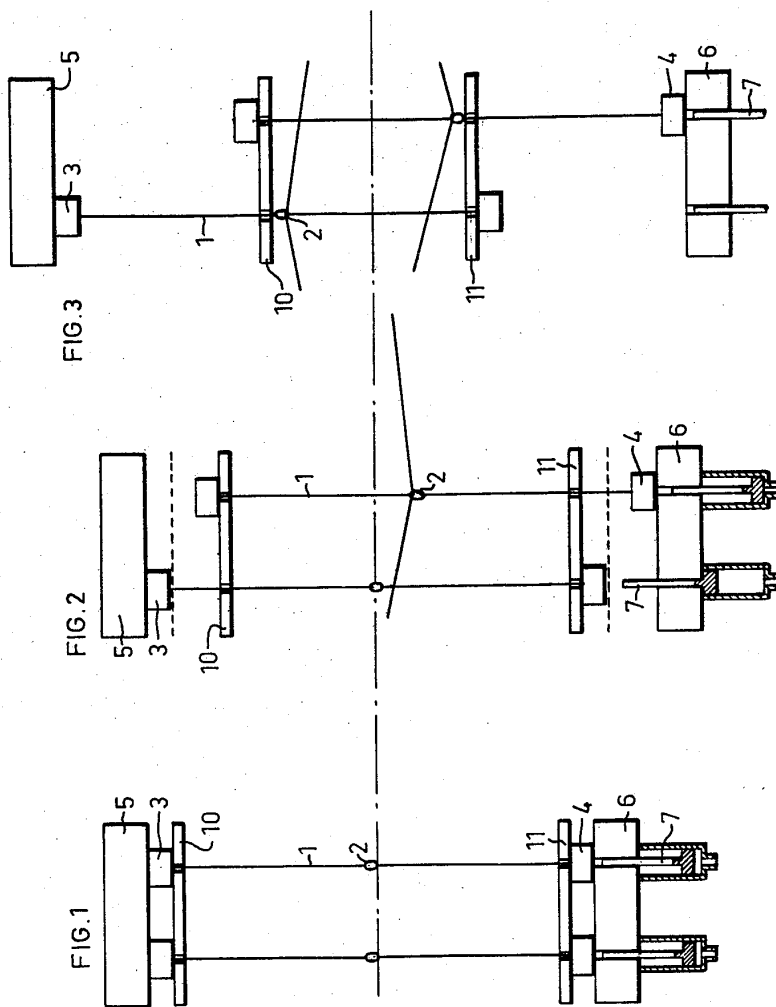
Sept. 17, 1963

W. LAURITSEN
SHEDDING MECHANISMS

3,103,953

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4 Sheets-Sheet 1



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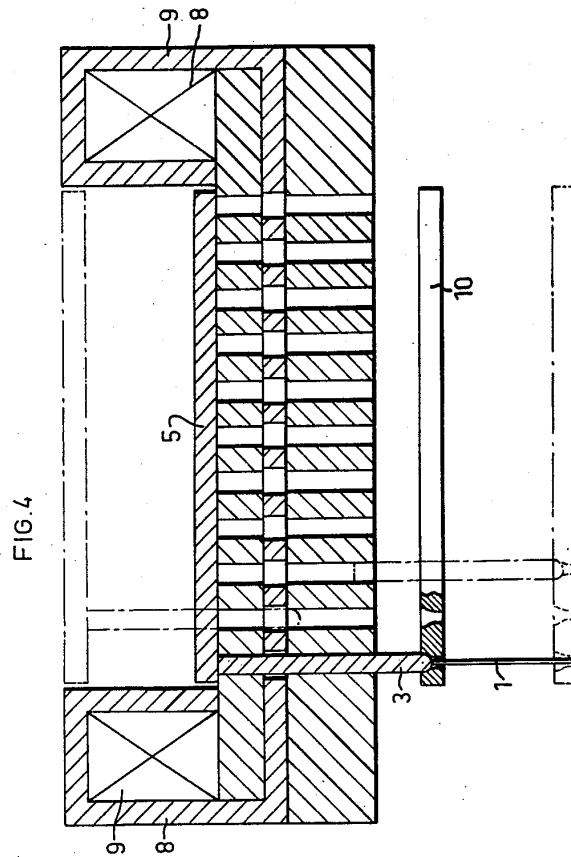
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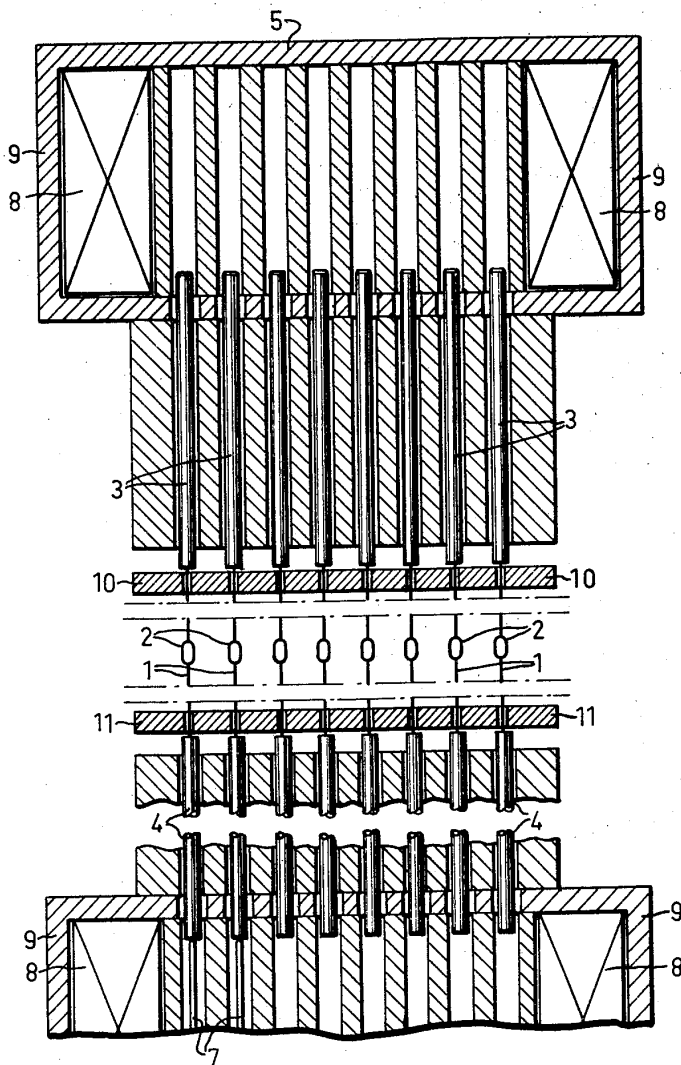
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FIG. 5



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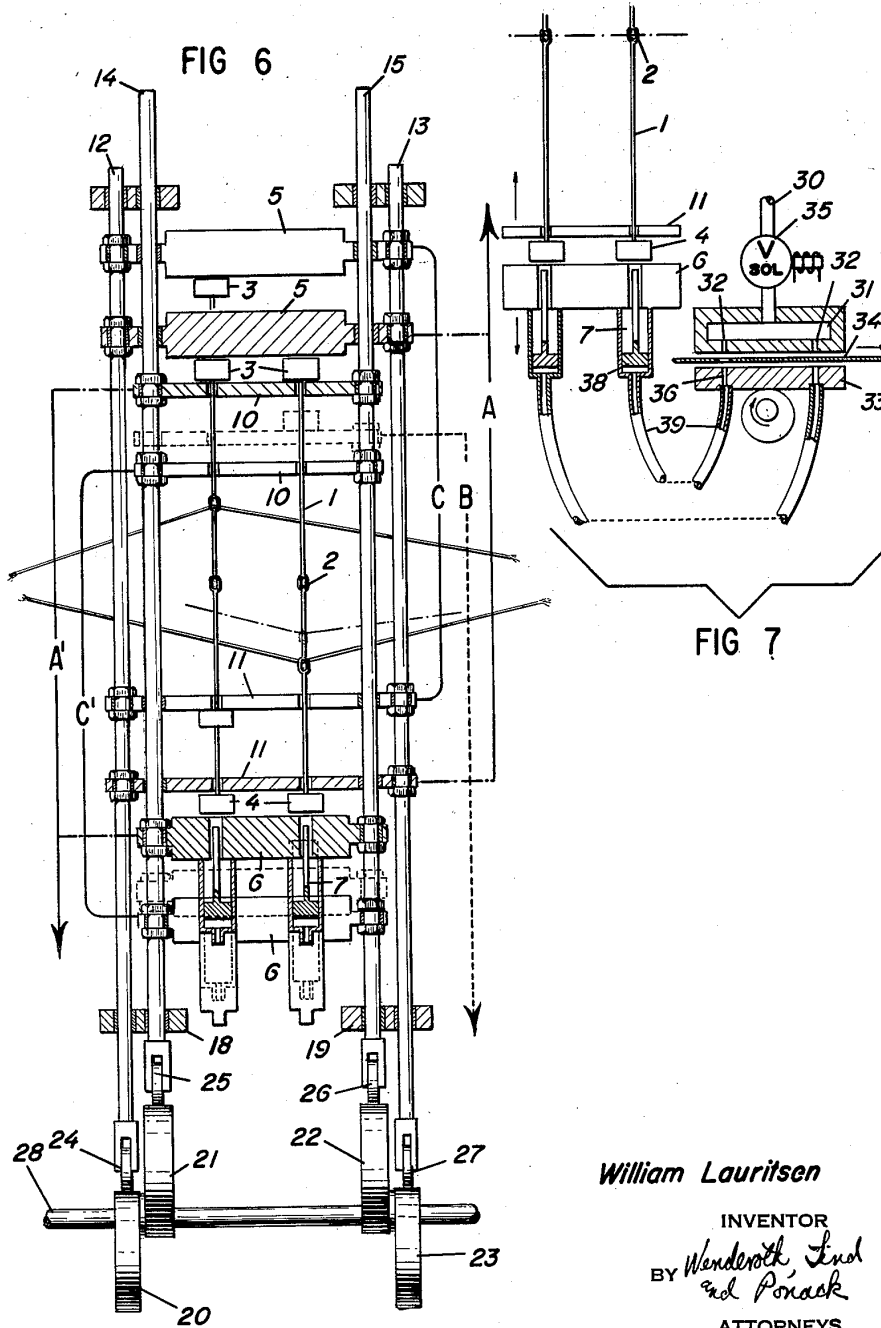
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SHEDDING MECHANISMS

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This invention relates to a shedding mechanism of the type in which each heald has its two ends provided with a permanent magnet, a soft iron member or a like armature adapted to be actuated by magnets to operate the healds for shedding. The invention is substantially characterized in that the shedding mechanism presents at the two ends of the healds a small number of magnets, preferably one at each end, for the operation of all healds and that the healds are adapted to cooperate with selectors, so dependent on the pattern that only the healds which are to engage the magnet at one end are actuated by said selectors.

Further features of the invention and the advantages thereof will appear from the following description, reference being made to the accompanying drawing which illustrates some embodiments, chosen by way of example, of the heald portion of a shedding mechanism. In the drawings:

FIGS. 1-3 diagrammatically show an embodiment of the heald portion with the constituent parts thereof in three different positions, FIG. 1 showing the heald portion in initial position with closed shed, while FIG. 2 shows the parts at the beginning of the opening movement of the shed and FIG. 3 shows the parts at open shed;

FIG. 4 shows a cross section of the upper part of the heald portion in one embodiment thereof, the uppermost and lowermost positions of the healds being indicated by dashed lines;

FIG. 5 shows a cross section of the heald portion, in another embodiment;

FIG. 6 is a schematic representation of the shedding mechanism with the means for moving the magnets and the comb boards; and

FIG. 7 is a diagrammatic representation of control means for the selectors.

The healds 1 in a shedding mechanism for looms are provided approximately at their middle portion with heald eyes 2 and present at their two ends a permanent magnet, a soft iron member or a like armature 3 and 4. These armatures 3 and 4 are actuated by magnets for shedding.

According to the invention, the shedding mechanism at the two ends of the healds 1 has a small number of magnets, preferably a single magnet 5 and 6, for the operation of all healds. Besides, the healds 1 are adapted to cooperate with selectors 7 so dependent on the pattern that only the healds 1 which are to engage the magnet 5 at the upper end, are actuated by said selectors.

In one embodiment of the invention the magnets 5 and 6 are permanent magnets, which makes for a simple construction. In another embodiment of the magnets 5 and 6 are electromagnets which permits during the operating cycle an increase and decrease of the pull so that it can be given the strength desired in each single case. FIGS. 4 and 5 show two embodiments in which the magnets 5 and 6 are electromagnets. In the FIG. 4 embodiment the magnets 5 and 6 are adapted to be moved towards and away from the positions occupied by the heald ends or more precisely the armatures 3 and 4 in the initial position of the healds 1. In the FIG. 5 embodiment the magnets 5 and 6 are fixedly arranged, in which case the electromagnetic fields must be so strong that they can attract the armatures 3 and 4 with sufficient strength also at a relative large distance. The electromagnetic fields are generated by solenoids 8, surrounded by soft iron caps 9.

As will appear from the embodiments shown in the

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drawings the healds 1 pass through holes in boards 10 and 11 disposed at the ends of the healds and which by reason of their function may be designated as comb boards. The comb boards 10 and 11 are adapted to engage the armatures 3 and 4 or corresponding projections at the heald ends, the comb boards 10 and 11 which naturally keep the healds 1 at definite relative distances, being reciprocable in the heald direction to impart to the healds 1 a guided and controlled movement at the opening of the shed and for returning the healds 1 to initial position.

In the cases where the magnets 5 and 6 are adapted to be moved towards and away from the heald ends in the initial positions thereof, the comb board 11 and 10, respectively, adjacent one end of the healds 1 is adapted to be moved synchronously with the magnet 5 and 6, respectively, at the other end. Said movements may preferably be produced by a drive shaft or like member included in the loom.

In the embodiment illustrated in FIG. 5 the comb boards 10 and 11 are preferably adapted simultaneously to be moved towards and away from the middle of the healds 1. In the embodiment shown in FIGS. 1-4 the comb board 10 and the corresponding magnet 6 are adapted at least when the shed is opened, to be moved slightly before the comb board 11 and the corresponding magnet 5.

As shown in FIG. 2 one heald 1 will follow the magnet 6 at the initial downward movement thereof because at least at this moment the magnet 6 is stronger than the magnet 5. The other heald 1 will, however, be retained in its initial position because of its cooperation with a selector 7 consisting of a pin, a needle or like element. When the magnet 5 then effects its upward movement it takes the other heald 1 along so that the shed shown in FIG. 3 is formed, which is thus dependent on the pattern.

In the FIG. 5 embodiment the heald 1 and the armatures 3 and 4 thereof occupy initial position or selecting position, i.e. with closed shed. The comb boards 10 and 11 are about to begin their movement towards each other. The solenoids 8 are energised, for which reason the magnets 5 and 6 try to attract the armatures 3 and 4 disposed at the healds 1. If the magnet 6 at this moment is somewhat stronger than the magnet 5, all armatures 4 actuated by this magnet 6 will be more strongly attracted than the armatures 3 actuated by the magnet 5, and as a consequence the armatures 3 resting on the comb board 10 will follow this means downwardly. Should, however, a counter-pressure from a selector 7 actuating an armature 4 be slightly larger than the difference between the pull of magnet 5 and that of magnet 6, the magnet 5 will attract the armatures 3, and as a consequence the armatures 4 resting on the comb board 11 will follow this means upwardly.

As will appear from the foregoing, the operation of the healds by the shedding mechanism according to the present invention can be carried out at any angle whatever to the horizontal plane. It is thus possible to have for instance a fully horizontal heald movement, since this movement can be made independent of the weight of the healds.

As is evident from the embodiment shown in FIGS. 1-3, the selectors 7 are adapted to be operated by a pressure medium or the like which by means of valves is distributed to the different selectors 7 in dependence on the pattern. Said valves can be adapted for actuation by pattern cards via ordinary jacquard needle mechanisms or the like. The pattern cards can also be adapted, by reason of their perforations, to constitute said valves or the valve members cooperating therewith. In another embodiment the selectors 7 may be adapted for operation by the pattern via a tape recorder.

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Fixedly connected to eccentric rods 12 and 13 are the magnet plate 5 and the comber board 11, while eccentric rods 14 and 15 carry the magnet plate 6 and the comber board 10.

The four eccentric rods 12, 13, 14 and 15 are movable to and fro or up and down in the bearing guides 16, 17, 18 and 19 and are set in motion by the eccentric disks 20, 21, 22 and 23 through the rollers 24, 25, 26 and 27 engaging said disks. Said eccentric rods 12 and 13 simultaneously move the magnet plate 5 and the comber board 11 and rods 14 and 15 simultaneously move the magnet plate 6 and the comber board 10.

The eccentric disks 20, 21, 22 and 23 are fixed to the shaft 28 in such a way that the eccentric rods 12 and 13 are always given a movement in the opposite direction to the eccentric rods 14 and 15, whereby the magnet plate 5 and the comber board 11 are given a uniform motion but in the opposite sense relative to the magnet plate 6 and the comber board 10 connected by the eccentric rods 14 and 15.

In the initial position A—A₁ the magnet plate 5 and the comber board 11 and, respectively, the magnet plate 6 and the comber board 10 are indicated by hatched surfaces while the details in position B are shown with dashed contours. In position C and C₁, respectively, the contours of the magnet plates 5 and 6 and comber boards 10 and 11 are drawn by full lines.

Position A—A₁ corresponds to the situation in FIG. 1, position B is the same as the state in FIG. 2, and position C—C is similar to the open shed position in FIG. 3.

Due to a specific design of the eccentric disks 20, 21, 22 and 23 the movement of the magnet plate 6 and the comber board 10 start before that of magnet plate 5 and comber board 11, and occupy position B. Only at that moment will the magnet plate 5 and the comber board 11 start their movement in the opposite direction and then occupy their extreme positions in location C simultaneously as the magnet plate 6 and the comber board 10 take their extreme positions C₁.

The comber boards in FIG. 5 can be driven in the same manner as in FIGS. 1, 2, 3 and 4, i.e. in the same manner.

FIG. 7 shows how a perforated pattern card or an endless pattern band can actuate the selectors by a pressure medium.

Compressed air is led from a compressor and a compressed air tank (not shown) through a pipe 30 to a distribution box 31 which on one flat side has the same number of holes as a Jacquard apparatus of an ordinary jacquard machine, e.g. 1320 holes. In FIG. 7 only two holes 32 are shown. Between this distribution box 11 and a plane counter-pressure plate 33 which has the same number of holes 36 as the distribution box 31 and registers with them, there is advanced, with an intermittent movement, a chain of perforated cards or an endless perforated band 34. Each time the perforated (pattern) band stops, i.e. each time the heald is to change according to the perforation in the band, the plate 33 is pressed against the distribution box 31, the perforated band 34 remaining clamped in airtight relationship between these elements. At this moment a valve 35, e.g. a magnetically actuated valve, is opened in the pipeline 30, and the air thereby flows into the distribution box 31, passing through the holes 32, where there are holes in the pattern band 34. (In FIG. 7 only one hole is shown.) The air then flows on through flexible conduits 39 and actuates the pistons 38 with their selectors 7 which in turn press against the armatures 4 at one end of the healds 1. At the beginning of the pressure pulse the armatures 4 lie in supports between the magnet plate 6 and the comber board 11. The static pressure from the selectors 7 plus the magnetic attraction between armature 3 and magnet 5 (see FIGS. 1, 2 and 3) at the other ends of the healds 1 will then become greater than the magnetic attraction between magnet 6 and armatures 4, said armatures 4 actuated by the selectors 7 being released from the magnet plate 6 when

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said plate and the comber board 10, begin their movement away from the comber board 11 and the magnet plate 5, respectively, according to the schedule of motion earlier described. The selectors 7 thus overcome the difference between the oppositely directed attractions between the magnets 5 and 6 and armatures 3 and 4 at the two ends of the healds 1.

In all figures there is shown but one vertical section through a row of healds and for the sake of simplicity but two healds in the rows are shown in FIGS. 1 to 3 and 6, 7.

Instead of the system including pistons and selectors or the like, it is also possible to cause the compressed air to actuate the armatures directly. The armatures 4 can also be actuated by vacuum (suction pulse) but in such a case the magnetic attraction between magnet plate 5 and the armatures 3 must be greater than that between armatures 4 and magnet plate 6.

The selectors 7 need not necessarily be needles or like means. The pressure on the healds 1 which are not to follow, or be actuated by, the magnet 6 can thus be produced directly by means of compressed air or vacuum. In another embodiment the selection can be realized by deenergization of certain armatures 3 or 4 or by inverse polarisation thereof through electric induction.

All embodiments within the scope of this specification and/or the appended claims are comprehended within the scope and spirit of this invention. The embodiments of the invention were indicated for purposes of illustration rather than limitation. All variations and modifications of the invention are understood as being included within the scope thereof.

Thus in a further embodiment of the invention the comber board 11 and the oppositely movable magnet 6 are adapted, at least at the closing of the shed, to be moved before the other comber board 10 and the magnet 5. This will guarantee that the armatures 4 are always engaged with the magnet 6 at closed shed.

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

1. A shedding mechanism comprising a plurality of healds, an armature on each end of each heald, at least one magnet at each end of the healds and positioned to act on a plurality of armatures, and selectors at one end of the healds selectively acting on said healds, whereby when the ends of the healds are moved apart relative to each other by the action of the magnets on said armatures, certain of the healds can be acted on by said selectors for causing said certain healds to be moved by one of the magnets and the remainder of the healds to be moved by the other of the magnets.

2. A shedding mechanism as claimed in claim 1 in which means are provided for operating said selectors, said selector operating means comprising piston-cylinder means for each selector needle, pressure medium distribution means connected to said piston-cylinder means, and valve means in said distribution means for selectively directing pressure medium to individual piston-cylinder means.

3. A shedding mechanism as claimed in claim 2 in which said valve means comprises a plurality of valves, and valve actuating means for each valve comprising a pattern card controlled jacquard needle mechanism.

4. A shedding mechanism as claimed in claim 3 in which the valve means and valve actuating means are constituted by the pattern cards having perforations.

5. A shedding mechanism in accordance with claim 1, characterised in that the magnets disposed at the two ends of the healds are permanent magnets.

6. A shedding mechanism in accordance with claim 1, characterised in that the magnets disposed at the two ends of the healds are electromagnets.

7. A shedding mechanism in accordance with claim 1, characterised in that the magnets disposed at the two ends of the healds are fixedly arranged.

8. A shedding mechanism in accordance with claim 1,

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characterised in that means are provided for moving the magnets disposed at the two ends of the healds towards and away from the positions that the heald ends are to occupy in the initial position of the healds.

9. A shedding mechanism in accordance with claim 1, characterised in that comber boards are provided having holes therein through which said healds pass for holding the healds spaced, said comber boards being positioned adjacent the ends of the healds and adapted to engage the magnet means at the heald ends, and means for reciprocating said comber boards in the direction of the healds to impart to the healds a controlled movement at the opening of the shed and for returning the healds to initial position.

10. A shedding mechanism in accordance with claim 9 characterised in which said means for moving the comber boards are adapted to move one comber board toward and the other comber board away from the middle of the healds.

11. A shedding mechanism in accordance with claim 9, characterised in which means for reciprocating the comber boards adjacent one end of the healds is connected to the magnet at the other end of the healds.

12. A shedding mechanism in accordance with claim 11, characterised in that the means for reciprocating the comber board moves one comber board and the corresponding magnet, at least at the opening of the shed,

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slightly before the other comber board and the corresponding magnet.

13. A shedding mechanism in accordance with claim 11, characterised in that the means for reciprocating the comber boards moves one comber board and the oppositely movable magnet, at least at the closing of the shed, before the other comber board and the magnet.

14. A shedding mechanism in accordance with claim 1, characterised in that the selectors are pins, cooperating with the one ends of the healds.

15. A shedding mechanism as claimed in claim 1 in which the selectors are needles cooperating with the one ends of the healds.

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