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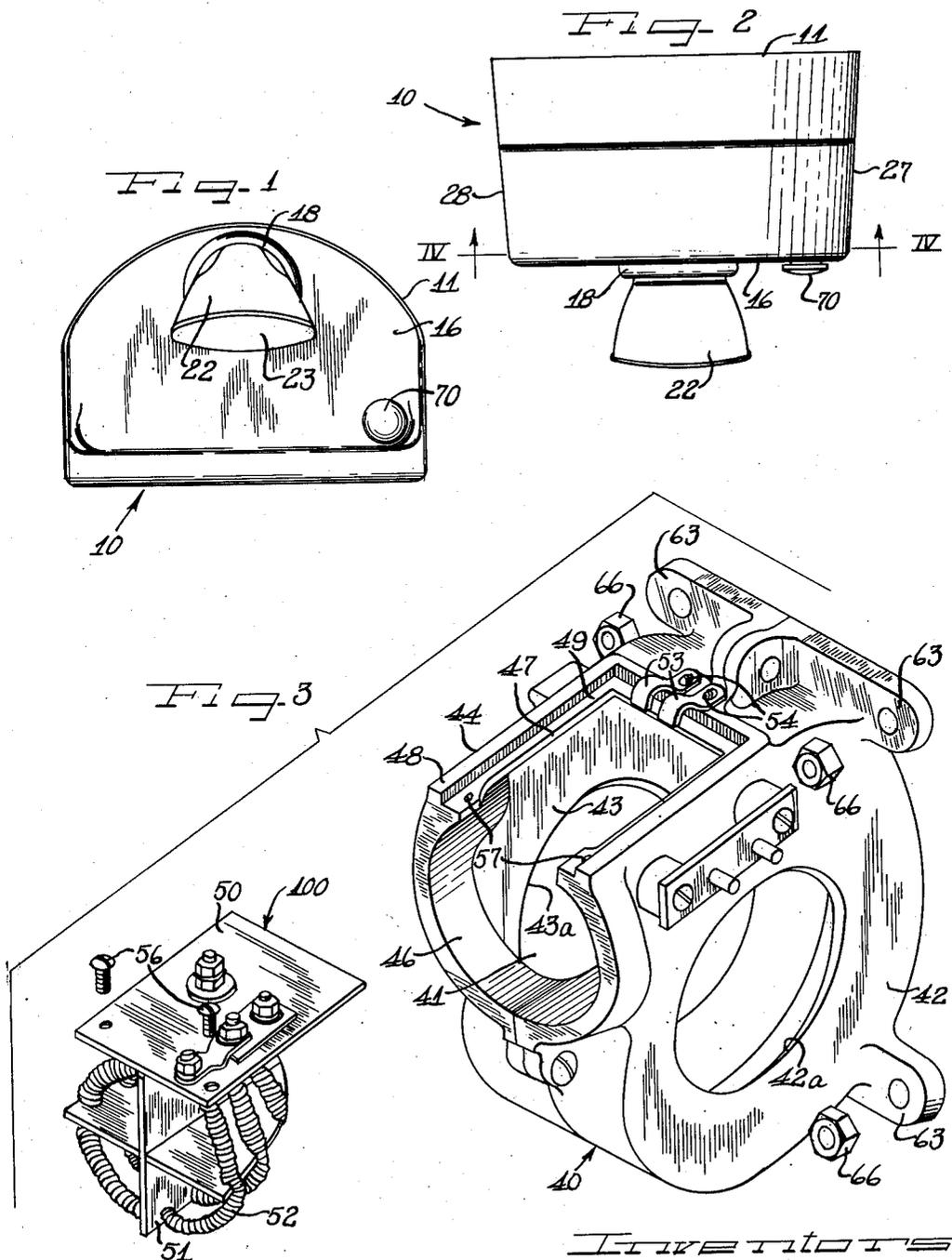
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ELECTRIC DRIER

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3 Sheets-Sheet 1



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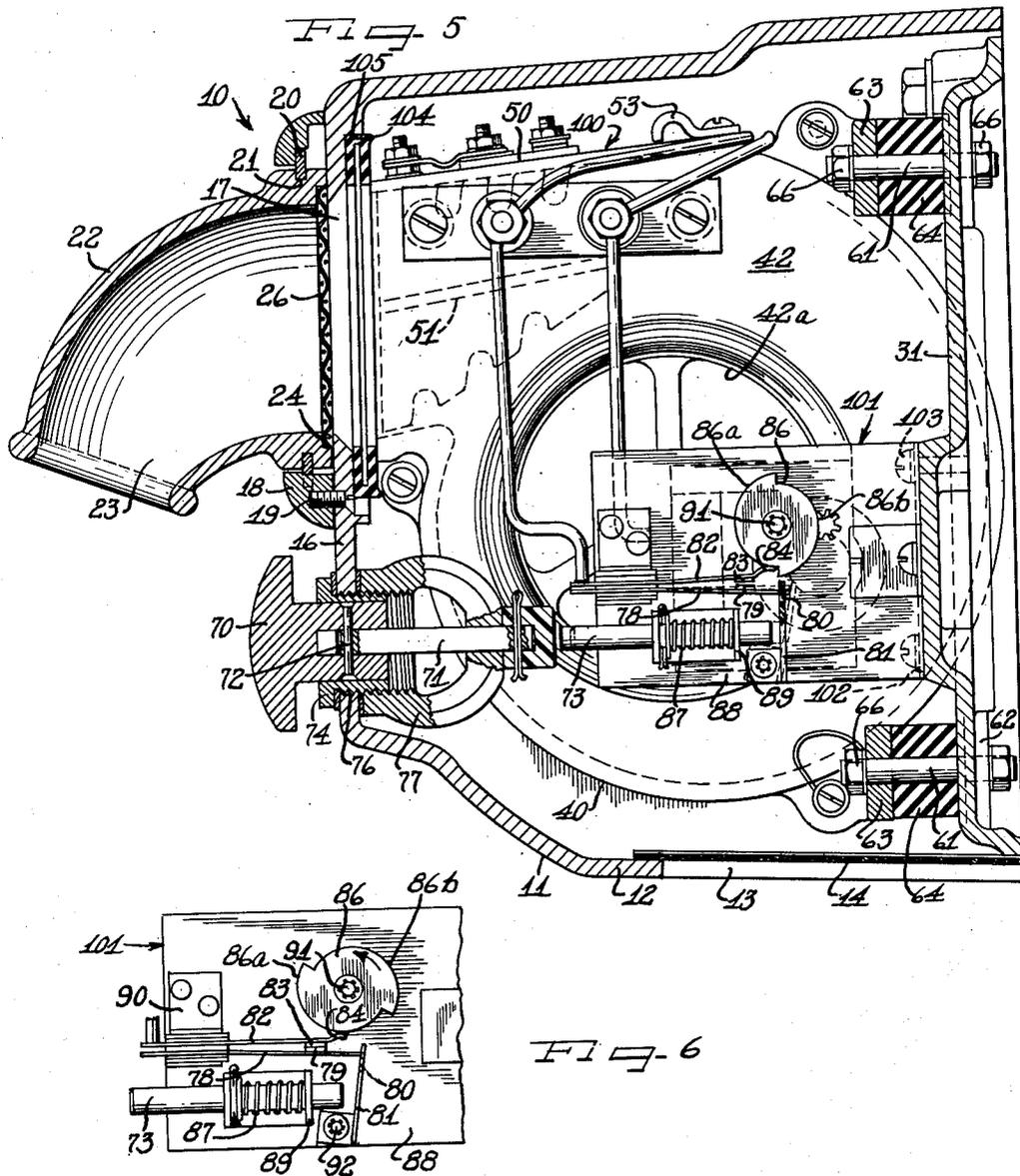
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UNITED STATES PATENT OFFICE

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ELECTRIC DRIER

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5 Claims. (Cl. 219—39)

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This invention relates generally to an electric drier apparatus and more particularly to an improved electric drier having an integral subassembly comprising a unitary casting forming an annular pumping chamber with a peripheral outlet and receiving a heater element removably positioned in the outlet to maximize heat transfer during an air pumping operation. The structure of the present invention further includes a cushioning mounting for the housing member for minimizing and dampening vibration, as well as an improved mounting arrangement whereby the electric drier structure may be conveniently assembled with a base plate connected to a supporting surface through the means of decoratively concealed connecting screws accessible through openings formed in the bottom of the electric drier casing.

The electric drier mechanism of the present invention further includes an improved timer device by means of which a snap-acting switch action is obtained, together with a cyclic timed operation whereby the electric drier may be operated only during a selected time interval.

It is an object of the present invention, therefore, to provide an electric drier apparatus including simplified structural elements fabricated as readily replaceable subassemblies.

Another object of the present invention is to provide an electric drier structure incorporating improved mounting means for minimizing and dampening vibration.

Yet another object of the present invention is to provide an improved timer mechanism for an electric drier apparatus.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheets of drawings in which a preferred embodiment of an electric drier structure incorporating the principles of our invention is shown by way of illustrative example.

On the drawings:

Figure 1 is a front elevational view of an electric drier according to the present invention;

Figure 2 is a plan elevational view of an electric drier according to the present invention;

Figure 3 is an exploded view showing the elements of a subassembly provided in accordance with the principles of the present invention;

Figure 4 is a cross-sectional view taken substantially on line IV—IV of Figure 2;

Figure 5 is a side cross-sectional view with parts shown in elevation and with parts broken away

for the sake of clarity of the drier structure shown in Figure 4; and

Figure 6 is a fragmentary broken elevational view of the timer mechanism shown in Figure 5, but illustrating the elements of the timer mechanism in a different relative position.

As shown on the drawings:

An electric drier is indicated generally by the reference numeral 10 and comprises a dished out cover 11 having a bottom wall 12 formed with an opening 13 covered by a screen 14 to provide an air inlet into the cover 11. The front wall of the cover 11 is indicated at 16 and is provided with an opening 17 surrounded by a retaining ring 18 connected to the front wall 16 by a plurality of screws 19. The retaining ring 18 is provided with an annular recess receiving a lock ring 20. The lock ring 20, in turn, is seated in an annular recess 21 formed in a generally L-shaped nozzle 22. The nozzle 22 has a flow passage 23 extending therethrough which is counterbored at one end as at 24 to receive a screen 26. Thus, the retainer 18, together with the lock ring 20 not only serves to adjustably position the nozzle 22 for relative angular alignment on the front wall 16 of the cover 11, but retains the nozzle 22 in abutting assembly with the front wall 16 so as to keep the screen 26 in closing position relative to the outlet opening 17, thereby to preclude entry of objects into the cover 11 through the opening 17.

The side walls of the cover 11 are indicated at 27 and 28, respectively, and are each provided with an inwardly extending boss 29 and 30 suitably apertured by a threaded opening to accept a correspondingly threaded fastening member.

A base plate 31 is provided and is received by the cover 11. It will be understood that the base plate may be firmly connected to a suitable supporting surface such as a wall, or at any other desirable location where it is desired to position the electric drier 10.

The base plate 31 is provided with a plurality of apertured bosses 32 through which may be extended suitable lag screws 33, or other connecting means for effecting the assembly of the base plate 31 to a supporting surface.

The base plate is further provided with a boss 34 and a boss 35 adjacent the sides thereof and arranged to come in aligned registry with each of the bosses 29 and 30 on the cover 11. Each of the bosses 34 and 35 is provided with a hollow cavity 34a and 35a and apertures are provided in the opposing end wall portions thus formed to loosely receive a connecting screw 36.

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Each of the screws 36 is provided with an enlarged head portion 36a constructed to cooperate with a suitable adjusting tool and a clip 37 is connected to the body portion of each of the connecting screws 36 for confinement in the hollow cavities 34a and 35a, respectively, thereby to retain the connecting screws 36 in assembly with the bosses 34 and 35.

It will be noted upon making reference to Figure 4 that the screws 36 are positioned in generally vertical alignment and an access opening 38 is provided in the bottom wall 12 of the cover 11 in registry with each screw 36 to facilitate manipulation thereof by a suitable adjusting tool such as a screwdriver or the like.

The length of the bosses 34 and 35 and the alignment of the clip 37 on each of the screws 36 positions the screws 36 for ready engagement with the threaded apertures provided in the bosses 29 and 30 as soon as the cover 11 is assembled with the base plate 31.

Positioned within the cover 11 is a subassembly comprising a housing member 40 forming an annular pumping chamber 41 and having side walls 42 and 43 each provided with an aperture 42a and 43a, thereby to form an axial inlet means for the pumping chamber 41.

The housing member 40 has a peripheral casing portion 44 having an opening 46 providing a peripheral outlet for the pumping chamber 41. A second opening 47 is provided in the casing portion 44 adjacent the peripheral outlet 46, the opening 47 being surrounded by an upstanding flange 48 and a recess 49 which receives a flat body portion 50 of a heating element 100.

The flat body portion 50 carries a skeletal X-frame 51 upon which is helically wound an electrical resistance element 52. The flat body member 50 is inserted into the recess 49 and one end thereof is resiliently retained by a pair of spring clips 53 connected to the housing member 40 by suitable fasteners 54 while the other end of the flat body member 50 is firmly assembled to the housing member 40 by means of a pair of screws 56 which may be threaded into suitable threaded apertures 57 formed in the walls of the recess 49.

When so positioned, the skeletal frame 51 will extend inwardly into the housing member 40 so that the electrical resistant element 52 will be positioned in the peripheral outlet formed by the casing portion 44 of the housing member 40.

A motor 58 is mounted adjacent the housing member 40 and is provided with a power take-off shaft 59 which extends through the opening 43a in the side wall 43 to rotatably drive a fan impeller 60. Thus, air will be drawn through the axial inlet means of the housing member 40 and will be expelled over the heating element 52 and through the peripheral outlet 46 formed by the casing portion 44.

In mounting the housing member 40 to the base plate 31 in accordance with the principles of the present invention, a vibration dampening arrangement is provided including a plurality of studs 61 each having threaded portions on opposite ends thereof inserted respectively through a corresponding one of a plurality of apertured bosses 62 formed in the base plate 31 and a corresponding one of a plurality of apertured bosses 63 formed on the housing member 40 and arranged to lie in coplanar relationship.

On the medial portion of each stud 61 is provided a bushing 64 made of an elastic cushioning material such as rubber or the like and which

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may be actively interposed between the housing member 40 and the base plate 31 to absorb and minimize any vibration occurring as a result of the operation of the drier apparatus. A nut 66 may be provided on each end of each stud 61 to draw the housing member 40 and the back plate 31 into cushioned assembly with one another.

To set the electric drier 10 in operation, an actuating mechanism including a push button 70 connected to a push rod 71 by a pin 72 is employed to engage a plunger rod 73 forming a part of a timing mechanism.

The push button 70 is supported for reciprocation by a bearing 74 threaded into an aperture 76 formed in the front wall 16 of the cover 11. The push rod 71 is further supported for reciprocation by a guide nut 77 threadedly assembled on the bearing 74.

In Figures 4, 5 and 6, the timer mechanism is indicated generally by the reference numeral 101. Said timer mechanism is mounted on a frame 80, the flange 102 of which is secured to the base plate 31 by means of screws 103. The timer mechanism includes a pair of elongated spring contact arms arranged in spaced parallel alignment. Using the plane of reference established on the drawings, a lower spring contact arm 78 is provided having a contact pad 79 on a medial portion thereof and including an end portion normally seated in an aperture 80 formed in a resilient retainer 81. An upper spring contact arm 82 having a contact pad 83 on a medial portion thereof is aligned in registry with the contact pad 79 is of a shorter length than the lower spring contact arm 78 and is provided with a curved end portion forming a cam-engaging surface 84.

A double face cam wheel 86 having a pair of cam surfaces 86a and 86b formed as eccentrically offset semicircles is aligned in operative registry relative to the spring arm contacts 78 and 82.

In the position of Figure 5, the lower spring contact arm 78 is retained by the retainer 81 so that the contact pad 79 is spaced away from the contact pad 83, the upper spring contact arm 82 having its curved cam-engaging surface 84 abutting the cam surface 86a.

Upon pressing the push button 70 inwardly, the plunger 73 moves to the dotted line position, thereby displacing the retainer 81 and disengaging the end portion of the lower spring contact arm 78 out of the recess 80, whereupon the spring contact arm 78 will move upwardly so that the contact pads 79 and 83 make electrical contact with one another.

As the cam wheel 86 rotates counterclockwise, the engagement between the cam surface 86a and the cam-engaging surface 84 on the upper spring contact arm 82 will force the spring contact arms 82 and 78 downwardly until the end portion of the lower spring contact arm will again register with the aperture 80. As soon as the push button 70 is released, a control spring 87 surrounding the plunger 73 and bottomed against the frame 80 having a spring seating tab 89 struck therefrom will urge the plunger 73 toward the full line position shown in Figure 5. Thus, when the cam wheel 86 has moved through half a revolution including 180° of arc corresponding to the extent of the cam surface 86a, the contact pads 79 and 83 on the spring contact arms 78 and 82 will be retained out of electrical engagement.

It will be understood that when the push but-

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ton 70 is again actuated, the same cycle of operation will occur since the cam surface 86b is similar to the cam surface 86a and will keep the contact pads 79 and 83 in electrical contact engagement for a predetermined time interval proportional to the rotational speed of the cam wheel 86.

It may be noted that the spring contact arms are connected to the frame 88 by suitable fastening means indicated at 90 and the retainer 81, together with the cam wheel 86 are carried by the frame 88 in predetermined spaced alignment relative to the spring contact arms 78 and 82 by any suitable means including a pin 91 for the cam wheel 86 and a fastener 92 for the retainer 81.

In installing the electric drier, the parts to be carried by the base plate 31 are first assembled thereon. The housing 40, with the fan impeller 50 and the heating element 100 in place, is secured to the base plate by means of the studs 61. The motor 58 is likewise fastened to the base plate (by means not shown) and the frame 88 carrying the timing mechanism is secured by screws 103 passing through the flange 102 into the base plate 31.

Similarly, before assembling the cover 11 on the base plate 31, the various parts carried by the cover, such as the nozzle 22 and push button 70, are first positioned in place. A rubber ring 104 is then fitted into an annular recess 105 formed for the purpose in the inner face of the front wall 16 about the opening 17.

The cover is next positioned over the base plate and the screws 36 screwed home into the internally threaded bosses 29 carried by said cover. In so doing the rubber ring, or gasket, 104 is compressed between the cover and the end of the end face of the peripheral opening 46 to seal the joint therebetween and cause all of the air from the pumping chamber to be discharged into the nozzle 22 when the drier is being operated.

Thus, only the two screws 36 serve to assemble the cover 11 in place over the base plate 31. This greatly facilitates both assembly and disassembly. Also, the hidden arrangement of the screws makes for a much neater exterior appearance of the drier; since no attaching means are then visible from the outside and the base plate 31 is with its wall attaching lug screws is entirely concealed by the cover.

Although various minor structural modifications might be suggested by those versed in the art to the preferred embodiment herein described by way of illustrative example only, it should be understood that we wish to embrace within the scope of this patent all such modifications as reasonably and properly come within the scope of our contribution to the art.

We claim as our invention:

1. In an electric drier, a blower having an annular pumping chamber with opposed central inlets thereinto, said blower having a peripheral outlet portion tangentially aligned relative to said pumping chamber, said outlet portion having a discharge opening and a flanged opening in a wall thereof adjacent to said discharge opening, an electrical heater element comprising a body portion removably received in said flanged opening of said blower and closing said opening, and a skeletal frame having electrical resistance members wound on said frame, said skeletal frame extending into said blower and positioning said resistance elements in the path of air directed to said discharge opening, and impeller

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means in said pumping chamber pumping air from said inlets over said heater element and through said discharge opening.

2. In an electrical drier, a blower unit having an annular pumping chamber and having apertured side walls providing an axial inlet means for said pumping chamber, said blower unit having a peripheral casing portion tangentially aligned relative to said pumping chamber and providing a peripheral outlet for said pumping chamber, an opening in said casing portion, a flanged recess surrounding said opening, a heating element comprising a plate received in removable assembly in said flanged recess, a skeletal frame connected to said plate, electrical heating elements helically wound on said skeletal frame and aligned to intersect said peripheral outlet, and a fan impeller in said pumping chamber to pump air from said inlet means over said heating elements and through said outlet.

3. In an electric drier, a base plate adapted to be mounted on a support surface, a blower unit having an annular pumping chamber and having apertured side walls providing an axial inlet means for said pumping chamber, said blower unit having a peripheral casing portion tangentially aligned relative to said pumping chamber providing a peripheral outlet for said pumping chamber, an opening in said casing portion, a flanged recess surrounding said opening, a heating element comprising a plate received in removable assembly in said flanged recess, a skeletal frame connected to said plate, electrical heating elements helically wound on said skeletal frame and aligned to intersect said peripheral outlet, a fan impeller in said pumping chamber to pump air from said inlet means over said heating elements and through said outlet, a plurality of apertured bosses on said blower unit aligned in coplanar relationship, a stud extending through each boss and into said base plate, and a bushing made of cushioning material on a medial portion of each stud, said bushing being interposed between said blower unit and said base plate to dampen and minimize the transmission of vibration therebetween.

4. In an electric drier, a base plate adapted to be mounted on a support surface, a blower unit having an annular pumping chamber and having apertured side walls providing an axial inlet means for said pumping chamber, said blower unit having a peripheral casing portion tangentially aligned relative to said pumping chamber providing a peripheral outlet for said pumping chamber, said casing portion having an opening therein, a flanged recess surrounding said opening, a heating element comprising a plate received in removable assembly in said flanged recess to close said opening, a skeletal frame connected to said plate, electrical heating elements helically wound on said skeletal frame and aligned to intersect said peripheral outlet, a fan impeller in said pumping chamber to pump air from said inlet means over said heating elements and through said outlet, a plurality of apertured bosses on said blower unit aligned in coplanar relationship, a stud extending through each boss and into said base plate, a bushing made of cushioning material on a medial portion of each stud, said bushings being interposed between said housing member and said base plate to minimize the transmission of vibration therebetween, a motor adjacent said blower unit, a power take-off shaft extending outwardly of said motor and

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generally parallel to said base plate and aligned on the rotational axis of said impeller, said power take-off shaft extending through one of said apertured side walls of said housing member to engage said impeller in driving connection therewith, and means to control the selective energization of said motor and said electrical heating elements.

5. An electrical drier comprising, a base plate for attachment to a wall, a motor, fan housing, heating element and timer mechanism all carried by said base plate, a cover, a nozzle for the discharge opening of said fan housing and a timer operating device carried by said cover, a plurality of spaced apart bosses on said base plate, each of said bosses having a hollow cavity formed therein with oppositely disposed spaced apart wall portions provided with aligned apertures, a screw for each boss extending loosely through said apertures, a head on one end of said screw outside of said boss, screw threads on the opposite end of said screw outside of said boss, a clip retainer on each screw larger than said apertures and smaller than said cavity and arranged in each corresponding hollow cavity of each boss between said spaced walls to retain the corresponding screw in permanent assembly with said base plate and a corresponding plurality of spaced apart boss portions on

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said cover, said boss portions disposed inwardly of said cover and in registering alignment with said bosses on said base plate, each of said cover bosses having a threaded aperture receiving a corresponding one of said screws, a wall of said cover having access openings in registry with each of said screws, and each of said screws having a tool-receiving portion in said head at said one end thereof cooperating with an adjustment tool inserted through the corresponding access opening for effecting rotation thereof to assemble the cover and the base plate.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,675,292	Burgess -----	June 26, 1928
1,788,408	Raybould -----	Jan. 13, 1931
1,853,162	Jacobi -----	Apr. 12, 1932
2,248,674	Hull -----	July 8, 1941
2,335,403	Gallagher -----	Nov. 30, 1943
2,375,920	Hewitt -----	May 15, 1945
2,479,571	Hewitt -----	Aug. 23, 1949
2,548,604	Hickey -----	Apr. 10, 1951

FOREIGN PATENTS

Number	Country	Date
125,200	Great Britain -----	Oct. 7, 1913