

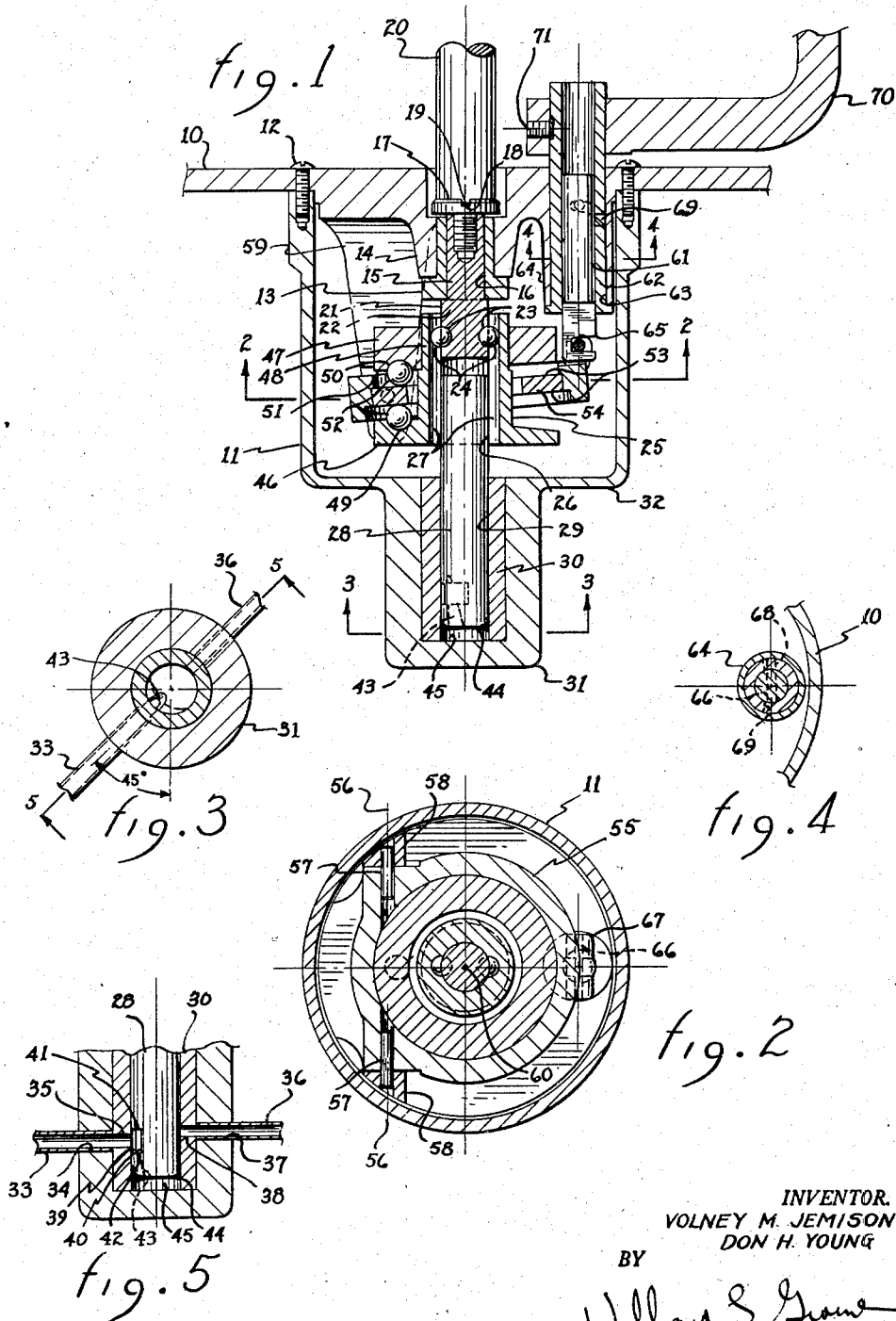
July 28, 1959

V. M. JEMISON ET AL

2,896,459

FLUID PUMP

Filed Feb. 15, 1957



INVENTOR.
VOLNEY M. JEMISON &
DON H. YOUNG

BY

William S. Gower
ATTORNEY

1

2,896,459

FLUID PUMP

Volney M. Jemison and Don H. Young, Phoenix, Ariz.,
assignors to Thunderbird Engineering Company, Phoenix,
Ariz., a corporation of Arizona

Application February 15, 1957, Serial No. 640,485

4 Claims. (Cl. 74—60)

This invention pertains to improvements in fluid pressure pumps and is particularly directed to pumps of small size of high efficiency and dependability.

One of the objects of this invention is to provide a fluid pump with a minimum of moving parts and accessories for its proper operation.

Another object is to provide a pump which may be adjusted for variable delivery utilizing an adjustable wobble plate control for actuating the main pumping member.

Still another object of this invention is to provide a fluid pump with a reciprocating and continuously unidirectional revolving piston in a cylinder including inlet and outlet ports in the cylinder and notch means in the piston adapted to effect the pumping operation of the device.

Further features and advantages of this invention will appear from a detailed description of the drawings in which:

Fig. 1 is an enlarged sectional view of a fluid pump incorporating the features of this invention.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is fragmentary section on the line 4—4 of Fig. 1.

Fig. 5 is a fragmentary section on the line 5—5 of Fig. 3.

As an example of one embodiment of this invention there is shown a fluid pump comprising the frame 10 to which is fixed the cup member 11 by suitable screws 12. A bearing bushing 13 is fixed in the downwardly extending integral boss 14 of the frame 10 and a drive shaft 15 is journaled against axial movement in the bore 16 of the bushing 13. A driving screw 17 is suitably threaded fixed in the upper end of the drive shaft 15 and its slot 18 is engaged by a mating tongue 19 of a suitable input power shaft 20 from a suitable source of power such as an electric motor (not shown).

On diametrically opposite positions on the periphery 21 of the lower enlarged portion 22 of the drive shaft 15 are formed hemispherical cavities 23 which receive the driving balls 24. A pump piston reciprocating spool 25 has a bore 26 in which is formed the axially extending semi-cylindrical grooves 27 which drivingly engage over the outer exposed portions of the driving balls 24. A clearance is provided between the periphery 21 of the drive shaft 15 and the bore 26 of the spool 25 so that the driving balls act as a floating driving connection therebetween to prevent binding due to possible mis-alignment between the drive shaft 15 and a piston 28 fixed by a suitable pin (not shown) in the bore 26 of the spool 25 and further permits relative vertical reciprocation of the spool 25 and the drive shaft 15.

The lower end of the piston 28 is rotatably and reciprocatably mounted in the bore 29 of the cylinder 30 fixed in the depending lug portion 31 formed integral with the bottom 32 of the cup member 11. A suction line 33 is suitably fixed in a bore 34 formed in the lug portion 31 and is in communication with an intake port

2

35 formed in the cylinder 30 while the discharge line 36 is suitably fixed in the bore 37 in the lug portion 31 and is in communication with an exhaust port 38 in the cylinder 30. The lower portion of the piston 28 is provided with a chordally disposed slot 39 having a convex bottom 40 and radially disposed sides 41 and 42. An axially extending groove 43 extends from the bottom end 44 of the piston through the side 42 into the slot 39. The slot 39 is arranged to be in communication with the intake port 35 during the upward rotary movement of the piston 28 and the slot 39 is in communication with the discharge port 38 during downward rotary movement of the piston. The groove 43 provides communication between the slot 39 and the variable suction and pressure chamber 45 formed in the lower portion of the cylinder 30 below the bottom end 44 of the piston 28.

The spool 25 has a lower integral flange 46 and an upper flange 47 suitably fixed to the hub portion 48 of the spool. Hemispherical cavities 49 and 50 are formed in the inner facing surfaces 51 of the flanges 46 and 47 and rotatably receive the balls 52 which in turn are in rolling contact with the faces 53 of the wobble plate ring 54. The ring 54 is fixed in the swinging yoke 55 which is pivotally mounted to rock about an axis 56 on the pins 57 carried in the lower ends 58 of the downwardly extending integral arms 59 of the frame 10. The yoke 55 can thus rock about the axis 56 from a position of minimum pump displacement with the faces 53 of the wobble plate ring lying in planes perpendicular to the axis of rotation 60 of the spool 25 and piston 28 to an angularly disposed position of maximum pump delivery such as shown in Fig. 1.

The yoke 55 may be adjustably positioned in desired angular position by means of the adjusting plunger 61 which is axially reciprocable in the rotatable adjusting sleeve 62 which is journaled against axial movement in the bore 63 formed in the integral depending boss 64 of the frame 10. The lower end of the plunger 61 is provided with a notch 65 which receives a pin 66 carried in the lugs 67 of the yoke 55, the interconnection with the pin 66 retains the adjusting plunger against rotation relative to the sleeve 62. A pin 68 fixed in the plunger 61 projects into the helical slot 69 formed in the sleeve 62 so that rotation of the sleeve causes vertical reciprocation of the plunger 61 which in turn rocks the yoke 55 on the pin 57 to angularly position the wobble plate 54 for the desired pump stroke. A suitable operating handle 70 is fixed to the sleeve 62 by a screw 71 for appropriately positioning the sleeve 62.

While the apparatus herein disclosed and described constitutes a preferred form of the invention, it is also to be understood that the apparatus is capable of mechanical alteration without departing from the spirit of the invention and that such mechanical arrangement and commercial adaptation as fall within the scope of the appendant claims are intended to be included herein.

Having thus fully set forth and described this invention what is claimed and desired to be obtained by United States Letters Patent is:

1. In a device for simultaneously rotating and reciprocating a piston on a frame, a spool fixed to said piston, a drive shaft connected to rotate said spool, flanges on said spool, and means for effecting axial reciprocation of said spool and piston during the rotation thereof comprising, a circular yoke surrounding said spool and positioned between said flanges, said circular yoke being pivotally supported at one side on said frame, means on said frame connected at the other side of said yoke for adjustably angularly positioning said yoke relative to the axis of rotation of said piston, and ball bearing means mounted at one circumferential position on said spool flanges engaging said yoke whereupon rotation of

3

said spool and piston by said drive shaft effects axial reciprocation of said piston.

2. In a device as set forth in claim 1 wherein a universal and axially slidable drive connection is provided between said drive shaft and said spool.

3. In a device as set forth in claim 1 wherein said ball bearing means on said spool comprises a pair of axially opposed ball bearings journaled in the facing surfaces of the flanges of said spool and are located at one circumferential position thereon, and a wobble plate ring 10 fixed in said yoke having parallel radially disposed faces engaging said ball bearings.

4. In a device as set forth in claim 2 wherein said universal and axially slidable drive connection comprises

4

a pair of ball bearings diametrically oppositely journaled in bearing cavities formed in the periphery of said drive shaft, and axially extending grooves in said spool engaged by said balls to connect driving power from said drive shaft to said spool and piston to permit freedom of axial reciprocation of said piston during rotation by said drive shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

857,221	Anderson et al. -----	June 18, 1907
2,582,157	Pica -----	Jan. 8, 1952