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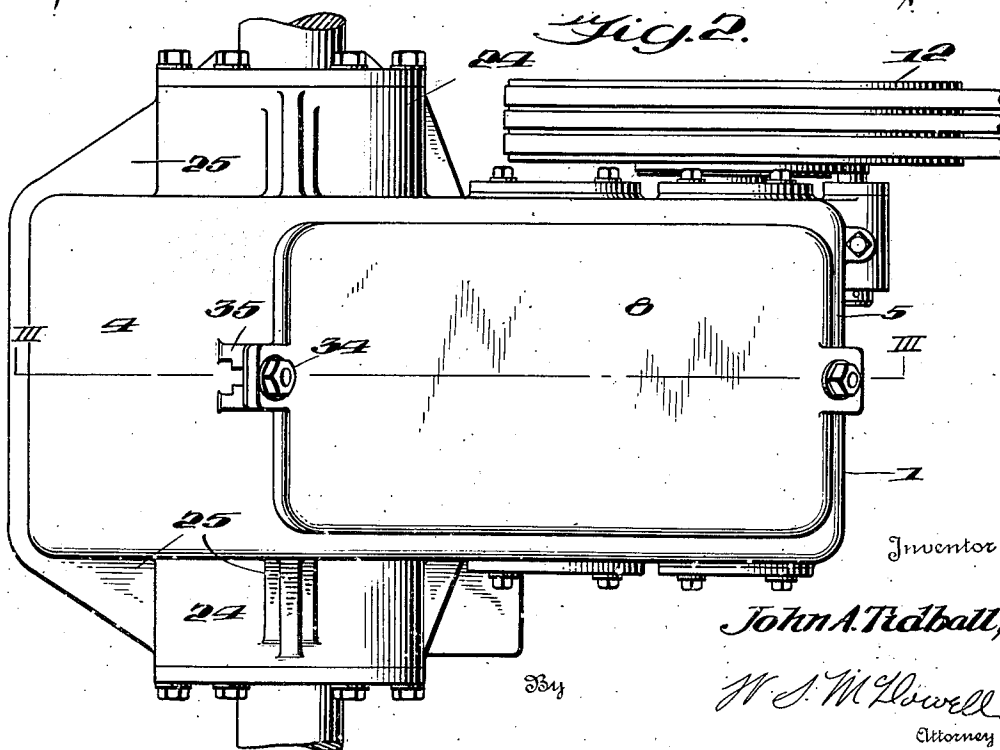
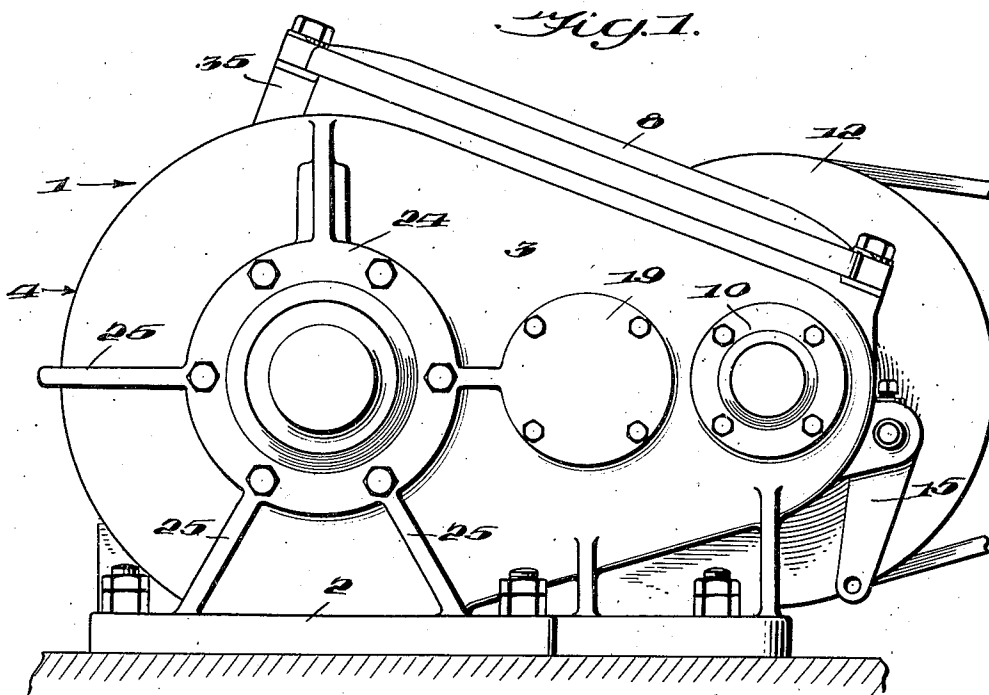
J. A. TIDBALL

2,270,980

SPEED REDUCER CASING

Filed Oct. 23, 1939

3 Sheets-Sheet 1



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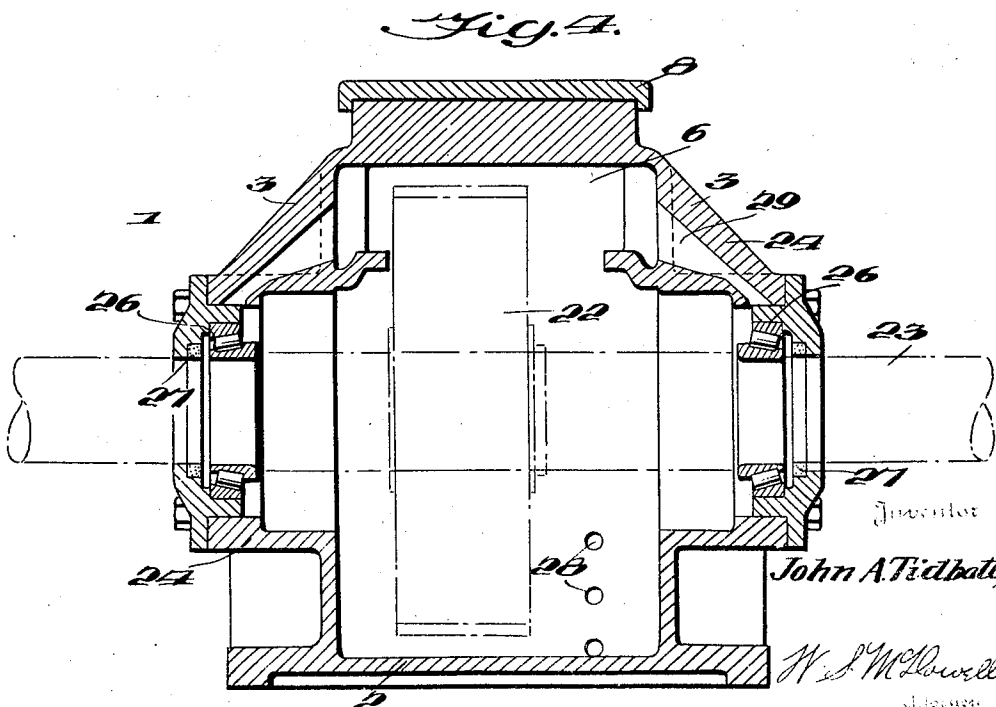
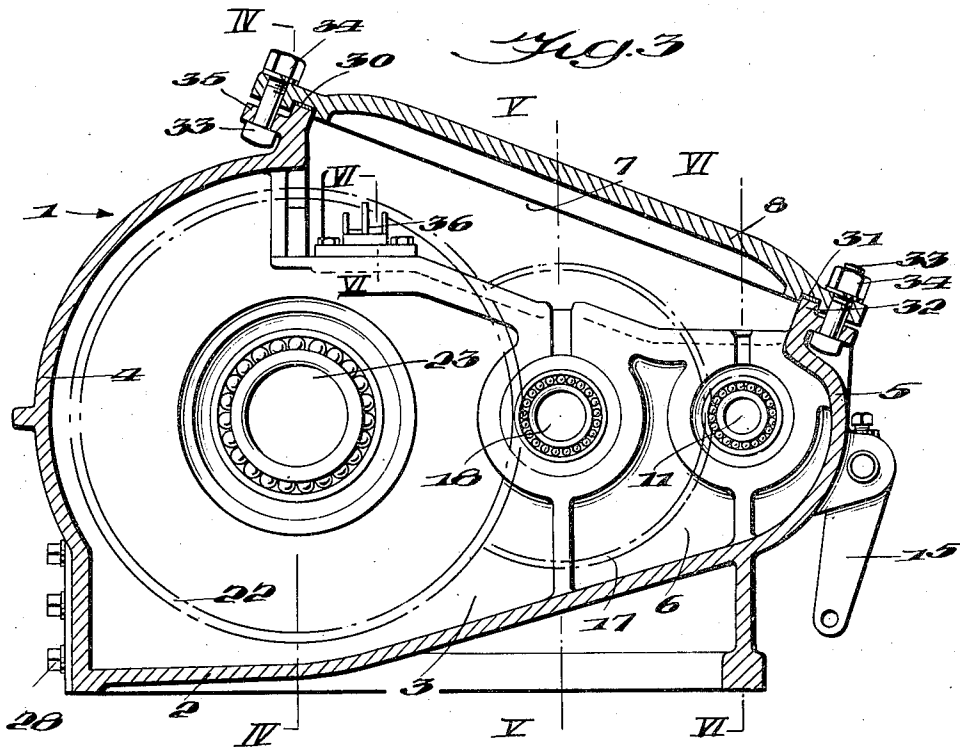
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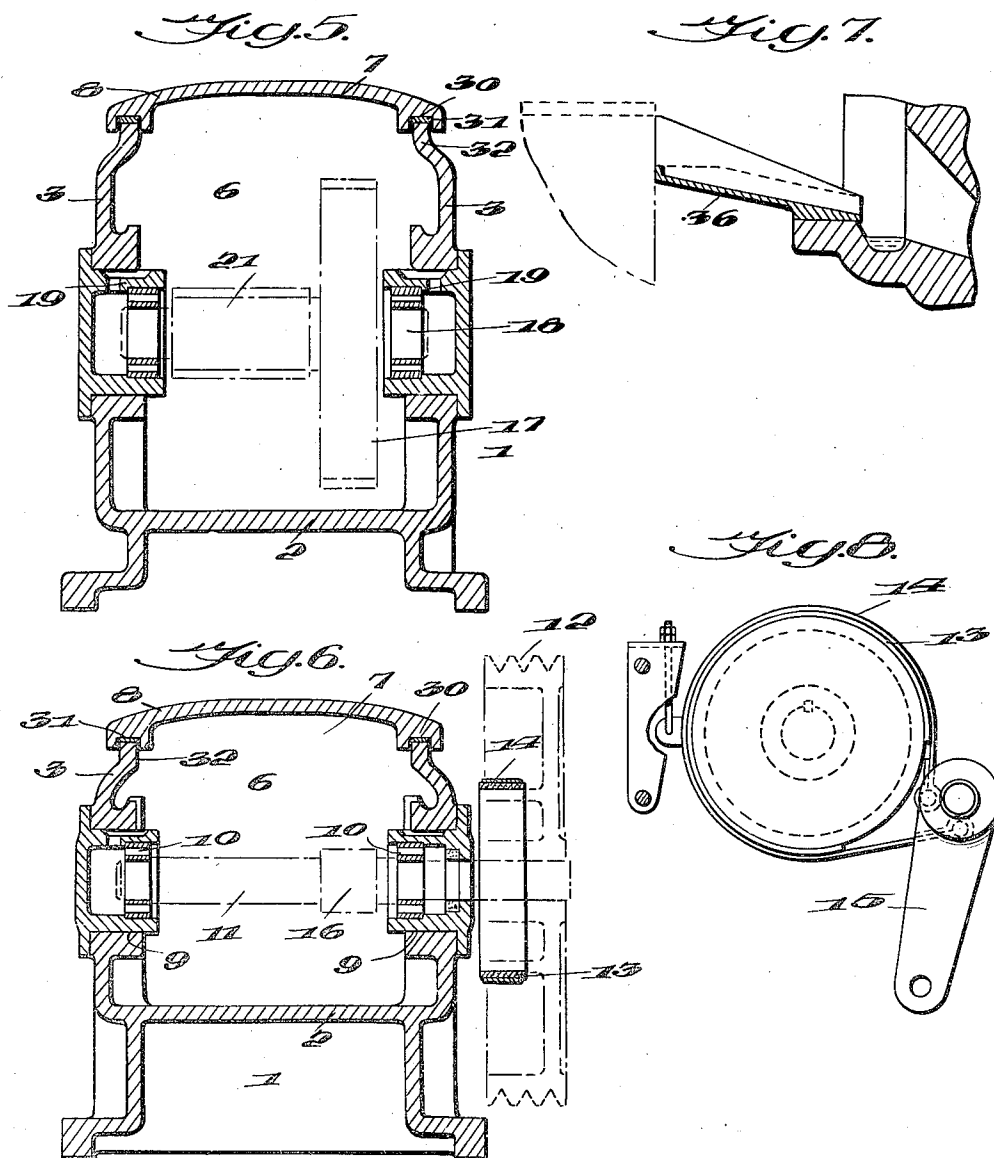
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SPEED REDUCER CASING

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3 Sheets-Sheet 3



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SPEED REDUCER CASING

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1 Claim. (Cl. 74—606)

This invention relates to the construction of speed-reducing gear casings, an object of the invention being to provide a gear case in which the side walls thereof are formed with bearings for the reception of a driven gear-carrying shaft, and wherein the construction of the casing is such as to provide greater strength and wall rigidity in the regions of said bearings than cases of ordinary design.

The case or housing for the conventional gear reducer is split along the horizontal plane passing through the center line of the gear-carrying shafts. Such a case develops weaknesses in use, particularly when the driven or low speed shaft is called upon to carry heavy bending and torsional loads. A second type of gear case now in use is of box-like form in which solid hubs or bearing extensions are integrally formed with the side walls and involves a single casting in lieu of the separable castings of the first type. The side walls of the second type cannot be reenforced with the ribs to provide as much rigidity against lateral collapsing as in the first or split type, since the cap or cover casting of the split type is designed to support the side walls of the base casting. In the solid or second type, if a top plate is used, the same is simply a loose cover and has no supporting effect.

When used in connection with oil well pumping machines, the slow speed shaft of the gear reducer is subject to heavy bending and torsional loads. The bending stresses tend to cause the side walls of the gear box to weave, and manufacturers of solid hub box cases have been faced with the problem of attempting to reenforce the side walls of the case around the bearings for the slow speed shaft to more fully withstand these stresses.

In accordance with the present invention, a case casting for gear speed reducers is provided which consists of a hollow metallic body having bottom, side and end walls, the side walls being formed with integral, rib reenforced, shaft bearing extensions of the solid non-split type, one of the end walls of the case extending from the bottom thereof to a position substantially over the tops of the bearing extensions, whereby to unite the side walls of the casting across the top of the latter, producing braced side walls in a solid box type of casting which will mechanically strengthen the casting and enable the side walls thereof to resist to a considerably greater extent than previous type of cases the high stresses and strains in the region of the low speed shaft.

For a further understanding of the inven-

tion, its objects, nature and preferred construction, reference is to be had to the following description and the accompanying drawings, wherein:

Fig. 1 is a view in side elevation of a geared speed reducer having a case formed in accordance with the present invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a vertical longitudinal sectional view taken through the speed reducer on the plane disclosed by the line III—III of Fig. 2;

Fig. 4 is a vertical transverse sectional view taken through the reducer on the plane indicated by the line IV—IV of Fig. 3, and disclosing the supporting journals for the low-speed shaft of the reducer;

Fig. 5 is a similar view on the line V—V of Fig. 3 and disclosing the supporting bearings for the intermediate shaft;

Fig. 6 is a similar view on the line VI—VI of Fig. 3 and disclosing the journals or supporting mechanism for the high speed or driving shaft;

Fig. 7 is a detail sectional view on the line VII—VII of Fig. 3;

Fig. 8 is a detail elevational figure of a brake mechanism for the high speed shaft.

The case shown at 1 in the drawings has been specifically designed for use with geared speed reducers of the type employed in connection with oil field pumping machines. Such speed reducers are used for obtaining the desired R. P. M. of a pitman crank employed in effecting rocking movement of a pump operating walking beam. It will be understood that electric motors or internal combustion engines are used as prime movers for apparatus of this type, and the speed reducer is interposed between the power shaft for such a prime mover and the pitman crank. This field of use, however, is but one of many in which the present invention finds useful application.

As shown in the drawings, the case 1 consists primarily of a single or integral metallic casting, which is formed to embody a bottom wall 2, transversely spaced vertical side walls 3 and substantially arcuate end walls 4 and 5. These walls produce an internal chamber 6 within the casting adapted for the reception of suitable shafts and gears found in speed reducers of conventional design. Access to the chamber 6 is provided by means of an opening 7 formed in the top thereof, and this opening is usually covered by means of a removable plate or lid 8.

The side walls 3 adjacent to the end 5 of the casting are formed with horizontally aligned

openings 9 for the reception of removable anti-friction bearings 10, arranged for the support of a high speed shaft 11. One end of this shaft projects through one of the bearings 10 and is connected with a belt wheel, indicated at 12. As is customary in speed reducers used in oil well pumping units, the belt wheel carries a brake drum 13, with which is engaged a flexible brake band 14, capable of being contracted around the drum by the pivoted lever 15.

The shaft 11 carries a pinion 16, which meshes with the teeth of a larger gear 17 carried by an intermediate shaft 18. This shaft, as shown more particularly in Fig. 5, is journaled in removable anti-friction bearings 19 positioned in horizontally aligned openings, which are formed in the side walls 3 of the case. Rotatable with the gear 17 is a wide-faced pinion 21, the teeth of which mesh with an enlarged gear 22 carried by a low-speed or driven shaft 23. It is this shaft which receives, in a gear reducer of the type set forth, the heavy bending stresses and strains which must be absorbed by the side walls of the case if proper operating conditions are to be maintained. Therefore, in the design of the case 1, the side walls 3 thereof are formed with integral hub extensions 24 having externally disposed, radially extending reinforcing ribs 25. The hub extensions are provided with horizontally aligned openings for the reception of removable thrust-receiving anti-friction bearings 26 and oil-packing rings 27. The interior of the casing is adapted to receive oil or other suitable lubricant, and the level of the lubricant may be determined by the removable plugs 28, arranged in the lower portion of the end wall 4. As the gears and pinions within the case revolve, the oil or lubricant is picked up thereby to lubricate the faces of the intermeshing gear teeth of all gears, and a portion of this oil is diverted through suitable chutes or channels 29, as shown in Figs. 4 and 7, in order to effect the lubrication of the shaft bearings.

The speed reducing mechanism so far described is of conventional form and is not claimed as a part of this invention. The present invention, however, resides more particularly in the construction and arrangement of the end wall 4. By reference to Fig. 3 of the drawings, it will be noted that the end wall 4 extends from the bottom wall to a position substantially over the top of the center of the shaft 23. That is, the upper end of the wall 4 terminates substantially coincidentally with a vertical plane passing through the longitudinal axis of the shaft 23. By so extending and locating the end wall 4, the same operates to join the side walls 3 across the top of the case in the region of the low speed shaft, which is the region of the case subject to maximum stresses and strains. The result is the provision of a case of very high strength per unit

of weight, which will avoid any tendency of the side walls to weave or flex under the severe operating conditions to which the reducer is placed, producing longer life for the speed reducing gears and providing more satisfactory operation.

The opening 7 in the top of the case is closed by the plate or lid 8, the under face of the latter being formed with a groove 30 which receives a gasket 31 and the edge surfaces of a rectangular flange 32, projecting upwardly from the side walls 3 and the end walls 4 and 5. The cover plate or lid is removably secured to the case by means of suitable fasteners, which in this instance comprise threaded bolts 33 and nuts 34, the bolts passing through registering openings formed in lugs 35, which project from the end walls 4 and 5 and corresponding openings provided in the cover plate 8. As indicated in Figure 4, the casing projects and cooperates with the cover 8 to reinforce the entire structure and thus the cover has a supporting effect.

Since the casing 1 is not split or divided into a plurality of sections, it is necessary when assembling the unit, to insert the gears in the casing through the opening 7. After positioning the gears in the case, the shafts are slipped into the gears through the openings in the side walls of the case and then the bearings are put into place and secured in shaft supporting positions.

As illustrated in Figs. 3 and 7, lubricant collecting elements 36 are secured to the inner side walls of the case and extend to positions adjacent the side surfaces of the gear 22, from which they will scrape the relatively heavy oil and conduct it to the channels 29.

While the preferred form of the present invention has been illustrated and described in detail, nevertheless, it will be understood that the single embodiment of the invention set forth is merely illustrative and is, of course, subject to considerable variation or modification without departing from the spirit and scope of the invention, as the latter has been defined in the following claim.

What is claimed is:

A housing for speed-reducing means comprising a casing having integral bottom, side and end walls and an open top, registering hub means provided on said side walls and extending laterally therefrom, said hubs being formed with openings for the reception of shaft bearings, the upper portion of one of the end walls extending upwardly and inwardly to the open top of the casing and terminating substantially in vertical registration with the longitudinal axis of certain of said hub means and there provided with projecting reinforcing means, reinforcing ribs integrally joining the side walls and hub means of said casing, and cover means cooperating with said reinforcing means for closing the open top of said casing.

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