



Fig.1

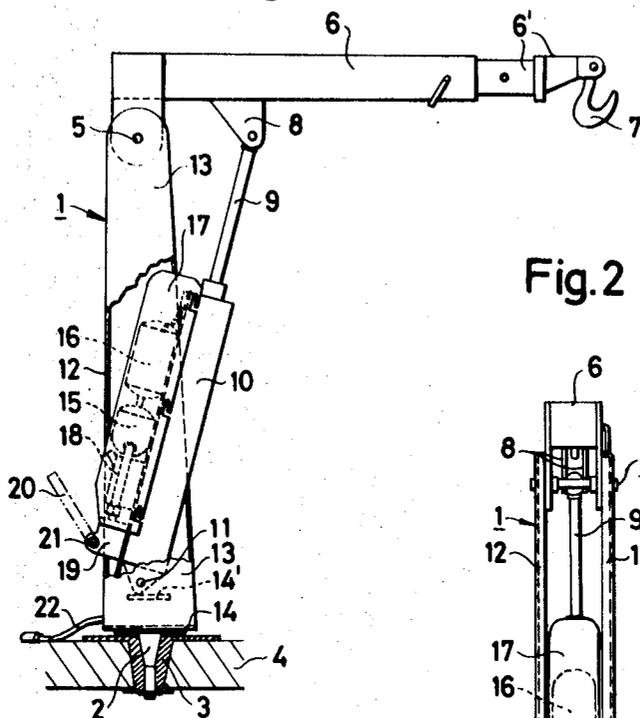
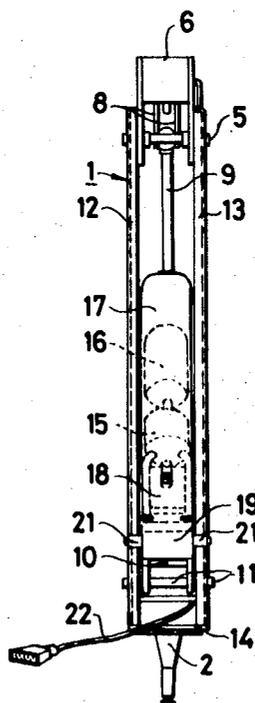


Fig.2



### SMALL SIZE CRANE HAVING A HYDRAULICALLY OPERATED JIB AND AN ELECTROMOTOR-DRIVEN HYDRAULIC PUMP

This invention is concerned with small size cranes of the type comprising a rotary crane post, a vertically swingable and, preferably, extensible jib mounted thereon, a hydraulic jack means to effect vertical swinging movements of the jib and a pump for supplying pressure fluidum to the hydraulic jack means, and wherein the crane post is formed with two spaced sidewall portions along a major part of its height and the hydraulic jack means includes a piston rod having its upper end hingedly connected to the jib and a cylinder having its lower end hingedly connected to the crane post between said spaced sidewall portions thereof. Due to their relatively small size and weight these cranes are readily portable and usually they are provided with a swivel pin projecting from the lower end of the crane post and adapted to be removably fitted into a socket secured in a base at the site or on the vehicle where the crane is to be used.

In my prior U.S. Pat. No. 3,326,391 of June 20, 1967 there is disclosed a small size rotary crane of substantially such character and presenting valuable features which may, if desired, be applied also in combination with my present invention.

Small size rotary cranes of this type have found extensive use for the handling of heavy objects, such as various loads, work pieces, building elements and the like, not only on trucks and other vehicles but also in storage rooms, workshops, loading yards, building sites and many other places. As also appears from my said prior patent these cranes were previously commonly provided with a hand- or foot-actuated pump, if they were not supposed to be specifically used, e.g. on a truck, where a suitable separate pressure fluidum source was already available and could conveniently be used also for supplying the crane, which is, of course, a rather rare condition. The operation of the cranes by means of a hand- or foot-actuated pump is, however, rather slow and inconvenient.

Therefore, the cranes in question are nowadays frequently delivered with an electromotor-driven hydraulic pump, at least as a special and optional equipment. Up to now the hydraulic pump and its related electromotor have then usually been mounted as an additional unit on the outside of one of the sidewall portions of the crane post proper. With such an additional pump and motor unit forming a rather clumsy and spacious projection on the crane post, the cranes have, however, lost a considerable part of their valuable slenderness and adaptability, and the pump and motor unit is also highly exposed to damage by blows and impacts. A further inconvenience with this known mounting of the pump and electromotor unit on the crane is that flexible pressure fluidum conduits are required between the hydraulic pump and the cylinder of the hydraulic jack means, because the pump is then rigidly secured to the crane post while the cylinder is, of course, swingably mounted in relation to the same.

The object of the present invention is to eliminate these inconveniences in cranes of the type referred to hereinbefore and having an electromotor-driven fluidum pump. In accordance with the invention, this is achieved by mounting both the hydraulic pump and its related electromotor, the one above the other, relatively high up on the rear side of the cylinder forming part of the hydraulic jack means, i.e. on the side of the said cylinder facing away from the outer end of the jib, so that the pump and the motor will not only partake in the tilting movements of the cylinder during the raising and lowering of the jib but also become substantially sheltered between the said spaced sidewall portions of the crane post, when the jib is in operative position.

As well known, the hydraulic jack means, including the cylinder, will occupy a forwardly inclined position during the normal operation of the crane jib and this is essential in connection with the invention, since the space between the two sidewall portions of the upright crane post is then free for taking up the pump and motor unit. The fact that the unit could then possibly partly project beyond the back side of the crane

post in such cases, where the jib may be, and is, swung down into an inoperative position substantially parallel with the front side of the crane post, is generally of no importance since the crane need not then be operated by an operator and is commonly not exposed to the same risk of being damaged either.

For further elucidation of the invention a preferred embodiment thereof will be more closely described in the following, reference being had therein to the accompanying drawing, wherein

FIG. 1 is a side view of a rotary small size crane embodying the invention, the one sidewall portion of the crane post being partly removed to show the parts inside it and the jib occupying a substantially horizontal, operative position, and

FIG. 2 is a rear view of the same crane, i.e. is showing the crane from the left in FIG. 1.

The rotary hydraulic crane shown in the drawing consists primarily of a crane post, generally designated by 1, which is rotatable about a vertical swivel pin 2 projecting from the lower end of the post and adapted to be received in a fitting socket 3 secured in a support or base 4, which may be stationary or movable. At the upper end of the crane post there is, by means of a traversing pivot pin 5, mounted a vertically swingable jib 6, which is provided with a telescopic extension 6' having at its outer end a hook 7 for the suspension of the load. On the underside of the jib 6 there is an attachment or ear 8 to which the upper end of a piston rod 9 is hingedly connected. The piston rod 9 forms part of a hydraulic jack means also including a cylinder 10, the lower end of which is hingedly connected to the crane post 1 by means of a horizontal pivot pin 11.

As most clearly appears from FIG. 2 the crane post 1 is bifurcated along a major part of its height and built up of two spaced-apart sidewall portions 12 and 13, both having inwardly turned side edges for improved strength. These sidewall portions are held together at their lower ends by means of a bottom plate 14, from the underside of which the swivel pin 2 is projecting, and also by means of a crosspiece 14', while their upper ends are held together by the pivot pin 5 for the jib 6. There is, of course, nothing preventing the use of further interconnections between the two sidewall portions 12 and 13 of the crane post as long as the same do not interfere with the hydraulic jack means and the jib, respectively. The cylinder 10 of the hydraulic jack means has its lower end mounted between the two sidewall portions 12 and 13 of the crane post 1 in such a manner that the entire jack means may be received within the crane post, when the jib is swung down into an inoperative position substantially parallel with and close to the front side of the crane. With the jib in such inoperative position the crane will form a rather compact and conveniently portable unit.

The crane as shown further comprises a hydraulic pump 15 with a related electric driving motor 16, both of which are, in accordance with the invention, mounted, the one above the other, relatively high up on the rear side of the cylinder 10, i.e. the side thereof facing away from the outer end of the jib, so that they will partake in the tilting movements of the hydraulic jack means during the raising and lowering of the jib. As shown, the pump 15 and the electromotor 16 are then suitably covered by a detachable protective cap 17, which forms a kind of "rucksack" on the cylinder 10. Below the pump 15 on the cylinder 10 there is, in the example shown, mounted an oil reservoir 18, which is preferably also covered by the cap 17, and further below the reservoir there is a valve housing 19 accommodating the valves required for the operation of the pump and the hydraulic jack means. The valves are actuatable by means of a lever 20 in FIG. 1, which may be alternatively connected to the one end or the other of an actuating spindle 21 traversing the valve housing 19, so that convenient actuation can take place from either side of the crane. However, there is nothing to prevent the use of a modified type of valve housing, in which actuation can take place from the rear side of the crane, in which case the valve housing, of course, does

not need to project so much beyond the back of the crane post.

As clearly appears from FIG. 1, the hydraulic pump 15 and its electromotor 16 will become sheltered in a favorable manner between the sidewall portions 12 and 13 of the crane post during the normal operation of the crane and at the same time, they will not in any way interfere with the swinging movements of the crane about the swivel pin 2. Since the pump 15, the oil reservoir 18 and the valve housing 19 form a rigid assembly with the cylinder 10, the conduit installation between these components will, of course, become very simple and require no flexible hoses. Since the electromotor 16 and the pump 15 are both rigidly mounted on the same support, that is the cylinder 10, there is also no need for flexible power transmission means between them. At the same time, all the components of the hydraulic system including the cylinder and the pump motor will form a self-contained unit which can easily be exchanged when ever necessary. Electric current is preferably supplied to the motor 16 from a battery or a main net through an electric cable 22. The hydraulic pump 15 and the electric motor 16 can, of course, be of any suitable type, provided that they are sufficiently small in size to enter the free space between the sidewall portions of the crane post.

I claim:

1. A crane comprising a crane post formed with two spaced-apart sidewall portions along a major part of its height; a vertically swingable jib having its inner end portion hingedly connected to the top of the crane post and extending away therefrom when in operative position; hydraulic jack means to

effect vertical swinging movement of the jib and including a cylinder having its rear end hingedly connected to the lower end portion of the crane post between said two spaced apart sidewall portions thereof, said cylinder having a diameter less than the space between said sidewall portions to permit said cylinder to swing between said sidewall portions, and a ram extending from said cylinder and having its outer end hingedly connected to the jib in a manner causing said cylinder and ram to occupy a forwardly inclined position when the jib is in operative position; an oil reservoir mounted on said cylinder; an oil pump for delivering oil under pressure from said reservoir; actuatable valve means mounted on said cylinder for controlling the flow of oil from said pump into said cylinder and from said cylinder back to the reservoir, respectively; and an electric motor operable to drive said oil pump; said electric motor and oil pump being both mounted, one above the other, on the rear side of said cylinder facing away from the outer end of the jib and being of a combined length no greater than the length of said cylinder, each having a diameter substantially equal to the diameter of said cylinder, such that said electric motor and pump swing with said cylinder between said sidewall portions during the raising and lowering of the jib and said electric motor and pump are disposed to be substantially sheltered between said spaced-apart sidewall portions of the crane post when the jib is in operative position.

2. A crane according to claim 1 further comprising a protective cap removably attached to said cylinder in a manner to cover said electric motor and oil pump.

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