Nov. 15, 1960 H. MEISEN 2,960,365

LIFTING SLING COMPOSED OF STEEL CABLES

Filed Jan. 17, 1956

Fig. 2

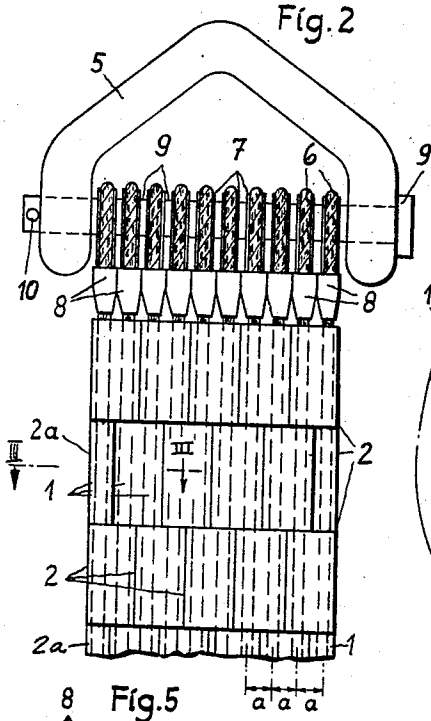


Fig. 1

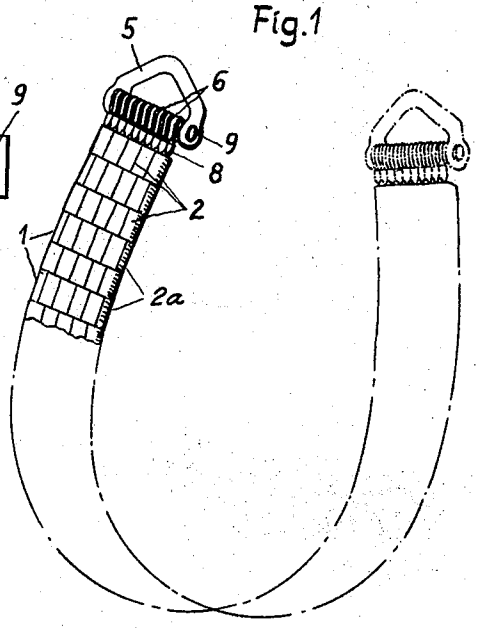


Fig. 5

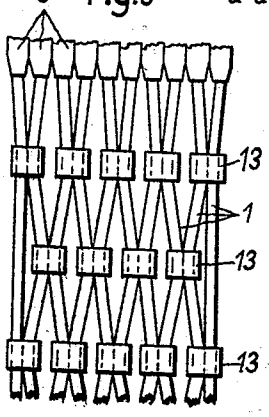


Fig. 6

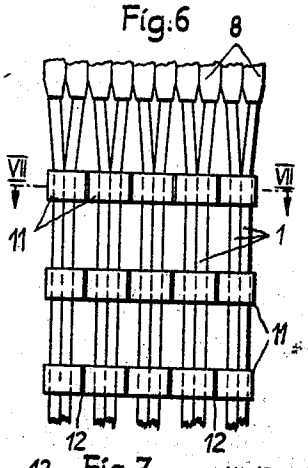


Fig. 4

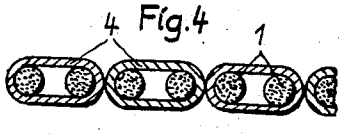
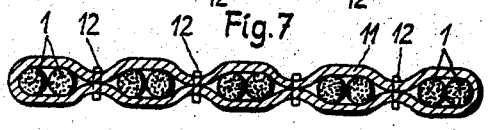


Fig. 7



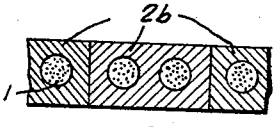
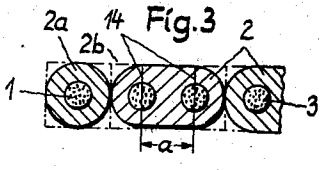


Fig. 3a

Fig. 3



INVENTOR.
Hans Meisen
BY Michael S. Striker
Atty.

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LIFTING SLING COMPOSED OF STEEL CABLES

Hans Meisen, Siemensstr. 2, Goggingen, bei Augsburg, Germany

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This invention relates to a lifting sling composed of steel cables which is provided at both ends with steel stirrups for the suspension on a crane hook. A known lifting sling of this kind embodies interlaced steel cables, the completed lifting band in its entirety being embedded in rubber by vulcanizing during the final stages of its manufacture. This lifting sling, which is designed for lifting and loading goods having easily damaged surfaces, is costly to manufacture and, furthermore, has the disadvantage that its inspection during use is very difficult since it is impossible to find out when one of the cables breaks, owing to the compactness of the vulcanized rubber envelope. Furthermore, lifting slings incorporating or consisting of interlaced cables cannot be fully loaded as the breaking load of such an interlaced sling is only about 75% of the normal cable breaking load. Furthermore, these vulcanised steel cable slings have the disadvantage that a repair is not possible if some of the cable strands break. Apart from this, such steel cable slings can only be manufactured in relatively small widths. Apart from this, the interlacing of the steel cables involves a larger consumption of high-grade and expensive cable material. In order to remove the above mentioned disadvantages, a lifting sling according to the invention is provided which consists of a plurality of steel cables arranged adjacent to one another in one plane and essentially parallel to one another, which steel cables are interconnected to form a flexible sling by means of connecting and supporting members arranged so that each of them encloses at least two cables, these connecting and supporting members being arranged so as to provide rows of cable interconnections across the sling which rows are positioned one behind the other lengthwise of the sling. This lifting sling is simpler and therefore cheaper to manufacture. In the event of damage, for example fracture of single steel cables, the possibility of inspection is provided and the damaged part can be replaced without difficulty.

The invention is described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a lifting sling,

Figure 2 is a plan view of one end of this lifting sling,

Figure 3 is a fragmentary cross section through the sling on the line III—III in Figure 2,

Figure 3*a* illustrates a modification of the sling of Fig. 3,

Figure 4 is a cross section through a sling with connecting members of a different form,

Figures 5 and 6 are fragmentary plan views illustrating alternative forms of lifting sling,

Figure 7 is a cross section on line VII—VII in Figure 6 on an enlarged scale.

The lifting sling according to Figures 1–3 embodies a plurality of steel cables **1** arranged in one plane, side-by-side and parallel to one another, which cables are interconnected by means of numerous connecting and supporting members **2**, each enclosing two cables to form a flexible sling. As can be seen from the drawing, these

connecting members **2** are arranged so that those in each transverse row are offset with respect to those in the adjacent row or rows. The adjacent members **2** in each row are in mutual contact with one another in transverse direction of the sling and each row is in contact with the adjacent row or rows. A lifting sling is thus formed which has a substantially uninterrupted supporting surface. This constructional arrangement ensures that ordinarily goods carried by the sling will not come in contact with the individual steel cables and at the same time also provides complete protection for the steel cables. If required, the steel cables positioned on the outside of the sling which would otherwise be partially exposed can also be protected by covering them over with a simple piece of tubular hose or a sleeve **2***a* as indicated in Figure 2.

In the case of lifting slings which are to be used for the transport of goods with sensitive surfaces, the connecting and supporting members **2**, **2***a* may consist of rubber or a plastic material similar to rubber.

According to Figure 3, the connecting and supporting members **2** have a completely oval, or alternatively a rectangular cross section as indicated in Fig. 3*a* at 2*b*, This cross section shows two holes **3** corresponding to the cross section of the cables, the distance between the centres of said holes corresponds to the distance *a* between the centres of the parallel cables. In order to facilitate easy and quick replacement of individual worn or damaged connecting members **2**, replacement members **2** may be split as at **14**. The replacement members **2** in this case are slightly bent open where they are split and then pushed over the two cables, after which they are re-closed.

As can be seen from Figure 4, simple pieces **4** of tubular hose can also be used, if required, as supporting and connecting members.

Furthermore, it is also possible to use connecting and supporting members which each enclose more than two cables.

According to Figures 1 and 2, steel stirrups **5** are provided on both ends of the lifting sling, which stirrups serve for hanging the sling onto the hook of a crane. The connection of the steel cables with one of these steel stirrups can be seen in Figure 2. The ends **6** of the steel cables are formed into loops using eyelets **7** and cable clamps **8**, said loops being fitted in a row side-by-side over a bolt **9**. This bolt **9** is removably engaged in the steel stirrup **5** and secured by means of a pin **10** or the like. The attachment of the steel cables to the steel stirrup **5** is thus very much simplified, and damaged cables can be replaced without difficulty after pulling out the bolt **9**.

It is advantageous to use, for the cable clamps **8**, metal clamps consisting of the aluminium alloy according to the French Patent No. 896,872, dated March 3, 1945, in which case each clamp, after insertion of the two cables, is deformed with the aid of suitable press dies into a solid circular cross section.

Another form of lifting sling according to the invention is illustrated in Fig. 5. In this, the connecting and supporting members **13** are also offset with respect to those in adjacent rows along the sling, which rows are, however, spaced apart from one another. For the protection of the steel cables **1**, these cables could be covered additionally with a sleeve of plastic material.

According to the example shown in Figures 6 and 7, connecting members **11**, made from rubber, plastic material or the like, are provided for the connection of all the steel cables **1** forming the sling, each of which connecting members encloses all the cables. By the provision of metal clamps **12**, each pair of cables is held together in the connecting member **11**.

The lifting sling according to the invention can be used not only for goods with a sensitive surface, but also for other purposes, for example in steel works for the transport of hot tubes and the like. In this case, the connecting and supporting members consist of short metal or steel envelopes, which protect the steel cables from contact with the load.

Apart from the advantages already mentioned, the lifting sling according to the invention has the following further advantages:

The lifting sling can, by contrast with the known plaited steel cable sling, be produced in any required width and cable strength, and consequently to suit any required loading. Furthermore, with the present lifting sling the full load-carrying capacity of the cable cross section can be taken into account, as all the cables may be stressed in a rectilinear direction, and uniformly, and may be consequently equally loaded.

I claim:

1. A band-shaped lifting sling comprising, in combination, a plurality of cables arranged substantially parallel with each other and spaced from each other substantially in one common plane; a plurality of elongated cover members made of elastomeric material, said cover members having each two longitudinal holes extending substantially parallel with each other at the same spacing as that of said cables, each of said cables passing through one of said two holes of a number of said cover members associated therewith, said cover members being movable in longitudinal direction along said cables and being arranged in end-to-end abutting relationship along said cables so that said cover members form with said cables a flexible sling having a substantially continuous elastomeric surface, whereby said cables are spaced from the goods handled by said sling and cables passing through the same cover members are mutually connected, not more than one of said two cables which pass through one of said cover members also passing through another single cover member in abutting end-to-end relationship with said one cover member; and attaching means attached to the ends of said cables.

2. A band-shaped lifting sling comprising, in combination, a plurality of cables arranged substantially parallel with each other and spaced from each other substantially in one common plane; a plurality of elongated cover members made of elastomeric material and having each at least two longitudinal holes extending substantially parallel with each other at the same spacing as that of said cables, each of said cables passing through one of said two holes of a number of said cover members associated therewith so that said cover members prevent said cables from contacting each other, said cover members being movable in longitudinal direction along said cables and being arranged in end-to-end abutting relationship along said cables and in rows aligned in transverse direction of said cables, the cover members of one row being transversely offset relative to the cover members of an adjacent row, the cover members in each row abutting each other in transverse direction of the sling, so that said cover members form with said cables a flexible sling having a substantially continuous elastomeric surface, whereby said cables are spaced from the goods handled by said sling and cables passing through the same cover members are mutually connected, not more than one of said two cables which pass through one of said cover members also passing through another single cover member in abutting end-to-end relationship with said one cover member; and attaching means attached to the ends of said cables.

3. A band-shaped lifting sling comprising, in combination, a plurality of cables arranged substantially parallel with each other and spaced from each other substantially in one common plane; a plurality of elongated cover members made of elastomeric material and having each at least two longitudinal holes extending substantially parallel with each other at the same spacing as that of said cables, each of said cables passing through one of said two holes of a number of said cover members associated therewith so that said cover members prevent said cables from contacting each other, said cover members being movable in longitudinal direction along said cables and being arranged in end-to-end abutting relationship along said cables and in rows aligned in transverse direction of said cables, the cover members in each row abutting each other, the individual cover members of one row being offset in transverse direction with respect to the cover members of an adjacent row, so that said cover members form with said cables a flexible sling having a substantially continuous elastomeric surface, whereby said cables are spaced from the goods handled by said sling and cables passing through the same cover members are mutually connected, not more than one of said two cables which pass through one of said cover members also passing through another single cover member in abutting end-to-end relationship with said one cover member; and attaching means attached to the ends of said cables.

4. A band-shaped lifting sling comprising, in combination, a plurality of wire cables arranged substantially parallel with each other and spaced from each other substantially in one common plane; a plurality of elongated cover members made of elastomeric material each cover member having at least one longitudinal hole forming a passage through said cover member, two of said cables passing through said passage of each of said cover members associated therewith so that said cover members prevent said cables from contacting each other, said cover members being split longitudinally between said longitudinal hole and one of their outer surfaces for enabling said cover members to be placed in position around the associated cable and to be removed therefrom, said cover members being movable in longitudinal direction along said cables and being arranged in end-to-end abutting relationship along said cables to form with the same a flexible sling having a substantially continuous elastomeric surface, whereby said cables are spaced from the goods handled by said sling, not more than one of said two cables which pass through one of said cover members also passing through another single cover member in abutting end-to-end relationship with said one cover member; and attaching means attached to the ends of said cables.

5. A band-shaped lifting sling comprising, in combination, a plurality of wire cables of equal length arranged substantially parallel with each other and spaced from each other substantially in one common plane; a plurality of elongated cover members made of elastomeric material each cover member having at least one longitudinal hole forming a passage through said cover member, two of said cables passing through said passage of each of said cover members associated therewith so that said cover members prevent said cables from contacting each other, said cover members being movable in longitudinal direction along said cables and being arranged in end-to-end abutting relationship along said cables to form with the same a flexible sling having a substantially continuous elastomeric surface whereby said cables are spaced from the goods handled by said sling, not more than one of said two cables which pass through one of said cover members also passing through another single cover member in abutting end-to-end relationship with said one cover member; and attaching means attached to the ends of said cables, said attaching means including a series of eyelets at each end of the sling, one eyelet being assembled with each end of each cable and positioned to extend perpendicularly to said common plane, and loop members extending over each of said series of eyelets, respectively, and connected with said series of eyelets.

(References on following page)

References Cited in the file of this patent

UNITED STATES PATENTS

1,168,802	Harrison	Jan. 18, 1916
1,227,726	Woodhead	May 29, 1917
1,639,788	Uline	Aug. 23, 1927
2,211,615	Brickman et al.	Aug. 13, 1940
2,410,378	Gallamore	Oct. 29, 1946
2,598,921	Knudsen	July 3, 1952
2,603,523	Cameron	July 15, 1952
2,661,231	Caldwell	Dec. 1, 1953
2,705,461	Campbell	Apr. 5, 1955
2,723,121	Cartwright et al.	Nov. 8, 1955

FOREIGN PATENTS

185,955	Austria	June 25, 1956
854,832	Germany	Nov. 6, 1952
722,007	Great Britain	Jan. 19, 1955
17,980	Holland	May 15, 1928
32,401	Holland	Apr. 16, 1934