Jan. 23, 1940. J. DAUSTER 2,188,035

HYDRAULIC PUMP

Filed Dec. 11, 1937 2 Sheets-Sheet 1

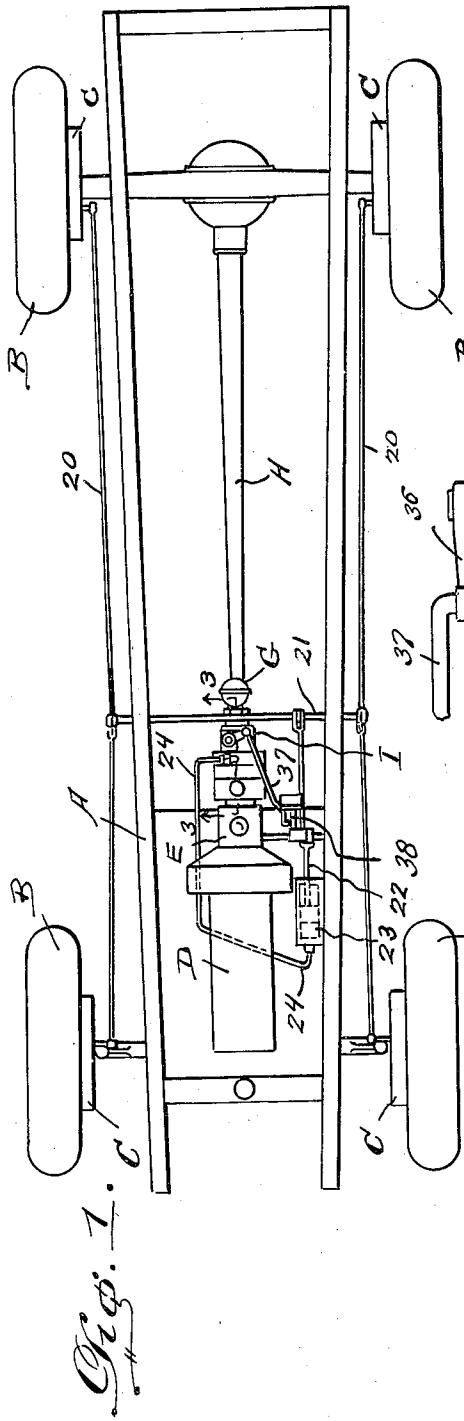


Fig. 1.

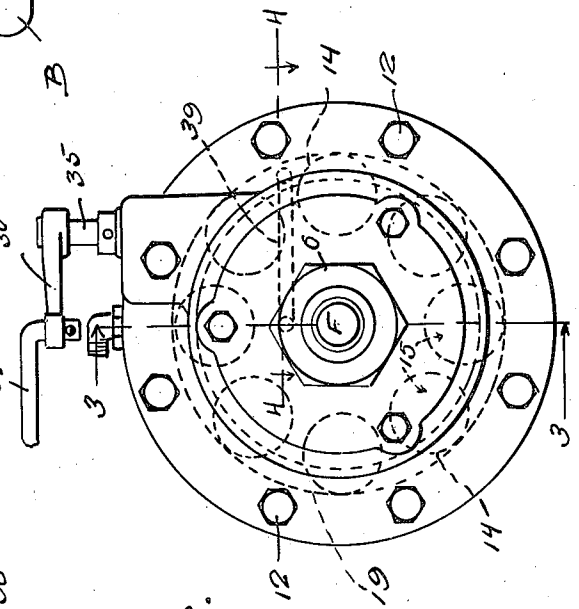


Fig. 2.

Inventor
John Dauster,

By J. Stanley Burch
Attorney

Jan. 23, 1940. J. DAUSTER 2,188,035

HYDRAULIC PUMP

Filed Dec. 11, 1937 2 Sheets-Sheet 2

Fig. 4.

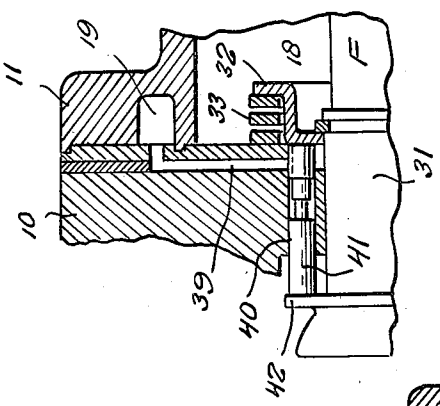


Fig. 3.

Inventor

John Dauster,

By J. Stanley Burch

Attorney

Patented Jan. 23, 1940

2,188,035

UNITED STATES PATENT OFFICE

2,188,035

HYDRAULIC PUMP

John Dauster, Wilkinsburg, Pa.

Application December 11, 1937, Serial No. 179,358

2 Claims. (Cl. 103—173)

This invention relates to hydraulic pumps suitable for use in hydraulic brake applying apparatus, and for other purposes, the pump receiving its power from a driven shaft and controlled by a manually operable lever or equivalent element within reach of the operator.

The primary object of the present invention is to provide an improved pump of the type including cylinders and pistons grouped about and parallel with the driven shaft, the pistons being operated by means including a cam disc keyed to the driven shaft.

A more specific object of the present invention is to provide a pump of the above kind wherein means is provided for normally maintaining the pump pistons projected and inoperative and for simultaneously releasing pressure from the discharge line of the pump, and manually operable means for rendering the pump pistons operative and controlling the degree of pressure developed in the discharge line of the pump, at will.

A still further object of the present invention is to provide a pump, characterized as described above, embodying a novel and compact combination, form and arrangement of parts which provides for durability of construction and efficiency in operation.

Further objects will become apparent as the nature of the invention is better understood, and said invention consists in the features and construction hereinafter more fully described, shown in the accompanying drawings and claimed.

In the drawings:

Figure 1 is a diagrammatic plan view of a motor vehicle chassis equipped with a brake applying apparatus embodying the present invention.

Figure 2 is an end elevational view of the construction shown in Figure 3, looking toward the left of the latter figure and drawn on a smaller scale.

Figure 3 is a vertical longitudinal section taken substantially on the plane of line 3—3 indicated both in Figures 1 and 2, and

Figure 4 is a fragmentary horizontal section taken substantially on the plane of line 4—4 of Figure 2.

Referring in detail to the drawings, A indicates generally a motor vehicle frame, B denotes the vehicle wheels on which the frame A is carried in the usual manner, C designates the vehicle brake housings associated with the wheels, D denotes the vehicle engine, E the transmission housing, F an engine driven shaft leading from the housing E, and G a universal joint housing interposed between the shaft F and a housing H containing the vehicle propeller or drive shaft.

In the illustrated use of the present invention, a housing I is disposed rearwardly of transmission housing E and has the shaft F extended therethrough. The housing I is secured against the rear end of transmission housing E and is provided at its rear end with a bearing 5 for shaft F, as well as a stuffing box 6 rearwardly or outwardly of bearing 5 to prevent leakage of oil or like hydraulic transmission fluid from housing I between the latter and shaft F. Housing I thus forms a reservoir adapted to be filled with the oil or hydraulic transmission fluid, a suitable filling opening 7 having a covered reservoir 8 associated therewith, being provided in the top of housing I, preferably near the forward end of the latter.

Housing I is preferably formed of three transverse sections 9, 10 and 11, bolted together as at 12 and preferably interfitted as at 13 to provide fluid-tight joints and facilitate assembly and maintenance of the sections in proper registration or axial alinement.

Formed in the intermediate section 10 in concentric surrounding relation to shaft F is a circular series of bores providing cylinders 14 parallel with shaft F and in which are arranged reciprocating pistons 15. Each cylinder 11 has an intake port controlled by a check valve 16 and discharge port controlled by a check valve 17 and these check valves are of well known form of construction to permit the hydraulic transmission fluid to be drawn into the cylinders 11 upon the retraction or suction strokes of pistons 15 and to permit discharge of the hydraulic transmission fluid from the cylinders under pressure upon projection or pressure strokes of said pistons. The housing I provides a chamber 18 forming a low-pressure reservoir for the hydraulic transmission fluid and from which reservoir such fluid is drawn into the cylinders past the intake valves 16 upon the suction strokes of said pistons 15.

Also, the section 11 has an annular chamber 19 in surrounding relation to the reservoir 18 and into which the transmission fluid is forced under pressure past the outlet valves 17 upon the projection or pressure strokes of pistons 15.

The brakes are provided with conventional operating rods 20 connected with a main operating shaft 21, which is in turn operatively connected with the piston rod 22 of a booster cylinder 23, and pressure is supplied to booster cylinder 23 through a pipe 24 connecting said boost-

er cylinder with the outlet port 25 leading from pressure chamber 19. Thus, when pistons 15 are operated to force the transmission fluid under pressure into chamber 19 and line 24, the brakes will be actuated so as to be applied in a generally well known manner.

Arranged in the cylinders 14 are helical compression springs 26 which act to normally retract the pistons 15 to the limit of their suction strokes. In order to project the pistons 15 in opposite to springs 26, a cam disc 27 is keyed on shaft F forwardly of pistons 15, and is arranged to successively actuate the pistons 15 to project the latter as shaft F is rotated, through the medium of a movable race ring 28 arranged in housing I between the marginal cam portion of cam disc 27 and the forward ends of pistons 15. A suitable thrust bearing generally indicated at 29 is interposed between the cam disc 27 and the forward end of housing I, while a similar bearing 30 is provided between the cam disc 27 and the movable race ring 28. These thrust bearings, beside taking up end thrust, provide for minimizing friction between the members 27 and 28 and between the member 27 and the forward end wall of housing I.

Slidably fitted in an axial bore of the housing section 10 is a sleeve 31, connected at its forward end with the movable race ring 28 by a loose ball and socket joint indicated generally at 32, the looseness of the universal joint permitting limited longitudinal movement of sleeve 31 without causing similar movement of race ring 28. A collar 32 is operatively connected to the rear end of sleeve 31 so as to operate to shift sleeve 31 rearwardly when actuated by a relatively strong helical compression spring 33 interposed between collar 32 and the housing section 10. It is here noted that the spring 33 is of a strength sufficient to overcome the springs 26 and maintain the pistons 15 projected, as and for a purpose which will presently be described. A fork or yoke 34 engages collar 32 and is operable for shifting said collar 32 forwardly against the action of spring 33, said fork or yoke being carried by the lower end of a vertical rock shaft 35 journaled in and projecting through the top of housing section 11 and provided on its upper end with an operating arm 36 connected by link or operating rod 37 with the brake lever 38 of the motor vehicle. The intermediate housing section 10 is provided with a tangential port 39 which communicates at its outer end with the pressure chamber 19 as shown more clearly in Figure 4, and which extends inwardly to a point adjacent sleeve 31 where the housing section 10 has an axial passage 40 in which is arranged a sliding piston valve 41. The sleeve 31 is provided near its forward end with an outwardly projecting flange 42 which engages the forward end of piston valve 41, and when sleeve 31 is moved rearwardly to its normal position by spring 33, piston valve 41 is arranged to uncover port 39 so as to permit passage of transmission fluid from pressure chamber 19 and pipe 24 into low-pressure reservoir 18, thus relieving the booster cylinder 23 of pressure and allowing the brakes of the vehicle to return to their normal released position. At this time, the sleeve 31 moves a slight distance to partially open piston valve 41 and relieve the pressure, after which cam 27 successively projects the pistons 15 and permits further rearward movement of sleeve 31 under the influence of spring 33 until the latter shifts the race ring 28 forwardly and maintains the pistons 15 all in projected or rearward position. At this time, race ring 28 is shifted rearwardly out of operating relation to cam disc 27, and the race ring 28 and pistons 15 remain idle as long as the brakes are released. Obviously, this is important in view of the fact that the pistons 15 are only operated when required for placing the transmission fluid under pressure and applying the brakes, thereby minimizing wear of the parts which are thus allowed to remain idle.

It will be seen that the collar 32 also abuts piston valve 41 at the rear end of the latter so that when shaft 35 is actuated to shift collar 32 forwardly against the action of spring 33, piston valve 41 will be shifted forwardly so as to close port 39 and permit springs 26 to retract pistons 15 and shift race ring 28 rearwardly into operative relation with cam disc 27. With shaft F rotating the pistons 15 will then be successively projected for drawing the transmission fluid from reservoir 18 and then forcing it into high-pressure chamber 19 and pipe 24, thereby actuating the piston of booster cylinder 23 and causing application of the brakes. The degree of application will of course depend upon the amount of movement imparted to brake lever 38 and the consequent degree of closing of port 39 effected by piston valve 41. In other words, piston valve 41 may be partially shifted forwardly to partially close port 39 for effecting a slow and light application of the brakes, or piston valve 41 may be shifted further forwardly so as to completely close port 39 and cause a quick and powerful application of the brakes. When piston valve 41 is partially closed it will be seen that part of the pressure fluid will be relieved from pressure chamber 19 and pipe 24 back to reservoir 18 by way of port 39. It might also be pointed out that the sleeve 31 is sufficiently loose on shaft F to permit passage of oil or pressure fluid to both ends of the housing I, and the reservoir 8 will hold a reserve supply of fluid and allow for expansion of the latter when heated, the oil in housing I keeping the moving parts in the housing I effectively lubricated. Additional pins, which have no valve action, may be arranged in passages at other points about sleeve 31 between flange 42 and collar 32, one of which pins is indicated at 43, and these will minimize canting and binding of sleeve 31 when the latter is shifted longitudinally of shaft F.

From the foregoing description, it will be seen that I have provided a very simple, compact and efficient hydraulic pump receiving its power from a rotating driven shaft. Hydraulic power is available whenever the driven shaft is rotated, and when the invention is applied to a motor vehicle, even when the vehicle is traveling with the engine out of operation. The pump is conveniently and easily controlled by the expenditure of little manual power through the operation of the control lever, and there is no need for normally by-passing the fluid from the pressure chamber back to the lower pressure reservoir because the pistons are normally maintained idle in projected position.

It will be noted that the hydraulic pressure is generated by the energy to be dissipated, the device absorbing such energy partially or totally, depending upon the size of the booster cylinder.

It is believed, in view of the foregoing description, that the construction and operation, as well as the advantages of the present invention, will be readily understood and appreciated by those skilled in the art. While I have illustrated and described herein a specific form or embodiment

of the present invention, it will of course be understood that the invention is susceptible of modifications and such changes in details of construction as fairly fall within the spirit and scope of the invention as claimed.

What I claim as new is:

1. In a hydraulic pump, a driven shaft, a liquid containing housing having a portion forming a low pressure liquid reservoir and provided with an annular high pressure liquid chamber, pistons reciprocable parallel with said shaft for drawing liquid from said reservoir and forcing the same under pressure into said high pressure chamber, means for driving said pistons from said shaft, spring-operated means including a valve and operating members movable parallel with said shaft for relieving the liquid under pressure from the high pressure chamber into said reservoir and simultaneously disconnecting said driving means for rendering said pistons inoperative, manually operable means for simultaneously rendering said driving means operative and cutting off the flow of liquid under pressure from said high pressure chamber into said reservoir, and means to conduct the liquid under pressure from said high pressure chamber to an extraneous fluid-pressure operated device.

2. In a hydraulic pump, a driven shaft, a liquid containing housing having a low pressure liquid reservoir and a high pressure liquid chamber, pistons for drawing liquid from said reservoir and forcing the same under pressure into said high pressure chamber, means for driving said pistons from said shaft, spring-operated means for relieving the liquid under pressure from the high pressure chamber into said reservoir and simultaneously disconnecting said driving means for rendering said pistons inoperative, manually operable means for simultaneously rendering said driving means operative and cutting off the flow of liquid under pressure from said high pressure chamber into said reservoir, means to conduct the liquid under pressure from said high pressure chamber to an extraneous fluid-pressure operated device, said pistons being reciprocable parallel with said driven shaft, said driving means including a cam disk keyed to said driven shaft, a movable race ring interposed between said cam disk and the pistons, anti-friction bearings between said cam disk and said race ring, said pressure relieving means including a port providing communication between the reservoir and said high pressure chamber and a control valve for said port movable parallel with said driven shaft, said race ring being movable out of operative relation with said cam disk to effect said disconnection of the driving means.

JOHN DAUSTER.