April 20, 1954 F. K. MITTRY, JR 2,676,052

POWER-OPERATED HOOK

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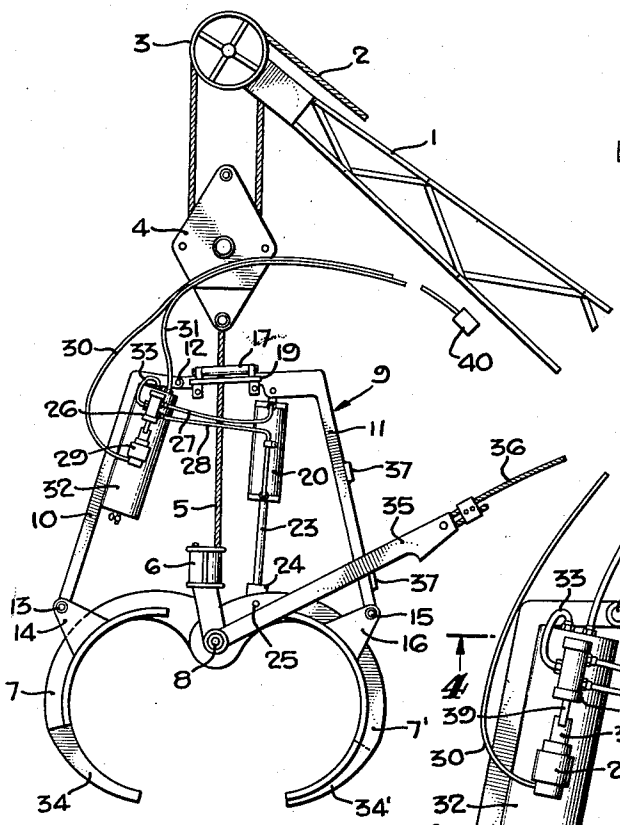


Fig. 1.

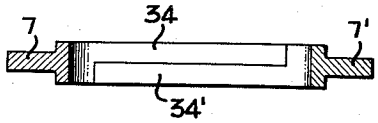


Fig. 3.

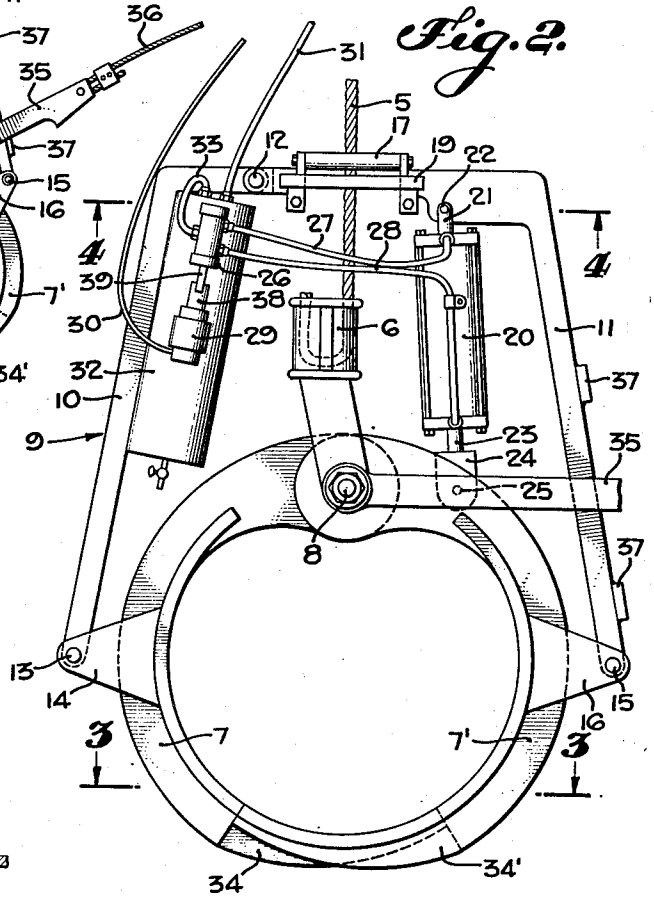


Fig. 2.

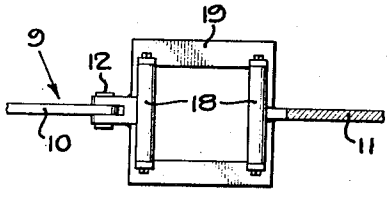


Fig. 4.

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POWER-OPERATED HOOK

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8 Claims. (Cl. 294—88)

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This invention relates to power operated hooks, and more particularly to power operated hooks used in conjunction with cranes or other hoisting devices for grasping heavy loads such as concrete laden dump buckets, baled scrap iron, etc.

One of the objects of my invention is to provide a power operated hook, the jaws of which are capable of lifting great weights without danger of the load causing the jaws to open.

Another object of my invention is to provide a power operated hook having a fast-acting, remotely-controlled pneumatic power unit for opening and closing the jaws.

A further object of my invention is to provide a power operated hook which is stable in operation and which will not become fouled or upset when the hook is disengaged from the load.

A further object of my invention is to provide a power operated hook which may be easily adapted to operate with any type of crane or other hoisting device.

Other objects and advantages of my invention will appear hereinafter in the detailed description thereof in connection with the accompanying drawings.

In the drawings:

Figure 1 is a general view in side elevation of a preferred form of device embodying my invention as adapted to operate with a crane, and showing the jaws in opened position.

Figure 2 is a side elevation of a preferred form of my invention, the jaws closed.

Figure 3 is a sectional view of the jaw-overlapping device taken on the line 3—3 of Figure 2.

Figure 4 is a fragmentary sectional view, taken on the line 4—4, of the cable guard and frame pivot member.

In Figure 1, a portion of a hoisting device is illustrated wherein lifting is achieved by means of a boom 1, a cable 2 run through a sheave 3, and block 4. The support cable 5 is suspended from the block 4. Means are provided for attaching the support cable 5 to the hook unit and, as shown in Figure 1, this means may include the cable anchor yoke 6.

Pivot means connecting the jaws 7 and 7' are provided and, as shown in the drawings, this means includes the pin 8, to which pin the cable anchor yoke 6 is secured.

The frame 9 is comprised of a short leg 10 and a long leg 11, means being provided for their pivotal connection and, as shown in the drawings, this means includes the pin 12. The short leg 10 likewise is pivotally connected to the jaw 7 at the pin 13 which is contained by the bracket

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14. The long leg is likewise connected to the jaw 7' at the pin 15 which is contained by the bracket 16.

Cable guide means are provided and, as illustrated in the drawings, this means may include the two pairs of rollers 17 and 18 mounted for axial rotation on the support member 19, which is secured to the long leg 11. Rollers 17 are opposed parallel members, as are rollers 18, so as to encompass the support cable 5.

Means are provided for the operable connection of the pneumatic power cylinder assembly to the frame 9 and jaws 7 and 7' and, as shown in the drawings, includes the air cylinder 20 pivotally connected to the leg 11 by means of bracket 21 and the pin 22, and the piston rod 23 pivotally connected to the jaw 7' by means of bracket 24 and pin 25.

Operation of the pneumatic power cylinder assembly is effected by a four-way valve 26 mounted on a storage tank 32 and connected with the cylinder 20 by air lines 27 and 28. The four-way valve 26 is actuated by the solenoid 29 mounted on the storage tank 32. Electric current for the solenoid 29 is supplied through the power line 30, the switch 40 preferably being located in the cab of the crane. Air line 31 supplies air to the storage tank 32 secured to the leg 10 and which is connected with the valve 26 by means of air line 33.

Means are provided to prevent the opening of the jaws when subjected to a heavy load suspended therefrom. As shown in the drawings, and more particularly in Figure 3, this means includes the offsets 34 and 34' on the outer ends of jaws 7 and 7' respectively so that the free end of each jaw is received by the offset in the other. Horizontal twisting of the hook is controlled by means of the bridle 35 and bridle cable 36 pivotally connected to the hook at the pin 8. Bridle stops 37 are provided on leg 11 in order to confine the vertical motion of the bridle.

As seen in Figure 2, when the piston rod 23 is retracted into the cylinder 20, the jaws are in closed or carrying position. Extension of the piston rod 23 causes relative separation of the pivot pins 8 and 12, bringing about through the action of legs 9 and 10, the opening of the jaws.

A means of operating the air cylinder is illustrated in the drawings. When the solenoid 29 is energized the armature 38 is retracted and the valve stem 39, which is secured to the armature 38, is thereby partially withdrawn. This allows air to flow from the supply tank 32 through air line 33, the four-way valve 26 and thence through

air line 27 into cylinder 20, extending the piston rod 23, thereby causing the jaws 7 and 7' to open as described above.

The exhaust air passes through air line 28 to the valve 26 and is vented from a port (not shown). When the electric circuit is opened and the solenoid de-energized, the armature 38 is ejected by means of a spring (not shown), retracting the valve stem 39. This reverses the flow of air through air lines 27 and 28, causing the piston rod to be retracted, closing the jaws 7 and 7'.

It will be noted that my invention provides (inter alia) for quick opening and closing of the jaws due to the arrangement of the four-way valve in close proximity to the air cylinder. The problem of time lag caused by long air feed lines is obviated by use of the electrically-operated four-way valve arrangement as described above.

While I have shown only a preferred form of my invention, it should be understood that various changes and modifications may be made without departing from the spirit of the invention.

I claim:

1. In a lifting hook of the cable-supported type, the combination of a jaw assembly comprising a pair of jaws and pivot means connecting the jaws, a frame comprising a pair of legs pivotally connected together, each leg being pivotally connected to one of said jaws, a cable anchor yoke connected to said pivot means, means on said yoke for anchoring the cable, a cable guide comprised of a plurality of rollers arranged to encompass the cable and positioned above the jaw assembly and said yoke whereby the jaw assembly is maintained in an upright position, a pneumatic power cylinder assembly operably connected at one end to said frame and at the other end to said jaw assembly, a four-way valve mechanism mounted on the frame, means for connecting the valve for control of the operation of said power cylinder assembly, and means to supply pneumatic pressure to said valve assembly.

2. In a lifting hook of the cable-supported type, the combination of a pivoted jaw assembly comprising a pair of jaws and pivot means connecting the jaws, the outer ends of said jaws being offset so as to form an overlap between the jaws when in the closed position, a frame comprising a pair of legs pivotally connected together, each leg being pivotally connected to one of said jaws, a cable anchor yoke connected to said pivot means, means on said yoke for anchoring the cable, a pneumatic power cylinder assembly operably connected at one end to said frame and at the other end to said jaw assembly, a valve mechanism mounted on the frame, means for connecting the valve for control of the operation of said power cylinder assembly, and means to supply pneumatic pressure to said valve assembly.

3. In a lifting hook of the cable-supported type, the combination of a pivoted jaw assembly comprising a pair of jaws and pivot means connecting the jaws, the outer ends of said jaws being offset so as to form an overlap between the jaws when in the closed position, a frame comprising a pair of legs pivotally connected together, each leg being pivotally connected to one of said jaws, a cable anchor yoke connected to said pivot means, means on said yoke for anchoring the cable, a cable guide comprised of a plurality of rollers arranged to encompass the cable and positioned above the jaw assembly and said yoke whereby the jaw assembly is maintained in an upright position, a pneumatic power cylinder assembly operably connected at one end to said frame and at the other end to said jaw assembly, a valve mechanism mounted on the frame, means for connecting the valve for control of the operation of said power cylinder assembly, and means to supply pneumatic pressure to said valve assembly.

4. In a lifting hook of the cable-supported type, the combination of a pivoted jaw assembly comprising a pair of jaws and pivot means connecting the jaws, the ends of said jaws being offset so as to form an overlap between the jaws when in the closed position, a frame comprising a pair of legs pivotally connected together, each leg being pivotally connected to one of said jaws, a cable anchor yoke connected to said pivot means, means on said yoke for anchoring the cable, a cable guide comprised of a plurality of rollers arranged to encompass the cable and positioned above the jaw assembly and said yoke whereby the jaw assembly is maintained in an upright position, a pneumatic power cylinder assembly operably connected at one end to said frame and at the other end to said jaw assembly, a four-way valve mechanism mounted on the frame, means for connecting the valve for control of the operation of said power cylinder assembly, means for actuating the four-way valve mechanism comprising a solenoid positioned in close proximity thereto, and means including a remotely extending electric cable for actuating the solenoid.

5. In a lifting hook of the cable-supported type, the combination of a jaw assembly comprising a pair of jaws and pivot means connecting the jaws, the outer ends of said jaws being offset so as to form an overlap between the jaws when in the closed position, a frame comprising a pair of legs pivotally connected together, each leg being pivotally connected to one of said jaws, a cable anchor yoke connected to said pivot means, means on said yoke for anchoring the cable, a pneumatic power cylinder comprised of a cylinder member and a piston member, one of said members being pivotally connected to said frame and the other member being pivotally connected to said jaw assembly, a four-way valve mechanism mounted on the frame, means for connecting the valve for control of the operation of said power cylinder assembly, and means to supply pneumatic pressure to said valve assembly.

6. In a lifting hook of the cable-supported type, the combination of a jaw assembly comprising a pair of jaws and pivot means connecting the jaws, the ends of said jaws being offset so as to form an overlap between the jaws when in the closed position, a frame comprising a pair of legs pivotally connected together, each leg being pivotally connected to one of said jaws at a position intermediate the pivot and outer end of said jaws, a cable anchor yoke connected to said pivot means, means on said yoke for anchoring the cable, a pneumatic power cylinder comprised of a cylinder member and a piston member, one of said members being pivotally connected to said frame and the other member being pivotally connected to said jaw assembly, a four-way valve mechanism mounted on the frame, means for connecting the valve for control of the operation of said power cylinder assembly, and means to supply pneumatic pressure to said valve assembly.

7. In a lifting hook of the cable-supported type, the combination of a jaw assembly comprising a pair of jaws and pivot means connecting the

jaws, a frame comprising a pair of legs pivotally connected together, each leg being pivotally connected to one of said jaws at a position intermediate the pivot and outer ends of said jaws, a cable anchor yoke connected to said pivot means, means on said yokes for anchoring the cable, a cable guide comprised of a plurality of rollers arranged to encompass the cable and positioned above the jaw assembly and said yoke whereby the jaw assembly is maintained in an upright position, a pneumatic power clyinder assembly operably connected at one end to said frame and at the other end to said jaw assembly, a four-way valve mechanism mounted on the frame, means for connecting the valve for control of the operation of said power cylinder assembly, means for actuating the four-way valve mechanism comprising a solenoid positioned in close proximity thereto, and means including a remotely extending electric cable for actuating the solenoid.

8. In a lifting hook of the class described, the combination of a jaw assembly comprising a pair of jaws and pivot means connecting the jaws, the outer ends of said jaws being offset so as to form an overlap between the jaws when in the closed position, a frame comprising a long leg and a short leg pivotally connected together, each leg being pivotally connected at one of said jaws at a position intermediate the pivot and outer ends of said jaws, a cable anchor yoke connected to said pivot means, a supporting cable anchored

in said cable anchor yoke, a cable guide comprised of a plurality of rollers arranged to encompass the said cable and positioned on the said long leg above the jaw assembly whereby the jaw assembly is maintained in an upright position, a bridle operably connected to said pivot means, a pneumatic power cylinder comprised of a cylinder member and a piston member, one of said members being connected to said long leg and the other member being pivotally connected to one of said jaws intermediate the pivot and outer ends thereof, a four-way valve mechanism mounted on the frame and connected to control the operation of said power cylinder assembly, means for actuating the four-way valve mechanism comprising a solenoid positioned in close proximity thereto, and means including a remotely extending electric cable for actuating the solenoid.

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