

Sept. 17, 1946.

A. G. F. WALLGREN

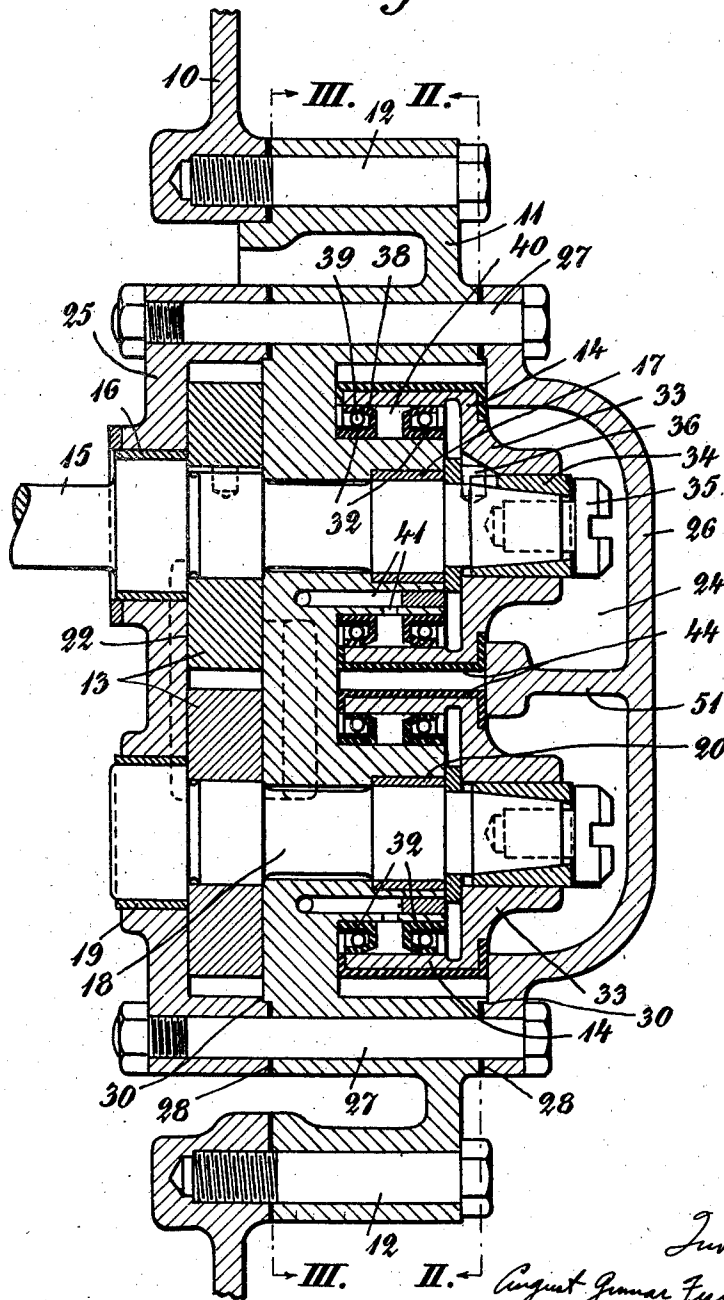
2,407,753

GEAR WHEEL PUMP

Filed Oct. 27, 1941

2 Sheets-Sheet 1

Fig. 1.



Inventor
August Gunnar Fredrik Wallgren
By
James H. Washburn
his Attorney

Sept. 17, 1946.

A. G. F. WALLGREN

2,407,753

GEAR WHEEL PUMP

Filed Oct. 27, 1941

2 Sheets-Sheet 2

Fig. 2.

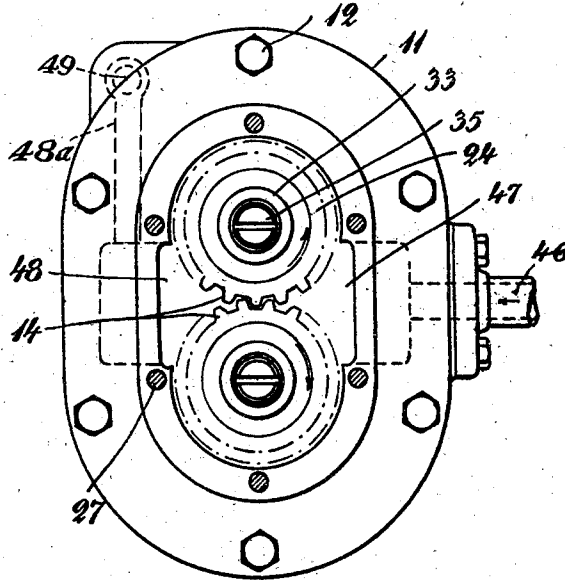
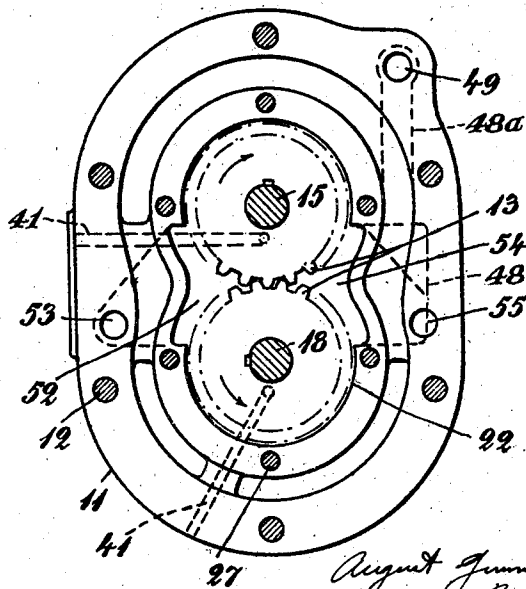


Fig. 3.



Inventor
August Gunnar Ferdinand Wallgren
By *J. J. Marshall*
His Attorney

UNITED STATES PATENT OFFICE

2,407,753

GEAR-WHEEL PUMP

August Gunnar Ferdinand Wallgren, Eskilstuna, Sweden, assignor to Aktiebolaget Bolinder-Munktell, Eskilstuna, Sweden, a corporation of the Kingdom of Sweden

Application October 27, 1941, Serial No. 416,777
In Sweden August 15, 1940

4 Claims. (Cl. 103—126)

1

This invention relates to gear wheel pumps intended primarily for water impurified by mud, sand and the like, such as sea water which is utilized, for instance, for the cooling of marine engines. Pumps of the gear wheel type have, among other things, the advantage over the reciprocating pumps hitherto used that they may be operated at a higher rotary speed, by reason of which they have smaller dimensions. It has hitherto not been possible, however, to utilize this advantage of gear wheel pumps, inasmuch as the particles entrained with the water wear or damage the bearings as well as the teeth of the pump, so that the pump is rendered inserviceable in a short time.

The main objects of the invention are to obviate this drawback and to provide a gear wheel pump for impurified water, being entirely safe in operation and the capacity of which remains unaltered even after the pump has been in operation for a very long time.

Further objects and advantages of the invention will be apparent from the following description considered in connection with the accompanying drawings which form a part of this specification, and of which:

Fig. 1 shows a section through a combined gear wheel pump for water and oil constructed in accordance with the invention;

Fig. 2 is an endwise view of the pump in a plane taken on line II—II in Fig. 1;

Fig. 3 is an endwise view of the pump in a plane taken on line III—III in Fig. 1.

In the embodiment as illustrated, the gear wheel pump is intended to be mounted in a motor frame 10, which is provided with an opening over which the pump housing 11 is placed. The pump housing may be connected with the frame 11 by means of bolts 12. The pump is formed with a pair of gear wheels 13 for the pumping of oil and with a pair of gear wheels 14 for the pumping of water. The oil circulates between the pump and the various lubricating and cooling places in the motor (not shown), and the water is taken in from the outside for direct or indirect cooling of the motor cylinders in a well known manner. A shaft 15 driven from the motor shaft is mounted in two bearings 16, 17. The one gear wheel 13 for the oil pump is arranged between the bearings 16 and 17. The one gear wheel 14 of the water pump is carried by an overhanging portion of the shaft 15 projecting outside the bearing 17. The two other gear wheels of the oil and water pumps are rigidly connected to a shaft 18, which is mounted on both sides of the gear wheel 13 of the oil pump in bearings 19, 20. The gear wheel of the water pump is in this case also arranged on the overhanging end portion of the shaft outside the bearing 20. The shaft 15 drives the shaft 18 over the gear wheels 13, while the

2

pair of gear wheels 14 has a clearance between the teeth. This clearance is of sufficient magnitude to prevent sand particles and the like entrained with the water from damaging the teeth.

The pair of gear wheels 13 are disposed in a compartment 22, and the pair of gear wheels 14 in a compartment 24. The compartment 22 is closed by means of a cover 25, and the compartment 24 by a cover 26, said covers being secured to the pump housing with the aid of bolts 27, if desired. Provided at the contact surfaces between the covers and the pump housing are soft packings 28. To ensure that the housing and the covers bear on the lateral surfaces of the respective gear wheels with the desired clearance, they are provided with shoulders 30 adapted to abut against each other when the bolts 27 are tightened up. The said clearances which are of material importance for the proper functioning of the gear wheel pumps, will thus be independent of the degree of compression of the packings 28 from case to case.

It is of material importance for the proper functioning of the pump that the water contained in the compartment 24 is prevented from entering the bearings 17, 20. Furthermore, leakage of oil from the oil pump into the water pump is not desirable. To this end, two packings 32 are arranged between the gear wheels 14 and the housing 11, as appears from Fig. 1. The hubs 33 of the gear wheels 14 are located for this purpose at the one (external) side of the toothed rims, so that the requisite space is obtained for the packings. The hubs 33 are connected without any play with the shafts 15, 18 with the aid of sleeves 34, the inner surfaces of which are conical, as are the end portions of the shafts, and which are retained by means of screws 35. Provided between the hubs 33 and shafts are carrier pins 36. The hubs are connected in a liquid-tight manner with the shafts, so that water cannot penetrate this way to the bearings 17, 20.

Each packing 32 may consist of a U-shaped ring 38 which is rigidly connected with the pump housing, and which may be pressed against the inside of the gear wheel 14 by means of a spiral spring 39. The packing rings 38 are placed in a manner such that the pressure of the respective media is added to the pressure of the spiral spring to bring about a suitable sealing pressure in the sliding surface between the rings and the gear wheels 14. Between the packings, there is a space 40 communicating with the atmosphere over passages 41. Water, which may thus penetrate from the gear wheel compartment 24 into the space 40, is led off through the said passages 41, and cannot reach the bearings 17, 20. If, on the other hand, oil would happen to seek its way out through the other packing 32, the oil will also be led off through the passages 41. The compart-

ments 22 and 24 are entirely separated from each other, as will be understood from the above.

The teeth of the pair of gear wheels 14 may be covered with a layer of rubber 44. If sand particles or the like would happen to be entrained with the water, these particles being of a greater diameter than the play between the teeth, said rubber layer will prevent damaging of the teeth. The rubber permits of being deformed without disadvantage while the sand grains are passing between the teeth. It will be found suitable to form the gear wheels of the water pump with angular teeth. In the embodiment shown, these gear wheels are of a greater width than the gear wheels 13 of the oil pump.

Otherwise, the pumps are constructed in a well known manner with inlets and outlets for the respective media. The water is taken in through a conduit 46 to the suction side 47 of the water pump. From the pressure side 48 of the pump, the water escapes through a passage 43a and a conduit 49 (Figs. 2 and 3) to the motor. The cover 26 is provided with a partition 51 between the suction and pressure sides of the water pump.

The oil is sucked in to the suction side 52 of the oil pump through a conduit 53, and escapes from the pressure side 54 thereof through a conduit 55. Otherwise, the pumps may be constructed in any known manner, and may be provided with passages, for example, beside the tooth engagement of the respective pairs of gear wheels, to lead off the liquid which is present between the teeth when the latter enter into engagement with one another. Such means are irrelevant to the invention, and for this reason they are not described in detail here.

The invention may be modified in many respects, without departing from the basic idea of the invention. Those parts of the pump which come into contact with the water, which may be salt water, are preferably made from non-corroding material, such as stainless steel.

What I claim is:

1. In a gear wheel pump for pumping liquid containing entrained solid particles, a housing having end walls and partition means for dividing the housing into two compartments, a pair of parallel shafts, bearing means for journalling said shafts in said partition and in one of said end walls, a pair of accurately meshing gears mounted on said shafts in the compartment between said partition means and said one of said end walls, a pair of toothed circular gears mounted on said shafts in the other compartment and in overhung relation with respect to the bearings in said partition means, the last-mentioned gears having sufficient play between them to accommodate the entrained solid particles, said other compartment being formed with inlet and outlet openings, and packing means between said partition means and said last-mentioned gears for preventing leakage of fluid between said other compartment and the bearing in said partition means.

2. In a gear wheel pump for pumping liquid containing entrained solid particles, a housing having end walls and a partition therebetween for dividing the housing into two compartments, a pair of bosses extending from said partition into one of said compartments, a pair of parallel shafts, bearing means in said bosses and in the end wall which bounds the other of said compartments for rotatably mounting said shafts,

each of said shafts having an over-hung end extending into said one compartment, a pair of accurately meshing gears mounted on said shafts in the other compartment, a pair of toothed circular hollow gears secured to the over-hung ends of said shafts in said one compartment and surrounding said bosses, the last-mentioned gears having sufficient play between them to accommodate the entrained solid particles, said other compartment being formed with inlet and outlet openings, said hollow gears being in fluid tight relation to the respective shafts, and packing means disposed between the interiors of said hollow gears and said bosses for preventing leakage between said one compartment and the bearing means in said bosses.

3. In a gear wheel pump for pumping liquid containing entrained solid particles, a housing having end walls and a partition therebetween for dividing the housing into two compartments, a pair of bosses extending from said partition into one of said compartments, a pair of parallel shafts, bearing means in said bosses and in the end wall which bounds the other of said compartments for rotatably mounting said shafts, each shaft having an over-hung end in said one compartment, a pair of accurately meshing gears mounted on said shafts in the other compartment, a pair of toothed circular hollow gears secured to the over-hung ends of said shafts in said one compartment and surrounding said bosses, the last-mentioned gears having sufficient play between them to accommodate the entrained solid particles, said other compartment being formed with inlet and outlet openings, said ends of the shafts being conical, conical sleeves disposed between said conical ends and the hubs of said hollow gears, bolts having threaded engagement with tapped holes in said conical ends for forcing said sleeves between the shafts and the hubs to effect a liquid-tight seal therebetween, and packing means disposed between the interiors of said hollow gears and said bosses for preventing leakage between said one compartment and the bearing means in said bosses.

4. In a gear wheel pump for pumping liquid containing entrained solid particles, a housing having end walls and a partition therebetween for dividing the housing into two compartments, a pair of bosses extending from said partition into one of said compartments, a pair of parallel shafts, bearing means in said bosses and in the end wall which bounds the other of said compartments for rotatably mounting said shafts, each shaft having an over-hung end in said one compartment, a pair of accurately meshing gears mounted on said shafts in the other compartment, a pair of toothed circular hollow gears secured to the over-hung ends of said shafts in said one compartment and surrounding said bosses, the last-mentioned gears having sufficient play between them to accommodate the entrained solid particles, said other compartment being formed with inlet and outlet openings, and a pair of axially spaced packing means between the interior of each of said hollow gears and the respective boss which the gear surrounds, and means forming a drainage passageway from the space between each pair of packing means.

AUGUST GUNNAR
FERDINAND WALLGREN.