

April 12, 1960

A. J. MATTER

2,932,122

LEVELERS FOR ENCLOSED APPLIANCES

Filed Nov. 6, 1953

3 Sheets-Sheet 1

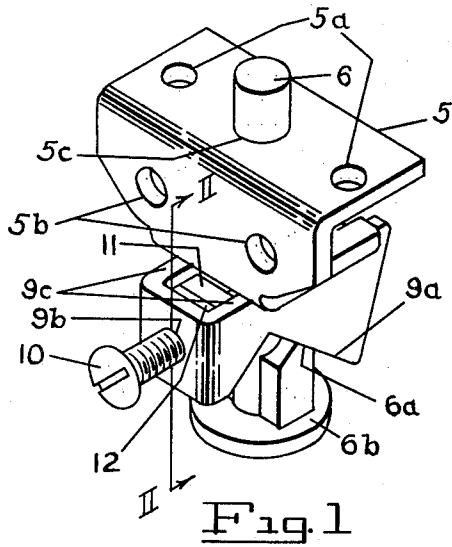


Fig. 1

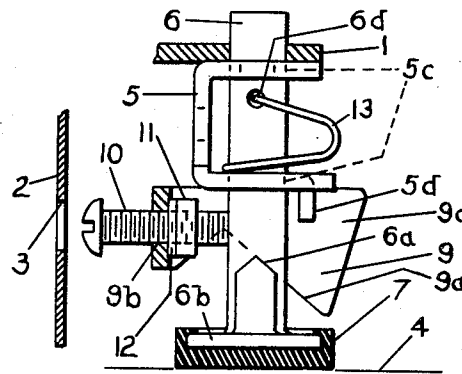


Fig. 2

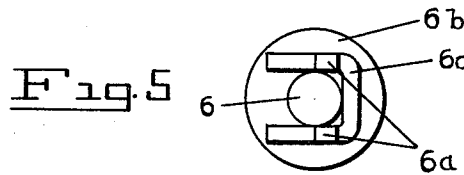


Fig. 5

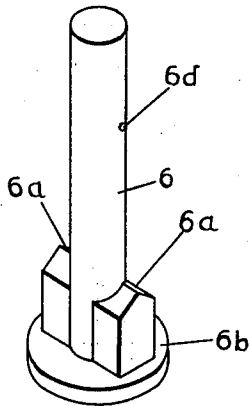


Fig. 3

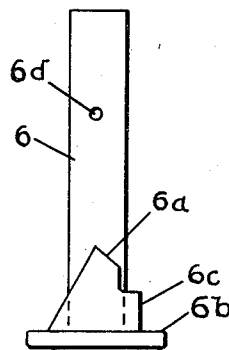


Fig. 4

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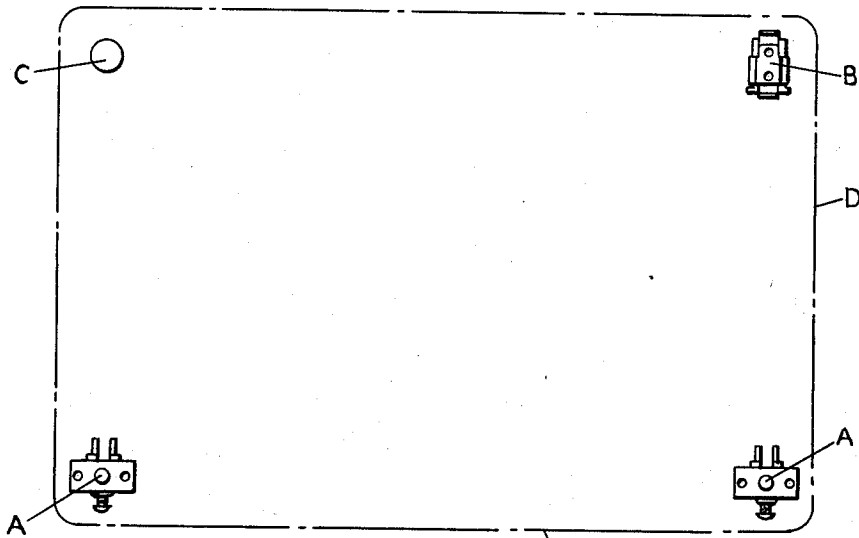


Fig. 6

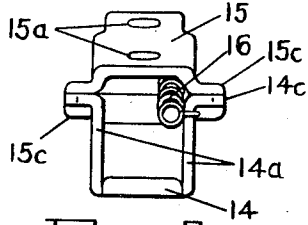


Fig. 8

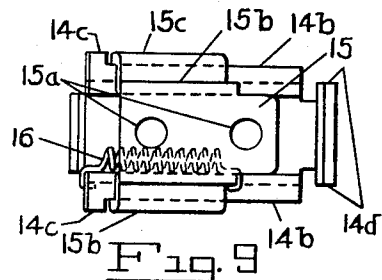


Fig. 9

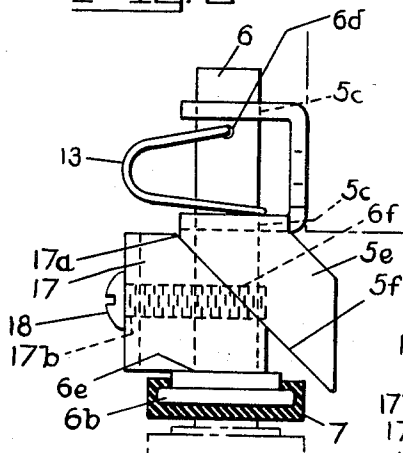


Fig. 10

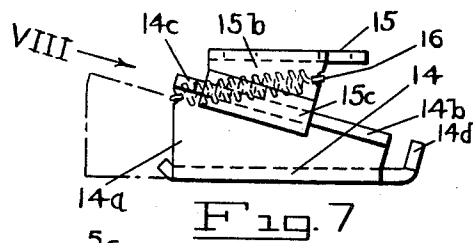


Fig. 7

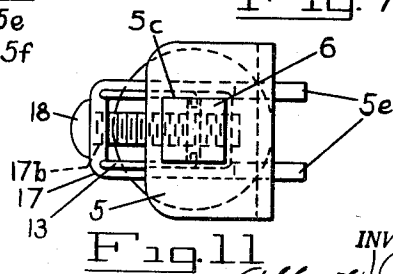


Fig. 11

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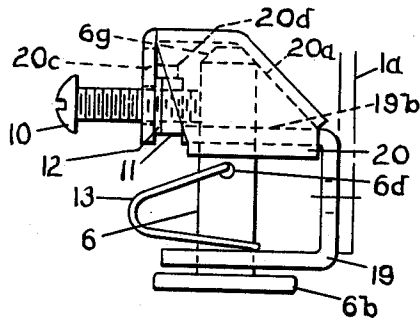


Fig. 12

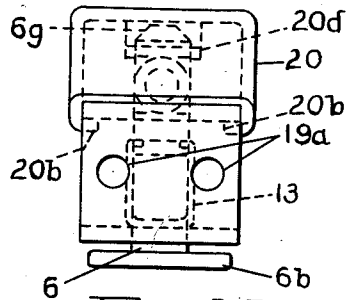


Fig. 13

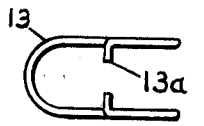


Fig. 17

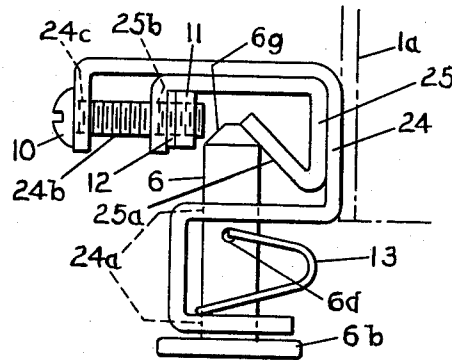


Fig. 14

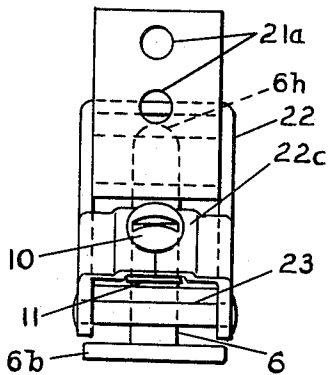


Fig. 16

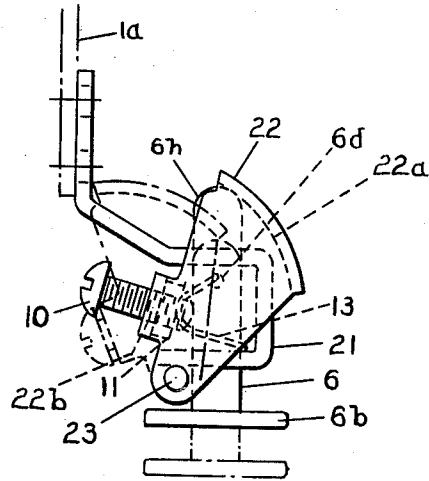


Fig. 15

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LEVELERS FOR ENCLOSED APPLIANCES

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11 Claims. (Cl. 45-139)

This invention relates to improvements in levelers for enclosed appliances and has for its object to provide such means enclosed within the cabinet or casing of appliances such as automatic washing machines, driers, ranges or other enclosed appliances, and adjustable through small apertures in the front wall of said cabinet or casing by means of a screw driver or key.

Another object is to provide devices for this purpose, readily attachable to frame members of such appliances or cabinets thereof and of relatively inexpensive construction.

Another object is to provide a plurality of supports for such appliances and cabinets, two of which are adjustable from without, to level the device front to back and side to side, and one or more of which automatically adjusts to provide four point support and eliminate wobble of the said appliance or cabinet.

I attain these objects by means of the devices shown in the accompanying drawings in which:

Fig. 1 is a perspective view of the preferred form of one of the front supports, adjustable by means of a screw driver.

Fig. 2 is an elevation, partially in cross section on the line II of Fig. 1, and includes a section through part of the cabinet front or casing.

Fig. 3 shows a perspective view of the vertical stem.

Fig. 4 is an elevation of a modified form of stem having a separate cam-piece.

Fig. 5 is a plan view of the stem and cam-piece shown in Fig. 4.

Fig. 6 shows the outline of an appliance cabinet or casing with two front manually operable adjusters, one rear automatic adjuster, and one rear non-adjustable support, all in plan view.

Fig. 7 is a side elevation of the said automatic adjuster.

Fig. 8 shows a front view of the said automatic adjuster seen in the direction of the arrow VIII in Fig. 7.

Fig. 9 is a plan view of the said automatic adjuster.

Fig. 10 shows an elevation of a modified form of manually operable adjuster.

Fig. 11 is a plan view of the parts shown in Fig. 10.

Fig. 12 shows a side elevation of another modified form of manually operable adjuster having a cam surface at the top of the stem.

Fig. 13 is a rear elevation of the same.

Fig. 14 illustrates another modification of top cam type adjuster, shown in side elevation.

Fig. 15 is a side elevation of a modified form of adjuster in which pivotally mounted cam is manually adjustable against the top of a vertical stem.

Fig. 16 shows a front elevation of the device illustrated in Fig. 15.

Fig. 17 is a plan view of the spring shown in Fig. 2.

Except in Fig. 6, the drawings are approximately full size. Like numerals of reference indicate similar parts throughout the several views.

Referring to Figs. 1, 2 and 3, 1 indicates a supporting section of an appliance or cabinet frame to which a foot

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or adjuster may be attached and 2 is a portion of the front panel or wall of the appliance or cabinet provided with a hole 3. 4 indicates a floor surface. A bracket 5 is shown attached to support 1, as by means of screws or rivets (not shown) through orifices 5a. As an alternate means of attaching to a vertically disposed support 1, holes may be provided as at 5b. Bracket 5 is also provided with holes at 5c for the reception of a vertically adjustable stem shown at 6. Stem 6 as shown in Figs. 1, 2 and 3 is provided with integral cam lugs 6a and foot disc 6b, which latter may be provided with a rubber shoe 7. A modified form of stem 6 is shown in Figs. 4 and 5, wherein the cam lugs 6a are part of a separate stamping of U-form, is used as shown at 6c. Stem 6 is also provided with a hole 6d for the reception of spring ends. Stem 6 is slideably held in holes 5c of bracket 5.

Bracket 5 is provided with a downwardly extending projection 5d to serve as a guide for sliding cam 9 which is U-shaped with cam edges 9a on the two legs 9c and is provided with a hole 9b for the reception of a screw 10 upon which is mounted a square nut 11 and a square fiber washer 12. The hole in fiber washer 12 is slightly smaller than the outside diameter of the screw 10 to provide a braking effect upon the screw to keep it from turning under vibration. A spring 13 has inturned ends 13a as shown in Fig. 17, adapted to enter stem hole 6d and exerts upward pressure to lift the stem and hold the parts in assembly, the lower end of the spring resting on the bracket end as shown. Thus the spring prevents the stem from dropping out of the bracket.

In assembly, as shown in Fig. 2, the legs 9c of sliding cam 9 are spaced to slide freely on 2 sides of stem 6 and bracket guide projection 5d. When installed in an enclosed appliance such as an automatic washing machine or range, screw 10 is located in co-axial alignment with hole 3 in casing 2 and maintains this relative position.

In operation a screw driver end is inserted through hole 3 to engage the screw slot. Turning the screw clockwise into nut 11 causes the nut to travel outward and away from the stem and thus forces the sliding cam in the same direction so that it in turn forces the stem downward. When the stem (or its rubber shoe when used) rests on floor 4, this adjustment raises the appliance or cabinet at this point. To lower the appliance the screw 10 is turned counter-clockwise.

For the purpose of simplified description the entire unit shown in Fig. 1 is now referred to as unit A and is so indicated in Fig. 6. D in Fig. 6 indicates the outline of an appliance cabinet in which 2 in Figs. 2 and 6 indicates the front wall thereof. In the preferred assembly two units A are attached at the front corners of the appliance as shown in Fig. 6 and at B is indicated an automatic adjuster and at C a plain non-adjustable foot may be used. A simple example of an automatic unit B is shown in Figs. 7, 8 and 9 and comprises a foot-member 14 of U-shape having upturned sides 14a which terminate in out-turned slideways 14b having upper stop-projections 14c. Lower stop-projections are also provided at 14d. A housing 15, provided with holes 15a for attachment by means of screws or rivets to a supporting member of an appliance has downwardly extending sides 15b which terminate in grooved side extensions, 15c adapted to slideably engage slideways 14b. A spring is provided at 16 and tends to force foot member 14 diagonally downward in the direction of the arrow in Fig. 7 until the stop-projections 14c engage the housing. Diagonally upward movement of foot-member 14 is limited by contact of stop-projections 14d against the housing.

Figs. 10 and 11 show a modified form of unit A in which cam lugs are omitted on stem 6 which is made

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square to prevent its turning in square holes 5c provided in bracket 5. Downwardly extending cam wings 5e on bracket 5 are provided with angular cam surfaces 5f which engage U-shaped cam 17 having angular cam surfaces 17a. The lower edges of cam 17 rest on surface 6e of stem 6. A screw 18 passes freely through a hole 17b provided in cam 17 and is threaded into stem 6 at 6f. A spring 13 engages hole 6d in stem 6 and urges said stem upwardly. Vertical adjustment of stem 6 is accomplished by rotation of screw 18.

In Figs. 12 and 13 another modified form of unit A is shown wherein the cam action is upon the upper end of stem 6 which is beveled as shown at 6g in Fig. 14 and shown dotted in Figs. 12 and 13. Stem 6 is slideably mounted for vertical adjustment in bracket 19 which is provided with mounting holes 19a for attachment to supporting member 1a which is a part of an appliance. The upper leg 19b of the U-shaped bracket serves as a slide-way for a cam-member 20 having an angular cam surface 20a and inturred flanges 20b which slide under slide-way 19b. At the front of cam-member 20 is provided a downwardly bent portion 20c, perforated to freely receive a screw 10 upon which a friction washer 12 and square nut 11 are mounted. The inner end of the screw contacts stem 6. To prevent said nut turning a retaining lug 20d is bent inwardly from portion 20c. A spring 13 engages hole 6d in stem 6 to hold the stem up against cam surface 20a. Adjustment of the stem is accomplished by turning screw 10.

Fig. 14 illustrates another modification in which an S-shaped bracket 24 slideably carries a stem 6 in perforations 24a. Stem 6 has a beveled upper cam end 6g against which the cam surface 25a of cam 25 bears. Bracket 24 has a horizontal bearing surface 24b which slideably supports upward thrust of cam 25. To operate the cam for vertical adjustment of the stem a screw 10 is rotatably mounted in holes 24c and 25b provided in bracket 24 and cam 25 respectively. A square fiber braking washer 12 and square nut 11 are mounted on the screw as shown. Vertical adjustment of the stem 6 is accomplished by turning screw 10. Stem 6 is held upwardly against cam 25 by a spring 13 having inturred ends engaging stem holes 6d.

Another method of adjusting a vertical stem by means of a cam is shown in Figs. 15 and 16 in which a stem 6 has a rounded top cam end 6h and is slideably mounted in a bracket 21 having mounting holes 21a for attachment to support member 1a. A U-shaped cam 22 is pivotally mounted by means of a pivot pin 23 against the under side of bracket 21 and has a curved cam surface 22a which bears on the rounded end 6h of stem 6. To operate the cam for vertical adjustment of the stem a screw 10 is freely held in an opening 22b of cam cross portion 22c and is provided with a square nut 11 and bears against stem 6. A spring 13 with inturred ends 13a engaging holes 6d in stem 6 forces the stem upward against cam surface 22a.

The present practice of many manufacturers of enclosed appliances, such as washing machines, driers and cooking ranges is to provide four threaded foot stems vertically held in corner brackets of the appliance and provided with nuts and lock-nuts for vertical adjustment.

This necessitates turning the appliance on its side in order to adjust the foot stems to suit irregularities in the floor and to level the upper surface of the appliance. This is particularly objectionable when the appliance is installed in a recess as it then is necessary to remove the appliance several times for re-adjusting by approximation. This requires the services of at least two men and the appliance is rarely exactly supported at all four corners.

To overcome this difficulty I have devised a combination of units designated as A, B, and C which provide simple means of adjustment for leveling with a screw driver or key through small openings in the front wall of an appliance. Unit C is one that requires no adjust-

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ment at the time of leveling. This also provides minute automatic adjustment after leveling so that the load is carried on all four feet, thus preventing wobble and reducing vibration.

Referring to Fig. 6 which shows a suggested arrangement of the several units, the procedure for installation of an appliance equipped with these units is as follows:

Front adjusting units A have the foot-stems adjusted upwardly to their limit, which can be done during assembly at the factory. In this position of the front feet the appliance is tilted slightly downward at the front.

The appliance D is now slid backwardly into its intended location causing the automatic unit B to adjust upwardly.

Unit A opposite unit C is next adjusted to level the appliance from front to back, using a screw driver or key through the small aperture in the front of the appliance casing to turn the adjusting screw.

To level the appliance from left to right, unit A opposite unit B is next adjusted in the same manner. If the center of gravity is toward the unit B slight downward pressure may be applied on the corner diagonally opposite unit B so as to provide three point bearing on units A and C, which will permit unit B to automatically adjust downwardly to the floor and thus provide four point bearing.

This automatic adjustment and solidity of support thereafter is due to the fact that the top of foot member 14 slopes at a small angle to the horizontal, as do the surfaces on the housing 15 that cooperate therewith; the component of a downward thrust on the housing parallel to such surfaces being insufficient to cause relative movement between the housing and the foot member. In the absence of a spring the slope should usually be not more and preferably less than 15°. The spring adds its resistance to the frictional resistance in preventing relative movement of the foot member from the full line position in Fig. 9 to the broken line position; and, therefore, the addition of a spring permits the use of a somewhat steeper slope, depending on the strength of the spring. When the appliance is slid into position unit B adjusts itself to some position between the two extreme positions, for the reason that the friction of the foot member on the floor permits relative movements, not possible under static conditions, between the foot member and the housing. Then, when the appliance is tilted, as mentioned above, the spring is left free to take up any slack.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A levelling means for an appliance comprising two front feet and two rear feet, one rear foot being of the type that adjusts itself automatically and the other having a fixed setting; the two front feet being independent of each other and each containing means to adjust it vertically and an outwardly directed horizontal screw for operating said means and maintaining any given adjustment of that foot, and the screws having at their outer ends means by which they may be turned.

2. A vertically adjustable foot structure including a bracket adapted to be attached to an appliance, a vertical stem extending slidably through said bracket, a spring positioned between the ends of the stem and connected at one end to the stem while its other end is engaged with the bracket to prevent the stem from falling out, a member engaged with the bracket and movable laterally with respect to both the bracket and the stem, cooperating cam surfaces on said member and said stem to cause the stem to be pressed down when said member is shifted in one direction, and a transverse screw extending through a part of said member and forming an adjustable spacer between the same and the stem for shifting said member in said direction.

3. A foot structure as set forth in claim 2, wherein the movable cam member is mounted for sliding movements at right angles to the stem.

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4. A foot structure as set forth in claim 2, wherein the movable cam member is mounted on the bracket for swinging movements through a small angle.

5. A foot structure as set forth in claim 2, wherein the screw is in screwthreaded relation with the movable cam member and abuts against the stem.

6. A foot structure as set forth in claim 2, wherein the screw extends loosely through a part on the movable cam member and is screwed into the stem.

7. A foot structure as set forth in claim 2, wherein the cam surface on the stem is in a fixed position thereon and lies below the surface on the cam member with which it cooperates.

8. A vertically adjustable foot structure including a bracket member adapted to be attached to an appliance and having a U-shaped portion with its legs horizontal and one above the other, a vertical stem member extending slidably through said legs, a spring positioned between said legs and resting at one end on the lower leg while its upper end is secured to the stem member, a cam element movable laterally relatively to both members, cooperating cam surfaces for moving the stem member down, one of such surfaces being in a fixed position on one of said members and the other surface being on the movable cam element, and a screw extending through a part of the said cam element and engaging one of said members to form an adjustable spacer for moving said cam element in the direction to press the stem down.

9. A foot structure as set forth in claim 8, wherein the stem member has at the bottom a shoulder, the cam element is slidably supported on said shoulder with its cam surface facing upwardly, the cooperating cam surface being on the bracket member, and the screw passes loosely through the cam element and is screwed into the stem member.

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10. In an automatic foot-adjusting unit, a floor contacting foot member U-shaped in vertical transverse section, with the upper edges of the legs of the U inclined relative to the floor contacting surface, an inverted upper U-shaped member attachable to an appliance to be supported and having the lower edges of the turned down legs inclined at the same angle as the upper edges of the legs of the floor engaging member, said U legs having interlocking runways slidably engaged to permit relative sliding movements between said members, and a spring connecting said members and urging the foot member downwardly along said runways.

11. An automatic adjusting unit as described in claim 10, wherein the angle of the runways is in the vicinity of 15° plus an increment offsetting the pull of the spring, so that the weight of the supported appliance will not affect the relative positions of the foot member and the supporting member except when the appliance is slid along the floor or is raised at the point of attachment of said unit to the appliance.

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