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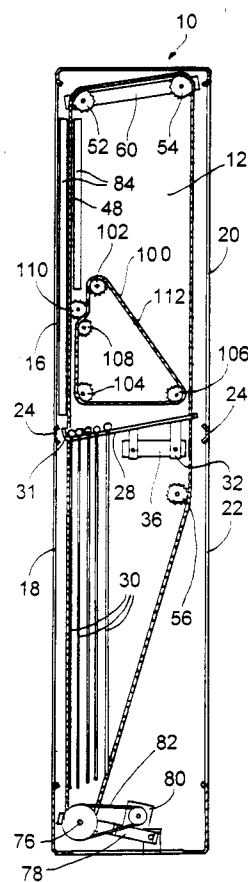
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(54) **Multiple image display device.**

(57) Several image-holding panels, having running rollers at their upper corners, rest with the rollers upon parallel running tracks that are inclined from an input end to an output end. A transfer device, which may be a chain, collects the panel which arrives in turn by gravity to the output end of the magazine and transfers it to the input end of the same or of another magazine.

**Fig. 2****EP 0 643 379 A1**

This invention is concerned with an image display device, particularly for advertising images, such as bills for newspapers and magazines in newsstands, product publicity in supermarkets and stores, advertising messages and program information in banks, sports grounds, airports and railways stations, open-air events and similar situations.

Traditionally, advertising and other communication in situations such as mentioned above are delivered to the public by displaying posters, bills and the like, which are posted on free wall areas on commercial premises. However, as the quantity of information to be presented to the public increases, often in connection with the development of commercial services, the display area is often insufficient. Moreover, even where it is possible to post all the desired bills on the wall, the messages, because of overcrowding, have little effectiveness in capturing the attention of the public.

In order to display several bills or posters in one area, it is known to use image display devices which periodically change their message. For instance, a display device is known where the image to be displayed is cut in strips which are affixed to homologous side surfaces of respective, rotatable, prism-shaped rods, which are set side-by-side and are rotated together at intervals. With triangular prisms, where each face bears a strip from a different image, three different images can therefore be displayed. However, this type of display can be used in practice only for semipermanent presentations, lasting, say, weeks or months, because changing the images is obviously time-consuming and toilsome, and requires a trained worker. Moreover, this display device is limited to a program of two or three images.

In another multiple display device, a set of bills or posters are attached to one another in a loop and are moved intermittently along a display window. This display device also requires the work of a trained person at all changes of an image, and the replacement is, in any case, a time-consuming operation, where the loop must be advanced to the desired place, the images must be disconnected and the loop must again be restored, and so on.

In any case, even in the latter image display device of the prior art, the number of images that can be scanned is quite limited. Accordingly, the main object of the invention is to provide a multiple image display device which can present to the public in succession a considerable number of images, particularly standard bills or posters, and in which it is quick and easy to change one or more bills.

Another object is to provide the above image display device so that it can be manufactured at a low cost, without a need for expensive fixtures and with high tolerance to defects and inaccuracies in

dimensions and positioning.

The above objects, as well as other objects and advantages that will appear from the disclosure, are achieved by the invention with a multiple image display device, comprising:

- a) a plurality of image-holding panels, bearing running rollers at their upper, opposite corners and respective projections extending beyond said rollers;
- b) one or more magazines for said panels, which comprise respective pairs of parallel, running tracks at a mutual distance equal to the distance between said rollers, each pair being inclined from a high input end to a low output end of the magazine, the opposite rollers of said panels resting on said tracks and running by gravity towards the output;
- c) a transferral device, driven by timed motor means, adapted to hook the opposite projections of panels located at the output of each magazine and to transfer said panels to the input of a magazine.

The invention will now be described in more detail, with reference to preferred embodiments which are shown in the attached drawings, given by way of illustrative, nonlimiting example, and wherein:

- Fig. 1 is a front view of a image display device according to a first preferred embodiment of the invention;
- Fig. 2 is a vertical cross-section, made along line II of Fig. 1;
- Fig. 3 is a front view, on an enlarged scale, of a detail of Fig. 1, showing an upper corner of an image-holding panel, hooked on a hooking pin, in a first position;
- Fig. 4 is a view similar to Fig. 3, with the hooking pin in a second position;
- Fig. 5 is an end view of the detail of Fig. 3;
- Fig. 6 is a view, partially broken away and on an enlarged scale, of another detail of Fig. 1;
- Fig. 7 is a front view of a couplig plate of Fig. 6, on a reduced scale;
- Fig. 8 is a view similar to Fig. 2, for a second preferred embodiment of an image display device according to the invention; and
- Fig. 9 is a view in transverse cross-section made along line IX of Fig. 8.

With reference to Figs. 1 and 2, an image display device according to a first preferred embodiment of the invention comprises a cabinet 10, laterally closed by vertical walls 12, 14 and having, on its two opposite fronts, rectangular windows 16, 18, 20, 22, which are superposed in pairs which are divided by respective horizontal bars such as 24. The cabinet is preferably made of bent and welded metal sheet.

Parallel running tracks, comprising straight, inclined cylindrical rods 26, 28 have their lower ends bent squarely in 31 to form abutments, and are attached at midheight to side walls 12, 14, respectively. Several image-holding panels 30, described below with reference to Fig. 3 to 5, are hung to tracks 26, 28. For fastening to the walls, the rods forming running tracks 26, 28 are provided with welded brackets such as 32, 34, having holes through which they are bolted to channel- or box-shaped sections 36, 38, which in turn are welded to the walls.

The holes of at least one of the brackets, say 34, are made as slots (not visible in the Figures) so that the position of the associated running track can be adjusted in a vertical and a horizontal direction, within a range of 1 or 2 centimeters. With this provision, the tracks 26, 28 can be aligned with precision, in spite of even large errors from the nominal reference positions on the walls, due to manufacturing tolerances of cabinet 10.

As shown on Figs. 3 to 5, an image-holding panel 30 comprises a rectangular plate 38 of metal sheet or other material, e.g. of a synthetic material, which is welded or bonded on one side to a tubular staff 40 which projects on opposite sides beyond the profile of plate 38 in the shape of stubs such as 42, having their ends partially undercut to form downward-pointing recesses 44. The stubs 42 bear respective rollers 46, each having a peripheral groove, and each being held axially between the corner of plate 38 and a retaining screw 47. The opposite sides of plate 38 are adapted for holding bills or posters, which are attached with clips, nails, magnetic pieces or other known means. Each panel 30 rests with both rollers 46 on opposite running tracks 26, 28, and the gravity force pushes all panels 30 in a stack against abutments 31.

Two loop-linked chains 48, 50, running on gearwheels 52, 54, 56, 58 extend along side walls 12, 14, inside the walls and outside running tracks 26, 28, with two vertical spans of which one is aligned with tubular staff 36 of the panel which is adjacent to abutments 31, the other with the opposite end of the running track. Gearwheels 52, 54, 56 on both side walls are idle, and are mounted by means of bearings on stationary pins (not visible in the Figures) projecting inwardly from brackets which are generally channel irons 60 welded to the wall.

For supporting gearwheels 52 and 54 on wall 14, as shown on Figs. 6 and 7, a rectangular plate 62, welded to the wall, has five threaded bores in which respective screws 64 are engaged to attach an adjustable plate 66 to plate 62, the adjustable plate having five corresponding slots 68, where the adjustable plate can be adjusted in height in a wide range. Adjustable plate 66 carries two welded,

threaded pins 70, which in turn carry respective beings 74, fastened with nuts 72. The gearwheels are welded to the outside track of each bearing 74. Nuts 72 allow the axial position of gearwheels 52, 54 to be adjusted independently of each other.

Gearwheels 58, i.e. the driving wheels of the respective chains, are keyed on a common transverse shaft 76, which is rotatably mounted on a pivoted frame 78 and is driven by an electric motor 80, mounted on the same frame, by means of a transmission 82. The frame is pivoted to brackets carried by a bedplate, preferably by means of damping blocks, and is kept under tension by stretching means not shown.

The chains are partly guided by chain-confining pads such as 84, which consist in laths of a frictionless material fastened to the walls, whereby the chain is accurately positioned. At intervals along both chains 48, 50, pins 90 project inwardly and, during their rising motion, hook (see Fig. 3) the recesses borne by the stubs of the panel 30 that happens to be resting against abutments 31. The panel is therefore lifted vertically along the window and then moved across to the opposite window, and finally lowered until it comes to rest at the high end of the running tracks. Motore 80 runs intermittently, preferably under control of one or more position detectors, such as microswitches not shown, so that the panels will halt in positions at register with the windows.

The image display device of the invention further includes a third, auxiliary chain 100, which is arranged on a side wall 12 of the cabinet, in a substantially triangular loop, having a vertically descending span along the ascending span of chain 48 and a horizontal span which is substantially parallel to running track 26. Auxiliary chain 100 is carried on three idle gearwheels 102, 104, 106, with a chain-stretching sprocket 108. An intermediate gearwheel 110 trasmits motion from chain 48 to the auxiliary chain, whereby the latter will move in a direction opposite to the former.

One of the links of auxiliary chain 100 carries a pin 112, projecting inwardly, and synchronized with pins 90 of chains 48 and 50 so that it will run along the inner side of a panel during its rise in the vertical span and then follows the panel during its transverse movement, thus preventing the panel from jolting or swinging under the dynamic forces in transfer, which would be unpleasant to the sight. The gearwheel 106 at the back is axially displaced outwardly with respect to the vertical plane of the other gearwheels 102, 104, so that pin 112 will progressively move away from the panel over the horizontal span, until the panel is completely disengaged at the end of its horizontal movement.

Preferably, according to the invention, the upper idle gearwheels 52 and 54 of main chains 48,

50 are closer to their mates on the opposite wall than both driving wheels 58, so that the chain-confining laths correspondingly converge. Consequently, both chains will converge upwards in the rising span, and diverge downwardly on the opposite side of the cabinet. The distance is chosen so that the ends of pins 90, which project from the chains for a length larger than the length of recesses 44, will at first hook the recesses alone (see approaching step on Fig. 3) and then, as the chain rises in the rising span, the pins will move into the tubular portion of the stubs (Fig. 4), subsequently diverging again in the descending span, where the panel again rests with the recesses only, so that the panel can be dropped and unhooked on the running tracks.

Without the above arrangement, in case of defective leveling of cabinet 10 or defective alignment between opposite gearwheels (particularly the upper ones, 52 and 54) which would cause the upper edge of the panel to slant slightly, the panel might slip sideways on the opposite hooking pins, and possibly become disengaged. Because of the above arrangement, however, the upper staff of the panel is confined between the chains and cannot become disengaged in any case. Accordingly, the image display device of the invention can be installed on a ground or floor that is only roughly horizontal, without having to level the cabinet with a water level, as would be necessary otherwise.

In conclusion, the image display device of the invention can be manufactured with cheap techniques of metal carpentry, rather than with precision machining. For instance, the cabinet is made with metal sheet that is cut in shears and bent in a bending press, and the parts are welded by spot welding, with tolerances in the range of one centimeter; plates and brackets are welded to the side wall of the cabinet as disclosed above, also with wide tolerances, since any misalignments can be adjusted during assembly, by means of the slot mounts mentioned above.

Finally, any small defects of alignments or leveling of the cabinet on the ground can be tolerated because, as shown above, they do not cause malfunction.

The image display device described above and shown on Figs. 1 to 7 is provided, as a rule, of fixtures such as timers for controlling the movement of the panels, which will usually be arranged in the base of the cabinet, microswitches acting as position detectors, arranged in predetermined, crucial points in the path of the panels, program or operating mode selectors, lighting lamps, e.g. tube lamps arranged on the sides of the windows, and the like. These fixtures are neither shown in the Figures nor described above, either because they

are not essential to the invention or because they are obvious for the person skilled in the art.

With reference to Figs. 8 and 9, a second preferred embodiment of the invention will now be described. The image display device comprises a cabinet 210 similar to cabinet 10 of Figs. 1 to 7, which is provided with windows similar to those of the first embodiment, and which are not shown here for better clarity of the drawings. In this case, two pairs of running tracks 220, 220' are arranged in cabinet 210, having a function similar to tracks 20 of Figs. 1 to 7, but here consisting of channels arranged vertically one above the other and having opposite inclinations one to the other, so that two vertically superposed magazines are formed. To each of the two pairs of tracks 220, 220', similarly to the first embodiment, respective image-holding panels 226 are hooked (only a few are shown), which have rollers 234 for running on said channels. In contrast to the first embodiment, tracks 220, 220' are not closed at their output ends. along the opposite ends of tracks 220 vertical guides 280, 282 are arranged, wherein respective slides 284, 286 are received, extending up to the respective input and output ends of the tracks, whereby they act as slidable abutments for the opposite ends of the panel staffs which are stacked in the magazines. The four slides 284, 286 hang at opposite ends of two respective chain lengths 288, which run on gearwheels 290, the latter being rotatably mounted at the upper corners of cabinet 210. An electric motor 252 is adapted to drive chains 288 and so to move slides 284, 286 alternately up and down, by means of a toothed-belt drive 250, similarly to Fig. 1.

The slides have, near their tops, respective seats 292, 294, made as lateral cutouts, which in their low position (for slides 284) or in their high position (for slides 286) are aligned with the output of the associated tracks for receiving the ends of the panel staff which is lowest in the stack. To this end, guides 280, 282 have respective interruptions immediately above tracks 220.

The panel rollers rest on tracks 220, running by gravity toward the output of the magazine. In the position shown on Fig. 8, the lower end of slide 284 shuts the output of the lower magazine, thus holding the stack of panels 226. The output of the upper magazine, on the other hand, is shut by a shutter 296, which is aligned with slide 286. Shutter 292 is freely slidable and, when the associated slide 286 is lowered, it falls to shut the output of the upper magazine, being retained by a tooth abutting against a nose 298. When slide 286 rises again, its top pushes shutter 296 upwards, and seat 294 of slide 286 can therefore align with the output of the magazine.

It can be seen that, by anternate rotation of motor 252 in either direction, slides 284, 286 have an up-and-down motion. At each rise, slides 284 collect a panel at the output of the lower magazine 220 and carry it to the input of upper magazine 220', while, at the same time, slides 286 carry a panel from the output of upper magazine 220' to the input of lower magazine 220. Therefore all the panels follow a repeating path, which takes them in turn with both faces in front of each window.

For the same size, the embodiment of Figs. 8 and 9 will manage twice the number of panels of the first embodiment.

The second embodiment is also equipped with fixtures such as detectors, timers, etc. (not shown), similarly to the first embodiment.

Preferred embodiments of the invention have been disclosed, but other changes are feasible within the scope of the invention. The number of magazines, of display windows, of image-holding panels, as well as the size of the panels and of the cabinet may change. The hooking pins engaging recesses in the panel staff might be replaced with other kinds of interlocking members. Further, the panel-transferring device for moving the panels from the outputs to the inputs of the magazines, which in the preferred embodiments is made of chains with hooking pins or slides, might be implemented in other shapes, such as with ropes, links, levers, etc. For instance, transfer slides 84, 86, rather than being driven by alternating chains, might be moved by means of linear drives such as pneumatic cylinders, etc. Moreover, the windows might be made only on one wall of the cabinet, rather than on two opposite walls.

## Claims

1. A multiple image display device, characterized in that it comprises:
  - a) a plurality of image-holding panels, bearing running rollers at their upper, opposite corners and respective projections extending beyond said rollers;
  - b) one or more magazines for said panels, which comprise respective pairs of parallel running tracks at a mutual distance equal to the distance between said rollers, each pair being inclined from a high input end to a low output end of the magazine, the opposite rollers of said panels lying on said tracks and running by gravity towards the output;
  - c) a transferral device, driven by timed motor means, adapted to hook the opposite projections of panels located at the output of each magazine and to transfer said panels to the input of a magazine.
2. The image display device of claim 1, characterized in that it comprises a single magazine comprising a single pair of inclined running tracks.
3. The image display device of claim 1, characterized in that said running tracks have an abutment for the rollers of said image-holding panels at the output end of the magazine, and in that said transferring device comprises a pair of main chains in respective loops lying in parallel, vertical planes at the sides of said magazine, driven by motor means, and bearing at intervals hooking members passing externally along the input and output of said magazine for hooking the projections of a panel hanging at the output of said magazine while the main chain moves upwards, and for laying a panel at the input of said magazine while the main chain moves downwards.
4. The image display device of claim 3, characterized in that said running tracks comprise cylindrical rods and said rollers have a peripheral groove for engagement therewith.
5. The image display device of claim 3 or 4, characterized in that said projections have respective recesses pointing downward and said hooking members are pins projecting inwardly from the main chains to engage said recesses.
6. The image display device of claim 5, characterized in that the vertical spans of the main chains extend from a lower wheel to an upper wheel, respectively, that said upper wheels are closer to each other than said lower wheels, that each of said projections has a tubular portion adjacent to the recess, and that said pins are longer than said recesses in the projections, so that they will partially penetrate said tubular portions thereof.
7. The image display device of one of claims 3 to 6, characterized in that it further comprises an auxiliary, loop-linked chain, running on gearwheels adjacent to one of said side walls of the cabinet, the auxiliary chain having a span parallel to the rising branch of the adjacent main chain in the area above said running tracks, and having an inwardly projecting pin, and being driven synchronously and in contrary direction with said main chain, whereby said pin acts as an abutment against swinging of the panel while it is lifted by the main chain.
8. The image display device of claim 7, characterized in that an idle gearwheel is arranged

between the adjacent vertical spans of the auxiliary chain and of the adjacent main chain and engages both chains, whereby motion is transmitted from the main chain to the auxiliary chain.

9. The image display device of claim 7 or 8, characterized in that an said auxiliary chain further has a substantially horizontal span, whereby its pin accompanies the horizontal transfer of the panel. 10
10. The image display device of claim 9, characterized in that the substantially horizontal span of the auxiliary chain diverges from the vertical plane of the running track, whereby its pin moves out to disengage the panel at the end of its horizontal travel. 15
11. The image display device of one of claims 7 to 10, characterized in that the upper gearwheels of said main chains are rotatably supported on stationary pins projecting from a coupling plate having slot apertures by which the @contropiastra@ is bolted in an adjustable position on a plate attached to the cabinet wall. 20 25
12. The image display device of one of claims 5 to 11, characterized in that each of said cylindrical rods forming the running tracks is provided with integral brackets having slot apertures for screw attachment in an adjustable position to a member integral with the side wall. 30 35
13. The image display device of claim 11 or 12, characterized in that the cabinet is made of metal sheets welded to one another, and that said plates and said track-mounting members are welded to the side walls. 40
14. The image display device of one of claims 2 to 13, characterized in that one of the supporting gearwheels of each of both main chains is a driving wheel and in that both driving wheels are integral with a single shaft extending transversely between the opposite side walls of the cabinet and being driven by an electric motor. 45
15. The image display device of claim 14, characterized in that the shaft and the motor are mounted on a rigid frame that is pivoted to the cabinet along a horizontal transverse axis, and biased by traction means to maintain the main chains under tension. 50 55
16. The image display device of claim 15, characterized in that the pivoting axis of said frame

is near the base of the cabinet.

17. The image display device of one of claims 3 to 16, characterized in that said main chains are guided between chain-confining laths at least along their vertical spans.
18. The image display device of claim 1, characterized in that it comprises two magazines, each comprising a pair of inclined tracks, one magazine lying beneath the other and having an inclination opposite to the other, and in that said transfer device comprises slides provided with respective seats for receiving the projections of said image-holding panels and vertically slidable from the input of one magazine to the output of the other magazine, respectively, whereby panels are transferred from the output of each magazine to the input of the other magazine, and shutter means for shutting the outputs of the magazines in coordination with the movement of the slides.
19. The image display device of claim 18, characterized in that said shutter means comprise, for the slides which transfer the panel from the upper to the lower magazine, respective projections of the slides beneath the reception seats, which are as long as the distance from the input of the upper magazine to the output of the lower magazine.

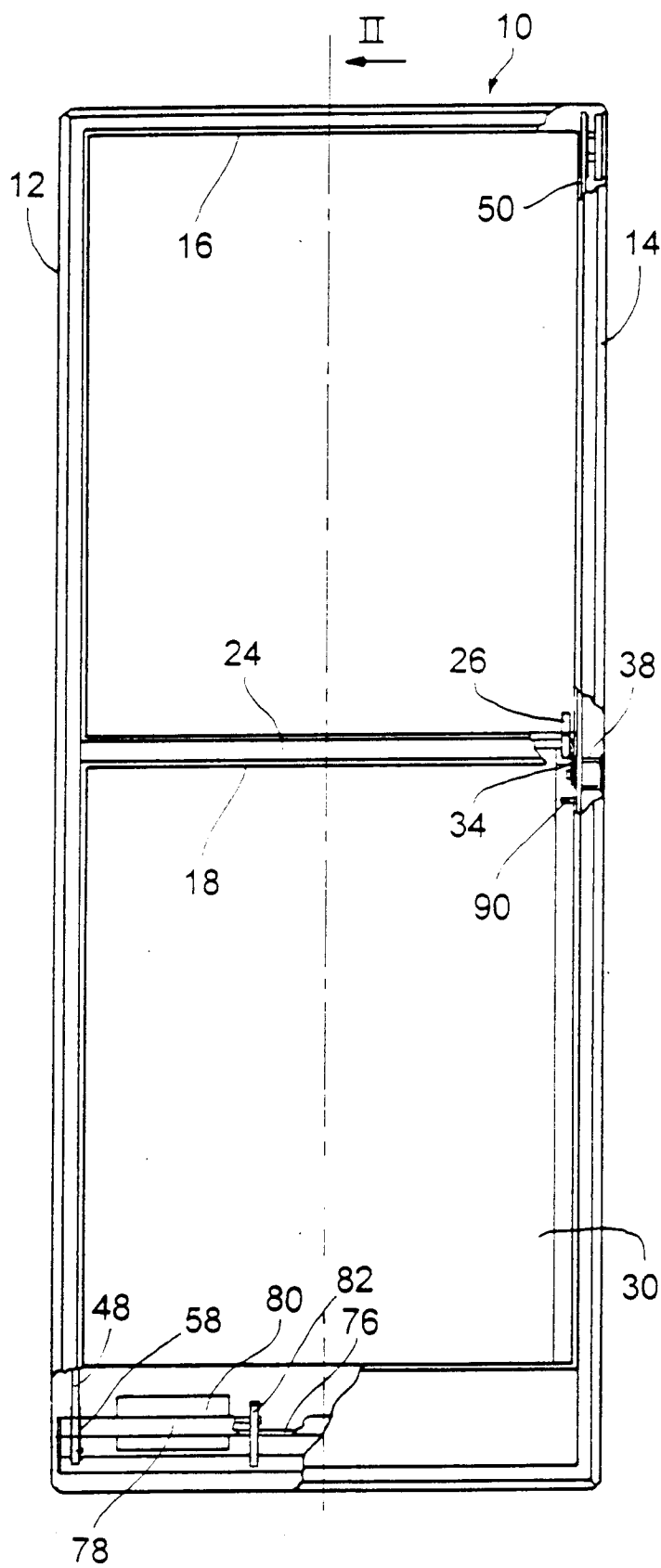


Fig. 1

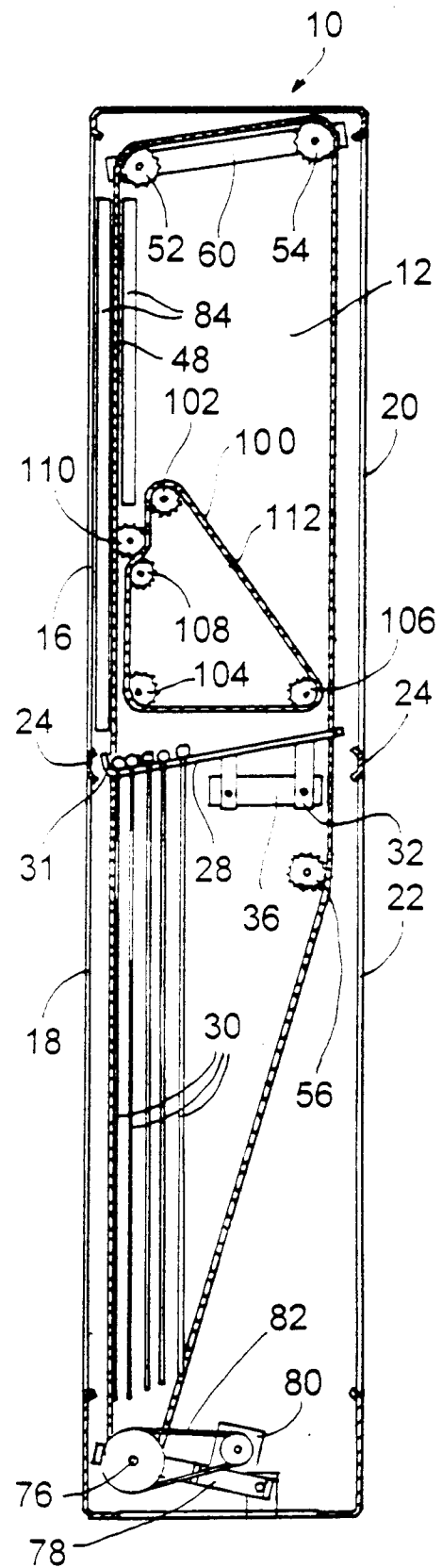


Fig. 2

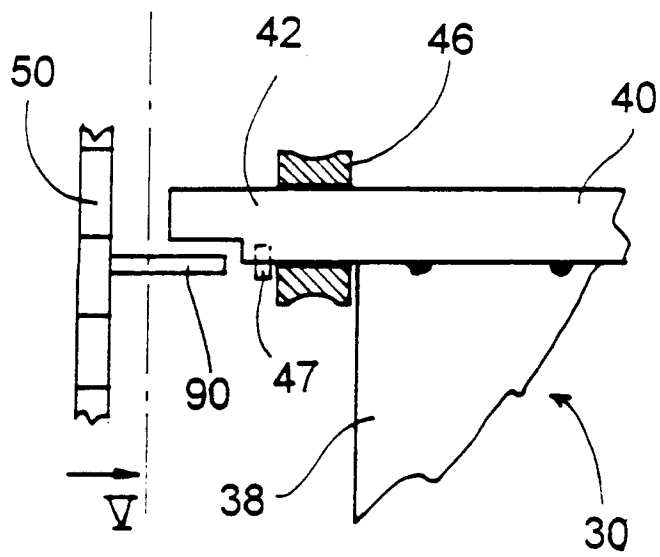


Fig. 3

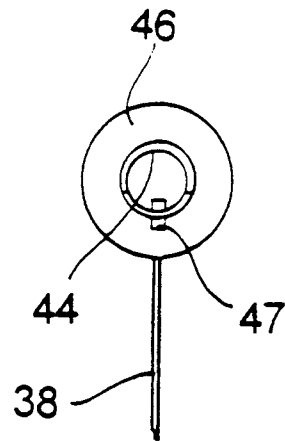


Fig. 5

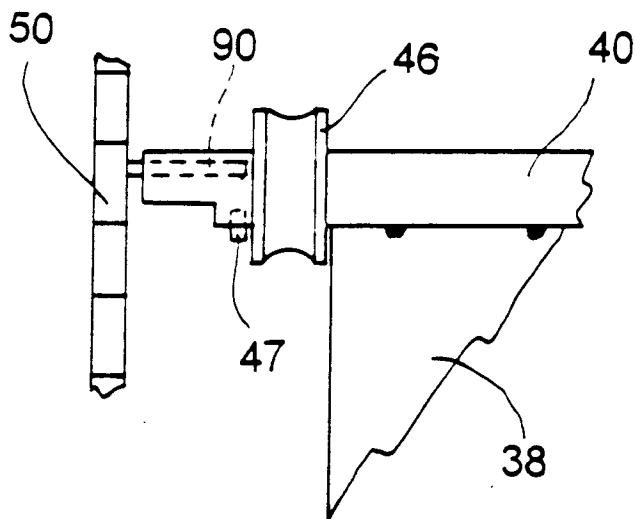


Fig. 4

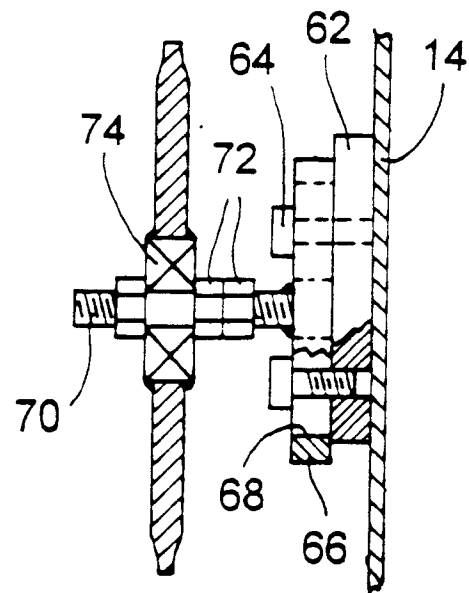


Fig. 6

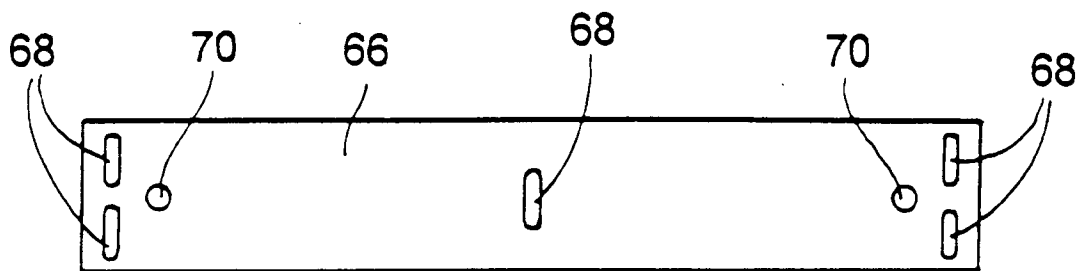


Fig. 7



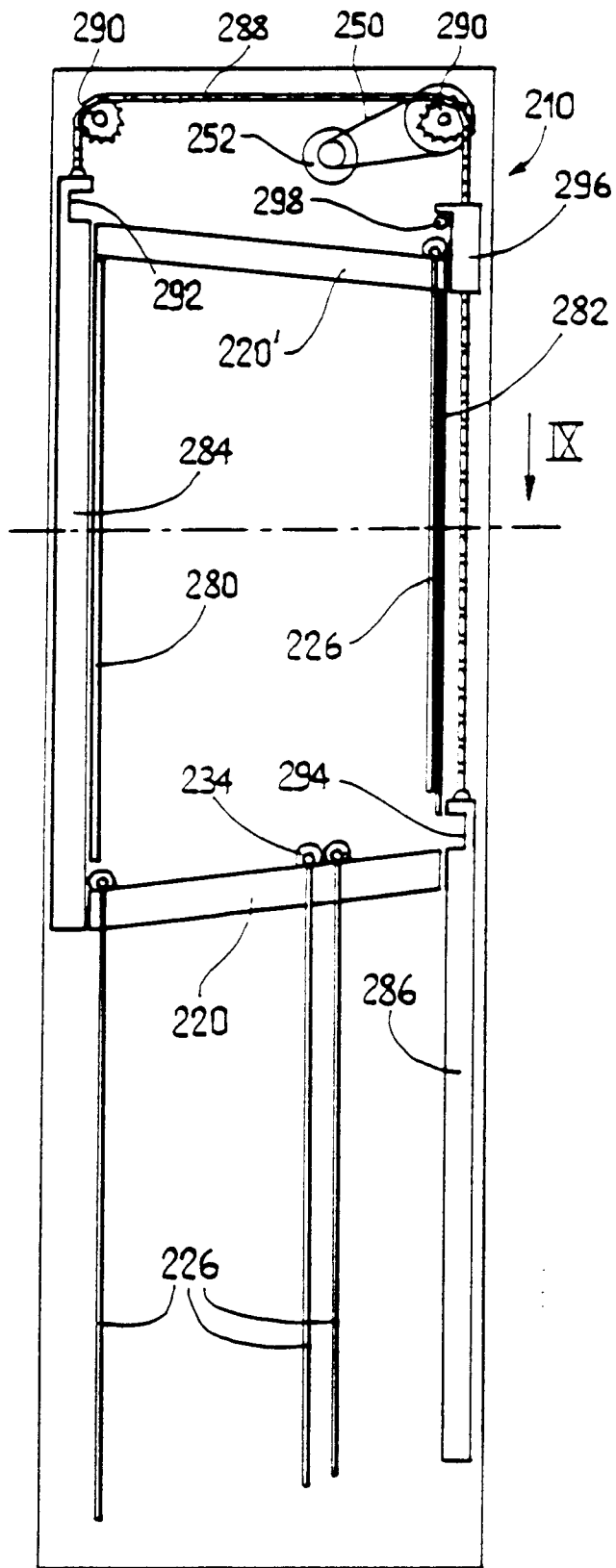


Fig. 8

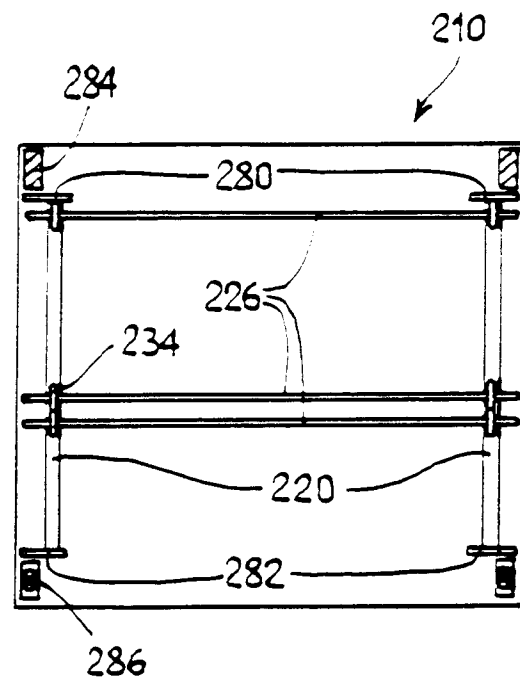


Fig. 9



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## EUROPEAN SEARCH REPORT

Application Number  
EP 94 20 2607

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 A	FR-A-421 088 (CARON) * page 1, line 28 - page 2, line 60; figures 1,2 * ---	1-3 14	G09F11/32
X	FR-A-676 257 (DOUCET) * page 1, line 47 - page 3, line 18; figures 1-5 * ---	1-3,14	
X A	DE-U-19 39 947 (BRINDÖPKE) * page 2, line 29 - page 4, line 23; figures 1-5 * ---	1,3 18	
A	GB-A-1 433 792 (ANALYSIS DESIGNS (WEMBLEY) LTD.) * page 2, line 42 - page 3, line 63; figures 1-9 * ---	1-3,5	
A	DE-C-550 288 (STERN) * page 1, lines 47-73; figures 1-4 * -----	1-3,5,14	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G09F
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 31 October 1994	Examiner Taylor, P
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