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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Improvements relating to gerotor pumps.**

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Description

This invention relates to gerotor pumps comprising a male lobed rotor meshed internally of a female lobed annulus. The annulus has more lobes - usually one more than the rotor, and their axes are eccentric. On one side of a plane containing the axes, the chambers bounded by the respective lobes open to an inlet, and on the other side of that plane they open to an outlet. Relative rotation causes said chambers to process about the axes and so vary in size thus inducing flow into the chambers on the inlet side and expelling it out on the outlet side. Such pumps are herein called "of the kind referred to".

Drive may be imparted to the pump via the annulus as for example in DE-A-3504306 or via the rotor as for example in FR-A-2527683 which shows the rotor journalled on a stationary shaft (which in that specification is a tube forming part of the fluid flow path) and having projecting dogs which are engaged in a complementary bore of a drive gear which is also journalled on the shaft. The problem with this arrangement is that the pump requires a substantial axial length: firstly there is the unavoidable axial length of the gerotor set which is one of the parameters involved in pump output characteristic, then there is the axial length necessary for the mechanical coupling between the dogs and their complementary formation of the drive gear, and thirdly there is the length required for adequate journalling of the drive gear itself.

In many situations where these gerotor pumps are used, space is restricted: the object of the invention is to provide a rotor driven gerotor pump requiring less axial space.

According to the invention a pump comprising a male lobed rotor provided on a shaft, rotatable about the shaft axis and meshed with an internally lobed annulus itself rotatable in a pump body on a second and parallel axis, said annulus having more lobes than the rotor, and a gear for driving the rotor, said gear being mechanically coupled to the rotor and journalled on the said shaft, is characterised in that said mechanical coupling between the gear and rotor takes place within the axial dimension of the rotor.

The gear and rotor may be journalled on successive portions of the shaft with drive dogs on the parts engaged together within the axial confine of the rotor or the gear may have a hub portion journalled on the shaft and keyed or splined in the bore of the rotor which is thereby indirectly journalled on the shaft.

Various embodiments of the invention are more particularly described with reference to the accompanying drawings wherein:

Figure 1 is a sectional elevation of a first embodiment:

Figure 2 is a fragmentary end elevation of the same; and

Figure 3 is a view similar to Figure 1 showing a second embodiment.

Turning first to Figures 1 and 2, a pump body 10 is provided with one or more inlet passages 12 opening through the side wall (not shown) to the cavity housing the annulus 14 and rotor 16. The outlet passage opens from that cavity. It will be appreciated that both inlet and outlet may open generally radially or tangentially from the cavity or through one or other side wall, or a combination of these according to requirements.

Shaft 18 is fast in the body, for example being a press-fit. In Figure 1 it is bushed at 20-22 to journal the rotor 16 and the drive gear 24 respectively. A passage system 30-32 shown in dotted line communicates with port 34 to allow lubrication of the bushes.

The drive gear (or sprocket 24) is provided with axially extending dogs 28 (see Figure 2) which mesh with like dogs 26 in the rotor 16 so that the gear and rotor are directly dogged together for drive between them. Hence the gear drives the rotor which drives the annulus at a different speed for the usual gerotor pumping action.

Turning now to Figure 3, the arrangement is generally similar except that here the gear 24 has a hub portion 38 extending over the full axial dimension of the rotor 16, so that the rotor may be considered to be indirectly journalled on the shaft. The hub and rotor are keyed or splined together at 46 for direct drive between them.

Claims

1. A pump comprising a male lobed rotor (16) provided on a shaft (18), rotatable about the shaft axis and meshed with an internally lobed annulus (14) rotatable in a pump body (10) on a second and parallel axis, said annulus having more lobes than the rotor, and a gear (24) for driving the rotor, said gear being mechanically coupled to the rotor and journalled on the said shaft (18),
   characterised in that said mechanical coupling between the gear (24) and rotor (16) takes place within the axial dimension of the rotor.

2. A pump as claimed in Claim 1 wherein said gear (24) and rotor (16) are journalled directly on the shaft on successive axial portions of the same, and the gear has drive dogs (28) which extend axially into complementary formations in the rotor (16).

3. A pump as claimed in Claim 1 wherein said gear (24) has a hub portion (38) journalled on the shaft (18) and the exterior of the hub portion is keyed or splined to the interior of the rotor (16) to form the mechanical coupling therebetween, and said rotor is thereby indirectly journalled on said shaft.

Patentansprüche

1. Pumpe, enthaltend einen auf einer Welle (18) angeordneten, mit Außenzähnen versehenen Rotor (16), der drehbar um die Wellenachse gelagert ist und mit einem Ring (14) mit Innenlappen in Eingriff steht, der um eine zweite und parallele Achse drehbar in einem Pumpengehäuse (10) gelagert ist, wobei der Ring mehr Lappen als der Rotor aufweist, und ferner enthaltend ein Getriebe (24) zum Antrieb des Rotors, wobei das Getriebe mechanisch mit dem Rotor gekuppelt und auf der Welle (18) gelagert ist, dadurch gekennzeichnet, daß das Getriebe (24) und der Rotor (16) innerhalb der axialen Abmessung des Rotors mechanisch miteinander gekoppelt sind.

2. Pumpe nach Anspruch 1, wobei das Getriebe (24) und der Rotor (16) unmittelbar auf der Welle auf aufeinanderfolgenden axialen Bereichen dieser Welle gelagert sind, und wobei das Getriebe Mitnehmeransätze (28) aufweist, die in axialer Richtung in entsprechend gestaltete Ausnehmungen im Rotor (16) eingreifen.

3. Pumpe nach Anspruch 1, wobei das Getriebe (24) einen mittleren Bereich (38) aufweist, der auf der Welle (18) gelagert ist, und wobei das Äußere des mittleren Bereichs mit dem Inneren des Rotors (16) verkeilt oder festgesetzt ist, um eine mechanische Verbindung zwischen diesen Elementen zu bilden, und wobei der Rotor damit indirekt auf der Welle gelagert ist.

Revendications

1. Pompe comprenant un rotor mâle lobé (16) monté sur un arbre (18), pouvant tourner autour de l'axe de l'arbre et engrenant avec un anneau (14) lobé intérieurement qui peut tourner dans un corps de pompe (10) sur un second axe parallèle au premier, le dit anneau comportant plus de lobes que le rotor, et un pignon (24) d'entraînement du rotor, ledit pignon étant couplé mécaniquement au rotor et tourillonnant sur ledit arbre (18), caractérisé en ce que ledit couplage mécanique entre le pignon (24) et le rotor (16) se produit dans la dimension axiale du rotor.

2. Pompe selon la revendication 1, dans laquelle le pignon (24) et le rotor (16) tourillonnent directement sur l'arbre, sur des parties axiales successives de celui-ci, et le pignon présente des dents d'entraînement qui se prolongent axialement dans des formations complémentaires du rotor (16).

3. Pompe selon la revendication 1, dans laquelle le pignon (24) présente une partie de moyeu (38) qui tourillonne sur l'arbre (18), l'extérieur de la partie de moyeu étant calé ou claveté sur l'intérieur du rotor (16) pour réaliser leur couplage mécanique, ledit rotor tourillonnant ainsi indirectement sur ledit arbre.

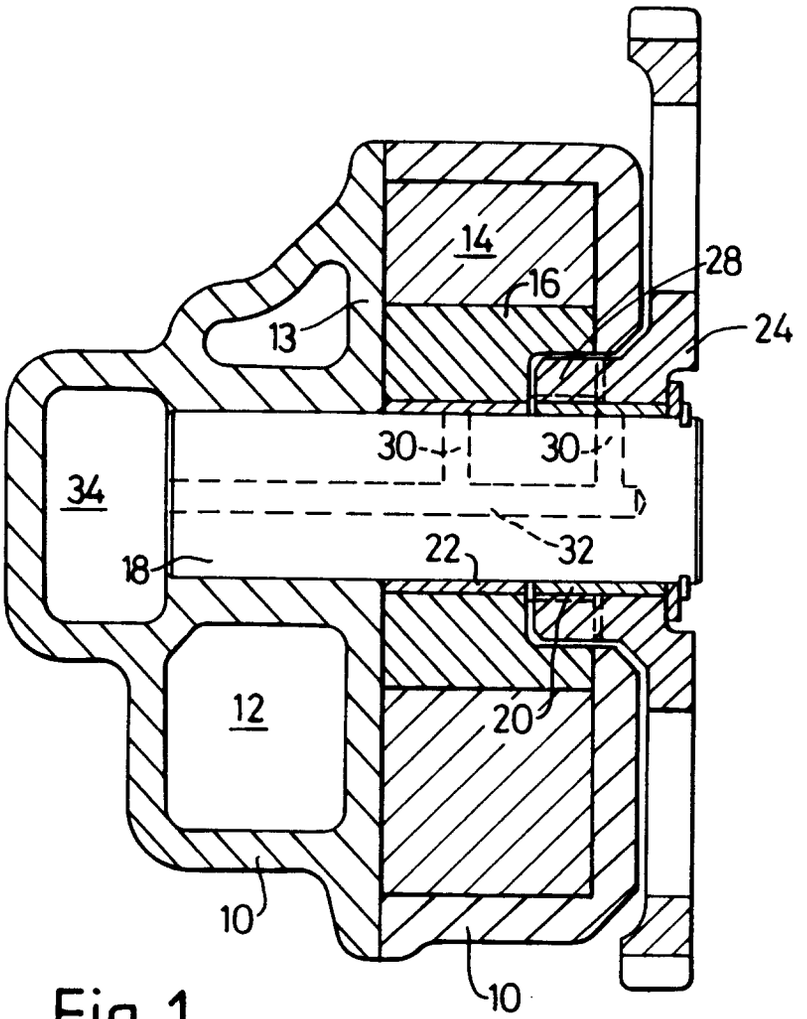

Fig. 1

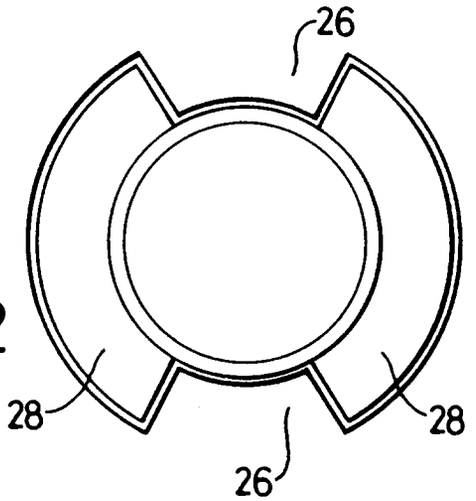

Fig. 2

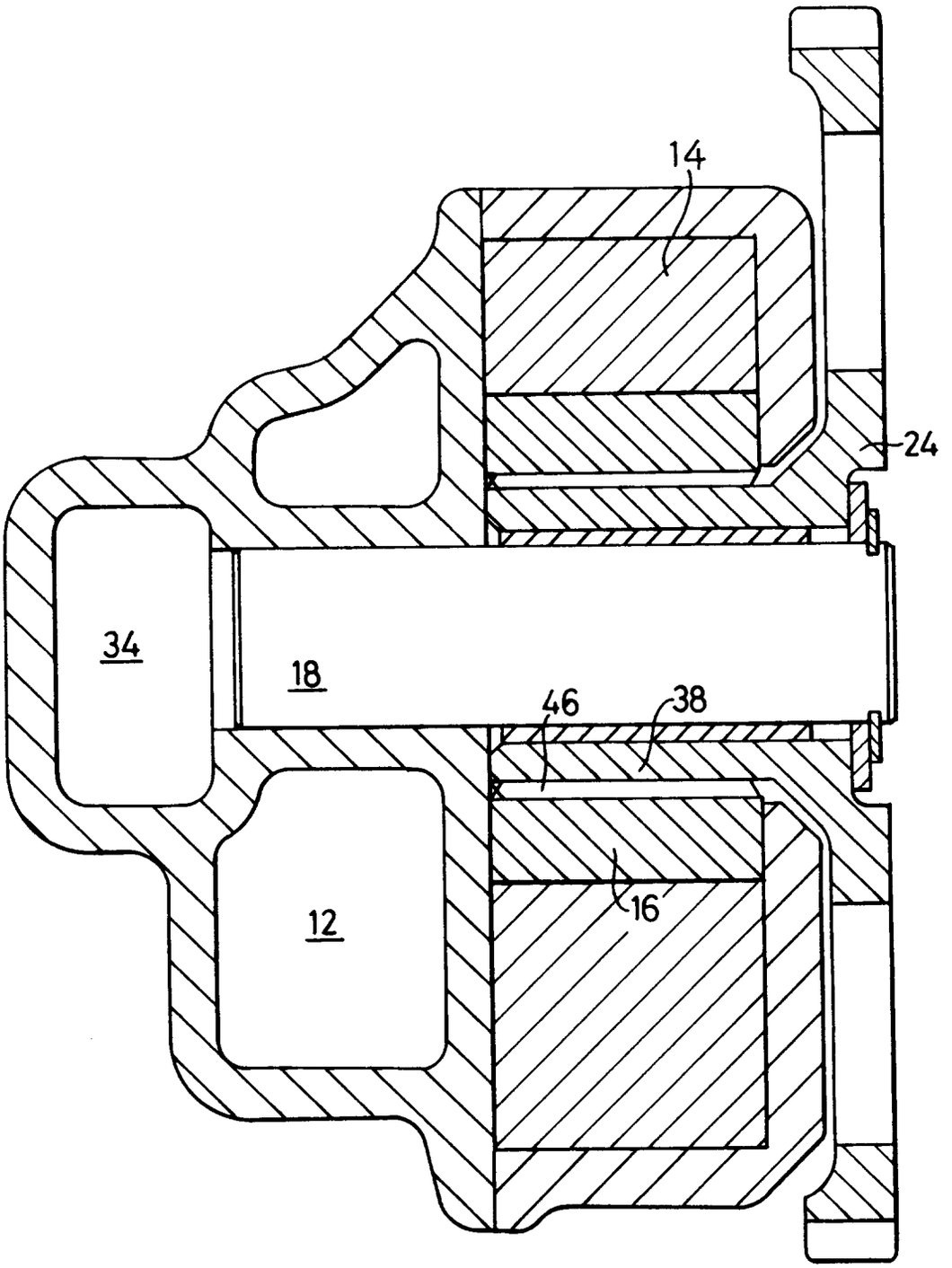

Fig. 3