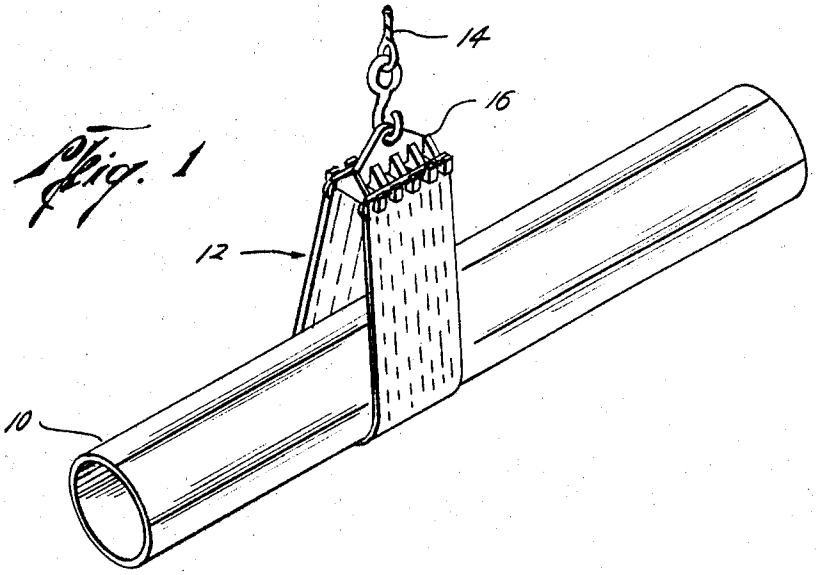
Feb. 4, 1969 J. E. SUTTON 3,425,737

PIPE SLING

Filed Aug. 28, 1967

Fig. 1



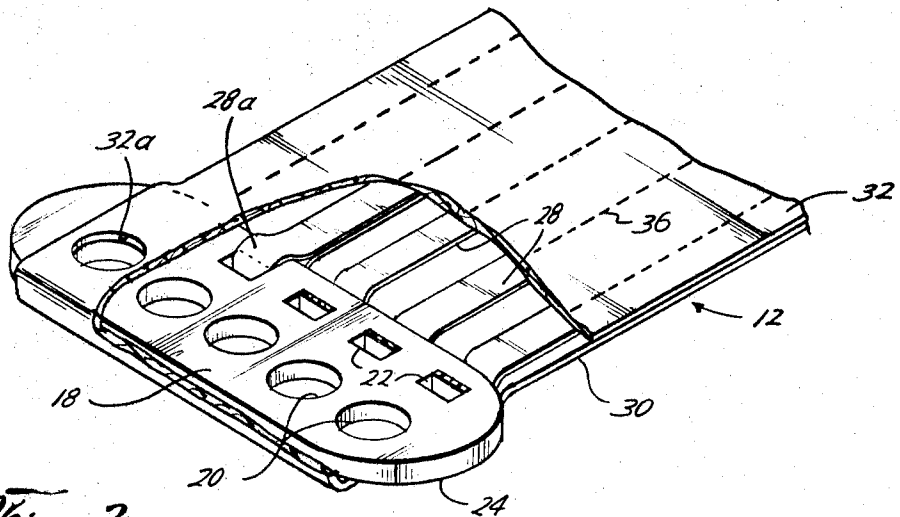


Fig. 2

Jimmy E. Sutton
INVENTOR.

BY Donald Gunn

ATTORNEY

United States Patent Office

3,425,737

Patented Feb. 4, 1969

3,425,737

PIPE SLING

Jimmy E. Sutton, 5612 Mitchelldale,
Houston, Tex. 77018

Filed Aug. 28, 1967, Ser. No. 663,775

U.S. Cl. 294—74 6 Claims

Int. Cl. B66c 1/18

ABSTRACT OF THE DISCLOSURE

For use in lifting pipes and other elongate objects, pipe sling apparatus preferably engaged by an overhead apparatus providing a lifting force to a connector means, an elongate means of generally flexible and planar construction adapted to extend around a pipe and having two ends, at least one of which is releasably connected to the overhead lifting apparatus wherein said elongate means is fabricated of a plurality of preferably woven straps adapted to sustain a substantial load, a cloth wrapping about the plurality of straps and stitched thereto, and impregnated to form an abrasion-resistant surface to protect the elongate means from damage.

Summary of problem and invention

The construction of a large diameter pipe line requires distribution and handling of the pipe sections. Routinely, they are unloaded from a truck or other vehicle maneuvered into a parallel location adjacent the excavation or ditch, hoisted above the terrain and into the excavation and joined to the pipe previously positioned in the ditch. While construction techniques may vary from the foregoing, it is recognized, of necessity, that the pipe must be handled in generally difficult circumstances. It is with a view of pipe handling and its many related problems that the present invention is summarized as providing an elongate means including a connector means which is adapted to be placed about a pipe for lifting by overhead apparatus. More particularly, the present invention is summarized as including a plurality of preferably woven elongate members which are quite strong individually and which are encased in a fabric wrapping which forms an essentially planar pipe sling which is impregnated to form an abrasion resistance means.

The present invention is more readily understood from a consideration of the included drawing wherein:

FIG. 1 is a perspective view of the present invention in use in lifting a pipe; and,

FIG. 2 is an isometric view of a substantial portion of the pipe sling with the fabric cover broken away to disclose additional details of construction, it being appreciated that the pipe sling includes two ends preferably of similar or identical construction.

In the drawing, attention is directed first to FIG. 1 of the drawing which illustrates a pipe **10** lifted by the sling of the present invention identified by the numeral **12**. A hoist cable **14** is connected to a head iron **16** which then engages the pipe sling **12** of the present invention for lifting the pipe **10**. Thus, it will be appreciated that the structure shown in FIG. 1 permits the overhead lifting apparatus **14** to be positioned above the pipe **10** and the pipe sling **12** passed under the pipe and engaged with the head iron **16** for lifting the pipe **10**.

Attention is directed to FIG. 2 of the drawing which will be described in detail prior to returning to FIG. 1. The pipe sling of the present invention is indicated by the numeral **12** in FIG. 2. It will be appreciated that the structure is substantially elongate with a portion thereof omitted since both ends of the pipe sling are identical, and since the central portions vary only in length and are fabricated in the same manner along the length. With this point in

mind, attention is directed to an end iron **18** which extends substantially transverse to the loading acting on the pipe sling. The end iron **18** is a generally rectangular metal plate of substantial strength. A number of holes **20** are adapted to be engaged by lifting means of the head iron **16** as will be described. Additionally, substantially elongate slots **22** are formed across the length of the end iron **18** near one edge for receiving a plurality of load bearing members as will be described. The slots **22** are preferably slightly wider than the means passed therethrough for ease of interconnection and need have only sufficient width to permit access during assembly. The number of slots **22** is subject to variation as are the spacing and actual size. At any event, it will be appreciated that one slot **22** is provided for each of the elongate members placed therein and their spacing is such as to not cause excessive stress concentrations in the end iron means **18**.

Note should also be taken of the number of holes **20** formed in the end iron **18** for engaging with the head iron **16**. The number of holes is likewise subject to variation and need only to transfer the weight of the pipe **10** to the end iron without weakening between adjacent holes.

The narrow face or dimension of the end iron **18** is curved or rounded at **24**.

The pipe sling **12** of the present invention is adapted to be substantially long in the completed form. For instance, widths of 42 inches are not uncommon, and lengths substantially over ten feet are occasionally used to lift pipe perhaps three feet or greater in diameter. For purposes of discussion and as an illustrative size only, the pipe sling **12** is presumed to be ten feet in length, in describing the construction of one embodiment hereof. For a length of perhaps ten feet, a plurality (between four and twenty) of nylon-like belts (webbing or woven construction) are placed parallel to one another and looped through the openings **22** in the end iron **18**. The second end iron (not shown) is spaced the appropriate distance from the first, and one selected nylon-like webbing belt **28** is threaded through each opening **22** in the end irons **18**, with each belt **28** passing through like openings at each end. It will be understood that the two ends of each nylon webbing belt **28** are brought together at some point between the end iron pieces **18** and are sewed together. It is not particularly critical that the spliced ends of the belt **28** be located at some mid-point, although it is preferable to not position the splice of the belt ends at the openings **22** in the end irons **18**.

Attention is directed to the loop **28***a* shown in FIG. 2 wherein it is illustrated that the webbing **28** is looped through the selected opening **22** in the end iron and is doubled back on itself for the length of the pipe sling.

As noted above, the number of webbing belts **28** included across the width of the sling is subject to some variation, although they should be in sufficient number to sustain the load placed on the sling **12**. At any event, the webbing belts **28** are located substantially fully across the width of the sling **12** and are positioned at both edges of the sling **12**. Then, a preferably woven cloth cover including a lower planar portion **30** and an upper planar portion **32** is placed about the pipe sling including the end irons **18** and the webbing belts **28**. The curved ends **24** of the end irons may protrude from the encasing cloth positioned about the webbing belts. It is not necessary to fully enclose the end irons; however, it is preferable to fully wrap the woven cloth cover around the belts **28** and most edges of the end irons **18** to prevent sharp edges from scratching the pipe **10**. Preferably, the cloth wraps just around the edgemost webbing belts of the sling to define its optimum width and extends fully over the end irons to define the optimum length. The cloth is joined to the belts **28** wherein the cover is sewed by the seam of stitches **36** to the various belts. Internal placement of the

belts **28** with respect to the cover is of significance. It is desirable that the belts **28** are spaced evenly along the length of the pipe sling **12** to maintain uniform strength, thickness and load distribution and to prevent bunching or limpiness of the completed structure. Moreover, in the preferred method of assembly, one side of the encasing cloth sack (perhaps the lower cover **30**) is first positioned adjacent the webbing belts and is sewed thereto to position the various elongate elements. Thereafter, the upper cover **32** is placed on the webbing belts and the stitches **36** indicate that the upper cover is also sewed to the partially assembled structural elements to form the permanent structure. As a further alternative, the cloth encasement may be of "sock" construction or may be formed of a single elongate cloth which is wrapped about the device.

It should be noted that the cloth cover extends over the end iron **18** and a plurality of openings **32***a* are formed in the cover itself to permit access to the openings **20** in each end iron. On the other hand, the slots **22** (of assistance in stringing the webbing **28**) are covered and no other openings are found in the completed pipe sling.

Note should be taken of the materials for fabrication of the present invention. Preferably, the webbing belts **28** are of nylon, which is quite strong and relatively inexpensive. In addition, nylon provides a woven belt which is quite flexible and is endowed with other physical characteristics desirable for a pipe sling. The width, thickness and even thread size is left to choice and depends on a number of circumstances of useage. Of further interest is the fact that the cloth cover is best a continuous member which fully surrounds the pipe sling. It may have a seam or seams which are best perhaps located at either edge, or it may be a continuous sock-like member open only at the ends with the seams formed at the extremes of the end irons **18**. The location of the seams is of no particular consequence so long as they are substantially joined to provide the desired encasing for resistance of abrasion as will be discussed.

Cotton has been found to be very suitable material for the cloth cover, although other cloth materials may be used. Preferably, the cloth cover is impregnated with polyurethane to yield a degree of resilience and abrasion resistive characteristics to the completed pipe sling **12**. It will be appreciated that some pipe is uncoated and is quite rough on the exterior; further, the circumstances of use require the pipe sling to be "snaked" under a pipe on abrasive ground surfaces such that the pipe sling not availing itself of abrasion resistive means is badly frayed by the surfaces. The use of polyurethane to impregnate the cloth cover substantially increases the life of the pipe sling. As a matter of fact, the abrasion encountered by the pipe sling, absent the cloth cover and the chemical impregnation, is sufficient to destroy the nylon webbing belts in short order and to generally bar the use of the pipe sling in actual field conditions. However, in the circumstances of the present invention, the life of the pipe sling is not merely enhanced, but is substantially multiplied by the use of the chemically impregnated cover which resists and absorbs the abrasive effects of the circumstances of use of the pipe sling .

Note should be taken of the cloth wrapping. One weight of cloth is about one-eighth inch thick, and has three layers of cloth. The product is similar to industrial cloth belting. The nylon webbing is best selected from military specified inventories and is preferably one and three-fourths inches wide. Since the cotton cloth does not stretch, a stretchable cloth can be adapted in lieu of the cotton cover.

While the foregoing describes the nature of the present invention, it is described hereinbelow in operation to convey further understanding of the pipe sling. In routine operations, the overhead lifting apparatus **14** is positioned above the pipe **10** with the pipe **10** resting on the ground, skids, or some other surface. The head iron **16** is carried on the hook and the cable is positioned above a central point of the pipe **10**. The pipe sling **12** of the present invention is engaged with one side of the head iron **16**. As shown in the drawings, the head iron includes a number of hooks, perhaps five, on opposite sides. The hooks on one side of the head iron **16** are engaged with the openings **20** in the end iron **18** at one end of the pipe sling **12**. It is of no particular consequence which end is first engaged to the head iron, and which faces of the sling is presented to the pipe in contact with the pipe. The pipe sling **12** is then "snaked" under the pipe **10** by appropriate means. For instance, a small rope can be used to pull the free end of the pipe sling **12** under the pipe **10**. Because of the relative thinness of the pipe sling, no particular problem with preliminary lifting of the pipe **10** is encountered. Moreover, it is possible to position the pipe **10** over the sling **12** when the pipe **10** is removed from the vehicle and placed on the ground. At any event, the pipe sling **12** is placed beneath the pipe **10** to permit lifting of the pipe in the below described manner.

After the pipe **10** is positioned over the central portions of the sling **12**, and with one end engaged with the head iron, the head iron is lowered sufficiently to permit the free end of the pipe sling to be hooked to the head iron. Then, the lifting apparatus raises the head iron above the pipe **10** and the pipe sling is pulled taught in the manner illustrated in FIG. 1. At this juncture, the apparatus is in position to lift the pipe **10** carried by the apparatus.

It is possible to lift upwards of two hundred tons of pipe utilizing the device of the present invention. Moreover, the abrasive surfaces, even with a pipe **10** which weighs as much as two hundred tons, do not damage or wear the pipe sling **12** since the cover surrounding the load bearing members within the pipe sling protects them from abrasion, rough handling, and the like. Moreover, the pipe sling **12** is adapted to resist abrasion caused by the surface of the pipe or the surface of the ground, the ditch into which the pipe is placed, or other environmental conditions.

Note should be taken of various sizes of the present invention. For one large sling useful in lifting pipe of perhaps forty-two inches in diameter, and weighing several tons per section, the device of the present invention has a belt width of up to forty-eight inches with the belt length of approximately fifteen feet. The total weight of the large pipe sling is less than two hundred pounds, permitting one man to effect connection to the overhead lifting apparatus. In further particular, the weight can be substantially less for smaller models. It will be appreciated that even with the maximum size, the pipe sling **12** of the present invention is routinely handled by one man. Moreover, the pipe sling is connected to the head iron **16** by one man, since the sling itself is quite flexible and can be easily maneuvered into position for engaging the hooks of the head iron **16**.

What is claimed is:

1. A pipe sling comprising:

(a) first and second load-supporting members having transverse openings in portions thereof;

(b) a plurality of paralleled belts extending between said load-supporting members and respectively looped through said transverse openings for transferring loads form said belts to said load-supporting members;

(c) abrasion-resistant means encasing said belts and at least said portions of said load-supporting members in which said transverse openings are located; and,

(d) means on said load-supporting members adapted for releasable connection to pipe-handling apparatus.

2. The pipe sling of claim **1** wherein said connecting means on each of said load-supporting members are comprised of at least one opening in each of said load-supporting members adapted to receive a portion of such pipe-handling apparatus.

3. The pipe sling of claim 2 wherein said abrasion-resistant means include a fabric sleeve covering said belts and said load-supporting members and having openings therein coinciding with said one opening in each of said load-supporting members.

4. The pipe sling of claim 3 wherein said fabric sleeve is impregnated with a chemical for imparting added resiliency and abrasion-resistance thereto.

5. The pipe sling of claim 3 wherein said fabric sleeve is impregnated with polyurethane for imparting added resiliency and abrasion-resistance thereto.

6. The pipe sling of claim 1 wherein said abrasion-resistant means includes a fabric sleeve covering the flat

side of said belts and extending to said first and second load-supporting members.

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EVON C. BLUNK, *Primary Examiner.*

ROBERT D. GUIOD, *Assistant Examiner.*