Nov. 15, 1955 P. J. ENDEBAK 2,723,626

PUMP DRIVE

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Fig-1

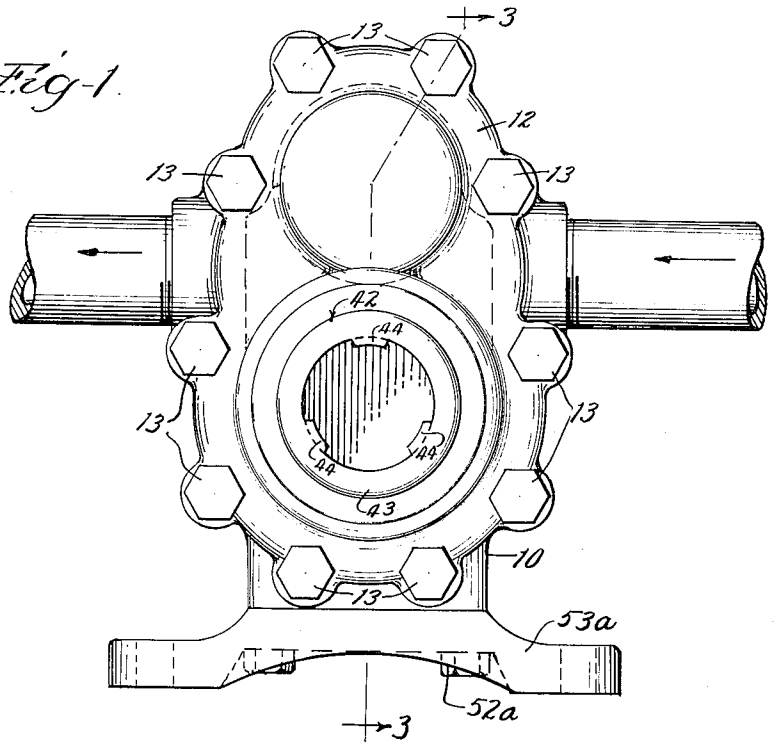
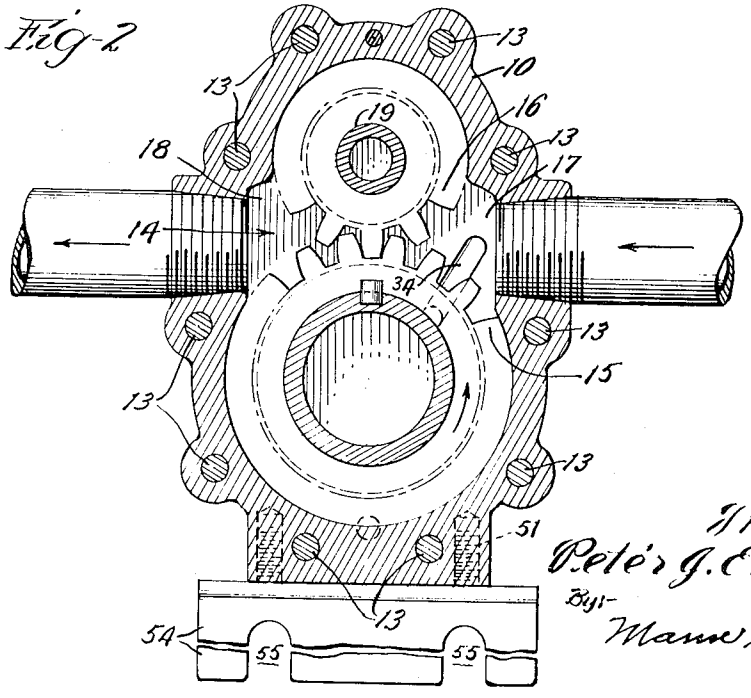


Fig-2



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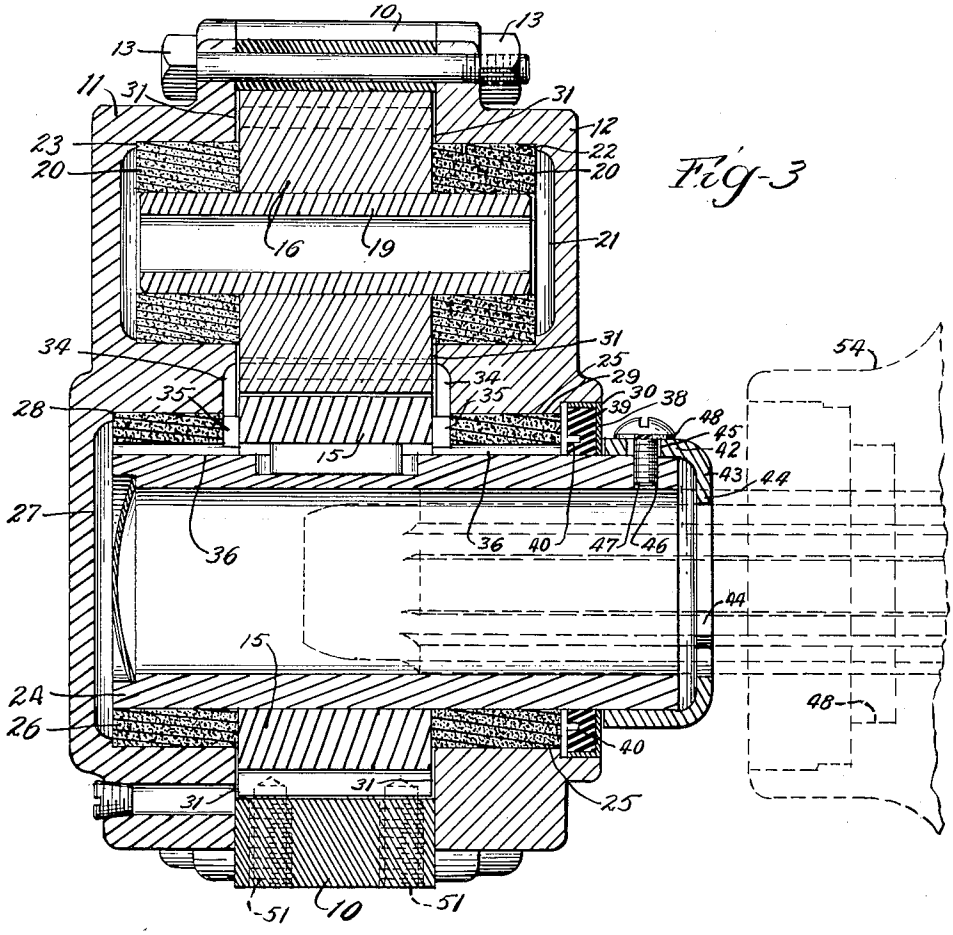


Fig-3

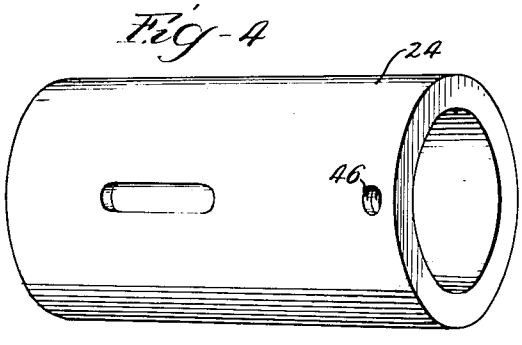


Fig-4

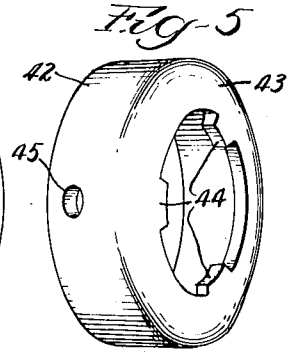


Fig-5

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Fig-6

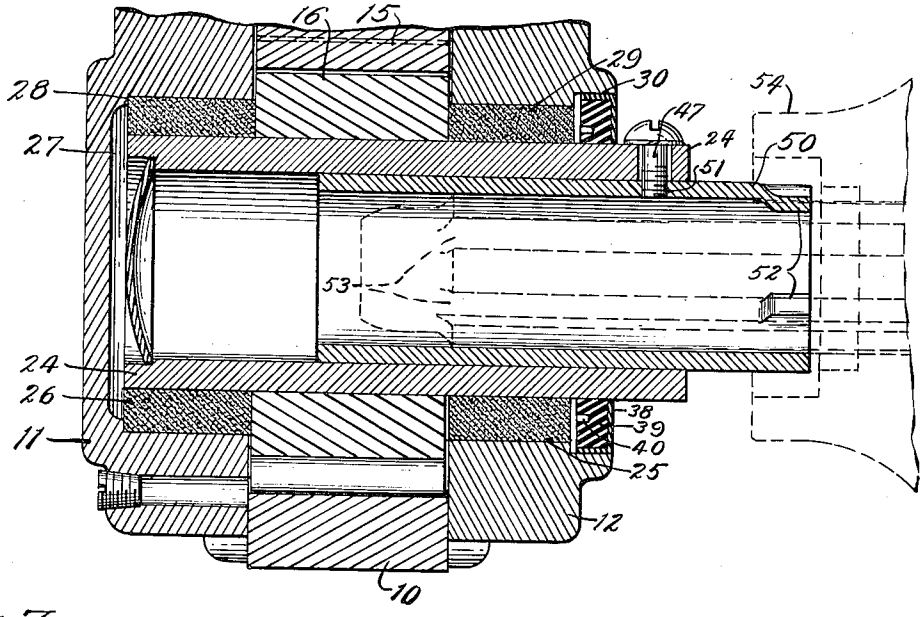
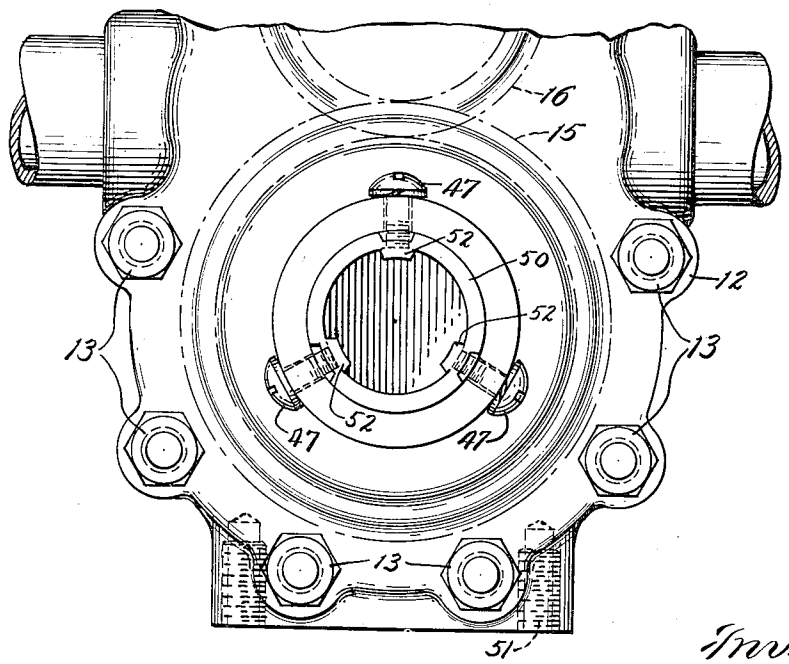


Fig-7



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PUMP DRIVE

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Application March 1, 1949, Serial No. 78,905

4 Claims. (Cl. 103—205)

This invention relates to pumps for handling liquids in pest and weed control, and has for its principal object to provide a simple, durable pump that may be readily driven from the power take-off of a tractor.

Fig. 1 is a front side elevation of a pump embodying the invention;

Fig. 2 is a vertical central section through the same crosswise to the driving shaft;

Fig. 3 is a vertical section in a plane through the axes of the gears;

Fig. 4 is a perspective view of the end portion of the shaft for the main gear;

Fig. 5 is a perspective view of a driving connection adapted to be associated with that shaft and a power take-off of a tractor;

Fig. 6 is an enlarged fragment of Fig. 3 with a different driving connection associated with the main shaft of the pump; and

Fig. 7 is an end view of Fig. 6 looking from the right.

The pump casing includes a flat sided body portion **10** having a contour shown in Figs. 1 and 2, a front cover plate **11**, and a back cover plate **12** secured to the body portion by bolts **13**.

The body portion is provided with a pump chamber, generally indicated by **14** (Fig. 2), in which are received the pump gears **15** and **16**, and which is ported at **17** and **18** to provide a low pressure or intake chamber section and a high pressure or discharge chamber section, respectively.

The smaller gear or pinion **16** is mounted on a hollow shaft **19** having its end portions journalled in bearings **20** pressed into bearing sockets **21** in the covers **11** and **12**, respectively, against the bearing seats **22** and **23**.

The main pump gear **15** is keyed to a hollow shaft **24** having its end portions journalled in bearings **25** and **26** pressed into the covers **11** and **12**. The bearing **26** is pressed into a socket **27** against a bearing seat **28**, and the bearing **25** is pressed into a bore **29** terminating in a counterbore **30** opening to the outside of the back cover **12**.

The clearance between the side faces of the gears **15** and **16** and the adjacent faces of the front and back covers **11** and **12** is on the order of 1½ to 2 thousandths, as indicated by the reference numeral **31**, whereas the clearance between the opposite sides of the gears **15** and **16** and the adjacent faces of the bearings **20**, **25**, and **26** is on the order of plus ½ thousandths to 0. By this means, the bearings form an effective seal with the pump gears, and prevent leakage from the discharge chamber **18** to the intake chamber **17**.

The inner faces of the front and back covers **11** and **12** are cored out, or otherwise recessed, at **34** in line with similar recesses **35** in the bearings **25** and **26** communicating with grooves **36** along the bore of the bearings **25** and **26** open to the surface of the shaft **24**.

This provides a relief connection to the intake or low pressure side of the pump to prevent the possibility of pressure developing adjacent to the ends of the shaft **24** that would throw the arrangement out of balance.

Preferably, the bearings **25** and **26** are made of sintered carbon, and, in the course of machining the bearing surfaces, small particles of carbon are pushed into the pores of the bearing material, and any irregularity in the shaft tends to loosen those particles, which then tend to work between the shaft and the bearing, and travel along the surface. Being extremely hard material, they become abrasive. The grooves **36**, however, form a trap for those particles by which they are readily eliminated from the bearing surfaces.

The counter bore **30**, and therefore the joint between the shaft **24** and the back cover **12**, with the bearing **25** is effectively closed and sealed by a metal cap **38** filled with a rubber ring **39** having an angular groove **40**.

Some of the liquids used for weed and pest control are highly corrosive, and, in order to protect the pump from corrosion by those or other materials, it is preferable to make the several parts of corrosion resisting material. For example, in a pump that has been found satisfactory, the casing is made of heat treated aluminum alloy known as Alcoa 356T6.

The gear **16** and the shaft **19** are made of an alloy containing approximately 88% copper, 10% tin, 2% zinc. The gear **15** and the shaft **24** are made of an alloy composed of approximately 9 to 10% aluminum; iron 1.25 maximum, the principal remainder copper.

In order to permit the pump to be driven from the power take-off of a tractor, or other machine, the shaft **24** is provided with a driving connection comprising a sleeve **42** having an inturned flange **43** equipped with teeth **44** adapted to engage in the grooves of a spline shaft, such as a standard SAE spline shaft customarily used on tractors. The sleeve **42** is provided with an opening **45** adapted to be aligned with a threaded openign **46** in the shaft **24** to receive a screw threaded Sems fastener unit **47**, which includes a locking washer **48**.

This driving connection is particularly suited to use with a 1⅜" spline shaft, commonly forming the power take-off of a Ford-Ferguson tractor, indicated by the dotted lines **48** in Fig. 3.

For use with a 1⅛" SAE spline shaft forming the power take-off on some tractors, there is provided another driving connection **50**, shown in Figs. 6 and 7, which comprises a length of tubing adapted to be telescoped within the shaft **24** substantially as shown in Fig. 6, and threaded at **51** to receive the Sems fastener unit **47**.

The projecting end of the driving connection **50** has inwardly directed teeth **52** adapted to be received in the grooves of the SAE spline shaft, indicated by the dotted lines **53** in Fig. 6. That shaft should project well into the sleeve **50** substantially as indicated, and the projecting portion of the latter should extend within the overhanging gear casing **54** of the tractor.

The driving connections are preferably made of steel and case hardened, particularly at the toothed portions.

The body portion **10** is provided with threaded openings **51** at the bottom to receive stud bolts **52***a*. In some uses, they will fasten the pump to a base, generally indicated at **53***a*, Fig. 1; and, in others, to an angular base, generally indicated at **54**, Fig. 2; many having slots **55** to receive bolts that ordinarily hold a part of the tractor casing in place.

I claim:

1. In a pump and driving means assembly of the class in which a gear pump having a hollow shaft to be driven which has smooth internal and external surfaces is telescoped over the externally splined portion of the power take-off shaft of a tractor or like machine, the com-

bination with said telescoped shafts of a connector comprising a hollow body terminating at one end in a tubular portion provided with smooth internal and external surfaces telescoped over the splined portion of said power take-off shaft and having one of its said surfaces engaged with one of the named surfaces of the pump shaft and terminating at its other end in inwardly directed teeth drivingly engaged in the grooves of said splined portion, and fastening means extending into the tubular portion of the connector and into the pump shaft for securing said shafts against relative turning.

2. In a pump and driving means assembly of the class in which a gear pump having a hollow shaft to be driven which has smooth internal and external surfaces is telescoped over the externally splined portion of the power take-off shaft of a tractor or like machine, the combination with said telescoped shafts of a connector comprising a hollow body terminating at one end in a tubular portion provided with a smooth internal surface telescoped over the splined portion of said power take-off shaft and having its said surface engaged with the outer surface of the pump shaft and terminating at its other end in inwardly directed teeth drivingly engaged in the grooves of said splined portion, and fastening means extending into the tubular portion of the connector and into the pump shaft for securing said shafts against relative turning.

3. In a pump and driving means assembly of the class in which a gear pump having a hollow shaft to be driven which has smooth internal and external surfaces is telescoped over the externally splined portion of the power take-off shaft of a tractor or like machine, the combination with said telescoped shafts of a connector comprising a hollow body terminating at one end in a tubular portion provided with a smooth external surface telescoped over the splined portion of said power take-off shaft and having its said surface engaged with the inner surface of the pump shaft and terminating at its other end in inwardly directed teeth drivingly engaged in

the grooves of said splined portion, and fastening means extending into the tubular portion of the connector and into the pump shaft for securing said shafts against relative turning.

4. In a pump and driving means assembly of the class in which a gear pump having a hollow shaft member to be driven which has smooth internal and external surfaces is telescoped over the externally splined portion of the power take-off shaft of a tractor or like machine, the combination with said telescoped shaft member and shaft of a connector member comprising a hollow body terminating at one end in a tubular portion provided with smooth internal and external surfaces telescoped over the splined portion of said power take-off shaft and having one of its said surfaces engaged with one of the named surfaces of the pump shaft member and terminating at its other end in inwardly directed teeth drivingly engaged in the grooves of said splined portion, and fastening means securing said shaft and shaft member against relative turning comprising a set of circumferentially spaced screws extending through one of said members and threaded into the other member.

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