Jan. 8, 1929.

1,697,852

W. L. COURSEN

MULTICYLINDER PUMP

Original Filed Jan. 11, 1927

Fig. 1.

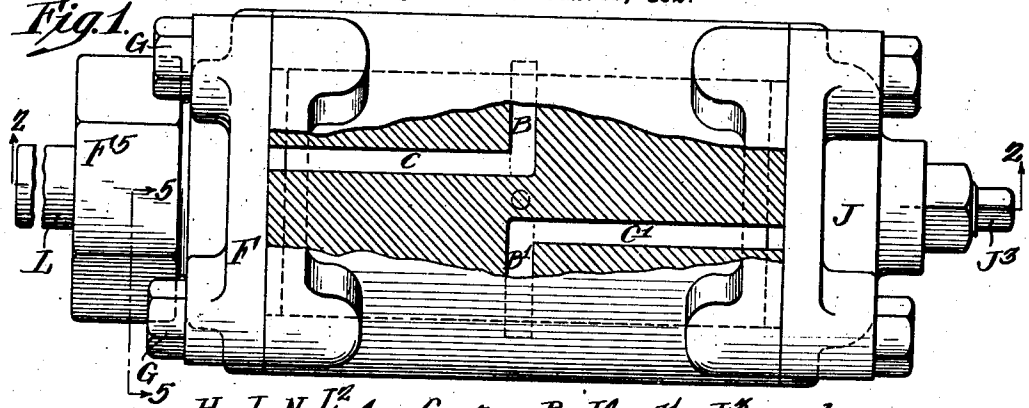


Fig. 2.

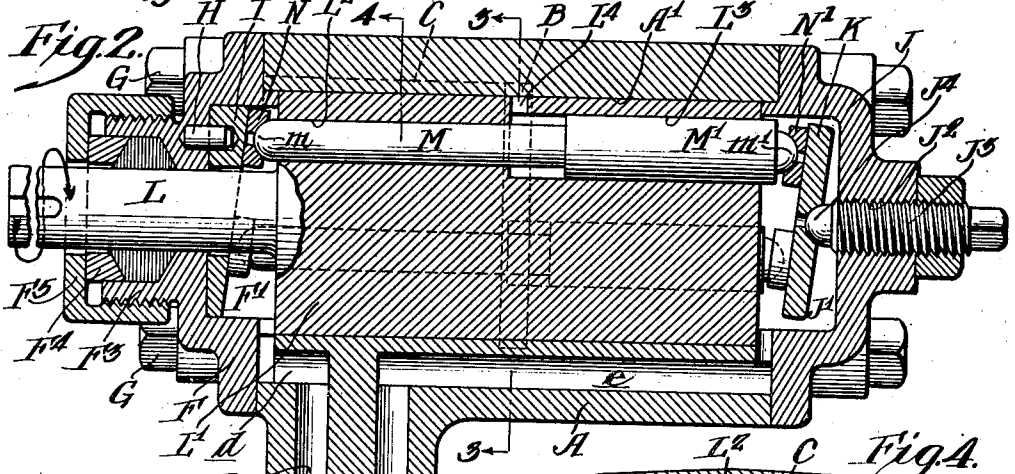


Fig. 3.

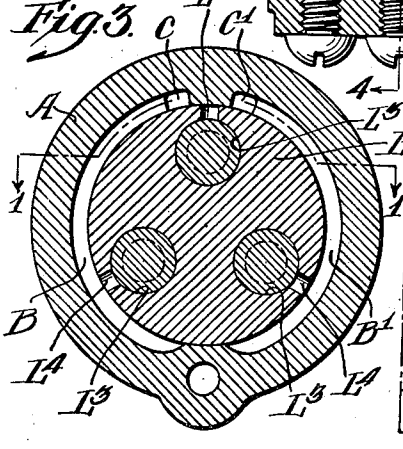


Fig. 4.

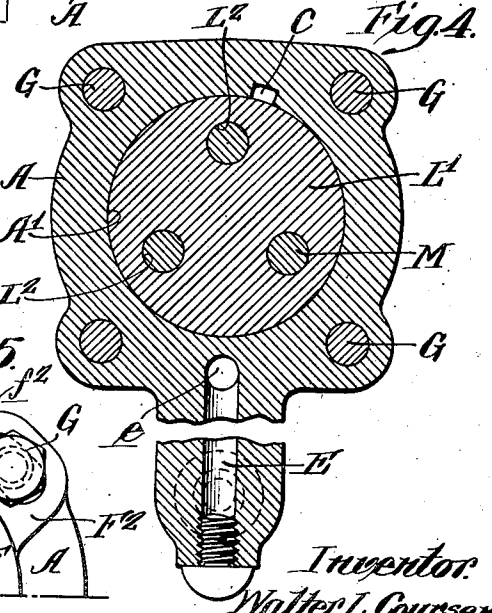
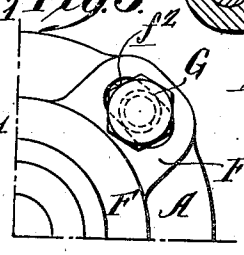


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MULTICYLINDER PUMP.

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My invention relates to multicylinder pumps of the type in which a rotating cylindrical body has formed in it a series of cylinders in which pistons are caused to reciprocate as the body revolves by means of a cam operating on the end of the pistons. The object of my invention is to provide a pump of this general character in which the fluid upon which the pump operates will act as a lubricant for the moving parts and in which the moving parts will be only exposed to the differential of pressure existing between the inlet and outlet ports of the pump, my pump being specially designed for use with viscous fluids such as viscose or nitrocellulose collodion and to serve as a regulator controlling the delivery of the fluid to the spinerettes through which the fluid is forced to form filaments although it will be understood that my improved pump can be usefully applied to any work for which a pump is adapted.

The nature of my improvements will be best understood as described in connection with the drawings, which illustrate a pump embodying my said improvements and in which

Figure 1 is a top view of the pump on the section line 1—1 of Fig. 3.

Figure 2 is a sectional elevation of the pump taken as on the section line 2—2 of Fig. 1.

Figure 3 is a transverse sectional elevation on the line 3—3 of Fig. 2.

Figure 4 a transverse sectional elevation on the line 4—4 of Fig. 2 and

Figure 5 is a view illustrating a simple device for adjusting the cam which actuates the pistons.

A indicates the pump casing which is formed with a cylindrical bore indicated at A^1 intermediate the ends of which are formed the suction and delivery chambers B and B^1 communicating respectively with the end chambers of the casing through conduit passages C and C^1, which for the best lubricating effects are made as open faced channels, as indicated in the drawings. D is an inlet port connecting through an extension *d* with the chamber formed at one end of the casing and E is an outlet port communicating through an extension *e* with the chamber at the other end of the casing. F is a cap closing one end of the casing and forming an end chamber indicated at F^1. This cap is held in place, as shown, by bolts G passing through lugs F^2, which are slotted as indicated at f^2 so as to permit of such angular adjustment of the cap on the casing as may be desirable to properly adjust the cam to be described. F^3 is an externally threaded gland casing extending outward from the cap F, F^4 an annular packing compressing gland and F^5 a member screwing on the threaded wall F^3 and pressing on the gland F^4, as is usual in gland construction. H is a pin secured on the inside of the cam F and used to hold in position an inclined cam indicated at I. J is a cap secured to the opposite end of the casing and affording a chamber J^1 at said end of the casing. This cap as indicated has an externally threaded perforation J^2 in which fits a screw J^3 carrying a ball pivot at its inner end, as indicated at J^4. K is a wabble plate centrally pivoted on the pivot J^4. L is a shaft passing through the stuffing box in the cap F and secured to or forming a part of a rotating body L^1 which fits in the cylindrical bore of the casing and has formed in it a series of longitudinally extending cylinders indicated at L^3, said cylinders having radially extending ports, as indicated at L^4, which register with the suction and delivery chambers B and B^1 as the rotating body revolves. By preference and as shown in the drawings, an extension of reduced diameter, as indicated at L^2, communicates with the end chamber of the casing opposite to that with which the cylinder proper communicates. M, M^1 indicates a differential piston working in the cylinders L^2, L^3 and having as shown ball pivots *m*, *m*, at its ends. As shown, these ball pivots fit into cylindrical recesses in sliding shoes N and N^1, the shoes N resting in contact with the face of the cam I and the shoes N^1 resting in contact with the face of the wabble plate K.

In operation the fluid enters the end chamber F^1 through the ports D, *d*, passes thence through the trough-like port C in free contact with the rotating body L^1 into the suction port B; thence through the ports L^4 the fluid is drawn into the cylinder L^3 during the outstroke of the piston M^1 and forced by the pistons during their instrokes through the ports L^4 into the delivery chamber B^1; thence the fluid passes through the troughlike chamber C^1 in contact with the rotating body into the end chamber J^1 and thence through the outlet port E, and it will be obvious that by my construction all moving parts in the end

chambers F^1 and JJ^1 are thoroughly lubricated by the fluid passing through them; that there is no end pressure on the rotating body L^1 except the differential of pressure between that in the chambers F^1 and J^1; that where the differential pistons are used as illustrated the pressure on the ends of the piston parts M and M^1 are only exposed to the differential between the pressure of the two end chambers and that where the conduit passages C and C^1 have open faces, as indicated, the entire surface of the rotating body L^1 is constantly lubricated by the fluid flowing through the said passages.

The adjustable pivot J^3, J^4 enables me to set the wabble plate K in such relation to the cam I as to hold the ends of the pistons in constant operative contact with said cam and this adjustable pivot also enables me when the pressure in the two chambers F^1 and J^1 is so regulated as to hold the pistons in operative contact with the wabble plate to regulate the stroke of the pistons by retracting the pivot so that the cam will only act on the pistons during a portion of the rotation of the body L^1.

The essential novel features of my construction may be applied to any of the many well known modifications of the type of pump indicated in the drawings and above described and consists in providing such pumps with end chambers at each side of the rotating body communicating respectively with the inlet and outlet ports and communicating also through the suction and delivery ports formed in the cylindrical portion of the casing so that the rotating body is exposed to the differential pressure existing between the two end chambers. Another important feature of my invention consists in the construction by which the conduits connecting the end chambers with the suction and delivery ports of the casing are open faced channels so that the rotating body carrying the cylinders is lubricated from end to end by the fluid flowing through these passages. It is also important, though not vital, to use the differential piston construction indicated so that the ends of the differential piston will extend into the opposite end chambers of the casing. This is desirable as both ends of the pistons are constantly lubricated by the fluid in the end chambers and because it enables me to use as a means for holding the pistons in operative relationship to the cam I a wabble plate or equivalent located in the opposite end chambers; it will be understood however that any of the well known equivalent means for holding the piston in operative contact with the cam may be used.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A multicylinder pump comprising a casing with a cylindrical bore, chambers at each end thereof, inlet and outlet ports connected one to each of said chambers, diametrically opposed suction and delivery chambers lying between the ends of its cylindrical bore and conduit passages connecting the end chambers of the casing with such suction and delivery chambers in combination with a rotating cylindrical body fitting in the cylindrical bore of the casing so that contacting surfaces form a substantially fluid-tight joint, said body having a series of pump cylinders extending longitudinally into it, and ports leading outwardly therefrom and registering with the suction and delivery chambers of the casing, pistons working in the pump cylinder having ends which extend into an end chamber of the casing, a fixed cam located in the end chamber bore into which the pistons extend for actuating the pump piston and means for holding the pistons in operative position with respect to said cam.

2. A multicylinder pump comprising a casing with a cylindrical bore, chambers at each end thereof, inlet and outlet ports connected one to each of said chambers, diametrically opposed suction and delivery chambers lying between the ends of its cylindrical bore and conduit passages connecting the end chambers of the casing with such suction and delivery chambers in combination with a rotating cylindrical body fitting in the cylindrical bore of the casing so that the contacting surfaces form a substantially fluid-tight joint, said body having a series of pump cylinders extending longitudinally through said body, and ports leading outwardly therefrom and registering with the suction and delivery chambers of the casing, differential pistons working in the pump cylinder having ends which extend into the end chambers of the casing, a fixed cam located in one of the end chambers for actuating the pump piston and means for holding the pistons in operative position with respect to said cam.

3. A pump having the constructive features of claim 1 further characterized by having the conduit passages connecting the end chambers of the casing with the suction and delivery chambers formed as open faced chambers in the cylindrical bore of the casing so that the fluid passing through them flows in contact with the cylindrical surface of the rotating cylindrical body.

4. A pump having the constructive features of claim 2 further characterized by having as an operative means for holding the pistons in operative relation to the cam, a wabble plate centrally pivoted in the end chamber opposite to that in which the cam is located and contacting with the piston ends extending into its containing end chamber.

5. A pump having the constructive features of claim 2 further characterized by having as an operative means for holding the pistons in operative relation to the cam, a

wabble plate centrally pivoted in the end chamber opposite to that in which the cam is located and contacting with the piston ends extending into its containing end chamber and means for adjusting the pivot of said wabble plate and thereby varying the stroke of the pistons.

6. A pumping having the constructive features of claim 2 further characterized by having the conduit passages connecting the end chambers of the casing with the suction and delivery chambers formed as open faced chambers in the cylindrical bore of the casing so that the fluid passing through them flows in contact with the cylindrical surface of the rotating cylindrical body.

WALTER L. COURSEN.