

[54] **FREIGHT BRACE**

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[51] Int. Cl..... **B60p 7/14, B61d 45/00**

[58] Field of Search... **105/369 B, 369 S, 369 BA, 105/376**

[56] **References Cited**

**UNITED STATES PATENTS**

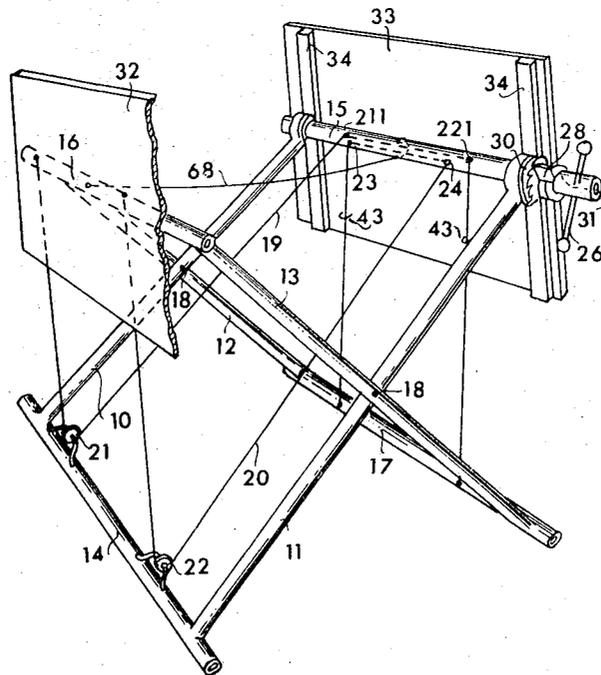
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*Primary Examiner*—Drayton E. Hoffman  
*Attorney, Agent, or Firm*—Larson, Taylor and Hinds

[57] **ABSTRACT**

A freight brace including first and second brace members having long pieces which intersect each other and are pivotally connected at their points of intersection in a scissors like manner, each brace further including parallel horizontal upper and lower cross pieces. At least one and preferably a plurality of flexible elongated elements such as wires or tapes extend from the lower cross piece of the first frame up to the upper cross piece of the second frame from which the elements are redirected to the lower cross piece of the second frame and then upwardly to the upper cross piece of the first frame. These elements permit expansion of the frame and the slack therein is taken up as the frame contracts in size. Each frame has associated therewith a wall member preferably mounted on the outer side of the upper cross piece of each frame, these wall members being vertically adjustable and adapted to be urged against the freight being braced by the present apparatus.

**11 Claims, 7 Drawing Figures**



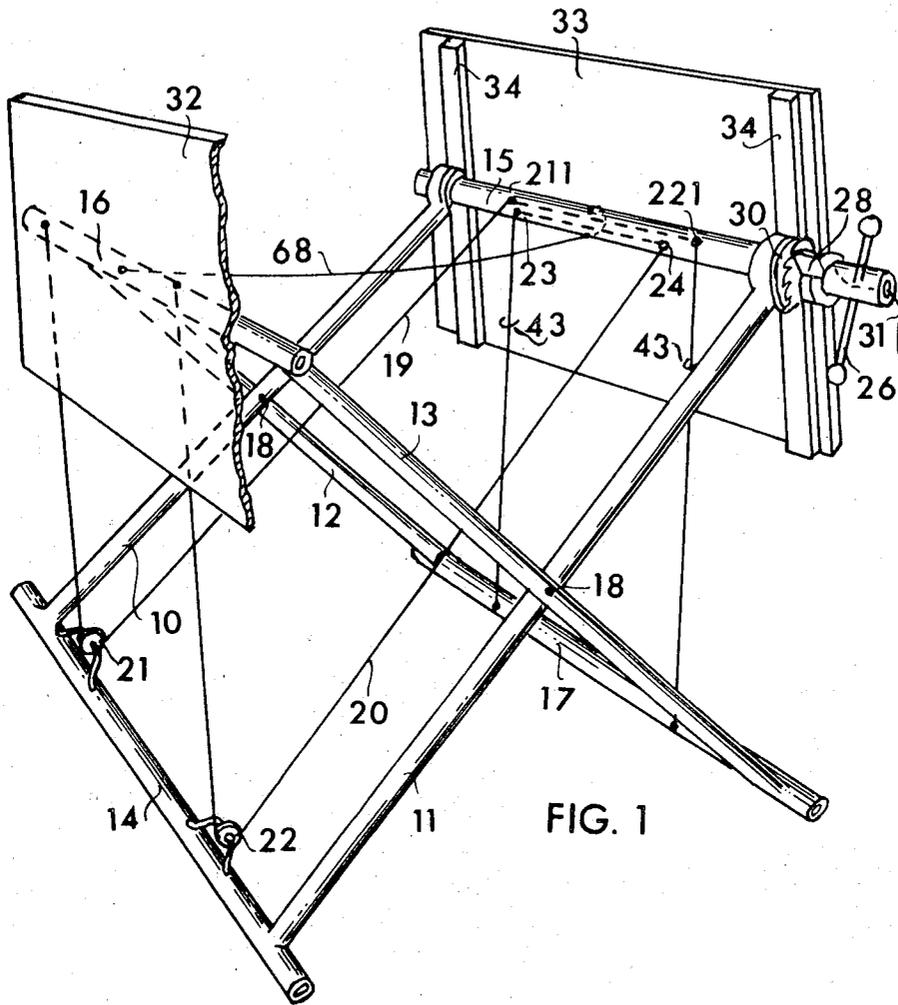


FIG. 1

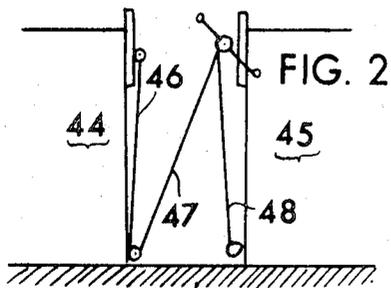


FIG. 2

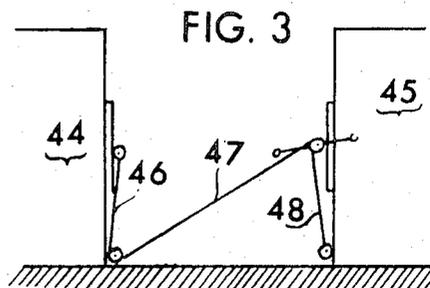


FIG. 3

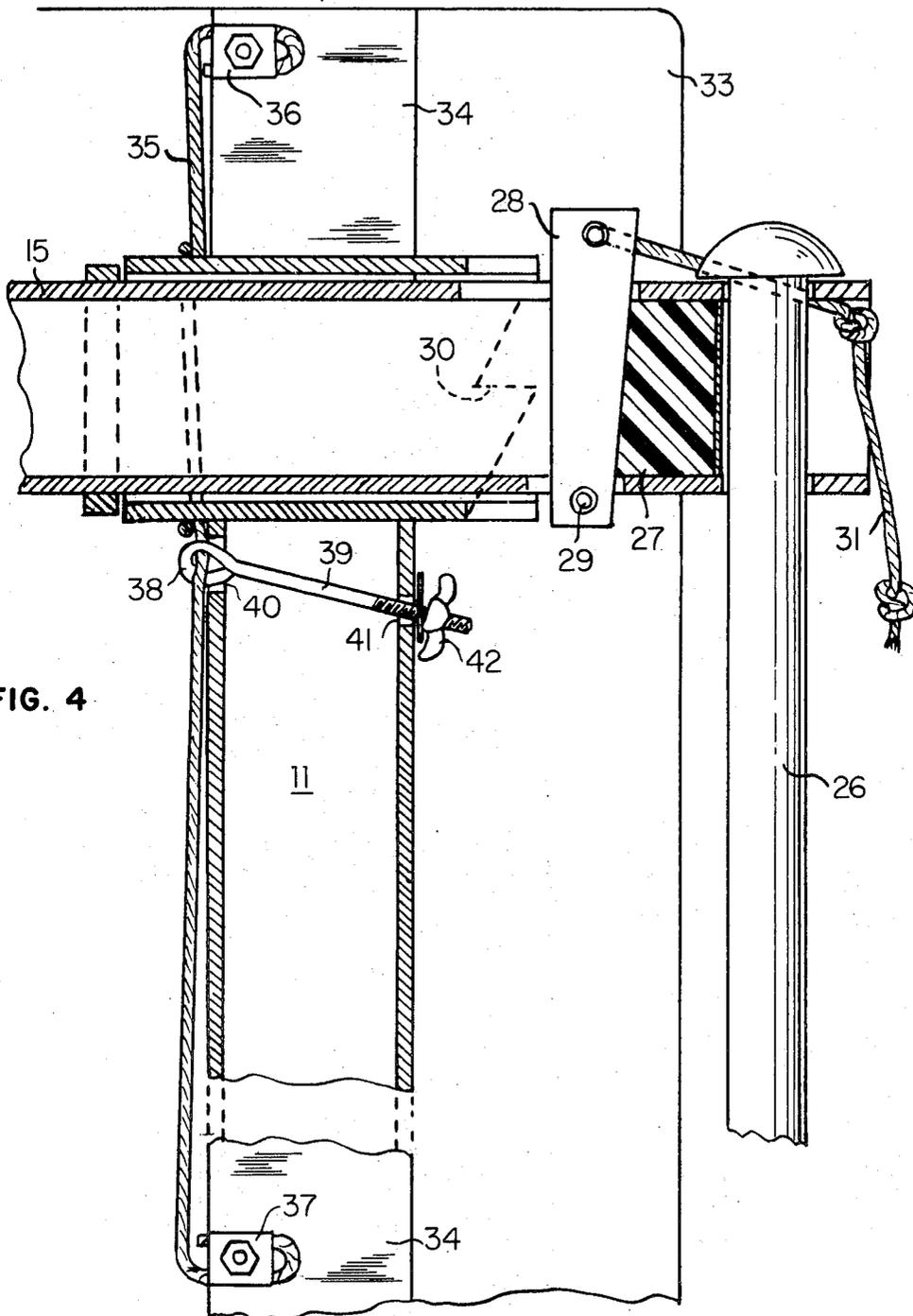


FIG. 4

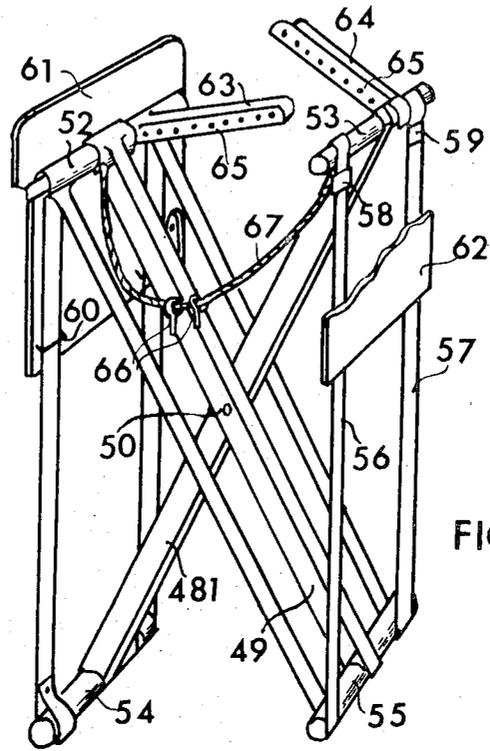


FIG. 5

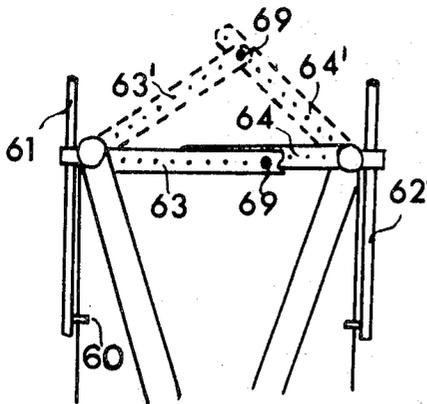


FIG. 6

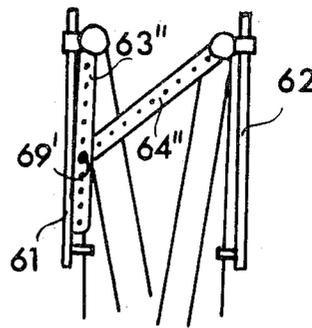


FIG. 7

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## FREIGHT BRACE

At present, inflatable cushions are used to a great extent for bracing freight in cargo cars such as railway cars, automobiles, boats, containers and so on. These cushions are mounted in spaces between the different freight units. A certain insecurity will exist, however, due to the risk of leakage of the air from the cushions during transportation. Another disadvantage is the need for a source of air under pressure.

U.S. Pat. No. 3,472,180 shows a normally stationary but adjustably movable wall, by means of which one may vary and change the interior space in for instance a cargo car so that no unnecessary spaces exist in the load with the attendant danger of displacement such as by rolling upon sudden changes of movement such as by damage to the transportation vehicle. In U.S. Pat. No. 1,708,413, another more portable solution to the problem is shown for keeping apart different freight units, such as for instance different cases in a freight space, and in U.S. Pat. No. 3,33,553, a scissor like arrangement is shown, which is pressed apart by turning movement around a screw by means of a crank.

The last mentioned arrangement with the scissors however, has disadvantages, for instance that the pressure to keep the parts apart is applied only on one point of the adjacent freight units, and that the cranking operation will take a long time. As for the two other arrangements they have the disadvantage that they are either rigidly mounted or they comprise too many parts, for instance loose wedges, which should be mounted between the braces. Further, the stroke length, i.e., the extension of the variation in distance between the freight units, is rather limited.

The present invention relates to a solution of the problem of creating a freight brace, which in the first place builds upon the scissors idea but which has a plurality of contact points and a great stroke length, which may be easily changed by means of a system of wires or straps with a stop arrangement for fixation of the scissors in the desired position.

The present invention thus relates to an arrangement to bring apart and/or fixedly position two vertical, displaceable wall elements a desired distance from each other, said arrangement comprising one first and one second frame, each per se substantially enclosed within a surrounding rectangle. Each frame includes one upper and one lower cross piece and at least one long piece connecting said cross pieces, whereby the mid points of the long pieces of the two frame constructions are pivotably combined by means of bolts or the like running through them so that a scissor like or folding chair like apparatus is obtained.

According to the invention a group of wire or tape elements extends from attachments in the upper cross piece of the first frame, around re-directional rollers or around suitable guiding means in the lower cross piece of the second frame, into and through the interior of the upper cross piece of the second frame and finally out of that cross piece and downwardly to two attachments in the lower cross piece of the first mentioned frame. Arrangements are further provided for shortening or extending the wire or tape elements in order to adjust the stroke length of the scissor-like brace arrangement, i.e., the width in the horizontal direction, thereby tightening said systems between the upper cross piece of each frame and the lower cross piece of the opposite frame.

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The invention will be further described below in connection with two different embodiments shown in the attached drawings, but it is understood that the invention is not limited to these two embodiments, but that various modifications and variations may exist within the scope of the invention.

In the drawings, FIG. 1 is a perspective view of the arrangement according to one embodiment of the invention, whereas FIG. 2 and FIG. 3 show in schematic form the function of said arrangement. FIG. 4 shows on an enlarged scale, a detail of the arrangement according to FIG. 1. FIG. 5 is a perspective view of a second embodiment, and FIGS. 6 and 7 show in two different positions an auxiliary arrangement for use in the freight brace according to the embodiment of FIG. 5, when the horizontal distance between the sides of the freight brace is very small. The last mentioned arrangement, of course, can also be used in the embodiment of FIGS. 1 - 3.

In the arrangement according to FIG. 1 the two frames comprise closed rectangular frames, one frame comprising a couple of long pieces 10 and 11 and a couple of cross pieces 14 and 15 and the other having long pieces 12 and 13 and cross pieces 16 and 17. One of these cross pieces, namely the cross piece 15, is totally mounted in the ends of the corresponding long pieces 10 and 11. The frames are pivotably connected together by means of bolts 18, 18, running through the middle points of the long pieces 10 and 12 or 11 and 13, resp. Suitably one single bolt may be used, running through both pairs of long pieces through holes, shown in FIG. 1, so that a scissor construction is formed. A couple of steel wires 19, 20, attached to the upper cross piece 16 of the first frame are directed over a couple of directional rollers 21, 22 connected to the lower cross piece 14 of the second frame. Thereafter they run through holes 211 and 24 in the tube-formed, turnable cross piece 15 in the same frame, in directions opposite to each other through the interior of this cross piece 15 and out through openings 23, 221 in the cross piece 15, whereafter they continue to the lower cross piece 17 of the first mentioned frame. A wire 68 is arranged between the two upper cross pieces 16 and 15 to prevent collapse of the scissors, when not used in its stretched position.

The turnable cross piece 15, which, as mentioned above, is tube-formed, is provided at its one end with a crank 26, comprising a bar with two handle balls. The bar of said crank may be displaceably arranged within the tube, so that in each of the extended positions the one handle ball will contact the tube 15 as a stop means, whereas the other handle ball will be situated at the farthest possible distance from the tube 15 thereby forming a long lever arm when turning the tube 15. A stop arrangement is applied in connection with the crank, which will be more clearly shown in the section view according to FIG. 4.

A rubber block 27 in the interior of tube 15 acts as a contact spring for a stop arm 28 mounted inside of the tube 15 and is turnable about a pin 29, the free end of said stop arm being in contact with a saw tooth formed ring 30, which simultaneously forms a bearing for one end of the tube 15. The arm 28 can be drawn out from this stop position in engagement with the ring 30 by means of a drawing means 31 such as a wire or the like.

On the outside of each frame a plate 32, 33 is provided, preferably reinforced by a couple of braces 34, 34. This plate is movable vertically to a lower or a higher position by means of a wire construction, separate from the above mentioned wire construction, and comprising a wire 35, (see FIG. 4.) One end of this wire is attached to the plate 32 by means of a wire lock 36 and its other end is attached to the same plate 32 by means of a wire lock 37. Between these two wire locks the wire 35 runs through the eyelet 38 of a bolt 39 and includes at least one turn around the ring 30. The bolt 39 runs through two openings 40, 41 in the long piece 11, and at its opposite end it is provided with a nut 42. A similar wire construction suitably is arranged at each of the other long pieces 10, 12 and 13.

For guiding the first mentioned wire construction clamps 43 are provided close to the lower edge of each of the two plates, and the wires 19, 20 run through said clamps.

The arrangement now described functions in the following way, (see FIGS. 2 and 3).

It is assumed in FIG. 2 that one has to press apart two big cases or other freight units 44 and 45, situated a rather small distance from each other. The arrangement according to FIG. 1, now described, is then mounted between the two freight units, simultaneously as the locking of the saw tooth provided stop wheel on the ring 30, if required, is released by drawing in the drawing means 31. Thereafter the release means is freed so that the stop arm 28, see FIG. 4, will again mesh into the teeth on the ring 30, and by means of the crank 26 the shaft 15 is turned around, so that the branch of the wire 19 running from the cross piece 14, as well as the branch running to the cross piece 17, and also the wire 20 will be wound up on the shaft 15. Thereby the two branches 46 and 48, see FIG. 2, are shortened, whereas the branch 47 will remain the same length. The scissor construction moves together in vertical direction, simultaneously as it is widened in horizontal direction, until the desired support action is obtained between the two freight units 44 and 45.

The position in the vertical direction of each plate is adjusted shortly before a hard contact pressure has been created by releasing the clamping of the wires 35 by releasing the nuts 42. After fixing the position of the scissor construction, the nuts 42 are again locked, so that eyelets 38 will be drawn inwardly against their respective openings 40 and the wires 35 will be stretched, thereby locking the plates in their adjusted vertical positions.

When the freight brace is to be removed, one has to draw in the release means 31 so that the stop arm 28 is drawn out from its meshing with the teeth of the ring 30, whereafter the scissor can be pushed together into a somewhat narrower shape, and thereafter it can be displaced out between the two freight units.

In the arrangement according to FIG. 5, the two long pieces 10 and 11 are replaced by one single long piece 481, and the two long pieces 12 and 13 are, in a corresponding way, replaced by one single long piece 49. At their middle points they are joined by means of a guide bolt 50. Each long piece 49, 481 is provided at its upper end with a cross piece 52, 53, respectively, and at its lower end with a cross piece 54, 55, respectively. The wires 19 and 20 have been replaced by belts 56 and 57, respectively. These are extendable or shortenable by means of belt spanners 58 and 59, respectively, known

per se, for instance as in tape spanners for travellers' luggage and the like. Clamps 60 have been provided at the lower edges of the plates 61 and 62 in the same way as the clamps 43 in the arrangement according to FIG. 1.

In the arrangement according to FIG. 1, it was found to be difficult to provide sufficient force for separating the construction when the distance between the freight units 44 and 45 is small, such as in the case in FIG. 2, whereas on the other hand, a completely sufficient force is obtained when the distance is greater, such as in FIG. 3. This results because the component of force of the tension in branch 47 in the horizontal direction will be rather small when said branch of the wire has a greater inclination. Therefore it may be suitable to arrange an auxiliary means for improving the separation between the plates 31 and 32 or 61 and 64, resp. For this purpose one can arrange a couple of arms 63 and 64, one of which is turnable about the upper cross piece 53. These arms have only been shown in connection with the construction according to FIG. 5, but of course they can also be used in connection with the construction according to FIG. 1. They are suitably made from channel irons, whereby the one arm 63 is a little broader than the other arm 64 so that the last mentioned arm may be pushed into the channel of the first mentioned arm. Both of these arms are provided with a number of holes 65, intended to carry bolts 66. These may be suitably hung on a wire 67 extending between the two upper cross pieces 52 and 53, so that they are ready to use. The wire 67 further has the purpose of keeping together the construction in its broadest position in horizontal direction and to prevent its collapsing, when not in use. A similar wire 68 is provided in the arrangement according to FIG. 1.

FIGS. 6 and 7 show schematically two different ways of using the arms 63 and 64. In the way of use shown in FIG. 6 the arms are brought into a position forming an obtuse angle in which the arms are indicated by 63' and 64', whereafter a bolt has been introduced, for instance at the place 69. When the arms are thereafter pressed downwardly by hand into the positions 63 and 64, resp., they are separated, and they will create the desired separation force. In the arrangement according to FIG. 7 the two arms are instead positioned downwardly into the position 63'' and 64'' respectively and held by a bolt at the place 69'.

When the plates 61, 62 are at a great distance from each other, this additional separation device is not required. When they are a somewhat smaller distance from each other, the separation device used as shown in FIG. 6 is preferable. At the smallest distance between the plates, separation device may best be used as shown in FIG. 7.

The arm 63, however, also has another function. When the distance between the plates 61 and 62 is so great that there is no need for using the arms 63 and 64 for obtaining a separation force, one may by turning the arm 63 downwardly and connecting it to the long piece 49, on which there is for this purpose an eyelet, provide an additional force for pressing the plates 61 and 62 apart, which will in many cases be useful.

I claim:

1. A freight brace comprising:

first and second frame members, each of which includes parallel lower and upper cross pieces and at least one long piece interconnecting said lower and

upper cross pieces, said long pieces of the two frame members crossing each other and pivotally connected to each other at the crossing point thereof for turning movement about the pivot connection in a scissors-like manner,

at least one flexible elongated element for securing the two frame members at various positions, said elongated element fixed to the lower cross piece of the first frame member, extending upwardly therefrom to the upper cross piece of the second frame member and redirected therefrom to the lower cross piece of the second frame member and redirected therefrom to the upper cross piece of the first frame member, to which it is connected, said elongated element being long enough to permit the two cross pieces to move apart a predetermined distance, and means for taking up slack in the elongated element when the two upper cross pieces move closer together than said predetermined distance,

and a wall member connected to each frame member in the vicinity of its upper cross piece on the outer side thereof, each said wall member being vertically displaceable relative to its respective upper cross piece,

whereby the elongated element, upon removal of the slack, positions the frame members and hence also the wall members at a selected distance apart from each other for bracing a load, and wherein the wall members may be moved vertically to properly position them relative to the load being braced.

2. A freight brace according to claim 1, each frame member including a pair of parallel long pieces which, with the upper and lower cross pieces, forms a rectangle, each long piece crossing and pivotally connected to a long piece of the other frame member.

3. A freight brace according to claim 1, each frame member including a single long piece interconnecting the centers of its respective upper and lower cross pieces, and thus forming an I-shaped member, the two long pieces being pivotally connected together.

4. A freight brace according to claim 1, said elongated element comprising a wire fixed to the lower cross piece of the first frame member, extending upwardly to the upper cross piece of the second frame member and longitudinally therethrough and out

thereof and over to the lower cross piece of the second frame member, around a roller attached thereto and up to an attachment to the upper cross piece of the first frame member.

5. A freight brace according to claim 1, said upper cross piece of the second frame member being rotatably mounted in bearings in its respective long piece, said means for taking up slack comprising means for rotating the said second frame upper cross piece about its axis and locking means for locking the second frame upper cross piece at a selected position.

6. A freight brace according to claim 5, said locking means including a wedge member fixed to the upper cross piece of the second frame member and releasably engagable with teeth on a fixed member surrounding the said upper cross piece of the second frame member.

7. A freight brace according to claim 1, said elongated element comprising at least one adjustable length tape, said means for taking up slack comprising means for adjusting the overall length of the tape.

8. A freight brace according to claim 1, the connection of each wall member to its respective frame comprising a further elongated element extending vertically and connected to the wall member at two vertically spaced points and releasably connected to its respective frame member intermediate said ends.

9. A freight brace according to claim 8, the connection of the further elongated element to its respective frame comprising an eyelet bolt, through the eye of which said further elongated element passes, and means for tightening and loosening the bolt so as to tighten or loosen the further elongated element against vertical movement or release the same.

10. A freight brace according to claim 1, said wall members including clamps thereon, through which the first said elongated elements pass on each of its vertical runs.

11. A freight brace according to claim 1, including a rigid perforated rod extending from each upper cross piece towards the other upper cross piece and rotatable relative to its respective upper cross piece, and a bolt for passing through selected apertures in both of the rods for rigidly positioning the frame in a given position.

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