United States Patent [19]

Senelet

[11] **3,871,685**

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[54] **DEVICE FOR STATILIZATION OF AN APPLIANCE**

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[21] Appl. No.: **433,797**

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Jan. 18, 1973 France 73.01789

[52] **U.S. Cl.** **280/150.5**, 212/154

[51] **Int. Cl.** **B60s 9/12**

[58] **Field of Search** 280/150.5; 212/145

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[57] **ABSTRACT**

A device for stabilization of an appliance having a chassis comprising a telescopic beam adapted to be fixed to the chassis, a telescopic arm pivotally connected to the beam and carrying a stabilization support, means for telescoping the arm and beam, and means for adjusting the relative angular position of the arm and beam and permitting first and second extreme angular positions corresponding to orientations of the telescopic movement of the arm which are respectively vertical and at an inclination to the vertical.

7 Claims, 9 Drawing Figures

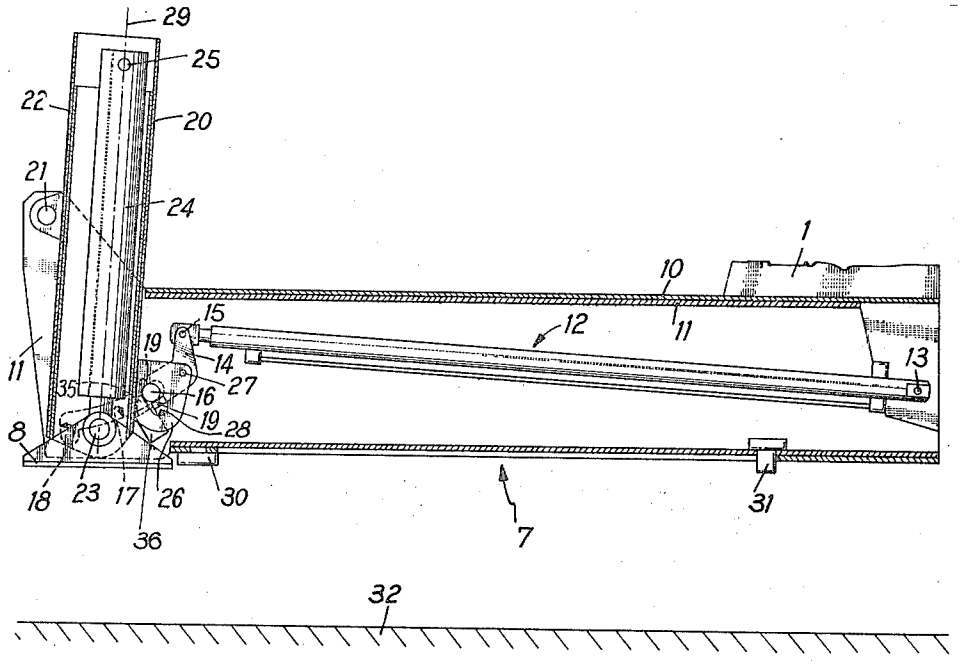

Fig. 1

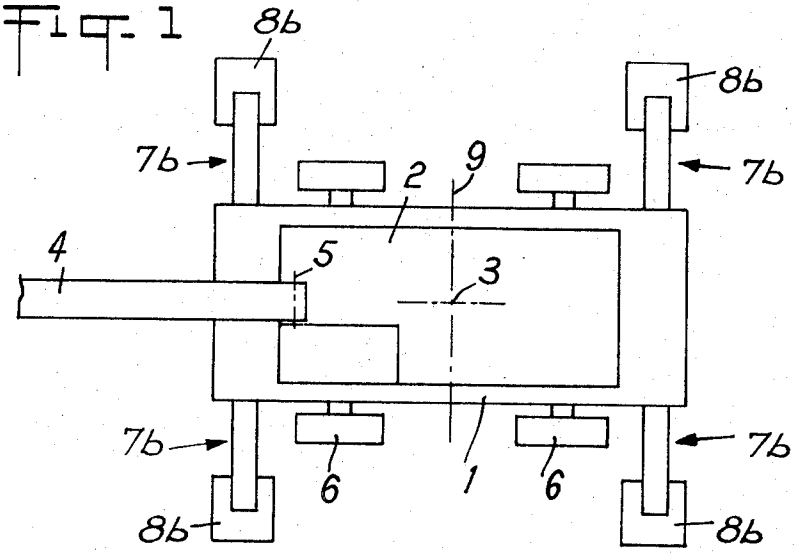

Fig. 6

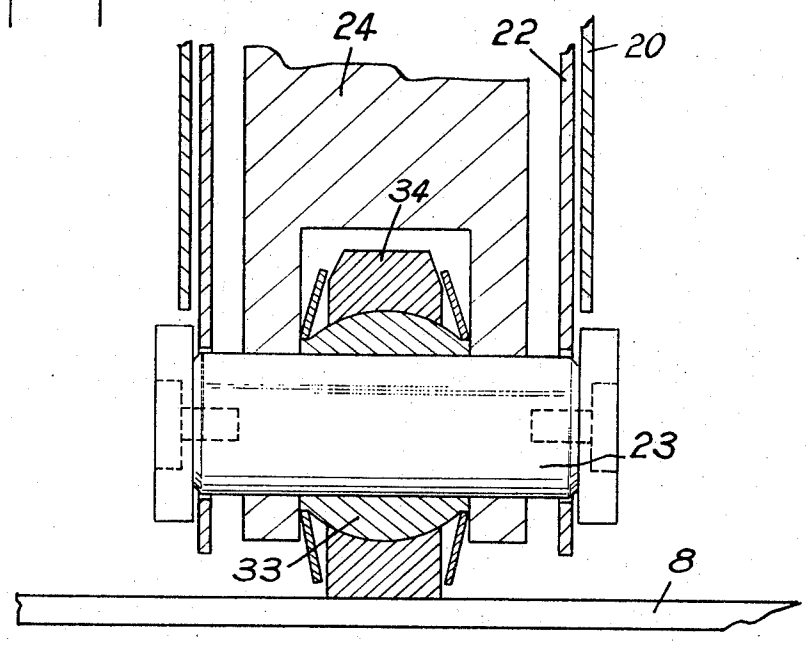

FIG 2

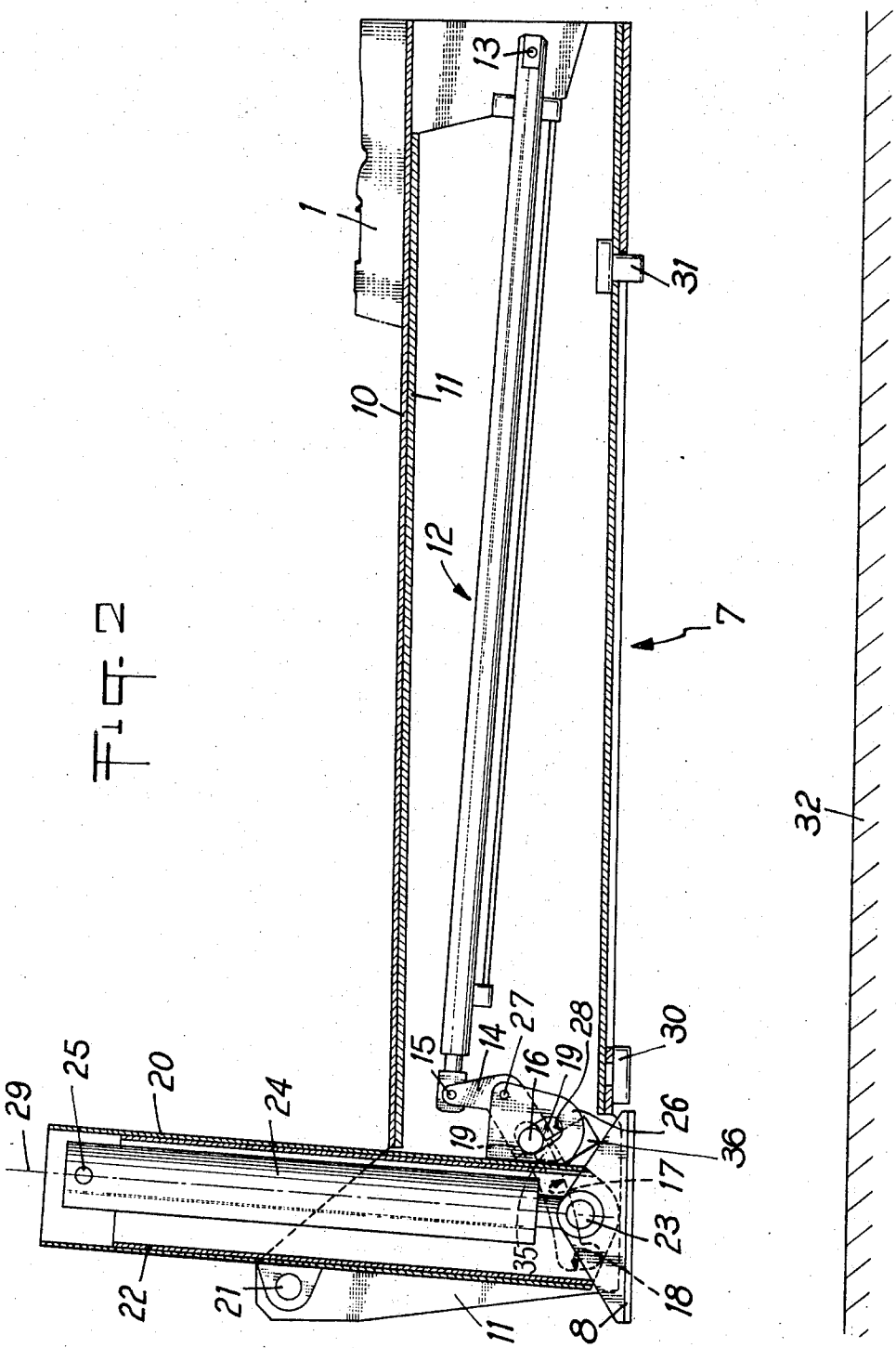
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FIG. 3

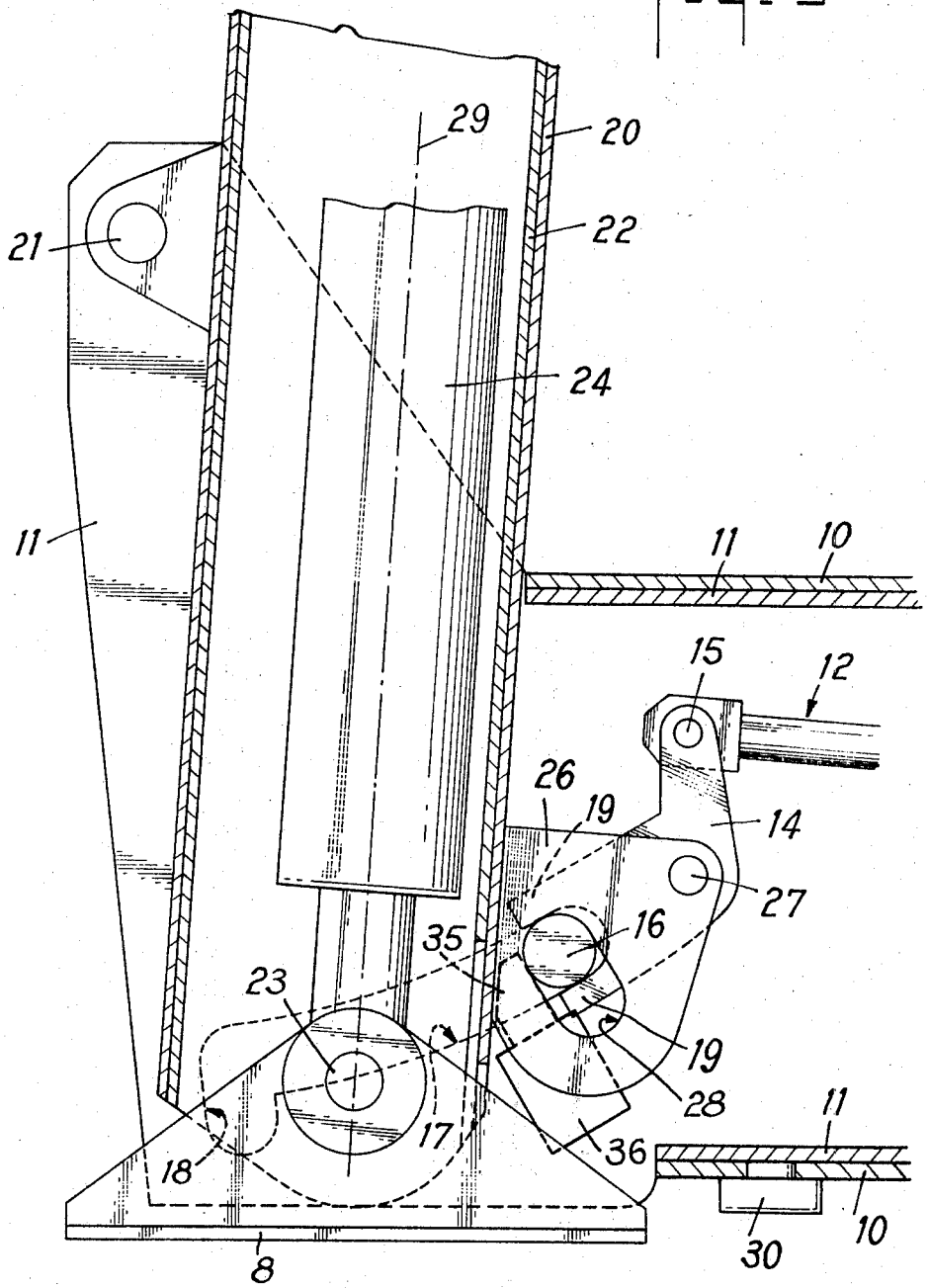
29
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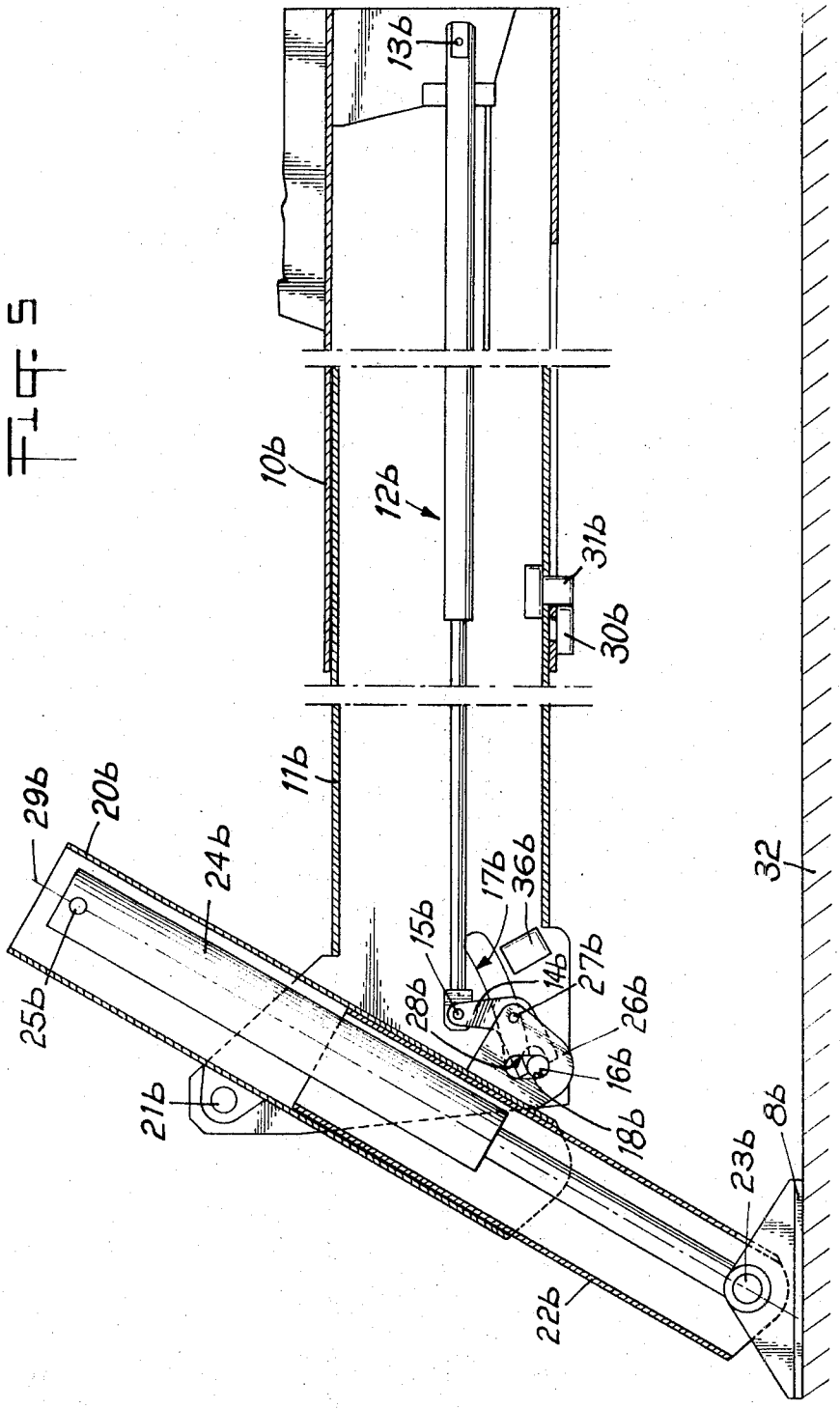
FIG. 5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25b
21b
23b
8b
22b
32

FIG. 4

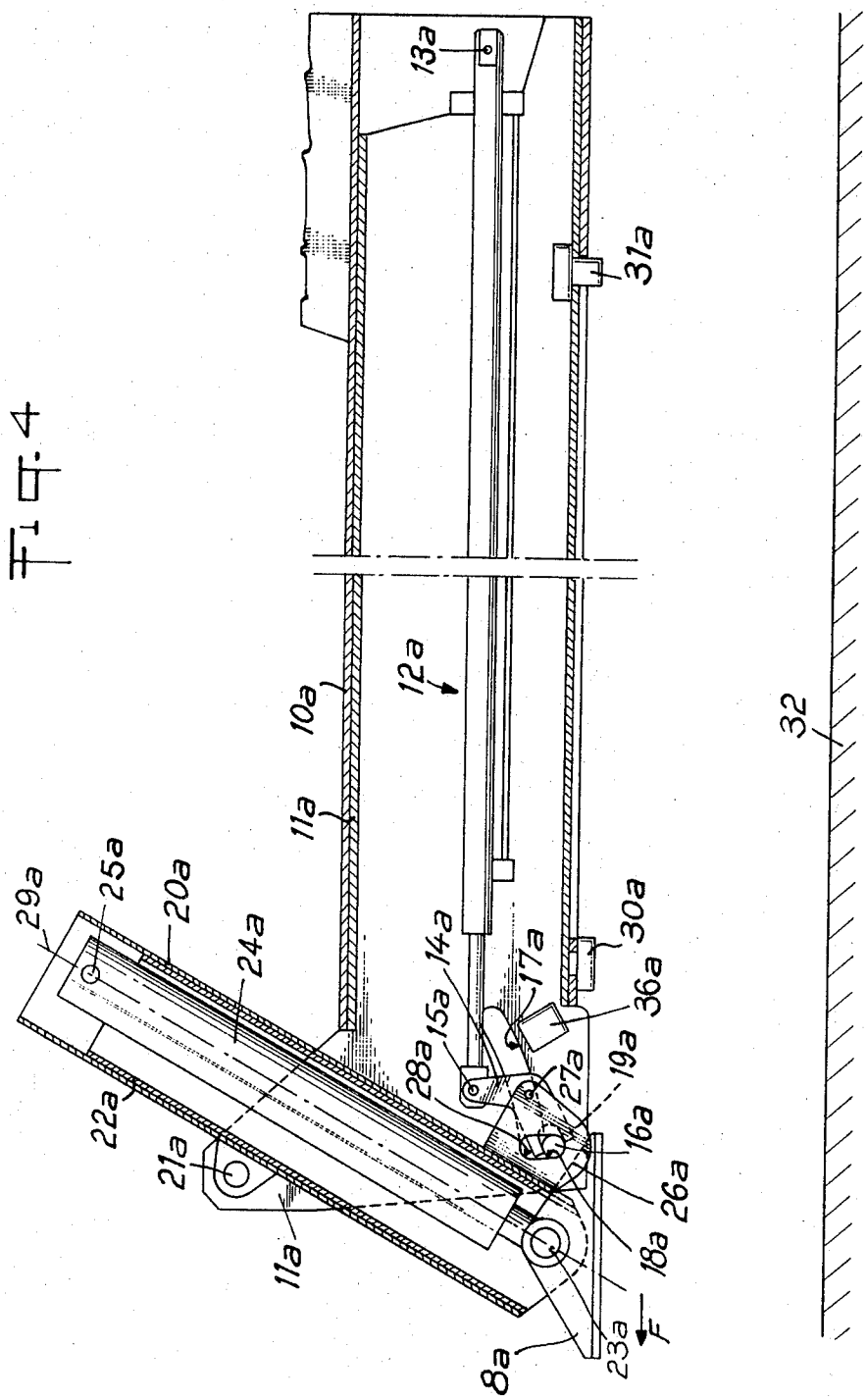
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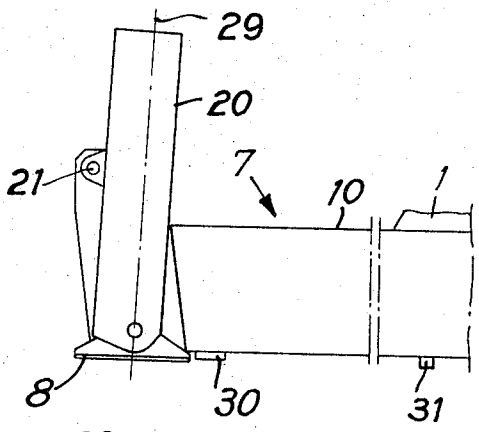
FIG. 7



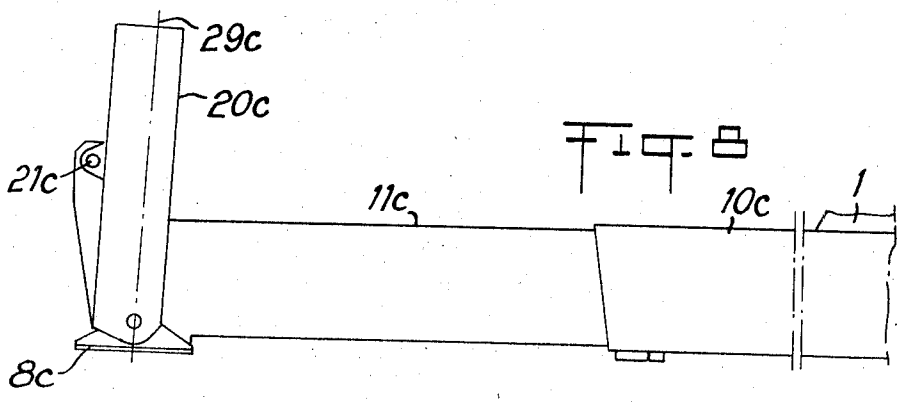


FIG. 8

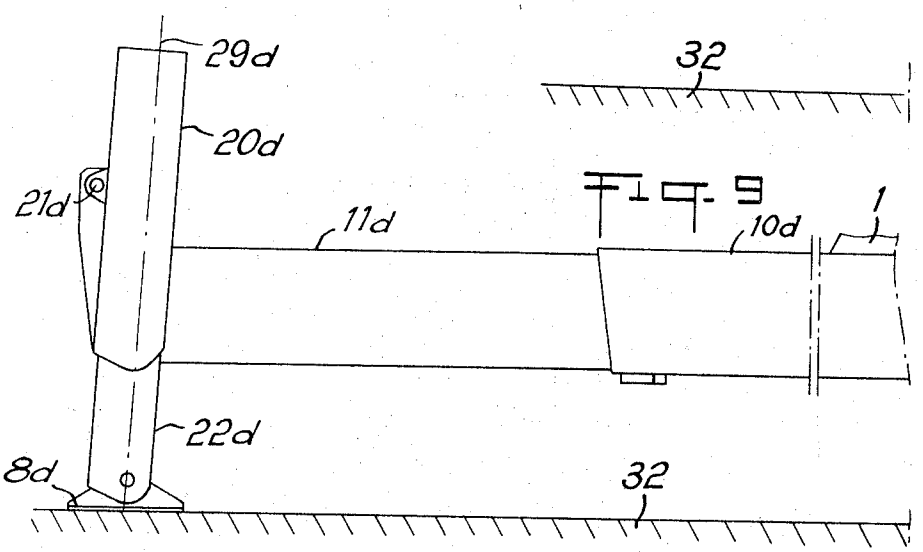


FIG. 9

DEVICE FOR STATILIZATION OF AN APPLIANCE

The present invention relates to improvements in stabilization devices for appliances.

It is known that during the working periods of e.g. a maintenance or public works appliance or vehicle it is advisable to ensure good stabilization of the chassis thereof. Customarily this operation is carried out by making the chassis bear on the ground by means of plates made integral with the said chassis and called stabilization supports.

It is clear that the best stabilization is obtained by arranging the stabilization supports as far away as possible from the chassis so as to produce a support polygon of large dimensions. This way of proceeding, however, comes into contact with statutory provisions for highway traffic, which lay down that a certain loading gauge should not be exceeded.

In wishing to take advantage of the advantages inherent in a large support polygon whilst respecting the highway traffic rules it has been proposed that the stabilization supports should be mounted on telescopic beams and the said supports articulated to the beams.

According to one aspect of the present invention there is provided a device for stabilization of an appliance having a chassis comprising at least one telescopic beam having at least two elements of which a first beam element is adapted to be coupled to the chassis and a second beam element is slidably mounted with respect to said first beam element; a first means for adjustment of the relative position of said first and second beam elements coupled between said first and second beam elements; a telescopic arm pivotally mounted on said second beam element for pivotal movement about a horizontal axis and comprising at least two elements of which a first arm element is pivotally mounted on said second beam element and a second arm element is slidably mounted with respect to said first arm element; a second means for adjustment of the relative position of said first and second arm elements coupled between said first and second arm elements; a stabilization support arranged at one of the ends of the said arm; and a third means for adjustment of the relative angular position of said first arm element with respect to said second beam element coupled between said first arm element and said second beam element and permitting first and second extreme angular positions of adjustment corresponding to orientations of the direction of telescopic sliding movement of said arm which are respectively substantially vertical and inclined with respect to the vertical in the sense of movement of the free end of said second arm element away from the chassis.

Advantageously said third adjustment means comprises said first adjustment means, a first slot in said second beam element, a second slot in said first arm element, a slidable member introduced into said first and second slots and coupled to a portion of said first adjustment means movable with respect to said first beam element, and a stop for limiting sliding of said beam under extension.

Further, said third adjustment means preferably includes a selective retention means for said slidable member for retaining it at the location which it occupies in said first slot which corresponds to said first extreme angular position of said first arm element with respect to said second beam element.

Said first slot preferably comprises a first branch which is slightly inclined with respect to the direction perpendicular to the direction of telescopic sliding of said arm, and a second branch which extends the first branch, is substantially perpendicular to it and forms a notch for retaining said first arm element with respect to said second beam element in said second extreme angular position. When the device is mounted on the appliance, the direction of telescopic sliding of said beam is advantageously substantially parallel with one of the transverse axes or longitudinal axes of said chassis.

Preferably said first and second adjustment means consist of jacks.

According to another aspect of the invention there is provided a method of putting in place a stabilization support as above described, wherein the adjustment of the pivoting of the arm is effected to place it in the second extreme angular position, telescopic sliding of the beam for extending it is carried out, and finally the telescopic sliding of the arm for extending it is carried out.

The invention will be better understood from the following description of an embodiment thereof, given by way of example only, with reference to the accompanying drawings, in which:

FIG. **1** is a plan view of an appliance provided with stabilization devices in accordance with the invention;

FIG. **2** is a section through an embodiment of a stabilization device in accordance with the invention, in a first configuration for unimpeded travel of an appliance provided with it;

FIG. **3** is a section showing a detail of the device of FIG. **2**;

FIGS. **4** and **5** are sections similar to that of FIG. **2**, of the stabilization device of FIG. **2** in two different configurations;

FIG. **6** is a section showing a part of the device of FIG. **2**; and

FIGS. **7**, **8** and **9** illustrate in elevation three other configurations of the stabilization device of FIG. **2**.

In FIG. **1** a handling appliance consisting of a self-propelling crane is illustrated. It comprises a chassis **1** upon which a turret **2** is mounted to rotate about a vertical axis **3**. A crane jib **4** is articulated to the turret **2** about a horizontal axis **5**. The chassis **1** is furnished with two sets of wheels **6** and has in addition four stabilization devices **7***b* embodying the present invention, each device **7***b* comprising a plate **8***b* forming a stabilization support, and which are arranged transversely of the chassis **1** of the appliance, parallel with the transverse axis **9**.

In FIG. **2** a stabilization device **7** is shown comprising a first element **10** of a telescopic beam and of a second element **11** of this beam.

The first element **10** is hollow and fast with the chassis **1**, and the second element **11**, which is also hollow, is mounted slidingly in the element **10**. A jack **12** is coupled between the first element **10** and the second element **11** by being articulated on to the element **10** for pivotal movement about an axis **13**, and articulated on to a plate **14**, forming a connecting means, for pivotal movement about an axis **15**. The plate **14** is coupled to the second element **11** by a pin **16** slidable in a slot having two branches **17** and **18** and formed in the second element **11**, the pin **16** being arranged between two branches **19** of one end of the plate **14** which is shaped like a fork.

It will be observed that the rod **35** of a jack **36** is, in the configuration of FIGS. **2** and **3**, arranged to project in front of the pin **16**, keeping the latter at the end of the slot branch **17** which is opposite the branch **18**. The rod **35** of jack **36** can, however, be retracted into the body of the jack and can thus be completely withdrawn from engagement with the pin **16** in the slot **17**, as illustrated in FIGS. **4** and **5** in which the jack is shown at **36***a* and **36***b* respectively. The body of the jack **36** is in fact fixed to the second element **11** of the beam.

A telescopic arm illustrated in FIGS. **2** and **3**, comprises two elements: a first element **20** which is articulated to the second element **11** of the beam for pivotal movement about an axis **21** and a second element **22** which is slidably mounted in the first element **20**. A stabilization support **8** is articulated to the free end of the second arm element **22** for pivotal movement about an axis **23**. In addition a jack **24** is articulated to the first arm element **20** for pivotal movement about an axis **25** and to the second arm element **22** for pivotal movement about the axis **23**. The plate **14** is pivotally connected to a member **26** fast with the first arm element **20** for pivotal movement about an axis **27**. A slot **28** centred on the axis **27** is partially superimposed on the slot **17**, **18**, the pin **16** being introduced concomitally into the slots **17**, **18** and **28**.

The telescopic arm **20**, **22** and the telescopic beam **10**, **11** are in a like configuration in FIGS. **2** and **3**. The second element **11** of the beam is almost entirely contained within the first element **10**, just as the second arm element **22** is also almost entirely contained within the first arm element **20**. Moreover it can be seen that the pin **16** is arranged at the end of the slot branch **17** which is opposite to that adjoining the slot branch **18**. The direction **29** of sliding of the second arm element **22** in the first arm element **20** is substantially vertical. It will be observed that the slot branch **17** is elongate and slightly inclined with respect to the horizontal, the slot branch **18** being perpendicular to the slot branch **17** at one end of branch **17** and directed downwardly. Two members **30** and **31** are fixed respectively to the first element **10** and the second element **11** of the telescopic beam so as to cooperate with one another to limit the amplitude of relative sliding of the first element **10** and the second **11** of the beam.

In FIGS. **4** and **5** the same members are found again as those already described in respect of FIGS. **2** and **3**, but in two new configurations. The members are designated by the same references as those used in FIGS. **2** and **3**, followed respectively by indices *a* for the configuration of FIG. **4** and *b* for the configuration of FIG. **5**.

In the configuration of FIG. **4** the rod of the jack **12***a* has been moved slightly out of the cylinder of this jack, which has caused displacement of the pin **16** along slot branch **17***a* and into the branch **18***a* to position **16***a*. Consequently the plate **14** has come to position **14***a*, the member **26** being constrained to arrive at a new orientation **26***a*. This movement has pivoted the arm **20***a*–**22***a* about the axis **21***a*. Thus the direction of sliding of the second element **22***a* of the arm with respect to the first element **20***a* of the arm has moved to **29***a*. The direction **29***a* is inclined with respect to the vertical in the sense of the arrow F, that is to say, in the sense of the movement of the support **8***a* away from the first element **10***a* of the beam. It is seen that the slight extension of the jack **12***a* has caused practically no sliding of the second element **11***a* of the telescopic beam with respect to the first element **10***a*. Further, the slot branch **18***a*, being substantially perpendicular to the branch **17***a*, is in space substantially vertical or again substantially aligned with the axis **21***a*. The slot branch **18***a* has a particular locking function which will appear.

In the configuration of FIG. **5** the extension of the jack **12***b* has been continued. The pin **16***b* has been kept in the position which it had at **16***a* and remains in the slot branch **18***b*. The second element **11***b* of the beam has this time come out of the first element **10***b*. Moreover the jack **24***b* has been extended, which has caused the second element **22***b* of the arm to come out of the first element **20***b*. It will also be seen that the stabilization support **8***b* has come to bear against the ground **32**, whereas in the configurations of FIGS. **2**, **3** and **4**, the stabilization support **8** and **8***a* was arranged above the ground **32** without being in contact with it. It will also be seen that the direction **29***b* of extension of arm **20**, **22** is parallel to the direction **29***a* of FIG. **4**.

FIG. **6** illustrates the coupling of the jack **24** and of the support **8** to the second arm element **22**. It is seen that in fact a pin **23** connects the second element **22** and the end of the jack **24** and can slide out of the first element **20** of the arm. A bush **33** of spherical shape is arranged on the pin **23**, and a bearing block **34** having a shape corresponding to that of the bush **33** and fast with the stabilization support **8** is mounted to pivot freely about the bush **33**.

FIGS. **7** to **9** show in elevation the stabilization device of FIGS. **2** to **6**. In FIG. **7** the device is in the configuration shown in FIGS. **2** and **3**.

In FIG. **8** the second beam element has come to **11***c*, the said beam being fully extended. The first element is at **10***c*. The first element of the arm has come to **20***c*, the second element of the said arm remaining in the retracted position with respect to the said first element **20***c*. The bearing plate has arrived at **8***c* and the pin **21** has arrived at **21***c*. The direction **29***c* of relative sliding of the elements of the arm has remained parallel with the direction **29**.

These various elements are in the configuration of FIG. **9** with the beam elements at **10***d* and **11***d* (the beam fully extended), and the arm elements at **20**d and **22***d* (arm also extended), the bearing plate **8***d* bearing effectively on the ground **32**. The articulation pin **21** has arrived at **21***d* and the direction **29** has become **29***d*, parallel with **29**.

The advantages of the stabilization device which has just been described will be better understood in the course of the following explanation of the use of this device.

The method of putting the stabilization support in place is new. Stabilization devices are known which enable telescopic sliding of a beam arranged transversely of the chassis of the appliance. In such known devices a one-piece, non-telescopic pivoting arm is articulated on the movable element of the telescopic beam, and pivoted in the second phase of putting in place, in order to put the stabilization support in contact with the ground. With the above described device according to the invention the arm is telescopic and the putting in contact with the ground is effected by telescoping of the arm. This telescoping therefore constitutes the last phase of the putting into place. On the other hand the pivoting of the arm on the movable element of the telescopic beam can be and, in fact, is effected during the course of the first phase of putting into place.

As regards FIGS. 2, 4 and 5, three phases have been illustrated of putting into place of a first method of use.

FIG. 2 illustrates the stabilization device in its entirely retracted configuration. The direction 29 is practically vertical and the total width of the device is less than the limit of overall width allowed for highway travel of the appliance.

During a first phase, the rod 35 can either be out of the jack 36, as is shown in FIGS. 2 and 3, or retracted into the jack. During the subsequent phases, the rod 35 must be withdrawn into the jack 36, at least at the start, so that the pin 16 is free of the rod and can move along the slot branches 17 and 18.

The first active phase consists in feeding the jack 12 to cause its extension. This extension has already been carried out in the configuration of FIG. 4. The jack is at 12*a*. The pin 15 has arrived at 15*a*, whilst the pin 16 has arrived at 16*a* after having slid along the slot branch 17*a*. The pin is locked in the position 16*a* at the bottom of the branch 18*a*. It will have been observed that the movement has displaced the pin 27 to 27*a*, which has made the element 20 tilt to 20*a* about the pin 21*a*. In this configuration the direction 29*a* is inclined with respect to the vertical, so that the stabilization support 8 has been displaced to 8*a* in the sense of the arrow F, that is to say, in the sense of movement away from the chassis. It will be observed that, as the second arm element is entirely retracted into the first element, the stabilization support at 8 as well as at 8*a* is arranged above the ground 32 without being in contact with it. Moreover the pin 16*a* is arranged at the bottom of the branch 18*a* in a position which prevents its undesired displacement since then the direction of the thrust of the jack 12*a* in the sense of extension is substantially perpendicular to the branch 18*a* and therefore has substantially no component parallel with the branch 18*a* for causing the pin 16*a* to withdraw from this branch. The branch 18*a* therefore functions to lock the pin in the position 16*a*.

The second active phase consists in continuing the extension of the jack 12*a* to arrive at the configuration 12*b* of FIG. 5. The pin 16*a* having reached the end of its possible travel, tilting of the first element 20*a* of the arm has already attained its maximum value. Thus extension of the jack to 12*b* can of itself only now cause telescopic sliding outwards of the second element 11*b* of the beam relative to the first element 10*b*. The stabilization support again moves away from the chassis and to a considerable extent (by an amount of the order of magnitude of the lengths of the elements 10*b* or 11*b*). Sliding is limited by abutment of the members 30*b* and 31*b*. During this second active phase the stabilization support has remained above the ground out of contact with it.

The third active phase of the putting in place is then carried out by extension of the jack 24*b* in the direction 29*b*. This extension causes the stabilization support to descend towards its position 8*b* in which it is in contact with the ground 32. It will have been observed that the direction 29*b* is parallel with the direction 29*a*, the first element 20*b* of the arm having remained tilted in the same extreme position. Thus the telescoping outwards of the second element 22*b* of the arm from the first element 20*b* brings about a complementary movement of the stabilization support further away from the chassis.

It is the sum of the various movements of the stabilization support away from the chassis which in fact enables an overall movement away to be obtained simply, which is greater than that obtained by the methods of putting into place of the known devices.

This overall movement away is obtained simply and in particular by employment of only two jacks for obtaining three phases of putting into place. It will in fact have been observed that the jack 12 is employed once at 12*a* for the purpose of making the first element of the telescopic arm tilt into its extreme position 20*a* (or 20*b*) corresponding with the putting in place of the stabilization support, and is employed a second time for the purpose of effecting telescopic sliding outwards of the second element 11*b* from the first element 10*b* of the beam.

While tilting of the first arm element from the position 20 into the position 20*a* may constitute the first phase of the putting into place, the latter could alternatively be constituted by the telescopic sliding outwards of the second element 11*b* of the beam relative to the first element 10*b*. In the latter case of course, tilting of the first element 20*a* (or 20*b*) of the arm constitutes the second phase of the putting in place. It will, however, have been observed that abutment of the members 30*b* and 31*b* will in any case enable sliding of the second element 11*b* to be limited with respect to the first element 10*b* of the beam and that therefore if the first element of the arm is not tilted, continued extension of the jack 12*b* will cause this tilting with certainty. The fact that the first phase of the putting in place is constituted by the tilting of the first element 20*a* of the arm is connected with the existence of friction between the elements 10*a* and 11*a*, and with the fact that the force necessary to bringing about the tilting is in general less than that necessary to overcome the effects of the friction.

Finally it will be noted that if apparently tilting of an arm articulated to the end of a beam is in itself known, the tilting proposed in the above described device is quite distinct from that of the known arms. With the latter the tilting is of large amplitude, generally of the order of half-a-turn (180°), so that in the retracted position of the stabilization device the stabilization support is orientated laterally or even upwards. In the above described device, the tilting has a limited amplitude, less than a quarter of a turn (90°) and generally of the order of one eighth of a turn (45°).

This characteristic of the tilting is therefore new and is connected with the fact that not only is the arm articulated but it is also telescopic. This latter feature enables the provision of a clearance from the ground of the stabilization support 8 in its retracted position which is better and greater than that which has previously been possible.

The above described stabilization device may also be used in such a way that tilting of the element 20 of the telescopic arm about the axis 21 is avoided, the arm being kept parallel with the initial direction 29. For this use the pin 16 is kept in the position illustrated in FIGS. 2 and 3, which correspond with FIG. 7, by moving the rod 35 out of the jack 16 and keeping it in front of the pin 16, thus preventing displacement of the pin. The putting in place then consists in causing the telescoping of the beam to bring the second element of the beam to 11*c*, the first element remaining at 10*c*. Finally the arm is telescoped, which makes the second element of this arm arrive at 22*d*, the first element of the arm being

in a position **20***d* identical with **20***c*. The bearing plate **8***d* is then bearing firmly on the ground **32**.

It will have been observed that the axes **29***d* and **29***c* are parallel with the axis **29**. Of course the separation of the bearing plates **8***d* located on each side of the appliance is less than when tilting of the arm **20***d* is allowed, but this method of use may be desirable in certain cases where the maximum possible separation of the bearing plates is too large.

It will be understood that retraction of the stabilization device is effected in the reverse order of its putting in place.

The invention is not limited to the embodiment which has just been described but on the contrary covers all variants which might be applied to it without departing from its scope or its spirit.

What is claimed is:

1. A device for stabilization of an appliance on a support surface and having a chassis comprising:

a. at least one telescopic beam having at least first and second beam elements; said first beam element being adapted to be coupled to the chassis and said second beam element being slidably mounted for movement with respect to said first beam element;

b. first means for adjusting the releative position of said first and second beam elements, said first adjusting means being operatively connected between said first and second beam elements;

c. a telescopic arm pivotally mounted on said second beam element for pivotal movement about a horizontal axis and comprising at least first and second beam elements; said first arm element being pivotally mounted on said second beam element and said second arm element being slidably mounted for movement with respect to said first arm element;

d. second means for adjusting the relative position of said first and second arm elements, said second adjusting means being operatively connected between said first and second arm elements; one of said arm elements having a free end positioned adjacent the support surface upon actuation of said second adjusting means;

e. a stabilization support pivotally mounted at the free end of said one arm element; and

f. third means for adjusting the relative angular position of said first arm element with respect to said second beam element; said third adjusting means being operatively connected between said first arm element and said second beam element for moving said telescopic arm between first and second extreme angular positions of adjustment corresponding to orientations of the direction of telescopic sliding movement of said arm which are respectively substantially vertical and inclined with respect to the vertical in the sense of movement of the free end of said second arm element away from the chassis.

2. A stabilization device as claimed in claim **1**, wherein said third adjusting means includes said first adjusting means, a first slot associated with said second beam element, a second slot associated with said first arm element, a slidable member cooperating with said first and second slots and coupled to a portion of said first adjusting means movable with respect to said first beam element, and stop means for limiting sliding movement of said second beam element beyond a predetermined extension.

3. A stabilization device as claimed in claim **2**, including a selectively operable retention means for retaining said slidable member at a position in said first slot which corresponds to said first extreme angular position of said first arm element with respect to said second beam element.

4. A stabilization device as claimed in claim **2**, wherein said first slot has a first branch which is slightly inclined with respect to a direction perpendicular to the direction of telescopic sliding movement of said arm, and a second branch forming an extension of said first branch substantially perpendicular to said first branch and forming a notch for maintaining said first arm element with respect to said second beam element in said second extreme angular position.

5. A stabilization device as claimed in claim **1**, wherein when said first beam element is secured to the chassis, the direction of telescopic sliding of said beam is substantially parallel to one of the transverse axis or longitudinal axis of the chassis.

6. A stabilization device as claimed in claim **1**, wherein said first adjusting means includes a jack.

7. A stabilization device as claimed in claim **1**, wherein said second adjusting means includes a jack.

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