This invention relates to a novel collapsible lift bag, especially but not exclusively for harmless handling, transportation or storage of materials subject to damage by pressure exerted thereon, such as seeds, beans, potatoes, oranges, apples, and the like.

The primary object of the invention is to provide an inexpensive and efficient flexible walled bag of the kind indicated, which can be collapsed to a flat compact package, when not in use, so as to occupy minimum transportation or storage space; and which has novel lifting strain equalizing means which act to preclude both vertical and horizontal collapsing of the walls of the bag, when the bag is full and the lifting device has been connected thereto and is strained upwards to lift the bag, so that squeezing and compression of the contents of the bag is positively prevented.

Another object of the invention is to provide a lifting bag of the character indicated above which has a flexible bottom wall and a flexible side wall, wherein said equalizing means comprises rigid non-collapsible means associated with the upper end of the sidewall, an equalizer plate which is located above the upper end of the sidewall on the vertical center of the bag, flexible means connecting the equalizer plate to said rigid means, and an internal flexible lift member which extends vertically between and is secured to the equalizer plate and the center of the bottom wall of the bag, a lifting device being adapted to be connected to the equalizer plate for lifting and handling the bag.

Other important objects and advantageous features of the invention will be apparent from the following description and the accompanying drawings, wherein, for purposes of illustration only, a specific form of the invention is set forth in detail.

In the drawings:

FIGURE 1 is a side elevation of a lift bag of the present invention, showing the cable of a lift device connected thereto and the cover of the bag in elevated position;

FIGURE 2 is an enlarged top plan view of FIGURE 1, with the cover removed;

FIGURE 3 is a vertical transverse section taken on the line 3--3 of FIGURE 2;

FIGURE 4 is a perspective view, on the scale of FIGURE 1, showing the bag in collapsed condition with its cover removed;

FIGURE 5 is an enlarged perspective view showing another form of equalizer plate; and

FIGURE 6 is a vertical transverse section taken on the line 6--6 of FIGURE 5.

Referring in detail to the drawings, wherein like and related numerals designate like parts throughout the several views, the illustrated lift bag is preferably plain cylindrical in form, and comprises a normally flat flexible bottom wall 10, and a sidewall 12 on whose upper edge is formed a tube 14 which extends theretoward and encloses the rigid ring 16. The walls of the bag can be of any suitable flexible material, such as canvas, and the bottom wall 10 can be integral with or otherwise fixed to the lower end of the sidewall 12.

Suitably fixed, as indicated at 18, to the underside of the bottom wall 10, is a radially outwardly extending flexible damping loop 20. The loop 20 is preferably secured to the bottom wall 10, directly beneath a radial reinforcing strip 22, which extends from the sidewall 12 to a point beyond the center of the bottom wall 10, and is suitably secured thereupon, as indicated at 24. At the center of the bottom wall 10, a rigid reinforcing disc 26 is secured between the inner end of the reinforcing strip 22, and the bottom wall 10, and has an upwardly extending eye 28 which extends upwardly through an opening 30 in the strip 22. An internal, flexible lifting cable 32 is secured at its lower end, as indicated at 34, to the loop 28. The cable 32 is longer than the height of the bag sidewall 12, is centered with respect to the sidewall 12, and extends thereafter.

Flexible centering cables 36, which are spaced equally around the circumference of the upper end of the bag, have outer ends secured, as shown in FIGURE 3, as by means of loops 38, embracing the tube 14, and the rings 16 enclosed therein, and extending through grommets 40 in the sidewall 12 immediately below the tube 14. The centering cables 36 are longer than the diameter of the bag and have loops 42 on their inner ends, which are secured through evenly circumferentially spaced holes 44 in an equalizer plate 46.

The equalizer plate 46, in FIGURES 1 to 4, comprises a flat circular disc 48 whose upper and lower sides are severally and suitably fixed, as indicated at 50 and 52, upstanding and downwardly extending, centered, rigid loops or eyes 54 and 56, respectively, the upper end of the internal lift cable 32 being connected, at its upper end, as indicated at 58, to the lower eye 56. The length of the internal lifting cable 32 and the lengths of the centering cables 36 are such that the equalizer plate 46 is centered with respect to and is spaced above the upper end of the bag, with the centering cables 36 stretched at acute angles of approximately 37° to the horizontal, when the equalizer plate 46 is pulled upwardly, as by a lifting device (not shown) connected to the upper eye 54, or by a lifting device connected to a loop 58 on the upper end of an external lifting cable 60, which has a loop 62 on its lower end which is engaged through the upper eye 54.

For use in place of the equalizer plate 46, where ventilation is required, as where the structure of the bag is avalized of as a storage or camping tent, a ventilating equalizer plate 46a, shown in FIGURES 5 and 6, is provided. The equalizer plate 46a is composed of a flat circular disc 48a provided with circumferentially spaced holes 44a for connection of the centering cables 36, the disc 48a being formed with a central opening 64 which is surrounded by a fixed stiffened tubular neck 66. An upper connecting eye 54a is fixed, as indicated at 58a, within the upper end of the neck 66, and a lower connecting eye 56a is fixed, as indicated at 52a, within the lower end of the neck 66.

For protection in storage or otherwise, the bag is provided with a removable flexible cover 68, which comprises a circular sheet 70, larger in diameter than the bag, and having a central reinforced opening 72 which passes the upper connecting eye 54 or 54a of the equalizer plates, with the material of the sheet 70 around the opening 72 bearing upon the discs thereof, as shown in FIGURE 3. The peripheral edge of the sheet 70 is preferably provided with a reinforcing and weighting web 74 or the like, which assures a proper drape of the peripheral edge portion of the sheet 70 around and below the upper end of the bag.

It will be seen from the foregoing, that, as lifting pull is exerted upwardly on the equalizer plate, the bag being filled with material of the kinds mentioned, the internal lift cable 32 prevents the bag bottom wall 10 from sagging or collapsing downwardly, because of its connection to the equalizer plate, the rigid ring 16 prevents the upper end of the bag sidewall 12 from being collapsed inwardly by the pull of the centering cables 36, and the centering
cables 36 act to center the equalizer plate and the internal lifting cable 32 in the bag, so that a straight line upward pull is maintained, which is not reduced by tiltings and swingings of the bag in the course of handling thereof by a lifting device. The relatively low or acute angles of the centering cables 36, relative to the horizontal, reduce to tolerable amplitudes, the tendency existent with longer and less acutely angled centering cables, to permit tiltings of the bag relative to the equalizer plate, and accompanying partial distortion and collapsing of the bag side wall, during handling of the bag. As a result, crushing or lesser squeezing or compression damage to the contents of the bag, in the handling thereof, are eliminated.

Although there has been shown and described a preferred form of the invention, it is to be understood that the invention is not necessarily confined thereto, and that any change or changes in the structure of and in the relative arrangements of components thereof are contemplated as being within the scope of the invention as defined by the claim appended hereto.

What is claimed is:

A collapsible lift bag having a flexible bottom wall and a flexible sidewall having a free upper end, an internal lifting cable longer than the height of said sidewall, said cable having a lower end secured to the center of the bottom wall and an upper end extending above the upper end of the sidewall, an equalizer secured to the upper end of the internal cable and normally spaced above the upper end of the sidewall with the internal cable in stretched condition, radial centering cables having inner ends secured to the equalizer and outer ends secured to the upper end of the sidewall at points spaced therearound, and connecting means on the equalizer for connection of a lift device thereto, said centering cables being flexible and being disposed at acute angles to the upper end of the bag sidewall in stretched condition, and a cover for the upper end of the bag, said cover having a central opening exposing said connecting means, said cover being flexible and larger in diameter than the bag and resting upon said centering cables, said cover having a peripheral edge portion draped externally on the bag sidewall below the upper end of the sidewall.

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