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(54) Hoist Apparatus

(57) Hoist apparatus (2) is provided for moving a first object relative to the apparatus and/or for moving the apparatus relative to a surface. The hoist apparatus (2) includes support means (24,26,28,30) for supporting the first object relative to the apparatus (2) and/or the apparatus (2) relative to a surface in use and drive means (52) for driving movement of the support means (24,26,28,30). At least three separate support means (24,26,28,30) are provided with said apparatus (2) for supporting said at least first object and/or said apparatus (2).

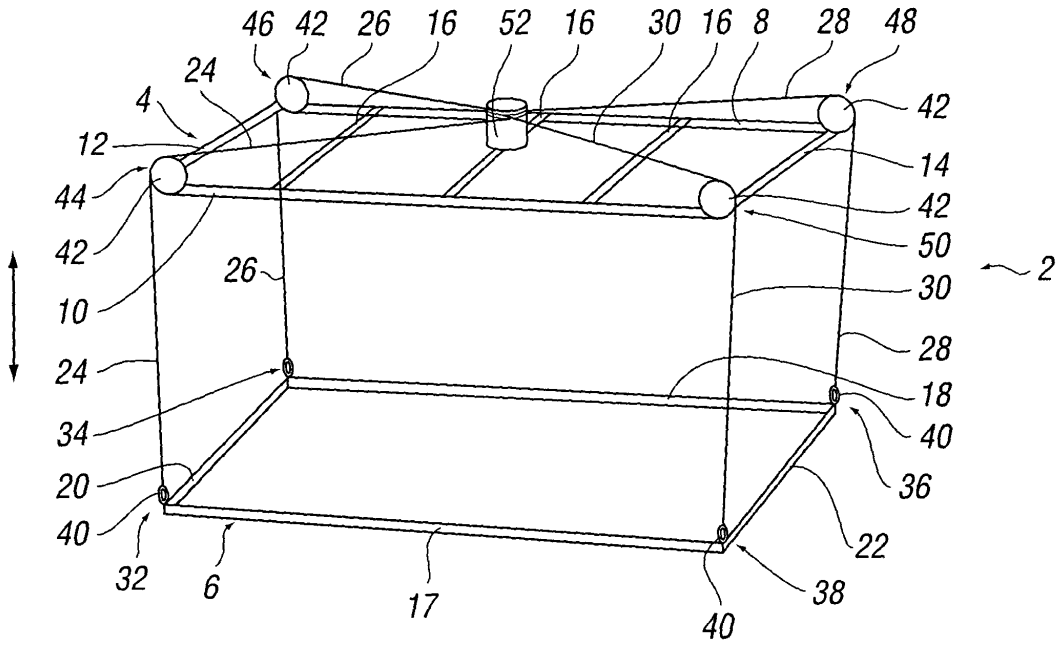

FIG. 1a

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Description

[0001] This invention relates to hoist apparatus and a method of use thereof.

[0002] Although the following description refers almost exclusively to hoist apparatus for use in a retail outlet and method of use thereof, it will be appreciated by persons skilled in the art that the hoist apparatus of the present application can be used in any suitable environment, such as a warehouse environment, in an office, in domestic premises and/or the like. The scale of the hoist apparatus of the present application can be readily adapted according to its intended use. In addition, the hoist apparatus can be used to move any or any combination of objects between two or more required positions in use.

[0003] Retail outlets often have large amounts of space available between the head height of customers walking on the floor surface of the outlet and the ceiling of the retail outlet. This space is often utilised to create suspended displays, such as to display promotional material, advertisements, hang merchandise and/or other items, such as Christmas decorations and/or the like. The manner in which the promotional material, merchandise and/or the like is displayed is of importance as it projects an initial impression of the retailer to the consumer and also informs the consumer of new and existing product lines and/or prices. Such displays are often required to be changed on a regular basis to allow a wide range of promotional offers and merchandise to be displayed and are also required to look neat and tidy.

[0004] Changing of suspended displays is often a time consuming process and in many modern retail outlets the displays can often be suspended at a significant height above the floor surface of the outlet. Movement of the suspended displays can often present a health and safety risk to the worker or workers responsible for changing the displays. For example, it is known that some retail outlets have suspended displays of up to 8m high above the ground surface. Conventionally, a display worker typically has to use access equipment, such as a ladder, steps and/or the like, to access the suspended displays that are out of their reach. The access equipment either requires the worker to climb up the same to the level of the suspended display or requires the access equipment to be raised off the ground and moved to the level of the suspended display. Use of access equipment could result in the worker injuring themselves, particularly if they are also trying to lift, carry and/or remove products on and/or off the suspended display at the same time. In addition, use and/or hire of access equipment is typically expensive, it requires a large amount of space to position the access equipment relative to the suspended display and often requires skilled workers to use the same.

[0005] It is known to provide a basic type of hoist system for use in a retail outlet for suspended displays of a type used to display lightweight promotional material, such as advertisements printed onto paper or lightweight cardboard. Such hoist systems typically comprise a frame attached to a ceiling of the outlet to which a tubular motor is attached. The tubular motor is used to drive movement of two spaced apart wires between extended and retracted positions. Promotional material can be detachably attached between the free ends of the wires. This type of hoist system is limited to lightweight applications only. In addition, it is often the case that the wires move out of synchrony, thereby resulting in the promotional material being suspended in an uneven manner which is unsightly and creates a bad impression to a customer of the retail outlet.

[0006] It is therefore an aim of the present invention to provide hoist apparatus which overcomes the abovementioned problems.

[0007] It is a further aim of the present invention to provide a method of using hoist apparatus which overcomes the abovementioned problems.

[0008] According to a first aspect of the present invention there is provided hoist apparatus for moving at least a first object relative to said apparatus and/or moving the apparatus relative to a surface, said hoist apparatus including support means for supporting said at least first object relative to the apparatus and/or the apparatus relative to a surface in use, and drive means for driving movement of said support means, and wherein at least three separate support means are provided with said apparatus for supporting said at least first object and/or said apparatus.

[0009] By providing at least three separate support means for supporting and moving the at least first object relative to the apparatus and/or the apparatus relative to a surface, this allows the weight of the at least first object which is to be supported and/or the apparatus to be heavier than existing systems. The apparatus is arranged such that the at least three support means can move substantially synchronously, thereby preventing uneven movement or suspension of the at least first object and/or apparatus.

[0010] Preferably the at least three support means are movable between at least first and second positions in use. The first position is typically a raised, retracted, suspended or display position and the second position is typically a lowered, extended or loadable position. Control means can be provided with or associated with the apparatus to allow intermediate positions to be provided between said at least first and second positions.

[0011] With the support means in the first raised position, the at least first object and/or apparatus is also in a corresponding raised position. With the support means in the second lowered position, the at least first object and/or apparatus is also in a corresponding lowered position.

[0012] Preferably the hoist apparatus is capable of moving said at least one object and/or apparatus between substantially vertically spaced apart positions. The hoist apparatus allows the at least one object and/or apparatus to undergo substantially linear and/or reciprocal movement in use.

[0013] Preferably each support means includes any or any combination of one or more elongate cables, wires, tapes, chains and/or the like for attaching to the at least first object and/or for attaching the apparatus to a surface in use. The drive means typically drives movement of said one or more elongate cables, wires, tapes, chains and/or the like in use. Further preferably each support means is substantially flexible, thereby allowing the support means to be wound onto a drum, reel or other suitable recoiling system to allow the support means to be moved between extended and retracted positions in use.

[0014] Preferably the support means includes attachment means for attaching the same to the at least first object in use and/or for attaching the apparatus to a required surface in use. The attachment means can include any or any combination of suitable attachment means, such as one or more hooks, clips, buckles, ties, VELCRO, nuts and bolts, screws, welding, friction fit, inter-engaging members and/or the like. The attachment means can be fixed, detachably attached or integral with the at least first object and/or apparatus.

[0015] In one embodiment the hoist apparatus includes movement means for allowing or increasing the ease with which the support means can move in use. The movement means can include any or any combination of one or more pulleys, rotatable members, drums, channelled member and/or the like.

[0016] Preferably movement of the movement means are not driven or powered and movement of the same is as a result of movement of the support means thereover in use (i.e. passive movement).

[0017] Further preferably the movement means are located at a point on the apparatus which allows the direction of the support means to change, such as to allow the support means to move from a substantially horizontal direction to a substantially vertical direction.

[0018] The movement means can include tensioning means to allow adjustment of the tension of one or more of the support means to ensure the correct amount of tension is applied to the support means. It is important for the support means to be of the correct tension and thus be of the great length and/or height so that all the support means of the apparatus can be moved substantially simultaneously and evenly.

[0019] Preferably the tensioning means allows one or more of the movement means (such as for example a pulley) to be moved between two or more different positions, thereby adjusting the tension of the support means in use. Adjustment of the tensioning means is typically via manual user adjustment but adjustment could be actuated remotely via electrical, pneumatic and/or mechanical means.

[0020] In one embodiment the tensioning means includes bracket means. Protrusion means provided on or associated with the one of the movement means or bracket means is movably mounted in a slot provided on the other of the movement means or bracket means. The position of the protrusion means in the slot allows the position of the movement means relative to the drive means to be altered, thereby altering the level of the tension, height and/or length of the support means. For example, any or any combination of the movement means can be moved between raised and lowered positions on the bracket.

[0021] In one example, the tensioning means includes three separate pulleys associated with each support means. The position of any or any combination of the three pulleys can be altered to allow adjustment of the support means associated with the three pulleys.

[0022] The position of the protrusion means in the slot can be a user selected arbitrary position or can be one of a number of pre-determined positions.

[0023] In a preferred embodiment one or more slots are provided on the bracket means.

[0024] The protrusion means in one example includes a nut and bolt arrangement, screw and/or the like.

[0025] Preferably the slot is a curved slot.

[0026] Preferably the drive means is located substantially centrally or equidistance of the at least three support means, tensioning means and/or movement means. This positioning helps to ensure that the support means are moved substantially in synchrony.

[0027] In one embodiment the drive means includes a motor and the motor drives movement of the support means. The drive means can also include suitable gearing.

[0028] In a preferred embodiment four separate support means are provided with said hoist apparatus. Preferably the drive means is provided substantially centrally of the four support means.

[0029] In one embodiment a single motor or drive means is used to drive all the support means substantially simultaneously.

[0030] The positions between which the support means are movable can be pre-determined and/or can be selected arbitrarily by a user.

[0031] In one embodiment the hoist apparatus includes a frame or housing in or on which the drive means is located. The movement means, tensioning means, control means and/or the like can also be located on the frame or housing if required.

[0032] In one embodiment the at least first object is moved relative to said frame or housing in moving between said at least first and second positions. In this embodiment the frame or housing is typically fixed relative to a surface, such as for example a ceiling surface.

[0033] In one embodiment the frame or housing is moved relative to a surface, such as for example a ceiling surface, in moving the apparatus between said at least first and second positions. In this embodiment the at least first object can be attached, detachably attached and/or movable relative to the frame or housing.

[0034] The surface to which the apparatus can be attached to or moved relative to can be a ceiling or roof of a building, the underside surface of a platform, a substantially horizontal surface and/or the like.

[0035] In either embodiment, the hoist apparatus allows movement of the at least first object and/or the apparatus is capable of moving relative to a surface between substantially vertically spaced apart positions. Preferably the substantially vertical positions between which the at least first object and/or apparatus can be moved are co-axially arranged.

[0036] Preferably the first object is moved to positions below the housing or frame in use and/or the housing or frame is moved to positions below the surface to which the apparatus is attached in use.

[0037] In one embodiment the apparatus includes two frames or housings, a first frame or housing fixedly connected to a surface and a second frame or housing movable relative to the first frame or housing between substantially vertical spaced apart positions. In this embodiment the second frame or housing can comprise the at least first object or the at least first object can be connected to the second frame or housing.

[0038] In one embodiment the drive means includes at least one rotatable shaft, rotation of which is driven by the motor and/or suitable gearing in use.

[0039] Preferably guide means are provided on or associated with the at least one rotatable shaft to allow movement of the support means to be guided relative to said at least one rotatable shaft. The guide means acts to keep the support means separate during use, thereby preventing snagging or interference of the support means with each other. The guide means also allows the support means to be wound and unwound relative to the rotatable shaft to provide the extended and retracted positions.

[0040] Further preferably only a single rotatable shaft is used for movement of all the support means.

[0041] The guide means can include one or more channels, recesses and/or the like in which at least part of the support means can move in use.

[0042] Preferably the guide means provides a channel and/or recess for each support means to allow the support means to be separated relative to the other support means. This separation results in each of the support means being at different heights relative to the frame adjacent the guide means. The position of the movement means are adjusted to ensure each end of the support means are at approximately the same height relative to the other support means ends once they have passed over or through (i.e. downstream of) the movement means.

[0043] In a preferred embodiment the guide means includes a plurality of disc or plate members. The number of disc or plate members is typically 1 more than the number of support means used with the apparatus (i.e. number of discs= n + 1, where n = number of support means).

[0044] Preferably five disc or plate members are provided for use with four support means.

[0045] Preferably the rotatable shaft passes through an aperture defined in each of the disc or plate members, is integral with or is connected to each disc or plate member. Further preferably the disc or plate members are substantially co-axial with the longitudinal axis of the rotatable shaft.

[0046] Each disc or plate member is typically a pre-determined spaced distance apart from an adjacent disc or plate member. The pre-determined spaced distance apart is preferably sufficient to allow the support means to move within said space in use.

[0047] In a preferred embodiment the rotatable shaft is substantially vertically arranged and rotation of the shaft drives rotation of the one or more disc or plate members about said substantially vertical axis in a substantially horizontal plane. Since the support means can be attached to the disc or plate members, rotation of the disc or plate member causes the support means to wind or unwind relative to the shaft.

[0048] Preferably position detection means are provided with the drive means, rotatable shaft and/or guide means so as to allow detection of the position, height or distance the support means, frame and/or housing have moved in use, thereby providing an indication of the position of the housing or object in vertical space. In one embodiment the means includes a tacho type device or a plurality of apertures defined on a peripheral edge of the guide means or disc and the number of apertures passing detection means are counted, thereby determining the degree of rotation of the guide means and thus the movement of the support means relative to the guide means.

[0049] In one embodiment at least part of the support means are arranged to move in a substantially vertical plane between the at least one object and the movement means or between the movement means and a surface to which the apparatus is attached to in use, and at least part of the support means are arranged to move in a substantially horizontal plane between the movement means and the drive means.

[0050] Preferably the motor is an electric motor and further preferably the motor is an encoded motor or has encoded processing means associated with the same. The encoded processing means allows one or more predetermined positions to be determined between which the at least first object can be moved and/or between which the apparatus can be moved. For example, the encoded motor or processing means determines the distance or distances the support means can move in use.

[0051] The at least one object can take any suitable form, such as for example, a mannequin, shop merchandise, lighting system, Christmas decorations, promotional material, advertisement, a frame, a platform, further movement or hoist apparatus and/or the like. In a preferred embodiment the at least one object is in the form of a frame on or from which shop merchandise can be attached or hung.

[0052] Preferably illumination means comprise or are associated with the at least one object and/or a frame or housing of the apparatus. For example the illumination means can include one or more lights.

[0053] Electrical connection means can be provided on the at least one object and/or frame or housing of the apparatus to allow an electrical supply to be provided to said object, one or more items located on said object, to said apparatus and/or the like.

[0054] In one embodiment an electrical cable recoil or folding system is associated with the hoist apparatus to allow electrical cable used on or with the at least one object and/or apparatus to move in a controlled manner in conjunction with the at least one object and/or apparatus. For example the electrical cable can be moved between extended and retracted or recoiled positions as the support means of the hoist are moved between extended and retracted or recoiled positions.

[0055] In one embodiment the electrical cabling is at least partially enclosed in or associated with a housing, such as for example a plastic housing. The housing is capable of articulation, can concertina and/or is flexible to allow said housing and thus the cabling associated therewith to be moved between extended and at least partially folded or collapsed conditions in a controlled manner.

[0056] In one embodiment the hoist apparatus is remote controlled using remote control means. However, due to health and safety requirements, a deadman switch is preferably associated with the hoist apparatus to allow control of the apparatus to prevent a person being injured as a result of the at least one object and/or apparatus being moved onto them.

[0057] Preferably a limit or stop switch is provided to prevent the apparatus from moving beyond pre-determined limits. For example, the limit switch can prevent the apparatus from moving too close to a surface to which it is attached, thereby preventing damage to said surface.

[0058] According to a second aspect of the present invention there is provided a method of using hoist apparatus, said hoist apparatus including support means for supporting at least a first object relative to the apparatus and/or supporting the apparatus relative to a surface in use, said method including moving said at least first object relative to the apparatus and/or moving the apparatus relative to a surface using drive means for driving movement of said support means, and wherein at least three separate support means are provided with said apparatus.

[0059] According to a further aspect of the present invention there is provided suspended display apparatus. The apparatus typically includes a hoist arrangement as hereinbefore described.

[0060] According to a yet further aspect of the present invention there is provide a method of using suspended display apparatus. The apparatus typically includes a hoist arrangement as hereinbefore described.

[0061] Two or more sets of hoist apparatus can be used together if required. The electrical systems of the two sets of apparatus can be hard wired together to allow activation of both sets simultaneously using single control means.

[0062] Embodiments of the present invention will now be described with reference to the accompanying figures, wherein:

Figure 1a is a simplified perspective view of hoist apparatus according to one embodiment of the present invention where an upper frame is fixed to a ceiling surface and a lower frame is movable relative to the upper frame in use;

Figure 1b is a simplified perspective view of hoist apparatus according to a second embodiment of the present invention where a frame is movable relative to a ceiling surface in use;

Figure 2 shows a plan view from above of a top frame of the hoist apparatus in one embodiment;

Figure 3a illustrates a detailed view of a disc forming part of the guide means in one embodiment;

Figure 3b illustrates a detailed side view of a stack of discs forming the guide means according to an embodiment of the present invention;

Figures 4a-4e illustrate the further components used to create the stack of discs in figure 3b;

Figure 5 shows a detailed side view of the motor and disc arrangement in one embodiment of the present invention;

Figure 6 illustrates components of a counting or tacho mechanism used with the apparatus in one embodiment of the present invention;

Figures 7a and 7b illustrate different positions of tensioning means used in one embodiment of the present invention;

Figure 8 is a simplified overview of the power supply arrangement for the apparatus in one embodiment of the present invention; and

Figures 9a and 9b show a side view and end view respectively of a cable reel system in one embodiment of the present invention.

[0063] Referring to the figures, there is illustrated hoist apparatus 2 for use in retail outlet for allowing merchandise to be loaded onto the apparatus in a first lowered position, and for the merchandise to be raised to a suitable position between the floor and ceiling in a second raised or suspended position. By allowing at least part of the apparatus to be moved between the lowered and raised positions, this allows the retail staff to load the merchandise onto the display without having to use access equipment, ladders and/or the like.

[0064] Referring firstly to figure 1a, the hoist apparatus 2 includes a first frame 4 which is fixedly attached to a ceiling of the retail outlet in use using suitable connection means, such as nuts and bolts for example (not shown), and at least a first object in the form of a second frame 6 which is movable relative to the first frame 4 and therefore the ceiling between raised and lowered positions. The merchandise is typically located on or associated with the second frame 6 in use.

[0065] The first and second frames 4, 6 can take any suitable form and can be any suitable size, shape and/or design. The frames can be formed from any suitable material, such as metal, wood, plastic, rubber and/or the like. The frames 4, 6 are typically formed so as to provide sufficient strength and rigidity to the apparatus structure.

[0066] In the illustrated example, first frame 4 is substantially rectangular in shape and has two side frame members 8, 10 and two end frame members 12, 14. A plurality of bracing members 16 are provided between the two side frame members to provide the frame with rigidity and strength. Second frame 6 is also substantially rectangular in shape, although it is to be noted it can be of a different size, shape and/or design to the first frame 4 if required, and includes two side frame members 17, 18 and two end frame members 20, 22.

[0067] Support means in the form of four elongate and substantially flexible wires 24, 26, 28, 30 are detachably attached to each corner 32, 34, 36, 38 of second frame 6 via suitable attachment means 40. For example, the attachment means 40 could be in the form of hooks.

[0068] Movement means in the form of rotatable pulleys 42 are provided in each corner 44, 46, 48, 50 of first frame 4. Each pulley has a recess or channel defined on an outer surface thereof and a wire 24, 26, 28, 30 is located over each corner pulley. The pulleys 42 rotate freely (and are non-powered) on movement of the wires over the same in use.

[0069] Drive means including an electric motor 52 is attached to central bracing member(s) 16 of first upper frame 4. Motor 52 is arranged substantially equidistant and centrally of the four pulleys 42. This allows the wires to be moved substantially simultaneously and by substantially equal amounts, thereby creating a smooth and even movement of the lower second frame 6 in use.

[0070] More particularly, the drive means includes a single upright rotatable shaft 54 which is driven to rotate by motor 52. The rotatable shaft can be provided in any position relative to the motor. Guide means in the form of five discs 56, 58, 60, 62, 64 are arranged in a stack. Each disc has an aperture 66 defined centrally therethrough and shaft 54 is located therethrough such that rotation of shaft 54 drives rotation of discs 56-64. Rotation of the discs and shaft in a clockwise direction moves the wires in one of an extended/lowered or retracted/raised position. Rotation of the discs and shaft in an anti-clockwise direction moves the wires in the other of an extended/lowered or retracted/raised position.

[0071] The discs are arranged co-axially with the apertures 66 arranged substantially parallel to the longitudinal axis of the shaft 54. Each disc is arranged a spaced distance apart to provide a gap 68 therebetween and this gap is sufficient to allow a single wire to be located therein and to be wound onto and unwound from the shaft in use. Thus a single wire 24, 26, 28, 30 is provided in each gap so that each wire is kept separate to the other wires to prevent tangling of the same. This adds to the smooth operation and movement of the present invention.

[0072] Since the wires 24-30 are separated from each other in a spaced vertical arrangement on the guide means, the height or length of the wires relative to the object being supported is therefore different at the guide means. To compensate for this, tensioning means 108 are associated with pulleys 42 as will be described in more detail below.

[0073] The motor is typically an encoded motor so that pre-determined limits of movement of the wires are preset in the apparatus. This ensures that the second frame 6 can only move within pre-determined limited relative to the first frame 4, thereby preventing the second frame 6 moving too close to first frame 4 or moving too far away from first frame 4 and hitting a floor surface which may cause damage to the same. Memory means can also be associated with the motor or motor processing means so that the apparatus remembers its current position and the upper and lower limits of movement even after a power failure.

[0074] Figure 6 illustrates one possible example of position detection means or tacho 105 that can be used with the present invention. The position detection means includes a disc 102 with a plurality of aperture 104 arranged equal spaced distances apart adjacent the peripheral edge 106 of the disc. The disc 102 rotates on rotation of the shaft 54 or driving of motor 52. Detection means are able to detect or count the number of apertures moving past the same in use, thereby determining the degree of rotation of the guide mean discs 56-64 and thus movement of the support wires 24-30 in use. The position of the disc 102 can be stored in memory of the apparatus so that further movement of the disc 102 can be detected and measured.

[0075] A deadman switch (not shown) is typically associated with the apparatus to allow a user to operate the motor. The user can typically use the switch to stop movement of the second frame 6 at any point between the lower and upper limits of movement suitable for allowing the user to load merchandise on to the second frame and to suspend the merchandise at a required height.

[0076] In use, the second frame 6 is typically moved from a presentation position, which is a raised or suspended position above the floor of the retail outlet, wherein the frame has merchandise or one or more other items attached to the same, to a loading position, which is a lowered position wherein a user can directly access the second frame from the floor surface without requiring special access equipment. In moving the frame 6 be-

tween the loading and presentation positions, the user actuates the deadman switch causing the motor to either wind the wires onto the discs or unwind the wires from the discs, thereby either shortening or lengthening the suspending length of the wires respectively.

[0077] The parts of the wires between the discs and the pulleys are arranged in a substantially horizontal plane and arranged to move at least partly horizontally and diagonally across the first frame 4. The parts of the wires between the pulleys and the second frame 6 are arranged in a substantially vertical plane and are arranged to move substantially vertically. Thus, on movement of the wires, at least part of a wire moves substantially perpendicularly to a remaining part of said wire.

[0078] In one embodiment the electric motor is a 24V motor which is capable of 4000 r.p.m. This can provide lifting and lowering speeds of the second frame 6 relative to the first frame 4 of between 15metres m/s to 45 metres m/s. This speed can be increased or decreased depending on the motor gearbox ratio selected.

[0079] In the illustrated example, each wire is typically approximately 8m long but it will be appreciated that the support means can be any suitable length depending on the application in which the hoist apparatus is to be used for.

[0080] Each wire end is fixed to a point on a disc or rotatable shaft so as to prevent the wires from completely unravelling from the disc during use. Any suitable fixing can be used.

[0081] Each pulley typically rotates about a substantially horizontal axis in the illustrations but any suitable pulley type of arrangement can be used.

[0082] The strength and rigidity of the hoist apparatus can be adjusted to ensure a suitable weight item or items can be moved using the same. For example, the illustrated example typically allows up to 150Kg of weight to be moved.

[0083] It will be appreciated that the upper frame could be in the form of a housing with a plurality of apertures defined in a lower surface thereof for the wires to be moved into and from the housing.

[0084] A plurality of hoist systems could be used side by side in premises or could be used individually or a spaced distance apart from each other.

[0085] Referring to figures 4a and 4b, there is illustrated an embodiment via which the end of the wire adjacent the motor is fixed to prevent uncoiling of the wire in use. The figures 4a and 4b show a large disc 70 and a small disc 72 respectively. The two discs 70, 72 are brought into abutting relationship in use, with the central apertures 74, 76 of each co-axially arranged for location of the rotatable shaft therethrough, to create each disc member 56-64 described above. An end of a wire is located between the two discs 70, 72 and is secured therebetween.

[0086] Figures 4c and 4d illustrate different views of an L-shaped bracket 78 used to support the stack of discs and the motor in use. Figure 4e is a top plan view of the stack of discs attached to the support bracket. End plates 80 are provided for each end of the disc stack.

[0087] In the above described embodiment (i.e. figure 1a) the upper frame 4 can be moved relative to the ceiling or surface to which the frame is attached to in use if required, in addition to movement of the lower frame 6 relative to the upper frame 4. Figure 1b shows a further embodiment wherein the apparatus includes an upper frame 4 but no lower frame 6 and said upper frame 4 is movable relative to a ceiling surface. In the embodiment in figure 1b, the motor 52 and movement means in the form of pulleys 42 are provided on the movable frame. The ends of the support wires opposite to the guide mean ends are connected to the ceiling. Movement of the upper frame allows user access to the upper frame for adjustment of the tensioning means 108, access to the motor 52, guide means 54-64 and/or the like. An upper stop (not shown) can be provided on the apparatus, such as for example on top of the motor. The upper stop can detect when a maximum height of the upper frame 4 has been reached relative to a ceiling or surface to which the upper frame is attached to prevent damage to the apparatus and/or ceiling. For example, the stop can be in the form of a switch that switches movement of the frame and/or apparatus off when the ceiling is detected. The switch in one embodiment includes a resilient protruding member which activates an electrical switch when the free end of the resilient protruding member makes contact with the ceiling.

[0088] Referring to figure 5, a mounting for the motor on the upper frame is shown in more detail. Two spaced apart angled brackets 110 are fixed to the sides of motor 52 at one end and the other end is fixed to a top surface of a further bracket 112. Further bracket 112 has the rotatable shaft 54 associated with the same and can also have the guide means associated therewith. Aperture and/or slots 114 are defined in brackets 110 and/or 112 so as to reduce the weight of the same.

[0089] Referring to figures 7a-7b there is illustrated tensioning means 108 for allowing adjustment of the position of the pulleys 42 relative to the frame 4 in use and thus adjustment of the tension and height of each support wire 24-40 relative to the other support wires 24-30. More particularly, in this illustrated embodiment three separate pulleys 116, 118, 120 are associated with each corner of frame 4. Tensioning means 108 in the form of two first bracket plates 122 are located either side of the pulleys and are fixed to frame 4. Two second bracket plates 126 are movably mounted to first bracket plates 122 at a first end 127 thereof via a tension nut 128 that is movably mounted in curved slot 124 located at a first end 129 of bracket plate 122. Tensioning bolt 130 and nut secure the position of end 127 of bracket plate 126 relative to first bracket plate 122. Second end 132 of bracket plate 126 is movably mounted in curved slot 134 defined in bracket 122. The middle pulley 118 is movably mounted with said bracket plate 126 in said slot 134 to allow pulley 118 to be moved between a lowered position, as shown

in figure 7a, and a raised position, as shown in figure 7b. It can be seen that adjustment of middle pulley 118 in slot 134 relative to pulleys 116, 120 alters the tension of wire 26. A plurality of apertures 136 can be defined in bracket 122 for the location of pulley 120 in different positions. Similar different position apertures can be defined in bracket 122 for the location of pulley 116 in different positions. Thus, the above described arrangement provides a passive tensioning pulley mount to allow adjustment in the height of the wire under frame 4. The position of any of the three pulleys can be adjusted to alter the wire tension.

[0090] Referring to figure 8, there is shown a simplified arrangement of the electrical elements of the apparatus in one embodiment. Motor 52 is located on frame 4 and tacho 105 is associated with motor 52. Both the motor and tacho are controlled by control unit 138 also located on frame 4. A height limit switch 140 is associated with frame 4 so as to prevent the frame from being raised too high and damaging the ceiling or surface to which frame 4 is attached in use. The switch 140 is activated once the frame 4 is moved a predetermined distance relative to the ceiling. This height limit switch can be of any suitable type. A self reeling power supply 142 is connected to a mains power supply 144 and to control unit 138. A user actuated operating panel 146 is provided that can communicate with the control unit 138 via wire or wireless means. "Up" and "down" switches 148, 150 are provided on operating panel 146 to allow a user to raise and lower frame 4 accordingly. The control unit typically includes memory storage means to store any data necessary to control the motor, tacho, operating panel, height limit switch and/or the like. An isolator switch 152 can be provided on control unit 138 to allow manual electrical isolation of the apparatus if required.

[0091] The self reeling power supply 142 supplies electrical current along electrical cable that is located within a self reeling articulated plastic housing. 154, as shown in figures 9a and b. The articulations of housing 154 allows the cable contained therein to be folded up on itself in lengths 156, 158 160 as shown by arrows 162 in figure 9, thereby allowing the housing and cable to be moved between extended and stored conditions without the cable becoming tangled or snagging. Guide means in the form of brackets 164, having a channel and an outwardly protruding open end, are provided to store the housing 154 therein on the frame when it is not in use or when not all the length of the housing and cabling is required.

[0092] It will be appreciated that the detailed drawings and accompanying description are only examples of embodiments of the present invention and any or any combination of the abovementioned features can be provided and still fall within the scope of the invention.

Claims

1. Hoist apparatus, said hoist apparatus for moving at least a first object relative to said apparatus and/or moving the apparatus relative to a surface, said hoist apparatus including support means for supporting said at least first object relative to the apparatus and/or the apparatus relative to a surface in use, and drive means for driving movement of said support means, **characterised in that** at least three separate support means are provided with said apparatus for supporting said at least first object and/or said apparatus.

2. Hoist apparatus according to claim 1 **characterised in that** the support means are movable between a first raised position and a second lowered position.

3. Hoist apparatus according to claim 1 **characterised in that** the support means are substantially flexible and can include any or any combination of one or more elongate cables, wires, tapes or chains.

4. Hoist apparatus according to claim 1 **characterised in that** attachment means are provided for attaching the at least first object to the apparatus and/or for attaching the apparatus to the surface, the attachment means including any or any combination of one or more hooks, clips, buckles, ties, hook and loop, nuts and bolts, screws, welding, friction fit or inter-engaging members.

5. Hoist apparatus according to claim 1 **characterised in that** movement means are provided for allowing or increasing the ease with which the support means can move in use, said movement means including any or any combination of one or more pulleys, rotatable members, drums or channelled members.

6. Hoist apparatus according to claim 5 **characterised in that** tensioning means are provided to allow the tension of one or more support means to be adjustable relative to the other support means by allowing movement of the movement means.

7. Hoist apparatus according to claim 1 **characterised in that** the drive means are provided substantially centrally or equidistant of the at least three support means.

8. Hoist apparatus according to claim 1 **characterised in that** the drive means includes a motor driving rotation of a rotatable shaft, the rotatable shaft driving movement of the support means between wound and unwound positions.

9. Hoist apparatus according to claim 8 **characterised in that** guide means are associated with the rotatable shaft and said guide means are arranged so as to keep each of the support means a spaced distance apart from each other in use.

10. Hoist apparatus according to claim 9 **characterised in that** the guide means include a plurality of discs mounted on the rotatable shaft, said discs provided a spaced distance apart with a channel or recess defined between said discs and a support means movable between wound or unwound positions within each channel or recess.

11. Hoist apparatus according to claim 1 **characterised in that** an electrical cable recoil system is associated with the apparatus to allow electrical cable used on or with the at least one object or apparatus to be moved in a controlled manner.

12. Hoist apparatus according to claim 1 **characterised in that** a limit or stop switch are provided to limit movement of the apparatus and/or at least first object between pre-determined limits.

13. Hoist apparatus according to claim 1 **characterised in that** at least part of the support means are arranged to move in a substantially vertical plane between the at least one object and movement means associated with the support means or between the movement means and a surface to which the apparatus is attached to in use, and at least part of the support means are arranged to move in a substantially horizontal plane between the movement means and the drive means.

14. Hoist apparatus according to claim 1 **characterised in that** position detection means are provided to allow detection of the position, distance or height the support means, frame and/or housing have moved in use.

15. A method of using hoist apparatus, said hoist apparatus including support means for supporting at least a first object relative to the apparatus and/or supporting the apparatus relative to a surface in use, said method including moving said at least first object relative to the apparatus and/or moving the apparatus relative to a surface using drive means for driving movement of said support means, and wherein at least three separate support means are provided with said apparatus.

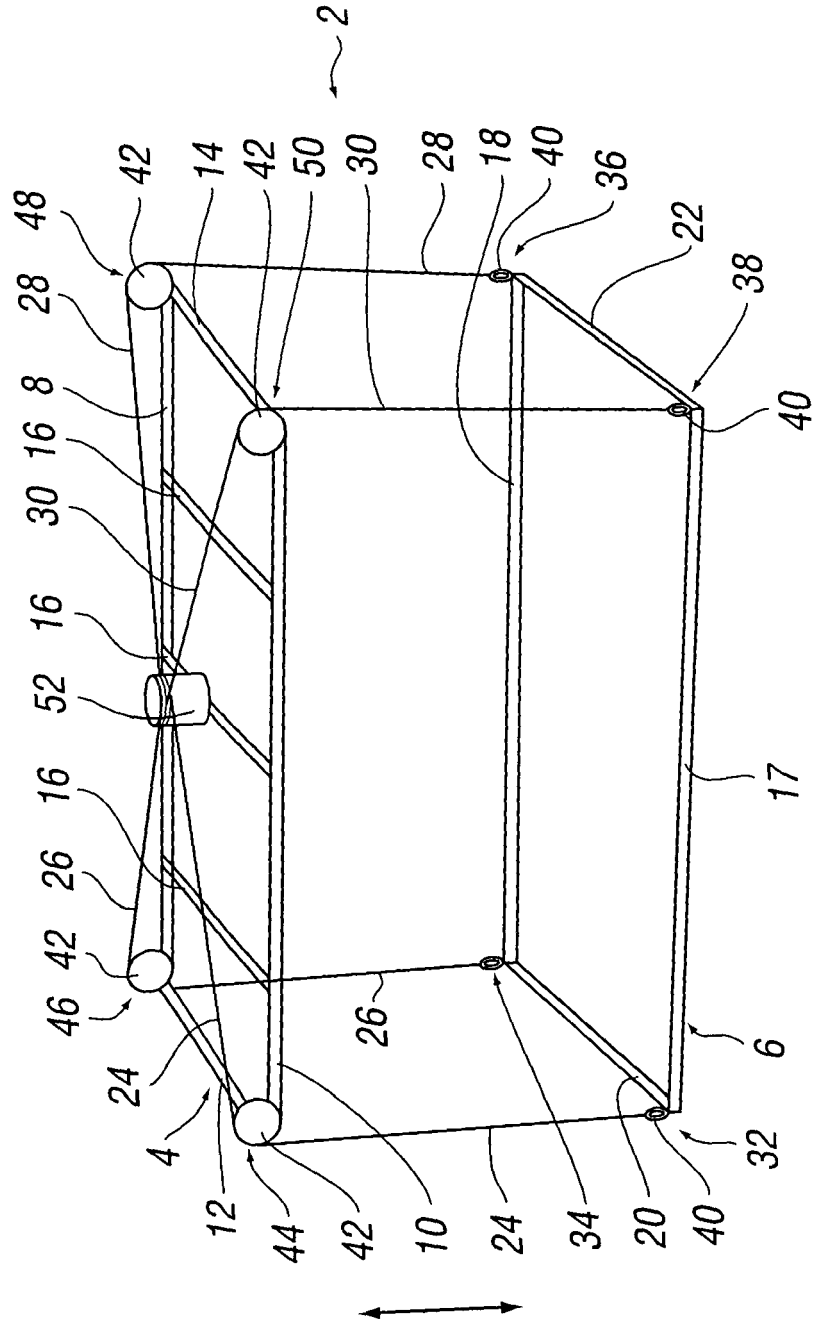
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FIG. 1a

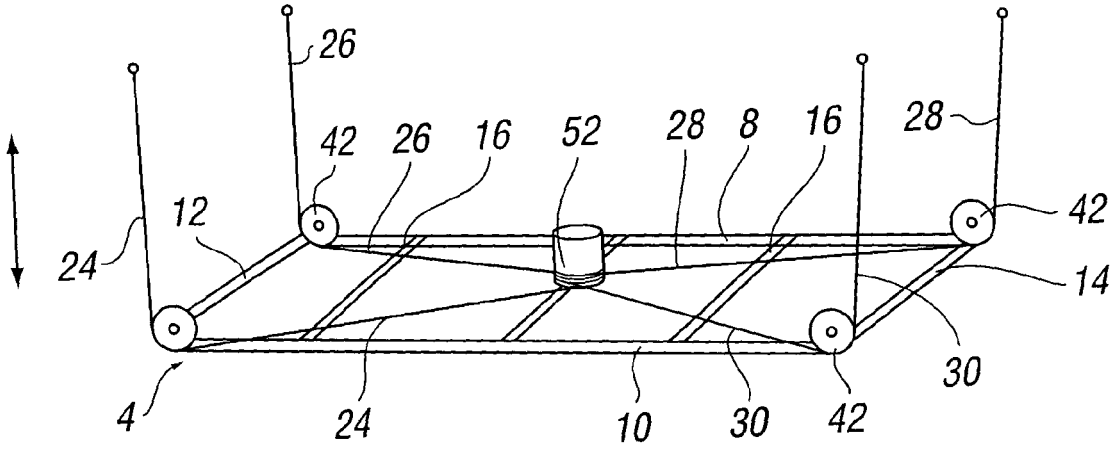

FIG. 1b

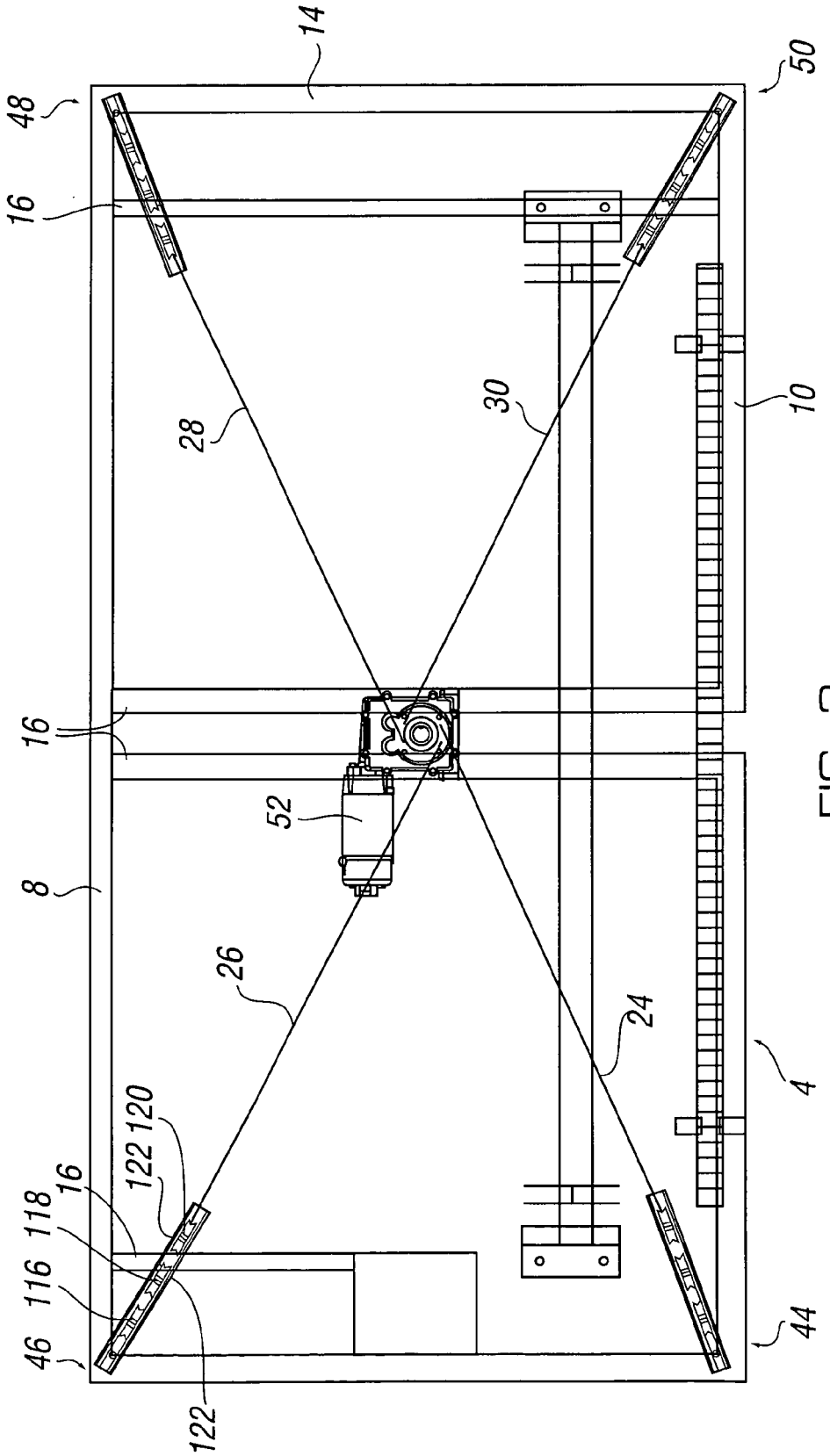

FIG. 2

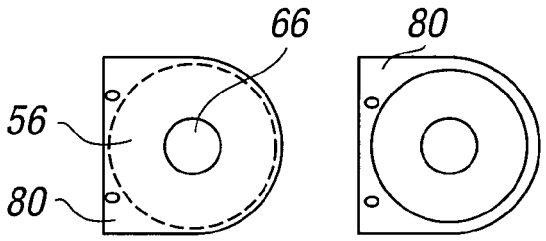

FIG. 3a

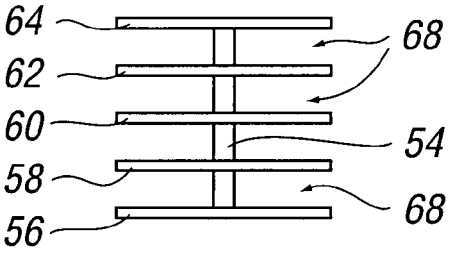

FIG. 3b

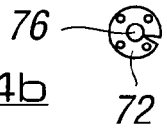

FIG. 4b

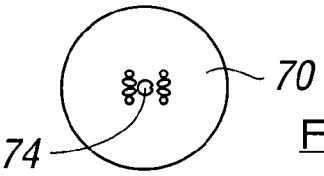

FIG. 4a

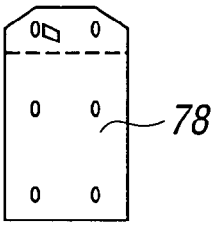

FIG. 4c

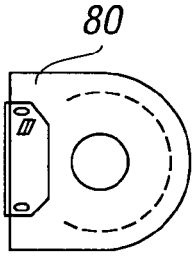

FIG. 4e

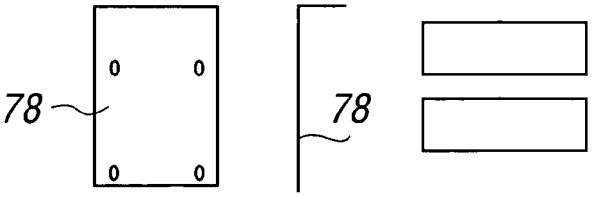

FIG. 4d

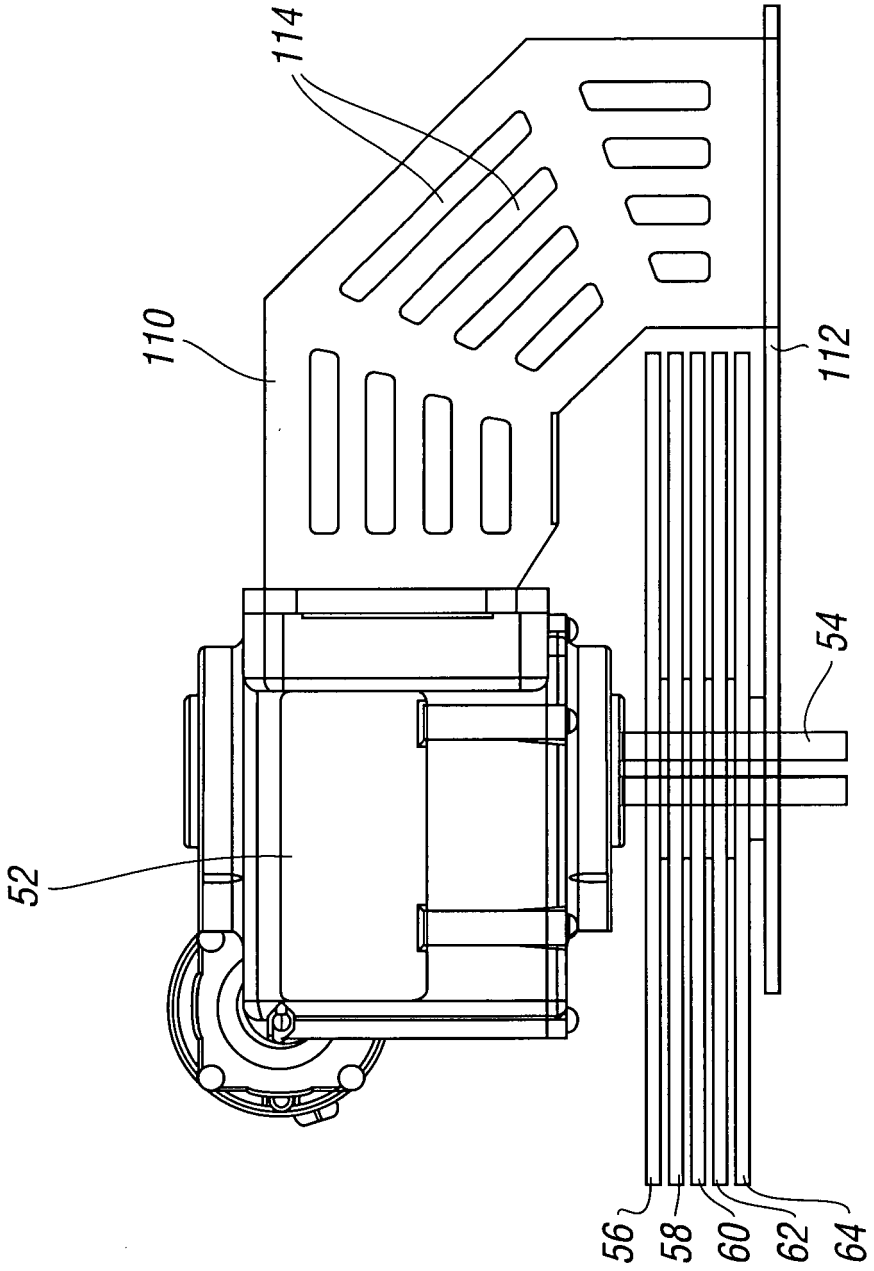

FIG. 5

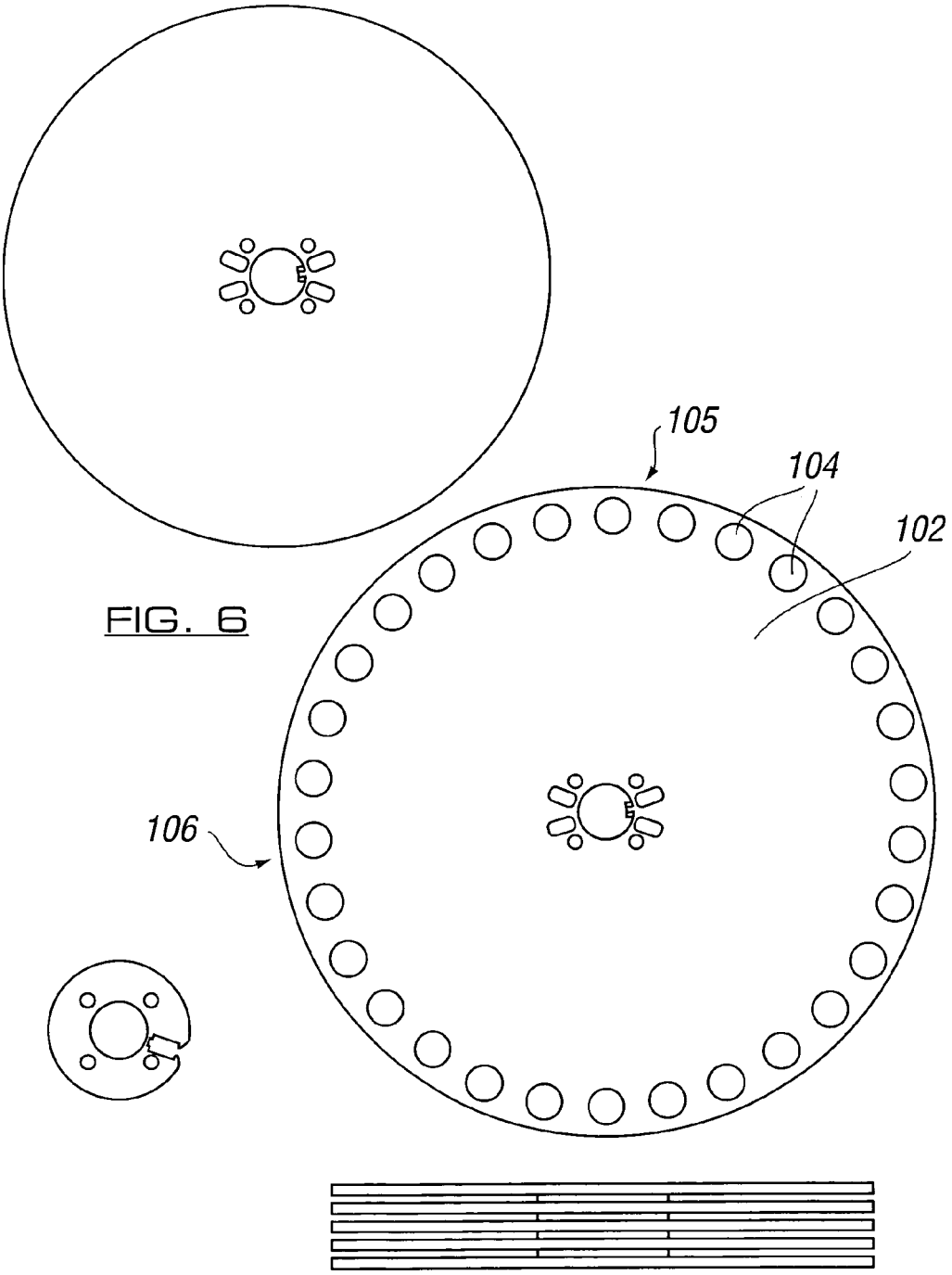

FIG. 6

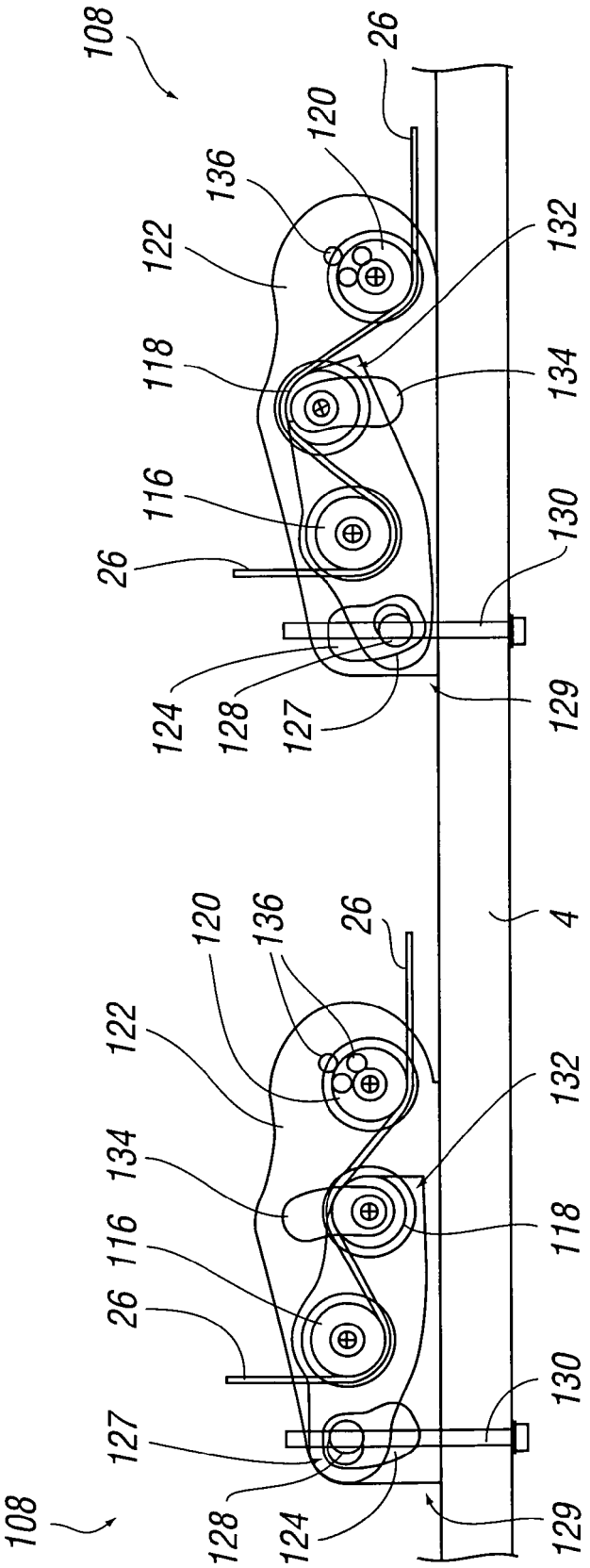
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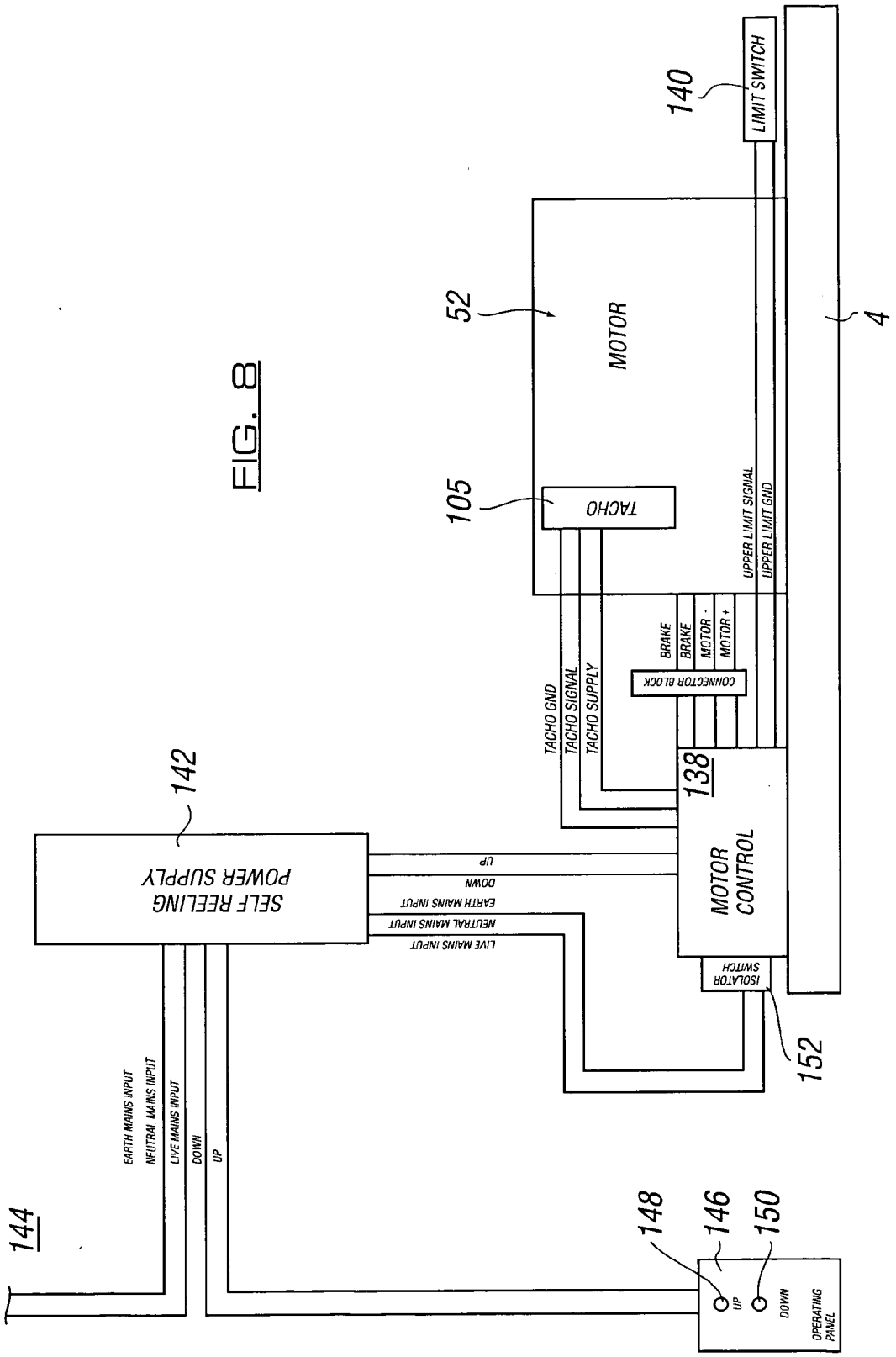
FIG. 7b

FIG. 7a

FIG. 8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MOTOR
4
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UPPER LIMIT SIGNAL
UPPER LIMIT GND
BRAKE
BRAKE
MOTOR -
MOTOR +
CONNECTOR BLOCK
TACHO GND
TACHO SIGNAL
TACHO SUPPLY
138
MOTOR CONTROL
142
SELF REELING POWER SUPPLY
UP
DOWN
EARTH MAINS INPUT
NEUTRAL MAINS INPUT
LIVE MAINS INPUT
ISOLATOR SWITCH
152
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NEUTRAL MAINS INPUT
LIVE MAINS INPUT
DOWN
UP
148
146
150
UP
DOWN
OPERATING PANEL

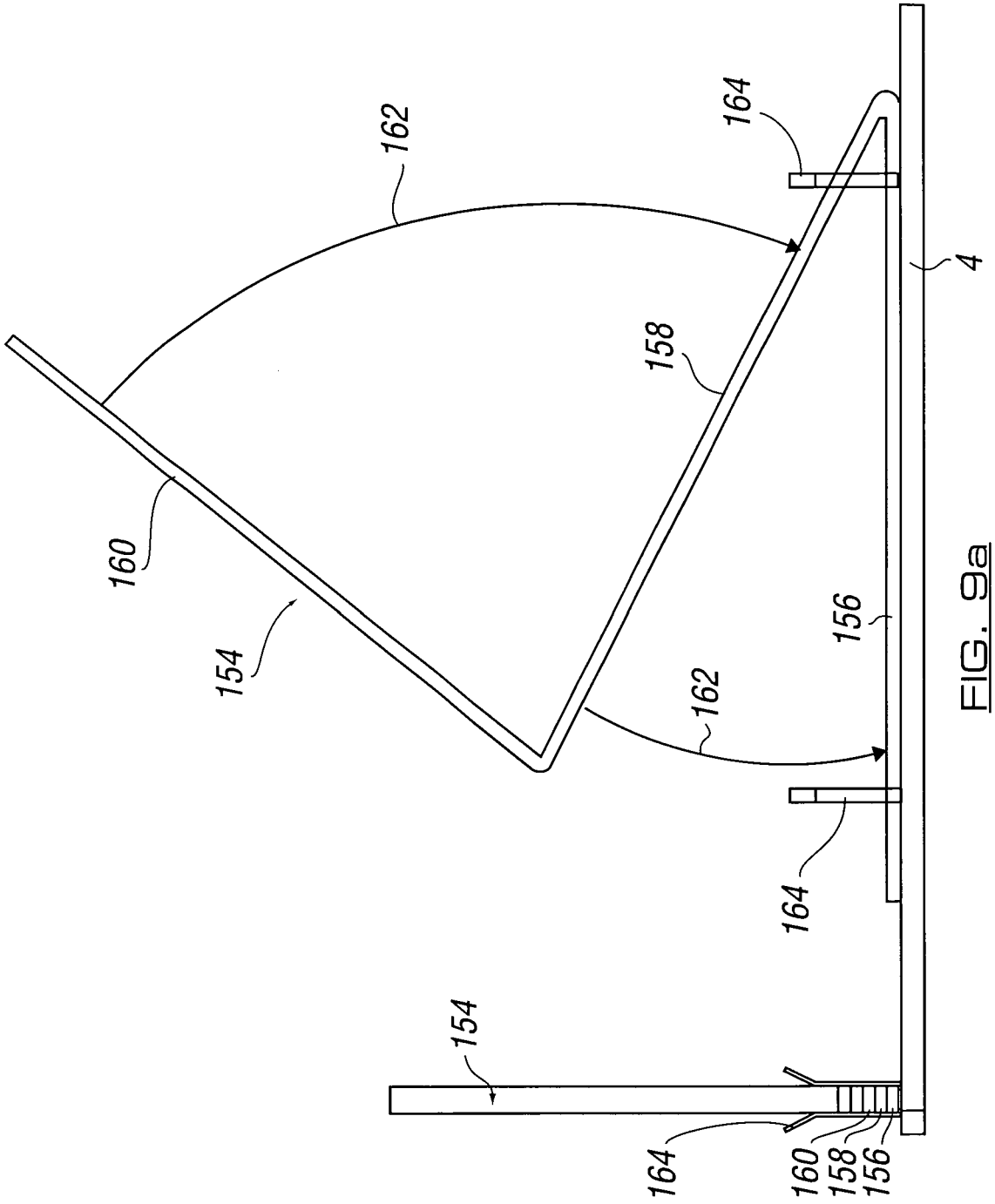

FIG. 9a

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EUROPEAN SEARCH REPORT

Application Number
EP 10 16 3400

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 September 2010	Rupcic, Zoran

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Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT

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			TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 September 2010	Rupcic, Zoran

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