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## (54) Golf swing simulator device.

(57) A golf swing simulator device as in GB 2039221 or GB 2081107, in which the arm is mounted to a wall by means of a casting (32) so as to be rotatable about an axis (26) which makes an angle (α) to the horizontal. The casting has a solid central region (40) which can be machined (50, 52) and drilled (54) to take a bearing for the arm on the axis (26) at any angle (α) in the range 10° to 30° from the horizontal.

The casting may be associated with a plate (60) having diagonally opposite vertically elongate apertures (64) to provide initially adjustable mounting to the wall, and diagonally opposite smaller apertures (62) to provide a final secure fixing to the wall.

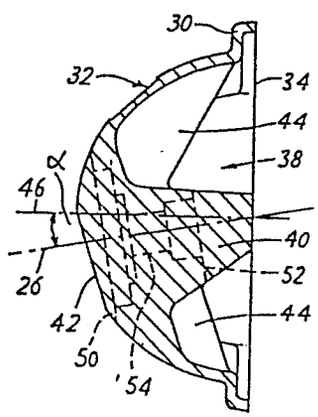


FIG.5

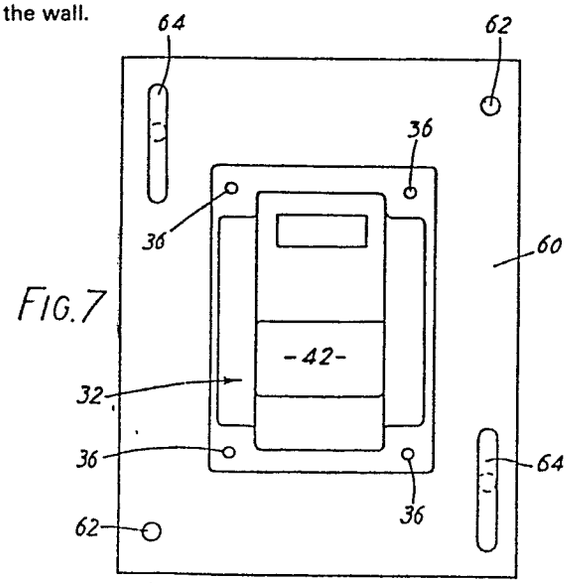


FIG.7

EP 0 204 501 A2

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# GOLF SWING SIMULATOR DEVICE

This invention relates to equipment for practising the game of golf. More particularly it relates to the golf swing simulator disclosed in GB 2039221 and GB 2081107.

In those Patents there is disclosed a golf swing simulator device comprising a handle or mounting for a handle representing that of a golf club, attachment means for mounting the device to a stationary support, and a linkage connecting the handle with the attachment means, the linkage comprising an arm pivotally mounted at one end to the attachment means about a first axis, the arm extending away from said axis so that on pivoting the other end of the arm describes a circle about said first pivot axis, a crank one end of which is connected with said other end of the arm through a pivotal connection having a second axis of rotation preferably coplanar with but spaced from said first axis and the other end of which is rotatably mounted to the handle about the longitudinal axis of the handle so that the handle projecting from the crank is spaced from said pivotal connection in line with said second axis. That equipment further provides means for adjusting the effective length of the arm, means for adjustment of the angle that the first pivot axis makes with the horizontal, and means whereby the angle between the first and second axes can be adjusted. In general terms, therefore, the simulator device provides three rotational axes; said first extending from the attach-

ment means of the arm and about which the arm swings thereby establishing a swing plane; said second pivot axis acting between the free end of the arm and the handle to allow the wrists to pivot or "cock" during the stroke; and a third pivot axis extending longitudinally of the handle itself. It is believed that these three types of movement are essential for establishing a correct swing action. However, so that the apparatus can be adjusted to suit different users, and possibly different notional clubs for the same user, or so that the user can experiment with different swing planes, swing radii, lie angles and so forth, the equipment can also provide adjustment in the height of the attachment to the stationary support, and the angles which the first and second pivot axes make with the horizontal. The adjustment of the attachment height adapts to different users' arm length and different club standing heights, and also compensates for different swing plane angle settings; the setting of the first pivot axis allows the swing plane angle to be adjusted; and the setting of the second pivot axis allows the lie angle of the club to be set, or maintained when the first pivot axis is adjusted. There is quite a complicated relationship between the various adjustments which can be made, but the equipment described in the above specifications is adapted in various ways to simplify these adjustments.

Equipment of the type described above will obviously be useful in golf clubhouses, gymnasia and the like, where

it would be used by many people. However, an individual, once he has determined his optimum or preferred settings, might not need to adjust them thereafter, so that a market could arise for a somewhat simplified version of the equipment in which some or all of the adjustments were preset to suit the individual user. The user would still need to have initial access to the fully adjustable equipment so as to determine his parameters, but for this purpose he could use equipment owned by the golf club or a shop or the like. In particular, if the swing plane is predetermined, then for practical purposes the height at which the attachment means has to be mounted on the support will be determined by the radius of swing, which is related to the user's arm length and which is in turn reflected by the effective length of the arm of the equipment and the club standing height. The support will not normally form part of the equipment, but could for example be a wall in a building, and once the attachment means is mounted to the wall, no further settting need be made. Consequently, such simplified equipment need not have any scale to indicate the height at which the mounting means has to be set; this could be determined merely by a conventional ruler. The attachment means itself would be connected to the arm by means of a pivotal joint articulating about the first pivot axis which makes a fixed angle with the horizontal, thereby determining the swing plane. It is likely, but in principle not essential, that the effective length of the arm will still be adjustable,

thereby determining the radius of swing; and the angle made by the second pivot axis to the horizontal, which determines the lie angle, will also still be adjustable. There may be little or no merit in attempting to make these fixed; the arrangement shown in Fig. 5 of the drawings accompanying GB 2081107 representing a particularly advantageous arrangement for this region of the equipment. However, equipment could be offered with these settings also fixed according to predetermined values; so that the user armed with his particular parameters as determined on the variable simulator could buy a fixed setting simulator with those particular settings.

The present invention provides a golf swing simulator device as described above having the three types of pivotal movement, but at least the angle which the first pivot axis makes with the horizontal being fixed.

More particularly the present invention provides a golf swing simulator, wherein the attachment means comprises an integral moulding or casting having a rear face adapted for attachment to a support, and a body portion projecting forwardly from the rear face, the body having a central part of solid material extending rearwardly towards said rear face and through which a passage can be formed to accommodate a bearing for the pivotal joint with the arm within a range of possible angles which said first pivot axis can make with the horizontal. The range of angles suitably comprises 10 to 30° from the horizontal. Preferably it has a lower value which is at least 10° from the horizontal and an

upper value which is not more than 30° from the horizontal. The attachment means is preferably provided with a marking to indicate the point from which the vertical height for mounting the attachment means to the support should be measured.

Additionally or alternatively, the attachment means has a rear face for attachment to a support, with a plurality of apertures extending through the attachment means to said rear face to take securing screws or the like, at least two of said apertures being shaped to provide a relatively close fit for a screw of suitable size, and at least one of said apertures being vertically elongate so that the position of the screw in the aperture is adjustable.

In order that the invention may be more clearly understood, various embodiments will now be described with reference to the accompanying drawings, wherein:

Fig. 1 shows a side view of a casting for the attachment means,

Fig. 2 shows a rear view of the casting on the arrow A of Fig. 1,

Fig. 3 shows a front view of the casting on the arrow B of Fig. 1,

Fig. 4 shows a cross-sectional plan view through the casting on the line C-C of Fig. 2,

Fig. 5 shows a vertical cross-sectional view through the casting on the line D-D of Fig. 2,

Fig. 6 shows a cross-sectional view, similar to Fig.

5, after the casting has been machined to receive the joint bearing, and

Fig. 7 shows a front view, similar to that of Fig. 3, of a modified form of attachment means.

Referring to the drawings, and firstly to Figs. 1 to 4; the attachment means for pivotally mounting the arm of the device to a fixed support takes the form of an integral casting of suitable metal having a backing portion 30 and a body portion 32 projecting forwardly therefrom. The backing portion has a planar rear surface 34 to abut the surface of the support, for example a wall of a building, and the corners of the backing portion are provided with apertures 36 to take mounting screws or bolts for securing the casting to the supporting surface. The rear of the body portion is hollow, as shown at 38 in Figs 2, 4 and 5. The body portion is substantially rectangular in plan view (Fig. 4) but arcuate in side view (Figs 1, 5 and 6). The body portion has a solid central region 40 extending from a slightly downwardly sloping front face 42 and projecting into the hollow interior 38 of the body as far as the planar rear surface 34. Within the hollow region 38 the inwardly projecting portion of the central region is reinforced by webs 44.

The casting thus produced is then machined to accommodate a bearing for the pivotal joint with the arm (not shown). The pivot axis will be the axis 26 of the swing plane of the device, and makes an angle $\alpha$ with the horizontal, shown at 46. The angle $\alpha$ therefore has to be selected

for the particular mounting in question, and Fig. 5 shows in broken lines the nature of the machining which has to be done. On the front surface of the body portion a new angled face 50 is machined normal to the pivot axis 26, and the rearwardly projecting part of the central portion is also cut back to a rear face 52 parallel to the plane 50 and spaced from it by the length of the bearing. A passage 54 for the bearing is then drilled between the two faces on the desired axis 26. Thereafter the bearing can be fitted and the arm pivotally mounted to the body. Fig. 6 shows a cross-section through the finished casting prior to fitting the bearing, except that it is shown as having been formed with a greater angle $\alpha$ than shown in broken lines in Fig. 5, thereby illustrating that a range of angles is possible within the area of material provided by the solid central region 40 of the body.

Since, all other things being equal, a greater angle @ will require the attachment means to be mounted at a greater height above the ground, it is convenient to mark the outside of the body with a datum point, the position of which varies according to the angle $\alpha$, so that the user does not have to calculate a different height above the ground, but rather the deviation of the height from a given vertical setting will be compensated for by the positioning of the datum point. As shown in Fig. 1, a series of graduations 56 are provided down one side of the body, and these are marked downwardly over the range 10 to 25, representing variations

in the angle $\alpha$ from 10° to 25° from the horizontal. The body can be marked to show the actual angle $\alpha$ of its pivot axis 26, either by means of a separate marking on the body, or by putting a mark opposite the particular graduation on the scale 56. Alternatively, all the numerals on the scale 56 could be omitted except the one corresponding to the angle $\alpha$. In the example shown in Fig. 1, if the angle $\alpha$ is to be 17°, and the nominal height at which the device has to be mounted above the ground is h, then the attachment means is mounted to the support with the graduation 17 at that height h above the ground. Had the angle $\alpha$ been less than 17°, then the attachment means would have been mounted correspondingly lower, and had it been greater than 17°, the attachment means would have been mounted correspondingly higher.

Alternatively, the body could be provided with a single mark as a datum point for setting its height on the support, according to what is determined to be the appropriate height from the fully variable simulator referred to above.

In another embodiment the body having a fixed mark can be adjustably mounted on a wall plate which is fixed to the support, the wall plate having a scale, such as for example shown in Fig. 1 of EP 45660, against which the mark can register. The wall plate can have a similar construction to that shown in EP 45660, with a pair of restricted-mouth channels in which the heads of bolts are slidably retained, the bolts passing through the corner apertures 36 in the

body 32 of the attachment means. When nuts are tightened onto thee bolts the body will be locked to the wall plate, but can be slid up and down by slackening the nuts.

Referring to Fig. 7; the casting of Figs. 1 to 6 is shown associated with a projecting plate 60. The casting can be integral with the plate, or the plate can be made for example of wood and the casting screwed to it through the corner apertures 36. The plate is provided with two circular apertures 62 in diagonally opposite corners, and two vertically elongate apertures 64 in the other two diagonally opposite corner regions.

The plate is mounted to the wall or other support in the following manner. The plate is placed against the wall at the correct height, and marks are made on the wall through the elongate apertures 64, at about the middle of each aperture. Screws are inserted through the apertures at these points and into the wall and temporarily tightened so that the plate is held firm at that position. The rest of the golf swing simulator is mounted to the attachment means 32 (unless it is already attached to it), and the standing height of the club is then checked relative to the ground. As necessary, the screws in the elongate apertures 64 are slackened and the height of the plate 60 adjusted so that the club handle is at the correct standing height. The screws in the apertures 64 are then retightened and the screws are passed through the smaller apertures 62 into the wall and tightened so as to secure the plate at the correct

position without the possibility of displacement.

With this embodiment, it is unnecessary to have any scale or markings at the side of the casting, as shown in Fig. 1, since the final setting of the height of the attachment member is determined, not by measuring the height of the casting from the ground, but by the standing height of the club handle, which is the more directly relevant dimension.

CLAIMS

1. A golf swing simulator comprising a handle or mounting for a handle representing that of a golf club, attachment means for mounting the device to a stationary support, and a linkage connecting the handle with the attachment means, the linkage comprising an arm pivotally mounted at one end to the attachment means about a first axis, the arm extending away from said axis so that on pivoting the other end of the arm describes a circle about said first pivot axis, a crank one end of which is connected with said other end of the arm through a pivotal connection having a second axis of rotation and the other end of which is rotatably mounted to the handle about the longitudinal axis of the handle so that the handle projecting from the crank is spaced from said pivotal connection in line with said second axis, at least the angle which the first pivot axis makes with the horizontal being fixed.

2. A golf swing simulator according to claim 1, wherein the attachment means comprises an integral moulding or casting having a rear face adapted for attachment to a support, and a body portion projecting forwardly from the rear face, the body having a central part of solid material extending rearwardly towards said rear face and through which a passage can be formed to accommodate a bearing for the pivotal joint with the arm within a range of possible

angles which said first pivot axis can make with the horizontal.

3. A golf swing simulator according to claim 2 wherein the range of angles comprises 10° to 30° from the horizontal.

4. A golf swing simulator according to claim 2 wherein the range of angles has a lower value which is at least 10° from the horizontal and an upper value which is not more than 30° from the horizontal.

5. A golf swing simulator according to claim 1 wherein the attachment means has a rear face for attachment to a support, with a plurality of apertures extending through the attachment means to said rear face to take securing screws or the like, at least two of said apertures being shaped to provide a relatively close fit for a screw of suitable size, and at least one of said apertures being vertically elongate so that the position of the screw in the aperture is adjustable.

6. A golf swing simulator according to claim 5, wherein the attachment means has two of said close fitting apertures and two of said elongate apertures.

7. A golf swing simulator according to claim 6 wherein the two close fitting apertures are diagonally opposite each

other, and the two elongate apertures are likewise diagonally opposite each other.

8. A golf swing simulator substantially as herein described with reference to the accompanying drawings.

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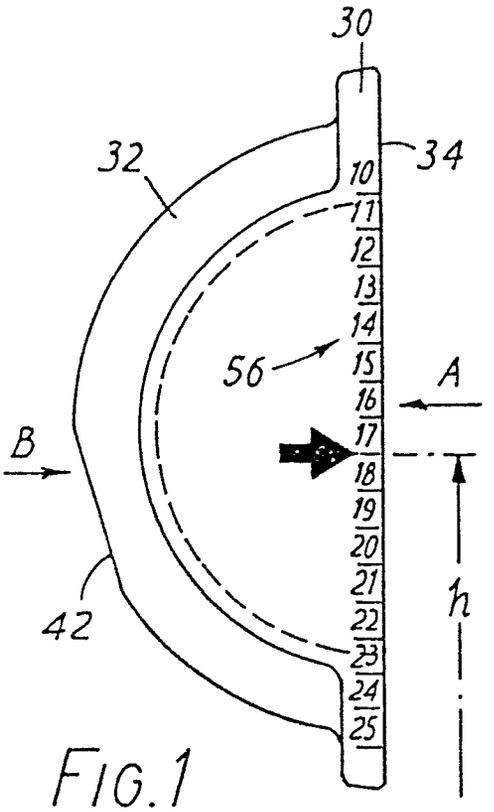


FIG.1

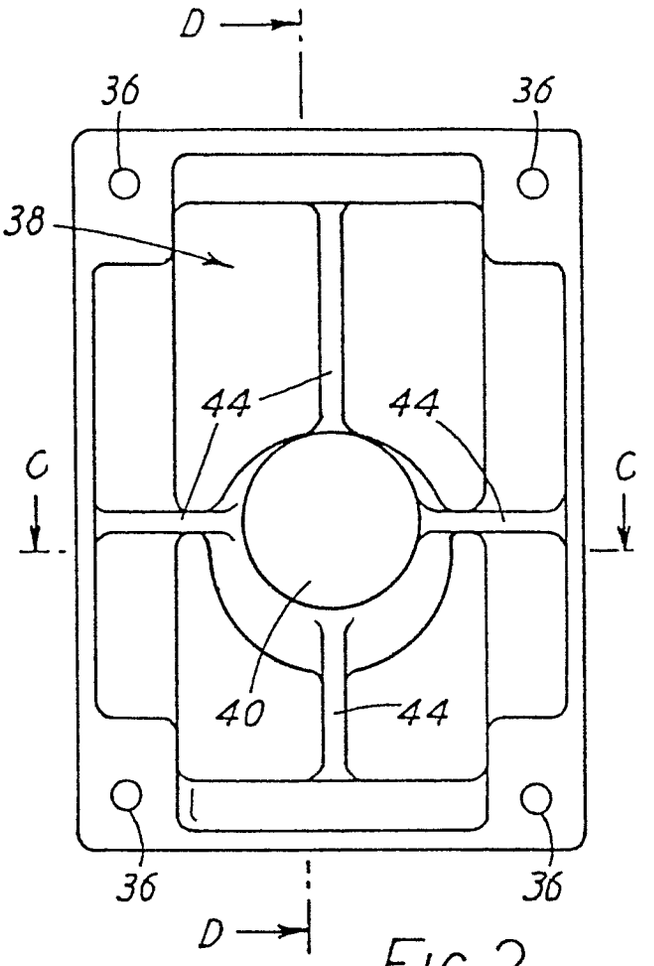


FIG.2

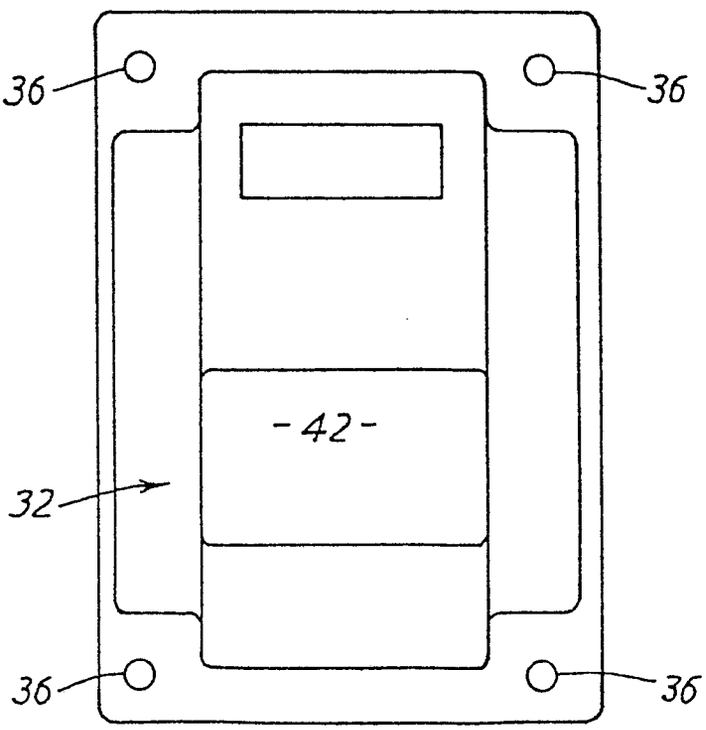


FIG.3

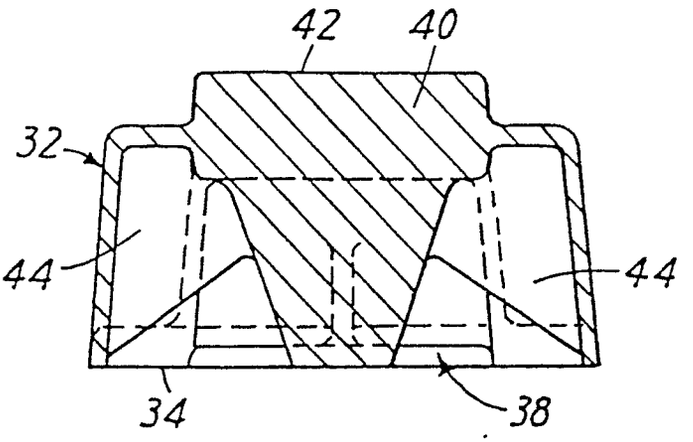


FIG.4

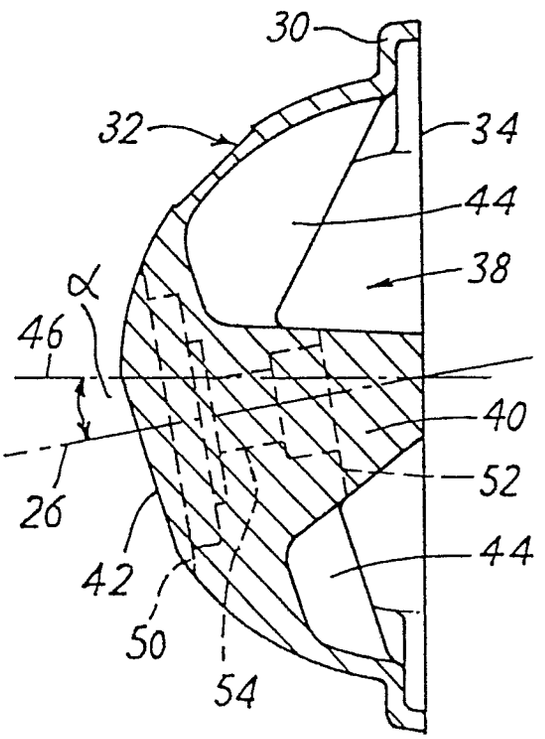


FIG.5

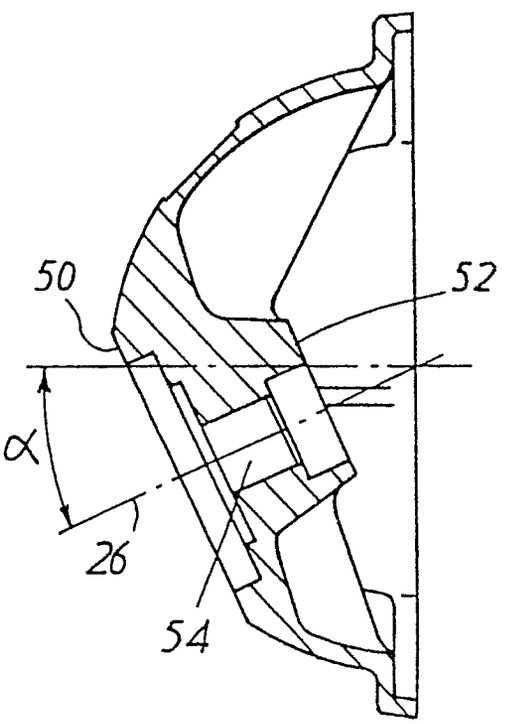


FIG.6

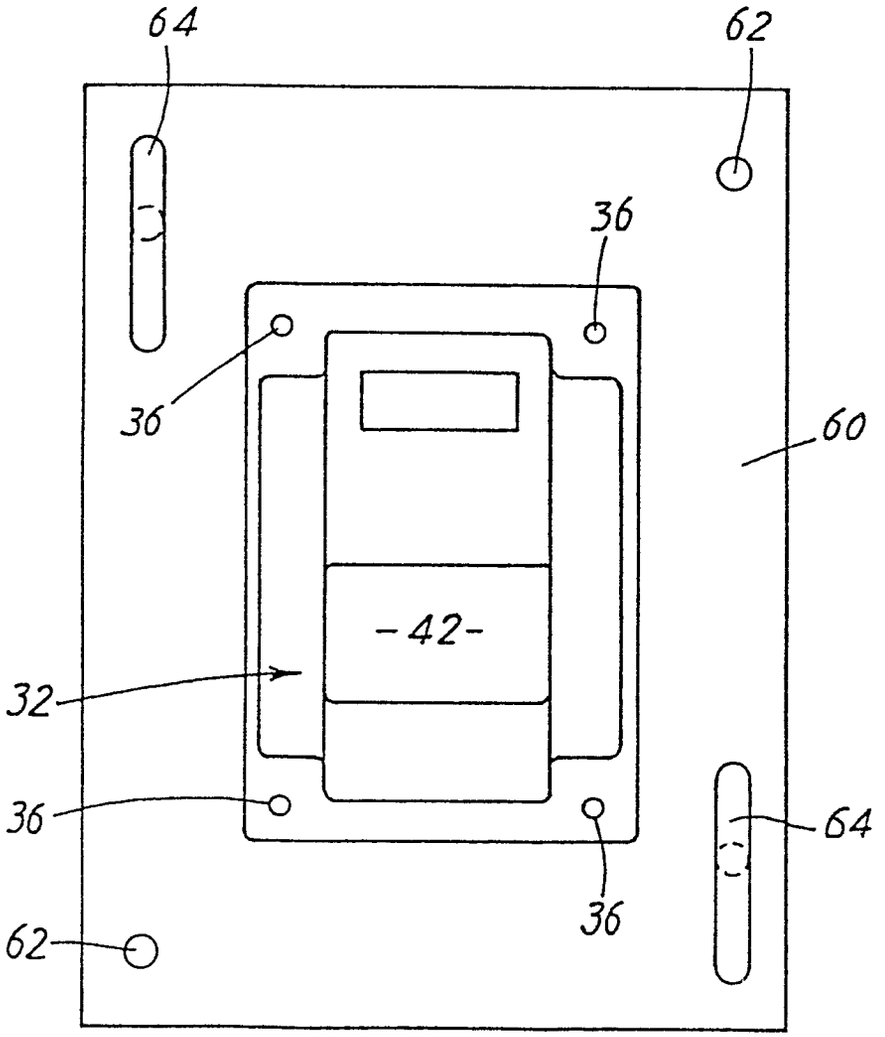


FIG. 7