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(54) Multi-sided display sign

(57) A display sign for displaying at least four, and preferably six, messages, pictures or designs sequentially which includes at least one, but preferably a plurality, of rotating segments. Each segment is attached to a rotating means such as a shaft and each segment preferably has three faces. Each face has a pivotable section, which is pivotable by about 180 degrees about an axle, and a pivotor for pivoting the pivotable section. In one embodiment, each face also includes a fixed section, and the pivotable section is substantially one-half the width of the fixed section. The pivotable section alternately overlays substantially one-half the fixed section. The pivotor may be a cam and a bias spring. When a segment is rotated by 120 degrees, the cam pushes against the pivotable section, so that the bias spring becomes stretched pulling the pivotable section and causing it to pivot about the axle. After each segment has rotated by about 360 degrees, the direction of rotation is reversed so that a second set of messages, pictures or designs is displayed. In a second embodiment, each face is co-extensive with each pivotable section. The pivotor includes a cam, which engages the axle of the pivotable section, causing it to pivot.

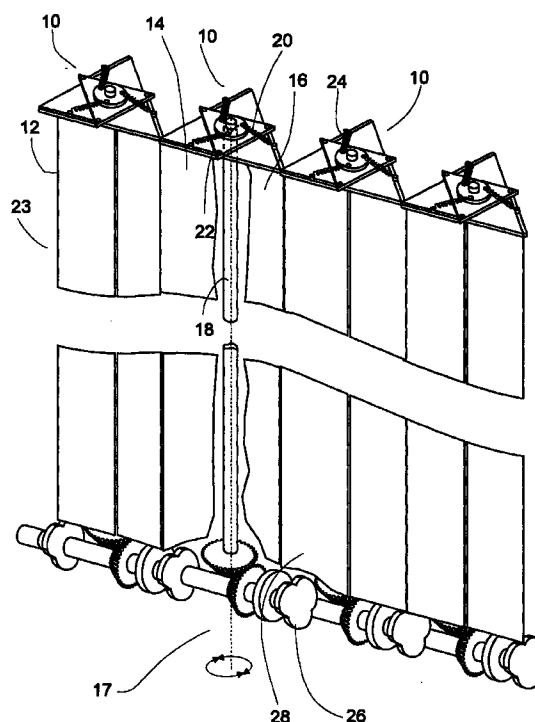


Fig. 1

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Description

FIELD AND BACKGROUND OF THE INVENTION

[0001] The present invention relates to a display sign and, more particularly, to a rotating display sign capable of displaying more than three pictures, messages or designs on its surface.

[0002] Such rotating signs can be used to display pictures, messages or designs which are related to advertisements, public service announcements and the like, and can have many shapes, including rectangular, square and circular. These rotating signs have the advantage of being capable of displaying multiple pictures, messages or designs sequentially, thus increasing the efficiency of the use of display space. One such type of rotating sign is composed of multiple triangular segments, each of which has three faces. Each face is made of metal, plastic or the like, on which part of a message, picture or design has been applied. The individual segments are placed side by side, aligned so that the front face of one segment is flush with the front face of its neighbor, enabling the complete picture, message or design to be seen. When the individual segments are synchronously rotated, a different message, picture or design is displayed. Each sign can display up to three different messages sequentially. The ability to display up to three messages is particularly advantageous when display space is limited.

[0003] The advantage of these segmented rotating signs is that they can display up to three different messages rather than one, thereby increasing the efficient use of the display space. However, greater efficiency in terms of both use of display space and cost could be obtained if more than three messages could be displayed on a single display sign.

[0004] The number of messages cannot be increased by simply altering the shape of the rotating segments to increase the number of faces, for example by making each segment a cube, since the segments would then be unable to rotate. Thus, a multi-sided display sign able to display an increased number of messages must allow each segment more displayable surfaces, without increasing the number of faces.

[0005] In addition, such multi-sided display signs are currently operated according to an electrical timing mechanism, which determines the length of time for displaying each message. This timing mechanism can only be manipulated locally, at the actual location of the sign itself. Such a timing mechanism is therefore highly inconvenient, since an operator must travel to the sign itself in order to change the length of time for displaying each message. A more efficient and convenient timing mechanism would permit the operator to perform any adjustments from a remote location, so that many display signs could potentially be controlled from a single location. Such a remotely operable mechanism could also return information about the operating status of the

display sign to the operator, thereby enabling the operator to diagnose any faults without traveling to the location of the sign itself. Thus, a remotely operable timing mechanism would be much more convenient for controlling the operation of the multi-sided display sign.

[0006] There is thus a widely recognized need for, and it would be highly advantageous to have, a rotating display sign capable of sequentially displaying more than three messages, which includes a remotely operable timing mechanism.

SUMMARY OF THE INVENTION

[0007] According to the present invention there is provided a display sign, including: (a) a plurality of rotating segments, the segments being substantially aligned with each other, each of the segments including at least two faces and each of the faces having: (i) a substantially vertically oriented pivotable section having two sides, featuring a substantially vertically oriented axis, the pivotable section being pivotable about the axis; and (ii) a pivotor for causing the pivotable section to pivot by about 180 degrees, such that both sides of the pivotable section are alternately displayable; and (b) a rotator for rotating the segments in a substantially coordinate manner.

[0008] According to further features in preferred embodiments of the invention described below, each of the segments has three faces.

[0009] According to still further features in preferred embodiments of the invention described below, the face further includes a fixed section, the pivotable section is substantially one-half the width of the fixed section, the axis is located near a substantially vertical edge of the pivotable section, and the vertical edge is located near the middle of the fixed section, such that substantially one-half of the fixed section is alternately being overlaid by the pivotable section. Preferably, the pivotor includes a cam to push against the pivotable section, and a bias spring to pull the pivotable section. Also preferably, the axis is an axle.

[0010] According to yet another embodiment of the invention described below, the pivotable section is co-extensive with each face of the segment. Preferably, the axis is an axle, and the pivotor includes a cam for engaging the axle. Also preferably, the axle is attached to a support with at least one notch, and with at least one roller, and the cam includes a slot for engaging the roller and a redirector for engaging the notch, such that the support is pivoted by the cam. More preferably, there are two notches, one of the notches being located on each of opposing sides of the support, and two rollers, one of the rollers being located on each of opposing ends of the support. Also preferably, the pivotable section is substantially bowed for containing the axle. Also preferably, both tips of the pivotable section are substantially tapered.

[0011] According to other preferred embodiments of

the present invention, the pivotable section further features a tensioning mechanism, the tensioning mechanism including: (1) a holder for being attached to an edge of the pivotable section; (2) a tensioning pin for providing tension between the holder and the pivotable section, such that the pivotable section is held in a substantially vertical, substantially planar orientation; and (3) a tensioning bracket for holding the tensioning pin against the holder and against the pivotable section, such that the tensioning pin is able to provide the tension. Preferably, the tensioning bracket further features a tensioning screw for holding the tensioning bracket against the tensioning pin and an opening for receiving the tensioning screw. More preferably, the holder further features a cut-away, the cut-away being dimensioned to receive the tensioning bracket. Preferably, the edge is a lower edge of the pivotable section. Alternatively and preferably, the edge is an upper edge of the pivotable section.

[0012] According to still other preferred embodiments of the present invention, the display sign further comprises: (c) a message board for being attached to the pivotable section.

[0013] According to yet another preferred embodiment of the present invention, the rotator further includes: (i) a first transmission disk; (ii) a segment disk for each segment; (iii) a transmission bar for connecting the first transmission disk to each segment disk; and (iv) a first motor for rotating the first transmission disk, such that the transmission bar causes each segment disk to rotate, such that each segment is rotated. Preferably, the rotator further includes a second transmission disk attached to the transmission bar and a second motor for rotating the second transmission disk.

[0014] According to yet another preferred embodiment of the present invention, the display sign further comprises a controller system for remotely controlling the display sign, the controller system featuring: (a) a software for performing at least one instruction for controlling the display sign; and (b) a PLC controller for controlling at least one operation of the display sign according to the at least one instruction of the software. Preferably, the controller system remotely controls the display sign through a network and the controller system further features: (c) a computer for operating the software; (d) a first communication device for connecting the computer to the network; and (e) a second communication device for connecting the PLC controller to the network. Preferably, the software is capable of performing the at least one instruction for controlling a plurality of the display signs.

[0015] Also preferably, the rotator further features: (i) a motor for rotating the segment; and (ii) a power supply for supplying power to the motor; and wherein the PLC controller controls the at least one operation of the display sign by determining an amount of the power being supplied to the motor. More preferably, the at least one instruction determines a length of a time interval for displaying each side of each face of each segment.

Also more preferably, the at least one instruction determines a frequency of display of each side of each face of each segment.

Preferably, the controller system further includes at least one sensor for sensing the at least one operation of the display sign and for sending information related to the at least one operation of the display sign to the PLC controller. More preferably, the at least one sensor senses a stage of rotation of each segment. Also more preferably, the at least one sensor senses a frequency of pivoting of each pivotable section. Most preferably, the PLC controller causes the computer to show an alarm if the at least one sensor indicates a fault in the at least one operation of the display sign, such that the at least one operation of the display sign is being performed incorrectly.

[0016] Preferably, the controlling system further includes a camera for monitoring an environment around the display sign and for sending information regarding the environment to the PLC controller. Also preferably, the software is capable of calculating a number of persons viewing the display sign according to information received from the camera. Alternatively and preferably, the controlling system further includes a camera for monitoring the display sign.

[0017] According to yet another embodiment of the present invention, there is provided a controller system for remotely controlling a display sign, the display sign including a plurality of rotatable segments, the controller system featuring: (a) a software for performing at least one instruction for controlling the display sign; and (b) a PLC controller for controlling at least one operation of the display sign according to the at least one instruction of the software. Preferably, the software is capable of performing the at least one instruction for controlling a plurality of the display signs.

[0018] Preferably, the controller system remotely controls the display sign through a network and the controller system further features: (c) a computer for operating the software; (d) a first communication device for connecting the computer to the network; and (e) a second communication device for connecting the PLC controller to the network.

[0019] More preferably, the display sign further features: (i) a motor for rotating each of the segments; and (ii) a power supply for supplying power to the motor; wherein the PLC controller controls the at least one operation of the display sign by determining an amount of the power being supplied to the motor. Also more preferably, each segment features a plurality of faces and the at least one instruction determines a length of a time interval for displaying each face of each segment. Most preferably, the at least one instruction determines a frequency of display of each face of each segment.

[0020] Also most preferably, the system further includes at least one sensor for sensing the at least one operation of the display sign and for sending information

related to the at least one operation of the display sign to the PLC controller. Preferably, the at least one sensor senses a stage of rotation of each segment. Also preferably, each face of each segment features a pivotable section and the at least one sensor senses a frequency of pivoting of the pivotable section. Also preferably, the PLC controller causes the computer to show an alarm if the at least one sensor indicates a fault in the at least one operation of the display sign, such that the at least one operation of the display sign is being performed incorrectly.

[0021] Preferably, the system further includes a camera for monitoring an environment around the display sign and for sending information regarding the environment to the PLC controller. More preferably, the software is capable of calculating a number of persons viewing the display sign according to information received from the camera. Most preferably, the system further includes a camera for monitoring the display sign.

[0022] Hereinafter, the term "pivot" is understood to include movement which is alternately clockwise and counter-clockwise in direction, as well as movement which is completely clockwise in direction, and movement which is completely counter-clockwise in direction.

[0023] Hereinafter, the term "message board" refers to a thin film, sheet or other substantially planar configuration of material, to which a portion of the message, picture or design is attached. With regard to the message board, the term "attached" includes, but is not limited to, connected to, embedded within, integrally formed with, adhered to, printed on and painted on.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1 is a front view of an illustrative complete display sign according to the present invention;

FIG. 2 is a top view of a single rotating segment according to the present invention, as shown in Figure 1;

FIG. 3 shows the top view of the single rotating segment of Figure 2 as it might appear in operation;

FIG. 4 shows a front view of a plurality of rotating segments according to the second embodiment of the present invention;

FIG. 5 shows a view of the mount for a single rotating segment of Figure 4;

FIG. 6 shows a portion of a single face of a rotating segment according to Figure 4;

FIGS. 7A-7G show sequential views of the pivoting of a single face, according to Figure 4;

FIGS. 8A and 8B show an exemplary attachment of a message board to a face according to the present invention;

FIGS. 9A-9C show an exemplary lower tensioning mechanism according to the present invention;

FIGS. 10A-10C show an exemplary upper tensioning mechanism according to the present invention;

FIGS. 11A-11C show sequential views of the pivoting of a single face with another embodiment of the pivot of Figure 4 according to the present invention;

FIG. 12 shows an exemplary transmission mechanism for the display sign of Figure 11; and

FIGS. 13A and 13B show an illustrative remotely operable controller according to the present invention.

BRIEF DESCRIPTION OF THE INVENTION

[0025] The present invention successfully addresses the shortcomings of the presently known configurations by providing a means for sequentially displaying more than three messages in the same display space.

[0026] More specifically, in its most preferred embodiment described above, the present invention is capable of sequentially displaying six messages in the same display space, which is a doubling of the number of displayed messages over the state of the art.

[0027] The present invention is used in the following manner. The display sign has at least one segment, and preferably a plurality of segments. When the display sign has a plurality of segments, these segments are substantially aligned, so that the front face of each segment is substantially flush with the front face of the neighboring segment. The segment has at least two, and preferably three, faces. Each face is a substantially vertically oriented planar surface. One fraction of each message, design, or picture is applied to each face. The total message, picture or design is visible when the same face of each segment is displayed, so that at least two, and preferably three, different messages, pictures or designs are displayed sequentially when the segments rotate synchronously. At least two, and preferably three, more messages, pictures or designs can be sequentially displayed when the pivotable section of each of the faces of each segment pivots.

[0028] For purposes of description, the discussion herein is focused on display signs with a plurality of segments and with three faces, it being understood that the present invention is not limited in scope only to such dis-

play signs, but also encompasses display signs with a single segment or with two faces.

[0029] In one embodiment of the display sign of the present invention, each face has a pivotable section and a fixed section. The pivotable section is substantially one-half the width of the fixed section. Half of one fraction of each message, picture or design is applied to one substantially vertical half of the fixed section of a face, and the other half is applied to one side of the pivotable section of that face, so that the entire fraction is visible when that half of the fixed section is aligned with that side of the pivotable section. Thus, during the display of each message, picture or design, the viewer would see one half of the fixed section and one side of the pivotable section, with the pivotable section covering the other half of the fixed section. The total message, picture or design is visible when the same side of the pivotable section and the same half of the fixed section of the same face of each segment is at the front.

[0030] In a second embodiment of the present invention, each pivotable section and each face are co-extensive, such that the pivotable section is attached to, and substantially covers, the face. Again, a fraction of each message, picture or design is applied to each face, so that the total message, picture or design is visible when the same face of each segment is at the front.

[0031] In both of these embodiments, a single display sign could therefore display six different messages, pictures or designs by both rotating the segments synchronously, and by pivoting the pivotable section of each of the faces of each segment, doubling the number of messages, pictures or designs which a conventional display sign could display. Furthermore, in both of these embodiments, the display sign is not limited to a single shape, and can have many shapes, including, but not limited to, substantially rectangular, substantially square, and substantially circular.

[0032] Another feature of the display sign of the present invention is a remotely operable controller for controlling the operation of the display sign from a remote location. This controller determines the length of time for displaying each message by controlling the operation of the motor for rotating the segments. The controller receives instructions through a remote link such as a modem which is connected to the regular telephony network. The instructions can then be sent from a computer at the remote location.

[0033] In addition, preferably the controller is able to sense both the rotation of the segments and the pivoting of the faces. The controller is then preferably able to relay this information back to the remote location, either substantially continuously or at predetermined intervals of time. More preferably, the controller is able to initiate contact with the remote location if a fault is found with the operation of any part of the display sign. Although all of the features of the controller of the present invention are described with reference to the second embodiment of the display sign of the present invention, it is under-

stood that such a description is for the purposes of clarity only and is not meant to be limiting. Thus, the controller of the present invention could potentially be used with many different types of electronic display signs.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0034] The present invention is of a display sign which can efficiently sequentially display at least four, and preferably six, messages in the same display space.

[0035] The principles and operation of a display sign according to the present invention may be better understood with reference to the drawings and the accompanying description.

[0036] Referring now to the drawings, Figure 1 is a front view of an illustrative display sign, according to the first embodiment of the present invention. Shown in Figure 1 is a plurality of triangular rotating segments 10, each of which has three faces, or substantially vertically oriented planar surfaces, 12. Hereinafter, "face" designates a substantially vertically oriented planar surface. A fraction of each message, picture or design is applied to each face 12, such that the complete message, picture or design is visible when the same face 12 of each segment 10 is displayed. When segments 10 are synchronously rotated, three messages, pictures or designs are sequentially displayed.

[0037] Each face 12 has a pivotable section 14 and a fixed section 16. Substantially one half of each fraction of the design, picture or message is attached to substantially one half of fixed section 16, and to one side of pivotable section 14, so that the entire fraction is visible when that half of fixed section 16 is aligned with that side of pivotable section 14. The other half of fixed section 16 is covered by pivotable section 14, since pivotable section 14 is substantially one-half the width of fixed section 16. Thus, a complete message is visible when the same half of each fixed section 16, and the same side of each pivotable section 14 of each segment 10, is displayed. A different message, design or picture is visible when pivotable section 14 pivots, such that the opposite half of each fixed section 16, and the opposite side of each pivotable section 14, is displayed.

[0038] Pivotable section 14 is pivoted at least once during a single complete rotation of segment 10. Each segment 10 is rotated by a rotator 17, which preferably includes a rotatable shaft 18 placed in the center of segment 10. Preferably, rotator 17 also includes a plurality of gears, an engine and the like, for rotating segment 10. Rotatable shaft 18 has an extension 20 at or near the top of rotatable shaft 18, which is preferably substantially triangular in shape. Extension 20 is attached to each face 12 of segment 10 by means of an axle 22, such that there are preferably three axles 22 attached to extension 20. Axle 22 is placed at least partially through an edge of pivotable section 14, and is the axis about

which pivotable section 14 pivots. Pivotable section 14 is made to pivot by a pivotor 23, which preferably includes a bias spring 24 and a cam 26. One end of bias spring 24 is attached to substantially the center of pivotable section 14, and the other end of bias spring 24 is attached to extension 20 at the top of rotatable shaft 18. Cam 26 is preferably below each segment 10, and pushes against pivotable section 14. Preferably, each pivotable section 14 has a tab 28, which is engaged by cam 26, such that cam 26 pushes against pivotable section 14 at tab 28.

[0039] Shown in Figure 2 is the top view of segment 10. Top edge 30 of a pivotable section 14 can be seen, with bias spring 24 attached at one end to substantially the center of top edge 30. The other end of bias spring 24 is attached to extension 20. Axle 22 extends from top edge 30 to extension 20.

[0040] The operation of illustrative segment 10 of Figures 1 and 2 is shown in Figure 3. Each face 12 is sequentially displayed by rotating segment 10 by about 120 degrees, by means of rotatable shaft 18 (not shown, see Figure 1). After three such partial rotations, segment 10 has rotated by about 360 degrees, displaying all three faces 12. During each partial rotation of about 120 degrees, pivotable section 14 of at least one face 12 pivots by about 180 degrees. The movement of rotatable shaft 18 (not shown, see Figure 1) turns cam 26 (not shown, see Figure 1), which then pushes tab 28 (not shown, see Figure 1) of pivotable section 14, moving pivotable section 14 away from fixed section 16. Bias spring 24 then becomes stretched. Stretched spring 24 pulls pivotable section 14 as indicated by the direction of an arrow 32, enabling pivotable section 14 to pivot about axle 22. Pivotable section 14 is now covering substantially one half 34 of fixed section 16, uncovering substantially the opposite half 36 of fixed section 16. Since each face 12 is at the front of segment 10 only once during each complete rotation of about 360 degrees, only one side of each pivotable section 14 and one half of each fixed section 16 is displayed per complete rotation of segment 10.

[0041] After every complete rotation of segment 10, the direction of rotation is reversed so that the opposite side of each pivotable section 14 and the other half of each fixed section 16 is displayed. The direction of rotation must be reversed because after pivotable section 14 has been pivoted once, tab 28 is no longer engagable by cam 26, since tab 28 is now near the opposing substantially vertical edge of face 12. Reversing the direction of rotation permits tab 28 to be engagable by cam 26 again.

[0042] Figure 4 shows a front view of the second embodiment of the present invention. The underlying concept of this second embodiment is similar to the underlying concept of the first embodiment. The display sign according to this second embodiment also has a plurality of segments 10, each of which is also rotated by rotator 17. Each segment 10 has three, substantially

vertically oriented, faces 40, only one of which is shown here. One fraction of each message, design, or picture is applied to each face 40. The total message, picture or design is visible when the same face 40 of each segment 10 is displayed, so that three different messages, pictures or designs are displayed sequentially when segments 10 rotate synchronously. Three more messages, pictures or designs can be sequentially displayed when a substantially vertically oriented pivotable section 42 pivots.

[0043] In this embodiment, pivotable section 42 is co-extensive with face 40, such that pivotable section 42 is attached to, and completely covers, face 40. Pivotable section 42 is preferably substantially bowed, such that each horizontal edge is slightly curved. Each pivotable section 42 has a substantially vertically oriented axle 44, such that axle 44 is the axis about which pivotable section 42 pivots. Such bowing thereby enables axle 44 to be inserted within pivotable section 42. Also preferably, each tip of pivotable section 42 is substantially tapered, so that pivotable section 42 is substantially thinner at each tip than in the center. Such tapering enables each pivotable section 42 to pivot more easily, without interfering with the operation of one or more other pivotable sections 42.

[0044] Each segment 10 has a mount 46. In the preferred embodiment illustrated, mount 46 includes a substantially horizontally oriented platform 48. Axle 44 preferably extends through an opening 50 in platform 48, which is dimensioned to accommodate axle 44.

[0045] Figure 5 shows the preferred embodiment of mount 46, including platform 48. A portion of axle 44 is shown, extending through opening 50 of platform 48. End 52 of axle 44 is preferably attached to a support 54. In the preferred embodiment shown, support 54 has at least one, but preferably two, notches 56. If there are two notches 56, preferably one is located on each of opposing sides of support 54. Support 54 also includes at least one, but preferably two, rollers 58. If there are two rollers 58, preferably one is located on each of opposing ends of support 54. Preferably, at least a portion of support 54 rests substantially on or near a fixed, substantially curved cam 60, such that roller 58 engages cam 60. Cam 60 preferably has at least one substantially straight edge, and also preferably includes at least one slot 62 and at least one redirector 64. In the preferred embodiment shown, cam 60 has one slot 62 and one redirector 64. Redirector 64 is preferably in the form of a substantially circular disk, dimensioned to be accommodated by notch 56.

[0046] A view of a portion of face 40, axle 44 and support 54, without the intervening portions of mount 46, is shown in Figure 6. Support 54 is also shown in the preferred embodiment illustrated by Figure 5. In the preferred embodiment shown in Figures 4-6, a pivotor 63 preferably includes cam 60, and more preferably also includes support 54, roller 58, notch 56, slot 62 and redirector 64.

[0047] The method of operation of the display sign as shown in Figures 4-6 is shown in Figures 7A-7G. Figure 7A shows segment 10 before the start of a partial rotation of about 120 degrees. As segment 10 begins to rotate, roller 58 of at least one face 40 slides into slot 62, as shown in Figures 7B and 7C. To better enable face 40 to pivot, cam 60 preferably has at least one straight edge, for engaging a roller 66 of a second face 68, as face 40 pushes against face 68, as shown in Figure 7C. As roller 58 of face 40 slides into slot 62, notch 56 is engaged by redirector 64, as shown in Figures 7C and 7D. Redirector 64 causes the direction of movement of support 54 to change, enabling support 54 to pivot by about 180 degrees, as shown in Figures 7D and 7E. Roller 58 then leaves slot 62, as shown in Figure 7F, and the partial rotation of segment 10 is complete, as shown in Figure 7G. Note that the preferred tapered shape of the tips of face 40 enable each face 40 to pivot easily, without contacting a neighboring face 40.

[0048] Figures 8A and 8B show an exemplary attachment of a message board to a face according to the present invention. A top cross-sectional view of pivotable section 42 from the embodiment of Figure 4 is shown in Figure 8A. As noted previously, pivotable section 42 is co-extensive with face 40, such that pivotable section 42 is attached to, and completely covers, face 40. A message board 70 is attached to each side 72 of pivotable section 42 by an attacher 74. As described previously, the term "message board" refers to a thin film, sheet or other substantially planar configuration of material, to which a portion of the message, picture or design is attached. With regard to the message board, the term "attached" includes, but is not limited to, connected to, embedded within, integrally formed with, adhered to, printed on and painted on. Also with regard to the message board, the term "message" will hereinafter include message, picture or design.

[0049] Preferably, message board 70 is attached to side 72 of pivotable section 42 with at least one, and preferably a plurality of, pins 76, of which two pins 76 for each message board 70 are illustrated. More preferably, attacher 74 also includes an adhesive substance, such as a glue, the selection of which would be obvious for one of ordinary skill in the art. The material of message board 70 can include, but is not limited to, plastic or malleable metal such as aluminum.

[0050] Figure 8B shows an enlarged view of the encircled area 78 of Figure 8A. As shown, pins 76 penetrate through both message board 70 and at least a portion of pivotable section 42 in order to secure message board 70 to pivotable section 42. The advantage of pins 76, and especially of the combination of pins 76 and the adhesive substance, is that message board 70 can be more easily attached to pivotable section 42 through such a combination. If an adhesive substance is used, the adhesive can be applied to either message board 70, pivotable section 42, or both. Next, message board 70 is laid against pivotable section 42 in the desired ori-

entation, so that the portion of the message, picture or design is correctly displayed. Finally, pins 76 are inserted through message board 70 and into at least a portion of pivotable section 42, thereby secure attaching message board 70 to pivotable section 42.

[0051] Figures 9A-9C show an exemplary lower tensioning mechanism according to the present invention. The lower and upper tensioning mechanisms help to maintain pivotable section 42 in a substantially planar, vertical orientation. Preferably, pivotable section 42 is relatively thin, in order to reduce the amount of space required by each pivotable section 42 for pivoting as shown in Figure 7. However, as pivotable section 42 becomes increasingly thinner, although pivoting becomes easier as described for Figure 7, pivotable section 42 also becomes more susceptible to the effects of wind or other disturbances. Such disturbances can cause pivotable section 42 to become partially deformed out of the vertical plane and into the horizontal plane, and to bend such that pivotable section 42 is no longer substantially planar and vertically oriented. Such deformation or bending can prevent the proper display of the message, design or picture, in addition to potentially damaging pivotable section 42. Thus, the lower tensioning mechanism of Figure 9, preferably in combination with the upper tensioning mechanism of Figure 10, is able to maintain the tension of pivotable section 42 such that pivotable section 42 remains substantially planar and vertically oriented, even when disturbed by wind, for example.

[0052] Figure 9A is a partially cut-away illustration of pivotable section 42 according to the embodiment shown in Figure 4. Pivotable section 42 preferably features a lower tensioning mechanism 78. Lower tensioning mechanism 78 includes a holder 80. Holder 80 connects pivotable section 42 to support 54. Holder 80 also holds at least one, and preferably a plurality, of tension pins 82. Tension pin 82 maintains the tension between holder 80 and pivotable section 42, to substantially prevent deformation or bending of pivotable section 42.

[0053] Each tension pin 82 is held firmly between holder 80 and pivotable section 42 by a tension bracket 84 and at least one, and preferably a plurality of, tension screws 86. Each tension screw 86 is inserted through an opening 88 in tension bracket 84, thereby holding tension bracket 84 against a portion of pivotable section 42. Preferably, each holder 80 features at least one, and preferably a plurality of cut-away portions 88 of which two are illustrated in Figure 9C. Each cut-away portion 88 is substantially in the geometrical shape of tension bracket 84, so that tension bracket 84 can be inserted into cut-away portion 88, thereby increasing the force with which each tension pin 82 is held between holder 80 and pivotable section 42. The combination of holder 80, tension pins 82, tension brackets 84 and tension screws 86 forms lower tensioning mechanism 78.

[0054] Figure 9B shows a close-up view of tension pin

82 alone. As shown, tension pin 82 preferably features a groove 90. Groove 90 enables tension pin 82 to be more closely held against a corresponding slot 92 in holder 80 (see Figure 9A). Tension pin 82 also features a projection 93 substantially near the top of tension pin 82. Projection 93 is pressed firmly against a corresponding pivotable section projection 95, so that tension pin 82 is held more firmly against the interior surface of pivotable section 42.

[0055] Figure 9C shows a close-up view of the front portion of holder 80 and of two tension brackets 84. As noted previously, holder 80 preferably features a plurality of cut-away portions 88 of which two are illustrated. Each cut-away portion 88 is substantially in the geometrical shape of tension bracket 84, so that tension bracket 84 can be inserted into cut-away portion 88, thereby increasing the force with which each tension pin 82 is held between holder 80 and pivotable section 42.

[0056] Figures 10A-10C show an exemplary upper tensioning mechanism according to the present invention. Pivotable section 42 also preferably features an upper tensioning mechanism 94, as shown in Figure 10A. Upper tensioning mechanism 94 also includes a holder 96, which is shown in close-up in Figure 10B. Holder 96 also holds at least one, and preferably a plurality, of tension pins 82, one of which is shown in close-up in Figure 10C. Tension pin 82 maintains the tension between holder 96 and pivotable section 42, to substantially prevent deformation or bending of pivotable section 42. For upper tensioning mechanism 94, tensioning pin 82 has two sections 95 with opposite threads, held by a joint 97. Each section 95 has limited mobility within joint 97. When tensioning pin 82 is rotated, each oppositely-threaded section 95 is pulled toward joint 97 to produce the tension for pivotable section 42.

[0057] Each tension pin 82 is preferably held firmly between holder 96 and pivotable section 42 by a tension bracket 84 and at least one, and preferably a plurality of, tension screws 86 (not shown). Each tension screw 86 is inserted through an opening 88 in tension bracket 84, thereby holding tension bracket 84 against a portion of pivotable section 42. Preferably, each holder 96 features at least one, and preferably a plurality of cut-away portions 88 (not shown). Each cut-away portion 88 is substantially in the geometrical shape of tension bracket 84, so that tension bracket 84 can be inserted into cut-away portion 88, thereby increasing the force with which each tension pin 82 is held between holder 80 and pivotable section 42. The combination of holder 96 and tension pins 82, and preferably also tension brackets 84 and tension screws 86 forms upper tensioning mechanism 94.

[0058] These tensioning mechanisms are particularly useful for an indoor embodiment of the display sign of the present invention (not shown). In this preferred embodiment of the display sign of Figures 4-10, the pivotable sections are very thin and are designed for a single use only. The message, design, or picture is

attached to the pivotable sections at the factory. After the message, design or picture is no longer intended for display, the pivotable sections are removed from the sign and are then disposed of. New pivotable sections are then placed on the sign. Since the sign is intended for indoor display, the pivotable sections do not need to be very rigid. However, the tensioning mechanisms of Figures 9 and 10 would be preferred for enabling the very thin, disposable pivotable sections to remain substantially planar and vertical, without deformation or bending.

[0059] Figures 11A-11C show sequential views of the pivoting of a single face with another embodiment of the pivotor of Figures 4 and 5 according to the present invention. A pivotor 98 is similar to pivotor 63 of Figures 4 and 5. For example, pivotor 98 also includes a first cam 100, similar to cam 60 of Figures 4 and 5, with at least one slot 102 and at least one redirector 104. One slot 102 and two redirectors 104 are shown. However, preferably now slot 102 is substantially rectangular or square in shape, with substantially straight edges. Also pivotor 98 preferably includes a second cam 106. Second cam 106 preferably has a relatively narrow, tapered tip 108, which is located closer to slot 102 of first cam 100. Second cam 106 preferably then broadens on both edges 110.

[0060] The mechanism of pivotor 98 is similar to that of pivotor 63 of Figures 4 and 5. However, the mechanism of pivotor 98 has one additional feature. Roller 58 of support 54 now preferably rollingly engages both one edge 112 of first cam 100 and one edge 110 of second cam 106 substantially simultaneously for at least a portion of the time interval required for a complete rotation of segment 10. In other words, roller 58 now preferably rolls between both one edge 112 and one edge 110, substantially simultaneously contacting both edges 110 and 112, for at least a portion of the time interval required for a complete rotation of segment 10. The advantage of having second cam 106 is that roller 58 is now rollingly held on the correct pathway around first cam 100, thereby reducing the likelihood that roller 58 will move into an incorrect position.

[0061] This mechanism is more easily understood by viewing the sequential movements of a first roller 58 and a second roller 114 in Figures 11A-11C. In Figure 11A, first roller 58 is rolling between first cam 100 and second cam 106. In Figure 11B, now second roller 114 is rolling between first cam 100 and second cam 106. In Figure 11C, first roller 58 is rolling between first cam 100 and another second cam 116.

[0062] Figure 12 shows an exemplary transmission mechanism for the display sign of Figure 11. A transmission mechanism 118 features a motor 120 and gear 122. Gear 122 engages a first transmission disk 124, causing first transmission disk 124 to rotate. First transmission disk 124 can be substantially any suitable shape, but is shown here as being circular. First transmission disk 124 is connected to at least one, but pref-

erably a plurality of, segment disks 126 by a transmission bar 128. When first transmission disk 124 rotates, segment disks 126 are also rotated by transmission bar 128. During this rotation, transmission bar 128 describes an eccentric path. Each segment disk 126 rotates one segment 10. More preferably, a second transmission disk 130 is attached to an opposing end of transmission bar 128. Preferably, a second motor and gear (not shown) simultaneously rotate second transmission disk 130 as first transmission disk 124 is rotated.

[0063] For the embodiment illustrated in Figures 1-3 and also for the embodiment illustrated in Figures 4-7 and in Figures 8-12, each segment individually, or alternatively a plurality of segments collectively, is rotated by a rotator. If a plurality of segments is rotated collectively, the segments are preferably rotated in a substantially coordinate manner. For both embodiments, each complete rotation of a segment can be accomplished in three distinct steps, each step being a partial rotation of about 120 degrees. Alternatively, for the embodiment illustrated in Figures 4-7 and in Figures 8-12, each complete rotation can be accomplished by a continuous, slow movement of segment 10, without discrete partial rotations. Furthermore, in the most preferred embodiment illustrated above in Figures 4-7 and in Figures 8-12, all rotations of segment 10 can optionally be in the same direction. This is an advantage over the display sign as illustrated in Figures 1-3, where the movement of segment 10 must change direction after every rotation.

[0064] Although a substantially rectangular display sign is shown for the first embodiment in Figure 1, all embodiments of the display sign according to the present invention can have many shapes, including, but not limited to, substantially square, substantially rectangular, and substantially circular.

[0065] Figures 13A and 13B illustrate an exemplary remotely operable controller according to the present invention. Figure 13A shows a block diagram of a controller system 132, which may be used to control one sign, a plurality of signs, many signs such as 50-500 signs or even more signs if desired. Controller system 132 features a computer 134 which may be of substantially any type. Hereinafter, the term "computer" includes, but is not limited to, personal computers (PC) having an operating system such as DOS, Windows™, OS/2™ or Linux; Mackintosh™ computers; computers having JAVA™-OS as the operating system; and graphical workstations such as the computers of Sun Microsystems™ and Silicon Graphics™, and other computers having some version of the UNIX operating system such as AIX or SOLARIS™ of Sun Microsystems™; or any other known and available operating system. Hereinafter, the term "Windows™" includes but is not limited to Windows95™, Windows 3.x™ in which "x" is an integer such as "1", Windows NT™, Windows98™, Windows CE™ and any upgraded versions of these operating sys-

tems by Microsoft Inc. (Seattle, Washington, USA). Computer 134 operates software which preferably has a GUI (graphical user interface), through which the operator (not shown) enters commands and instructions, and receives information.

[0066] As described in further detail for Figure 13B, the operator can determine how often, and for how long, a particular message, design or picture is displayed. For example, a first message on one side of one set of faces of the segments might be displayed for two minutes every ten minutes. A second message on one side of a second set of faces might only be displayed for ten seconds, and so forth. As another example, an advertisement which was not deemed suitable for a particular audience, such as cigarette advertising near a school for children, might only be displayed at certain times of day. In this example, the cigarette advertisement would only be displayed at night, after the children had left the school. As yet another example, the sign might rotate substantially without pause, or only for brief pauses, to display a set of messages related to one marketing theme or story. The software operated by computer 134 preferably enables the operator to determine such display parameters.

[0067] Computer 134 is connected to a regular telephony network 136 by a first modem 138. Alternatively and preferably, computer 134 could be connected to another type of network, such as a cable network, a wireless cable network or a LAN (large area network) or a WAN (wide area network) through the appropriate corresponding communication device. A second modem 140 is also connected to regular telephony network 136. Again second modem 140 could be replaced by any suitable communication device, depending upon the type of network connection required. Second modem 140 transmits data to, and receives data from, a PLC (programmable controller) 142. Such programmable controllers are well known in the art, and are available from several different manufacturers. Preferably, PLC 142 controls the actions of a single display sign.

[0068] PLC 142 controls the action of the display sign or signs by controlling a motor 144. Motor 144 is controlled by PLC 142 according to the amount of power available from power supply 146 through a power switch 148. Motor 144 is connected to a gear 150, which is then connected to a transmission mechanism of a display sign (not shown), such as that illustrated in Figure 12, although other transmission mechanisms could also be used. Thus, by controlling motor 144, PLC 142 is able to control the action of the display sign.

[0069] For example, if a particular message was to be displayed for a longer period of time, PLC 142 could first stop motor 144. The segments of the display sign (not shown) would then stop rotating, and the message would remain on display. After the desired period of time, or time interval, had elapsed, PLC 142 would allow motor 144 to operate, thereby causing the segments of the display sign (not shown) to rotate.

[0070] Preferably, PLC 142 is also connected to at least one sensor 152, which is able to sense the status of operation of the display sign. As illustrated, there are two types of sensors 152. The first type of sensor 152 is at least one index sensor 154, of which two are shown. More preferably, one index sensor 154 is attached to the top of the axle for each segment and the second index sensor 154 is attached to the bottom of the axle for each segment. Each index sensor 154 determines the stage of the segment within the approximately 360 degree rotation cycle. Each index sensor 154 is able to send this information to PLC 142. PLC 142 can then return this information to computer 134, preferably substantially intermittently, substantially continuously, at predefined intervals of time and/or when a problem in the rotation cycle has been detected. Such a problem could be indicated when one segment remains at a given stage in the cycle, while other segments continue to rotate, for example.

[0071] The second type of sensor 152 is at least one face proximity sensor 156, of which two are shown. Each face proximity sensor 156 registers the time when each face of the segment is displayed (not shown). Each face proximity sensor 156 can then send this information to PLC 142. PLC 142 can then return this information to computer 134, preferably substantially intermittently, substantially continuously, at predefined intervals of time and/or when a problem in the pivoting cycle has been detected. Such a problem could be indicated when one face on one segment fails to pivot, while the equivalent face on other segments continues to pivot, for example.

[0072] These different types of sensors 152 are particularly important for the remote operation of controller system 132, since these sensors 152 enable the operator of controller system 132 to detect any problem with the operation of the display sign without requiring a visit to the actual physical location of the sign itself. Furthermore, these sensors 152 also enable the operator to determine whether a particular program for the operation of the sign is performing correctly. Thus, both mechanical and software faults can be diagnosed through the information received from sensors 152.

[0073] According to other preferred embodiments, preferably a small CCD (charge-coupled device) camera 158 and/or other video camera 160 could be mounted on the display sign (not shown) for monitoring the environment. For example, either camera 158 or video camera 160 could record the number of persons viewing each message on the display sign. This information could then be sent through modem 140 to modem 138, and would be received by computer 134. This information could be used to determine the cost to the client for displaying the desired message at particular times of the day or on particular days, for example, similar to the relationship between the cost of displaying an advertisement on the television and the time of day which the advertisement is shown. In both cases, the

number of potential viewers of the advertisement can be used to determine the cost of displaying the advertisement at that time, or for other marketing purposes, for example.

[0074] In addition, another such camera could be mounted so as to provide a display of the sign itself. Again, this information could then be sent through modem 140 to modem 138, and would also be received by computer 134. The display of the sign itself would be another indication of the status of operation of the sign, and would also enable the operator to determine whether the sign was operating correctly. In addition, preferably either camera 158 or video camera 160 could also enable the operator to determine if the sign had been vandalized or defaced, for example. Alternatively and preferably, both types of cameras 158 and 160 could be mounted on the sign, or two CCD cameras 158 or two video cameras 160 could also be used, rather than using two different types of cameras.

[0075] Figure 13B shows a flow chart of the operation of an exemplary software according to the present invention. The software of the present invention may be used to control one sign, a plurality of signs, many signs such as 50-500 signs or even more signs if desired. In other words, the number of signs whose operation can be controlled and determined by the software of the present invention is not limited.

[0076] In the first step, the computer screen displays an icon representing each sign to be controlled. In the second step, the operator selects a particular icon corresponding to a particular sign. In the third step, a menu is displayed on the computer screen, containing such choices as the frequency of display of each side of each face of the segments, the time interval of the display, and preferably the time of day in which that side is to be displayed, for example. Other choices preferably would include the coordination between the display of at least two sides, for example, so that two messages, designs or pictures could be displayed sequentially. Thus, this menu would enable the operator to determine when the message, design or picture is to be displayed, how often the display is to occur, and to set other display parameters.

[0077] In the fourth step, the operator sends the instructions to the display sign through the modems, for example. Preferably, in the fifth step, a computer animation of the display of the sign, or more preferably an actual video image of the display of the sign, is displayed on the computer screen. Optionally and preferably, if a fault with the operation of the display sign arises as described previously, in the sixth step the operator is alerted to the problem by an alarm. Such an alarm could include, but is not limited to, an audible signal such as a beep, highlighting of the icon or of the animated or real display of the sign, for example by flashing, or by displaying the information regarding the problem in one portion of the computer screen.

[0078] Also optionally and preferably, in the seventh

step, the operator is able to calculate how much time each message, design or picture was displayed, and how often the display occurred. More preferably, the operator could then correlate this information with the number of persons who viewed the sign, as described previously. All of this information could then be used to calculate how much the customer must pay for the display of the message, design or picture, or for other marketing purposes, for example.

[0079] While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made.

[0080] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. A display sign, comprising:
 - (a) a plurality of rotating segments said segments being substantially aligned with each other, each of said segments including at least two faces and each of said faces having:
 - (i) a substantially vertically oriented pivotable section having two sides, featuring a substantially vertically oriented axle, said pivotable section being pivotable about said axle; and
 - (ii) a pivotor for causing said pivotable section to pivot by about 180 degrees, such that both sides of said pivotable section are alternately displayable; and
 - (b) a rotator for rotating said segments in a substantially coordinate manner.
2. The display sign of claim 1, wherein each of said segments has three faces.
3. The display sign of claim 2, wherein each of said faces further includes a fixed section, said pivotable section is substantially one-half the width of said fixed section, said axle is located near a substantially vertical edge of said pivotable section, and said vertical edge is located near the middle of said fixed section, such that substantially one-half of said fixed section is alternately being overlaid by said pivotable section.
4. The display sign of claim 3, wherein said pivotor includes a cam to push against said pivotable section, and a bias spring to pull said pivotable section.
5. The display sign of claim 2, wherein said pivotable section is coextensive with said face.
6. The display sign of claim 5, wherein said pivotor includes a cam for engaging said axle.
7. The display sign of claim 6, wherein said axle is attached to a support with at least one notch, and with at least one roller, and said cam includes a slot for engaging said roller and a redirector for engaging said notch, such that said support is pivoted by said cam.
8. The display sign of claim 7, wherein said at least one notch is two notches, one of said notches being located on each of opposing sides of said support, and said at least one roller is two rollers, one of said rollers being located on each of opposing ends of said support.
9. The display sign of claim 5, wherein both tips of said pivotable section are substantially tapered.
10. The display sign of claim 5, wherein said pivotable section further features a tensioning mechanism, said tensioning mechanism including:
 - (1) a holder for being attached to an edge of said pivotable section;
 - (2) a tensioning pin for providing tension between said holder and said pivotable section, such that said pivotable section is held in a substantially vertical, substantially planar orientation; and
 - (3) a tensioning bracket for holding said tensioning pin against said holder and against said pivotable section, such that said tensioning pin is able to provide said tension.
11. The display sign of claim 5, further comprising:
 - (c) a message board for being attached to said pivotable section, said message board having at least a portion of a message attached.
12. The display sign of claim 1, wherein said rotator further includes:
 - (i) a first transmission disk;
 - (ii) a segment disk for each segment;
 - (iii) a transmission bar for connecting said first

transmission disk to each segment disk; and

(iv) a first motor for rotating said first transmission disc, such that said transmission bar causes each segment disk to rotate, such that each segment is rotated. 5

13. A controller system for remotely controlling a display sign, the display sign including a plurality of rotatable segments, the controller system featuring: 10

(a) a software for performing at least one instruction for controlling said display sign; and

(b) a PLC controller for controlling at least one operation of said display sign according to said at least one instruction of said software. 15

14. The controller system of claim 13, wherein said software is capable of performing said at least one instruction for controlling a plurality of the display signs. 20

15. The controller system of claim 13 wherein the controller system remotely controls said display sign through a network and the controller system further features: 25

(c) a computer for operating said software; 30

(d) a first communication device for connecting said computer to the network; and

(e) a second communication device for connecting said PLC controller to the network. 35

16. The controller system of claim 15, wherein the display sign further features:

(i) a motor for rotating each of said segments; and 40

(ii) a power supply for supplying power to said motor; and wherein said PLC controller controls said at least one operation of the display sign by determining an amount of said power being supplied to said motor. 45

17. The controller system of claim 15, wherein each segment features a plurality of faces and said at least one instruction determines a length of a time interval for displaying each face of each segment. 50

18. The controller system of claim 17, wherein said at least one instruction determines a frequency of display of each face of each segment. 55

19. The controller system of claim 18, further including

at least one sensor for sensing said at least one operation of the display sign and for sending information related to said at least one operation of the display sign to said PLC controller.

20. The controller system of claim 19, wherein said at least one sensor senses a stage of rotation of each segment.

21. The controller system of claim 19, wherein each face of each segment features a pivotable section and said at least one sensor senses a frequency of pivoting of said pivotable section.

22. The controller system of claim 19, wherein said PLC controller causes said computer to show an alarm if said at least one sensor indicates a fault in said at least one operation of the display sign, such that said at least one operation of the display sign is being performed incorrectly.

23. The controller system of claim 13, further comprising a camera for monitoring an environment around the display sign and for sending information regarding said environment to said PLC controller.

24. The controller system, of claim 23, wherein said software is capable of calculating a number of persons viewing the display sign according to information received from said camera.

25. The controller system of claim 13, further comprising a camera for monitoring the display sign.

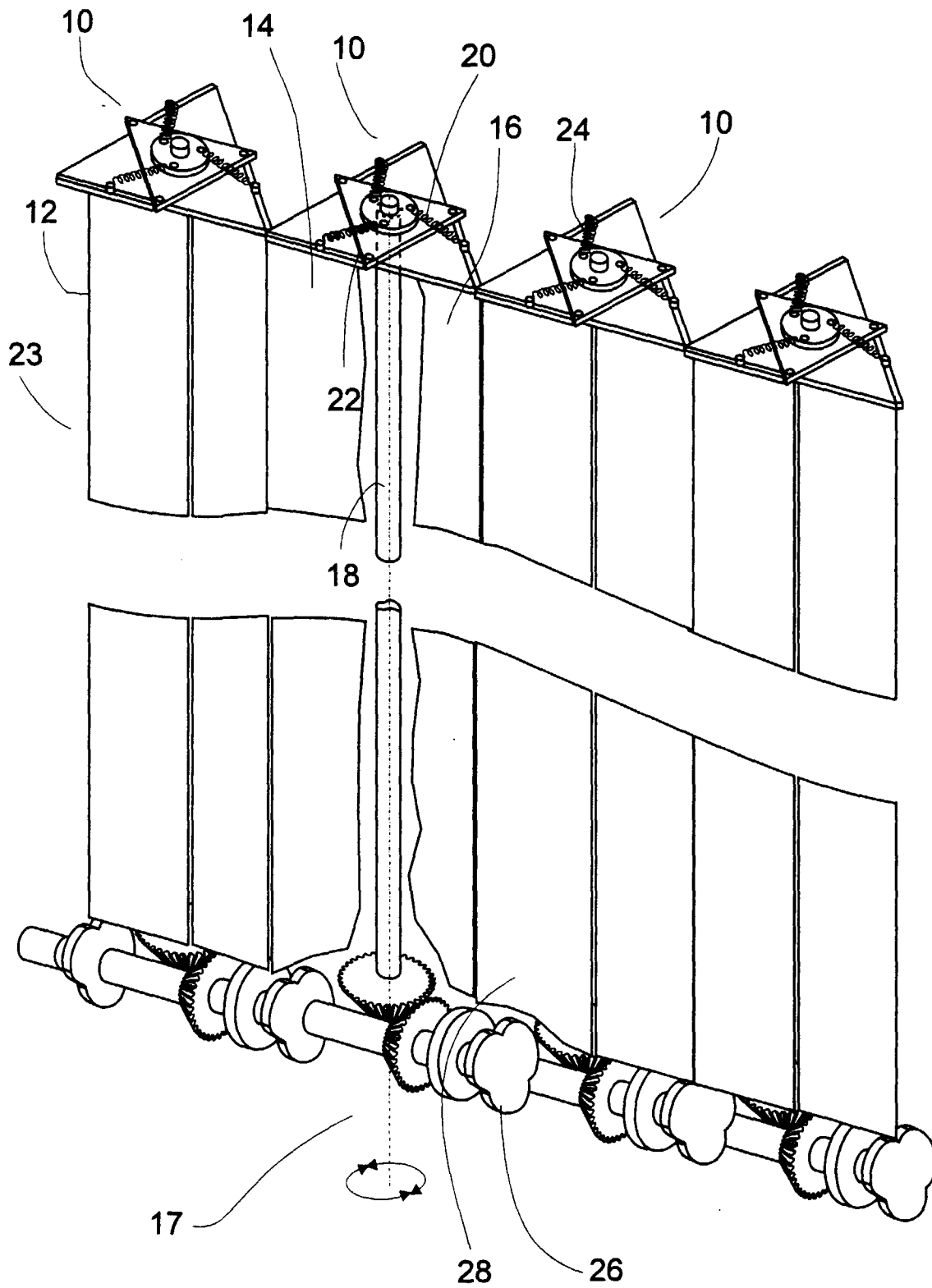


Fig. 1

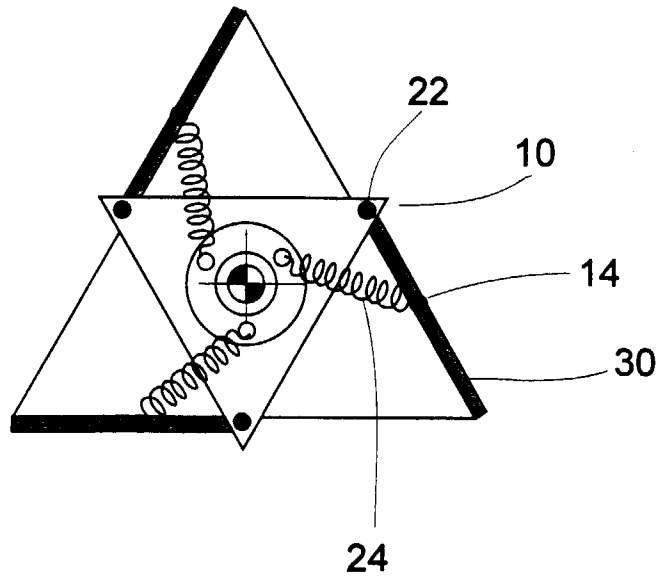


Fig. 2

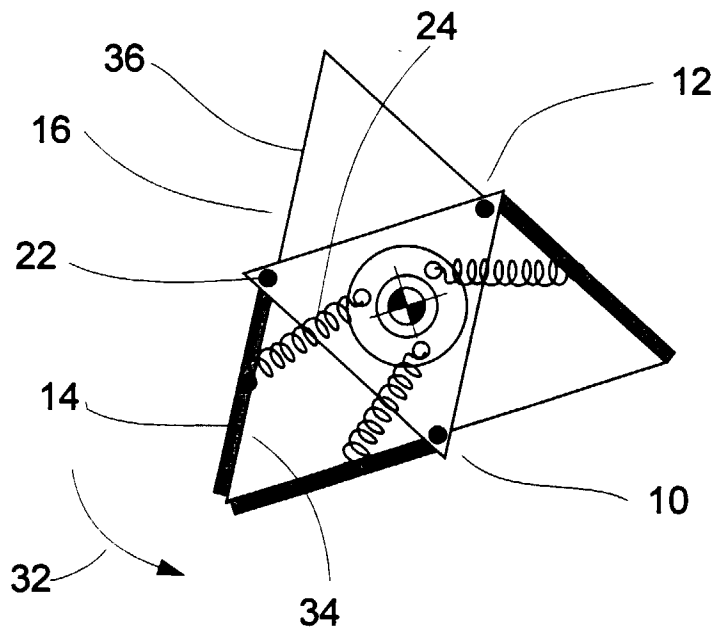


Fig. 3

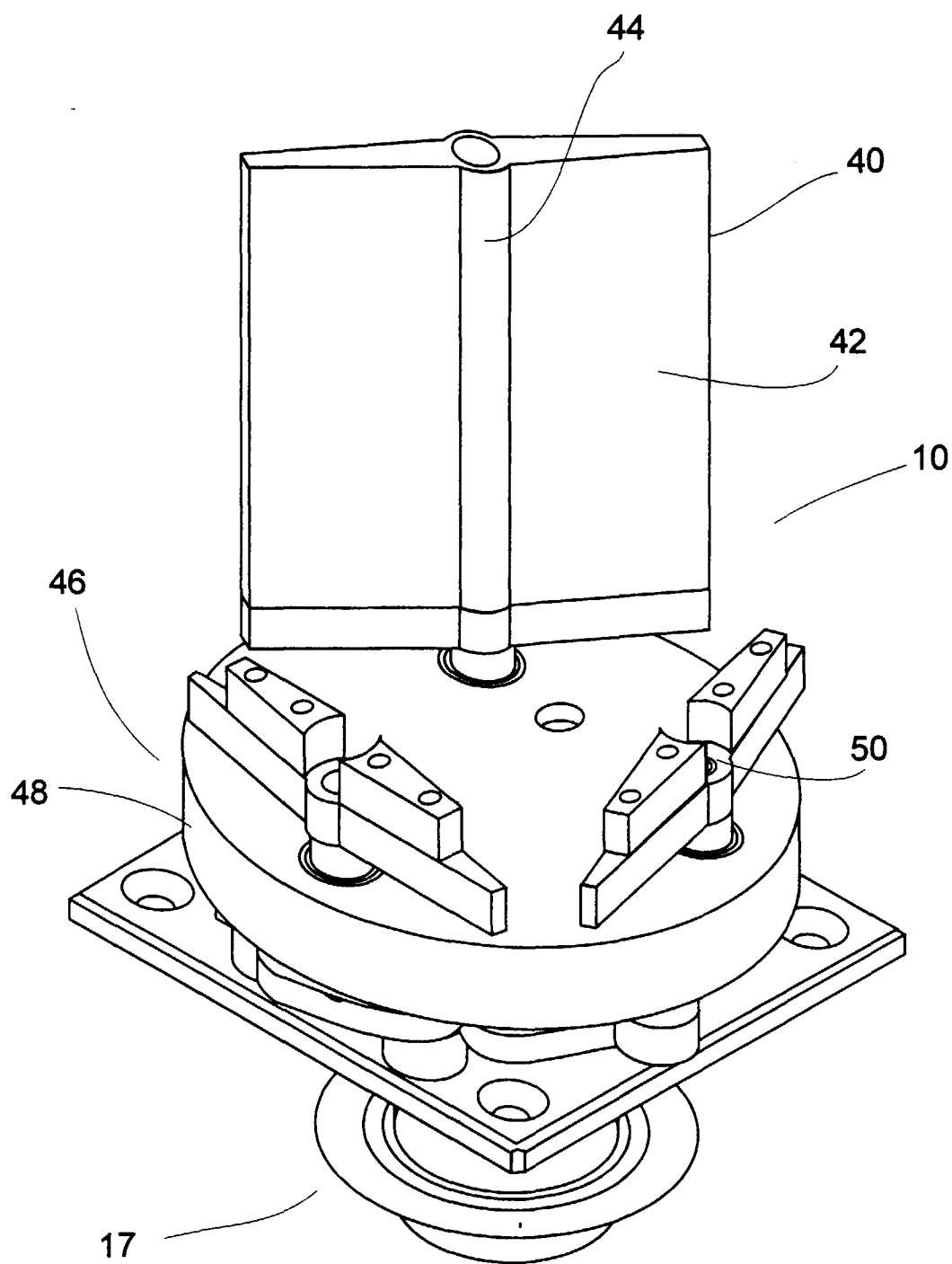


Fig. 4

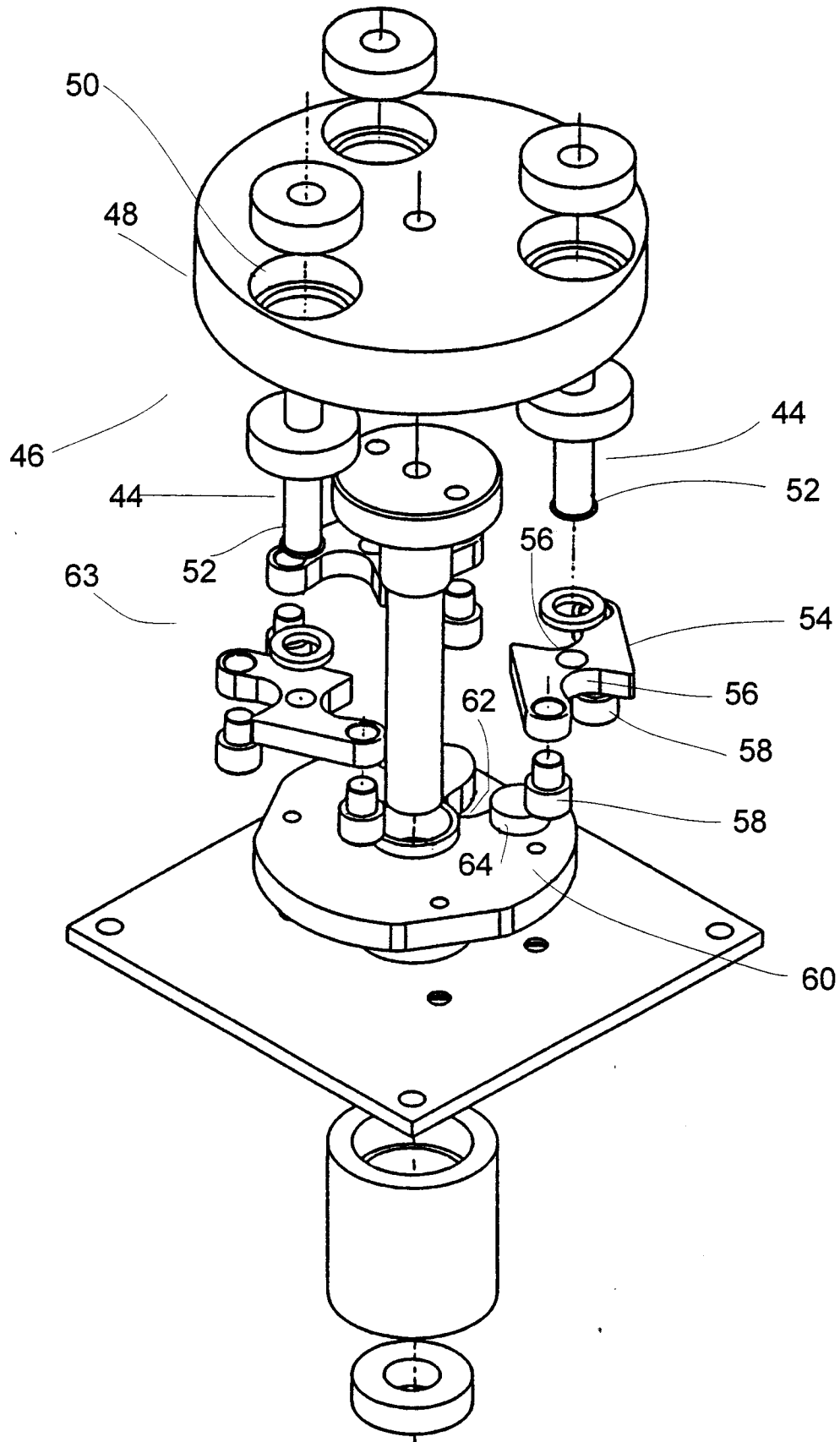


Fig. 5

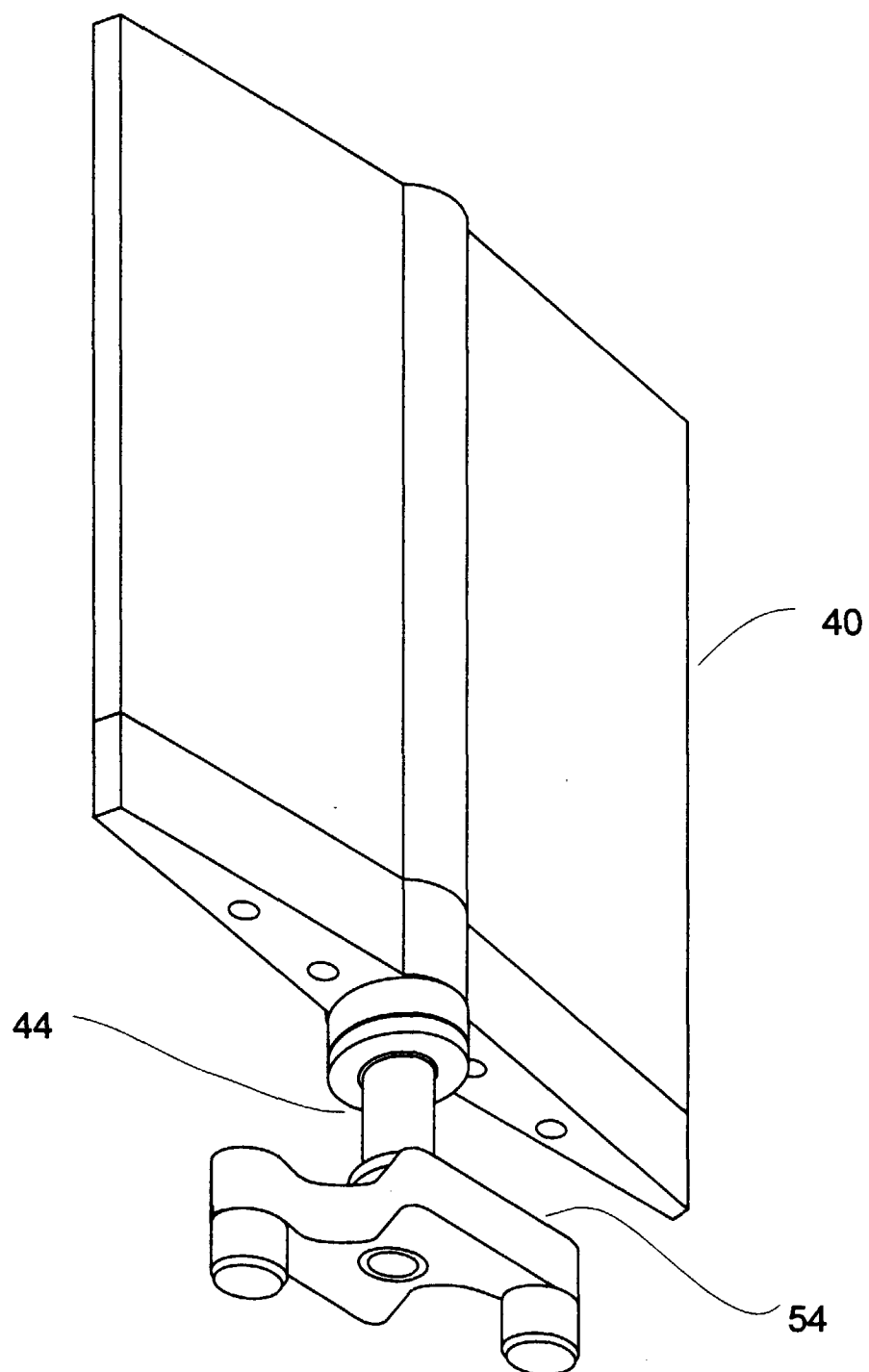


Fig. 6

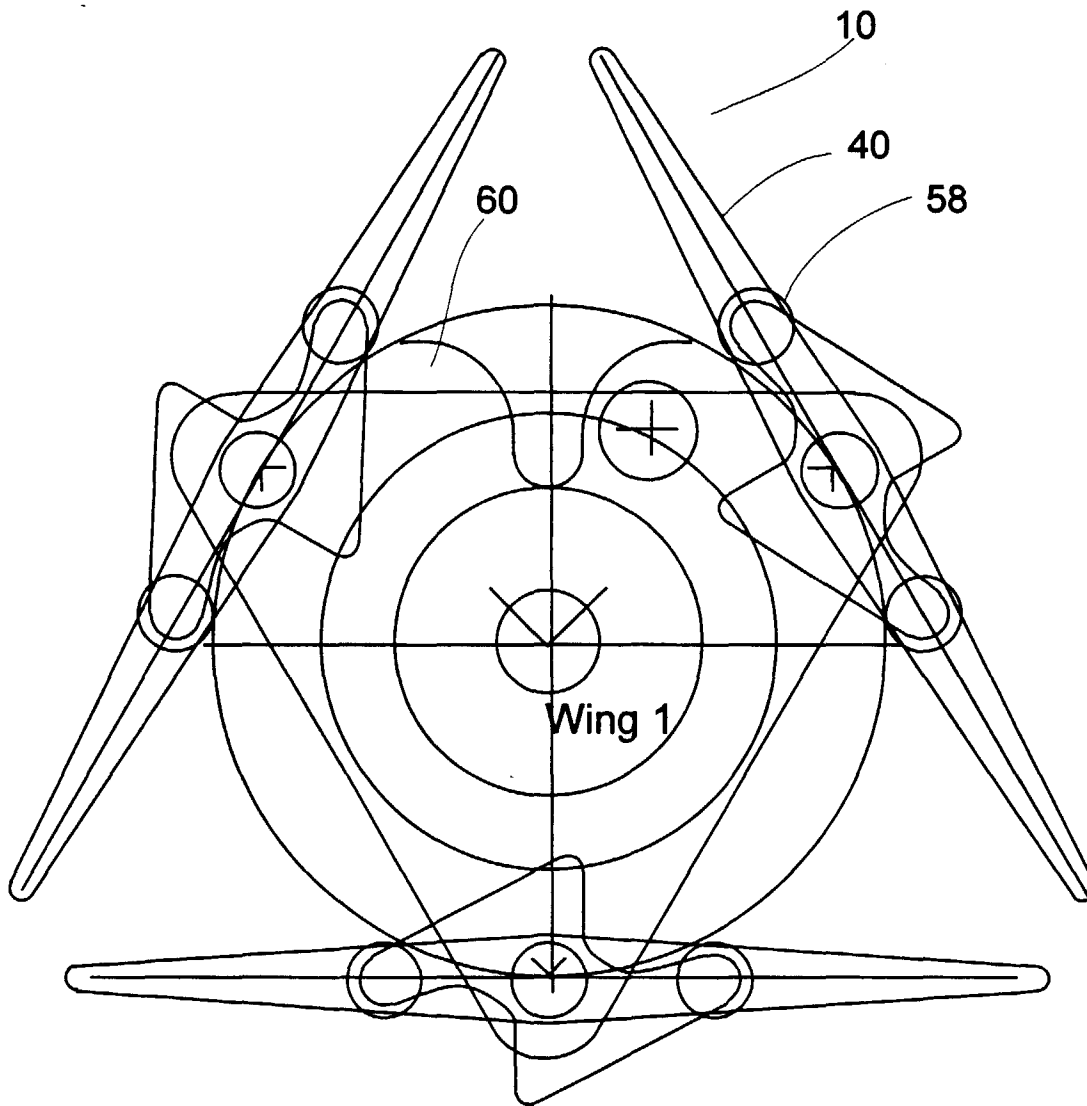


Fig. 7a

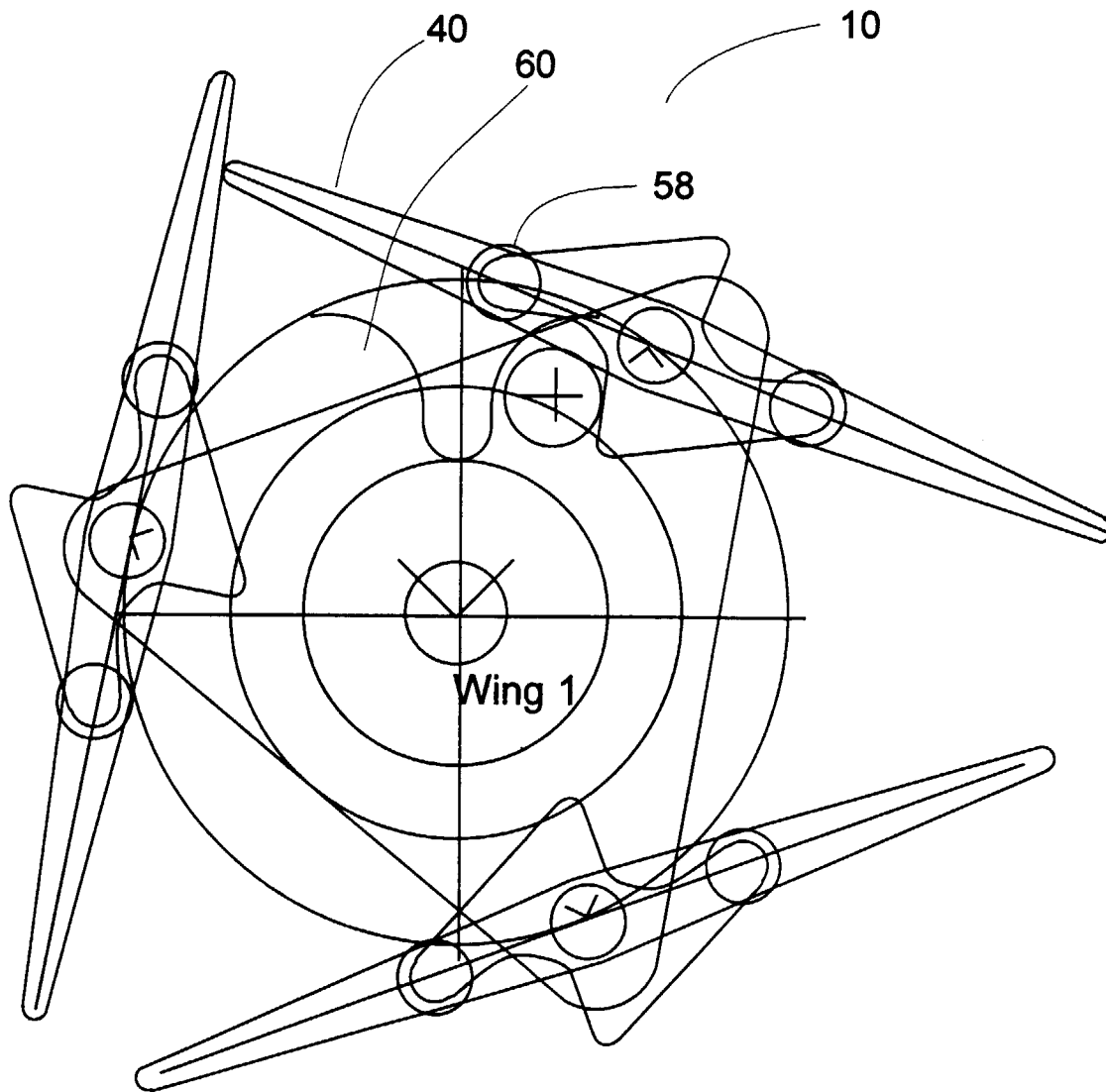


Fig. 7b

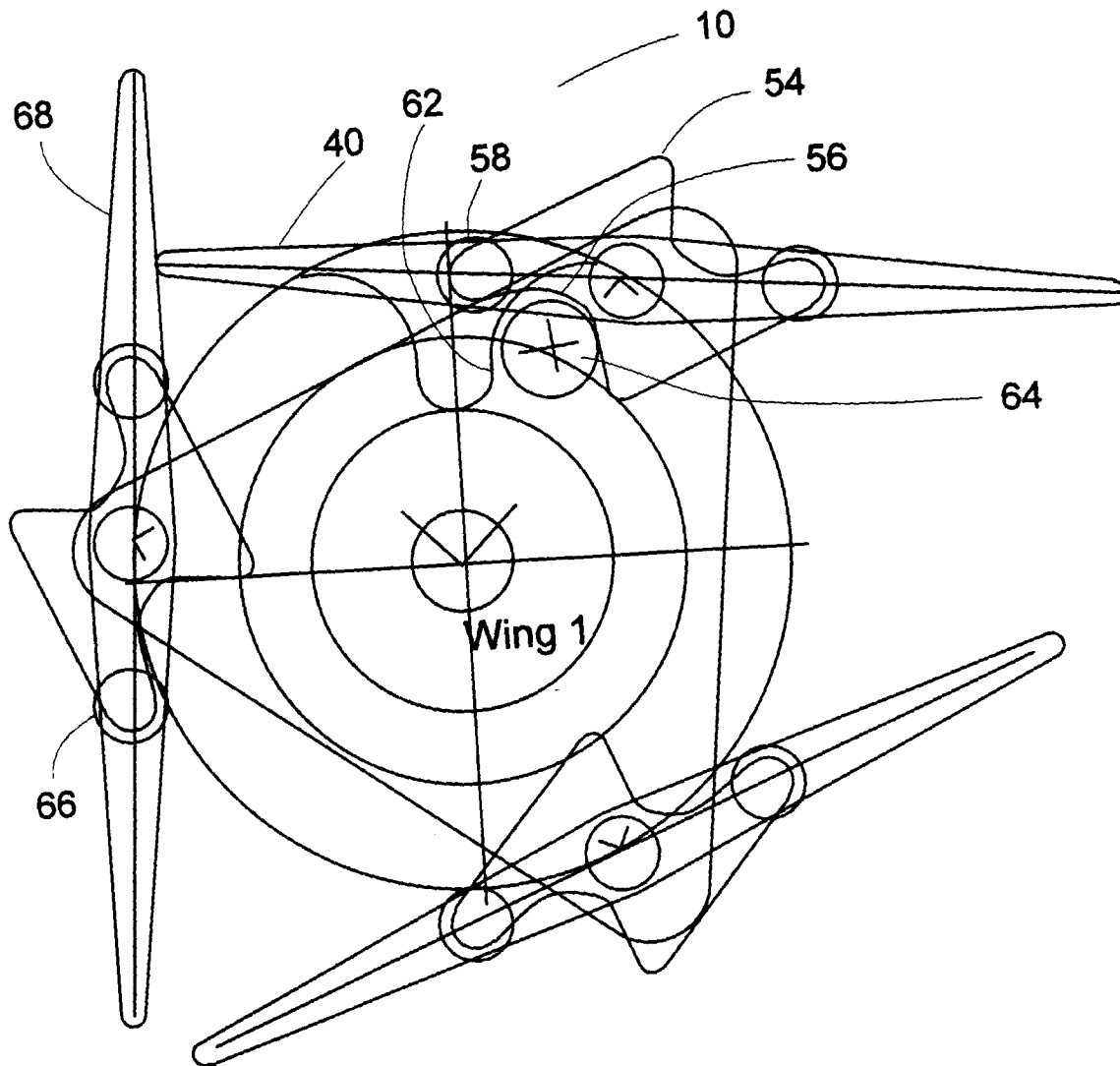


Fig. 7c

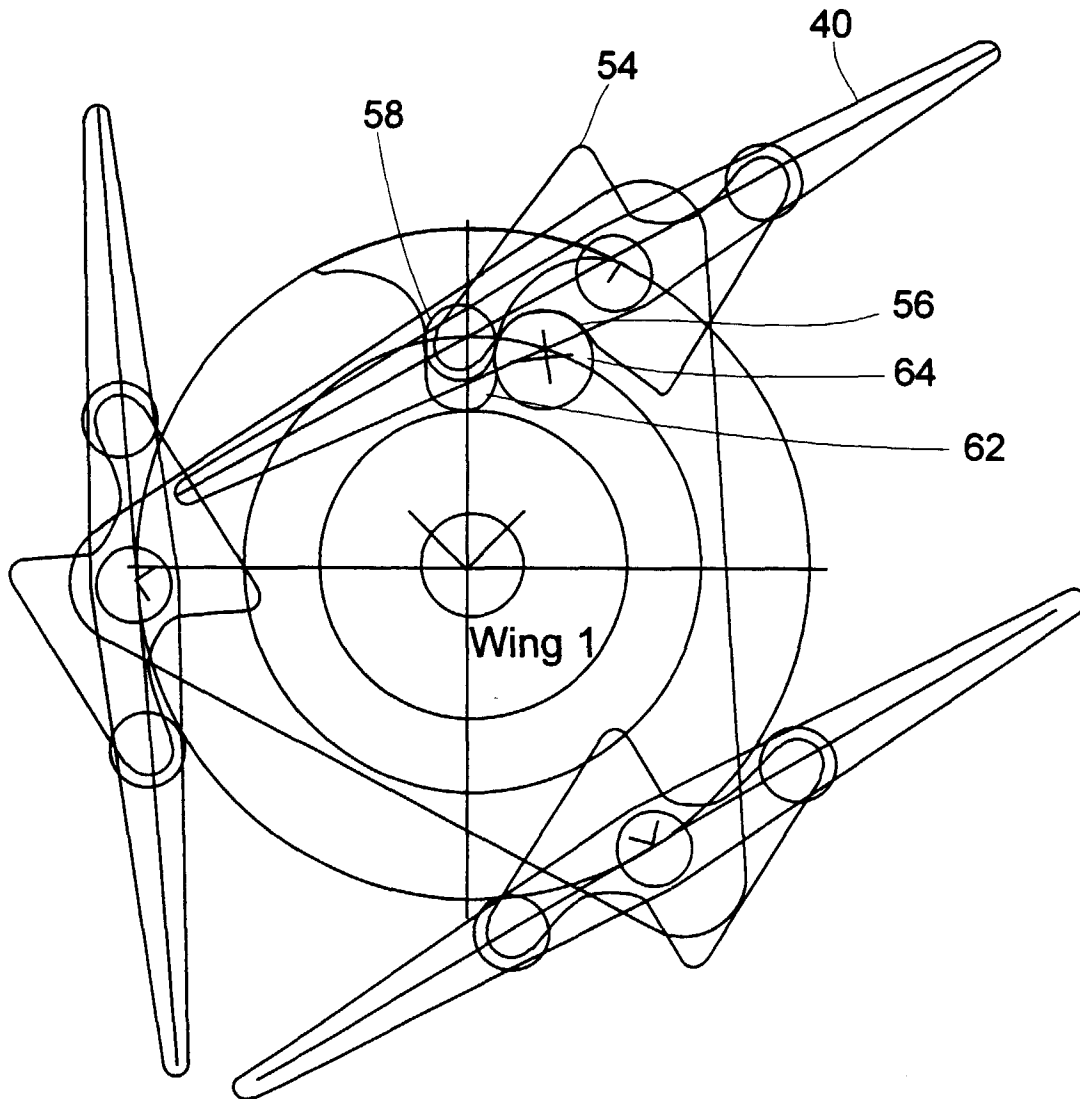


Fig. 7d

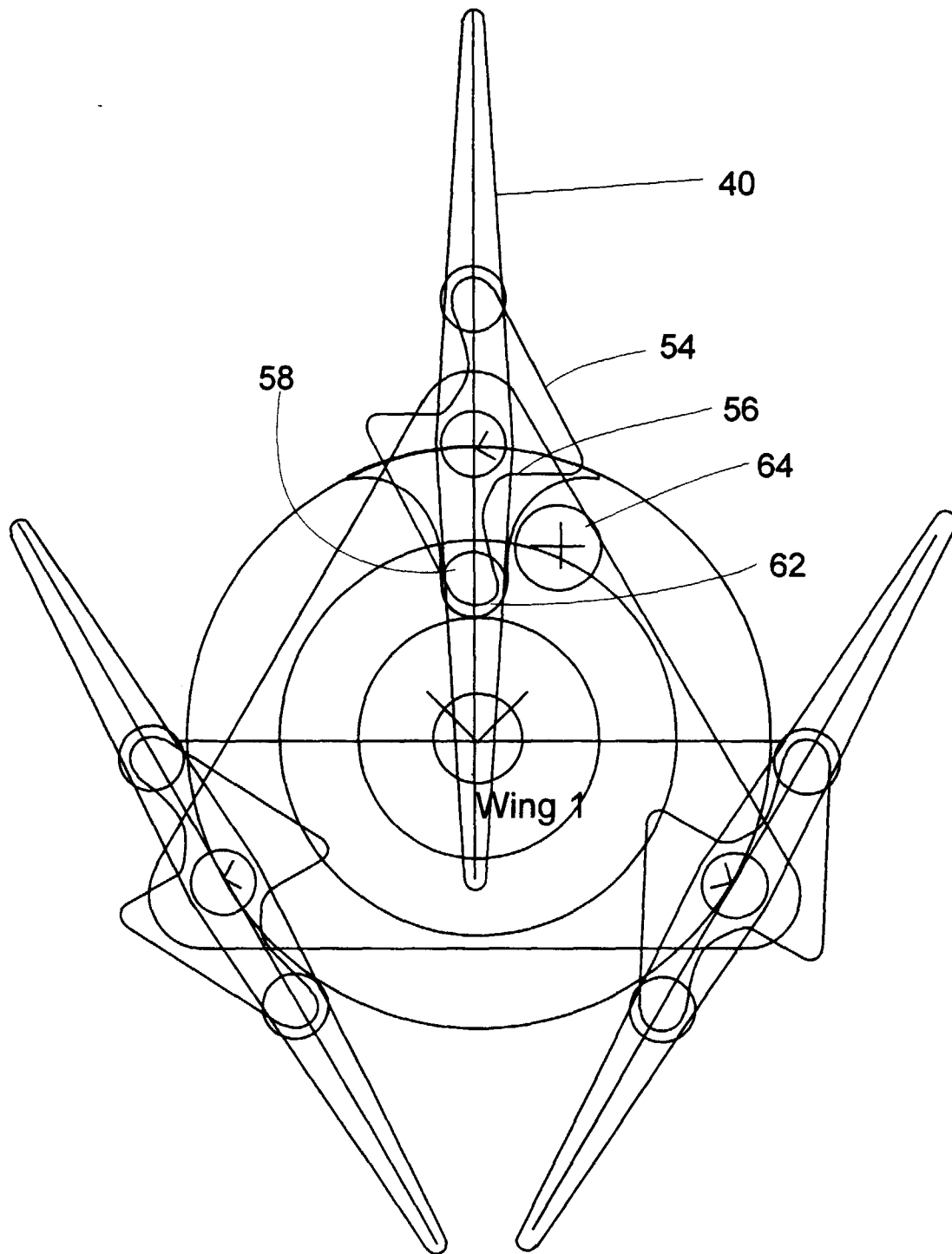


Fig. 7e

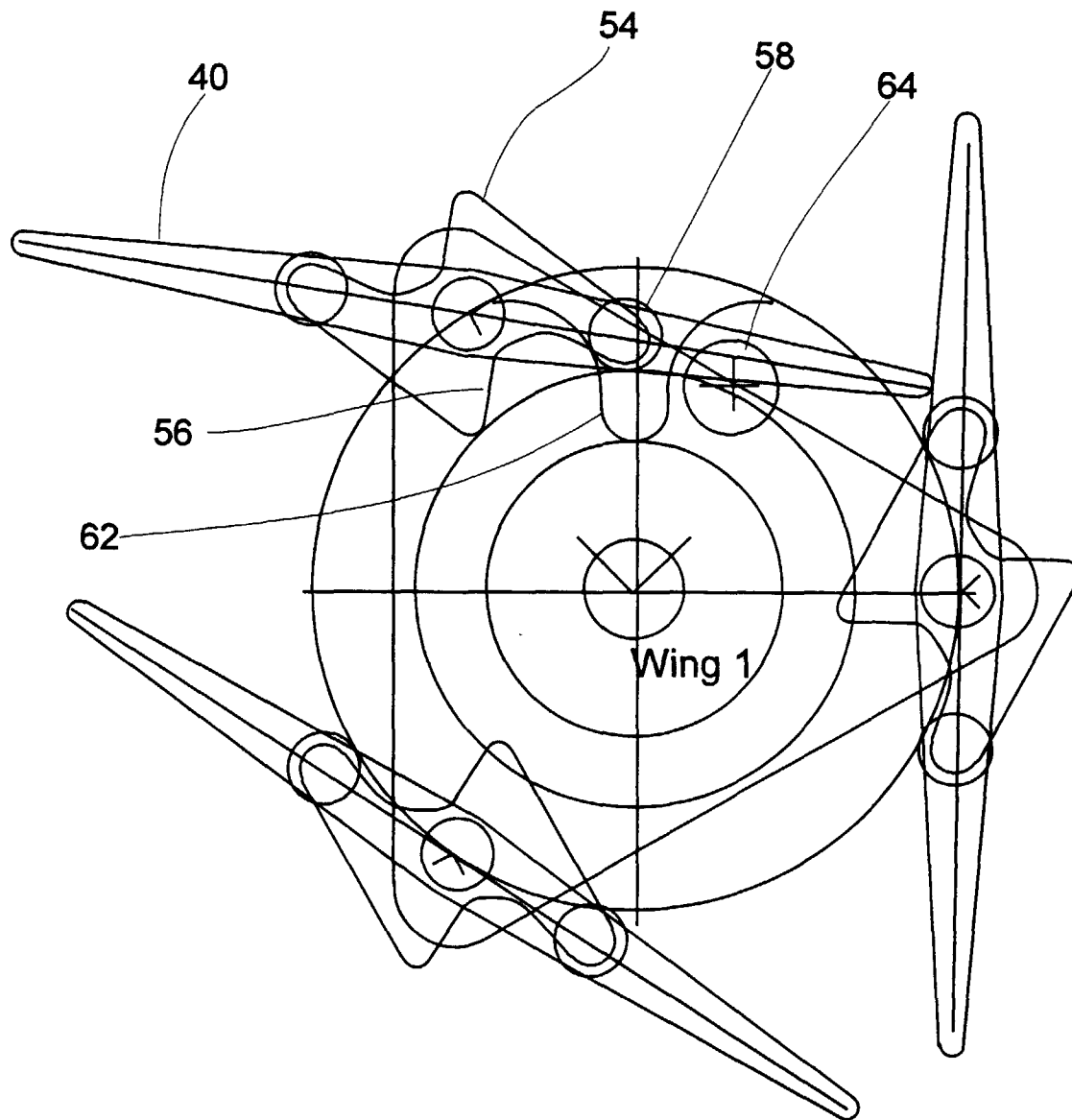


Fig. 7f

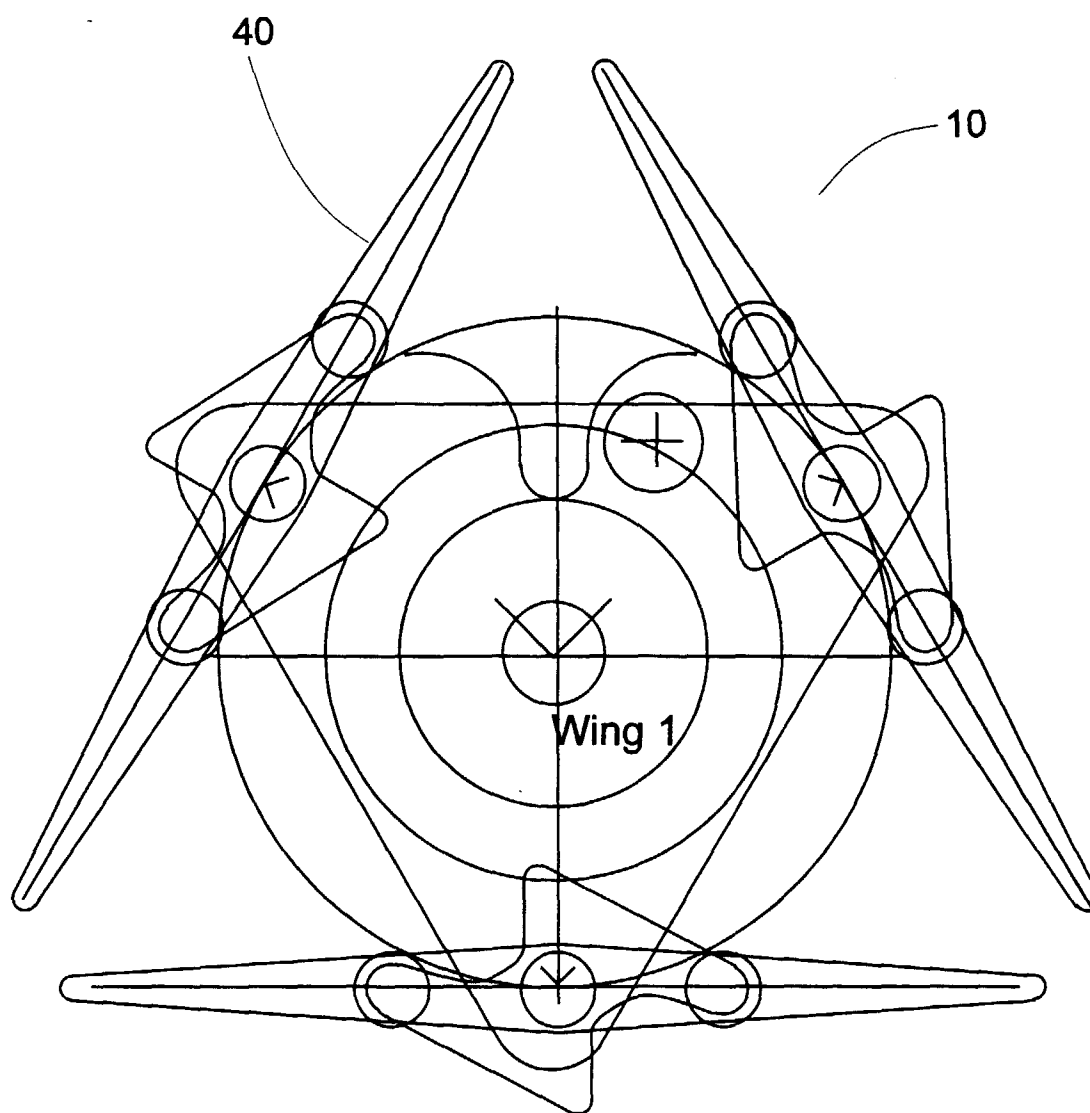


Fig. 7g

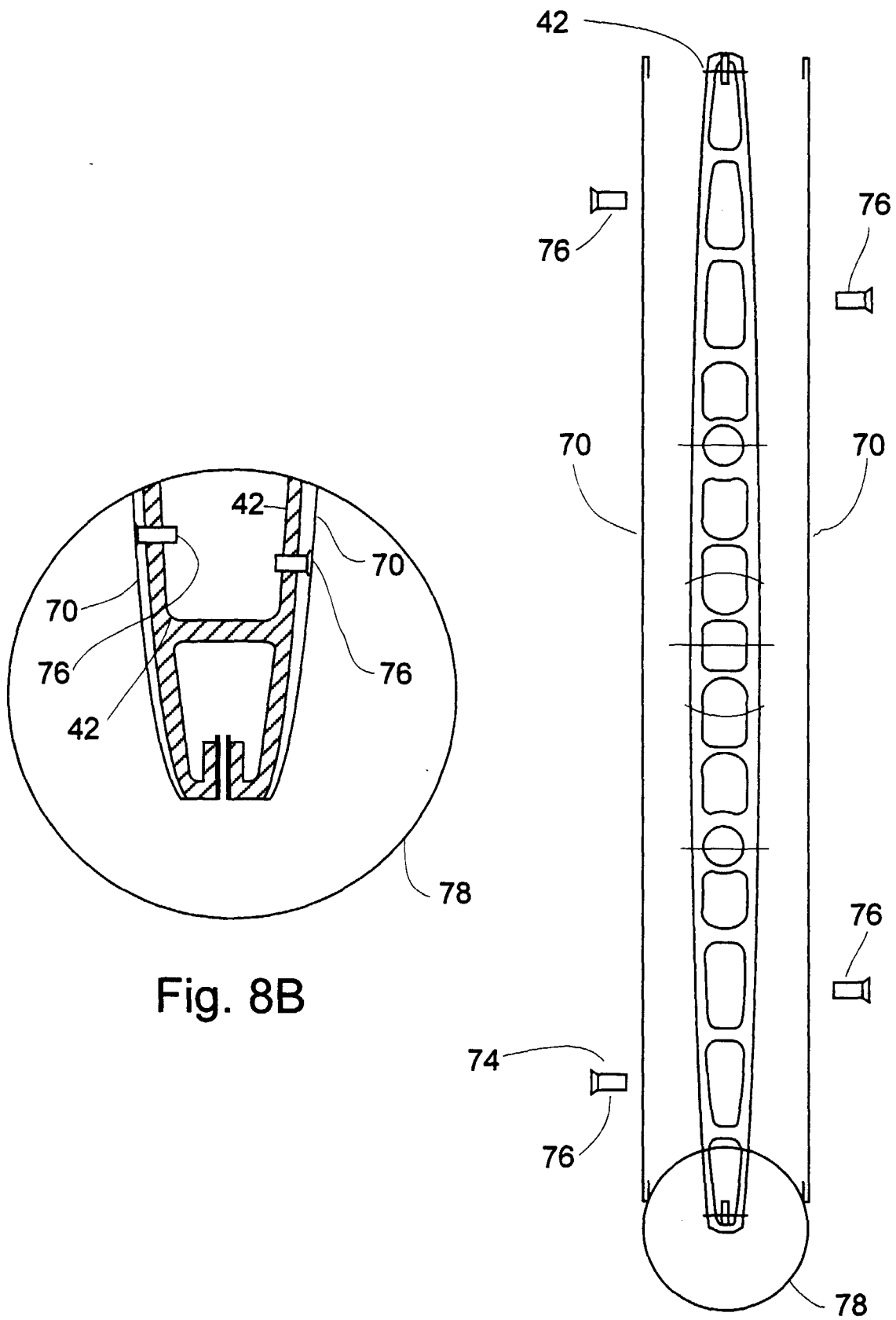


Fig. 8B

Fig. 8A

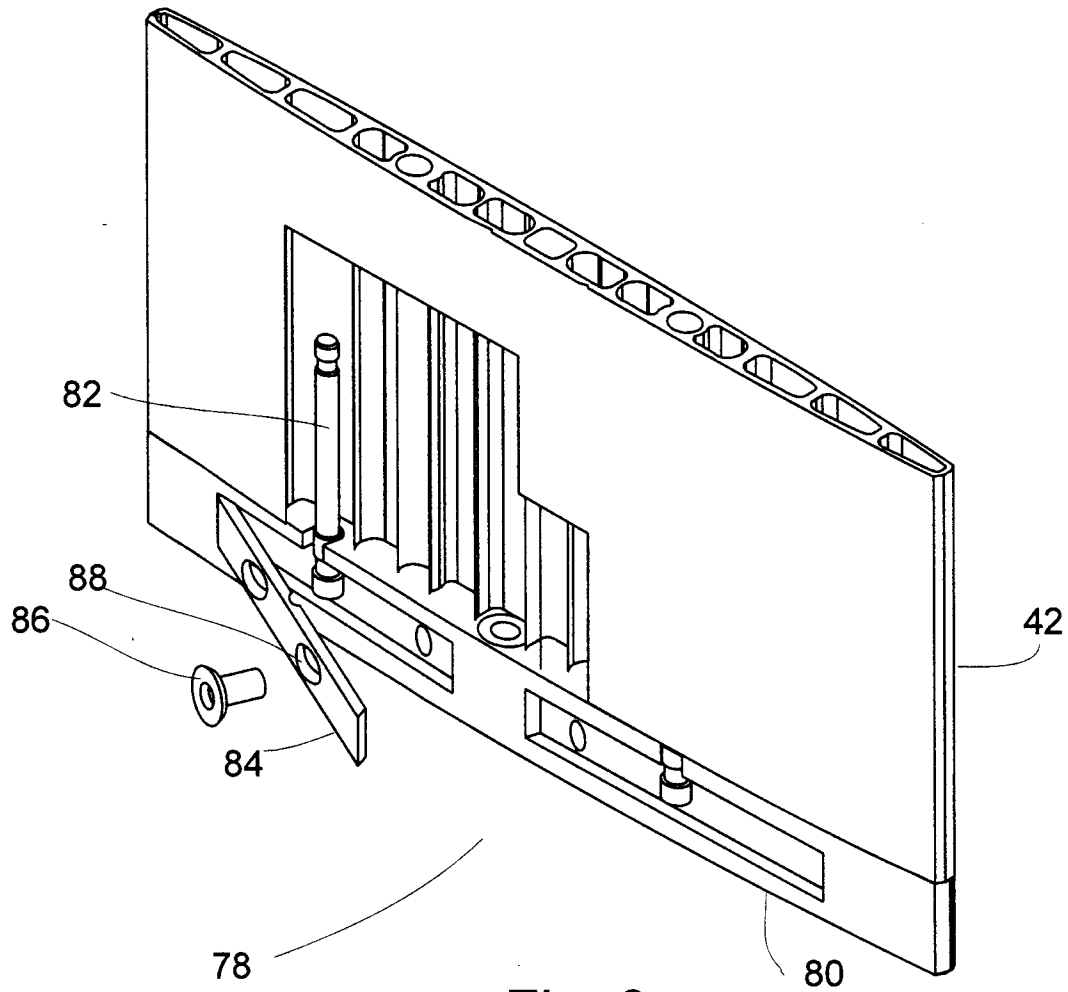


Fig. 9a

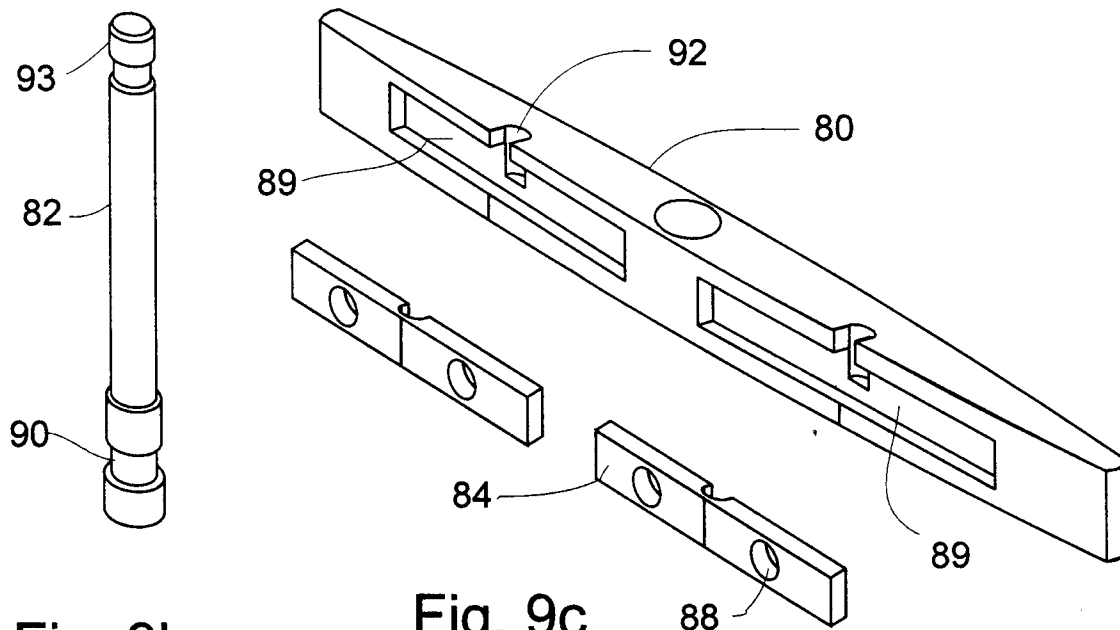


Fig. 9b

Fig. 9c

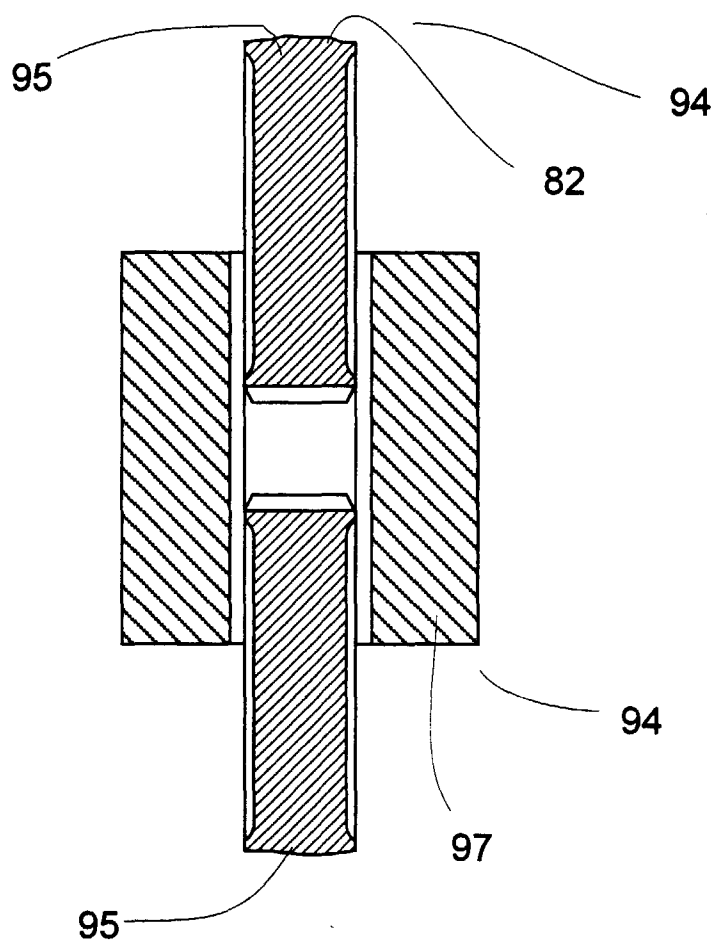


Fig. 10a

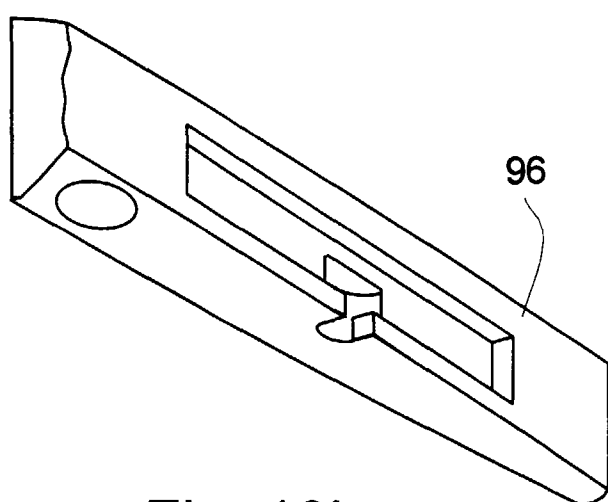


Fig. 10b

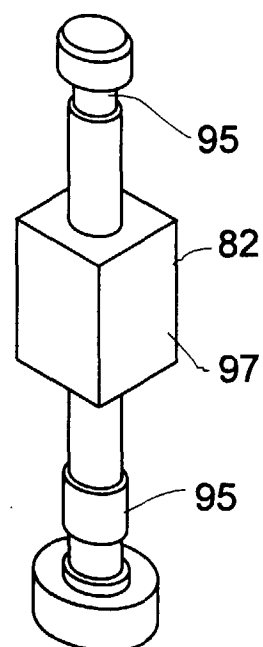


Fig. 10c

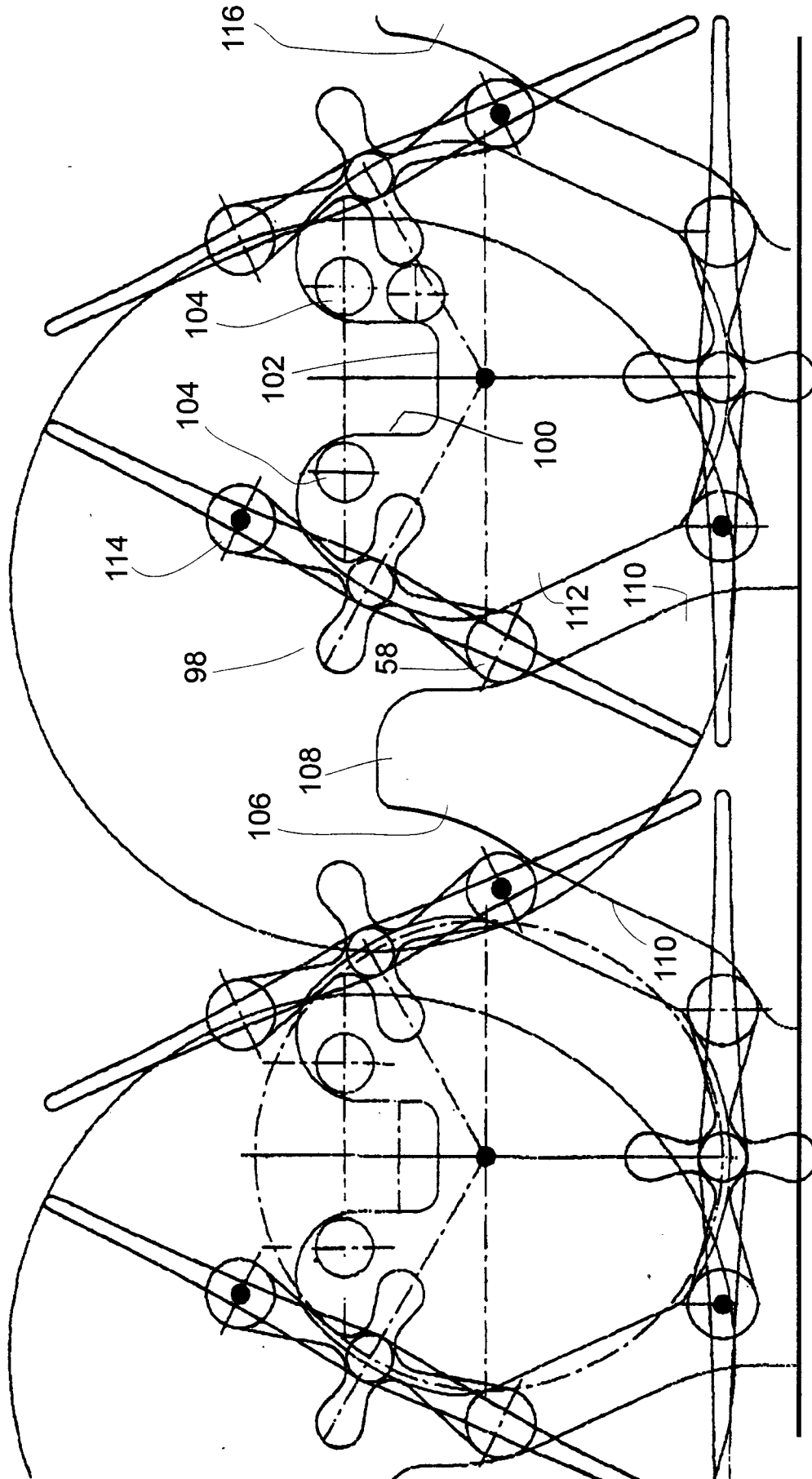


Fig. 11a

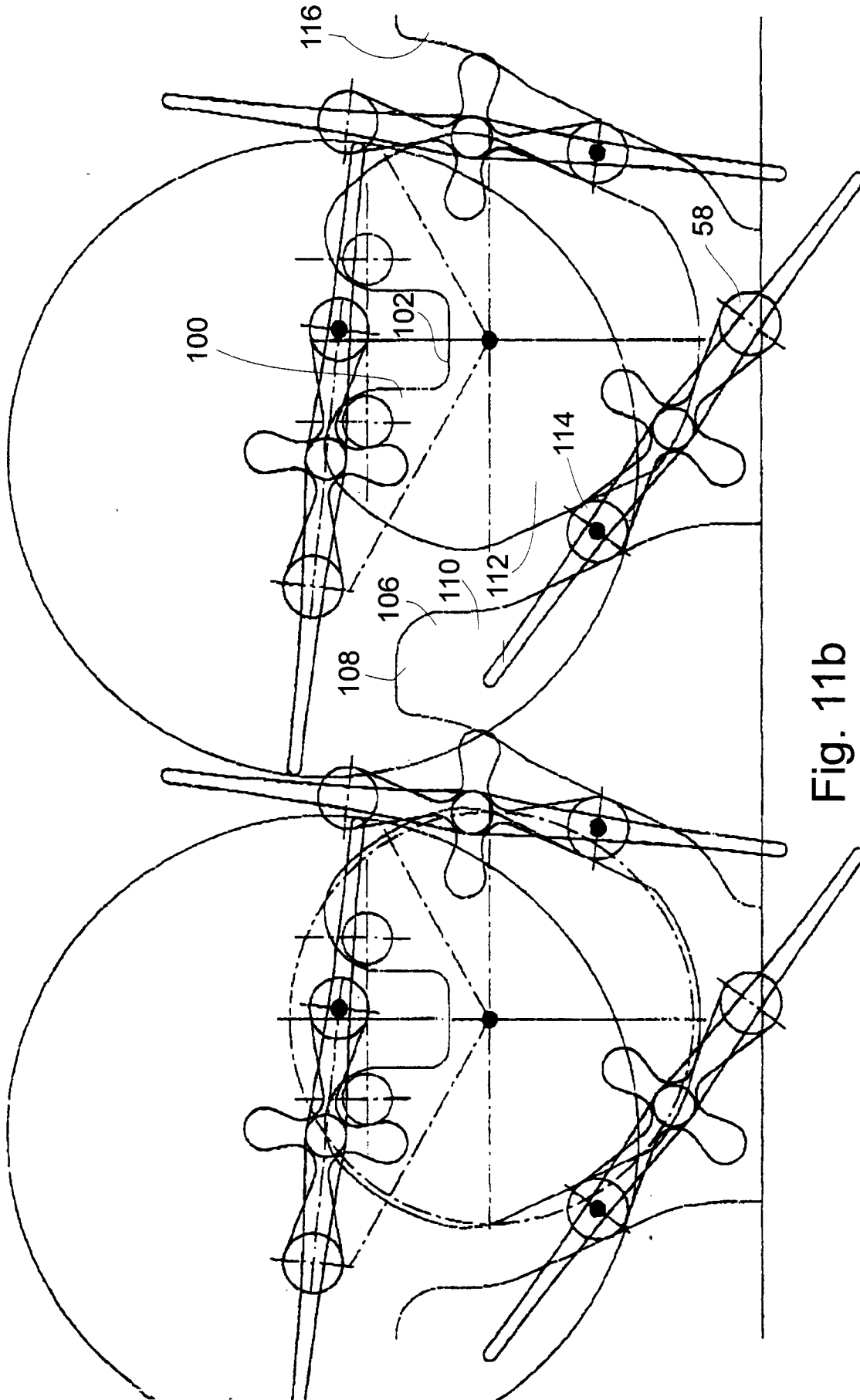
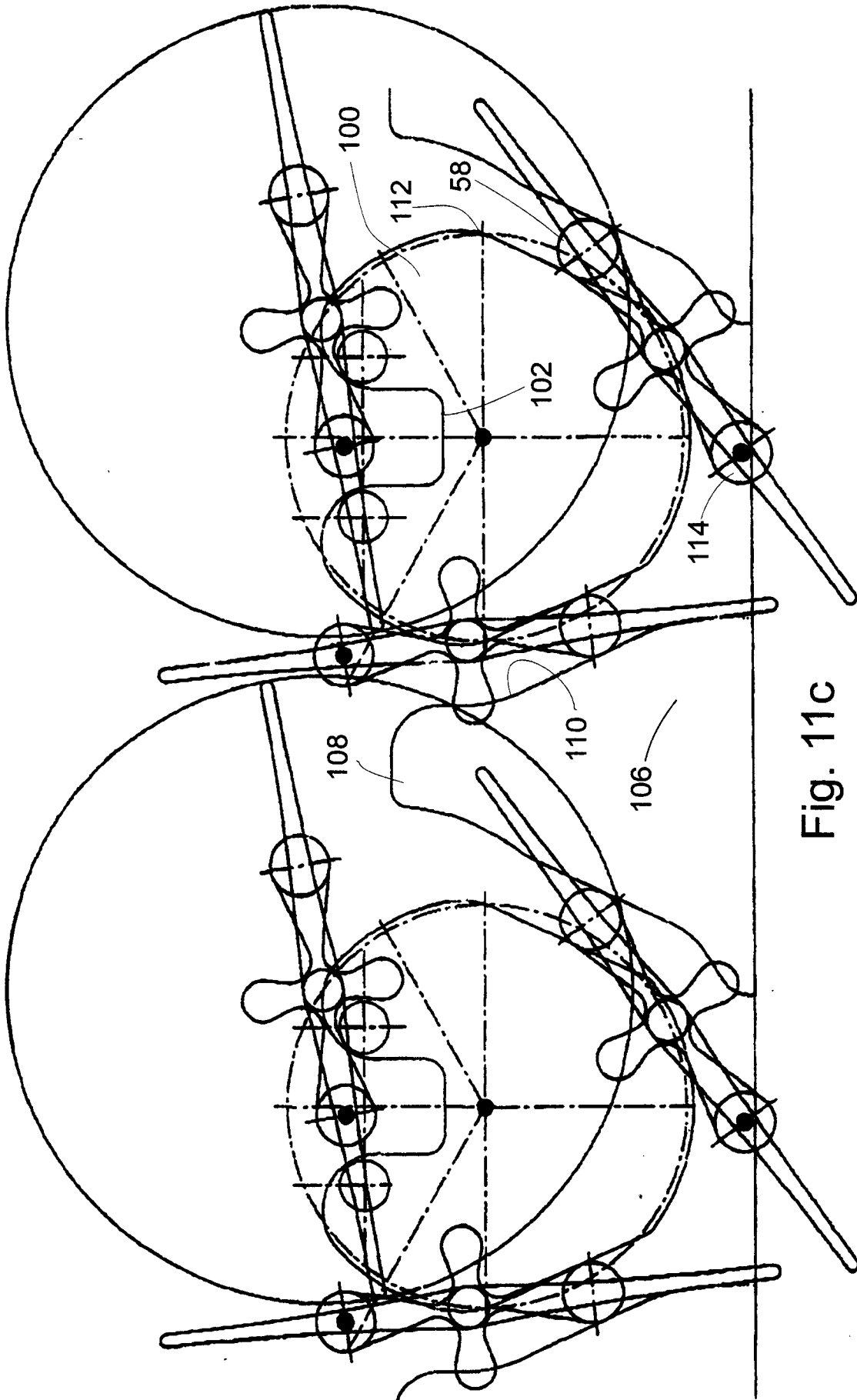


Fig. 11b



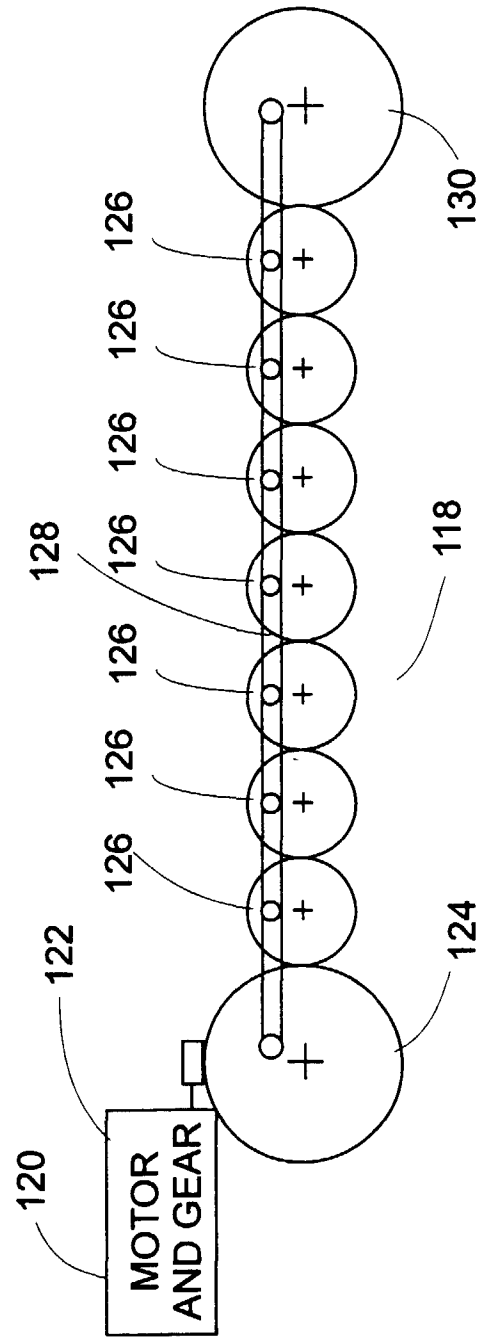


Fig. 12

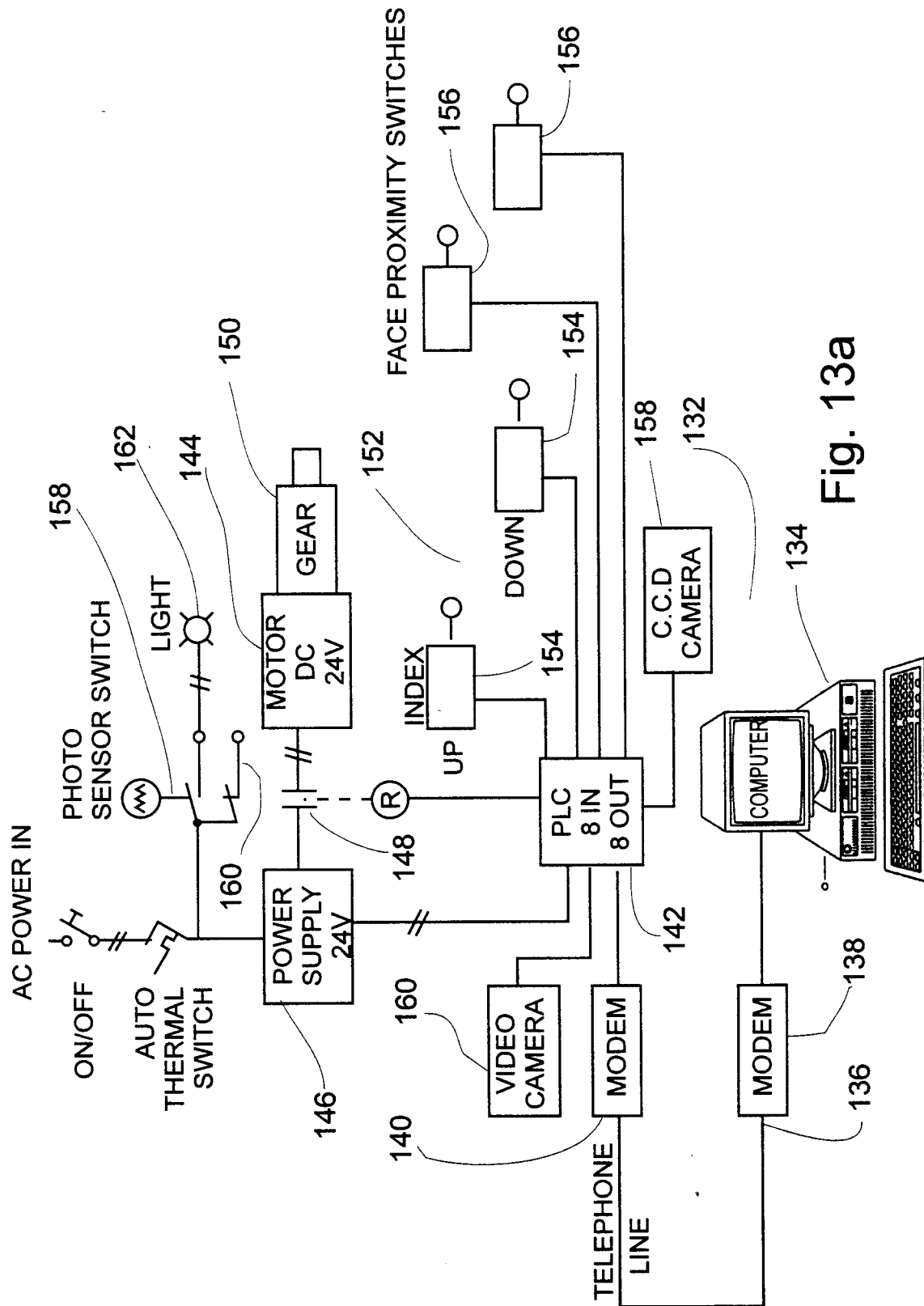


Fig. 13a

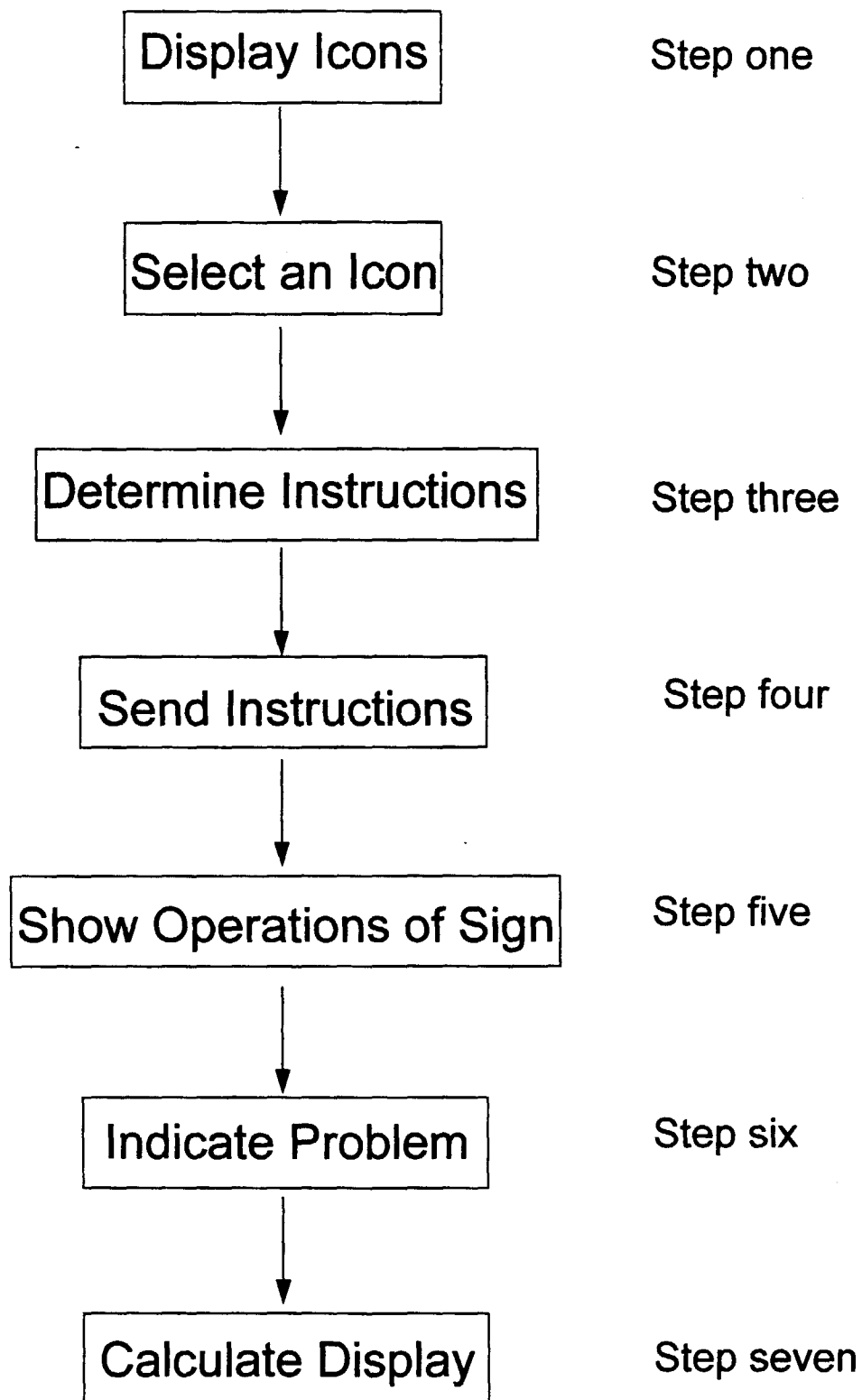


Fig. 13b



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 98 10 2802

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 109 115 A (JANSE LICHTREKLAME BV) 23 May 1984	1,2,5	G09F11/02
A	* the whole document * ---	9	
X	US 4 274 218 A (HARVEY BRIAN F) 23 June 1981 * claim 1; figures 1-3 *	1	
A	US 3 657 833 A (VETTER RICHARD H) 25 April 1972 * the whole document * ---	1-3,12	
A	FR 564 473 A (FITZALAN ROBERT H ET AL) 31 December 1923 * figure 2 *	3	
A	EP 0 501 303 A (PRISMA SKYLTREKLAM AB) 2 September 1992 * figure 1 *	6	
A	US 4 168 587 A (FALK SVENAKE) 25 September 1979 * claim 1; figure 5 * -----	10,12	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G09F
-The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 July 1998	Examiner Puhl, A
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			

EPO FORM 1503 03.82 (P04C01)



European Patent
Office

Application Number
EP 98 10 2802

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-12



European Patent
Office

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 98 10 2802

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-12

A display sign with rotating segments including faces with a pivotable section, a pivotor and a rotor for rotating the segments.

2. Claims: 13-25

A controller system for remotely controlling a display sign with rotatable segments using a software and a PLC controller.