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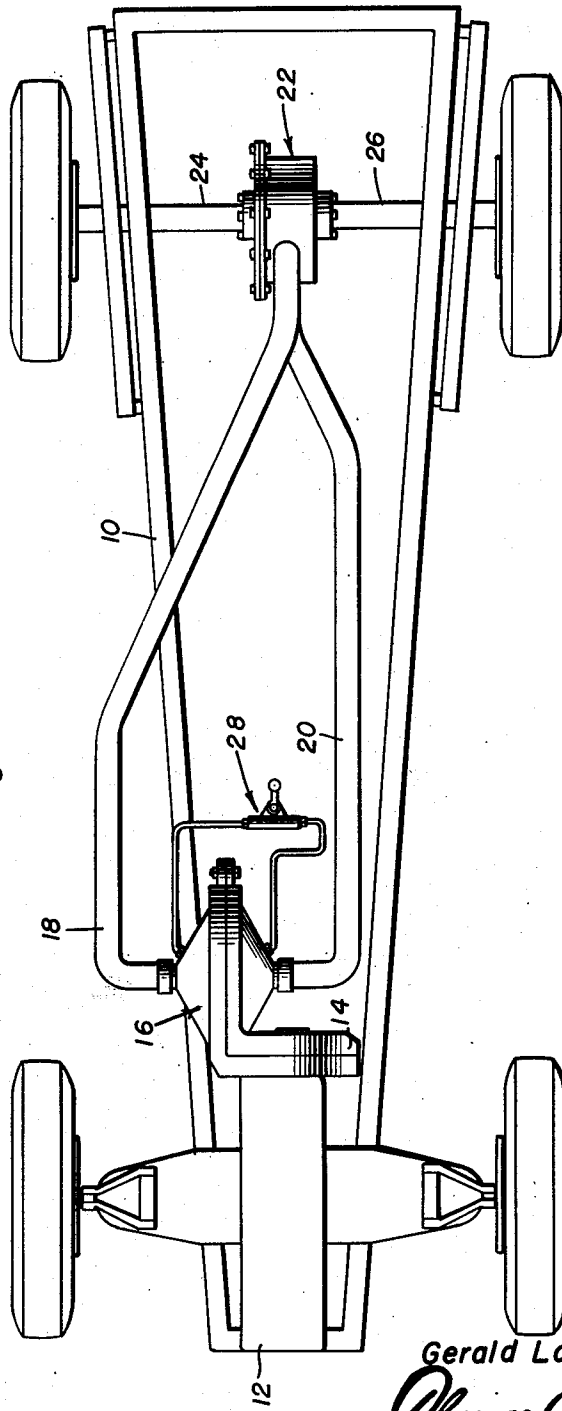
2,614,499

SCREW PUMP

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3 Sheets-Sheet 1

Fig. 1.



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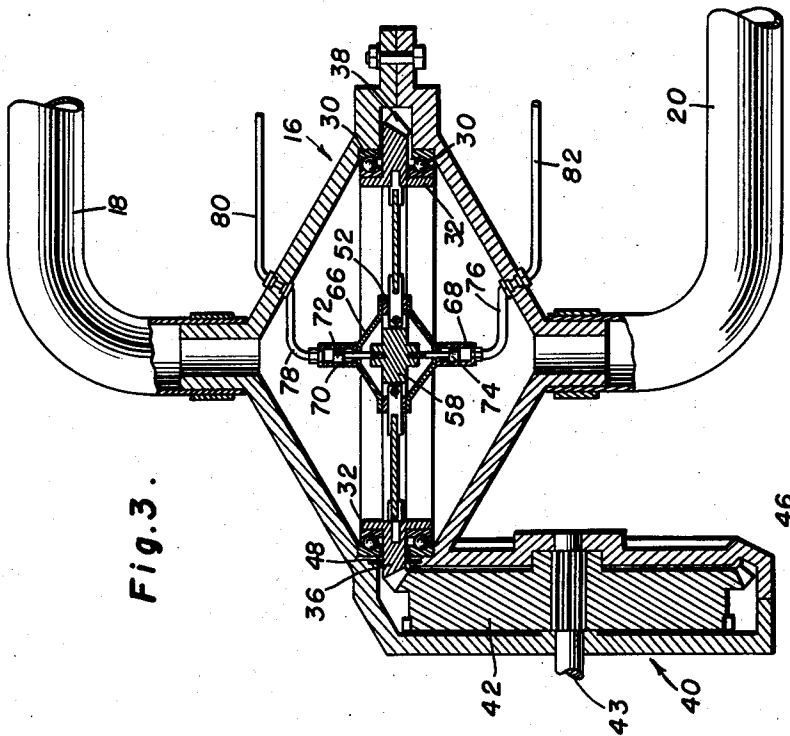


Fig. 3.

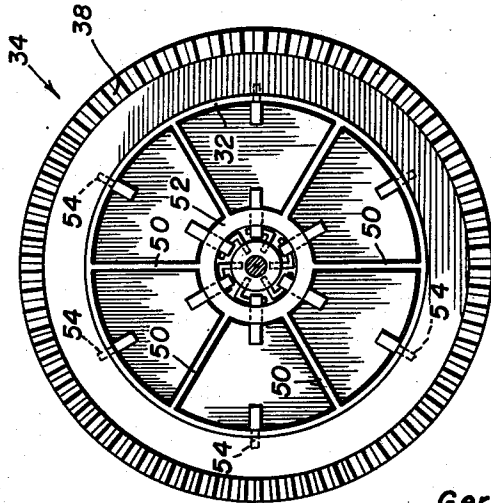


Fig. 2.

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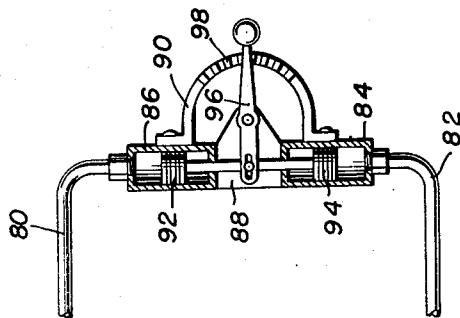
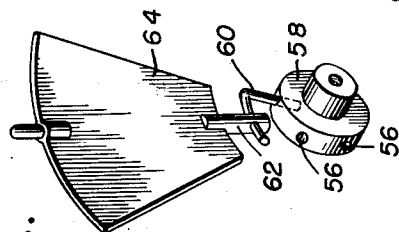
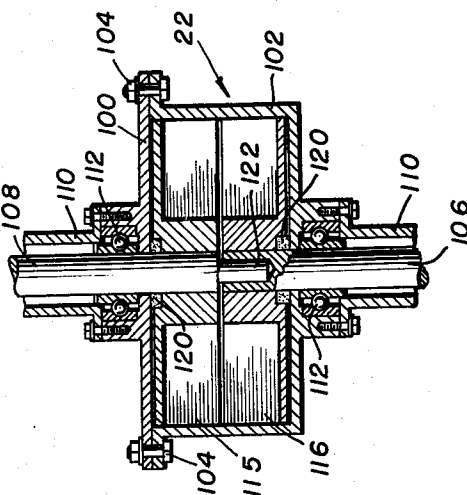
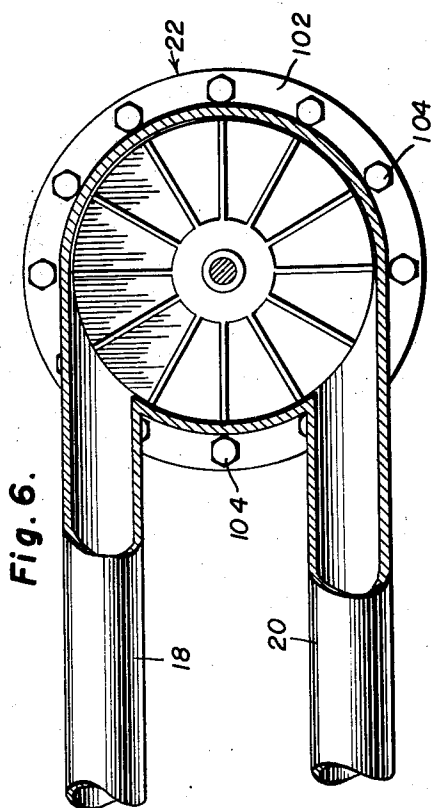
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UNITED STATES PATENT OFFICE

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SCREW PUMP

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9 Claims. (Cl. 103-37)

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This invention relates to novel and useful improvements in a hydraulic drive system particularly useful in motivating automotive vehicles.

An object of this invention is to provide improved pump means for directing fluid.

Another object of this invention is to provide a novel and improved means for driving the rotor of said pump means.

A further object of this invention is to provide controllable pitch veins or blades in said rotor and improved means for controlling the pitch of said blades.

Another object of this invention is to provide an improved differential means, associated with said pump means for compensating for the usual differential in speed of the rear wheels of a conventional vehicle.

Another object of this invention is to provide a simple hydraulic transmission utilizing but few moving parts and which is extremely efficient in operation as well as inexpensive to manufacture.

Ancillary objects and features of novelty shall become apparent to those skilled in the art, in following the description of the preferred embodiment of the present invention, illustrated in the accompanying drawings, wherein:

Figure 1 is a plan diagrammatic view of the preferred form of the present invention;

Figure 2 is a side view of the rotor used in conjunction with the pump means and forming part of the present invention;

Figure 3 is a sectional view of the flywheel and pump means forming part of the present invention;

Figure 4 is a perspective of the blade means used in the rotor of the pump means;

Figure 5 is a sectional view of the control means utilized in regulating the pitch of the blade;

Figure 6 is a sectional view of the differential used in the present invention; and,

Figure 7 is a transverse sectional view of the differential disclosed in Figure 6.

Referring now in detail to the illustrated preferred embodiment of the present invention, like reference characters are used throughout to indicate similar elements.

Viewing Figure 1, there is disclosed a conventional vehicular chassis 10 having an internal combustion engine 12 at one end thereof. A flywheel housing 14 is secured to the said engine 12 and a pump housing 16 is communicated with the said flywheel housing. Conduits 18 and 20 respectively lead from the said pump housing

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16 to a differential 22 which has axle housing members 24 and 26 respectively extending therefrom. From an inspection of this figure the general operation of the invention becomes apparent. Torque from the internal combustion engine 12 is transmitted to a flywheel within the housing 14, which in turn is transmitted to a pump rotor within the housing 16. There are controllable pitch blades within the said rotor to which end, the control means 28 has been provided therefor. Fluid in the system is then pumped through a selected conduit to the differential means 22 and then the fluid is returned back to the housing 16 after turning the rotating, independent differential members in the said differential housing or case 22.

The specific construction of the pump means is disclosed in Figure 3 wherein a ball bearing race 30 extends around the periphery of the said housing 16. One ring of the said race 30 engages the housing while the other ring engages a suitable flange 32 which is positioned on the rotor member 34. Of course, a pair of ball bearing races may be provided on alternate faces of the said rotor 34 and the associated flange 32 may also be duplicated as seen in Figure 3. A peripheral extension 36 is provided about the said rotor 34 and bevel gears 38 form the terminal portion thereof.

It will be noted that the said housing 16 has an extension 40 thereon which forms a housing for a flywheel member 42. This flywheel is driven by the engine crank shaft 43 which is also journaled in the housing extension 40. Gear teeth 46 of the bevel type are formed integral with the flywheel 42 and are complementary to the said gear teeth 38. The said teeth 38 and 46 are in operative engagement for the purpose of transmitting torque from the engine 12 through the flywheel 42, thence to the rotor 34. Oil seal means 48 may be provided at the junction between the housing 16 and the extension 40.

The interior structure of the said rotor 34 forms an important part of the present invention and will be described at this time. A plurality of radially extending legs 50 connect the outer periphery of the said rotor 34 with an outer hub 52, which is positioned adjacent the center of the said rotor. Apertures 54 are provided in the outer surface or periphery of the said rotor 34 and each of said apertures are provided substantially midway of the pair of radially extending arms 50. Complementary apertures 56 are provided in a slide member or inner hub 58.

which is positioned within the hub 52. Bell crank members 60 are received in each of the said apertures 58 at one end thereof while the other end extends through the lower portion of a shaft 62. Now, this shaft 62 is rigidly secured to a blade 64. The said blade 64 is obviously positioned between a pair of radially extending arms 50 and the other end of the said shaft 62 is received in a selected one of the aforementioned apertures 54.

There is a small cage 66 about the said hub 52 and diametric cylinders 68 and 70 respectively extend from the said small cage 66. Pistons 72 and 74 respectively are reciprocatedly received in the said diametrically opposite cylinders 68 and 70 respectively and the piston rods are rigidly, but detachably, secured to the said slide member 58. Any type of securing means may be utilized for this purpose, however, the screw-threaded arrangement shown in Figure 3 is deemed adequate and even desirable.

Conduits 76 and 78 respectively extend from the said small, diametric cylinders and terminate at selected walls of the housing 16. Then, new conduits 80 and 82 respectively extend from the housing 16 after forming a junction with the above mentioned conduits 76 and 78. Reference is now made to Figure 5 wherein a second pair of cylinders 84 and 86 respectively are provided. The said conduits 80 and 82 terminate in respective cylinders and any suitable connecting means may be utilized for retaining these conduits in a fixed, detachable relation with the said cylinders 84 and 86. As is disclosed the usual thread and nut construction is preferable. A plate 88 is utilized for the purpose of retaining the said cylinders 84 and 86 in a selected position and a ring or annulus 90 extends from one of said cylinders to the other. A pair of opposed pistons 92 and 94 respectively are received in the said cylinders 86 and 84 and the associated piston rods extend to a common junction point. A lever 96 is pivoted to the said plate 88 and a lost motion connection is utilized for retaining the said junction of the piston rods and the lever 96 in an operative adjustable position. Friction means 98 may be supplied on the said annulus 90 for retaining the lever 96 in a selected position. Fluid is introduced to said last mentioned piston cylinder arrangement for the purpose of sliding the slide member 58 which in turn obviously changes the pitch of the blade 64. The flow of fluid in the said housing 16 may be regulated as to speed and direction by this means.

The said conduits 18 and 20 extend rearwardly to the differential case 22. Referring now to Figures 6 and 7 primarily there is disclosed this case 22 which is composed primarily of a back plate 100 and a recess member 102 rigidly secured thereto by means of bolts 104 or the like. Axles 106 and 108 respectively extend interior of said housing 22 and are received within suitable axle housings 110 as is well known in the art. The axles 106 and 108 may be journaled in suitable, conventional bearings 112 which are in themselves friction reducing members.

A pair of independent impellers 115 and 116 are received in said case 22. One of the said impellers 115 is journaled on a first shaft 108 while the other impeller 116 is journaled on the other shaft or axle 106. It is seen that by this construction the said impellers 115 and 116 are independent of each other as to rate of speed. Since the conduits 18 and 20 extend into operative communication with the said case 22, it is

quite apparent that the fluid pumped from the housing 16 enters the said case 22, drives the impellers which in turn motivates the axles 106 and 108 for the purpose of driving a vehicle. Of course, sealing means 120 may be utilized in the system wherever deemed necessary, as is disclosed in Figure 7 wherein the oil seals 120 are provided adjacent the axles, at the point wherein they enter the case 22. It is also apparent that if desired, a reduced shank 122 may extend from a selected axle 108 and enter the opposite axle 106 through the medium of a suitable bore provided therein. This is merely for the purpose of giving or lending support to the impeller system within the case 22. If so desired, anti-friction bearings may be supplied within this bore and reduced shank construction.

While there has been described and illustrated but a single preferred embodiment of the present invention, it is apparent to those skilled in the art, that various changes including omissions, and additions may be made herein without departing from the spirit of the invention. Accordingly, limitation is sought only in accordance with the scope of the following claims.

Having described the invention, what is claimed as new is:

1. A flywheel actuated pump for use in a vehicle having a flywheel in a casing as a component of a fluid actuation unit comprising a housing communicating with said casing and having a fluid inlet and a fluid outlet, a rotor disposed in said housing including a hub and an outer member engaging the flywheel and peripherally supported in said housing, a plurality of blades, each of said blades having a pivot pin at the tip thereof disposed in said outer member and a crank attached at the root thereof mounted for pivotal movement in said hub, and means for moving said hub with respect to said outer member thereby rotating said blades about said cranks and said pivot pins as an axis to change the pitch thereof.

2. A pump for use in a vehicle as a component of a fluid actuation unit comprising a housing having a fluid inlet and a fluid outlet, a rotor disposed in said housing including a hub and an outer member having peripheral driven means thereon, a plurality of blades, each of said blades having a pivot pin at the tip thereof disposed in said outer member and a crank attached at the root thereof mounted for pivotal movement in said hub, and means for moving said hub with respect to said outer member thereby rotating said blades about said cranks and said pivot pins as an axis to change the pitch thereof, said hub moving means comprising opposed cylinders disposed in said housing and mounted on said hub, pistons disposed in said cylinders, and means for conducting fluid to each of said cylinders.

3. A pump for use in a vehicle as a component of a fluid actuation unit comprising a housing having a fluid inlet and a fluid outlet, a rotor disposed in said housing including a hub and an outer member having peripheral driven means thereon, a plurality of blades, each of said blades having a pivot pin at the tip thereof disposed in said outer member and a crank attached at the root thereof mounted for pivotal movement in said hub, and means for moving said hub with respect to said outer member thereby rotating said blades about said cranks and said pivot pins as an axis to change the pitch thereof, said hub moving means comprising opposed cylinders disposed in said housing and mounted on said hub,

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pistons disposed in said cylinders, and means for conducting fluid to each of said cylinders including a manually operable fluid pump communicated with said fluid conducting means.

4. A pump comprising a casing having a fluid inlet and a fluid outlet, a rotor disposed in said casing which includes an outer member having peripheral driven means thereon, bearings interposed between said outer member and said casing peripherally supporting said rotor, a hub, a plurality of blades pivoted at their tips to said outer member, means pivotally attaching said blades at their roots to said hub, and means disposed in said casing for displacing said hub with respect to said outer member to change the effective pitch of said blades.

5. A pump comprising a casing having a fluid inlet and a fluid outlet, a rotor disposed in said casing which includes an outer member having peripheral driven means thereon, bearings interposed between said outer member and said casing peripherally supporting said rotor, a plurality of blades having tips and root ends, means pivoting said tips to said outer member, a hub, a cage disposed in said casing, means supporting the cage and mounting the root ends of said blades in said hub for pivotal movement, said hub being disposed in said cage, and means reacting on said hub for laterally displacing said hub with respect to said outer member to change the pitch of said blades.

6. A pump comprising a casing having a fluid inlet and a fluid outlet, a rotor disposed in said casing which includes an outer member having peripheral driven means thereon, bearings interposed between said outer member and said casing peripherally supporting said rotor, a plurality of blades having tips and root ends, means pivoting said tips to said outer member, a hub, a cage disposed in said casing, means supporting the cage and mounting the root ends of said blades in said hub for pivotal movement, said hub being disposed in said cage, and means reacting on said hub for laterally displacing said hub with respect to said outer member to change the pitch of said blades, said mounted and supporting means comprising a plurality of cranks secured to said hub and said blades.

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7. A pump comprising a housing having an inlet and an outlet, a peripherally supported rotor member mounted in said housing and having peripheral driven means thereon, a plurality of blades pivoted to said rotor member and having pivot pins extending toward a common center, a cage mounted on said pins, a hub disposed in said cage, means associated with said hub and said pins for imparting rotative movement to said blades upon linear movement of said hub including a plurality of cranks, and fluid actuated means associated with said cage for imparting linear movement to said hub including pistons fixed to said hub, cylinders in said cage with said pistons disposed therein and means for introducing fluid to said cylinders.

8. The combination of claim 7 and said cylinders being disposed on opposite sides of said hub, said last mentioned means including a manually operative fluid pump remote from said cylinders and pistons, and conduits intercommunicating said cylinders and said fluid pump.

9. The combination of claim 8 and means fixed to said rotor member for actuating said rotor member.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,233,610	Schleicher	July 17, 1917
1,304,566	Hornbrook	May 27, 1919
1,436,661	Laswell	Nov. 28, 1922
1,711,254	Spren	Apr. 30, 1929
1,803,858	MacClatchie	May 5, 1931
1,870,928	Smith	Aug. 9, 1932
1,998,152	Zipay	Apr. 16, 1935
2,010,555	Moody	Aug. 6, 1935
2,407,630	Dewan	Sept. 17, 1946
2,417,224	Weatherhead	Mar. 11, 1947

FOREIGN PATENTS

Number	Country	Date
8,975	Great Britain	Apr. 16, 1913