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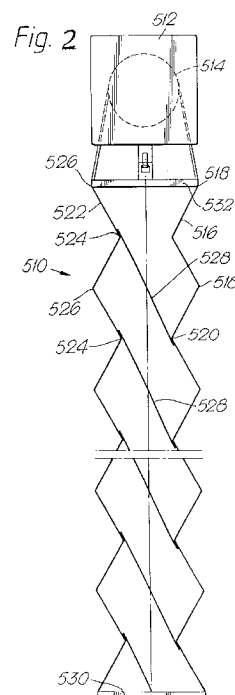
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(54) Covering assembly for architectural openings

(57) A covering assembly in the form of a window blind includes a front sheer fabric 516, provided with a plurality of forward and rearward pleats 518, 520, and a rear elongate sheer fabric 522, again provided with forward and rearward pleats 524, 526.

A plurality of vanes 528 interconnect the front and rear sheets and are connected to the front and rear sheets at the location of the pleats. In one embodiment one edge of each vane is connected to the rear interior face of the forwardly extending pleat of one sheet, while the other edge is connected to the front interior face of a forwardly extending pleat of the rear sheet, and in another embodiment the one edge is connected as previously mentioned, but the other edge is connected to the forward interior face of a forwardly extending pleat of the rear sheet.

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Description

The present invention relates to a covering assembly particularly for windows, doors and other architectural openings.

There are many known forms of covering assemblies for windows, doors and the like including curtains, roller blinds, venetian blinds, drapery and the like. Recently there has been proposed a window covering assembly which includes a first and second generally parallel spaced apart vertically extending sheer fabrics having a plurality of spaced generally parallel transversely extending vanes fixedly secured to the first and second sheer fabrics to extend therebetween.

The sheer fabrics are often constructed of a translucent or transparent material and may be in the form of woven or knitted fabrics or non-woven fabrics or indeed may simply be sheets of plastics material. The vanes are usually opaque or semi-opaque and by adjusting the relative positions of the sheer fabrics, the vanes can be caused to tilt relative to the sheer fabrics rather in the manner of the slats of a horizontal or vertical blind. Conventionally the vanes extend horizontally in such assemblies and the sheer fabrics are supported on a tilt roll which can also be used as a wind up roll. Also known are vertical venetian blinds in which the individual vanes extend vertically; such assemblies have a head rail for opening and closing the assembly and for tilting the vanes when the assembly is in the closed position covering the opening.

According to the present invention there is provided a window blind comprising in combination, a front light transmitting sheet having a plurality of parallel alternately forwardly and rearwardly directed pleats formed therein, a rear light transmitting sheet spaced apart from said front sheet in substantially parallel relation therewith and having a plurality of parallel alternately forwardly and rearwardly directed pleats formed therein, each forwardly directed pleat on one of said sheets in a neutral position of said window blind being in alignment with a rearwardly directed pleat on the other of said sheets, and a plurality of substantially parallel relatively non-light transmitting vanes having opposite side edges, one side edge of each vane being attached to said front sheet and the other side edge being attached to said rear sheet, whereby when one of said sheets is moved with respect to the other of said sheets from said neutral position in one direction of movement transverse to said vanes, said vanes are caused to lie perpendicular to said sheets whereby to allow passage of light through the blind material, and when said sheets are moved relative to each other from said neutral position in the opposite direction of movement said vanes are caused to at least partially block the passage of light through the blind material, and wherein said one side edge of each vane is attached to said front sheet adjacent to a pleat thereof and said other side edge of each vane is attached to said rear sheet adjacent to a pleat thereof.

In order that the present invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which:-

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Figure 1 is a schematic perspective view of one embodiment of assembly according to the invention; Figure 2 is an end elevation of the assembly of Figure 1;

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Figure 3 is a view similar to Figure 2 of a slightly modified version;

Figure 4 is a schematic perspective view of another embodiment of blind assembly according to the invention;

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Figure 5 is a schematic perspective view of a still further embodiment of window covering according to the invention; and

Figure 6 is an enlarged cross-section showing the assembly of Figure 5.

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In Figure 1 there is illustrated one form of window blind assembly indicated by the reference numeral 510. This assembly 510 is associated with a headrail 512 provided with an elongate tilt roll member 514 means (not shown) being provided to rotate this roll about its generally horizontal axis.

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The material 510 includes a front sheer fabric 516 provided with a plurality of spaced parallel, horizontal forward pleats 518 and rearward pleats 520. The material 510 also includes a rear elongate sheer fabric 522 formed with forward pleats 524 and rearward pleats 526 similar to the pleats 518, 520 of the front elongate sheer fabric 516.

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As best seen in Figure 2, a plurality of vanes 528 interconnect the front and rear sheer fabrics 516, 522. The vanes 528 in Figure 2 extend between a rear, interior, face of a rearwardly extending pleat 520 of the front sheer fabric 516 diagonally upwardly to where it is connected to the forward interior face of a forwardly extending pleat 524 of the rear sheer fabric 522.

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As shown the front and rear sheer fabrics 516, 522 are connected to a bottom rail 530 adjacent their lower ends and are connected to the elongate tilt roll 514 at their upper ends. In the construction illustrated a spacer member 532 is provided below the headrail and is connected to the front and rear sheer fabrics adjacent further pleats 518, 526 thereof. This spacer 532 is not essential but provides a better configuration for the upper parts of the pleated blind material.

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Figure 3 shows a slightly modified structure in which like parts have been indicated by like reference numerals. The vanes are here indicated by the reference numeral 534 and are connected slightly differently. In this construction the lower parts of the vanes 534 are connected to the rear, interior, face of a forwardly extending pleat 518 of the front sheer fabric 516 and the vanes are again inclined diagonally upwardly and connected to the front, interior, face of a forwardly extending pleat 524 of

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the rear sheer fabric 522. In this construction the vanes 534 are not planar as in Figure 3 but are reversed curved as shown at 536 and 538.

It will be appreciated that such a structure is, in some ways, rather similar to a venetian blind with the vanes 528,534. It will be appreciated that if the tilt roll 514, in either structure, is rotated in a clockwise sense, as seen in Figure 2 or Figure 3, the vanes 528,534, will overlies one another because they are in an overlapping mode and will thus, effectively, block the passage of light. If, however, the tilt roll 514 are tilted in a counter-clockwise sense, then the vanes 528,534, can be moved to a position in which they extend substantially horizontally, while remaining parallel to one another, so that there can be a passage of light therebetween.

For this purpose, therefore, the sheer fabrics 516,522, need to be formed of a translucent or transparent material, such as paper, or woven fabric, or non-woven fabric, or indeed they can be made of a plastics material. Similarly, the vanes 528,534 can be made of any suitable material. However, they are preferably formed of an opaque or semi-opaque material.

The vanes are connected in a suitable manner to the respective pleats 518,520,524,526 as appropriate. While it is contemplated that this could be done by a heat technique, such as by welding, they are preferably adhered by means of a third material such as stitching or stapling, but according to a preferred arrangement they are connected by being adhered, preferably using a hot melt adhesive, which melts at a temperature significantly below the melt temperature of the sheer fabric. It would be appreciated that the sheer fabric needs to have the pleats set in it and this can be done by a heat setting process which should again be conducted at a temperature in excess of the temperature of melting of the hot melt adhesive.

If reference is now made to Figure 4, a further rather different structure is illustrated. This structure has the pleats of the sheer fabrics extending generally vertically. In detail, therefore, the structure of Figure 4 employs a headrail 540 in which are mounted a plurality of sliding carriers 542 which are preferably provided with wheels (not shown) for running along guide tracks 544 formed in the headrail. Movement of the carriers 542 can be effected in any suitable manner but as shown a cord system 546 is provided. The assembly of carriers in the headrail may be generally similar to that disclosed in US Patent 3996988 in the name Dwight or in US Patent 4267875, in the name Koks. As in the Koks patent, a tilt rod 547 is provided and this may be rotated by a pulley 548 with a bead chain 550. The tilt rod 547 is associated with a worm and worm wheel, as in Koks US Patent 4267875, and the worm wheel in each carrier is connected to a separate hanger 552.

In Figure 5 there is illustrated a form of window covering suitable for covering a skylight in a horizontal or inclined roof.

The assembly includes a flexible window covering

indicated by the general reference numeral 410 this including the first sheer fabric 412, a second sheer fabric 414 and a plurality of transversely extending vanes 416 extending therebetween, the vanes being generally parallel to one another. This window covering 410 can be made in a number of different ways which do not form part of the present invention. The sheer fabrics 412,414 are made of a translucent or transparent material such as paper, a woven fabric or non-woven fabric or indeed they can be made of a plastics material. Similarly the vanes 416 can be made of any suitable material. However, they are preferably formed of an opaque or semi-opaque material.

The sheer fabrics 412,414 are connected to circumferentially spaced apart fixing means 420,422 on a wind up roll 424 which is mounted with its longitudinal axis extending generally horizontally to one side of the frame of a skylight.

Associated with the roll 424, at each end thereof, are cord reels 426,428 and a control pulley 430 at the end adjacent the reel 426. Rotation of the wind up roll 424 can be effected by operation of a cord, for example a bead cord 432 wrapped around the control pulley 430. Alternatively a motor drive could be provided. This rotation is also imparted to the cord reels 426,428.

Wrapped around the cord reels 426,428 are tension cords 34,36 which also pass around fixed pulleys 438,440 and are connected to opposite ends of an end rail 442 having, in its interior, a tension spring 444 to the ends of which are attached the ends of the tension cords 434,436. As can be seen more clearly in Figure 6, the end rail 442 is attached to the second sheer fabric 414 only. Two parallel tracks 443 are provided, one on each side of the covering, the tracks extending generally perpendicular to the axes of the wind up roll 424 and the end rail 442, the tracks for example being of channel or L-cross-section. At each end of the rail 442 a runner 445 is mounted and is slidable longitudinally in the adjacent rack 443 and serves to guide and support the rail. If desired further runners (not shown) could be provided on some of the vanes 416, these also sliding in the tracks. It is also contemplated that the tracks 443 and runners 445 could be omitted, particularly on smaller installations.

It will be understood that initial operation of the bead cord 432 will cause a certain rotation of the wind up roll 424. This will cause relative movement of the two sheer fabrics 412,414 with respect to one another in a direction parallel to one another. Thus the vanes will be caused to move from a position in which they extend in spaced apart relation, somewhat as shown in Figure 6, in which light can readily pass therethrough, to a closed position in which they overlap each other thus blocking off the passage of light.

Further movement of the wind up 424 will cause both of the sheer fabrics 412,414, with the flattened and overlapping vanes 416 therebetween, to be wound up onto the roll 424. As this happens, the end rail 442 will

move towards the wind up roll 424 so that the window covering can be pulled back by a desired distance and in fact can be pulled back completely.

If the bead chain 432 is operated in the opposite sense, then the cord reels will rotate in the opposite direction as will the wind up reel 424. The tension cords 434,436 will then tend to pull the end rail 442 back to the right as shown in Figure 5, thereby drawing the window covering to cover the window.

Claims

1. A window blind comprising in combination, a front light transmitting sheet having a plurality of parallel alternately forwardly and rearwardly directed pleats formed therein, a rear light transmitting sheet spaced apart from said front sheet in substantially parallel relation therewith and having a plurality of parallel alternately forwardly and rearwardly directed pleats formed therein, each forwardly directed pleat on one of said sheets in a neutral position of said window blind being in alignment with a rearwardly directed pleat on the other of said sheets, and a plurality of substantially parallel relatively non-light transmitting vanes having opposite side edges, one side edge of each vane being attached to said front sheet and the other side edge being attached to said rear sheet, whereby when one of said sheets is moved with respect to the other of said sheets from said neutral position in one direction of movement transverse to said vanes, said vanes are caused to lie perpendicular to said sheets whereby to allow passage of light through the blind material, and when said sheets are moved relative to each other from said neutral position in the opposite direction of movement said vanes are caused to at least partially block the passage of light through the blind material, and wherein said one side edge of each vane is attached to said front sheet adjacent to a pleat thereof and said other side edge of each vane is attached to said rear sheet adjacent to a pleat thereof.
2. A window blind according to claim 1, wherein said one side edge and said other side edge of said vanes being attached to the front sheet and the rear sheet such that said edges extend parallel to each other in said neutral position of the window blind and the vane between said edges extends in a generally S shaped curve.
3. A window blind according to claim 1 or 2, wherein the one edge of each vane is connected to the rear, interior, face of a forwardly extending pleat of the front sheet and the other edge of each vane is connected to the front interior face of a forwardly extending pleat of the rear sheet.
4. A window blind according to claim 1 or 2, wherein the one edge of each vane is connected to the rear, interior, face of a rearwardly extending pleat of the front sheet and the other edge of each vane is connected to the forward interior face of a forwardly extending pleat of the rear sheet.
5. A window blind according to any preceding claim, wherein said vanes extend vertically and further including a horizontal guide track; and a plurality of sliding carriers connected to the upper end of at least some of said vanes and slidable in said track.
6. A window blind according to claim 5, and further comprising:
 - a) a further sliding carrier mounted on said horizontal guide track for movement therealong;
 - b) a first elongate end rail connected to said further sliding carrier, said first end rail hanging vertically from said further sliding carrier and moveable with said further sliding carrier as said further sliding carrier moves along said track, said first end rail being connected to one of said front and rear sheets; and
 - c) a second elongate end rail connected to the other of said front and rear sheets at the end of said window covering opposite said first end rail.
7. A window blind according to claim 5 or 6, further comprising means moving an end one of said carriers along said horizontal guide track, whereby movement in one direction will cause said one end carrier to abut and move the next adjacent carrier in said one direction and subsequent carriers will also be moved, effective to open said window covering, and movement in the opposite direction will cause said one carrier to pull the next adjacent carrier and subsequent carriers will be pulled effective to close said window covering.
8. A window blind according to claim 7, further comprising spacer means connecting adjacent carriers at a predetermined spacing.
9. A window blind according to any one of claims 5 to 8, further including a hanger associated with each of said sliding carriers, said hangers being connected to the upper end of at least some of the vanes; and means to simultaneously rotate said hangers and thereby all of said vanes whereby when said hangers are rotated in one sense, the vanes are caused to lie parallel, thereby to allow passage of light through the blind and when said hangers are tilted in the opposite sense, adjacent vanes are caused to overlap, and thereby block the passage of light through the blind.

10. A window blind according to claim 9, and further comprising:
- a) a further sliding carrier mounted on said horizontal guide track for movement therealong;
 - b) a first elongate end rail connected to said further sliding carrier, said first end rail hanging vertically from said further sliding carrier and moveable with said further sliding carrier as said further sliding carrier moves along said track, said first end rail being connected to one of said front and rear sheets;
 - c) a second elongate end rail connected to the other of said front and rear sheets at the end of said window covering opposite said first end rail.
11. A window blind according to claim 9, further comprising means moving an end one of said carriers along said horizontal guide track, whereby movement in one direction will cause said one end carrier to abut and move the next adjacent carrier in said one direction and subsequent carriers will also be moved, effective to open said window covering, and movement in the opposite direction will cause said one carrier to pull the next adjacent carrier and subsequent carriers will be pulled effective to close said window covering.
12. A window covering according to claim 11, further comprising spacer means connecting adjacent carriers at a predetermined spacing.
13. A window covering assembly comprising in combination a window covering comprising first and second generally parallel spaced apart, longitudinally extending, sheer fabric sheets each defining parallel ends and parallel edges normal to said ends with juxtaposed ends of said sheets extending in spaced parallel relation, a plurality of longitudinally spaced, generally parallel, transversely extending vanes fixedly secured intermediate said first and second sheets and extending parallel to said sheet ends between the edges thereof, an end rail connected to one end of said second sheet and extending parallel to said vanes, a wind-up roll rotatable about its longitudinal axis and extending parallel to said end rail, means on said wind-up roll fixedly securing thereto juxtaposed ends of said sheets opposite said end rail in circumferentially spaced longitudinally extending relation thereon, said end rail being movable towards and away from said wind-up roll as said roll is rotated to wind or unwind said sheets, limited rotation of said wind-up roll when said sheets are fully extended causing said first and second sheets to move longitudinally relative to one another thereby to alter the angle of said vanes relative to said sheets.
14. A window covering assembly according to claim 13, wherein said wind-up roll and said end rail extend in spaced, generally parallel relation in a non-vertical plane.
15. A window covering assembly according to claim 13 or 14, wherein said end rail is spaced from the end of said first sheet corresponding to said one end of said second sheet.
16. A window covering assembly according to claim 13, 14 or 15, further comprising a cord reel carried by said wind-up roll, a fixed pulley positioned beyond said end rail when said end rail is furthest from said wind-up roll, a flexible tension member connected to said cord reel and adapted to be wound thereon when said wind-up roll is rotated to extend said window covering, and unwound therefrom when said wind-up roll is rotated to wind said window covering, said tension member passing over said fixed pulley and connected to said end rail, and means for applying tension to said tension member.
17. A window covering assembly according to claim 16, wherein said tension applying means comprises a tension spring located in said end rail.
18. A window covering assembly according to claim 13, further comprising means mounting said wind-up roll and said end rail in generally horizontally extending relation, first and second cord reels carried at opposite ends of said wind-up roll, first and second pulleys positioned beyond the ends of said end rail when said end rail is spaced furthest from said wind-up roll, first and second flexible tension members connected to said first and second cord reels respectively and windable thereon when said wind-up roll is rotated to extend said window covering and unwound therefrom when said wind-up roll is rotated to wind said window covering thereon, said first and second tension members passing over said first and second fixed pulleys and connected to opposite ends of said end rail, and means for applying tension to said tension members.
19. A window covering according to claim 18, wherein said tension applying means comprises a tension spring in said end rail having opposite ends secured respectively to said first and second tension members.
20. A window covering according to claim 18 or 19, further comprising means for rotating said wind-up roll from a remote location.
21. A window covering according to claim 13, further comprising two spaced apart parallel tracks extending generally perpendicular to said wind-up roll and

said end rail, and runners on said end rail guided for longitudinal movement in said tracks for guiding and supporting said end rail.

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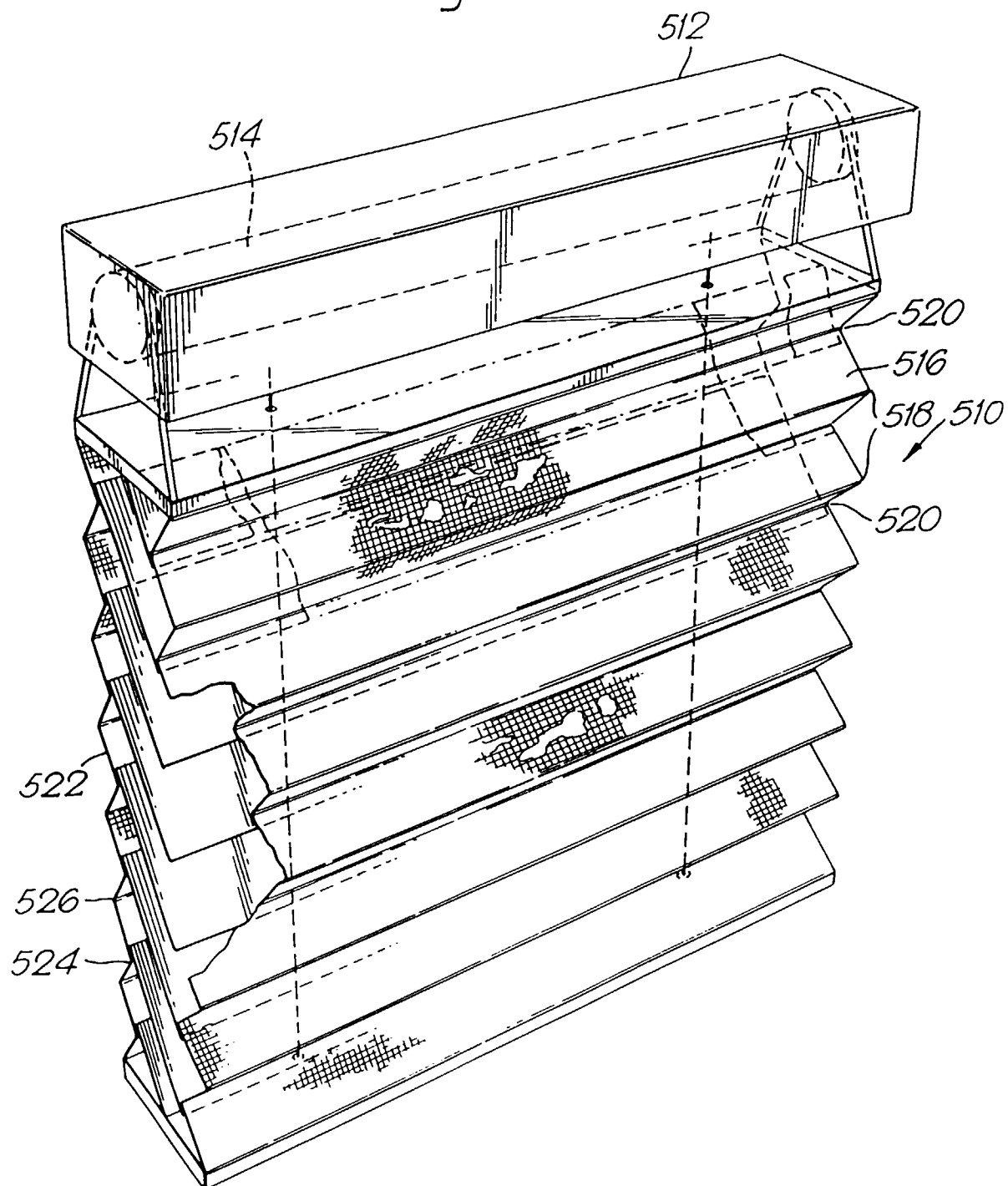
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Fig. 1



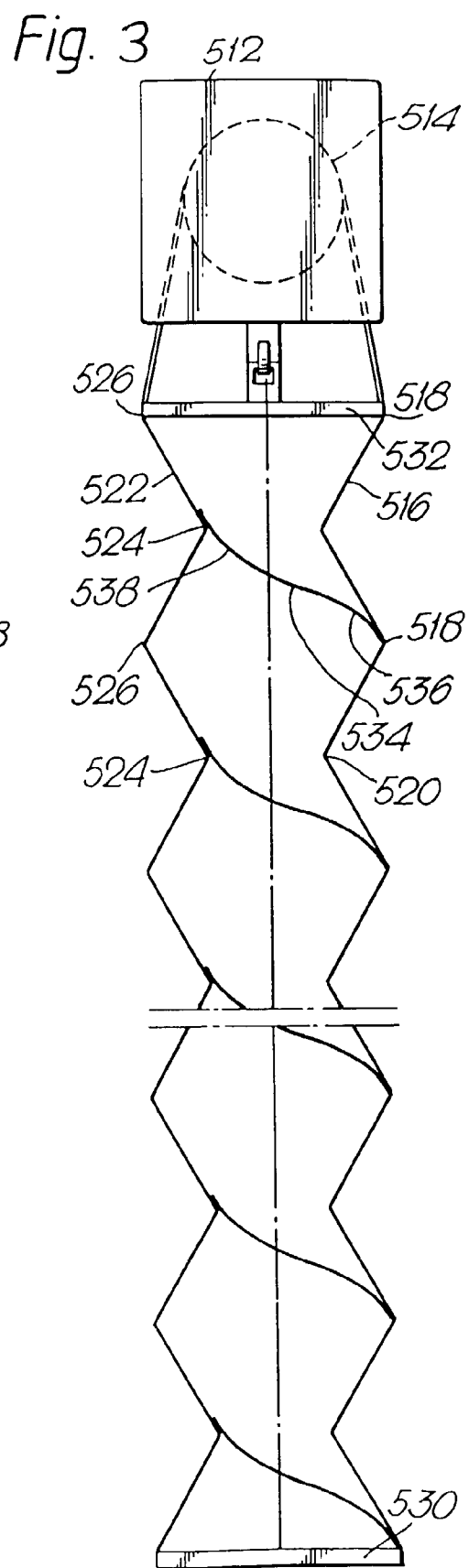
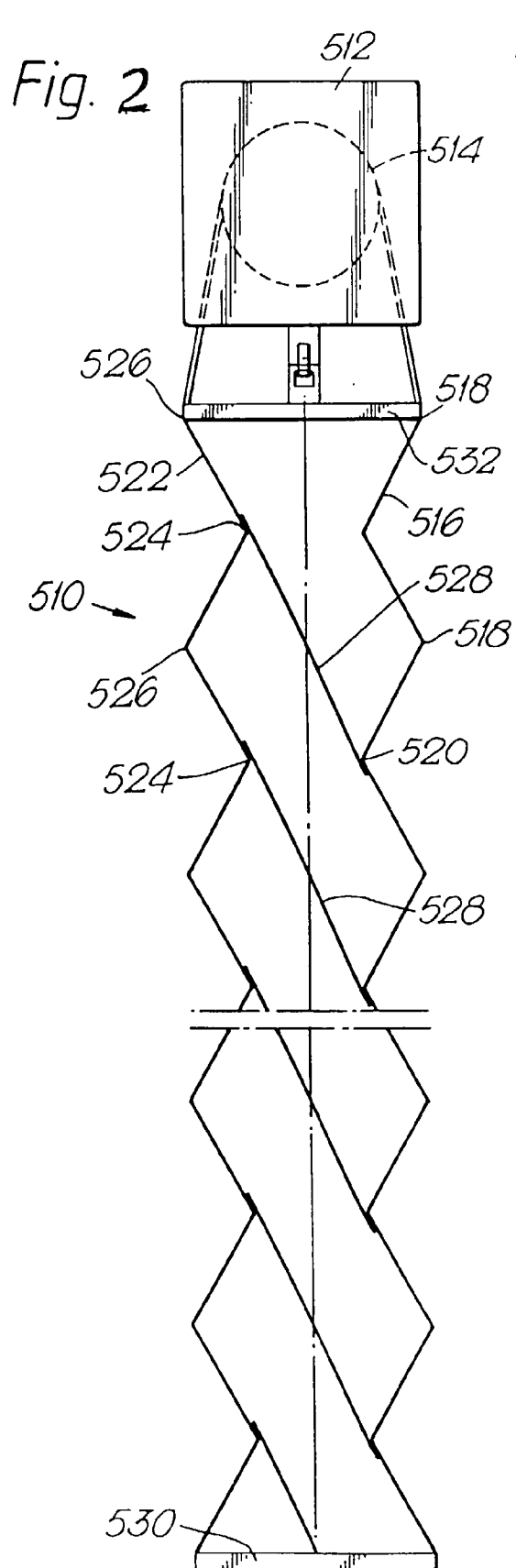


Fig. 4

