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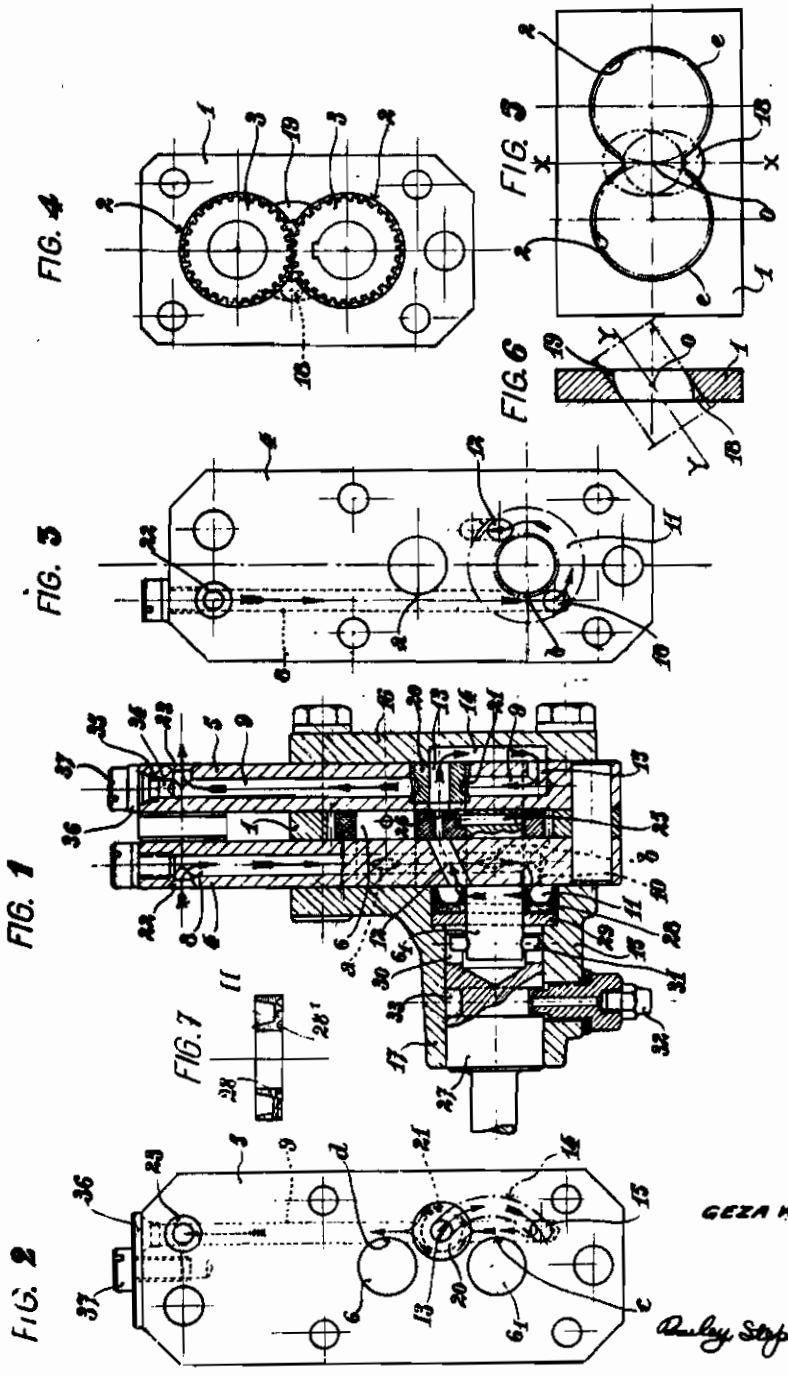

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ALIEN PROPERTY CUSTODIAN

GEAR PUMPS

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The present invention relates to gear pumps and more particularly to such gear pumps as are used industrially for displacing viscous fluids, for example fluids of this category employed for spinning artificial textile filaments and threads, and as are generally interposed between a master pressure pump and the spinning dies, the chief function of such gear pumps being to regulate the rate of delivery of the fluid.

An object of the invention is to provide for the aforesaid and like uses a gear pump having such an improved construction as to fulfil practical requirements under better conditions than similar pumps as used heretofore.

Another object of the invention is to provide an improved gear pump the structure of which is so devised as to cause the whole of the fluid flowing therethrough to perform during operation lubrication of at least some of the revoluble members of the pump and particularly of the gear shafts.

Another object of the invention is to provide a gear pump having such an improved structure as to damp away the fluid pulsations, thereby enhancing the steadiness in the rate of flow of the liquid and ensuring better spinning conditions when said liquid is used for the production of artificial textile filaments or threads.

A further object of the invention is to provide a gear pump of such improved construction as to enable the fluid to circulate therethrough directly without being hindered or throttled and without any whirling or stopping effect, thereby avoiding such sedimentations as might otherwise clog up the circuit or interfere with proper spinning conditions.

A still further object of the invention is to provide an improved gear pump of simple and rugged construction particularly well suited for the handling of viscous liquids used in the production of artificial textile filaments and threads and comprising self-contained means ensuring automatic flushing lubrication by the liquid itself and at the same time great regularity of flow.

With these and such other objects in view as will incidentally appear hereinafter, the invention comprises the novel construction, combination and arrangement of parts that will now be described with reference to the accompanying diagrammatic drawing exemplifying the same and forming a part of the present disclosure.

In the drawing:

Figure 1 is a vertical sectional view showing in its entirety an improved gear pump according to the invention comprising a body plate having recesses for the gears and side plates delineating and closing the pump body.

Figures 2 and 3 are elevational views showing the side plates.

Figure 4 is a side view showing the body plate separately.

Figure 5 is a diagrammatic elevational view showing the body plate, the other parts being omitted.

Figure 6 is a sectional view along the line X—X of Fig. 5.

Figure 7 is a sectional view of a modification of a detail of the pump.

Like reference characters designate like parts throughout the several views.

The constructional form of the invention illustrated in the drawing is a gear pump specially adapted for the handling of viscous liquids adapted to be spun into filaments or threads such for example as viscose, acetate, cupro-textile, artificial wool or the like.

Advantageously the pump body comprises a middle or body plate 1 formed with a pair of circular recesses 2 in which the gears 3 are snugly received. The middle plate 1 is closed and delineated sidewise by a pair of side plates 4, 5 through which are revolubly engaged the pins 6, 6_1 carrying the respective gears 3.

The side plates 4, 5 are hollowed to provide the suction duct 8 and the delivery duct 9 of the pump. The ducts 8, 9 preferably have their axes at right angles to the gear-carrying pins and have openings *a*, *b*, *c*, *d* which communicate with the holes in the side plates 4, 5 through which the pins 6, 6_1 are journalled.

Communication between the suction duct 8 and the suction chamber 10 of the pump takes place through a duct 10, a chamber 11 and a further duct 12. Likewise, communication between the delivery chamber 19 of the pump and the delivery duct 9 takes place through ducts 13, 14 and 15.

The chamber 11 is preferably formed in a separate front bracket 17, while the duct 14 is formed in a rear plate 16, said bracket and plate being bolted or otherwise fixedly secured to the side plates 4, 5 and pump middle plate 1.

As shown in Figs. 1 and 2, there is advantageously interposed on the delivery duct 9 intermediate the holes for the pins 6, 6_1 a ring or washer 20 having an annular groove 21 communicating with said duct 8. The ring or washer 20 may be axially bored to provide the duct 13 which communicates with the delivery chamber 19 of the pump and also with the duct 14.

The path of the liquid through the apparatus

shown in the drawing is as shown by the arrows and may be described as follows:

The liquid sucked in by the pump enters the apparatus through the inlet aperture **22** and flows through the duct **8**, then successively contacts or "licks" the front ends of the pins **6**, 6_1 where they are journalled in the side plate **4**. Thereafter the liquid enters the annular chamber **11** through the duct **10** and penetrates into the suction chamber **18** of the pump through the duct **12**. The liquid forced out of the delivery chamber **19** enters the duct **14** through the duct **13** bored in the ring **20** and then penetrates into the duct **9** through the duct **15**. After contacting and flushing the part of the pin 6_1 journalled in the side plate **5** and flowing through the groove **21** in the ring **20** (see Fig. 2) the liquid contacts or "licks" the part of the pin **6** journalled in the side plate **5** and is discharged through the outlet aperture **23**.

It will be seen that the whole of the liquid moved by the pump can thus contact or flush both ends of the gear-carrying pins **6**, 6_1 where they are journalled in the side plates **4**, **5**.

The circulatory circuit which has just been described presents amongst others the advantage of providing a through passage devoid of any throttling point and of giving rise to no whirling or stopping point where otherwise the liquid might settle down and build sediments which might choke proper flow and hinder suitable spinning operation.

Alternatively, the following constructional arrangements may be adopted:

The gears **3** may be so mounted or splined upon their operating pins **6**, 6_1 as to "float" upon them, the driving feathers **25** housed in said pins coacting with grooves **26** formed in the bore of said gears **3** so that no axial thrust can be transmitted to these gears.

In order to provide for the required degree of liquid tightness on that side where the pin 6_1 is driven by the outer control shaft **27**, elastic gasket **28** is provided so as to seal the chamber **11** on the front side. As shown in Fig. 1, said gasket comprises a U-shaped annulus and may be made for example of synthetic rubber.

Furthermore, owing to the fact that it contacts with the pumped fluid, said elastic gasket has the supplementary effect to damping the pulsations and to avoiding the irregularities of the rate of delivery of the pump.

In the constructional form shown, the gasket **28** is abutted against a washer **29** having a tight fit in a shouldered portion of the front bracket **17**.

In order to improve said damping effect of the gasket **28**, it is advantageous to provide the latter with grooves in one at least of the contact walls between said gasket and the washer **29**. Preferably, these grooves having a suitable shape, for example a circular (grooves 28_1, Fig. 7) or radial shape, will be situated in the bottom wall of said gasket **28**.

The shaft **27** which may be connected to the pin 6_1 in any approved way drives the latter advantageously as illustrated in Fig. 1 owing to co-action between grooves **30** in the rear end of said shaft and a key or cotter **31** set through the pin 6_1. The sectional area of the key or cotter **31** is preferably reckoned so that in case of jamming or of any abnormal resistance occurring in the pump operation, said key or cotter **31** should be sheared, thereby protecting the rest of the mechanism against any such undue stress as might otherwise seriously damage the most costly parts of the apparatus.

In accordance with another alternative feature of the invention, the shaft **27** is independently lubricated, for example by means of a lubricator **32** having a screw-threaded reduced shank engaged through a hole tapped in the bracket **17**, the extremity of said shank being in communication with a groove **33** in said shaft so as to hold the latter in proper longitudinal position.

Moreover, according to a particularly advantageous arrangement, the suction chamber **18** and delivery chamber **19** formed in the middle plate **1** are defined by walls extending askew and generated by the intersection of an oblique cylinder (as shown in chain lines in Fig. 6) or a skew prism with the cylindrical recesses **2** in which the gears **3** are accommodated, the geometrical axis Y—Y of said cylinder or prism being situated in the plane of tangence X—X of the pitch circles *e* of the gears **3** and passing through the point of contact O of the pitch circles located in the mean plane of said gears. The degree of slant of those edges which define the suction chamber **18** and the delivery chamber **19** with respect to the gear teeth should be preferably so selected as to cause the nicks of two consecutive teeth to be continuously in communication with said chambers **18**, **19**. The purpose of this arrangement is to regularize the rate of delivery of the pump.

According to a further alternative constructional form, regularity of the rate of delivery may be still further improved (this being of the utmost importance for spinning) by interposing either on the suction duct or preferably on the delivery duct of the pump a second resilient damping member such as a rubber pad or stopper **34** arranged in the end of the duct **9** and providing for the resilient material of which it is made an accurately bored recess **35**. Said stopper **34** is fitted on a cap plate **35** fixed to the side plate **5** by means of a screw **37**.

It will be seen that owing to the foregoing construction, the several objects of the invention are fulfilled inasmuch as it becomes possible by simple and cheap manufacturing means to provide a self-lubricating gear pump using the pumped liquid as a lubricating medium and possessing great regularity of rate of liquid delivery, thereby ensuring a major advantage particularly where the pump is intended to feed liquid to spinning dies in the production of artificial textile materials.

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