Aug. 10, 1954 W. P. KERN 2,685,974

MECHANICAL LOADING TONGS

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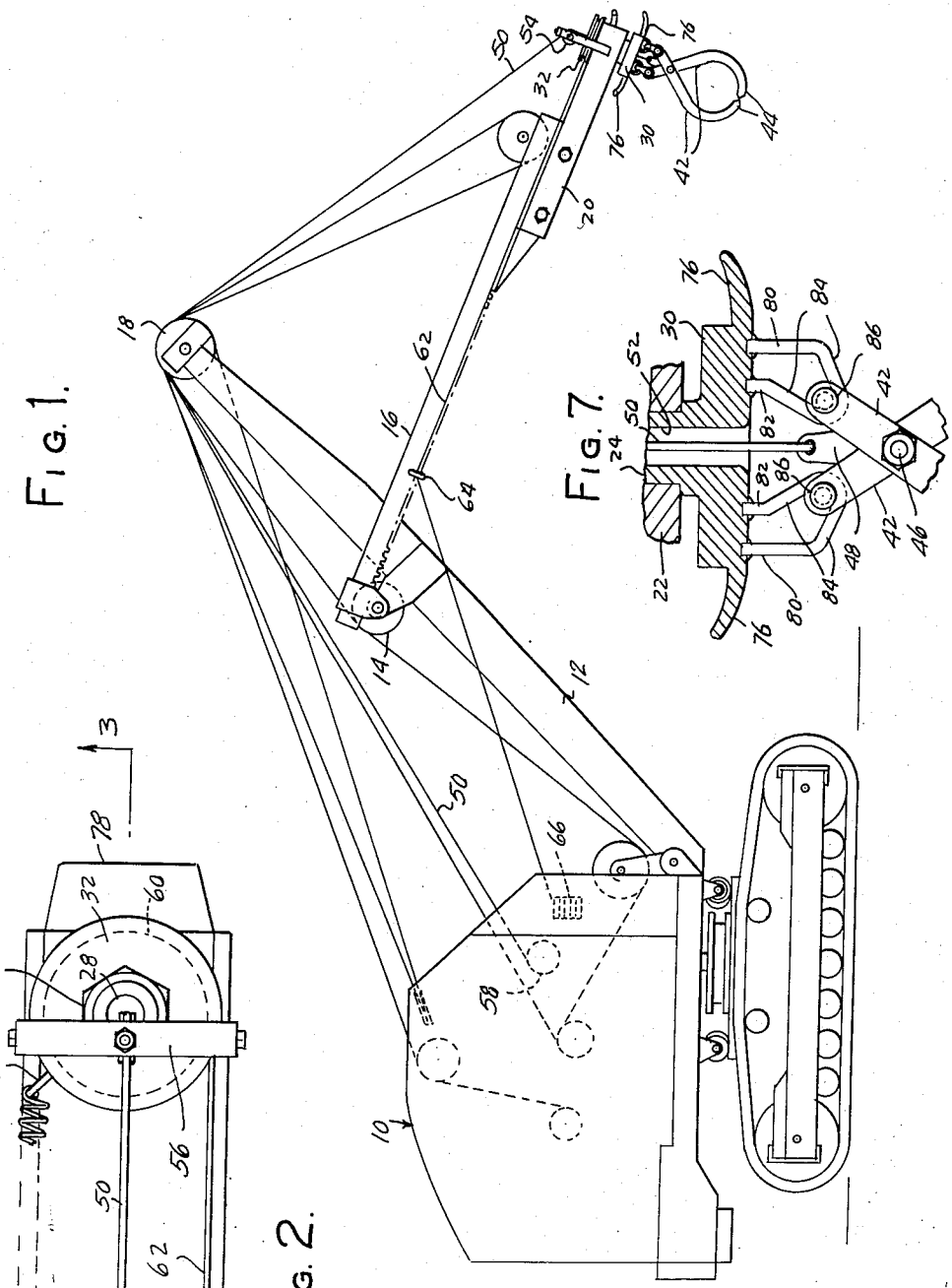


FIG. 1.

FIG. 7.

FIG. 2.

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FIG. 3.

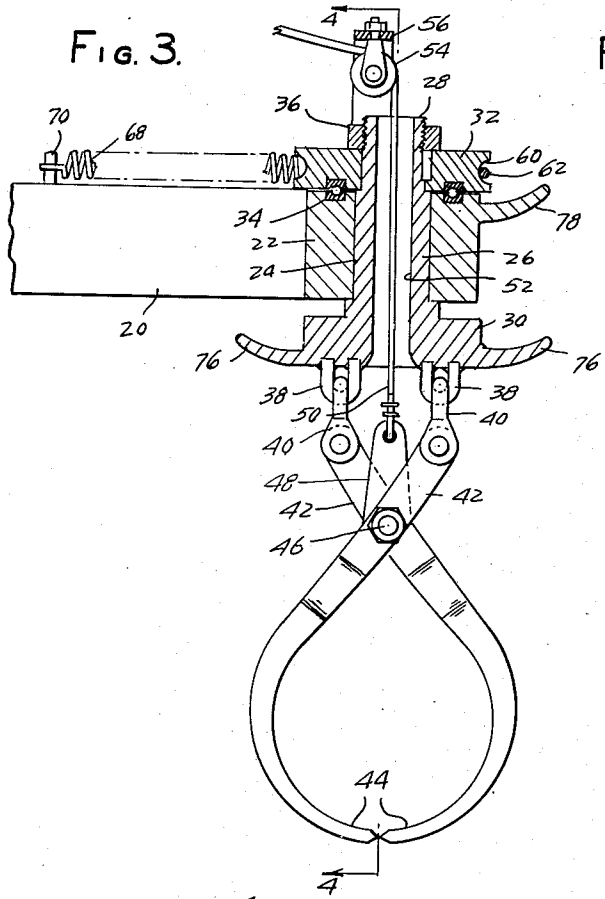


FIG. 4.

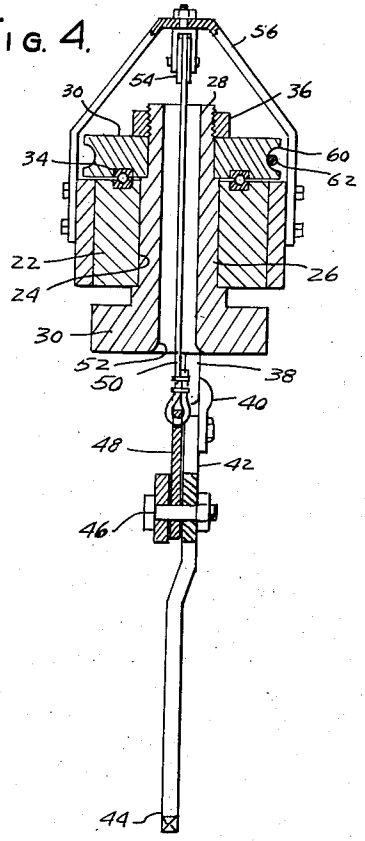


FIG. 5.

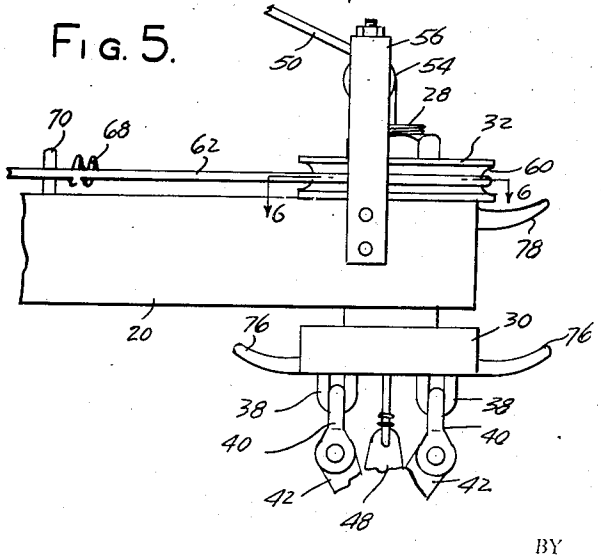
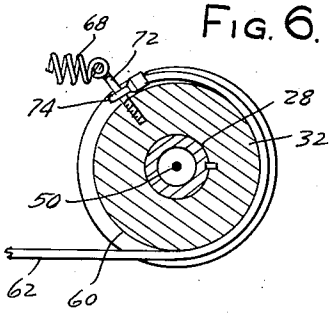


FIG. 6.



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Patented Aug. 10, 1954

2,685,974

UNITED STATES PATENT OFFICE

2,685,974

MECHANICAL LOADING TONGS

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Application July 25, 1952, Serial No. 300,822

2 Claims. (Cl. 214—147)

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This invention relates to a mechanical loading tongs, adapted to be mounted upon a conventional power shovel.

The following are objects of the invention:

First, to provide a tongs or grapple that can be mounted on power shovels without requiring extensive modification thereof; and

Second, to provide a tongs that is under the control of the operator at all times.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a side elevation of a shovel having the tongs mounted thereon;

Figure 2 is an enlarged top plan view of the tongs;

Figure 3 is a sectional view on line 3—3 of Figure 2;

Figure 4 is a sectional view on line 4—4 of Figure 3;

Figure 5 is a side elevation of the tongs, the lower ends of the tong members being broken away;

Figure 6 is a section on line 6—6 of Figure 5; and

Figure 7 is a view similar to Figure 3 in which the upper portion of the structure is broken away, showing a modification.

A power shovel 10 has a boom 12 provided intermediate its ends with a toothed drum 14 in mesh with the dipper stick 16. At the outer end of the boom is a sheave 18, and a conventional series of operating cables are trained over the sheave, for the purpose of controlling the swinging of the boom and dipper stick. All this is conventional and does not per se form part of the invention.

Secured rigidly to the outer end of the dipper stick is a U-shaped extension 20, projecting longitudinally of and beyond the dipper stick and having its bight formed with a head block 22. The head block is formed with a centrally disposed bore 24 opening upon the top and bottom surfaces of the block.

A stub shaft 26 is rotatable within the bore and is integral with a reduced upper end portion 28 projecting above the upper surface of block 22. At its lower end, the shaft is formed integrally with a flat, enlarged head 30 which in the present instance, but not necessarily, is of rectangular outer configuration.

Keyed to the portion 28 is a large pulley 32 overlying the top surface of the head block 22,

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anti-friction means 34 being interposed between the pulley and block and being formed, in the illustrated embodiment of the invention, as a ball bearing.

The portion 28 is externally threaded, and threadedly engaged thereon is a nut 36 that holds the pulley and end portion 28 assembled.

To the underside of the head 30 I weld spaced eyes 38, loosely receiving depending yokes 40 of inverted U shape. The upper ends of crossed tong members 42 are extended between the legs of the respective yokes and are pivotally joined to the yokes. The lower ends of said members are curved inwardly toward one another as at 42 for engaging an object, not shown, to be lifted. Intermediate their ends, the tongs are pivotally joined by a pivot pin 46.

The tongs normally swing to the closed position shown. Means is provided, however, for opening the same, under the positive control of an operator. To this end, a link 48 is pivotally connected at its lower end to the pin 46. At its upper end, the link is connected to one end of a cable 50 extending upwardly through center opening 52 of the head block 22, over a sheave 54 depending from the bight of a bracket 56 of inverted U shape straddling and fixedly mounted upon the head block 22. The cable 50, after being trained about the sheave, is passed over the boom sheave 18, and extends to the cab of the shovel, where it is wound upon a reel 58. The reel is rotatable in opposite directions, under the control of the operator, by any suitable mechanism, not shown.

Means is also provided for rotating the connected tong members about an axis normal to the axis of pin 46. To this end, the pulley 32 is circumferentially grooved as at 60, a cable 62 extending within the groove about the pulley. Cable 62 extends along the dipper stick, through an eye 64 on the stick, and is windable upon a spool 66 located within the cab and rotatable by a suitable mechanism, not shown.

The winding of the cable 62 upon the spool is adapted to rotate the pulley 60, and hence stub shaft 26, head 30, and tong members 42, in one direction. Movement thereof in a reverse direction is provided for by a spring 68, connected at one end to lug 70 on the extension 20, and at its other end to an eye bolt 72 threaded in and extending radially of the pulley 32. That end portion of the cable 62 that is trained about the pulley is also connected to the eye bolt. When the cable 62 is wound upon the spool 66, the spring will be placed under tension. Thereafter,

when the spool is freed for rotation in a cable-unwinding direction, the spring will return to its normal condition and will rotate the pulley in a reverse direction. The bolt **72** is so located, it should be noted, as to halt the reverse rotation of the pulley at a location in which the tong members will be disposed in a plane aligned longitudinally with the dipper stick.

To impart to the structure greater versatility in handling objects to be loaded, I provide, at opposite sides of the head **30**, upwardly curved horns **76**, and a horn **78** may also be forwardly directed from the head block **22**.

Figure 7 shows a modified connection of the tong members to the head **30**, that eliminates the shackles or yokes **40**. Depending, spaced eyes, welded to the block **30**, have parallel, spaced apart legs **80**, **82** of different lengths, merging into converging bight portions **84**. The bights of the respective eyes of the modified form are thus of acute-angled configuration, and are extended downwardly and in the direction of one another.

Received in the respective bights of the eyes are connecting pins **86**, that slide upwardly and downwardly upon the bight portions **84** responsive to opening and closing of the tong members.

Important characteristics of the invention are as follows:

First, the invention can be mounted upon the dipper stick of a conventional power shovel; and

Second, the tongs are under the positive control of the shovel operator at all times, not only with respect to opening and closing of the tong jaws, but also with respect to rotation of the tong members about an axis normal to the axis of their pivotal connection to one another.

It is believed clear that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. In a loading device, the combination, with a dipper stick mounted upon and extending outwardly of a power shovel, of a head block mounted at the outer end of the dipper stick, said head block having an aperture centrally thereof; a stub shaft rotatably mounted in the aperture of the head block for rotary movement about an axis normal to the longitudinal center line of the dipper stick; a head rigid with said stub shaft and disposed beyond one end of the head block; a pulley secured to the stub shaft for rotation therewith beyond the other end of the head block; a flexible element trained about said pulley and having one end extended in the direction of the inner end of the dipper stick; means at said one end of the flexible element arranged for shifting the element in one direction under the control of an operator, for rotating the head in one direction; a spring connected at its opposite ends to the other end of the flexible element and to the dipper stick respectively and tensioned to normally shift the element in an opposite direction, to impart return rotary movement to the head, the head having an axial bore extending therethrough and continuing through the stub shaft and pulley; a pair of eyes depending from one end of the head and disposed at opposite sides of said bore; a pair of tong members depending from said eyes, said tong members having upper ends joined to the eyes by pivotal connections shiftable radially of said bore, the tong members having crossed intermediate portions and article-engaging jaws at their lower ends; a pivot pin connecting the crossing portions of the tong members and arranged normally to the axis of rotation of the head; a cable connected at one end to the pivot pin and extending axially of and through said bore; and means at the other end of the cable arranged for imparting movement to the cable axially of the bore for shifting the pivot pin toward and away from the head, whereby to adjust the jaws to open and closed positions respectively.

2. In a loading device, the combination, with a dipper stick mounted upon and extending outwardly of a power shovel, of a U-shaped extension rigidly secured to the outer end of the dipper stick and projected longitudinally of and beyond the dipper stick, said extension including a head block formed in the bight thereof and having a center bore opening upon the top and bottom surfaces of the block; a stub shaft rotatable within the bore of the head block, said stub shaft being formed integrally with a reduced upper end portion projecting above the upper end surface of the block and being further formed integrally with an enlarged head engaged against the lower end surface of the head block; a stub shaft drive pulley secured to the upper end portion of said stub shaft for rotation with the stub shaft; means for rotating said pulley for imparting rotatable movement to the stub shaft; eye means depending from said head of the stub shaft and spaced diametrically of said head at opposite sides of the axis of rotation of the stub shaft; crossed tong members pivotally connected to one another intermediate the opposite ends thereof and having pivotal connections at one end to said eye means, said stub shaft having an end to end bore aligned with the center of rotation of the stub shaft and head; and a cable element extending through said bore of the stub shaft and shiftable longitudinally of the stub shaft, said cable element being connected to the tong members at the point of pivotal connection of the tong members to one another, for opening and closing the tong members responsive to movement of the cable element longitudinally of the stub shaft bore.

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