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2,829,317

DEVICE FOR SUSPENSION OF HOUSINGS

Filed June 11, 1954

2 Sheets-Sheet 1

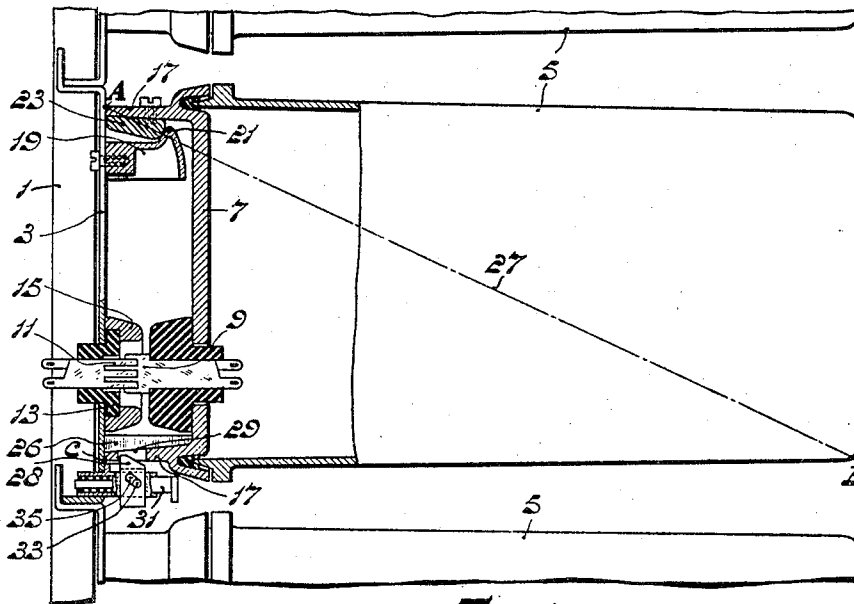


Fig. 1

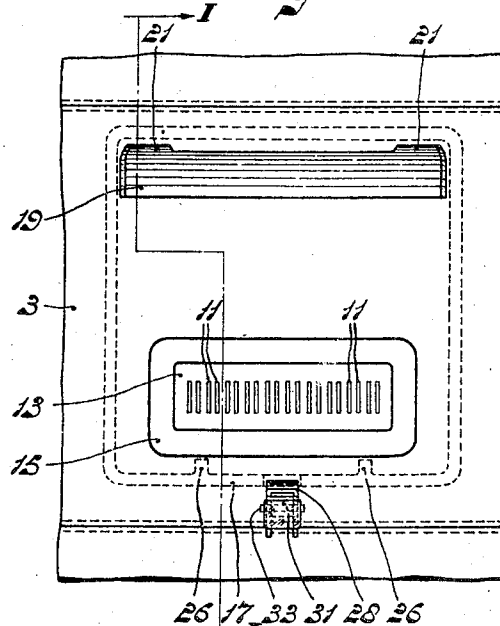


Fig. 2

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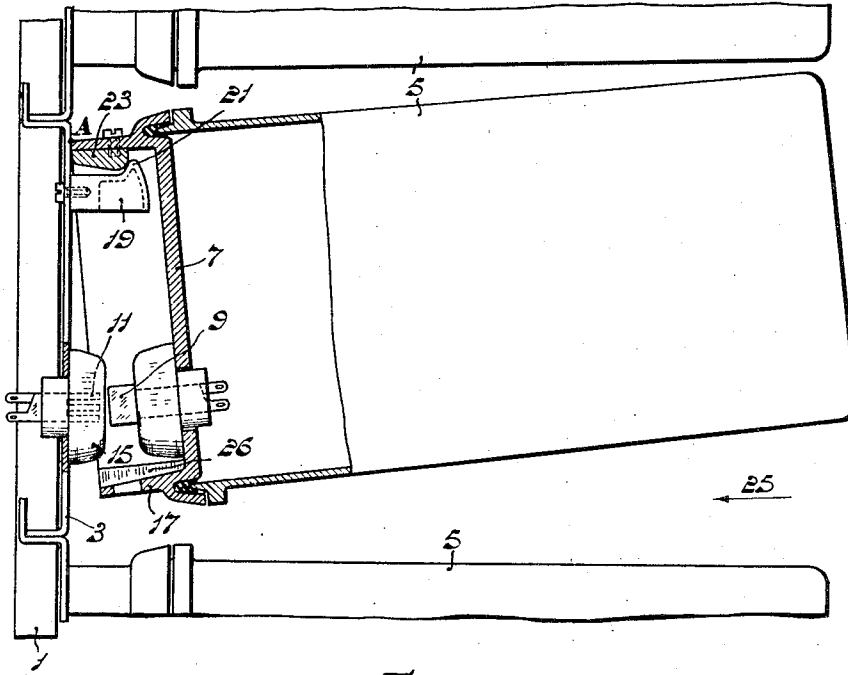


Fig. 3

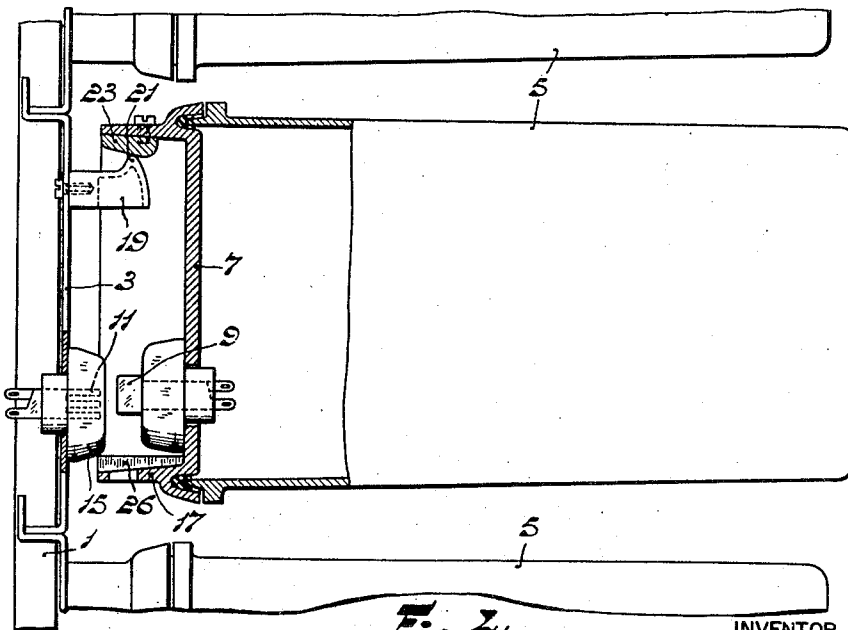


Fig. 4

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DEVICE FOR SUSPENSION OF HOUSINGS

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7 Claims. (Cl. 317-99)

This invention relates to suspension devices for the detachable attachment of housings comprising electric apparatus and connecting contacts to a vertical supporting wall having connecting contacts, for example in a frame, more particularly for telecommunication, in which a plurality of housings are provided in superposition and juxtaposition.

The housings must always be suspended on the frame and removed therefrom more or less by feel and the object of the invention is to provide a suspension device which permits of carrying out such operations without difficulty and without damage to the connecting contacts, even if the attachment means cannot be seen very well.

According to the invention, this is ensured by providing the supporting wall with at least one hook projecting forwardly and having its bit directed upwards (the stationary hook), whereas the rear wall of the housing adjacent the supporting wall comprises near its upper edge at least one hook projecting horizontally backwards and having its bit directed downwards (the removable hook), which hook co-operates with the first-mentioned in at least two tangent points shifted horizontally, in which the tangent planes are forwardly inclined, at least this hook exhibiting an inclined profile at its free extremity, abutment means which are active in the vertical direction being provided along the lower side of the rear wall, which means co-operate with abutment means provided on the supporting wall, both of which abutment means limiting the freedom of movement of the housing in the upward direction in such manner that the hooked connection can be loosened only after the front side of the housing has been moved upwards.

The abutment means are preferably constituted by elevations of the supporting wall and of the rear wall of the housing, at least one of the adjacent sides of the elevations being inclined as viewed from the supporting wall.

In one advantageous embodiment the (stationary) connecting contacts on the supporting wall are surrounded at least in part by a protective edge of which the lower portion also co-operates as an abutment means with the elevated lower edge projecting backwards, of the rear side of the housing.

In order that the invention may be readily carried into effect, it will now be described with reference to the accompanying drawings, given by way of example, in which:

Fig. 1 is a vertical section of one embodiment of the invention,

Fig. 2 is an elevation view of the supporting part of the suspension device shown in Fig. 1, and

Figs. 3 and 4 serve to demonstrate the operation of the device shown in Fig. 1.

Fig. 1 shows an amplifying frame, for example for line telephony, substantially comprising an iron frame 1 of conventional construction (only one pillar can be seen in Fig. 1) which carries a plurality of metallic panels 3, each of which serves as a supporting wall for a housing 5 or for a plurality of such housings in juxtaposition. A comparatively large number of housings, for example

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80, may be provided on the frame closely in superposition and juxtaposition. The housings 5 are each closed hermetically by an associated rear wall 7 and each comprise a plurality of electric parts, such as transformers, resistors, filters, amplifying tubes, etc., which jointly constitute an electric unity, for example an amplifier having a correcting network.

The connections of the amplifier extend to a horizontal row of vertical knife contacts 9 (the "loose" contacts), which co-operate with a row of resilient contacts (the "stationary" contacts) provided on the panels 3. The resilient contacts 11 are secured in an insulating block 13 having an elevated edge 15 by which the comparatively vulnerable resilient contacts are protected against damage. Protection of the knife contacts 9 is ensured by an elevated edge 17 of the rear wall 7 which, in addition, encloses in a dust-tight manner the space between the rear wall 7 and the panel 3, which space contains inter alia the contacts 9 and 11.

The supporting panel 3 has secured to it, adjacent its upper edge, a broad hook 19 projecting forwards and having a bit 21 which is directed upwards. Said bit actually comprises two active portions which are shifted horizontally (see Fig. 2) and which engage a bit 23, directed downwards, which is secured to the lower side of the upper horizontal part of the edge 17, constituting therewith a hook having its bit directed downwards. The bit 23, as seen in the sectional view of Fig. 1, comprises a circularly rounded portion which engages the bit 21 and exhibits an inclined part, whereas the free extremity of the hook 19, 23 likewise has an inclined profile which is rounded at the top. The finding of the position of engagement of the hooks is thus facilitated.

Fig. 3 shows the somewhat inclined position in which the housing is placed. In the vicinity of arrow 25 there is space for the hand holding the housing 5, 7. After the hooks 19, 21 and 17, 23 have engaged one another, the contacts 9 and 11 occupy the correct position of engagement, since the hook 19, 21 in co-operation with the edge 17 determines the position of the housing 5, 7 also in the lateral direction (see Fig. 2). The contacts 9 and 11 are caused to engage one another by pushing down the front part of the housing 5, the housing thus turning substantially about the junction line between the tangent points of the bits 21 and 23 until the position shown in Fig. 1 is reached.

In this position the housing is protected against loosening of the hook 17, 23, since the freedom of movement of the housing in the upward direction is limited to a small distance, for example 0.5 mm., which is insufficient for the bit 23 to disengage from the hook 19, 21. This limitation is obtained due to the lower side of the insulating block 13, 15 co-operating as an abutment means with the lower horizontal part of the edge 17 which, in the case shown in Fig. 1, is elevated by one or more vertical ribs 26 extending in the longitudinal direction of the housing 5, 7. The housing 5, 7 can be detached only after tipping the housing by moving its front side upwards approximately into the position shown in Fig. 3, so that the contacts 9 and 11 are caused to disengage from one another. The housing thus turns about a horizontal axis through the highest tangent point A between the housing—that is to say the edge 17—and the supporting wall 3. The circular part of the bit 23 then slides upwards along the rear side of the bit 21 which in view thereof preferably in profile substantially has the shape of a short arc of a circle having point A as its centre. The afore-mentioned lower side of the block 13, 15 is inclined, on the one hand to prevent the tipping movement from being impeded and, on the other hand, to facilitate the "finding" process in hooking-on the housing.

However, as may be seen from Fig. 4, upright introduction of the housing, which would involve a risk of wrong engagement and damage to the contacts 9 and 11, is not practicable.

Since the hooks are protected in the described manner against loosening, it is not necessary for them to be in the shape of barbs, that is to say the angle enclosed between bit 21 and the body 19 of the hook—in general the angle which the tangent plane (or tangent planes) in the tangent point between the bits 23 and 21 makes with the (horizontal) body 19—may be upwards of 90°, that is to say, the tangent plane is forwardly inclined, so that detachment of the housing is considerably facilitated; after the position shown in Fig. 3 is reached, the housing may be removed in the forward direction from the hook 19, 21 without exerting any appreciable force, the bit 23 of the removable crook sliding smoothly over the rounded top of the bit 21. Said angle may be about 120°, that is to say that the angle between the tangent plane and the vertical is 30°; in the case of a housing similar to that shown (see Fig. 1) in the form of a rectangular parallelepiped, which is longer than it is high, it is preferable to ensure that the tangent plane is at right angles to the junction line (dotted line 21, see Fig. 1) between the tangent point and the point B located in the front surface of the housing 5, 7 at the height of the lowest tangent point C with the supporting wall 3 (approximately at the height of the lower rib on the front side of the housing 5). For a circularly-bent surface of the back of the bit 21 having its centre at A, this requirement means that (as viewed in profile in Fig. 1) the tangent point of the bits 21 and 23 must be located on or above the junction line AB, since a simple calculation shows that in this case a force acting upon the front side of the housing and directed downwards—for example upon tipping down after hooking-in—can never bring about a shearing force at the tangent point tending to push the hook 17, 23 out of the hook 19, 21.

When complete protection against loosening of the housing 5, 7 is desired, it is possible to provide under the housing on the supporting wall 3 a pawl comprising a bolt 28 which is slidable vertically and subject to an upwardly directed pressure and which can snatch into a recess 29 provided on the lower side of the edge 17, so that the housing 5, 7 is completely locked. The housing is detached with the use of a member 31 which can slide horizontally and which is subject to a forwardly directed spring pressure, said member carrying a pin 33 which can slide in an inclined slot 35 of the bolt 28. The bolt 28 is moved downwards and the locking eliminated by pushing the member 31, for example by means of a wooden board which is brought between the housings 5.

What is claimed is:

1. A suspension device for removably attaching a housing for electrical apparatus to a vertical wall comprising a hook-shaped supporting member on said wall provided with a bit thereon, a companion, hooked-shaped attaching member on said housing provided with a bit thereon, said bits being interengageable and having their engaging portions pointing in an upward direction,

a first abutment means on said wall below said member, said housing being pivotally supported by sliding engagement of said attaching member on at least two horizontally spaced points on the surface of the bit on said supporting member, and a second abutment means on said housing below said attaching member and being engageable with said first abutment means for limiting the pivotal movement of said housing and for preventing the vertical displacement of said housing when said abutment means are engaged, said points of contact of the supporting member being included in a plane tangent to the contacting surface of said attaching member inclined at an acute angle to the vertical wall whereby the engaged abutment means can be separated by pivotal rotation of said housing in an upward direction.

2. A suspension device as claimed in claim 1 in which said abutment means comprise raised portions extending in opposition to one another from the vertical wall and from the housing respectively for limiting the pivotal movement of said housing, electrical contacts on said abutment means for engaging with one another when said abutment means are operably engaged, and opposed projections for protecting said electrical contacts projecting from said wall and said housing respectively, said projections having at least one surface engageable with a surface on the opposed projections for preventing the vertical displacement of said housing when said surfaces are engaged.

3. A suspension device as claimed in claim 1 in which projecting walls extend from the sides of said housing toward the vertical wall, and said bit mounted on an inner surface of one of the projecting walls constitutes said attaching member.

4. A suspension device as claimed in claim 1 in which the angle of the tangent plane with the vertical wall exceeds 30 degrees.

5. A suspension device as claimed in claim 1 in which said housing has the shape of a rectangular parallelepiped with the longest dimension disposed horizontally when said abutment means are engaged, and the tangent plane between said supporting and attaching members being at substantially right angles to a diagonal line extending between the contacting point of said members and the opposite lower corner of the housing.

6. A suspension device as claimed in claim 1 in which the bit on the attachment hook has a rounded surface.

7. A suspension device as claimed in claim 1 in which the bit on the supporting member has a curved surface thereon, the center of curvature of said surface being located on the intersection of said supporting wall and the top of said housing, and the tangent point between the bits on the two members lies on or above the diagonal line between said center of curvature and the opposite lower corner of the housing.

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