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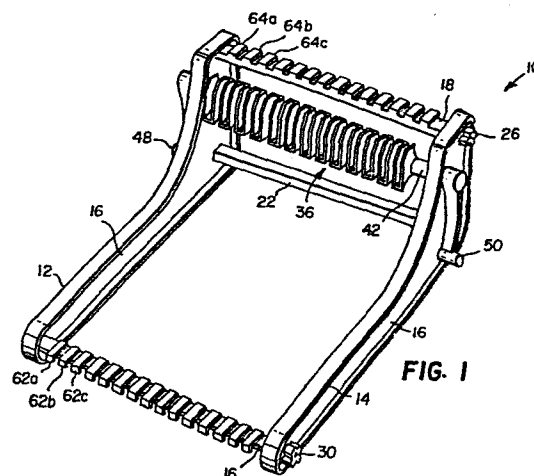
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(54) Loom with improved heddling mechanism.

(57) A shuttle loom includes first and second L-shaped frame members carrying spaced-apart warping members and heddling means. The heddling means includes a rotatable shaft carrying a plurality of triangular vanes attached at a vertex thereof to the shaft and extending through the plane joining the warping members. First and second pluralities of warp thread engaging members join alternating groups of adjacent vanes at opposite corners thereof for forming a shed as the shaft is rotated between two predetermined positions.



LOOM WITH IMPROVED HEDDLING MECHANISM

This invention relates in general to a shuttle loom and more particularly to such a loom having an improved heddling mechanism especially adapted for use in a small-scale, manually-operated loom such as a toy loom.

Heretofore, shuttle looms have employed heddles and harnesses of various configurations through which warp threads were passed and which operated in a reciprocating manner to form the shed through which the shuttle passed to weave the finished cloth. While such prior art heddles and harnesses have been useful in a great variety of looms for many years, they have principally been employed in connection with commercial looms and to some extent, in connection with home looms, but not in looms particularly designed for use by children.

Looms employing conventional heddles are versatile and reliable, but are difficult to set up for weaving, requiring a degree of manual dexterity greater than commonly found in small children.

Accordingly, it is an object of this invention to provide a loom and more particularly a shuttle loom having improved heddling means.

It is another object of this invention to provide such heddling means in a form readily manufacturable as a single element at relatively low cost.

It is another object of this invention to provide a loom having a minimum number of moving elements.

It is a further object of this invention to provide a loom uniquely simple in operation and that may conveniently be set up and operated by children.

Briefly stated and in accordance with a

presently preferred embodiment of the invention, a shuttle loom is provided having a frame for supporting first and second warping members at spaced-apart locations and a heddling member disposed between the warping members for both guiding The warp threads and forming a shed as the heddling member is moved between first and second positions.

The heddling member includes an inner shaft rotatably disposed in the frame generally parallel to the warping members, the shaft including a plurality of warp guiding vanes extending perpendicular to the shaft for receiving the warp threads therebetween and maintaining the same in horizontally spaced-apart relationship. Adjacent vanes are joined by alternating first and second pluralities of co-linear warp engaging members disposed between alternating remote corners of the vanes at a point removed from said shaft.

Upon rotation of the heddling mechanism between first and second positions, the first and second pluralities of warp-engaging members alternately displace first and second groups of warp threads to form the shed.

The elements of the invention that are believed to be novel are set forth with particularity in the appended claims. The invention itself, together with further embodiments and advantages thereof, may be more clearly understood by reference to the following detailed description thereof taken in connection with the accompanying drawing in which:

Figure 1 is a top perspective view of a loom in accordance with this invention;

Figure 2 is a partial top view thereof;

Figure 3 is a side view thereof showing the heddling mechanism in a first position;

Figure 4 is a side view thereof showing the

heddling mechanism in a second position;

Figure 5 is a partial perspective sectional view thereof showing the heddling mechanism in a first position; and

5 Figure 6 is a sectional view of a cam mechanism thereof;

Figure 7 is a sectional perspective view of an alternative heddling mechanism in accordance with the invention.

10 Referring now to figures 1 through 4, the several elements of the new loom may be seen. The loom, designated generally at 10, includings first and second frame members 12 and 14 each having an elongated base 16 and a generally upstanding portion at one end of the
15 base for supporting the remaining elements of the loom. First and second warping members 18 and 20 are disposed between the frame members and maintain the same in spaced-apart relation.

 Preferably the warping members include
20 projecting elements 62a-c and 64a-c around which the warp thread 60 may be routed when the loom is warped. An additional rod-shaped frame member 22 is disposed between the frame members 12 and 14 below the upper warping member 18 for increasing the stability of the
25 loom. The warping members 18 and 20 and the rod-shaped frame member 22 are preferably provided with threaded ends for removable attachment to the frame members. A plurality of nuts, 24, 26, 28, 30, 32 and 34, one on
30 each end of the two warping members 18 and 20 and the frame member 22 secure the warping members to the frame and give structural integrity to the loom. In this manner, the loom may be readily manufactured and shipped in disassembled form and assembled by the user.

 Heddling member 36 includes a shaft 42
35 pivotally mounted in holes in frame members 12 and 14.

Preferably, shaft 42 is provided, at at least one end thereof, with a cam 44 engaging a stop 46 on the frame member 16 for limiting the movement of the heddling member as will be more fully described hereinbelow. The heddling member is provided with operating handles 48 and 50 at the ends thereof for manually moving the heddling mechanism between the two shed forming positions thereof. The handles are removably attached to the ends of the shaft to secure the heddling mechanism in the frame.

All of the elements of the invention thus far described, are adapted to be manufactured in low-cost form, for example, by molding.

As seen in Figs. 1 and 5, the heddling mechanism includes a shaft 42 and a plurality of parallel spaced-apart warp thread guiding vanes 52a-b attached at a narrow end thereof to the shaft 42 and extending away therefrom through the path of the warp threads between the warping members (see Figs. 3-5). Preferably, each of the vanes has a generally triangular shape and is attached to the shaft at one vertex of the vane with the base thereof extending completely through the path of the warp threads. A first plurality of warp engaging members 54a-b (see Fig. 5) is disposed between alternate sets of vanes at one remote corner thereof and a second plurality of warp engaging members 56a-b is attached between the remaining alternate sets of vanes at the other remote corner thereof.

The operation of the new loom may be understood by referring now to figures 3 and 4 wherein the loom is shown with the heddling mechanism 36 in the required positions for forming the two sheds required to accomplish weaving, and in Fig. 2 wherein the path of the warp yarn may be clearly seen.

In operation, the loom is warped by attaching

one end of the warp yarn 60 to the warping bar 20 and passing the yarn through a space between adjacent warp guiding vanes, then around one of projection 64 extending from the warping bar 18 and back through next adjacent pair of vanes and around one of projections 62 on the other warping member 20 and so on until the desired width of warping threads is achieved. Depending on the position of the heddling member 36, the warp threads may engage one or the other of the pluralities of warp engaging members 54 and 56 during the warping process.

After the loom has been warped, weaving may begin. Weaving is accomplished on this loom in a manner substantially similar to looms heretofore known except that the operation of the heddling member is different. A shuttle of conventional design (not shown) is loaded with the weft thread. One end of the weft thread is secured to the warp and the shuttle is passed back and forth through the shed as the heddling member is alternately positioned between the two shed-forming positions shown in Figs. 3 and 4, and hereinabove described by moving handles 48 and 50 between a raised and lowered position. A woven product is produced.

The formation of the shed may be seen by referring to Figs. 3 and 4. Adjacent warp threads 60 a and 60 b are alternately raised out of the plane of the remaining warp threads by heddling mechanism 36. When one set of warp threads is raised by one set of warp engaging 54 members, the shuttle is passed through the shed in one direction. When the other set of warp threads is raised by the other set of warp engaging members 56 the shuttle is passed back through the shed in the opposite direction.

Figure 5 shows a cut-away partial perspective view of heddling member 36 showing the interaction with

warp yarn 60. First set of warp engaging pins 54 a and b raise a first group of warp threads 60b shown in phantom lines above their normal position to form a shed through which a shuttle may be passed. Second set of
5 warp engaging pins 56a and b are slightly below the normal path of the second set of warp threads 60a between warping members 18 and 20. Both the displaced warp threads and the non-displaced warp threads pass between and are guided by adjacent vanes 52a and b and
10 the remaining vanes.

Referring now to Fig. 6, a cut-away sectional view of the end of heddling mechanism 36 is shown. Shaft 42 includes can 44 engaging slot 46 on the inside surface of frame member 12. Shaft 42 is movable between
15 the position shown in Figs. 3 and 6 with handle 48 in the lowered position and the position shown in Fig. 4 with handle 48 raised. Cam 44 would move anticlockwise within slot 46 to the opposite stop thereof, as handle 48 is moved from the lowered to the raised position.

20 Figure 7 illustrates an alternative shed-forming mechanism 36 in accordance with this invention that may be employed interchangeably with the heddling mechanism shown in figures 1-6, but which is particularly adapted to be formed from plastic material
25 by molding. The heddling mechanism indicated generally at 36 is substantially identical to heddling mechanism heretofore described except that the warp engaging surfaces 74 and 76 comprise the end surfaces of first and second pluralities of webs joining alternating pairs
30 of vanes. In this way, the spacing of the vanes is securely maintained and the heddling mechanism is particularly sturdy.

While the invention has been described in connection with a presently preferred embodiment
35 thereof, those skilled in the art will recognize that

certain modifications and changes may be made therein
without departing from the true spirit and scope of the
invention which is accordingly intended to be limited
solely by the appended claims.

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WHAT IS CLAIMED IS:

1. A shuttle loom comprising;
first and second warping members for carrying a plurality of warp threads;
axially rotatable heddling means disposed
5 between said warping members and movable between first and second positions said heddling means comprising a plurality of warp guides for maintaining said warp threads in laterally spaced-apart position and first and second pluralities of alternating warp engaging members
10 connected between adjacent warp guides for selectively engaging and separating selected groups of warp threads from other warp threads as said heddling means is moved between said first and second positions, thereby forming a shed.
2. The loom of claim 1 wherein said heddling means further comprises a rotatable shaft and said warp guides comprise a plurality of vanes extending perpendicular to said shaft and extending through the
5 plane of said warp threads.
3. The loom of claim 1 further comprising cam means on said shaft for restricting the motion of said shaft between first and second positions separated by less than 180°.
4. The loom of claim 2 wherein said warp-engaging members comprise first and second pluralities of pins disposed between alternating first and second pluralities of said vanes whereby each of said first and
5 second pluralities of pins engages alternating pluralities of warp threads.
5. The loom of claim 1 wherein said heddling means comprises a shaft and a plurality of generally triangularly-shaped vanes affixed at a vertex thereof to said shaft and extending perpendicular thereto; and
5 first and second pluralities of webs joining

adjacent ones of said vanes at alternating edges thereof.

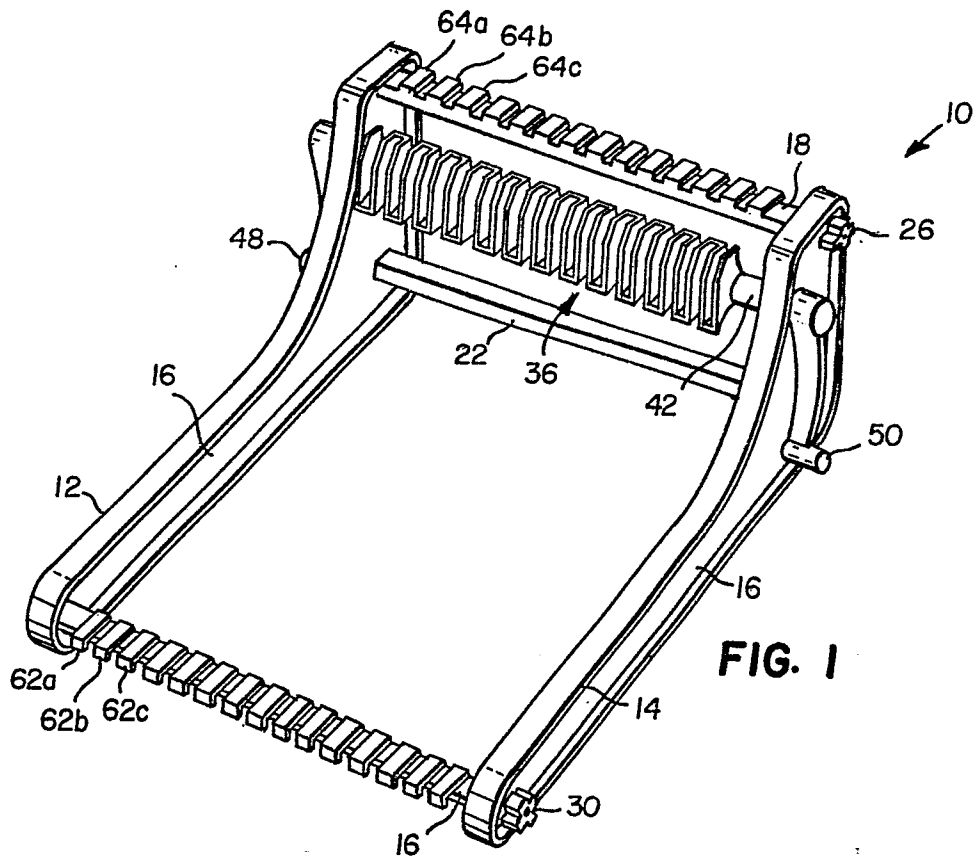
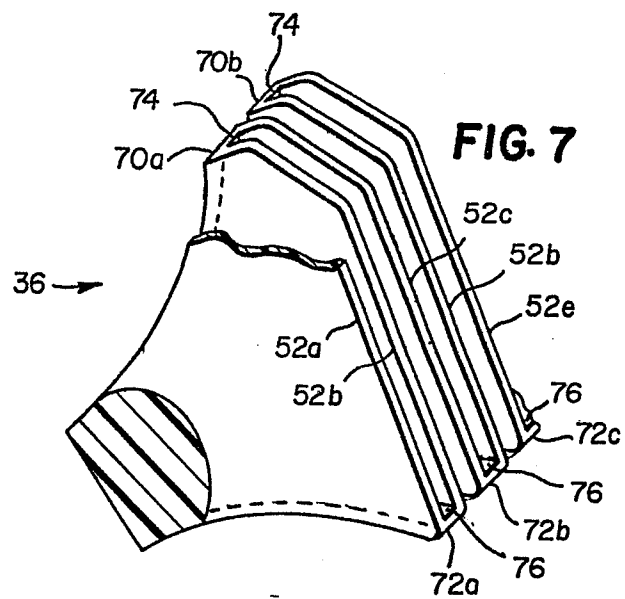
6. A shuttle loom comprising first and second generally L-shaped frame members; first and second warping members disposed between and joining said frame members; heddling means disposed between said frame members intermediate said warping members, comprising a rotatable shaft; at least one handle on one end of said shaft; a plurality of vanes extending perpendicular to said shaft and through a plane joining said warping members; first and second pluralities of warp-engaging members disposed between alternating groups of adjacent ones of said vanes for engaging alternating groups of warp threads for displacing said warp threads out of said plane or when said handle is moved between a raised and lowered position.

7. The loom of claim 5 wherein said warp-engaging members comprise first and second pluralities of pins disposed between alternating corners adjacent ones of said triangular-shaped vanes remote from said shaft.

8. The loom of claim 5 wherein said warp-engaging members comprise first and second pluralities of webs joining alternating adjacent edges of said vanes.

9. The loom of claim 5 further comprising cam means on said shaft for restricting the motion of said shaft between first and second positions separated by less than 180° .

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**FIG. 1****FIG. 7**

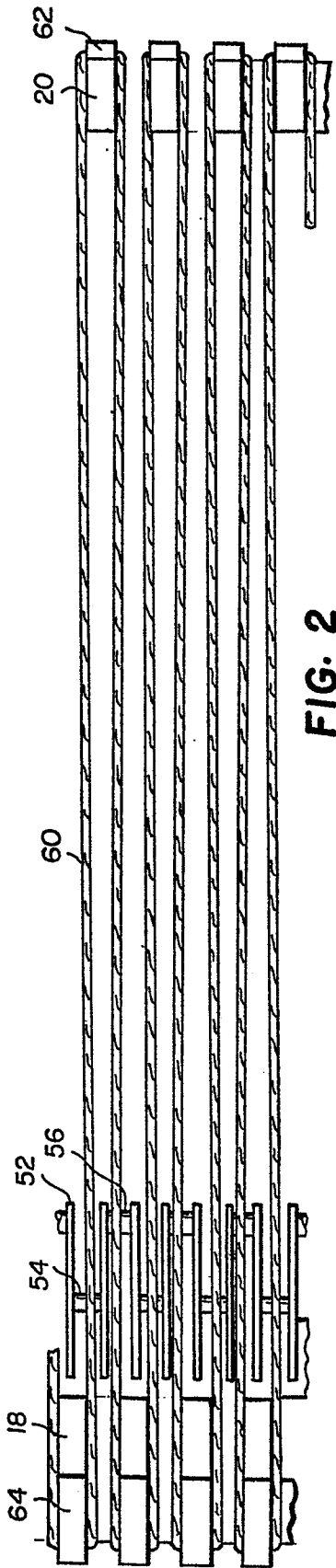


FIG. 2

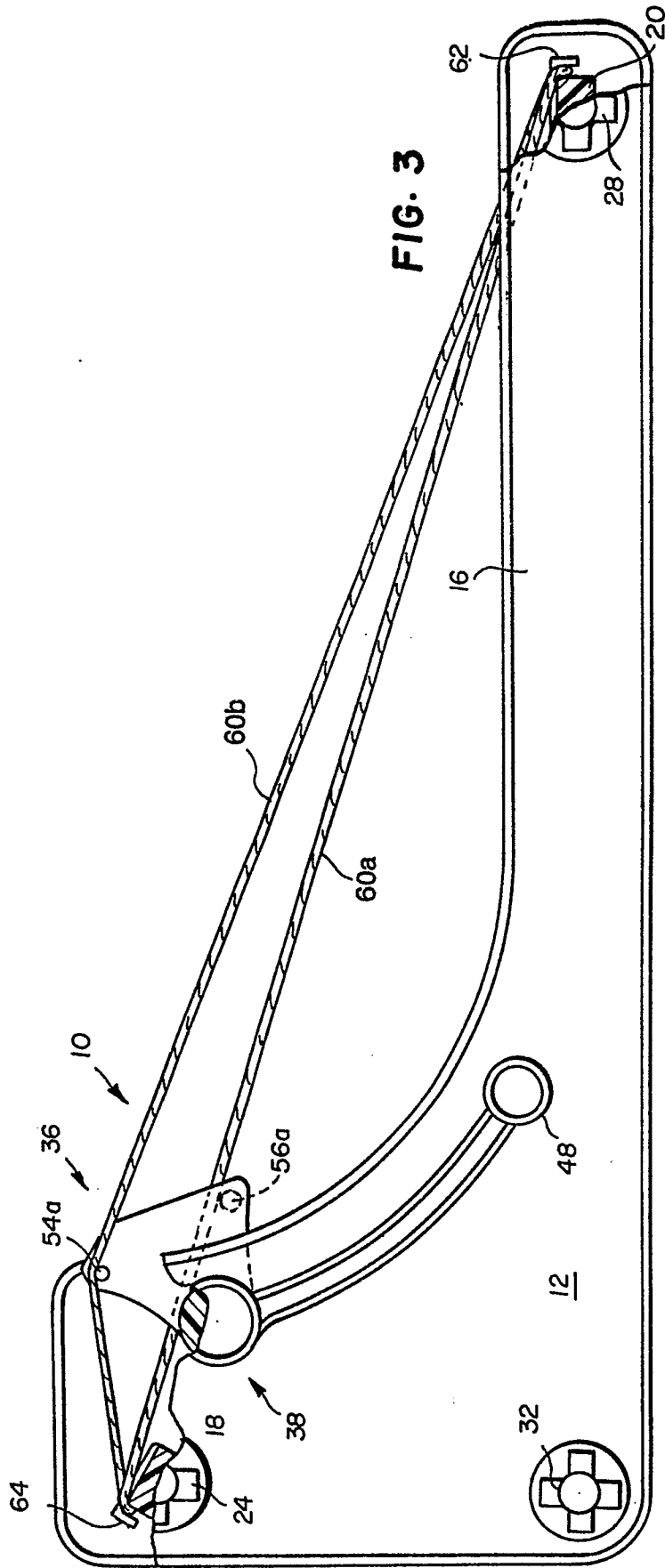
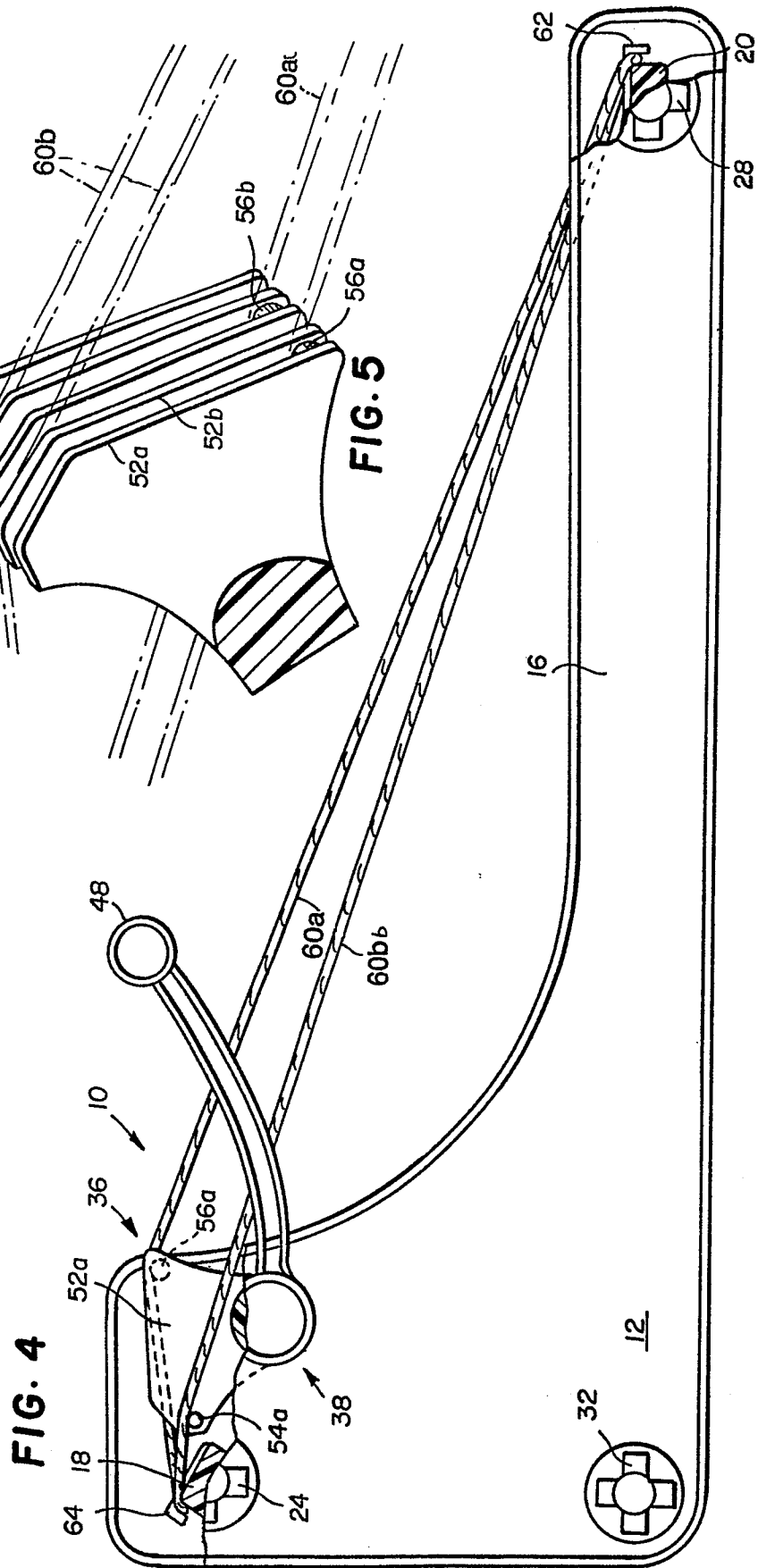
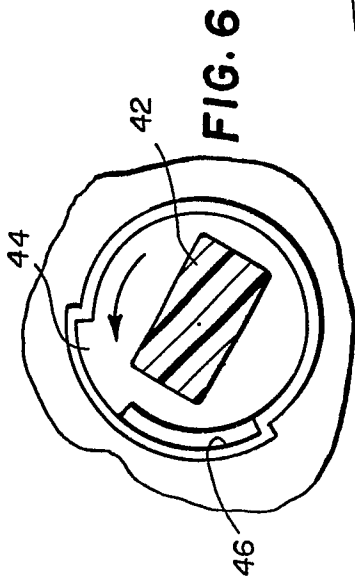


FIG. 3





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 84300234.6
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
X	DE - C - 834 376 (SCHACHENMAYR, MANN U. CIE) * Totality * --	1,2,5	D 03 D 29/00 D 03 C 13/00 A 63 H 33/30
X	DE - C - 416 935 (WITTE) * Totality * --	1,2,4	
A	US - A - 760 919 (POOLE) * Fig. 1 *	6	
A	US - A - 2 504 940 (WALLACH) * Fig. 2 *	6	
A	FR - A1 - 2 297 266 (PERIER) * Fig. 4 *	5	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
A	FR - A1 - 2 501 734 (CSILLAG FAIPARI SZOVETKEZET) -----		D 03 D 29/00 D 03 C 13/00 A 63 H 33/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 10-05-1984	Examiner MANLIK
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			