

Feb. 13, 1951

H. B. BREEDLOVE

2,541,197

ROTARY PUMP AND MOTOR HYDRAULIC TRANSMISSION

Filed Sept. 3, 1943

4 Sheets-Sheet 2

FIG. 5.

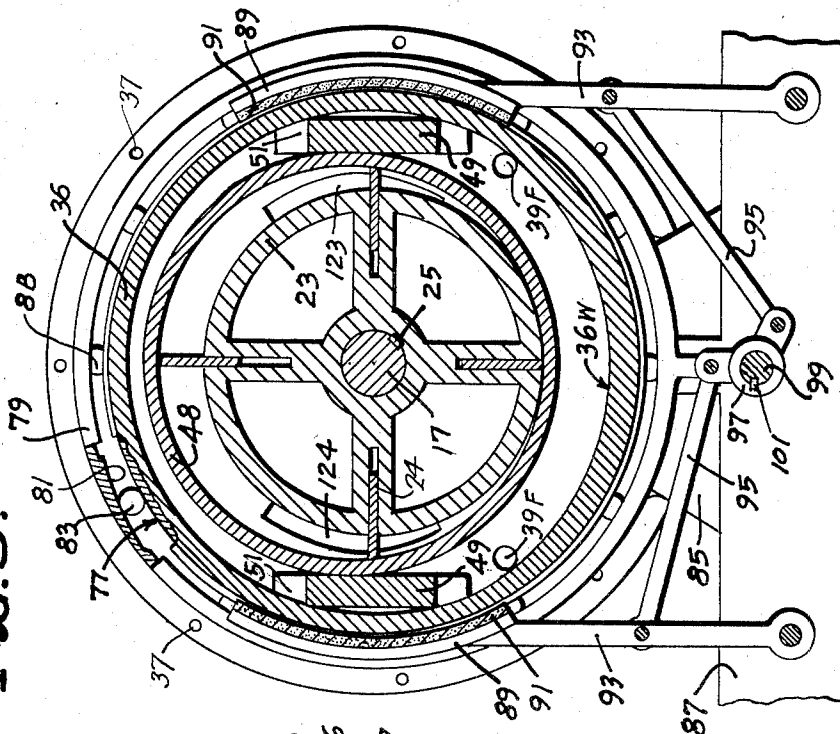


FIG. 4.

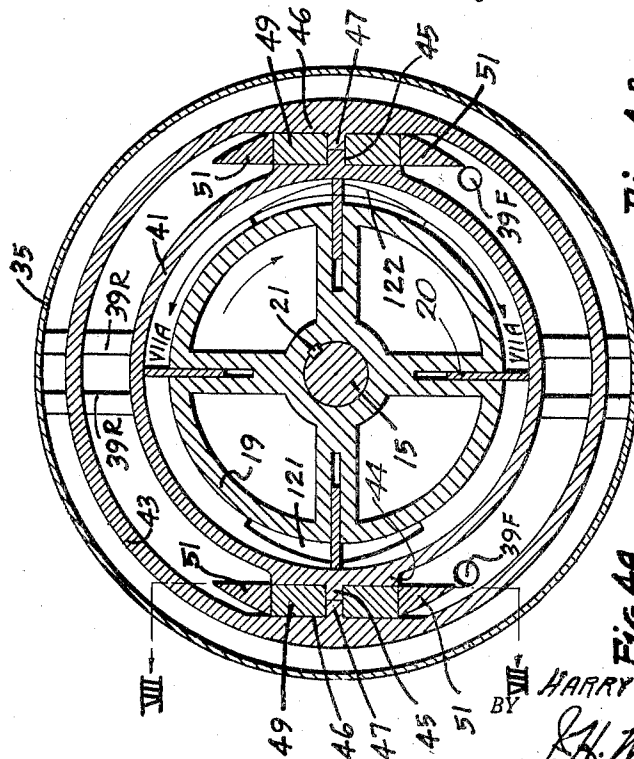


FIG. 4B.

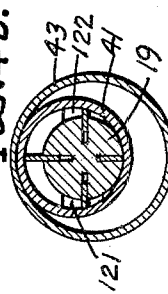


FIG. 4A.



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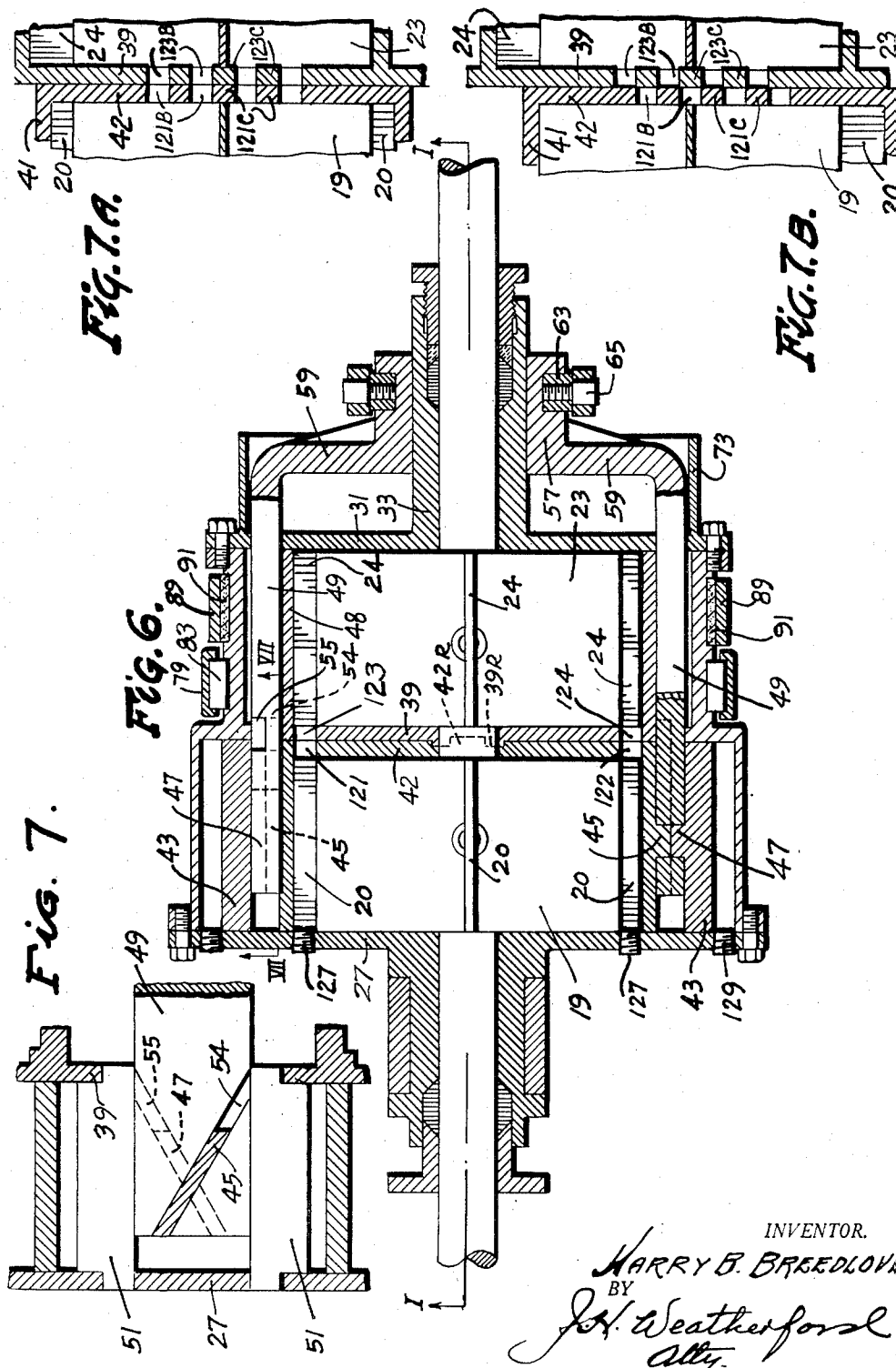
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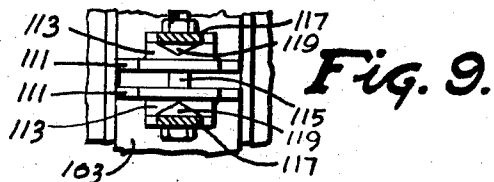


Fig. 9.

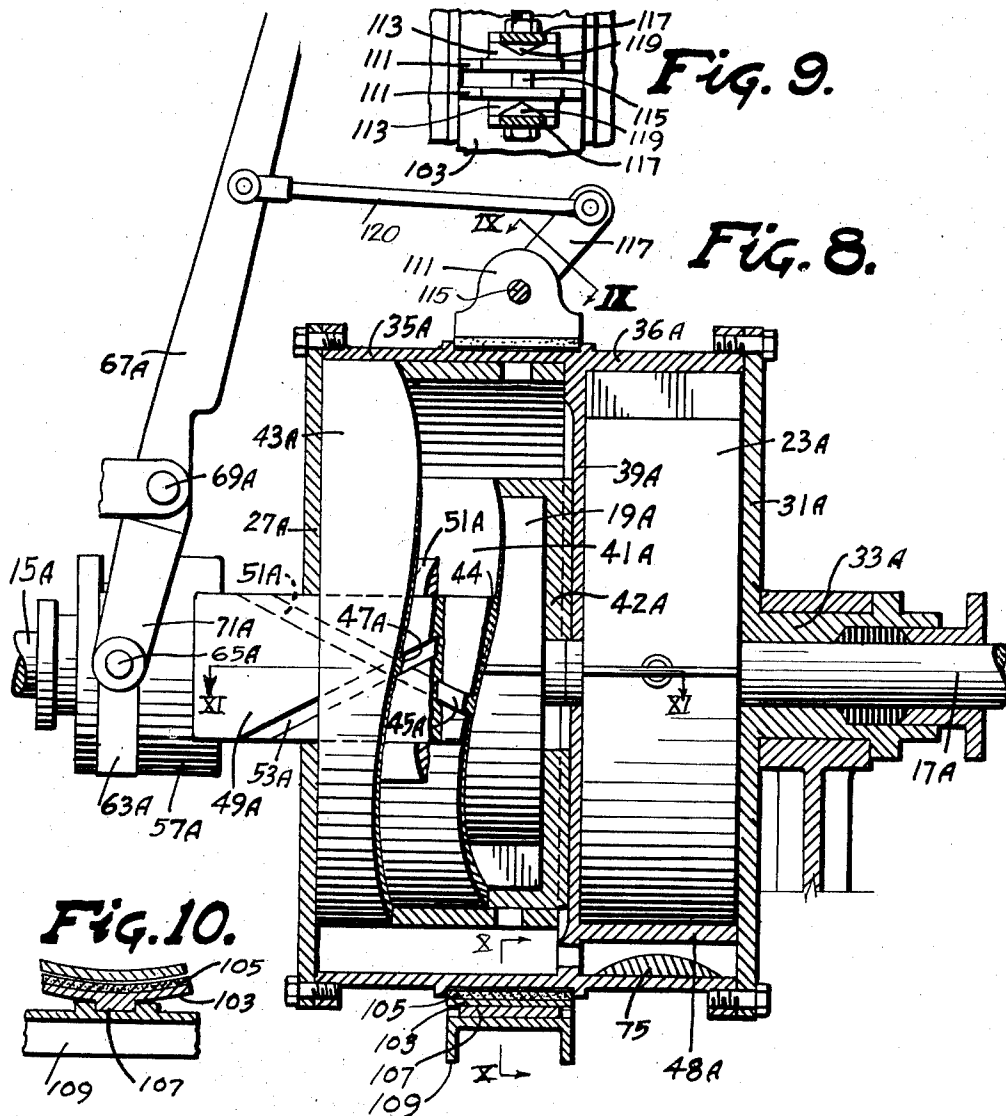


Fig. 8.

Fig. 10.

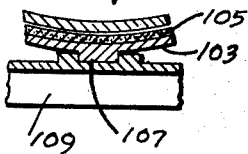
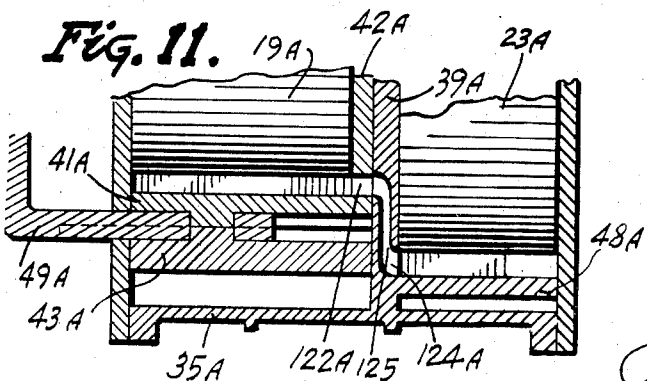


Fig. 11.



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ROTARY PUMP AND MOTOR HYDRAULIC TRANSMISSION

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Application September 3, 1943; Serial No. 501,093

7 Claims. (Cl. 60—53)

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This invention relates to means for transmitting power through the intervention of liquid from one shaft to another at speed ratios manually variable or reversible at will, and is a continuation in part of my application for patent, Serial No. 458,794, filed September 18, 1942, and now Patent No. 2,434,546, in so far as shift of the rotating casing relatively to the driving drum, and urging of the blades into wall contact is concerned.

Primarily it is based on the principle of utilizing two hydraulic units, one, hereinafter designated the pump, discharging fluid, and the other acting as a motor, and hereinafter so designated, receiving and utilizing the discharge from the pump as an energizing force, the pump being of variable capacity and the motor of constant capacity, and varying the capacity of the pump directly or inversely toward the capacity of the motor, speed ratios depending on the relative volumes, and relative directions of rotation on the direction of shift, the pump being driven by one shaft and the motor being mounted on and secured to the second shaft and delivering its torque thereto.

Both the pump and the motor are preferably of that well known type in which a head is turned in an eccentric casing, the head carrying members or blades which move outward and inward as the head turns, to maintain sliding contact with the eccentric casing. The pump differs from the usual types of such pumps in that the casing is shiftable with respect to the head, preferably under manual control, from concentricity to eccentricity therewith, in either of two diametrically opposed directions, the motor having a fixed eccentricity in one of said directions.

The objects of the invention are:

To provide a transmission which will deliver power from a rotating drive shaft, either in the same or opposite directions of rotation, to a driven shaft, which may be initially at rest, and in either case will build up the speed of the driven shaft smoothly and evenly by infinitesimal increments;

To provide a transmission which will accomplish at option either forward or reverse speed build-ups through an interposed fluid under pressure;

To provide a variable speed transmission in which at synchronous speeds in the same direction the pump and motor parts revolve together without relative movements of the parts;

To provide a variable speed transmission of rotary type in which both pump and motor are statically and dynamically balanced;

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To provide a variable speed transmission in which variation of speed is accomplished through variation in pump capacity, and through direct liquid displacement;

To provide means for accomplishing changes in speed rotation or direction without the intervention of gearing.

The means by which the foregoing and other objects are accomplished, and the manner of their accomplishment, will readily be understood from the following specification on reference to the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional elevation taken on the line I—I of Figs. 2 and 6, on the axial center line of the transmission, taken on the plane of greatest eccentricity of the motor casing, being the plane of eccentric shift of the pump casing, the latter casing being shown concentric with the shafts.

Fig. 2 is a fragmentary sectional elevation taken on the line II—II of Fig. 1 transverse to the shafts.

Fig. 3 is a fragmentary sectional detail taken on the line III—III of Fig. 1, showing interlocking ribs of the pump and motor casing.

Fig. 4 is a transverse section of the pump taken on the line IV—IV of Fig. 1, with casing in concentric position.

Fig. 4A is a reduced scale transverse section of the pump with the casing in one eccentric position; and Fig. 4B a similar reduced scale section showing the pump casing oppositely eccentric.

Fig. 5 is a transverse section of the motor taken on the line V—V of Fig. 1.

Fig. 6 is a longitudinal sectional plan, taken on the line VI—VI of Fig. 1, and at right angles to that view.

Fig. 7 is a fragmentary sectional elevation taken on the line VII—VII of Figs. 4 and 6.

Figs. 7A and 7B are fragmentary sectional elevations taken on the line VIIA—VIIA of Fig. 4, showing a grid type of connecting ports between pump and motor and respectively showing relative positioning of the grid bar in neutral position and full forward shift.

Fig. 8 is a sectional elevation taken as on the line I—I of Figs. 2 and 6, showing increase of diameter, and corresponding decrease in length of the motor casing and drum, and rearrangement of shift mechanism thereby made necessary. Pump casing being shown, however, shifted to maximum eccentricity and in direction to accomplish direct drive.

Fig. 9 is a fragmentary view taken on the line IX—IX of Fig. 8, showing a brake operating detail.

Fig. 10 is a fragmentary sectional elevation taken on the line X—X of Fig. 8, showing a brake support.

Fig. 11 is a partial sectional view taken on line XI—XI of Fig. 8.

It will be understood that the foregoing views show a structure made up largely of rotating parts and that the terms "elevation" and "plan" used therein are relative only, and are of these parts in selected position of rotation, this position, however, being maintained throughout all the views.

It will be further understood that it has been elected to show only radially shiftable blades, though it will be understood that other forms of blades well known in the rotary pumping art, as of the bucket type shown in Fig. 16 of my said application Serial No. 458,794, now Patent No. 2,434,546.

Referring now to the drawings in which the various parts are indicated by numerals:

15 is a pump or driving shaft to which power is imparted in any usual or desired manner, and 17 a motor or driven shaft to which driving torque is to be transmitted from the shaft 15, the two shafts being in axial alinement and preferably extending into substantially abutting relation.

Mounted on the shaft 15 is a pump or driving head 19 which is secured thereto as by a key 21, Fig. 4, and on the shaft 17, a motor or driven head 23, secured thereto as by a key 25, Fig. 5. These heads carry the usual outwardly and inwardly shiftable blades 20 and 24 respectively, which may be urged into wall contact by compression springs 20A, 24A in usual and well known manner, and as are the motor blades of my said patent.

Around these heads is disposed a housing comprising an end wall 27 which rotatably abuts one end of the head 19, and has a hub portion 29 journaled on the shaft 15, and end wall 31 which slidably abuts the opposite end of the head 23 and has a hub portion 33 journaled on the shaft 17, and a cylindrical barrel, which comprises a pump reaction member 35 and a motor reaction member 36, preferably integral, but in any event rigidly secured together, and which may be of differing diameters. The barrel is disposed between the end walls and is secured and sealed thereto as by bolts or screws 37. 39 is an intermediate wall which may be integral with the barrel, and in any event is rigidly secured thereto. This intermediate wall extends inward to and is journaled around either the shaft 15 or the shaft 17, and divides the housing into pump and motor sections.

Within the pump section and around the head 19, is an annular cylindrical casing 41 which at one end slidably abuts the housing end wall 27 and at the opposite end has a preferably integral disc-like end wall 42 which is interposed between the end of the head 19, which it shiftablely and rotatably abuts, and the intermediate wall 39 which it shiftablely abuts, and is centrally slotted to embrace the inner end of shafts 15 and 17. Walls 39 and 42 are provided with inter-engaging ribs 39R, 42R, respectively, which lock the walls against relative turning movement, but permit diametral shifting of the wall 42 and casing 41, the ribs 39R of the wall 39 being used merely to increase the effective depth of the groove for the rib 42R.

The interior diameter of the casing 41 is of sufficiently greater diameter than the diameter of the head 19 to permit establishment of the

maximum desired casing eccentricity with relation to the head.

Also within the pump section and around the casing 41 is an annular counter-weight 43, which is spaced from the exterior of the casing twice the spacing of the casing from the drum, this counter-weight being slidably disposed between the end wall 27 and intermediate wall 39 and notched for sliding engagement with the ribs 39R.

The wall forming this counter-weight is preferably apertured, as at 43F, Fig. 1, to permit flow of liquid therethrough, and the wall 39 also apertured as at 39F, Figs. 4 and 5, to permit inter-flow between the pump and motor housings, these latter apertures being outside any shifted position of the casing 41.

On diametrically opposite sides and at ninety degrees from the rib 42R, the casing 41 is provided with flattened bosses 44 whose outer faces longitudinally are parallel to the axis and bore of the casing and transversely are parallel to the ribs, these bosses having along their lengths outwardly extending lug portions 45 which are identically inclined to the casing axis, in both direction and amount.

Similarly the inner surface of the counter-weight 43 on diametrically opposite sides is thickened and flattened to form internal bosses 46 from which lugs 47 extend inwardly, preferably into abutting relation with the lugs 45, but are inclined to the counter-weight and casing axes in opposite direction to the inclinations of the lugs 45, the degree of the inclination preferably being substantially equal in the two sets of lugs.

Within the motor section of the housing and around the head 23 is an annular casing 48 which is disposed in permanently eccentric relation to the head 23, the axial plane of greatest eccentricity of the casing relatively to the head being parallel to the ribs 39R which guide and establish the line of shift of the pump casing 41. Casing 48 is integral with or rigidly secured at one end to the intermediate wall 39 which separates the motor and pump sections and at its opposite ends abuts the end wall 31 to which, though not so shown, it may also be rigidly secured. Eccentricity of this casing is counter-balanced, preferably by locally thickening the housing wall 36, as at 36W, opposite to greatest eccentricity of the casing.

Disposed between the bosses 44 of the casing 41 and the bosses 46 of the counter-weight 43 are slides 49 which are mounted for longitudinal shift, preferably between guides 51 which are carried by the end wall 27 and intermediate wall 39, and which may be integral with either thereof. The slides are grooved from their inner and outer faces to provide half depth lug-ways 54, 55, inclined with respect to the length of the slides to receive the casing and counter-weight lugs 45, 47 respectively.

Heads 19 and 23 may be of identical diameters and lengths, and the casings 41 and 48 similarly identical; in such case the slides 49 may extend through the motor housing.

Where the extension exterior diameter of the motor casing is the same or less than the pump casing and the housing permits, as in Figs. 1 to 7, the slides 49 may extend through the motor housing and beyond the end wall 31 of that housing. Exteriorly of the wall 31 the two slides 49 are rigidly coupled together and to a hub 57 by a transverse member 59. Hub 57 is shiftablely mounted on hub 33 of end wall 31, and is provided with a circumferential groove 61, in which

is disposed a collar 63 having oppositely extending pins 65. 61 is a shift arm which is oscillatably mounted on a bracket carried pin 69, and extending beyond the pin carrying a shift fork 71 which engages pins 65.

If desired, the extending slides and the transverse member 59 may be shielded, in part at least, by a cylindrical shield 73.

In Figs. 8 to 11, in which similar parts are designated by the addition of the letter "A," a modification is shown in which the pump head 19A is of less diameter than the motor head 23A, the latter head being shortened in length to create pump and motor chambers of equal capacity at full eccentricity of the pump casing. In this modification, the pump and motor housings 35A and 36A are shown as of the same exterior diameter, with a portion of the housing wall of the motor section serving as a wall portion of the eccentric motor casing of which only the wall portion 48A diametrically below the head 23A shows and is designated. The motor structure is counter-balanced as by a counterweight 75. The slides 49A are disposed in the pump section only and extend through the end wall 27A, rather than through the intermediate wall outer end wall, as before described.

Rotation of the housings must be prevented at certain times as during build-up of forward speed and accomplishment of reverse drive.

This may be accomplished by a brake, or by an overrunning clutch and a brake, as may appear most expedient. In Figs. 1, 5 and 6, an overrunning clutch preventing reverse rotation of the housing is shown. The clutch may comprise a cylindrical raceway 77 (Fig. 5) formed around the housing section 36, a surrounding carrier 79, having camming surfaces 81, and interposed rollers 83. Carrier 79 is anchored as through a base 85 to a fixed support 87. The brake may comprise oppositely disposed brake shoes 89, having suitable brake linings 91, the shoes being carried by arms 93, suitably carried by the support 87, and braking pressure applied through links 95, and a suitable head 97 by a shaft 99, to which the head 97 is secured as by a key 101, shaft 99 being journaled in support 87, and operated manually in desired manner, not here shown.

In Figs. 8 to 10, braking means alone is shown. This means preferably comprises a brake band 103 with suitable brake lining 105, which band is anchored as by a lug 107 to a suitable supporting member 109. Band and lining substantially encircle a suitable drum surface formed around the exterior of the housing 35A—36A, the band ends terminating in adjacent ears 111 which carry indented, oppositely faced camming blocks 113. Extending through these lugs is a bolt 115 on which is mounted a pair of arms 117 which are confined against separation by the head and nut of the bolt. Arms 117 have integral bosses 119 complementary to the indented camming surfaces of the blocks 113, and when in position of extreme shift, shown in Fig. 8, free the brake band from the housing to permit free rotation of the housing. Arms 117 are preferably coupled to shift arm 67A by a link 120, and are shifted by arm shift.

In Fig. 8, arm 67A is shown in position of extreme shift to accomplish synchronous forward speeds of motor head 23A and pump or driving head 19A, and the brake band 103 released. Shift of arm 67A to the left in the view toward neutral and through neutral to reverse, causes the bosses

119 to ride out of the indentations of the blocks 113 and into brake applying position.

The pump section discharges through ports 121, 122 in the end wall 42 and respectively registering ports 123, 124 in the intermediate wall 39 into the motor section. Similar ports, as the ports 122A and 124A in the modified form, shown in Figs. 8 and 11, are connected by passageways, as the passageway 125 (Fig. 11), which may be formed in the intermediate wall 39A.

The ports may be continuous slots, as shown in Figs. 4 and 5, or as shown in Figs. 7A and 7B, may be of grid-iron type, comprising alternate openings 121B and bars 121C in the end wall 42, and similar alternate openings 123B and bars 123C in the intermediate wall 39. Openings 121B and 123 B, being, as shown in Fig. 7A, in register, when the casing carrying wall 42 is concentric with the driving head 19, and as wall 42 is moved toward maximum eccentricity, as shown in Fig. 7B, the bars 121C of the wall 42 moving toward closure of the openings 123B of the wall 39, this being true of the movement in either direction.

In the modified form shown in Fig. 11, the slot 122A in wall 42A and entrance to passageway 125 in wall 39A may be of similar grid type.

127 indicates plugs which are removable to fill the pump and motor casings and 129 similar plugs for filling the pump and motor housings. They may be in duplicate if desired.

To prepare the transmission for use, one or both of the plugs 127 is removed and the pump and motor casings surrounding the driving and driven heads 19 and 23 are completely filled with fluid, preferably oil, and if desired the plugs 129 also removed and the housing surrounding both the pump and motor casings are similarly filled, the openings 43F and 39F permitting interflow to allow ready distributions of the fluid in the housing around the pump and motor casings, but not thereinto.

In use, the lever 67, or 67A as the case may be, is shifted to central positions, as indicated in Fig. 1, and the pump casing 41 brought to neutral position, as there shown, concentric with the pump head 19. The shaft 15 carrying the pump head may then be energized, and the head turned without appreciable torque effect on the motor. With the driving shaft and pump head at desired speed, lever 67 is shifted, shifting the slides 49, and through the lugs 45 and 47, shifting the casing 41 from concentricity with the drum 19, as shown in Fig. 4, to eccentricity therewith, and through the lugs 47, oppositely shifting the counter-weight 43 to maintain rotational balance. In this shift, ribs 39R and 42R compel movement parallel to the diametral axis of greatest eccentricity of the motor section, and depending on the direction of shift, establishes eccentricity of the pump casing 41 opposite to the eccentricity of motor casing 48 as in Fig. 4A, in which case torque effect is set up to turn the motor head 23 in the same direction as the pump head is being turned, or if, the shift of the casing 41 establishes eccentricity of the pump casing in the same direction as the eccentricity of motor casing 48 as shown in the diagrammatic view, Fig. 4B, in which case a reverse driving torque is set up.

In either case, the rate of shift is entirely governed by the rate at which the lever 67 is shifted and discharge from the pump chamber, at whatever rate shift is made, changes by smooth infinitesimally varying increment.

In Fig. 4A, discharge flow from the pump section caused by rotation of the driving head 19, clockwise as indicated by the arrow within member 19 in Fig. 4, is through the ports 121, 123 into the motor section, and return flow is through the ports 124, 122. Turning movement of the head 19 causes discharge flow which exerts torque on the pump casing 41 in the direction of rotation of the head and through ribs 39A of the intermediate wall 39 transfers this torque to the motor casing 48 carried by the wall 39, and to the motor head 23.

In Fig. 4B, discharge flow is through the ports 122, 124 into the motor section and return flow through the ports 123, 121, reverse turning torque and movement on the motor head and shaft being set up.

As shift of casing 41 from the neutral position of Fig. 4, toward the eccentric position of Fig. 4A, begins, infinitesimal quantity of fluid is transferred to the motor casing exerting heavy torque pressure to slowly turn the motor head and exerting a correspondingly heavy torque reaction against the motor casing 48. Reverse turning movement of the casings is prevented by the overrunning clutch 79 and persists until at equal speeds the forward torque pressure on the pump casing equals the reverse torque on the motor casing and the casings, housing, and heads turn as a unit.

Flow from the pump section increases as the eccentricity of the pump casing 41 is increased and in the modified or grid form of the ports, shown in Figs. 7A and 7B, the port areas are reduced toward cut-off. This causes greater velocity of flow through the ports and builds up back pressure against flow from the pump section which tends to increase the torque on the pump casing, the torque on the pump casing building up and exceeding the reverse torque on the motor casing so that the pump casing is carried forward, reducing flow through the ports, until as the grids between the ports 123B reach full cut-off, as shown in Fig. 7B, the speed of the pump casing reaches the speed of the pump head and a directly coupled unit is accomplished.

When shift of the casing 41 is begun from the neutral position of Fig. 4 toward the position shown in Fig. 4B, to accomplish reverse drive, the same infinitesimal quantity of fluid is transferred to the motor casing, exerting heavy torque pressure to, as before, turn the motor head and exerting a correspondingly heavy torque reaction against the motor casing 48, but in forward direction, this torque reaction not being resisted by the overrunning clutch. In such case, braking pressure is applied to the housing through the brake band 89 to hold the housing and casing against movement and this holding must be continued throughout. In such case, if reverse speed is to be built up to full pump speed, the grid type of port cannot be used as the pump head is moving in opposite direction to the motor head and cut-off of flow must result in locking the units together. However, reverse movement, particularly in motor vehicle drives, is ordinarily never attempted at full motor speed, and it is possible to use the grid type up to some two-thirds, or in extreme cases, possibly a little more of the driving shaft speed in reverse.

In the modified form of the device, shown in Figs. 8 through 11, the overrunning clutch has been omitted. In this form of the device, the braking pressure is maintained to lock the hous-

ing 35A, 36A against turning movement at all times except as the speeds of the driving and driven shafts approach equality at forward driving speed, at which time release of braking pressure is accomplished, as shown by the positioning of the parts in Figs. 8 and 9. In this form of the device the grid type of port may also be used, provided that release of braking action is accomplished before port cut-off occurs, but here again full reverse speed cannot be accomplished.

It will be understood that much of the detail herein shown is illustrative only of means by which the actions of the device may be accomplished, these details including the type of blade and head used, the means by which shift is accomplished, the method of counter-weighting, and other items, and it will be understood that only such claims as set out detail are to be limited thereby.

I claim:

1. A variable speed reversible hydraulic drive which includes a pump and an axially aligned motor; each comprising a rotatable casing and a rotatable head, each said casing including a cylindrically bored wall member and an end wall, said heads being disposed within said casings and each having inwardly and outwardly shiftable blades in contact with the cylindrical surface of its said wall member; means mounting said motor bored wall member in fixed eccentric relation to its said head, means mounting said pump casing with its said end wall in abutting relation to said motor casing end wall, means respectively forming parts of said end walls, diametrically disposed relatively to said heads along the plane of maximum-minimum eccentricity of said motor bored wall member, interlocking said pump end wall in shiftable driving relation to said motor end wall, said pump and motor end walls laterally with respect to said plane being apertured to establish relatively shiftable registering intake and outlet ports directly intercommunicating said pump and motor, means for shifting said pump casing diametrically with respect to its said head and to said motor wall member, and means for restraining reactionary movement of said casings.

2. A variable speed reversible hydraulic drive which includes a pump and an axially aligned motor; each comprising a rotatable casing and a rotatable head, each said casing including a cylindrically bored wall member and an end wall; said heads being disposed within said casings and each having inwardly and outwardly shiftable parts in contact with the cylindrical surface of its said wall member; means mounting said motor wall member in fixed eccentric relation to its said head, means mounting said pump casing with its said end wall in abutting relation to said motor casing end wall, means respectively forming parts of said end walls, diametrically disposed relatively to said heads along the plane of maximum-minimum eccentricity of said motor wall members, interlocking said pump end wall in shiftable driving relation to said motor end wall, said pump and motor end walls being apertured to establish relatively shiftable registering intake and outlet ports intercommunicating said pump and motor, means for shifting said pump casing diametrically with respect to its said head and to said motor wall members, and means for restraining reactionary movement of said casings.

3. A variable speed hydraulic drive, which includes pump and motor casings, pump and motor

heads, and annular counter-balance means, said casings each including a cylindrically bored wall member and an end wall, said heads being within said casings and having outwardly and inwardly movable blades in contact with the inner surfaces of their respective said wall members, said pump wall member being surrounded by said counter-balance means; means mounting said motor end wall member in eccentric relation to its said head, said pump end wall and said counter-balance means abutting said motor end wall member and being interlocked therewith in diametrically shiftable relation to said pump head and to said motor wall member along the diametral line of greatest and least eccentricity of said motor wall member, means establishing flow ports between said pump and motor casings, and means for shifting said pump wall member diametrically with respect to said pump head, and said counter-balance means in opposite direction.

4. A variable speed hydraulic drive, including axially aligned pump and motor heads, having inwardly and outwardly movable blades, a housing journaled around said heads and including a disc wall separating said housing into pump and motor sections, said motor section including a motor casing cylindrically bored for engagement by said motor head blades and fixedly carried by said housing in eccentric relation to said motor head, said pump section including a pump casing cylindrically bored for engagement by said pump head blades, and an annular counter-balance around said pump casing, said pump casing and said counter-balance means being radially shiftable, means shiftable coupling said pump casing and said counter-balance, in respective driving and driven relation to said housing and establishing a diametral path of movement of said casing and said counter-balance with respect to said motor casing, said disc wall having openings therethrough establishing inlet and outlet communication between said pump and motor sections, means for shifting said pump casing from concentricity with said pump head toward coaxiality with said motor casing or reversely toward non-coaxiality therewith, and for concurrently oppositely shifting said counter-balance, and manually operable means for restraining turning movement of said housing.

5. A hydraulic drive which includes a rotary driving pump and an axially aligned rotary motor in end-abutting relation and directly connected through relatively shiftable outflow and inflow ports, said pump including a rotary reaction member and a driving member and said motor including a rotary reaction member and a driven member, said motor being actuated by said pump, said reaction members including abutting end portions, said ports being in said abutting end portions, said reaction members being coupled together for concurrent rotation, said pump reaction member being shiftable transversely to the axis of rotation of its said driving member and toward cut-off of said ports, and means for releasably holding said reaction members against reactionary rotation.

6. A reversible hydraulic drive comprising a driving shaft and an axially aligned driven shaft, having respectively secured thereon a driving head and a driven head, each having inwardly and outwardly shiftable blades, a rotary cylindrical housing having end walls journaled respectively on said shafts and forming outer end

walls of pump and motor sections, and an intermediate wall interposed between said heads dividing said housing into said pump and motor sections and forming the inner end wall of said motor section, an annularly bored wall member surrounding said driven head and eccentrically disposed with respect thereto secured between said motor section outer end wall and said intermediate wall and cooperating with said walls to establish a fixedly eccentric motor casing; a shiftable annularly bored wall member and a rigidly secured disc-like end wall disposed in said pump section with said wall member around said pump head and said disc-like end wall in slidable engagement with said intermediate wall, and with said pump section outer end wall to establish a shiftable pump casing; diametrically disposed interengaging means respectively forming part of said disc-like wall and said intermediate wall cooperating to prevent relative rotation of said walls, said diametrically disposed interengaging means extending in the diametral direction of greatest and least eccentricity of said motor casing, both said disc wall and said intermediate wall, laterally outward in opposite directions from said interengaging means being cooperatively apertured to establish intercommunication between said pump and motor casings, shiftable counter-balance means within the pump section of said housing and around said bored wall member of said pump, slidably engaging said diametrically disposed interengaging means of said intermediate wall, and means for shifting said pump wall member and disc-like end wall at option from concentricity with said pump head to eccentricity therewith in either direction, and for concurrently oppositely shifting said counter-balance means; and means for restraining reactionary rotation of said housing.

7. A reversible hydraulic drive comprising a driving shaft and an axially aligned driven shaft, having respectively secured thereon a driving head and a driven head, each having inwardly and outwardly shiftable blades, a rotary cylindrical housing having end walls journaled respectively on said shafts and an intermediate wall interposed between said heads dividing said housing into pump and motor sections said housing and walls forming outer end walls of said pump and motor sections and said intermediate wall the inner end wall of said motor section, an annularly bored wall member surrounding said driven head and eccentrically disposed with respect thereto secured between said motor section outer end wall and said intermediate wall and cooperating with said walls to establish a fixedly eccentric motor casing; a shiftable annularly bored wall member and a rigidly secured disc-like end wall disposed in said pump section with said wall member around said driving head and said end wall in sliding engagement with said intermediate wall, and with said pump section outer end wall establishing a shiftable pump casing; diametrically disposed means respectively forming part of said disc-like wall and said intermediate wall cooperating to prevent relative rotation of said walls, said intermediate wall means extending in the diametral direction of greatest and least eccentricity of said motor casing, said disc wall and said intermediate wall, laterally outward from said diametral direction being cooperatively apertured to establish intercommunication between said pump and motor casings, means for

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shifting said pump bored wall member and end wall from concentricity with said pump head to eccentricity therewith, and away from coaxiality with said motor head; and overrunning clutch means restraining reactionary rotation of said housing.

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