March 14, 1944. E. McCORMICK ET AL 2,344,156

HYDRAULIC POWER LIFT

Original Filed April 19, 1937

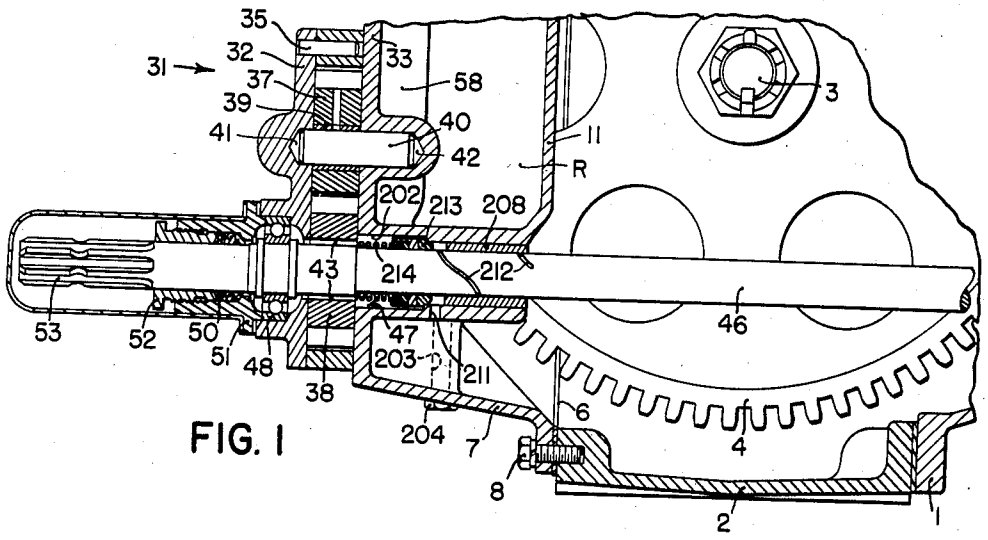


FIG. 1

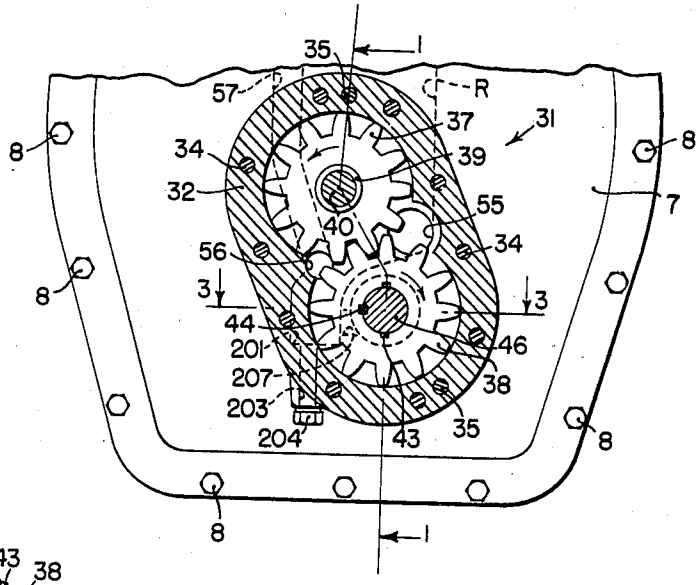


FIG. 2

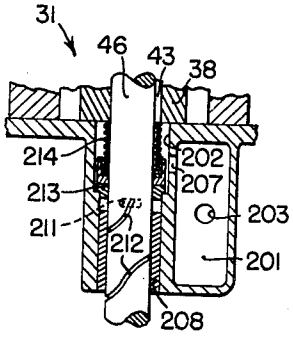


FIG. 3

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Patented Mar. 14, 1944 2,344,156

UNITED STATES PATENT OFFICE

2,344,156

HYDRAULIC POWER LIFT

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Original application April 19, 1937, Serial No. 137,651. Divided and this application March 8, 1941, Serial No. 382,385

1 Claim. (Cl. 184—6)

The present invention relates generally to hydraulic mechanisms, and more particularly to improvements in hydraulic mechanisms for tractors and the like for use as power lift mechanism therefor. This application is a division of an application, Serial No. 137,651, filed April 19, 1937, by Elmer McCormick and Merlin Hansen, issued November 17, 1942, as Patent No. 2,302,637. Hydraulic power lift mechanism of this general type is illustrated and described in United States Patent No. 2,107,760, issued February 28, 1938, to McCormick, Stewart and Worthington, and the present invention relates to modifications and improvements in such mechanism.

The principal object of this invention relates to the provision of a hydraulic power lift mechanism of improved design, which is more efficient and more durable in operation. A further object of the invention has to do with the provision of an improved power lift mechanism which is self-contained in a housing which bolts over the rear opening in the banjo type rear axle housing of the tractor, through which the power take-off shaft of the tractor extends and is supported within the housing of the power lift mechanism for driving the pump of the latter. More specifically, it is an object of our invention to provide bearing means for supporting the rear end of the power take-off shaft on the power lift housing, with an improved lubricating means therefor. A related object is to provide a forward bearing for the power take-off shaft beneath the power lift oil reservoir and a second bearing rearward of the power lift pump, with means for supplying oil to the forward bearing from the axle housing of the tractor and for supplying oil for the rear bearing from the power lift oil reservoir. A still further object of the invention is the provision of a lateral passage for supplying oil from the reservoir to the rear bearing for the power take-off shaft and to provide a sump at one side of said bearing into which grit and metal particles picked up by the oil may settle, whereby such foreign matter will be prevented from entering the bearing compartment.

These and other objects and advantages of the present invention will be apparent from the following description of the preferred embodiment, reference being had to the accompanying drawing, in which

Figure 1 is a fragmentary vertical longitudinal section taken through the lower part of the rear end of a tractor in which the present invention has been embodied; Figure 1 corresponding to a section taken along the line 1—1 of Figure 2;

Figure 2 is a rear view, looking forwardly, of the construction illustrated in Figure 1, with certain parts of the casing members being shown in section in order to better illustrate the operating mechanism; and

Figure 3 is a horizontal section taken along the line 3—3 of Figure 2, and showing the means for supplying oil to one of the power take-off shaft bearings.

Referring now to the drawing, as shown in Figure 1 the reference numeral 1 indicates the rear portion of a combined crank case and supporting framework of a tractor of well known construction, and 2 indicates the rear axle housing of such a tractor, such rear axle housing in the present case being of the banjo type. Such axle housings comprise laterally directed housing extensions (not shown) in each of which a drive shaft 3 is journaled by any suitable means. Each of said drive shafts 3 one of which is shown in Figure 1, carries a large driving gear 4, said gears being actuated by suitable transmission mechanism and differential means (not shown).

While our improved hydraulic power lift has been illustrated in connection with and mounted on a farm tractor in view of the fact that certain features of our invention are more particularly concerned with providing improved power lift apparatus for such tractors, it is to be understood, of course, that in its broader aspects our invention is not to be limited to such association, and may be applied in any other situation to which it is applicable.

In its preferred form our hydraulic power lift mechanism comprises a unit that is adapted to be bolted over the rear opening 6 of the axle housing 2, and includes a central housing 7 that is adapted to be secured, as by bolts 8, over such rear opening 6 in lieu of the usual cover plate that covers such opening in tractors of the above mentioned type. The central housing 7 includes a forward wall 11 and a rear wall 33, defining therebetween a reservoir R.

The lift control mechanism (not shown) is operated by pressure derived from a hydraulic pump of the positive displacement type. The pump is indicated in its entirety by the reference numeral 31, and as shown in Figures 1 and 2 it comprises a suitable housing 32 that is carried by and secured to the rear wall 33 of the central housing 7 by bolts 34. A pair of steel dowel pins 35 carried at opposite ends of the housing 32 and adapted to be inserted in openings provided therefor in the rear wall of the central housing

7 serve to aline the holes for the bolts 34 in the housing 32 and the central housing 7 in the assembling operation. The pump gears are indicated by 37 and 38, the gear 37 being journaled on a bearing 39 supported on a short shaft 40 disposed in sockets 41 and 42 formed in the pump housing casting 32 and in the rear wall 33 of the power lift housing 7. The other pump gear 38 is provided with three keyways or slots 43 (Figures 1 and 2) in one of which a key 44 (Figure 2) is placed for securing the gear 38 to a power take-off shaft 46 which extends forwardly into the tractor body 1 and is operatively connected with the tractor motor by any suitable means. The purpose of providing the additional slots 43 will be explained later herein. The shaft 46 extends rearwardly longitudinally of the tractor between the two main driving gears 4 and through an opening 47 in the rear wall 33 of the power lift housing 7 (Figure 1) and is journaled in a bearing 48 supported by the pump housing 32. A cap 51 is provided for closing the opening that receives the bearing 48, and the rear end of the power take-off shaft 46 extends through said cap and is sealed by suitable bushing means 52. A sealing washer 50 is also provided between the cap 51 and the shaft 46 on the inner side of the bushing 52. The rear end of the shaft 46 is splined, as shown at 53, to receive suitable power take-off connections by which any operating unit or units may be driven by the rotation of said shaft.

The pump gears 37 and 38 are rotated in the direction of the arrows in Figure 2 by the rotation of the shaft 46, and such rotation of the gears builds up pressure in one side of the pump housing 32 and creates a suction in the other side of the housing. On the suction side of the pump housing the rear wall 33 of the power lift housing 7 is provided with an opening 55 (Figure 2), and a similar opening 56 is provided on the other side of the pump housing 32 at the pressure side of the pump 31. The opening 55 affords communication between the suction side of the pump and the lower portion of the housing 7, which forms a reservoir R for the hydraulic fluid, and the opening 56 leads into a vertically disposed pressure channel 57 formed in a thickened section 58 at the rear wall 33, leading to the power lift control mechanism.

A sump 201 is provided at the bottom of the reservoir R as shown in dotted lines in Figure 2 and in plan section in Figure 3. This sump 201 is disposed at one side of a compartment 202 that is provided in the power lift housing to receive the power take-off shaft 46 before described. The bottom of the sump 201 is provided with a drain 203 that is closed by a plug 204. By this construction, by removing the plug 204 and allowing a portion of the fluid to flow from the reservoir, any particles of grit or metal collected in the sump can be drained off without the necessity of draining off all of the oil from the reservoir.

As above mentioned, the rear end of the power take-off shaft 46 is supported in a bearing 48, and in the present construction this bearing is lubricated by oil leaking along the sides of the gears 37 and 38 from the high pressure side of the pump, and in order to prevent the oil pressure in the bearing housing from building up to a point where leakage through the rear seal 50, 52 would take place, the extra keyways or slots 43 before mentioned have been provided in the gear 38 of the pump that is fixed to the power take-off shaft in order to conduct the oil from the bearing housing through the gear and into the compartment 202 from which it flows through an opening 207 into the sump 201. At the forward end of the compartment 202 we provide a second bearing support for the power take-off shaft 46 which is in the form of a sleeve 208, and this bearing sleeve is lubricated by oil from the axle housing 2 of the tractor, the oil flowing through a small opening 211 at the rear end of the bearing sleeve 208 and working through the bearing in a groove 212 provided in the power take-off shaft 46. A sealing washer 213 held in place by a helical spring 214 surrounding the shaft 46 prevents the escape of the oil from the power lift pump into the axle housing 2.

We claim:

Hydraulic power lift mechanism for tractors and the like having a rear axle casing, comprising a housing mounted on said casing and including a reservoir for hydraulic fluid, a power shaft for driving a hydraulic pump extending through said casing and said housing, an outer bearing positioned in said housing below said reservoir for supporting said power shaft, a sump for said reservoir disposed alongside said power shaft, a communicating passage between said sump and said outer bearing and having a port in a side wall of said sump above the lowest part of the latter to prevent foreign matter from the reservoir and sump from settling into said passage, a second bearing for said power shaft positioned in said housing below said reservoir and inwardly of said passage, sealing means within said housing interposed between said inner bearing and said passage, and means for circulating lubricant through said inner bearing from the rear axle casing.

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