

[54] GRAB BUCKETS

3,510,018 5/1970 Mork et al. .... 294/88 X

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Lawrence

[30] Foreign Application Priority Data

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294/88

[51] Int. Cl. .... B66c 3/16

[58] Field of Search ..... 294/69-72,  
294/88, 106, 115; 37/183-188, DIG. 7;  
214/147 R, 147 G

[56] References Cited

UNITED STATES PATENTS

3,314,709 4/1967 Guinot ..... 294/70

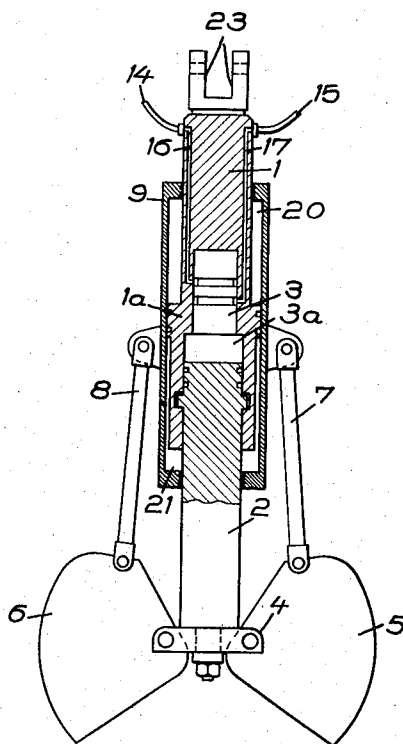
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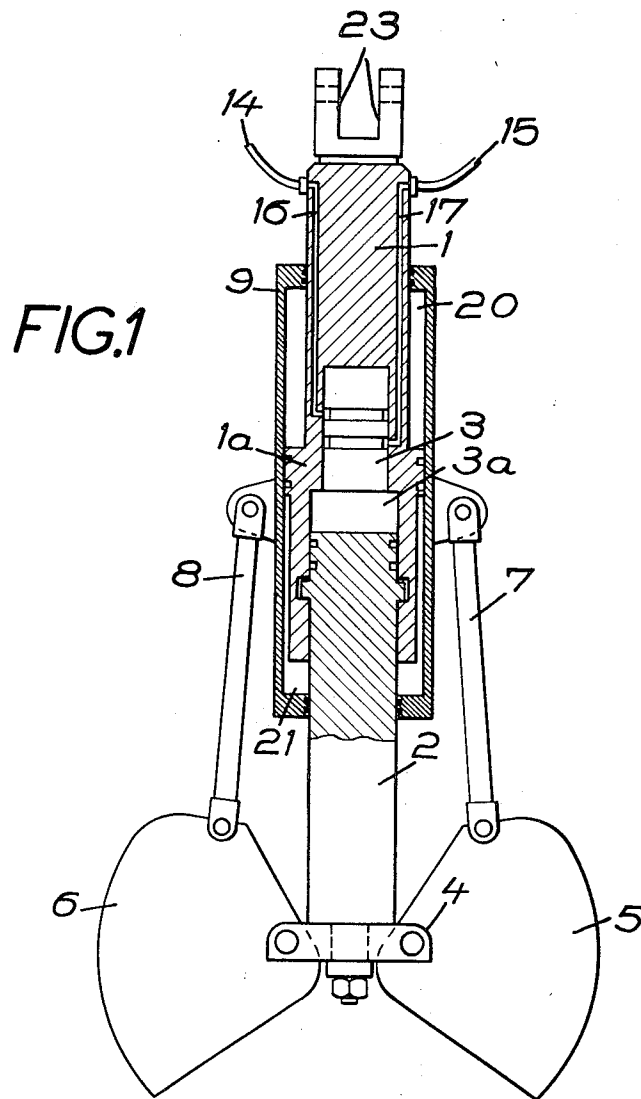
ABSTRACT

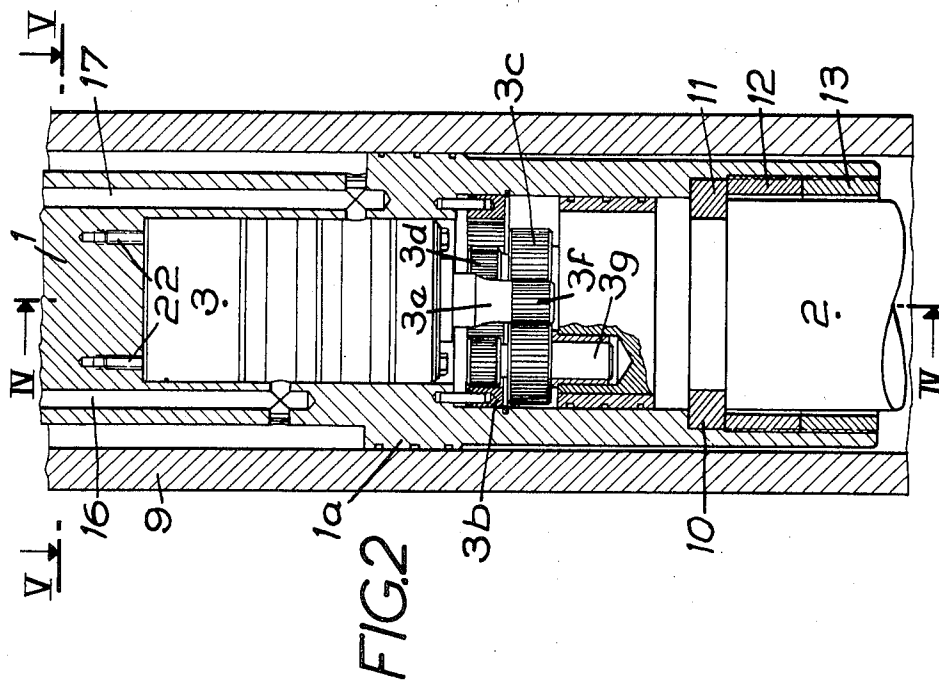
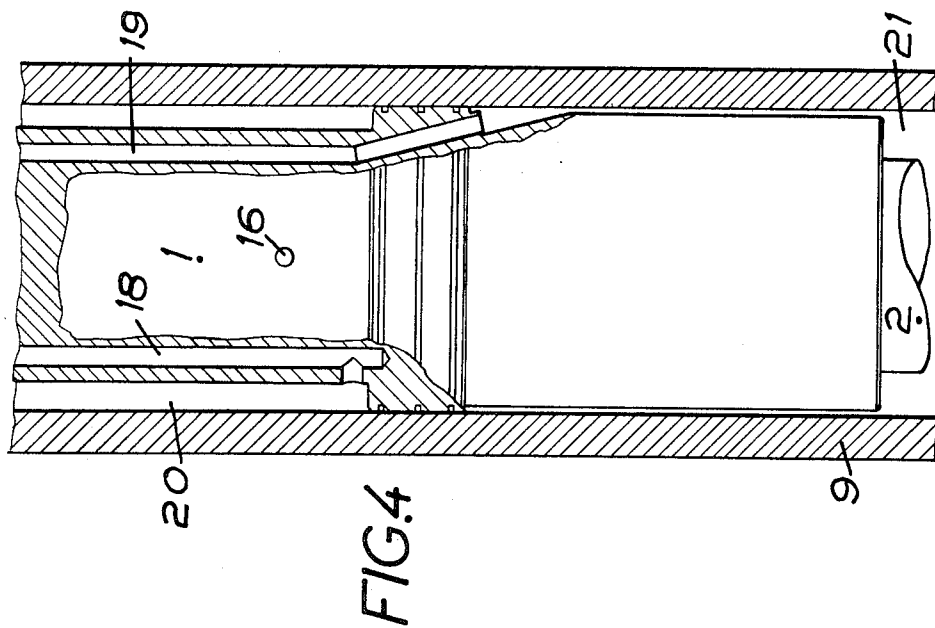
This invention relates to a grab bucket constituted by a double action jack comprising a piston rod in two parts, mounted coaxial and so as to rotate with respect to one another. This bucket comprises in addition a device for adjusting the angular orientation of the parts of the piston rod, this adjusting device being coupled directly to the said two parts of the rod.

One application of the invention is the manufacture of an orientable grab bucket which is compact and which has well protected control members.

8 Claims, 5 Drawing Figures







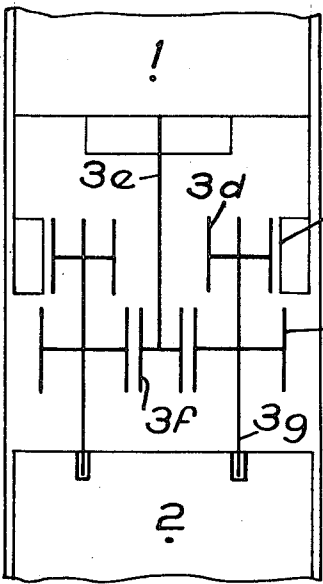


FIG. 3

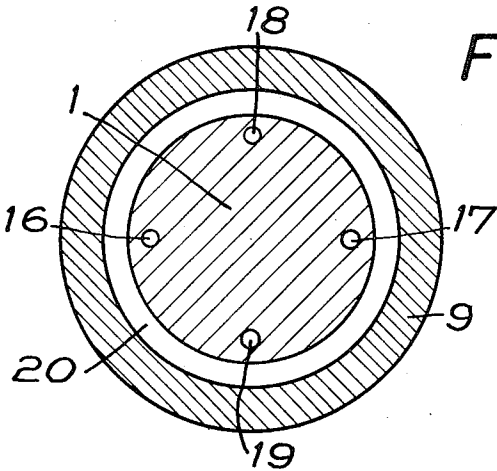


FIG. 5

## GRAB BUCKETS

The present invention relates to a drag bucket provided with a jack, the piston rod of which comprises two parts that are orientable with respect one to the other.

In the technical field of drag buckets, U.S. Pat. No. 3,314,709 for example already discloses the arrangement according to which the jack controlling the bucket has a piston rod composed of two parts which are mounted coaxially in the body of the jack and so to rotate with respect to each other.

Furthermore, it is known by the second addition Ser. No. 79,892 to French Pat. No. 1,136,481, in particular to provide a drag bucket with a device for adjusting its angular orientation about the axis of its control jack. By applying this orientation device to the drag bucket described in U.S. Pat. No. 3,314,709 the angular orientation of the two parts of the piston rod of the jack controlling the bucket could be regulated, though this had not yet been effected.

However, after a brief study and several tests, it was ascertained that the adaptation as such of the above-mentioned orientation device to the bucket described in U.S. Pat. No. 3,314,709 leads to cumbersome and therefore heavy and expensive arrangements which are moreover relatively fragile, the orientation device not always being correctly protected.

It has appeared necessary to continue the studies in order to remedy the above-mentioned disadvantages. The invention has been developed in this way and has for its object a grab bucket constituted by a double-action jack comprising a body, inside which a piston may move in translation, integral with a piston rod composed of two parts mounted coaxially and so as to rotate with respect to one another.

This grab bucket comprises in addition a device for adjusting the angular orientation of the two parts of the rod of the piston, this adjusting device being coupled directly to the said two parts of the rod of the piston.

A hollow is advantageously made in at least one of the two parts of the rod of the piston, whilst the adjusting device is disposed at least partially inside said hollow.

In addition, this adjusting device preferably comprises a hydraulic drive motor provided with two chambers selectively connected to a source of pressurised fluid and to a discharge tank by two conduits, in manner known per se, whilst said two conduits are made in one of the two parts of the rod of the piston.

Finally, the adjustment device often comprises, in manner known per se, a speed reducer coupled to the output member of the hydraulic drive motor.

The invention will be more readily understood and secondary characteristics as well as their advantages will appear, in the course of the following description, of an embodiment given by way of example. It is understood that the description and the drawings are given only by way of indicative and non-limiting example.

Reference will be made to the accompanying drawings, in which:

FIG. 1 is an elevational view, with part section, of a bucket according to the invention;

FIG. 2 is a detailed view of the device for adjusting the orientation of the bucket of FIG. 1;

FIG. 3 schematically shows the arrangement of the speed reducer, which the adjusting device of FIG. 2 is provided with;

FIG. 4 is a section along IV—IV of FIG. 2;

FIG. 5 is a section along V—V of FIG. 2.

Referring now to the drawings, FIG. 1 comprises, in known manner, a control jack, having piston means constituted by a lower rod part 2 mounted to pivot on an upper rod part 1, the piston member 1a, integral with the upper rod part 1, moving inside the cylinder 9. The working members comprising shell members 5 and 6 are articulated on a rocking lever 4 fixed to the lower end of the lower rod part 2 of the piston rod. Connecting rods 7 and 8 are coupled between the cylinder 9 and the shell members 5 and 6 respectively.

However, it is furthermore noted that the hollow in the upper rod part 1, inside which the lower part 2 partly penetrates, constitutes the housing of a hydraulic motor 3 coupled to a speed reducer 3a. The hydraulic motor 3 has its casing integral in rotation with the upper rod part 1 of the piston means, whilst the output member of the reducer 3a is integral in rotation with the lower rod part 2 of the piston means. Conduits 16 and 17 made in the upper rod part 1 of the piston means are connected, on the one hand, to the hydraulic motor 3 in order selectively to ensure the supply of pressurised fluid or the return to its discharge tank, for one, and for the other, the return to a discharge tank or the supply of pressurised fluid respectively, and on the other hand to the flexible conduits 14 and 15 branched to the supply circuit of the rotation of the bucket. It will further be noted that the piston member 1a defines, in cooperation with the upper rod part 1 and lower part 2 of the piston means and with the cylinder 9, the upper and lower chambers 20 and 21 respectively of the jack.

FIGS. 2 and 3 show in detail the assembly of the hydraulic motor 3 and the speed reducer 3a. The housing of the motor 3 is fixed by screws 22 to the upper rod part 1. The speed reducer is constituted by a planetary gear train. A pinion 3f is mounted integral with the driven shaft 3e of the motor 3 and meshes, in the present case, with three satellites 3c, each of them being fixed to an axis 3g mounted to pivot on the lower rod part 2 of the piston means. On each axis 3g there is fixed a second pinion 3d integral in rotation with the corresponding pinion 3c and meshes with a ring 3b integral in rotation with the upper rod part 1 of the piston means. It will be noted that the lower rod part 2 is locked in translation on the upper rod part 1 of the piston means by means of half-rings 10 and 11, the nut 12 and the counternut 13.

Furthermore, in addition to the above-mentioned conduits 16 and 17, two other conduits 18 and 19, also arranged inside the upper rod part 1 of the piston rod, selectively connect the chambers 20 and 21 of the jack to the pressurised fluid supply and to the discharge tank. The upper rod part 1 of the piston means is provided in known manner with a stirrup-shaped member 23 for connecting the bucket to the beam or jib of the public works machine which is equipped therewith.

The advantages of the bucket which has just been described will now be given.

Firstly, this bucket which comprises a jack having a piston rod in two parts, has, *ipso facto*, the advantages inherent in this arrangement. Among these advantages, the embodiment of the control of the shells 5 and 6 of

the bucket and the integration of the rotating joint, permitting the supply of the jack, with the jack itself, will be noted in particular.

However, these advantages of the known solutions are accompanied by that of a device for adjusting the orientation of the bucket integrated with the jack itself. This arrangement results in a compact construction (the overall size of the bucket is substantially identical to that of the non-orientable bucket), as well as a satisfactory mechanical protection of the mechanism of the device adjusting the orientation. In fact, the latter is not connected to the bucket at a spot exposed to shocks, but on the contrary is located inside the jack which, whether or not the bucket is provided with a device for adjusting its orientation, is, in any case, made and disposed in order to possess a good mechanical resistance, particularly to shocks.

It will also be noted that the use of a hollow made in the piston rod in order to house the hydraulic motor 3 and the speed reducer 3a, finally renders the piston rod, and consequently the complete bucket, lighter with respect to the prior known buckets, of which the piston rod did not comprise a hollow and which were equipped with a device for adjusting their orientation not integrated in said piston rod.

Moreover, it will be noted that the mechanism of the orientation adjusting device, when the latter is disposed in the rod of the jack, as in the bucket that has been described, is protected from any contamination, but also lubricated correctly and easily, simply by the outflow of leakages of the hydraulic fluid controlling the hydraulic motor 3.

Of course, there are numerous variants of the bucket that has been described by way of example, which are in accordance with the invention. The conduits 16, 17, 18, 19 which have shown substantially diametrically opposite in two's, the conduits of one of the groups being shifted angularly by 90° with respect to the conduits of the other group, could thus be disposed differently, if this proved necessary, or, even more simply, if this contributed to facilitating the manufacture and/or assembly for example.

Similarly, in order to be able to house the device for adjusting the orientation of the bucket, in the housing, which is necessarily not very voluminous, of the piston rod, this adjusting device is necessarily constituted by the assembly of a relatively rapid hydraulic motor 3 with a speed reducer 3a. Nevertheless, depending on the dimensions of the control jacks of the buckets and of the hydraulic motors which may be made, the speed reducer 3a is not always necessary. In this case, the hydraulic motor alone constitutes the device for adjusting the orientation of the bucket.

It will further be specified that, if it were preferred to choose a hydraulic motor for constituting the adjusting device because the supply with hydraulic fluid exists already, particularly for controlling the jack controlling the bucket, it is still possible to choose motors other than hydraulic ones, particularly electric motors.

I claim:

1. A hydraulically operated grab bucket comprising a hydraulic cylinder, working members pivotally connected to said cylinder, piston means positioned on the interior of said cylinder, said piston means including a piston member, an upper rod part and a lower rod part respectively extending from opposite ends of said cylinder, said lower rod part extending from said cylinder and being connected to said working members, said upper rod part being connectable externally of the cylinder to a supporting means, power adjusting means within the interior of said cylinder connecting the lower rod part to the upper rod part for enabling rotational adjustment of the lower rod part with respect to the upper part so as to effect a rotary positioning of said working members in a desired position wherein said piston member has an axial chamber into which axial chamber the upper end of said lower rod part extends with said adjusting means engaging the upper end of said lower rod part in said chamber.

2. The invention of claim 1 wherein said adjusting means includes a hydraulic motor means.

3. The invention of claim 2 wherein said upper rod part extends upwardly from said piston member and includes a hollow portion in which said hydraulic motor means is mounted.

4. The invention of claim 3 wherein said adjusting means includes a speed reducer coupled between the output of the hydraulic motor and the upper end of the lower rod part.

5. The invention of claim 4 additionally including first and second conduits extending through said upper rod part and connected to said hydraulic motor for providing power fluid to said hydraulic motor.

6. The invention of claim 3 wherein said speed reducer comprises a planetary gear train.

7. A hydraulically operated grab bucket comprising a hydraulic cylinder, working members pivotally connected to said cylinder, piston means positioned on the interior of said cylinder, said piston means including a piston member, an upper rod part and a lower rod part respectively extending from opposite ends of said cylinder, said lower rod part extending from said cylinder and being connected to said working members, said upper rod part being connectable externally of the cylinder to a supporting means, power adjusting means including hydraulic motor means within the interior of said cylinder connecting the lower rod part to the upper rod part for enabling rotational adjustment of the lower rod part with respect to the upper part so as to effect a rotary positioning of said working members in a desired position, wherein said upper rod part extends upwardly from said piston member and includes a hollow portion in which said hydraulic motor means is mounted.

8. The invention of claim 7 wherein said speed reducer comprises a planetary gear train.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,814,471 Dated June 4, 1974

Inventor(s) Yves G. Coeurderoy

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The assignee is changed to read --Societe

Anonyme: Poclain--.

Signed and sealed this 1st day of October 1974.

(SEAL)  
Attest:

McCOY M. GIBSON JR.  
Attesting Officer

C. MARSHALL DANN  
Commissioner of Patents