Aug. 10, 1954 C. D. VANDENBURGH 2,685,839

PUMP

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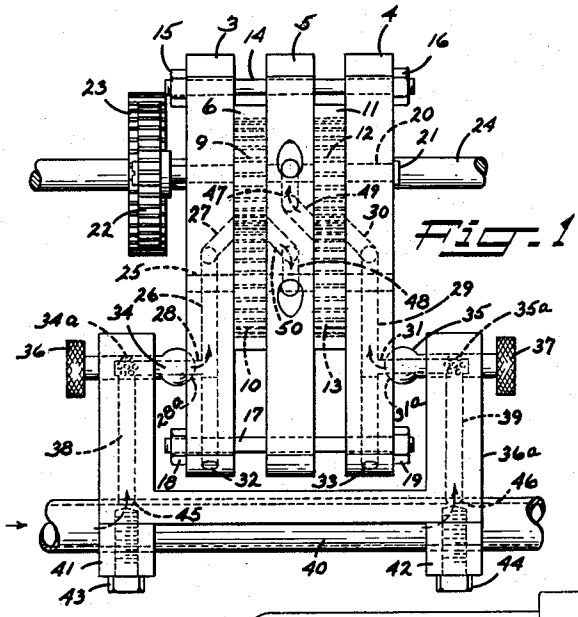


Fig. 1

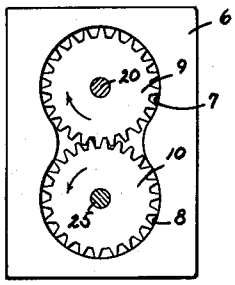


Fig. 4

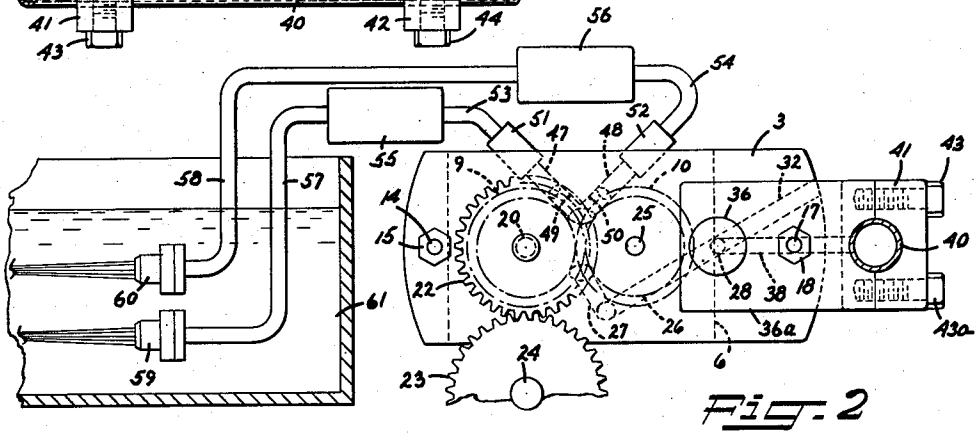


Fig. 2

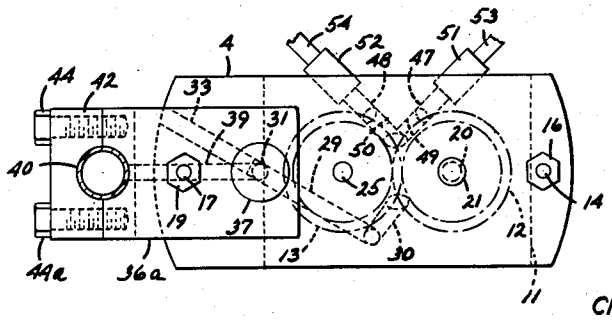


Fig. 3

INVENTOR.
CHARLES D. VANDENBURGH
BY
Thomas R. O'Malley
ATTORNEY.

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Charles D. Vandenburgh, Charlestown, Md., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

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2 Claims. (Cl. 103—4)

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This invention relates in general to a pumping device and more particularly to a multiple pump of the gear type. The invention is further concerned with a gear pump which is capable of pumping a plurality of separate streams of a liquid under uniform and equal pressure or a plurality of separate streams of liquid under different pressures.

While the present invention is applicable to the pumping of any type of a liquid or gas, for purposes of illustration the same will be described as it is applicable in the manufacture of artificial fibers and filaments, such as those made from viscose and the like. It should be understood, however, that the invention is not to be limited thereby but only insofar as the same may be limited by the appended claims.

Obviously, there are many and various types of pumps known in the art. However, when it is desired or necessary to pump two or more streams of a liquid at the same pressure, rate and quantity, the accurate synchronization of two or more pumps, no matter how well they are made, is practically an impossibility. To meet this problem, various pumps have been designed which are capable of pumping a plurality of streams of a liquid. However, in the main, such pumps are complicated in construction, hence expensive to manufacture and usually get out of adjustment very readily.

It is a general object of the present invention to provide a multiple gear pump which is capable of pumping a plurality of separate streams of a liquid at the same rate, pressure and quantity.

It is another object of the invention to provide a dual gear pump which is simple in construction, relatively inexpensive to manufacture and has only one driving means connected thereto.

It is another object of the invention to provide a dual gear pump which is not only capable of pumping two streams of a liquid at the same rate, pressure and quantity but is readily adaptable or convertible to a pump capable of pumping two streams of a liquid at different rates, pressures and quantities, in each case the pump receiving the liquid from a single source of supply.

It is a specific object of the invention to provide a dual gear pump which is particularly adapted to be employed with apparatus used in the manufacture of artificial fibers and filaments such as those made from viscose and the like.

Numerous other objects and advantages of the present invention will be obvious from the drawing and description of the invention hereinafter.

For a description of the invention, reference

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should be had to the accompanying drawing in which

Figure 1 is a top view of a dual pump mounted for use in spinning artificial fibers and filaments,

Figure 2 is a left side view of the pump in Figure 1 showing diagrammatically its relation to the coagulating bath of the spinning machine,

Figure 3 is a right side view of the pump per se, and

Figure 4 is a sectional detail showing the side view of one of the pump housings and pump gears.

Referring to all the figures of the drawing, the dual pump comprises two intake plates or members 3 and 4 and a discharge plate or member 5. Between the members 3 and 5, there is a casing or gear housing 6 which has two overlapping circular openings 7 and 8 defining a chamber in which the pump gears 9 and 10 are placed in mesh. There is a similar casing or gear housing 11 between the members 4 and 5 having a chamber in which the pump gears 12 and 13 are mounted.

The plates 3, 4 and 5, with the casings and pumping gears therebetween, are held tightly together by means of the tie bolt 14 having nuts 15 and 16 on each end thereof and the tie bolt 17 with nuts 18 and 19 thereon. The juxtaposed or interior faces of all the plates and housings are machined smooth and make a liquid-tight fit when the members are fastened together.

The driven gears 9 and 12 are mounted on the shaft 20 which extends through all the plates and the housings. Shaft 20 has a collar 21 fixed on one end thereof and a gear 22 on the other end. Gear 22 is in mesh with gear 23 mounted on the driving shaft 24 which in turn is driven by a motor or other suitable means (not shown). Idler gears 10 and 13 in mesh with gears 9 and 12 are driven by the latter and are mounted on idler shaft 25 which may also extend through all the plates 3, 4 and 5.

The outer plate 3 has an opening 26 drilled therein at an angle from the end thereof. An opening 27 drilled in from the side face of plate 3 communicates with opening 26 and communicates with the area of the chamber adjacent the mesh of gears 9 and 10. From the outside of plate 3, an opening or passage 28 is drilled which communicates with opening or passage 26. In the outer plate 4, there is an opening 29 drilled therein at an angle from the end thereof. An opening 30 is drilled in from the side face of plate 4 and communicates with opening 29. The opening or passage 30 communicates with the area of the chamber adjacent the mesh of gears 12

and 13. From the outside of plate 4, a hole or passage 31 is drilled which opens into the opening 29. Plugs 32 and 33 are inserted into the openings 26 and 29 in the ends of plates 3 and 4. The openings or passages 28, 26 and 27 form a channel in the plate or intake member 3, and the openings 31, 29 and 30 form a channel in the plate or intake member 4.

The face of openings 28 and 31 are hollowed out as shown at 28a and 31a in order to receive the hollow shafts or conduits 34 and 35 which are mounted in the saddle frame or bracket 36a and act as supporting members for the dual pump. The ends of conduits 34 and 35 are ball shaped and fit snugly into the recesses or hollowed out portions 28a and 31a, thus forming a fluid-tight ball and socket swivel joint in each instance. The conduits are screwed tightly against the outer plates 3 and 4 by means of the knurled knobs 36 and 37 on the conduits 34 and 35 respectively.

The center portions of conduits 34 and 35 have a number of openings 34a and 35a around the peripheries thereof which communicate with the openings or passages 38 and 39 in the saddle frame or bracket 36a. The frame in turn fits over the main fluid supply line 40 and is securely clamped thereto by a pair of clamping members 41 and 42 which fit around the supply line 40 and are fastened to the saddle frame by the bolts 43, 43a, 44 and 44a which pass through the clamping members and screw into the saddle frame.

The saddle frame 36a is positioned on the fluid supply line 40 so that the openings 38 and 39 therein coincide with the openings 45 and 46 in the periphery of the supply line.

The inner plate 5 has two openings or passages 47 and 48 drilled in the edge face thereof, which is at the top as viewed in Figure 2, opening 47 in the left side and extending downwardly at approximately a 45° angle and opening 48 in the right side and extending downwardly at approximately a 45° angle. Opening 47 communicates with the opening or passage 49, drilled outwardly toward the right side face of plate 5, as viewed in Figure 1. Passage 49 opens into the chamber for gears 12 and 13 where they mesh. Opening 48 communicates with the opening or passage 50, drilled outwardly toward the left side face of plate 5, as viewed in Figure 1. Opening 50 is positioned so as to open into the chamber for gears 9 and 10 where they mesh. The openings 47, 49 and 48, 50 form separate channels in the discharge plate or member 5.

When employing the dual pump for the manufacture of artificial filaments from viscose, for example, the operation is as follows: the viscose coming through the main line 40 passes up through the openings 38 and 39, through the conduits 34 and 35, through the channel comprising openings 26 and 27 to the pumping gears 9 and 10, and through the channel comprising openings 29 and 30 to the pumping gears 12 and 13. Both sets of pumping gears are of the same size and are driven at the same rate by the drive shaft 24 and gears 23 and 22, so that the viscose is delivered by the pumping gears under the same pressure and at the same rate to the channels comprising openings 49 and 50 in the discharge plate 5. The viscose passes out through openings 47 and 48, through the adapters 51 and 52 inserted into openings 47 and 48 respectively, through the alkali-resistant lines 53 and 54, through the filters 55 and 56, through lines 57 and 58 to the spinnerets 59 and 60 submerged in the coagulating bath 61. It is, of course, to be understood that the dual pump is easily adaptable to the pumping of other fluids and gases in other operations than that of producing artificial filaments and fibers.

If desired, the operation outlined above may be reversed. That is, the rotation of the drive shaft 24, and as a result the pumping gears, may be reversed and then member 5 becomes the intake plate and members 3 and 4 the discharge plates. In this instance, the fluid would flow through the channels formed by openings 47, 49 and 48, 50 to the pumping gears 12, 13 and 9, 10 respectively, and then be discharged through the channels in members 3 and 4, formed by the openings 27, 26, 28 and 30, 29, 31. When shaft 20 turns in a clockwise direction, as seen in Figure 2, the passages in the outer plates 3 and 4 will serve as intake conduits whereas the passages in center plate 5 will be discharge passages. However, when shaft 20 is reversed to turn counterclockwise in Figure 2 or clockwise in Figure 3, the passages in center plate 5 will be intake passages and the passages in outer plates 3 and 4 will be discharge passages.

In the illustrative embodiment of the invention shown in the drawing, the dual pump is pivotally mounted on the conduits 34 and 35 by reason of the ball and socket joint formed by the insertion of the conduits into the openings 28a and 31a in the faces of the intake plates 3 and 4 respectively. The pump is held down by its own weight so that gears 23 and 22 are in mesh. In addition, the ball and socket joints, formed by conduits 34 and 35 and members 3 and 4, are tight enough to prevent the disengaging of gears 22 and 23, when in operation. The pump may be lifted up out of engagement with the driving gear by hand or any other suitable means. Mounting the dual pump so that the same may be disengaged from the driving means when desired is particularly useful when a series of such pumps are being employed and all are being driven by the same drive shaft. In this way, if anything happens to any single dual pump, it may be disengaged without stopping the operation of the remaining pumps.

While the invention is primarily concerned with producing or pumping two streams of a liquid at the same rate and pressure from one pump, two streams may be pumped under different rates. This is accomplished by merely increasing or decreasing the thicknes of the separator plates or casings and the pumping gears associated therewith.

The dual pump of the present invention is simple in construction and inexpensive to manufacture, i. e., it is less costly than manufacturing two separate pumps. By employing the pump of the present invention, one is able to pump two streams of a liquid at the same rate and under the same pressure, thus alleviating the difficulty attendant upon any attempt to synchronize two separate pumps to pump two streams of a liquid at the same rate. Numerous other advantages of the invention will be obvious to those skilled in the art.

It should be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A constant ratio dual pump assembly for delivering two streams of a spinning fluid in the manufacture of artificial filaments and fibers comprising two outer plates and one center plate

spaced from each other, a gear housing compressed between each two adjacent plates having a double gear chamber therein and separating the plates, means for clamping the plates and housings together in fluid-tight relationship, a driven gear in the chamber of each housing, an idler gear in the chamber of each housing meshing with the driven gear, a driveshaft extending through the plates and the housings and keyed to the driven gear in each chamber, driving means for said shaft, a shaft journaling the idler gear in each chamber and supported in the plates, walls defining a separate conduit in each of the outer plates extending from an outwardly facing port in each plate to a port in each chamber, walls defining two separate fluid conduits in the center plate, one of said conduits extending from a port on the edge of the center plate to a port in the chamber of one housing and the other of said conduits in the center plate extending from a port on the edge of the center plate to a port in the chamber of the other housing, a bracket for the pump assembly in which the plates and housings as a unit are pivotally mounted, a pair of oppositely facing ball and socket joints extending

from said bracket and pivotally supporting the two outer plates at the outwardly facing port in each outer plate, and walls defining a fluid passage through said ball and socket joints.

2. A pump assembly in accordance with claim 1 in which the bracket is supported on a spinning fluid supply line, and walls defining a conduit affording communication from the interior of the spinning fluid supply line to the fluid passage through the ball and socket joints.

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