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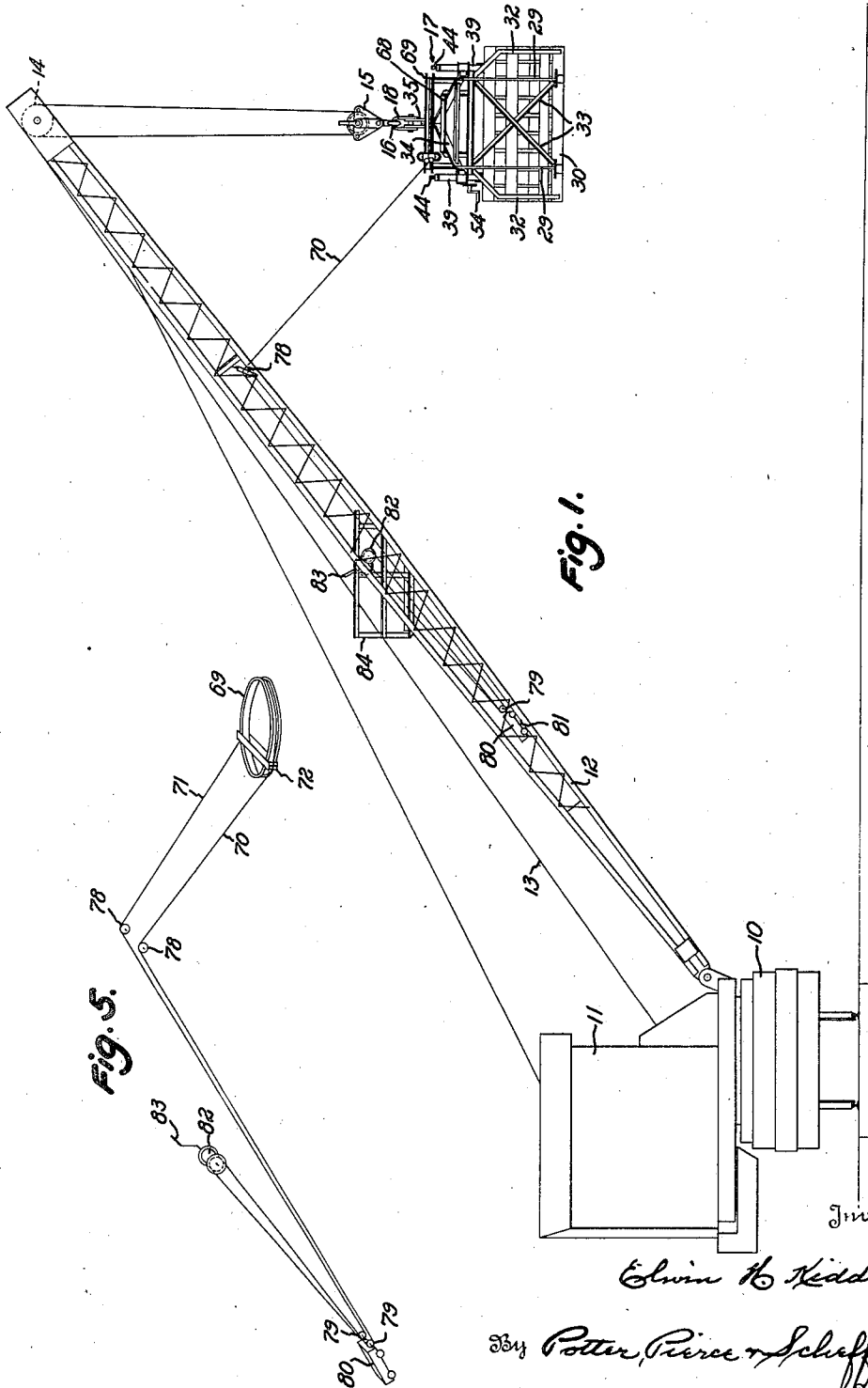
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TIE HANDLING APPARATUS

Filed July 27, 1940

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

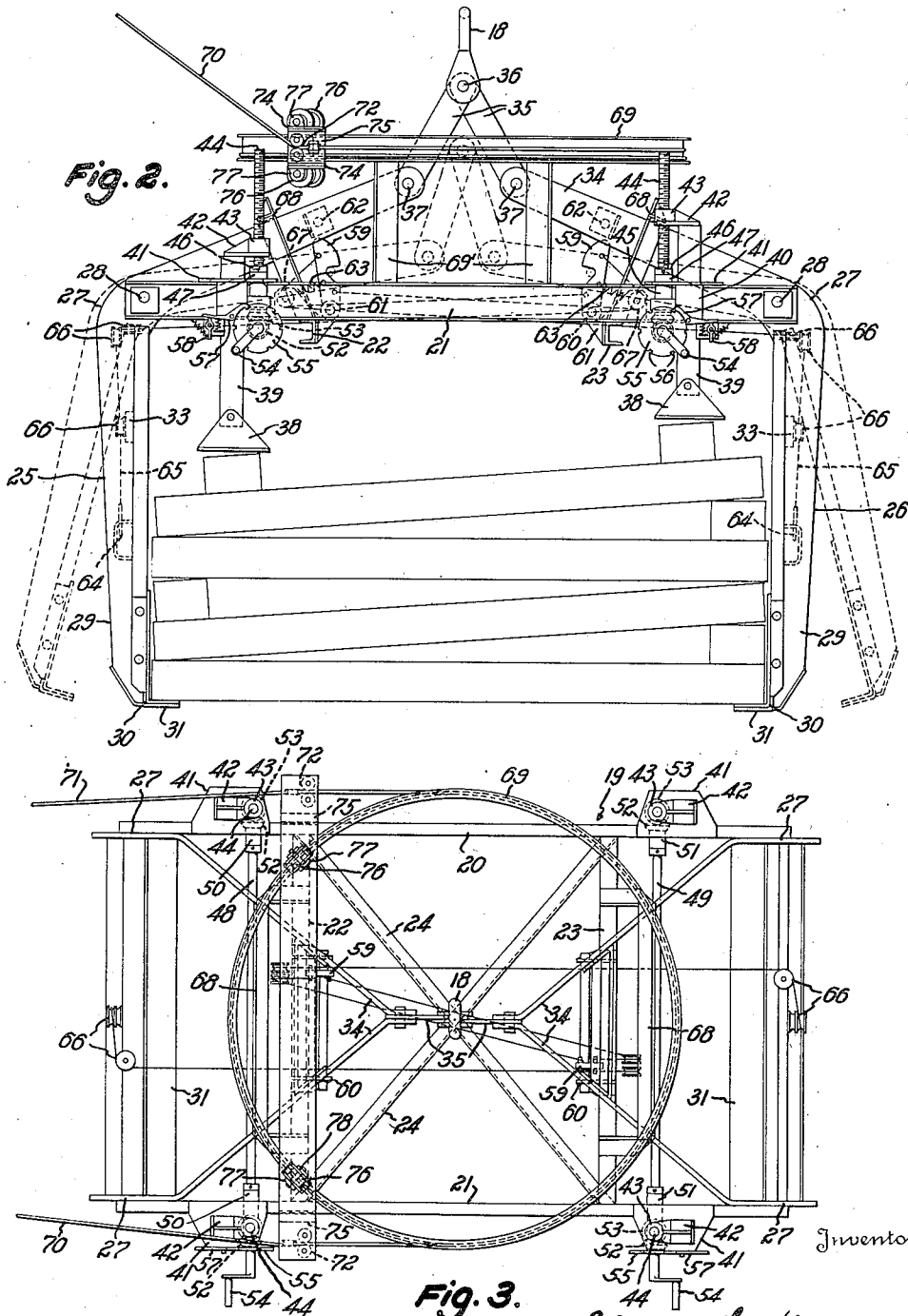


Fig. 3.

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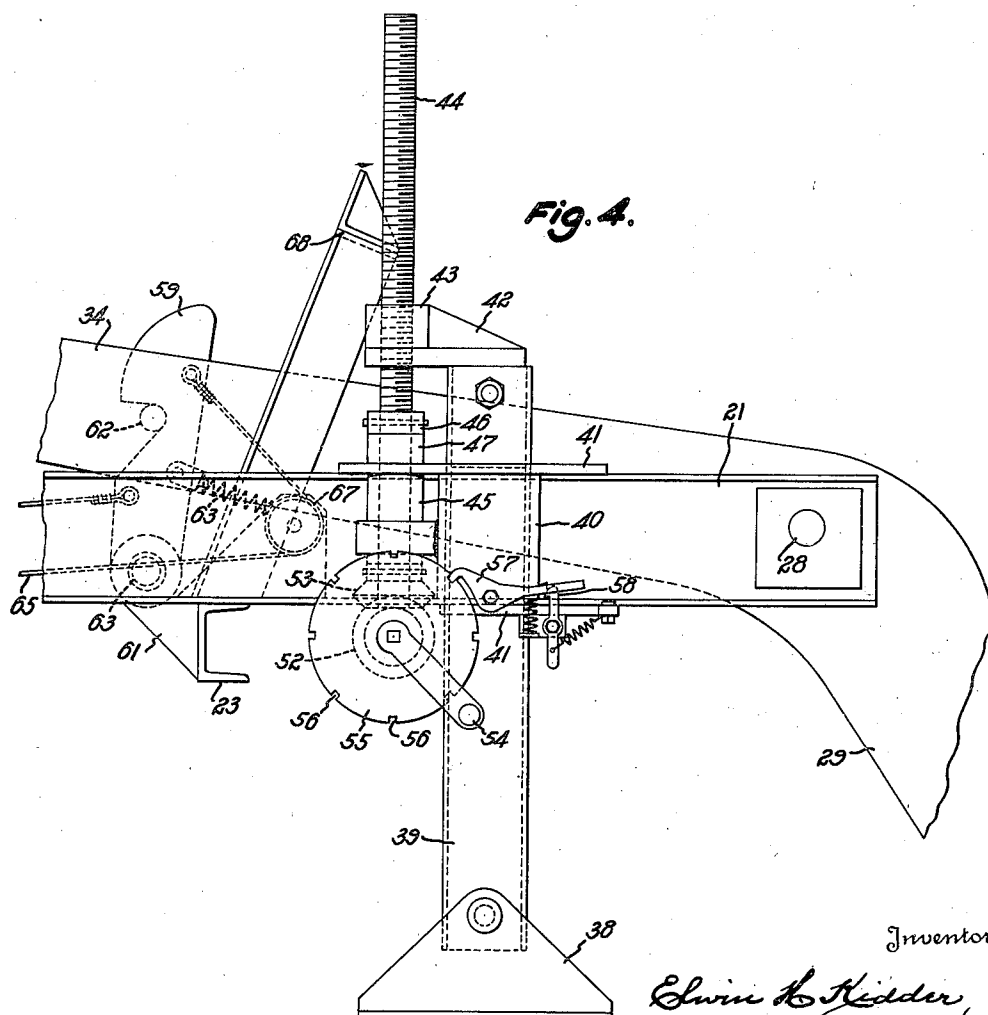
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UNITED STATES PATENT OFFICE

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TIE HANDLING APPARATUS

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11 Claims. (Cl. 212—42)

The present invention relates to apparatus for handling ties and particularly to apparatus for lifting a number of ties, stacked in proper manner for seasoning, from a car or the like and depositing the stacked ties onto a larger seasoning stack.

The primary object of the invention is to provide a simple and efficient mechanism for handling a stack of ties and particularly for lifting a number of ties stacked in proper manner for seasoning and forming the same into large seasoning stacks automatically without requiring a man to climb up on the larger stack to control the depositing of each smaller stack handled by the apparatus.

Another object of the invention is to provide a tie handling apparatus including a hoist mechanism and a novel tie grab which will handle stacks of ties arranged for seasoning in which the operations of orienting the tie grab in stack forming position is controlled from a control station on the hoist mechanism.

The apparatus comprises a mechanically actuated tie grab designed to handle stacks of ties and a hoist mechanism such as a locomotive crane for operating the tie grab, there being provided control means operated from a station on the hoist mechanism for orienting the tie grab when lowering the same to deposit or pick up a stack of ties.

Other objects and advantages of the invention, as well as the details of construction and operation thereof, will be evident from the following description with reference to the accompanying drawings. In the drawings:

Fig. 1 is a side elevation of a locomotive crane and tie grab embodying the invention,

Fig. 2 is an end view of the tie grab on an enlarged scale,

Fig. 3 is a plan view thereof,

Fig. 4 is an enlarged fragmentary side elevation, and

Fig. 5 is a schematic perspective view of the orienting connections to the tie grab.

Referring now more particularly to the drawings 10 indicates a locomotive crane having a rotary boom carriage 11 equipped with a boom 12 and hoist mechanism, not shown, for operating the hoist cable 13. The hoist cable 13 passes over the usual sheave 14 at the outer end of the boom 12 to a sheave block 15 equipped with a hook 16 for attaching the load. The parts thus far described are of conventional construction and the details form no part of the present invention.

A tie grab 17 of novel construction, is suspended by a shackle 18 from the hoist hook 16. The tie grab comprises a rectangular head frame 19 including spaced parallel side rails 20 and 21 formed of channel irons standing on edge and facing outwardly and spaced parallel cross members 22 and 23 joined at their ends to the spaced side rails 20 and 21 a distance from the ends of the latter. Crossed braces 24 extending diagonally between opposite points of attachment between the side and cross rails add to the rigidity of the head frame.

The cross members 22 and 23 are also channel members placed on edge and at their ends, which extend under the bottom flange of the side channels, are welded to the latter.

Pivottally suspended between the ends of the side rails 20—21 are opposed L-shaped lifting legs or tie-engaging side frames 25 and 26, of similar construction. Each of the tie-engaging frames comprises a pair of main frame members in the form of spaced bell cranks 27 mounted on pivots 28 at the ends of the respective side rails 20 and 21. The depending arms 29 of the bell cranks 27 extend to the lower end of the frame where a lower rail 30 is secured to the same, said rail having an inwardly projecting ledge or flange 31 for engaging under the ends of the lowermost ties in the stack to be lifted. Angular frame elements 32, spaced outwardly of the legs 29, and cross braces 33 between the same, are provided to lend rigidity to the side frames and support for the stack of ties handled thereby.

The other arms 34 of the bell cranks 27 converge inwardly toward the center of the head frame from the pivots 28 and are connected by links 35 to the king pin 36 of the shackle 18, the links 35 being pivoted to the respective ends of the arms 34 by pivot pins 37.

The head frame 19 is provided with four vertically adjustable foot members 38 adapted to rest on the upper ties of the stack to support the weight of the tie grab during engagement and disengagement of the frames 25 and 26 of the latter with the stack as will appear hereinafter. The feet 38 are mounted at the lower ends of square tubular posts 39 vertically adjustable in guides 40 mounted by bracket plates 41 welded to the upper and lower flanges of each of the side rails 20 and 21 adjacent the respective ends thereof. Each of the posts 39 has a head bracket 42 rigidly secured to the upper end thereof which head bracket is formed with an offset internally threaded sleeve or nut 43

through which passes a buttress thread screw 44. The screws 44 are journaled at their lower ends in vertical bearings 45 carried by the side rails 20-21 adjacent each of the guides 40. A thrust collar 46 mounted on each of the screws 44 engages a thrust bearing 47 resting on the upper bracket plate 41 in each instance.

The screw posts 44 at opposite sides of the head frame at each end form a pair and are connected for simultaneous adjustment so that the feet 38 are adjusted in pairs. For this purpose, cross shafts 48 and 49 are journaled in bearings 50 and 51 respectively carried by the side frame members 20-21 in line with the pair of screws 44 at opposite ends of the head frame. The shafts 48 and 49 are each provided with bevel gears 52 which mesh with bevel gears 53 carried at the lower ends of the respective screws 44, and each shaft is also provided with a crank 54 for rotating the same. From the above it will be evident that rotation of the shaft 48 will result in simultaneous vertical adjustment of the feet 38 at one end of the grab and rotation of the shaft 49 will result in simultaneous vertical adjustment of the pair of feet at the other end. This permits the feet at opposite ends to be adjusted to different elevations in order to cause the tie grab to rest level when supported on a stack of ties arranged for seasoning, this being necessary because such a stack is higher at one end than at the other.

In order to lock the shafts 48 and 49 against accidental rotation, each carries a disc 55 provided with spaced notches 56 in its periphery which are engaged by a spring pressed pivoted detent 57 carried on the lower bracket plate 41. A pivoted latch 58 is provided for latching the detent 57 out of engagement with the disc 55 when rotating the shafts for adjusting the elevation of the feet 38.

The suspension and distribution of weight in the pivoted side frames 25 and 26 is such that when the weight of the grab rests on the feet 38 and the hoist cable is slackened, the tie-engaging side frames swing outwardly about the pivots 28 to assume the position shown in dotted lines in Fig. 2. Means are provided to latch the frames in this extended or open tie-releasing position so that the grab may be lowered over a stack of ties to be lifted or raised from a stack after depositing the same. This latch means comprises a pair of pivoted latches 59 mounted on a rock shaft 60 journaled in brackets 61 carried by the respective cross frame members 22 and 23. Mounted between the converging arms 34 of each of the side frames is a latch rod 62 positioned to be engaged by the latches 59 whenever the frames assume the dotted line open position, the latches being yieldingly pressed to latching position by springs 63. After the grab is in position over a stack of ties to be lifted, the latches 59 are retracted simultaneously by pulling on either of rings 64. The rings 64 are carried by release cords 65 which pass over guide sheaves 66 mounted on the side frames and sheaves 67 mounted on the head frame to each set of latches 59 so that the latter are interconnected for operation from either side. Release of the latches 59 and tightening of the hoist cable to transfer part, at least, of the weight of the grab to the cable results in raising the arms 34 and inward movement of the side frames 25 to tie gripping position. The full weight of the tie grab and load of ties is then taken up by the hoist cable.

Stop bars 68 carried by the head frame serve to limit upward movement of the arms 34 and thus closing movement of the side frames beyond desirable limits.

In order to control the orientation of the tie grab from a remote control station on the hoist, a bull wheel 69 is mounted on the tie grab. This wheel, in the form of a chanel in cross section, is rigidly supported on legs 69' upstanding from the side rails 20 and 21 of the head frame and is disposed with its axis coincident with the vertical axis of the shackle 18. Two cables 70 and 71 pass in opposite directions around the bull wheel 69 and are dead-ended thereon. The cables on leaving the wheel pass through guide sheaves 72 carried by a floating guide frame roller mounted on the bull wheel. The guide frame comprises upper and lower spaced parallel plates 74 secured in spaced relation by end pieces 75 to form an open sided box-frame which slips chord-like over the bull wheel. Flanged guide rollers 76 journaled in brackets 77 carried by the plates 74 engage the upper and lower flanges of the wheel so that the frame can remain relatively stationary while the wheel turns therein.

The control cables 70 and 71, as seen in Fig. 1, extend from the guide sheaves 72 to and over guide sheaves 78 mounted on the boom 12 and pass downwardly and around pulleys 79 mounted on a weighted wheeled carriage 80 which runs on tracks 81 carried by the boom. From the pulleys 79 on the carriage 80 the cables 70 and 71 pass upward through the boom structure to a winding drum 82, being oppositely wound thereon so that as the drum is rotated by operation of a handwheel 83, one cable is taken up and the other paid out. The weighted wheeled carriage 80 acts as a tensioning counterweight to take up slack in the cables 70 and 71 as the tie grab is raised and lowered during the lifting and lowering operation without disturbing the adjustment of the cables.

The winding drum 82 and handwheel are mounted on the boom and a platform 84 for the operator is also mounted thereon so that the operator, located on the platform, can observe the grab during all of its movements and operate the drum controlling the cables 70 and 71 to rotate the bull wheel and thus control the orientation of the tie grab as it is lowered to position to deposit a load of ties on a stack or is lowered over a stack to be lifted.

While the operation of the apparatus will probably be understood from the above, a typical cycle of operation will be described. Assuming that the tie grab has the tie-engaging side frames latched in the open dotted line position and it is desired to lift a stack of ties from a car onto a seasoning stack, the cranks 54 are operated to adjust the vertical position of the feet 38, if this is required, so that the grab will rest level on the stack when lowered onto the same. The crane is then operated to bring the tie grab directly over the stack and the hoist cable 13 is paid out to lower the grab. As the grab is lowered, the operator on the platform 84 operates the handwheel 83 of winding drum 82, as required, to control through the cables 70 and 71 and bull wheel 69, the orientation of the grab with respect to the stack so that the grab will be in proper position when lowered over the stack. When the grab comes down over the stack, the weight thereof is transferred to the feet 38 which engage the top ties in the stack

and a slack is produced in the hoist cable for the purpose of facilitating retraction of the latches 59 by an operator on the ground pulling on one of the rings 64. As soon as the latches 59 are retracted, and while they are so held, the hoist cable is taken up sufficiently to lift the ends of arms 34 and cause the side frames to swing into position to engage and lift the stack. The tie grab with the engaged load is then raised and transported by the crane to position over the seasoning stack onto which it is to be deposited. As the load approaches the point of deposit, the operator on the boom platform observes the position of the load with respect to the desired position in which the same must be deposited to properly build up the seasoning stack and accordingly operates the hand wheel to turn the bull wheel 59 and the load, as required. The load is then lowered to the position of deposit and sufficient additional hoist cable is paid out to produce a slack so that under force of gravity the side frames swing out to the open tie-releasing position. As this occurs, the arms 34 fall and the rods 62 pass the heads of latches 59 and the side frames are latched in open position. The grab is then raised free of the deposited load and is ready to have the operation repeated.

While a preferred embodiment of the invention has been shown and described by way of illustration it will be understood that various modifications in the details of construction and operation may be resorted to without departing from the spirit of the invention within the scope of the appended claims.

I claim:

1. In tie handling apparatus the combination with a hoist mechanism including a hoist cable and a tie grab connected to said hoist cable for operation by said hoist mechanism, of a control station on said hoist mechanism, flexible members extending from said control station and connected to said tie grab and operable from said control station to orient said tie grab while the latter is suspended from said hoist cable and means for tensioning said flexible members in all relative positions of said hoist mechanism and said tie grab.

2. In tie handling apparatus the combination with a crane including a hoist cable and a tie grab connected to said hoist cable, of a control station mounted on said crane, a bull wheel mounted on said tie grab, flexible connecting elements extending from said control station to said bull wheel for orienting said tie grab from said control station while the latter is suspended from said hoist cable and means for tensioning said flexible connecting elements in all relative positions of said crane and tie grab.

3. In tie handling apparatus the combination with a crane including a hoist cable and a tie grab connected to said hoist cable, of a control station including a winding drum mounted on said crane, a bull wheel mounted on said tie grab, flexible cable members connected at one end on said bull wheel and at the other end on said winding drum to be taken in and paid out respectively by the latter to effect orientation of said tie grab while the latter is suspended from said hoist cable and means on said crane independent of said winding drum for taking up slack in said flexible cable members due to changes in the relative position of said tie grab and crane.

4. In tie handling apparatus, a crane structure

having a depending hoist cable, a control station on said crane structure, a tie grab adapted to lift stacks of ties comprising a head frame, a pair of depending tie-engaging members pivotally mounted on said head frame, means including arm members carried by the upper ends of said tie-engaging members and extending toward the center of said head frame for connecting said tie grab to said hoist cable, a bull wheel mounted rigidly on said head frame, flexible cable means connected to said bull wheel and extending to said control station for orienting said tie grab from said control station, and means for tensioning said flexible cable means in all relative positions of said tie grab and crane structure.

5. In tie handling apparatus, a tie grab adapted to lift and deposit a stacked load of ties comprising a head frame, tie-engaging frame members pivotally suspended at opposite ends of said head frame, each of said tie-engaging frame members including a rigid arm extending from the upper end thereof toward the center of said head frame, a shackle adapted for connection to a hoist cable, links pivotally connecting the ends of said arms to said shackle, whereby said arms support the weight of the tie grab when the latter is suspended by said shackle, foot members carried by said head frame adapted to support the weight of the tie grab when the latter is rested on a stack of ties, said tie-engaging frame members being arranged normally to swing outwardly to an open tie releasing position when the weight of the tie grab is supported on said foot members and to swing to a closed tie-engaging position upon elevation of the ends of said rigid arms by a lifting force on said shackle and manually releasable latch means normally resiliently biased to latching position for latching said tie-engaging frame members in open position.

6. In tie handling apparatus, a tie grab adapted to lift and deposit a stacked load of ties comprising a head frame, tie-engaging frame members pivotally suspended at opposite ends of said head frame, each of said tie-engaging frame members including a rigid arm extending from the upper end thereof toward the center of said head frame, a shackle adapted for connection to a hoist cable, links pivotally connecting the ends of said arms to said shackle, whereby said arms support the weight of the tie grab when the latter is suspended by said shackle, foot members carried by said head frame adapted to support the weight of the tie grab when the latter is rested on a stack of ties, said tie-engaging frame members being arranged normally to swing outwardly to an open tie releasing position when the weight of the tie grab is supported on said foot members and to swing to a closed tie-engaging position upon elevation of the ends of said rigid arms by a lifting force on said shackle, manually releasable latch means for latching said tie-engaging frame members in open position, a bull wheel mounted on said head frame and flexible cable members connected to said bull wheel for orienting the tie grab from a remote point while the latter is suspended by said shackle.

7. In tie handling apparatus, a tie grab adapted to lift and deposit a stacked load of ties comprising a head frame, tie-engaging frame members pivotally suspended at opposite ends of said head frame, each of said tie-engaging frame members including a rigid arm extending from the upper end thereof toward the center of said head frame, a shackle adapted for connection to

a hoist cable, links pivotally connecting the ends of said arms to said shackle, whereby said arms support the weight of the tie grab when the latter is suspended by said shackle, vertically adjustable foot members carried by said head frame adapted to support the weight of the tie grab when the latter is rested on a stack of ties, said tie-engaging frame members being arranged normally to swing outwardly to an open tie releasing position when the weight of the tie grab is supported on said foot members and to swing to a closed tie-engaging position upon elevation of the ends of said rigid arms by a lifting force on said shackle and manually releasable latch means for latching said tie-engaging frame members in open position.

8. A tie grab as defined in claim 7 in which a pair of vertically adjustable foot members is provided adjacent each end of said head frame, and means for adjusting the vertical position of the foot members at one end independently of the pair at the other end.

9. In tie handling apparatus, a tie grab adapted to lift and deposit a stacked load of ties comprising a head frame, tie-engaging frame members pivotally suspended at opposite ends of said head frame, each of said tie-engaging frame members including a rigid arm extending from the upper end thereof toward the center of said head frame, a shackle adapted for connection to a hoist cable, links pivotally connecting the ends of said arms to said shackle, whereby said arms support the weight of the tie grab when the latter is suspended by said shackle, a vertical guide member mounted adjacent each end of said head frame, a vertically adjustable post member extending through each of said guide members, a tie-engaging surface at the lower end of each of said post members, a head bracket mounted at the upper end of each of said post members having an offset threaded sleeve portion, upstanding screw posts journaled on said head frame extending through said threaded sleeve portions of said brackets, means for rotating said screw posts to raise and lower said post members, said tie-engaging frame members being arranged normally to swing outwardly to an open tie releasing position when the weight of the tie grab is supported on said post members and to swing to a closed tie-engaging position upon elevation of the ends of said rigid arms by a lifting force on said shackle and manually releasable latch means for latching said tie-engaging frame members in open position.

10. In tie handling apparatus, a tie grab adapted to lift stacks of ties comprising a head frame, a pair of depending tie-engaging members pivotally mounted on said head frame, means including arm members carried by the upper ends of said tie-engaging members and extending toward the center of said head frame for connecting said tie grab to a hoist cable, a bull wheel mounted rigidly on said head frame, flexible cable means connected to said bull wheel for orienting said tie grab from a point remote therefrom while the latter is suspended from a hoist cable, cable guide means carried by said bull wheel comprising a frame roller mounted thereon to permit rotation of said wheel relative to the frame, and guide pulleys carried by said frame adjacent opposite ends thereof for guiding said control cables onto said wheel.

11. In tie handling apparatus, a tie grab adapted to lift and deposit a stacked load of ties comprising a head frame, tie-engaging frame members pivotally suspended at opposite ends of said head frame, each of said tie-engaging frame members including a rigid arm extending from the upper end thereof toward the center of said head frame, a shackle adapted for connection to a hoist cable, links pivotally connecting the ends of said arms to said shackle, whereby said arms support the weight of the tie grab when the latter is suspended by said shackle, foot members carried by said head frame adapted to support the weight of the tie grab when the latter is rested on a stack of ties, said tie-engaging frame members being arranged normally to swing outwardly to an open tie releasing position when the weight of the tie grab is supported on said foot members and to swing to a closed tie-engaging position upon elevation of the ends of said rigid arms by a lifting force on said shackle, manually releasable latch means for latching said tie-engaging frame members in open position, a bull wheel mounted on said head frame, flexible cable members connected to said bull wheel for orienting the tie grab from a remote point while the latter is suspended by said shackle, cable guide means carried by said bull wheel comprising a frame roller mounted thereon to permit rotation of said wheel relative to the frame, and guide pulleys carried by said frame adjacent opposite ends thereof for guiding said control cables onto said wheel.

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