

Sept. 10, 1963

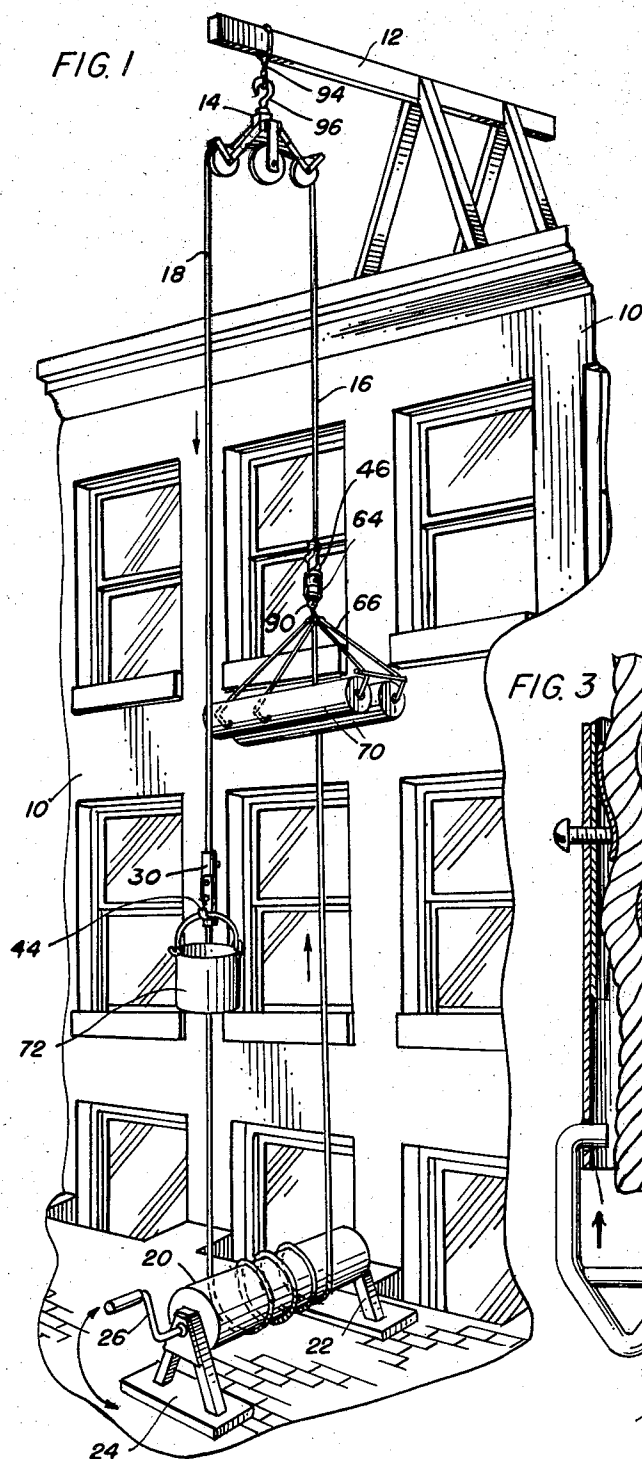
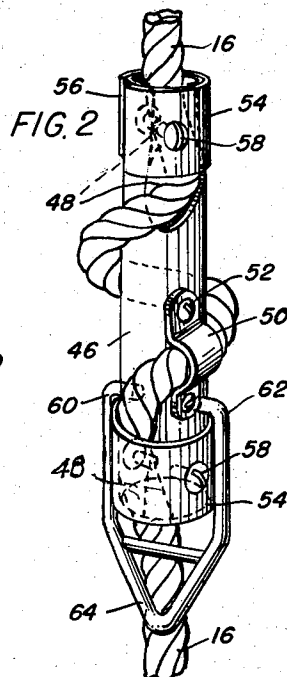
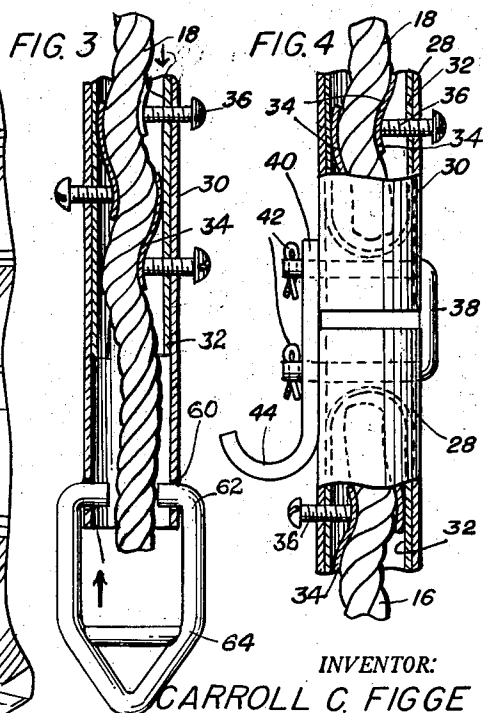
C. C. FIGGE

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METHOD AND APPARATUS FOR LIFTING

Filed Jan. 6, 1961

2 Sheets-Sheet 1



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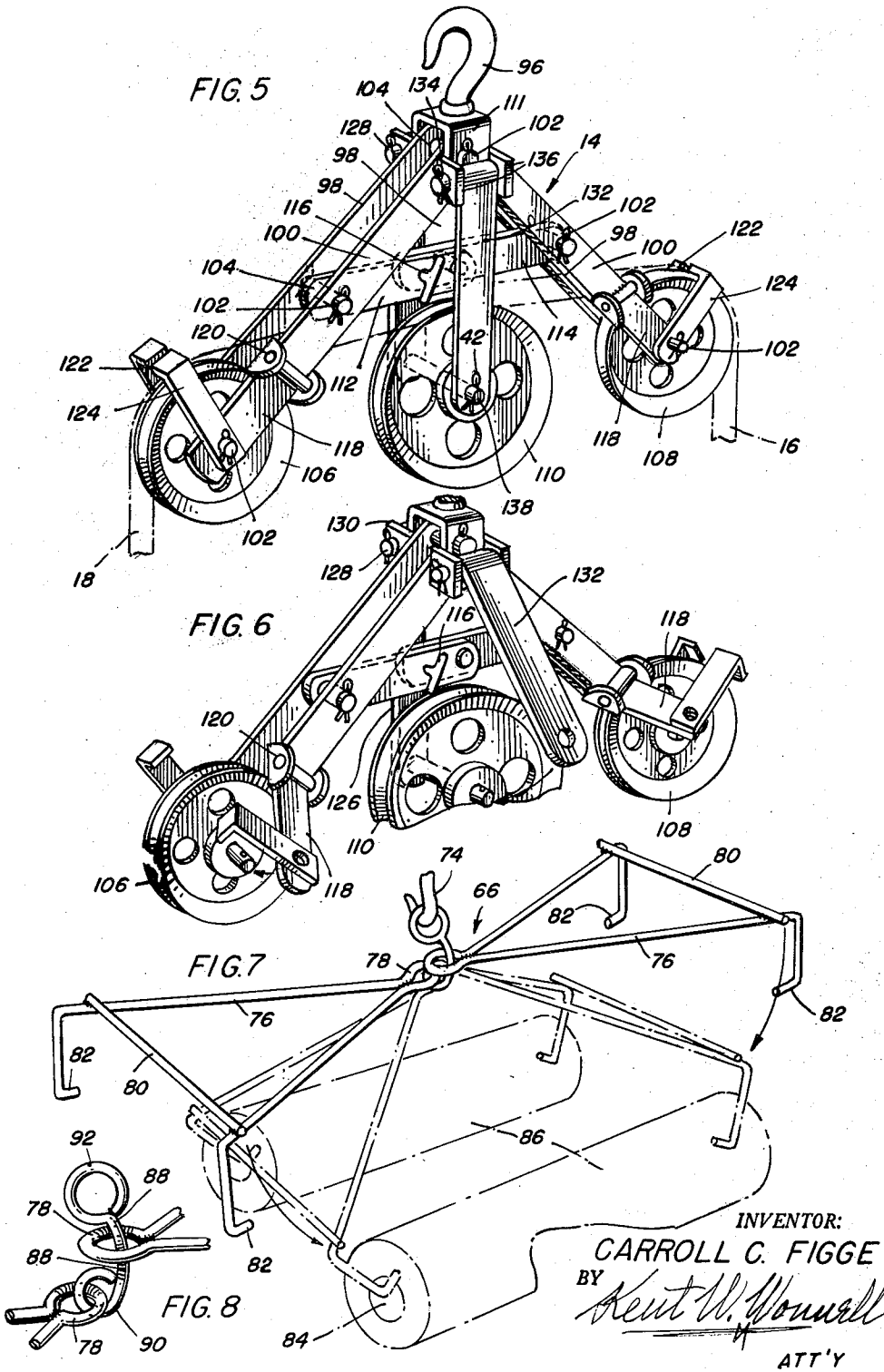
C. C. FIGGE

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METHOD AND APPARATUS FOR LIFTING

Filed Jan. 6, 1961

2 Sheets-Sheet 2



1

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METHOD AND APPARATUS FOR LIFTING

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5 Claims. (Cl. 254-142)

This method of lifting and the apparatus therefor may be employed generally in any connection where the hoisting of some product is in question, but is more particularly described as a method and apparatus for raising and lowering articles of manufacture for the erection and repair of buildings and building structures although it may have a more general application wherever used.

An important object of the invention is to provide a closed loop raising and lowering system for a multi-level building structure.

A further object of the invention is to provide means for increasing and decreasing the different levels to and from which the articles are raised and lowered.

A further object of the invention is to provide a closed loop for raising and lowering articles between levels not more than the maximum elevation and for changing the maximum elevation at will.

Still a further object of the invention is to utilize a single raising rope or cable by attaching the ends thereof to the same winding drum; by supporting a load from any predetermined location along the supporting cable; to mechanically connect the ordinarily opposite ends of the same piece of lifting cable; and to support a load from any of the devices which connect the cable or restrict the load to a predetermined location on any cable between the ends thereof.

A further object of the invention is to alter the overhead support for the widening cable path so that it may pass equally well over one, two or three sheaves; to provide means for disengaging or inserting any of the sheaves in a loop including the cable without disengaging the cable therefrom; to space the opposite flights of the cable from each other in a vertical direction depending upon the material to be elevated; and to support the multiple spaced sheaves upon a freely turnable pivot so that either of the vertical flights and the loads carried thereby will be more nearly adjacent the face of the building or other structure relative to which they are raised.

Other objects of the invention will appear more fully in the specification and will be apparent from the accompanying drawings in which,

FIG. 1 is a perspective view of an elevating system as applied to a building in which a closed loop circuit is passed over a multiple sheave at the top and several times around the winding drum at the bottom in relation to the adjacent wall of a portion of a building.

FIG. 2 is a perspective view of a rope having a snubber for predetermining the location of a supporting loop with respect to a continuous length of rope.

FIG. 3 is a partial sectional view showing an intermediate connector with a supporting hook.

FIG. 4 is a sectional view with parts broken away showing two rope end connectors in combination with a supporting hook.

FIG. 5 is a perspective view of a supporting sheave with three wheels any one of which may be disconnected from or connected in a loop including an elevating cable;

FIG. 6 is another perspective view of the construction shown in FIG. 5 showing the parts in which the wheels are mounted in the structure.

FIG. 7 is a perspective view illustrating the supporting mechanism and its application to a pair of roofing rolls; and

FIG. 8 is a perspective view of a portion of the lifting mechanism as shown in FIG. 7.

2

In elevating material for building operations, it is preferable to maintain a closed loop elevating support and to confine it both at the top and the bottom; to provide devices on the rope itself which may be utilized for raising and lowering different articles used in building; and to provide a sheave, drum or some other supporting power operated device which is rotatable for raising and lowering the different flights or portions of the cable. By proceeding in this manner, the cable is always of the proper length for hoisting articles to and from the highest station or story; it is a simple matter to change the elevation to a different height or floor by winding more of the cable about the drum or by inserting a greater length of cable in the loop by the means providing for this purpose and by operating the rotary device on the ground in the proper direction for raising and lowering the articles in question.

Referring now more particularly to the drawings, the facade or wall 10 of a building is shown having a support 12 on the roof for a material hoist comprising a sheave holder 14 at the top, a joined length of rope passing over the sheaves with an upward moving flight 16 and a downward moving flight 18 jointly wound upon a drum 20 at the bottom, the ends of the rope secured thereto, together or by means of a double support hereinafter described.

The winding drum lies in a vertical plane and may be held upward at the ends by supports 22 and 24 to rotate upon the horizontal axis in a well known manner and having a crank 26 representing a power means for rotating the drum in either direction and thereby raising and lowering the different flights or portions of the rope. It is well understood that the drum may be rotated by manual means or by motor, the particular means constituting no part of the present invention.

The ends of the rope may be joined as shown in FIG. 4 by a pair of connectors 28, each comprising an outer shell 30 into one end of which a sleeve 32 is inserted having spring tongues 34 extending inwardly therein for engaging the inserted end of a rope and the tongues being forced inwardly by screws 36 which extend through the outer shell 30 into sleeve 32 and against the tongues 34 for binding the adjacent end of a rope 16 or 18 tightly therein.

At the adjacent ends of these connectors into which the ropes are not inserted are one or more openings through which the parallel ends of a U-shaped clamp 38 are inserted, the free ends being joined by a plate 40 which is secured in place by cotter pins 42 inserted through appropriate holes at the ends of the clamp. The connecting or U-shaped end of the clamp is provided with a supporting hook 44 which therefore extends at a distance from either of the ropes 16 or 18 and affords a support for an article or materials to be raised by the hoist.

A metal sleeve 30 as shown in FIG. 3 is provided with a slot wide enough to admit the rope 18 therethrough, and another sleeve 32 which telescopes within the sleeve 30 is also provided with a slot wide enough to admit the rope. These sleeves when threaded on the rope may be telescoped and secured together by screws 36 which also engage the inner sleeve 32 and press the tongue 34 into engagement with the rope. The slots are not registered so that the rope is actually enclosed by them when the screws 36 are secured in place. These screws are usually staggered to provide the maximum snubbing action.

It is commonly known that a small snubbing action will hold a rope or cable against a large force applied at the end thereof and this is the action of the snubbing piece. In order to retain a portion of the rope within the metal sleeve 46, a circular split clamp 54 is applied thereto having a longitudinal slot 56 sufficiently wide to admit the rope into the slot 48 and then this clamp 54 is rotated to

3

cover the rope, and a fastening screw or screws 58 are inserted through the clamp against the rope 16 engaging the metal of the sleeve 46 for holding the collar of the clamp in place over the rope. With this adjustable engagement, the sleeve 46 is secured to the rope against movement in either direction.

Near one end of the sleeve 46 are openings 60 into which the ends of a yoke 62 may be inserted, leaving a hook or loop 64 for attachment to a load to be lifted or conveyed by the rope.

In the representation shown by FIG. 1, a carrier 66 for rolls 70 is shown attached by means of a loop 64 to an intermediate rope connector as shown in FIG. 2 applied to the upward moving side 16 of the rope and a pail 72 is attached by means of a hook 44 to a connector as shown for example by FIG. 4. The pail is presumably empty but offers a partial counter-balance to the rolls lifted by the carrier 66 and extending to any desired elevation included by the ropes.

The rotation of the drum in one direction will raise the carrier 66 so that the rolls can be unloaded at the roof or any intermediate station if desired at which time the pail will be at its lowest elevation. To reverse the direction of the rope, and to raise the pail or any other load, the rotation of the drum is reversed, raising the pail and lowering the carrier. It is understood that the pail or carrier and load equipment may be varied as necessary or desired.

A preferred construction of the carrier is shown in FIG. 7 in which two triangular pieces 76 each have a loop or eye 78 at their apex, a strengthening cross piece 80, supporting ends and inwardly turned bent extremities 82 which are thus spaced apart and adapted to engage in the corresponding opposite openings 84 of roll roofing 86. The two triangular pieces are less in length than the rolls of roofing 86 and are connected by a link 88 as shown more clearly in FIG. 8 which has a loop or eye 90 engaging the loop or eye 78 of one of the members with a stem extending through the loop or eye 78 of the other member and having a supporting eye 92 at the outer end thereof adapted to be engaged by a supporting hook 74 (44 or 64).

When this hook is gradually raised, the bent extremities 82 of the opposite carriers are loosely engaged in the openings at the centers of each of the rolls and a pair of rolls 86 may thus be engaged and raised by the hook 74 attached to a rope for discharging them at the roof or at any desired intermediate station.

The sheave holder 14 is preferably carried by an overhanging support 12 attached by a loop or a rope hanger 94 extending through a hook 96, preferably at the top of angular head pieces 98. Each head piece has a corresponding angular support 100 parallel to it throughout part of its dimension, but spaced therefrom by pins 102 inserted between both the head pieces 98 and the support 100, and spaced apart by sleeves 104 which allow the sheaves 106, 108 and 110 to be inserted therebetween and upon the pins or pivots for free rotation. The head pieces 98, the supports 100 are spaced apart in this manner at the top and extending over the outside of the pivot is a bracket 111 in which the hook 96 is pivoted for free rotation about a vertical axis. This will suspend the hanger by the hook or other support free to rotate about a vertical axis. The head piece 98 and the angular support 100 in front of it, are both made in two separate pieces and the two head pieces 98 may be adjusted and held in any desired position by a pair of links 112 and 114 pivoted separately to a pin 102 between the parts 98 and 100 and pivoted together at the other or adjacent end with an adjusting screw 116 extending through one of the links 112 and engaging a projecting portion of the other link 114 permitting the adjusting movement of the two head pieces 98 towards each other in accordance with their width.

At the end of each head piece 98, a bearing pin 102 is pivoted, a sheave 106 (or 108) is mounted thereon and the angular support 100 corresponding thereto has a sep-

4

arate link 118 mounted upon a pivot pin 120 and the outer or free end extending over the pivot pin 102 which extends in that direction from the head piece 98. A retainer plate 122 extends upwardly and partially overlaps the sheave 106, or the opposite corresponding sheave 108 and at the end of the link 118, a separate retaining plate 124 extends upwardly and substantially covers the remaining portion of the space overlapping the sheave 106 or 108.

With this construction, a continuous rope 16—18 extends separately over the two spaced sheaves 18 which are separated and retained in the sheaves by the rope hanger in accordance with the loads which they are to carry between the up and down ropes.

As an additional or a separate support, the middle sheave 110 has an arm 126 extending downward from a pivot 128 mounted in projections 130 attached to the angular head piece 98 at the top thereof, the projections being at the bottom of the bracket 111, and at the other side of the sheave holder is an arm 132 mounted at the top in a pivot pin 132 extending between projections 136 secured near the upper ends of the angular supports 100, the two outer or free ends of the arms 112 and 132 receiving a pivot pin 138 between them with the sheave 110 between the arms and all of the pivots being each provided with cotter pins 42 as shown in connection with the earlier figures of the drawing.

With this construction, it is possible to pass the hoisting rope over a single sheave of its holder 14; it may be the single sheave 110 which often is a trifle larger in diameter than the other two; it may be the single sheave and either one of the other sheaves 106 or 108, or it may be over the two outer sheaves 106 or 108 or it may include all three sheaves. The particular object of this construction is that the sheaves may be connected or disconnected and the rope may be adjusted accurately without actually disconnecting them or dislodging the rope from the sheave holder 14 but simply disconnecting the sheave from its pivot pin by means of the arms 118 or 132, or by correspondingly replacing any one of the sheaves which has been omitted within the rope loop embracing the desired sheave, or sheaves.

With this construction, materials of any kind can be hoisted from the winding drum to an intermediate position or to an upper limiting position on top of the roof. A great variety of articles are covered and particular means is provided for hoisting rolls of roofing, buckets containing water, cement, bituminous material and other equipment.

The lifting apparatus may be changed to cover other hoisting distances by wrapping more rope around the winding drum or by removing it therefrom and by adding or omitting different sections of rope by means of the end connectors as shown in FIG. 4 in which the hooks 44 may be omitted or not, as desired.

Another valuable feature of this invention is that a load may be applied to any portion of the rope by means of the connector shown in FIG. 2 without severing the rope itself which is of great advantage in transferring the apparatus from one length of total lift to another length. Thus it is not necessary to insert or remove a section of rope from the rope hoisting circuit and then to place the connector shown in FIG. 2 in the desired location or locations with respect to that portion of the rope which is in use.

When a load goes up in the conventional manner, only one of the ropes is used to pull up the load. The height of the sheave and the position of a load on the rope may be changed as desired in the down movement, both sides of the rope are operated by the drum, and it is not necessary for a man on the receiving end to push the unbalanced rope to the ground.

The frame around the sheave is hinged to open and make possible the hanging of the rope on the sheave or sheaves after which the frame closes. This eliminates

5

the need for threading the rope through the sheave. The extra sheaves are supplied and make the width of the path of the two flight portions of the rope wider or narrower and the location of the portions of the rope at different distances apart on the drum are for the same purpose. Neither the rope end connectors or the intermediate load connector can be moved through the sheave or sheaves or about the drum and it is therefore necessary to change the location of these parts on the rope for each different hoisting elevation. The ease with which this change can be accomplished is one of the desirable features of the invention.

With this construction, a work load goes up each time the opposite flight of the rope is pulled downwardly, either manually or by a drum means or its equivalent.

A load is hung on one side of the rope and empty equipment can be used as a counter-weight on the other side.

Neither of the load supports can go through sheaves or around the drum and it is necessary to adjust either one or both of these load supporters for every different hoisting elevation.

The supporting sheave may be opened and one or more wheels may be selected for the rope varying the distance apart of the rope flights in accordance therewith.

In widening the distance apart of the flights, a single sheave or multiple sheaves may be employed which allows room for the articles as they pass up and down on the rope.

Two devices are fastened to the different flights of the rope, one supporting device going up while the other supporting device goes down; and with or without two load supporting devices, the rope length must be longer than three times the height to which the load is lifted, this additional rope accumulating at the lower end thereof or being wound around the drum whichever is more convenient.

With this construction, the entire hoisting method is accomplished with the greatest facility in the arrangement of the parts, their attachment to the rope portions and in their adjustment at various heights thereon, and at the same time, the rope flights are located at various distances apart, both at the top and at the bottom without requiring time for complete dismantling and erecting the apparatus for each separate adjustment.

While I have thus described this invention in some detail, it should be regarded as an illustration or example rather than as a limitation or restriction of the invention, since various changes in the construction, combination and arrangement of the parts may be made without departing from the spirit and scope of the invention.

I claim:

1. In an apparatus for lifting materials from the bottom of a building to the top and to intermediate stations thereof, the combination with a winding drum at the bottom, of a support at the top having a plurality of sheaves spaced apart, a continuous conveyor rope having a plurality of loops around the drum with the loops spaced apart along the drum, the rope extending over the sheaves at the top, the conveyor rope thus having opposite upwardly and downwardly movable flights spaced apart from the sheaves to the drum, the rope conveyor having ends and pairs of end connectors therefor by means of which rope lengths are adapted to be inserted into, affixed to, joined together with, and removed from the continuous rope conveyor to make it selectively longer or shorter in accordance with the mounting of said sheaves at higher and lower elevations with respect to a building to which they are applied, additional means intermediate said rope ends for engaging the rope and supporting material to be raised, said additional means comprising a metal sleeve into the ends of which a portion of the rope intermediate the said ends thereof is inserted and about the outside of said sleeve the intermediate portion of the rope between the ends of the sleeve is wrapped, a snubber attached to the sleeve and engaging said intermediate portion of the rope be-

6

tween the ends of the said sleeve, and supporting hook means attached to and projecting from the sleeve by which said material is attached and supported.

2. In an apparatus according to claim 1, the said sleeve having slots at the ends of a size to accommodate the insertion and removal of said conveyor rope which extends inwardly at both ends of the sleeve, the said intermediate rope section being wound about the sleeve with the ends thereof disposed in the slots, a clamp applied at each end of the sleeve for holding the rope in said slot, and a snubber attached to the outside of the sleeve and in contact with the said intermediate rope portion which is wound about the sleeve for positively engaging the rope.

3. In an apparatus according to claim 1, means attached to the rope flights at the sides of the conveyor rope intermediate the ends of the flights for any particular elevation for supporting materials, said means comprising a pair of triangular supports, each support having diverging sides with bent ends and a common apex with a loop eye therein, a short wedging link with two eyes at the end, one eye in engagement with one of said loop eyes, and the link extending through the loop eye of the other support leaving the other hook eye of the link projecting one of the hooks supported by said conveyor sleeves engaging the last named link eye by means of which both supports are lifted at the centers drawing the bent ends inwardly and together, and a pair of rolls of material having hollow centers at the ends into which the bent ends of two diverging sides of the triangular supports are inserted and the supports raised by lifting engagement of the said bent ends, and the said rolls of material being raised and lowered in accordance with the conveyor rope.

4. In an apparatus, according to claim 1 in which the sheaves are arranged substantially in a plane and close together, supporting means therefor having a relatively fixed back and pivot pins for each of the sheaves projecting into the back and upon which the sheaves are rotatable, a front portion hinged to the supporting back having pivoting members for individually engaging the front ends of the pivot pins for locking each sheave into and out of engagement with the upper portions of the conveyor rope which passes over the sheaves.

5. In an apparatus in accordance with claim 4, the relatively fixed back of the sheave support comprising a pair of arms pivoted together at one end and the other ends extending angularly apart, a front frame comprising two pieces spaced from the back frame parts, members hinged to the lower ends of the front frame pieces to space them from the back frame parts, two sheaves mounted at the ends of the back frame arms and in said members hinged to the front frame pieces, the back frame arms and the front frame pieces being connected together and having guards extending partially over them to prevent disengagement of a rope from the top of the sheaves carried thereby, and link means for spacing the two back arms apart, additional means to prevent the disengagement of a rope from the said sheaves, a middle sheave suspended between the two other sheaves and comprising side arms extending from the back frame and from the front frame pieces with a connecting cross pin at the bottom for pivoting the middle sheave thereon, and said middle sheave having means for holding the upper portion of a conveyor rope in engagement therewith when the said third sheave is in use.

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