United States Patent [19]

Nattrass

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[54] **CARGO SLING**

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[30] **Foreign Application Priority Data**

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July 29, 1971	Great Britain	35663/71
Jan. 21, 1972	Great Britain	3013/72

[52] **U.S. Cl.** **294/74**

[51] **Int. Cl.** **B66c 1/18**

[58] **Field of Search** ..... 294/67 B, 67 BA, 67 EA, 294/74; 24/265 R, 265 CD, 265 AL, 230.5 S, 230.5 CS

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Assistant Examiner—Johnny D. Cherry
Attorney, Agent, or Firm—Stevens, Davis, Miller & Mosher

[57] **ABSTRACT**

A two part load encircling sling comprising a continuous loop secured to a second part of substantially unvarying length by means allowing movement of the loop in one direction but restricting or preventing it in the other; the sling in use tightening and remaining tightened about the load.

9 Claims, 12 Drawing Figures

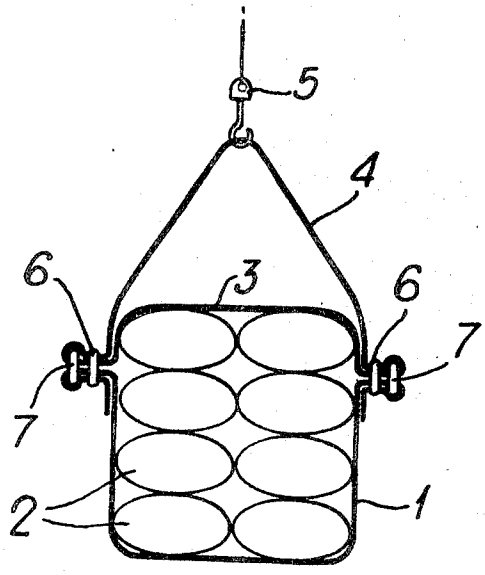


Fig. 1.

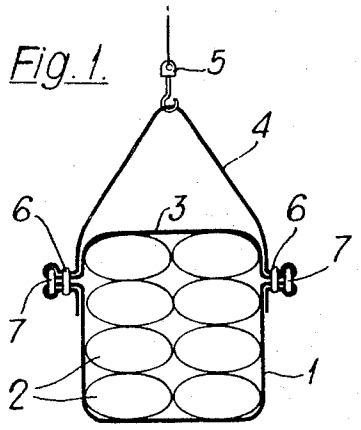


Fig. 2.

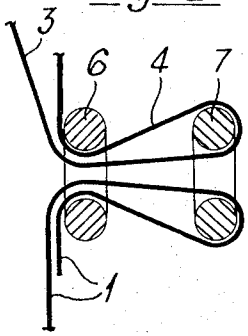


Fig. 3.

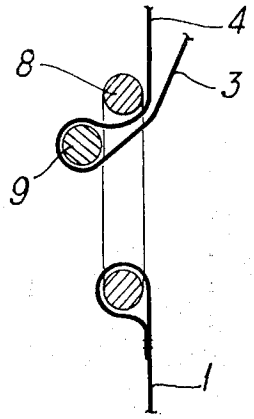
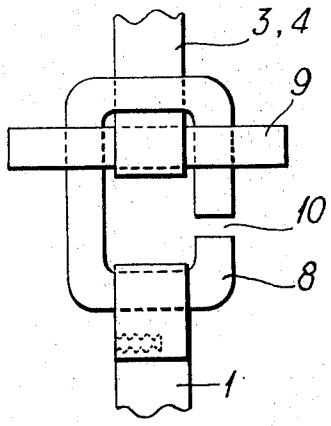


Fig. 4.



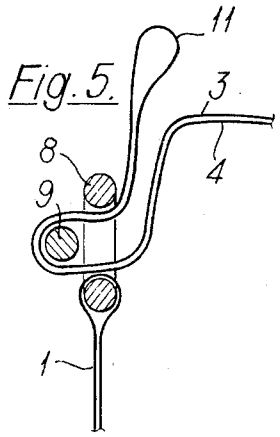


Fig. 5.

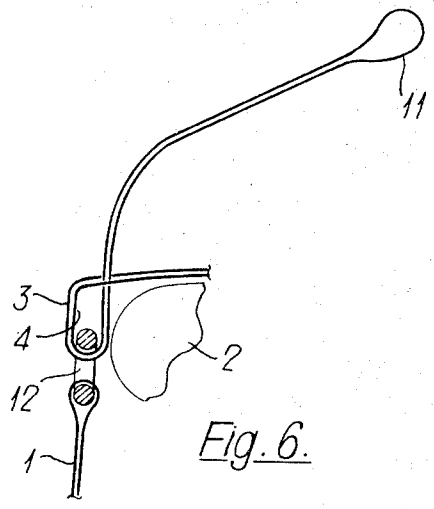
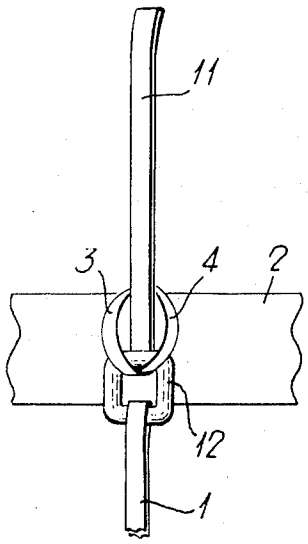


Fig. 6.

Fig. 7.



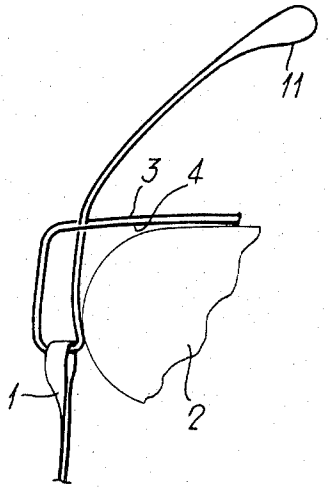


Fig. 8.

Fig. 9.

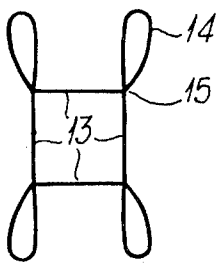


Fig. 10.

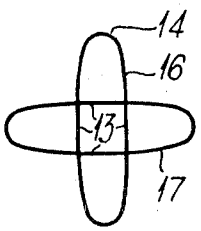
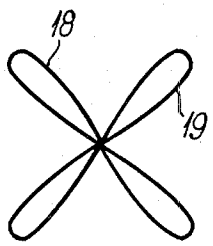


Fig. 11.



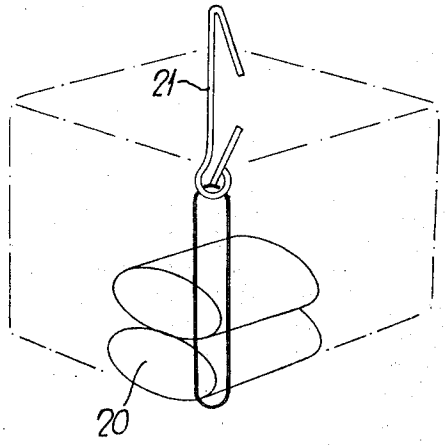


Fig. 12.

CARGO SLING

This invention relates to slings and in particular to a load-encircling sling which tightens about a load as the sling is tensioned and remains tight thereabout when the tensioning force is removed.

It is frequently required to handle and lift loads of irregular shape or unbalanced weight or which distort when encompassed by a sling, as for example sacks of powdered or granular material. Expensive equalizing slings have been used for handling such loads. Choker slings, formed of a length of rope or a loop of rope twisted into a noose, have been used as cheaper alternative but they suffer from the disadvantage that the standing part is rapidly abraded by the running part which leads to a shortened useful life or constitutes a serious hazard to repeated use. In addition choker slings do not remain tight about a load when the lifting tension is removed which may lead to collapse of the load during handling.

According to the present invention I provide a load encircling sling comprising two parts, one of substantially unvarying length and the other a continuous loop the two parts being secured together by means allowing movement of the loop material in one direction and restricting or preventing movement in the other direction which movement in use causes part of the loop to tighten about the encircled load.

A sling according to this invention may be comprised of any suitable flexible material such as natural or synthetic fibre ropes. Webbing or bands of natural or synthetic materials are particularly suitable by reason of the ease with which they may be secured together with restricted movement in one direction. Synthetic band materials of a most suitable type are described in pending British Pat. application No. 37942/69 and British Pat. specification 1272225. The materials described in these specifications are bands or endless bands of parallel continuous synthetic filaments encased in a sheath of thermoplastic organic material, such bands being very strong yet light and flexible.

In a sling according to this invention the part which is of substantially unvarying length may be a suitable length of rope or band material or may be an endless loop. By substantially unvarying length in this context it is meant that the length of this part which encloses a load substantially remains constant apart from any stretch of the material when the sling is tensioned and the load raised. The loop part of a sling according to this invention may be an endless rope or band or a length of rope or a band with the ends secured as for example by sewing, to form a continuous loop. In the latter case it is preferred that the joined ends are positioned so that the joint does not pass through the means used for restricting movement of the loop material during use of a sling.

The tightening effect in use of a sling according to this invention is brought about by attaching a load handling means, as for example a crane hook, to one limb of the loop which becomes tensioned as the load is taken up. This tension causes the loop material to move in the allowed direction through the restricting means. The other limb of the loop, which encloses that part of the load not enclosed by the sling part of substantially unvarying length, is thus drawn tighter about the load. By reason of the restricted movement of the loop material in the opposite direction a load once tightly secured

by the sling will remain so when the lifting force is released. Loads may thus be transported from place to place secured in a sling ready for instant handling, the load throughout being maintained securely together as a unit.

As the loop material of a sling is tensioned to tighten one limb of the loop about a load the length of the other limb lengthens. It is sometimes desirable to limit the amount of lengthening in this way and this may be accomplished by using a discontinuous length of sling material for the loop and forming the loop by joining the free ends in an adjustable manner, as for example by a restricting means as herein described.

When initially selecting or adjusting a sling according to this invention it is preferred that a combination of two parts is chosen so that the restricting means is positioned against a vertical face of a load and remains in this plane when the lifting tension is applied and the tightenable part moves into the fully tightened position. A single restricting means may be used and positioned at one vertical face of the load, it is however preferred to use a pair of restricting means positioned at opposite faces of the load since if only one is used the upper limb of the tightened part may need to be repositioned in the lifting means after tightening in order that the load will hang vertically.

A restricting means for securing together the two parts of a sling according to this invention may have several forms. Thus such means may comprise two chain links or rings through which one or both sling parts are taken in a sinuous path as more fully described hereinafter. Another form of restricting device comprises a single link or ring and a bar of length greater than the span of the link. In a further form of restricting device only a single link or ring may be used the part of a sling which tightens being taken in a particular sinuous path. In yet another arrangement the restricting means comprises the junction of the two sling parts and the manner in which they are looped together in which case no separate links are required. These and other forms of restricting means are illustrated in the accompanying drawings wherein;

FIG. 1 shows a load encompassed by a sling according to this invention,

FIG. 2 is an enlarged view, partly sectioned, of one form of restricting means,

FIG. 3 is a partly sectioned view of another form of restricting means,

FIG. 4 is an end elevation of a third form of restricting means,

FIG. 5 is a partly sectioned view of a fourth arrangement wherein a lifting loop is formed adjacent to a restricting means,

FIGS. 6 and 7 are side and end views of another form of restricting means wherein only a single link is in a restricting means, and

FIG. 8 is a side view of an arrangement wherein no separate link is used.

Simple slings according to this invention consisting of a single loop and a single part of substantially unvarying length may generally be used only to encompass loads comprising a limited number of individual items, as for example, a single stack of sacks or two stacks side-by-side. Larger loads and loads comprising a greater number of individual items may be handled very conveniently by means of the present invention using two continuous loops attached by two pairs of restricting

means to the four ends of a clover leaf or similar multiloop sling which encircles the lower part of the load and provides the part of the combined sling which is of substantially unvarying length. Examples of such multiloop slings and their combination with two continuous loops are illustrated in the further accompanying drawings wherein;

FIG. 9 is a clover leaf sling,

FIG. 10 is an alternative multiloop sling comprising two loops joined together at the intersections,

FIG. 11 is a second alternative double loop sling and

FIG. 12 illustrates a method of using a sling as illustrated in FIGS. 9 – 11 in combination with two loops and restricting means according to this invention.

Referring now to FIG. 1 one part of a sling comprises a discontinuous length of material 1, preferably in the form of a band which encloses the lower part of a load of sacks 2. A second part of the sling comprises a continuous loop of material one limb 3 of which encloses the upper portion of the load 2 and to the other limb 4 of which is attached a lifting hook 5. Each end of sling part 1 is taken in a sinuous path (shown to an enlarged scale in FIG. 2) around one limb of each of two chain links 6 and 7. The limbs of the loop sling 3/4 are similarly taken about the other limbs of the links 6 and 7. Loop sling 3/4 may be made by joining together, as for example by sewing a suitable discontinuous length of sling material or it may be made as an endless loop in which case provision must be made to attach one limb of each of two links in the process of forming the endless loop.

In operation as limb 4 of the loop sling 3/4 is tensioned by raising the lifting hook 5 the sling material is drawn through links 6 and 7 which are brought together until the whole is locked by friction. At the same time and before the whole is locked by friction limb 3 is drawn tight about the load thus causing tension in sling part 1 the ends of which are similarly drawn tight in the links 6 and 7. Upon release of the lifting force the material of the two parts of the sling being locked in links 6 and 7 is maintained tightly about the load.

Referring now to FIG. 2 an end of sling part 1 is passed through the lower limbs of each of links 6 and 7 then around the outside of the lower limb of link 7 and finally through link 6 under the first part of sling material passed therethrough. Limbs 3 and 4 of the loop sling part are passed through links 6 and 7 and around link 7 in a similar fashion. In FIG. 2 the twin-link restricting means is shown in a loosened state and when limb 4 is tensioned the sling material of each part 1 and 3/4 moves around their respective limbs of link 7 in an anti-clockwise direction until the whole is tight and movement (for the applied tension) ceases.

FIG. 3 illustrates a restricting means comprising a chain link 8 and a bar 9 of sufficient length to span the link 8 and extend some distance beyond. In this embodiment only the limbs 3 and 4, which are taken through the link 8 and around the bar 9, are movable unidirectionally in use and each end of sling part 1 is merely taken around the lower limb of link 8 and the free end joined to the standing part by suitable means such as sewing.

FIG. 4 illustrates a modification of the bar and link restricting means of FIG. 3 wherein one limb of the link 8 is split at 10 to allow an end of sling part 1 already formed into a loop to be attached.

In FIG. 5 a bar and link restricting means as in FIGS. 3 or 4 is shown with a different arrangement of the upper sling part 3/4. In this case both limbs 3 and 4 of the upper sling part are taken together through link 8 then under and around bar 9 and back over the top of bar 9 and through link 8 again. In this way a loop 11 is formed near the restricting means a pair of which are used in each complete sling the lifting means being connected to each loop 11. By this means a small distance between the top of the load and the lifting means may be obtained since the movement due to tightening is much reduced. An arrangement of this form may also be used with two chain links in place of a link and a bar.

Referring now to the arrangement illustrated in FIGS. 6 and 7 and endless loop is used as the upper sling part 3/4 an only a single link 12 is used as the restricting means. In use limbs 3/4 are put together across the top of a load 2 and a small looped portion 11 is taken down one vertical face of the load 2 inwardly through the link 12 and then upward between the link 12 and the vertical face of the load finally passing between spaced apart limbs 3 and 4 to a point centrally above the load 2, the looped end 11 together with a similar looped end from a restricting means on the opposite face of the load 2 then forming the points of attachment of lifting means. The performance of a sling of this arrangement in repeated use may be enhanced by incorporating in sling part 3/4 means to limit the degree of tightening of this part.

In FIG. 8 is illustrated an arrangement similar to that of FIGS. 6 and 7 with the exception that the link 12 is dispensed with and the looped portion 11 is taken through a looped end portion of the lower sling part 1 instead. For very highly compressible loads it may be desirable to take the loop portion 11 twice through the looped end portion of sling part 1 to obtain a secure attachment.

Referring now to FIG. 9 a multi-loop sling consists of an endless length of material formed so as to produce a load supporting portion 13 and four loops 14, the intersections 15 being sewn or otherwise attached together. In the double loop sling of FIG. 10 two endless loops 16 and 17 are laid one on top of the other and at 90° to each other and the intersections sewn or otherwise attached together to produce a load supporting portion 13 and four looped ends 14. Similarly the sling of FIG. 11 comprises two endless loops 18 and 19 of figure eight form joined at the central intersection.

In use as illustrated in FIG. 12 a multiloop sling of the kind illustrated in FIGS. 9 – 11 is placed on the ground and four stacks of sacks 20 placed on the load supporting part 13. The loop ends are then drawn up at the corners of the load and attached by restricting means to a pair of continuous loops (one only is illustrated) 21. As illustrated the restricting means is of the type illustrated in FIG. 8.

In use, particularly with very heavy loads, restricting means of the type illustrated in FIG. 1 and FIG. 2 may lock so tight that it is difficult to release the load from the encompassing sling without cutting the sling material. This does not matter in cases where the sling is intended for one trip only and to be thereafter disposed of. Slings according to this invention may be cheaply made and used in this disposable fashion. Restricting means according to FIG. 3 or FIG. 4 is easily releasable from the locked position merely by manually turning

bar 9 in a direction opposite to that in which it turns when moving into the locked position. Easier releasability may also be obtained in a device according to FIG. 3 or FIG. 4 by a modification wherein the relative positions of the upper limb of link 8 and bar 9 are fixed by rotatably attaching bar 9 to the link 8. In this way a controlled locking effect may be achieved. Any material of sufficient strength may be used to form the links of restricting means according to this invention, as for example ferrous or non-ferrous metals or plastics materials.

We claim:

1. A load encircling sling comprising two parts, one of said parts being of substantially unvarying length, the other of said parts being a continuous loop which is tightenable about an encircled load when tensioned by load lifting means and which is taken in a sinuous path through restricting means joining together said two parts, the restricting means serving when the continuous loop is tensioned to automatically allow movement of the continuous loop in one direction and to restrict movement in the other direction, said restrictive movement continuing after tension on said continuous loop is released.

2. The sling according to claim 1 wherein said restricting means comprises a chain link and a bar having a length greater than the span of said link.

3. The sling according to claim 1 wherein said restricting means comprises a single link and a loop formed in said part of substantially unvarying length.

4. The sling according to claim 1 wherein two continuous loops are attached by two pairs of restricting means to four ends of a multiloop sling.

5. The sling according to claim 1 including means for adjusting the length of said continuous loop.

6. The sling according to claim 1 wherein at least one of said sling parts is made from a band of parallel continuous synthetic filaments encased in a sheath of thermoplastic organic material.

7. The sling according to claim 1 wherein said restricting means comprises a junction of the two sling parts looped together.

8. In combination, a load and a sling encircling said load, said sling comprising two parts, one of said parts being of substantially unvarying length, the other of said parts being a continuous loop which is tightenable about an encircled load when tensioned by load lifting means and which is taken in a sinuous path through restricting means joining together said two parts, the restricting means serving when the continuous loop is tensioned to automatically allow movement of the continuous loop in one direction and to restrict movement in the other direction, said restrictive movement continuing after tension on said continuous loop is released.

9. The combination of claim 8 wherein after tensioning of said continuous loop, said restricting means is positioned substantially near the top edge of said load.

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