APPARATUS FOR TURNING HEAVY LOADS SUCH AS STONE

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ABSTRACT

Load turning sling means for handling heavy loads such as stone slabs and the like, and comprising a frame having brackets suspended therefrom for supporting a drive shaft in journaled relationship therewith. Drums are secured to opposite ends of the drive shaft, with the drums having an outer sling receiving drive surface thereon and a sling retaining head at each end of each drum. A pair of endless loop slings are arranged in captive relationship over the drums, and free to be positioned thereover, thus providing the load turning sling for handling loads suspended therefrom. The slings preferably have a high friction surface for frictionally engaging the sling receiving drive surface of the drum.

7 Claims, 2 Drawing Figures
APPARATUS FOR TURNING HEAVY LOADS SUCH AS STONE

BACKGROUND OF THE INVENTION

The present invention relates to an improved load supporting or slab turning device particularly arranged to handle heavy objects such as stone slabs and the like. More specifically, the apparatus of the present invention provides an improved means for handling heavy loads with a pair of axially spaced slings, with the slings being adjustably arranged to be positioned to form a cradle or the like to support and otherwise transfer the load from one disposition to another. One particular advantage of the apparatus is its ability to handle somewhat irregularly shaped loads, such as stone slabs or the like which have not been completely cut or otherwise treated so as to assume a rectangular parallelepipedon configuration.

In the past, various sling devices have been utilized to form cradles or the like for supporting heavy loads, however these devices have generally been adapted for use with regularly shaped stone or other large objects, and difficulty has frequently been encountered in arranging a structure to handle loads which do not form a regular configuration. For example, when irregularly shaped loads are being handled and turned or otherwise rotated, any irregularity in the configuration will frequently result in a "crawling" of the sling on the support. If the crawling becomes excessive, the load may be dropped or otherwise uncontrollably discharged, thus creating hazards to the operator.

The apparatus of the present invention includes a pair of adjustably positioned sling means which may be utilized to handle or otherwise support heavy loads, and to turn these loads with a reduced risk of having the belt move axially on the rotating support drum and thereby inadvertently discharge the load. Specifically, a pair of axially spaced drums are provided, with the drums being controllably rotated by suitable power means. Each drum carries a suspension sling in the form of a loop extending or passing over the surface of the drum, with the sling being adjustable in length to accommodate varying size loads and particularly adapted to reduce the tendency to crawl or otherwise move along the axis of the drum. In addition, means are provided for ease of maintenance of the apparatus, including in particular, means for readily removing slings from the drums.

SUMMARY OF THE INVENTION

Therefore, it is a primary object of the present invention to provide an improved load supporting and turning sling means for handling heavy loads, wherein the gap distance between the individual slings is readily adjustable to accommodate a variety of load sizes.

It is yet a further object of the present invention to provide an improved load supporting and turning sling means for handling heavy loads such as stone or the like which is arranged to accommodate irregularly shaped articles, such as articles having a configuration of other than a rectangular parallelepipedon.

It is still a further object of the present invention to provide an improved load supporting and turning sling means for handling heavy loads which is provided with a pair of endless loop slings which are arranged in captive relationship over a pair of axially spaced drums, and wherein the axial disposition of the slings may be readily adjusted in order to accommodate loads with varying dimensions.

It is still a further object of the present invention to provide an improved load supporting and turning sling means for handling heavy loads which is provided with a pair of axially spaced and coaxially arranged drum means, with each drum having an endless loop sling arranged thereover, and with the sling having a cross-sectional thickness which is small in relation to the diameter of the drum in order to improve the load handling capability of the sling.

Other and further objects of the present invention will become apparent to those skilled in the art upon a study of the following specification, appended claims, and accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a front elevational view of the improved load supporting and turning apparatus of the present invention, and illustrating the endless loop webbs in partially broken away form; FIG. 2 is a vertical sectional view taken along the line and in the direction of the arrows 2-2 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with the preferred embodiment of the present invention, and with particular reference to FIG. 1 of the drawing, the load supporting and turning apparatus generally designated 10 includes a frame means with a primary central support beam 11 having a plurality of brackets 12, 13, 14 and 15 depending therefrom. Brackets 12-15 inclusive are secured by welding or other conventional means to beam 11. As is indicated in FIG. 1, eyes 17 and 18 are also coupled to beam 11, in order to appropriately suspend the apparatus from an overhead support.

A drive shaft generally designated 20 is journaled for rotation within the individual brackets 12-15 inclusive, the drive shaft 20 being operatively coupled to the output of transmission or control 21, with the main power being supplied to transmission 21 by motor 22. Stub shafts 23 and 24 extend outwardly from transmission housing 21, these stub shafts 23 and 24 collectively forming a central shaft segment for the drive shaft means. Stub shafts 23 and 24 are coupled to the outer shaft segments 25 and 26 by means of a double sprocket chain coupling arrangement such as is shown at 27 and 28 respectively. The purpose of the coupling, while described more fully hereinafter, permits ready disassembly of the drive shaft segments to facilitate a change of slings.

Journal bearings are provided as at 30, 31, 32, and 33 for supporting the drive shaft within the individual brackets 12-15 inclusive. These bearings are preferably secured to the individual brackets by means of thru-bolts, such as is illustrated at 35, for example. It is the bolts 35-35 which support the shaft within the individual brackets, with the individual bearing structures 30-33 inclusive being utilized to maintain proper axial alignment with the various portions of the drive shaft.

As has been indicated, drum means are secured to the outer drive shaft segments, with the drum means including an outer sleeve portion such as the sleeves 40 and 41, with end caps 42 and 43 being coupled to
sleeve 40, and caps 44 and 45 being coupled to sleeve 41. The individual end caps have a central bore extending therethrough in order to accommodate the shaft segments, as is apparent in the drawing. Thus, controlled rotation of the individual drums is accomplished by motor 22 which is, of course, reversible, with the torque from the motor being directed to the shaft 20 through the transmission 21. Torque arm 47 is coupled between transmission 21 and frame element 11, as is indicated in the drawing. Also, control box 48 is provided in order to house the appropriate circuitry for controlling the output of motor 22.

A pair of endless loop slings 50 and 51 are provided, with these slings having a cross-sectional thickness dimension which is small relative to the diameter of the drum. The slings 50 and 51 are arranged in captive relationship over the drums and are arranged to be disposed in pre-selected disposition along the drums, as is indicated in FIG. 1. For most purposes, the cross-sectional thickness of the loop slings should be less than about 10 percent of the diameter of the drum over which it is running. Such a relationship minimizes the tendency of the belt to crawl or walk along the surface of the drum when irregularly shaped loads are being handled.

One belt system which has been found particularly adapted for use with handling heavy loads is a belt prepared from two individual sections or members, a first section or member being reinforced with nylon, with the second member also utilizing a nylon web reinforcement which is impregnated with polyvinyl chloride. Polyvinyl chloride is normally resistant to abrasion, and provides a frictional surface for contacting the outer periphery of drums 40 and 41. As is apparent, the heavily reinforced section or member is provided for the purpose of withstanding the heavy loads to be imposed.

As is apparent in the drawing, the various segments of drive shaft 20 are arranged in coaxial relationship, one to another. It will be apparent that the outer segments of shaft 20 must be axially aligned, however the central segment may be arranged in axial parallel relationship, if desired, with appropriate coupling means being utilized to transfer the rotational energy from the central shaft portion to the outer shaft portions.

As is apparent in the drawing, the sleeve members 40 and 41 which form the individual drums are generally elongated, and have a substantially equal length, one compared to the other. Also, for purposes of effective utilization of the structure, the length of the sleeves 40 and 41 will generally be substantially equal to the distance separating the inner ends of these drums.

In order to accommodate a change in slings, the operator is simply required to remove support bolts 35—35 from the appropriate brackets, and following de-coupling of the double sprocket chain coupling, the drum structure may be removed from the assembly, and the drum replaced. Such an operation is expedient in view of the slotted portions or areas 53 formed in the individual brackets 12—15 inclusive.

With attention being directed to FIG. 2 of the drawing, the individual components of the sling members are illustrated, with the heavily reinforced segment being shown at 55, and the frictional segment being shown at 56. This compound sling has been found to be both durable and reliable in use.

As has been indicated, the cross-sectional thickness of the endless loop slings is small relative to the diameter of the load supporting sleeve over which the sling moves. In a typical stone turning structure, the sleeves 40 and 41 had an outer diameter of 9 inches, with the appropriate webbing having a cross-sectional thickness of approximately nine-sixteenths inch. Such an arrangement permitted the carrying of heavy loads without excessive crawling of the webbing on the drum when irregularly shaped loads were being handled.

1. Load turning sling means for handling heavy loads comprising:
   a. frame means including a central support beam and a plurality of brackets secured in depending relationship from said beam;
   b. drive shaft means journaled for rotation within said brackets and having a central shaft segment and a pair of coaxially disposed outer segments arranged in axial alignment with said central segment and detachably secured to said central segment, the inner and outer ends of said outer segments each being held in depending relationship from said beam by one of said brackets;
   c. drive means for controllably rotating said drive shaft means;
   d. drum means with an elongated axial dimension secured to said outer segments and having an outer sling receiving drive surface thereon and a pair of enlarged sling retaining heads at each end thereof;
   e. a pair of endless loop slings each having a generally rectangular cross-section and each having a cross-sectional thickness dimension which is small relative to the diameter of said drum arranged in captive relationship, one over each of said drums, and between adjacent pairs of said brackets.

2. The load turning sling means as defined in claim 1 being particularly characterized in that each of said endless loop slings has reinforcing fibers maintained therewith, with a coating on the inner surface of said sling for providing frictional engagement between said sling and said drive surface.

3. The load turning sling means as defined in claim 1 being particularly characterized in that said drive shaft means are arranged coaxially, one to another.

4. The load turning sling means as defined in claim 1 being particularly characterized in that said drum means are of substantially equal length, and are spaced apart by a distance substantially equal to the drum length.

5. The load turning sling means as defined in claim 1 being particularly characterized in that said depending brackets are slotted for accommodating ready de-coupling of said drum means.

6. The load turning sling means as defined in claim 1 being particularly characterized in that the cross-sectional thickness dimension of said loop slings is less than 10 percent of the diameter of said drum means.

7. The load turning sling means as defined in claim 1 being particularly characterized in that said endless loop slings are formed with an inner ring member and an outer ring member, with said inner ring member having a frictional surface for engaging said drum means, and with said outer ring member having a plurality of nylon reinforcing fibers forming the assembly.