Sept. 1, 1959 E. R. GUSTAFSSON 2,902,256

HYDRAULIC JACK FOR RAISING CONCRETE FORMS

Filed July 25, 1956

Fig. 1.

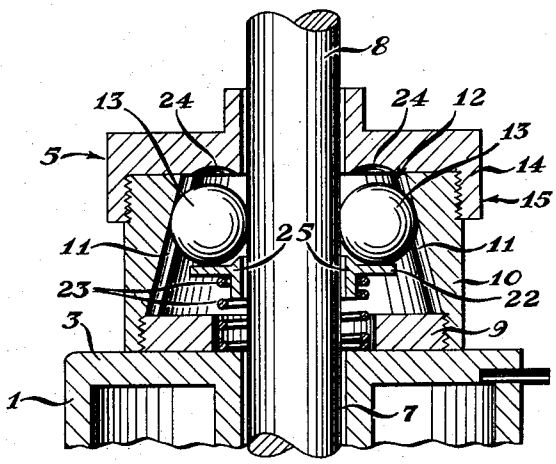
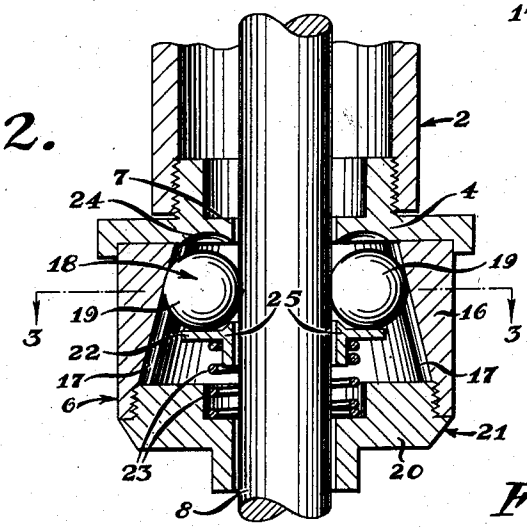


Fig. 2.



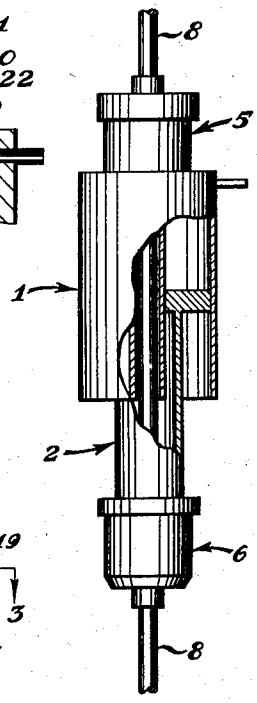
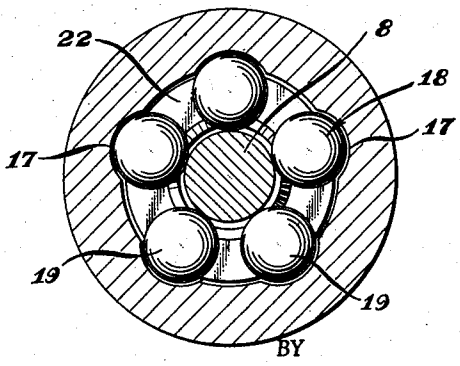


Fig. 4.

Fig. 3.



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HYDRAULIC JACK FOR RAISING CONCRETE FORMS

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2 Claims. (Cl. 254—106)

This invention relates to a hydraulic jack for moving concrete forms, of the type which at its ends carries gripping heads in the form of housings which are coaxial with the jack and which, with the intermediary of wedge surfaces and gripping means in the form of balls arranged in the respective housing, engage a rod passing concentrically through the jack and the housings thereon, said rod being intended to remain embedded in the concrete body erected by means of the concrete forms.

The jacks of the above type do not, however, permit a simple and rapid exchange of parts in the jack, which have been broken or otherwise destroyed, during operation nor when the jack is not in use. This is true especially of the ball gripping means which are exposed to considerable stresses and therefore often have to be exchanged during operation. Up to now it has been possible to effect such an exchange of parts only by removing the jack from the concrete forms and dismantling it.

One of the objects of the invention is to provide an improved jack of the above type which eliminates said disadvantage and permits exchanging the gripping means in an efficient and quick manner while the jack is in its operative position. According to the invention, the jack is characterized by the fact that each of said housings, which are coaxial with the jack, is disposed externally of the jack on the outer end of an end piece arranged at the respective end of said jack, said end piece having a hole therein for the passage of the rod and forming together with an end ring, located on the free end of the housing and at a distance from said end piece, the end walls of the frusto-conical cavity of the respective housing, whose side walls are formed by said wedge surfaces, one of the two end walls of either housing being removably connected thereto so that the widest portion of the frusto-conical cavity can be exposed for the purpose of exchanging, during the operation of the jack, parts such as the ball gripping means that have been broken or otherwise destroyed in either gripping head housing.

Another object of the invention is to provide improved means for retaining the balls in their respective housings when the jack is removed from one rod, so as to retain the balls in proper position for engaging another rod when the jack is placed thereon.

Further objects of the invention and the advantages gained thereby will be described in the following, reference being had to the accompanying drawings illustrating an embodiment of the invention.

In the drawings:

Fig. 1 is a longitudinal section of the upper portion of a hydraulic jack.

Fig. 2 is a similar longitudinal section of the lower portion of said hydraulic jack.

Fig. 3 is a cross section on line 3—3 in Fig. 2.

Fig. 4 is a schematic view showing the relationship of the structure of Fig. 1 with that of Fig. 2.

In the drawings a hydraulic jack is shown schematically in Fig. 4. Jack cylinder 1 has a chamber which is annular in transverse cross-section. Its chamber receives a piston which is rigidly mounted on the upper end of a tubular piston rod 2. It is to be understood that the details of the cylinder and piston are omitted in Fig. 4, these details not being a part of the present invention. For a detailed showing of a satisfactory structure, see U.S. Patent No. 2,756,019 to von Heidenstam et al.

The cylinder 1 comprises an end piece 3 integral with the cylinder, while the piston rod 2 presents an end piece 4 which is screwed into the free end thereof. Both the cylinder end piece 3 and the piston rod end piece 4 have gripping heads 5 and 6, respectively, which are disposed on the outer side of the respective end piece and which will be described more in detail in the following. The end pieces have axially disposed holes 7 which permit the jack to be passed onto a rod 8 which preferably is to remain embedded in the concrete body erected by means of the concrete forms operable by the hydraulic jack.

A ring 9 is secured to the outer side of the end piece 3 and its peripheral edge surface is threaded to coact with the internal threads of an externally cylindrical member 10 which has a frusto-conical cavity, the side walls of which are provided with axially extending grooves 11 distributed around the inner periphery thereof for accommodating a number of ball gripping means 13. The grooves 11 converge in the direction from the cylinder 1. The member 10 has external threads meshing with the internal threads of a ring 14 which can be screwed onto the member 10. The ring 9, the member 10 and the ring 14 collectively form a housing 15 mounted on the outer side of the end piece 3 of the jack.

An externally cylindrical member 16 is secured on the outer side of the end piece 4. Said member 16 has a frusto-conical cavity, the side walls of which are provided with axially extending grooves 17 distributed around the inner periphery thereof for accommodating a number of ball gripping means 19. The grooves 17 converge towards the cylinder 1. An annular bottom member 20 is screwed into the open end of the member 16. Said member 16 and said annular bottom member 20 collectively form a housing 21 mounted at the outer side of the end piece 4 of the jack.

Each of the housings 15 and 21 contains a ring 22 which is held in bearing engagement with the ball rows 12 and 18 formed by the balls 13 and 19, a spring 23 which is interposed between the respective ring 22 and the end piece 3 or bottom member 20 presses said ball rows towards the narrow portion of the respective housing.

When the jack is moved to raise the sliding forms, the ball row 18 of the gripping head 6 will be clamped against the rod 8. The ball row 12 in the gripping head 5 is then inoperative and permits said gripping head to be moved in relation to the rod 8. After the jack has made an operating stroke and is to move the gripping head 6 to a new position of engagement for raising the concrete forms, the gripping head 5 becomes operative and the ball row 12 in said gripping head is clamped against the rod 8, whereupon the jack moves the gripping head 6 by contraction.

An annular groove or recess 24 is provided in the surface of the ring 14 facing the cavity of the housing 15 as well as in the surface of the end piece 4 facing the cavity of the housing 21. On their surfaces facing the ball rows 12 and 18, respectively, the rings 22 have a projecting edge 25. When the jack is withdrawn from the top of the rod 8, the ring 22 acted upon by the spring 23 will move the respective ball row into the groove 24, and with the aid of the edge 25 it will hold the ball row in such a position that at a repeated use the jack can readily be mounted again on a rod 8.

The balls in the gripping heads are very easily ex-

changed during operation by unscrewing the member **10** or bottom member **20** and moving them some distance on the rod **8** to expose the balls. After the exchange has been made, the member **10** or bottom member **20** is returned to its position.

Modifications are conceivable within the scope of the inventive idea such as it is defined in the appendant claims.

What I claim and desire to secure by Letters Patent is:

1. A hydraulic lifting jack comprising an annular jack cylinder and piston assembly mounted on a vertical jack rod passing through said assembly, upper and lower ball-type grippers, one on said cylinder and one on said piston for alternately gripping said rod, and means for changing the balls in said grippers while said jack is under load, each said gripper comprising a housing having a cavity with an upwardly converging wall surrounding said jack rod, a series of balls disposed in a single layer in said cavity, and means urging said balls upwardly against said wall and said rod; said means for changing the balls comprising means mounting said upper gripper outside said assembly on top thereof, means mounting said lower gripper outside said assembly on the bottom thereof, and access means, for each said gripper, comprising a lower ring detachably threaded to the bottom of the respective housing for removing and replacing the balls therein.

2. A jack for elevating forms in connection with the pouring of concrete structures and operable in connection with a jack rod embedded in concrete, said jack comprising an annular jack cylinder and piston assembly through which said jack rod passes, two gripping heads arranged outside of said assembly and secured to opposite ends thereof, each of said gripping heads comprising a closed housing surrounding the jack rod, an upwardly converging side wall forming a frusto-conical cavity in said housing, a series of straight grooves in said upwardly converging side wall, a series of balls disposed in a single layer in said frusto-conical cavity and interposed between the jack rod and said side wall, one ball in each of said straight grooves, upper and lower annular members on said housing, one at each end of said upwardly converging side wall and having end surfaces for said frusto-conical cavity, said lower annular member being detachably connected to said housing, the upper one of said end surfaces having a recess facing said balls, a ring under said balls, said ring having an annular raised portion adjacent said jack rod, spring means biasing said ring upwardly against said balls to urge them during operation along said straight grooves into engagement with the jack rod and said side wall, and to hold them during detachment from said jack rod in said recess and in contact with said annular raised portion of said ring.

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