May 14, 1968 R. S. KUSS 3,382,625

PRESTRESSED ENCLOSURE

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FIG. 1

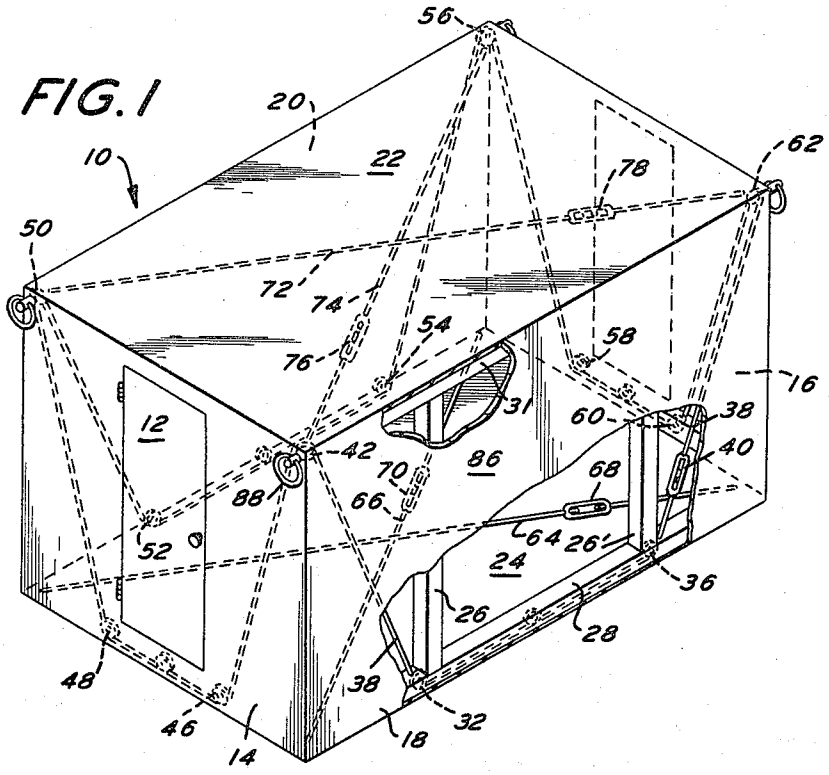
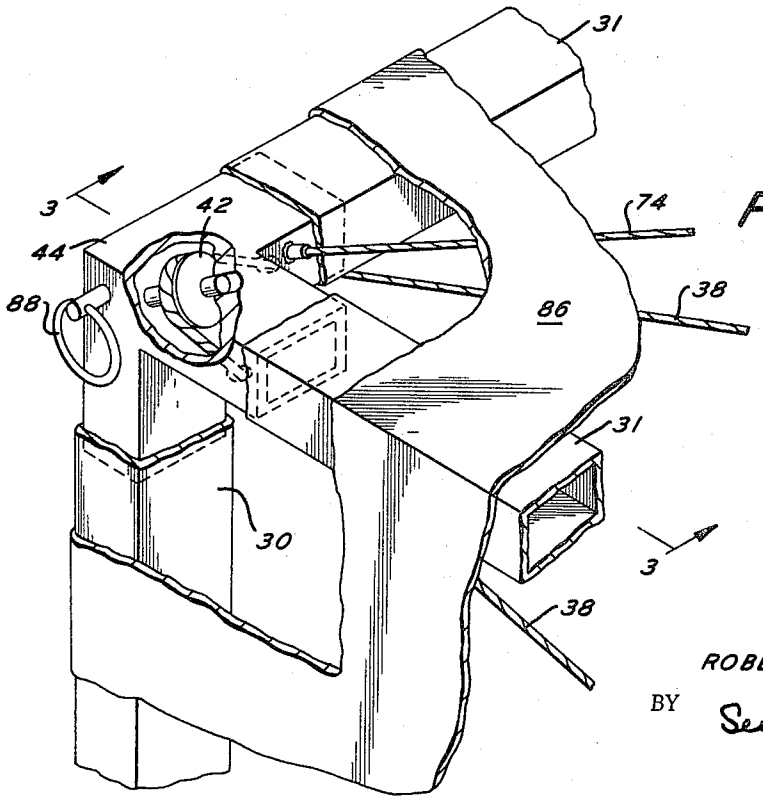


FIG. 2



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FIG.3

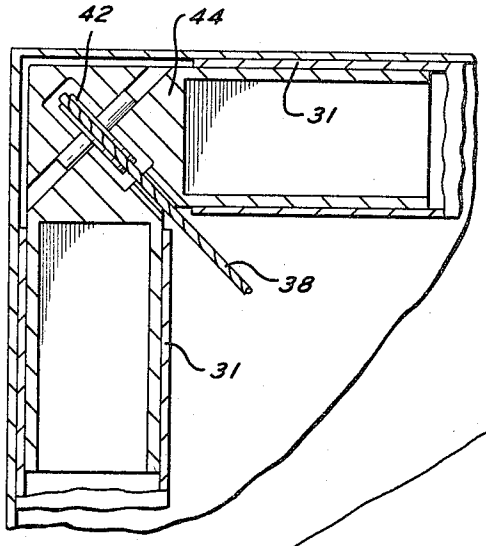


FIG.4

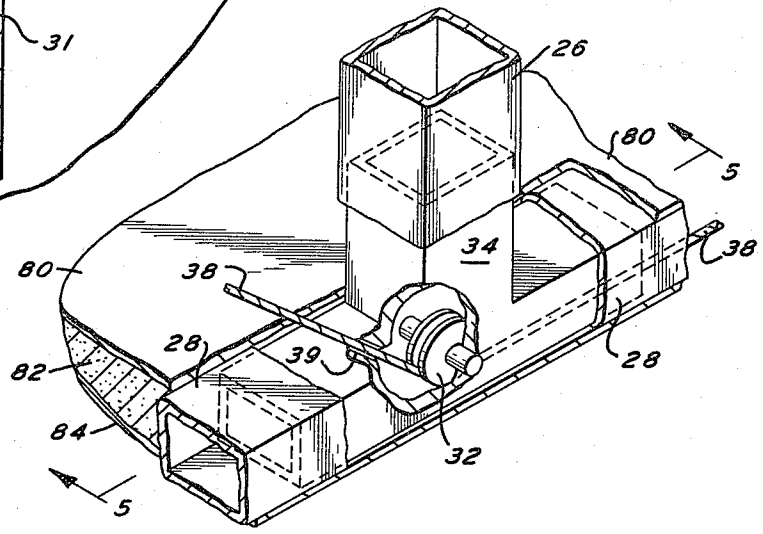
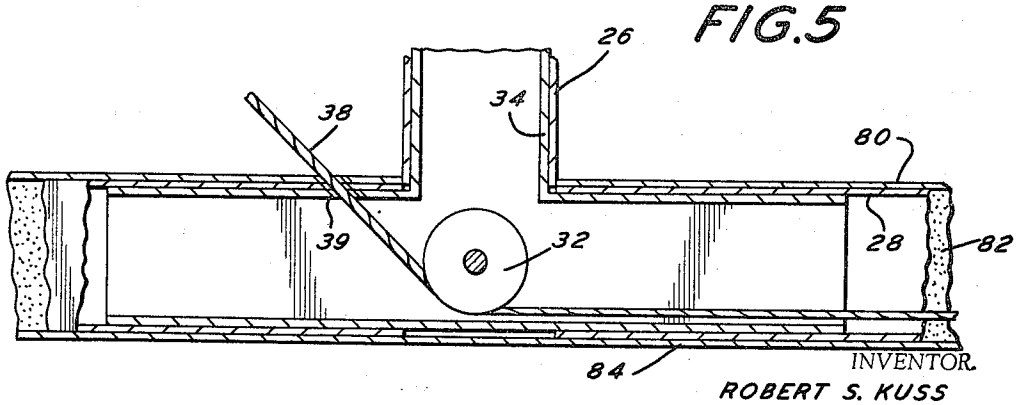


FIG.5



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United States Patent Office 3,382,625
Patented May 14, 1968

3,382,625

PRESTRESSED ENCLOSURE

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Filed May 19, 1965, Ser. No. 456,920
5 Claims. (Cl. 52—63)

ABSTRACT OF THE DISCLOSURE

An enclosure is provided with means for prestressing side walls in a direction extending from the bottom to the top so as to provide an equal amount of prestressing and support no matter how the enclosure is twisted or distorted by a cable having relative movement with respect to support points so that the cable can equalize the load throughout its length and distribute the load to other parts of the enclosure for absorption.

This invention relates to a prestressed enclosure of such a size that it may be lifted by a crane, a helicopter, etc.

The prestressed enclosure of the present invention is preferably adapted for use as a field enclosure by construction crews, the armed services, etc. The enclosure includes means within one of its walls for selectively providing access to the enclosure. Also, lifting hook means are provided on the enclosure to facilitate lifting the enclosure such as by a crane, a helicopter, etc.

The enclosures utilized heretofore suffer from a very serious defect. When they are lifted from above, the entire dead weight of the enclosure as well as any article therewithin is transmitted to the joints between the sections of the framework and/or the outer shell or skin of the enclosure. Thus, the joints must be rigidly made from rigid materials of great strength in order to accommodate the stresses imparted thereto by lifting the enclosure and the contents thereof.

The present invention facilitates utilizing materials of lower strength and cost while reducing the stresses to which the members are subjected. Thus, in accordance with the present invention the framework of the enclosure and/or roof and bottom wall may be selectively prestressed in an upward direction. As a result thereof, the enclosure will resume its normal position with the upward and downward forces equally balanced when suspended by lifting hook means from above. In other words, the direction of the drop load is 180° out of phase with respect to prestressed forces.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIGURE 1 is a perspective view, partly broken away, of the enclosure of the present invention.

FIGURE 2 is a partial sectional view of one corner of the enclosure in FIGURE 1.

FIGURE 3 is a sectional view taken along the line 3—3 in FIGURE 2.

FIGURE 4 is a partial sectional view of a portion of the enclosure in FIGURE 1.

FIGURE 5 is a sectional view taken along the line 5—5 in FIGURE 4.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIGURE 1 an enclosure in accordance with the present invention designated generally as **10**.

Access into the enclosure **10** is selectively provided by means of door **12** on a front wall **14**. The enclosure **10** also includes a rear wall **16**, side walls **18** and **20**, a top

wall or roof **22**, and a bottom wall designated generally as **24**.

Enclosure **10** is internally provided with a framework. The framework includes upright tubular members **26** at spaced points therearound including upright tubular members **30** at each corner. The tubular members extend between a lower horizontal tubular member **28** and an upper horizontal tubular member **31**. Members **28** and **31** extend around the inner periphery of the enclosure **10**.

At the location of each of the tubular members **26**, the member **28** is interrupted to receive a T section **34**. Section **34** is preferably in the form of a casting. One leg of the T section **34** extends into each of the adjacent ends of the member **28**. The remaining leg of the T section **34** extends into the tubular member **26**. The telescoping relationship facilitates internal support.

A pulley **36** is similarly supported by a T section beneath the other tubular section **26'** along the wall **18**. A cable **38** has its ends adjustably coupled to a turnbuckle **40**. From the turnbuckle **40**, the cable **38** extends through an aperture in the T section below tubular member **26'**, within the hollow tubular member **28**, around the pulley **32**, through an aperture in the T section **34**, and around a pulley **42**. Pulley **42** is supported adjacent the roof at the intersection of the walls **14** and **18** by a Y section **44**. The Y section **44** has one leg telescoped into the corner tubular member **30**, and its other leg telescoped into adjacent ends of the upper tubular member **31**. The Y section **44** is preferably also a casting similar to the T section **34**.

From the pulley **42**, the cable **38** extends downwardly around pulley **46**, through a corresponding portion of the lower tubular member **28**, around pulley **48**, and up to a pulley **50**. Pulleys **46** and **48** may be supported in the same manner as pulleys **32** and **36**.

From pulley **50**, the cable **38** extends downwardly around pulleys **52** and **54**. Pulleys **52** and **54** are preferably supported in the same manner as pulleys **32** and **36**. From pulley **54**, the cable **38** extends upwardly around pulley **56**. Pulley **56** is preferably supported in the same manner as pulleys **42** and **50**.

From pulley **56**, the cable **38** extends downwardly around pulleys **58** and **60**. Pulleys **58** and **60** are preferably supported in the same manner as pulleys **46** and **48**. From pulley **60**, the cable **38** extends upwardly around the pulley **62**. Pulley **62** is preferably supported in the same manner as pulley **42**. From pulley **62**, the cable extends to and is coupled to the turnbuckle **40**.

By turning the turnbuckle **40**, the cable **38** may be tensioned to prestress the framework in an upward direction toward the roof **22** so as to prestress the framework in a direction directly opposite to the direction of the drop load. The direction of the drop load is that effected by gravity due to the dead weight of the enclosure and any contents thereof when the enclosure **10** is horizontally disposed and supported from above.

The floor **24** may also be prestressed. The floor **24** is prestressed by means of cables **64** and **66** extending from diametrically opposite corners of the enclosure **10**, with the ends of the cables being connected to a portion of the lower tubular member **28**. Cable **64** is provided with a turnbuckle **68**. Cable **66** is provided with a turnbuckle **70**. When the turnbuckles **68** and **70** are turned, the floor may be similarly prestressed.

If desired, the roof **22** may also be prestressed in the same direction as the framework and the floor **24**. Thus, cables **72** and **74** have their opposite ends anchored to the upper horizontal tubular member **31**. Cable **72** is provided with turnbuckle **78** and cable **74** is provided with a turnbuckle **76**. The turnbuckles **76** and **78** may be uti-

lized to tension the cables 72 and 74 and thereby prestress the roof 22.

The floor designated generally as 24 may be comprised of an upper skin member 80, a lower skin member 84, with appropriate insulation 82. Insulation 82 may be a foam polymeric material such as foam polyurethane. The enclosure 10 is provided with an outer skin member 86 which may be a laminate of insulation and a weather resistant material if desired. Thus, a lightweight material such as sheet aluminum may be bonded to insulation such as foam polyurethane to form the outer skin member 86. Lifting hook means, such as lifting hooks 88, may be anchored to the upper corners of the enclosure 10 or any other convenient location. The lifting hooks 88 facilitate lifting the enclosure 10 from above my means of a crane, helicopter or the like.

Depending upon the ruggedness of the enclosure and its size as well as weight, the pulleys described above may be a single sheave pulley or a multi-sheave pulley with a corresponding number of cables as desired. As pointed out above, one or more of the vertical tube members disposed along the side, front or rear wall may be eliminated. The framework need not be made from hollow tubular members. When solid members are used for the framework, the pulleys are preferably supported below the solid members.

The enclosure 10 may be a shipping container lacking a door in the normal sense.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. Building structure comprising an enclosure having a horizontally disposed bottom wall coupled to upright walls disposed around the periphery of said bottom wall, a top wall coupled to the upper end of said upright walls, one of said walls having means for selectively providing access into the interior of said enclosure, a framework within said walls, lifting hook means on said enclosure to facilitate lifting said enclosure, and selectively adjustable means for prestressing said upright walls and floor in a direction extending from said bottom wall towards said top wall, said prestressing means including at least one pulley supported at the lower end of each upright wall and a pulley supported at the upper end of adjacent upright walls, a cable extending around said pulleys, an internal framework within said enclosure, said pulleys being supported by said framework, and an upright tubular member on the framework above said one pulley at the lower end of each upright wall.

2. Building structure in accordance with claim 1 wherein substantial portions of the framework are hollow, and the pulleys being supported within the hollow framework.

3. Building structure comprising an enclosure having top and bottom walls coupled to upright side walls, said top and bottom walls being substantially horizontally disposed, a first framework portion horizontally disposed adjacent the intersection of the upright walls and the top wall, a second framework portion horizontally disposed adjacent the intersection of the upright walls and the bottom wall, upright framework portions extending between said first and second mentioned framework portions, means for prestressing the upright walls in a direction extending from said bottom wall to said top wall, said means including at least one pulley supported by said second framework portion alongside of each upright wall, a pulley supported by said first framework portion adjacent each intersection of adjacent upright walls, a cable alternately extending around the bottom of said first-mentioned pulleys and over the top of said second-mentioned pulleys, and selectively adjustable means coupled to the ends of said cable so that the ends of said cable are free from anchorage to said framework portions, whereby said cable may equalize any load throughout its length and distribute the load to each pulley.

4. Building structure in accordance with claim 3 including two longitudinally spaced pulleys supported by said second framework portion alongside each upright wall, and said cable extending around the bottom of each of the last-mentioned pulleys.

5. Building structure in accordance with claim 4 wherein said enclosure has side walls which are longer than end walls, the side walls having upright tubular members, and each tubular member being disposed above a pulley supported by said second framework portion, and the distance between adjacent tubular members being greater than the distance between either tubular member and the adjacent end wall.

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