Feb. 14, 1933. C. W. LAWSER 1,897,560

GEAR PUMP

Filed Oct. 7, 1930

FIG. I.

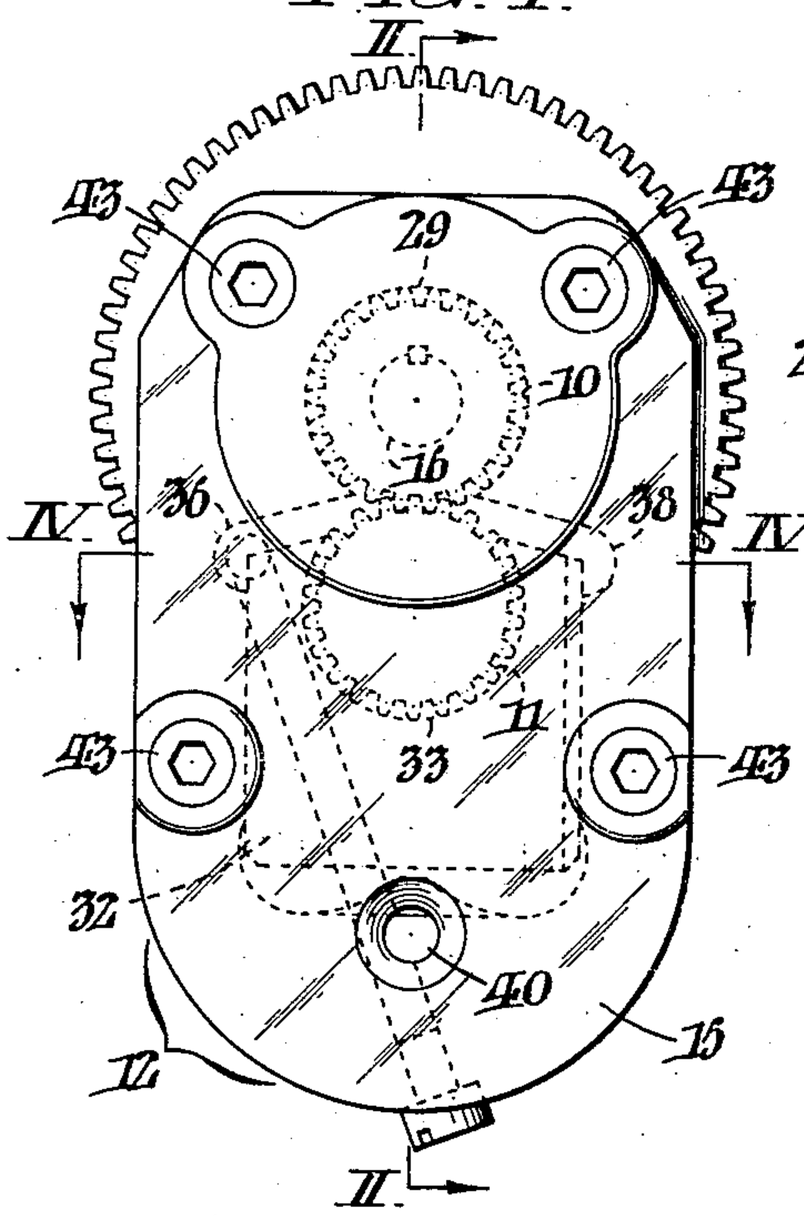


FIG. II.

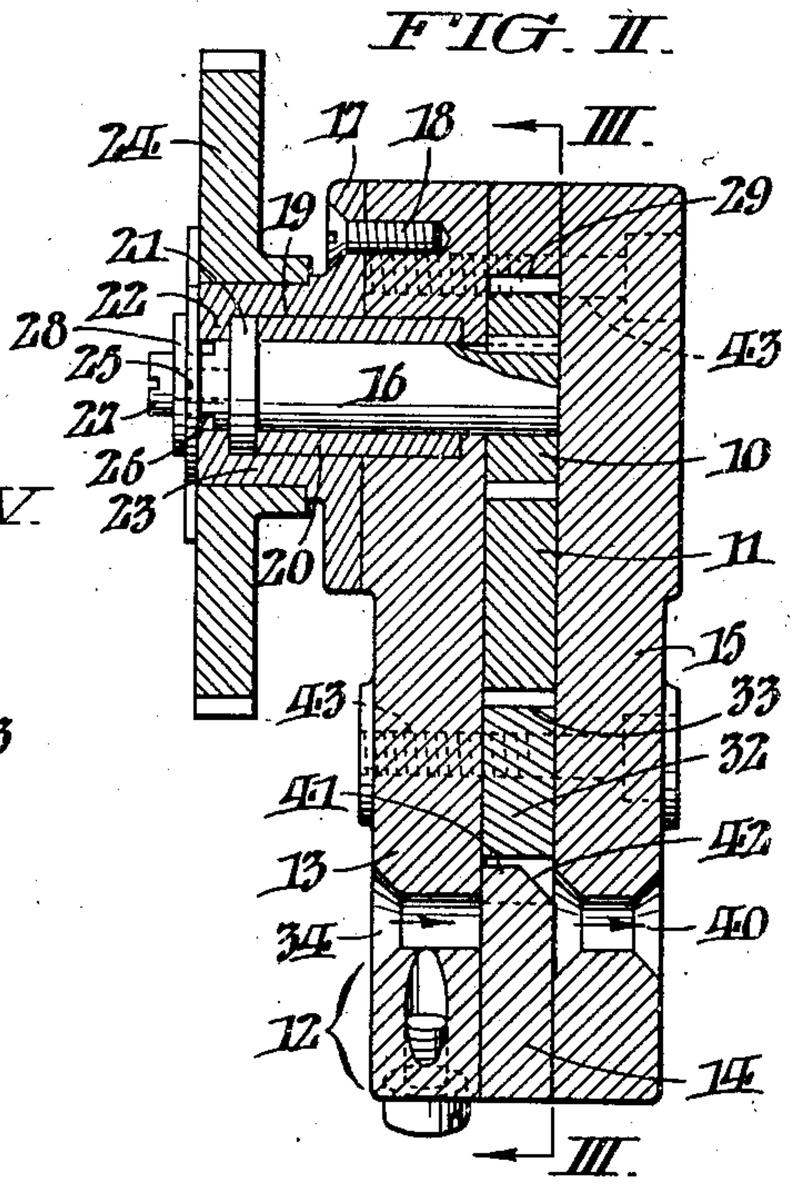


FIG. III.

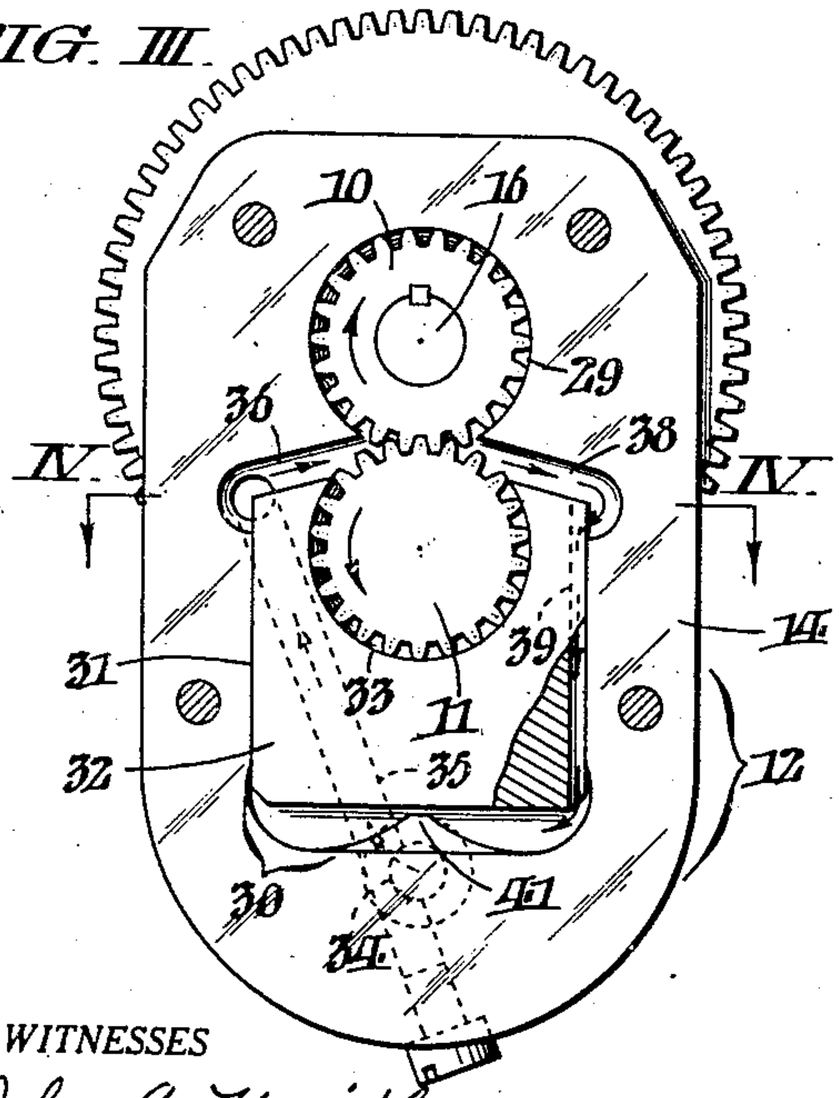


FIG. IV.

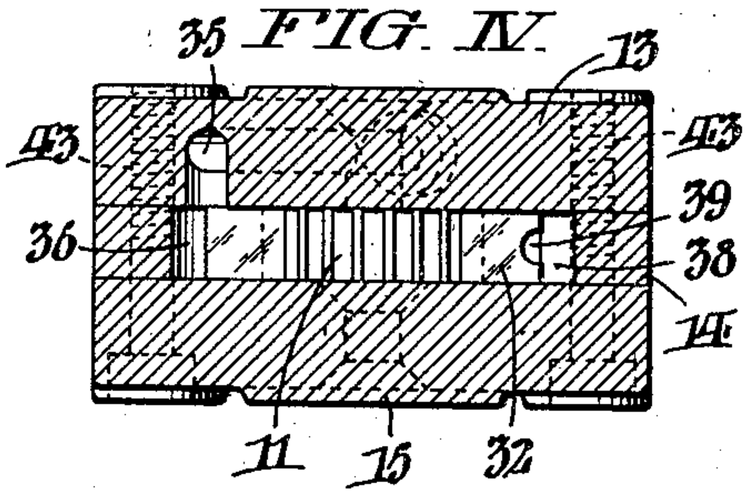
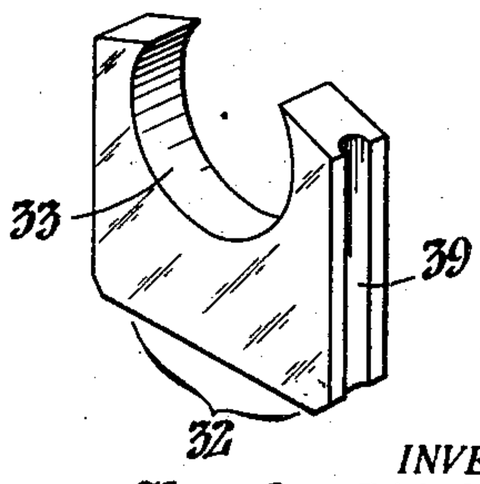


FIG. V.



WITNESSES

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Patented Feb. 14, 1933

1,897,560

UNITED STATES PATENT OFFICE

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GEAR PUMP

Application filed October 7, 1930. Serial No. 486,885.

This invention relates to gear pumps; and has more particular reference to gear pumps intended to be used in connection with machinery for spinning artificial silk or "rayon" as it is commercially termed.

In the manufacture of rayon, the raw viscid cellulose solution is delivered at a relatively high pressure for expulsion through the fine openings of the spinnerettes, and thereby converted into multiple threads or filaments which are combined in various numbers and passed through a setting bath incident to formation into yarns. With gear pumps ordinarily used heretofore in rayon spinning machines to deliver the cellulose solution to the spinnerettes, the gears were positionally fixed, and great difficulty has been experienced in securing a uniform delivery of the cellulose on account of leakage across the region of intermesh of the two gears due to allowance of excessive working circumferential clearances and to unavoidable inaccuracies in the gears themselves, regardless of very careful machining.

My invention is directed toward overcoming the above indicated deficiencies through provision, in gear pumps, of structural refinements whereby one gear is floatingly supported and at all times yieldingly held in intimate intermeshing relation with the companion gear under the influence of the delivery pressure to the pump, so that the possibility of leakage across the region of mutual contact of the gears is effectively precluded.

In the attached drawing, Fig. I is an elevation of a gear pump embodying the present improvements.

Fig. II is a vertical sectional view of the pump taken as indicated by the arrows II—II in Fig. I.

Fig. III is an elevation of the pump with one of the side components of its casing removed, or viewed as indicated by the arrows III—III in Fig. II.

Fig. IV is a cross sectional view of the pump taken as indicated by the arrows IV—IV in Figs. I and III; and,

Fig. V is a perspective view of a piston element that carries the floating gear of the pump.

With more detailed reference to the several illustrations, the intermeshing gears of the pump are designated respectively by the numerals 10 and 11, and shown as being enclosed in a casing 12 which is composed of three plate-like sections or components 13, 14 and 15. The upper gear 10 is splined to a shaft 16 which extends outward through the side component 13 of the casing 12, and through a bearing member 17 separately attached to said component by screws, whereof one is indicated at 18 in Fig. II. Lodged in an internal circumferential recess 19 of the shaft bore jointly afforded by the casing component 13 and the bearing member 17, is a renewable bearing sleeve 20. The shaft 16 is retained in the assembly through engagement of an integrally formed collar 21 adjacent the outer end thereof between the corresponding end of the sleeve 20 and an inward circumferential flange 22 of the bearing member 17. Rotatably supported on the boss 23 of the bearing member 17 is a driving gear wheel 24. This driving gear wheel 24 has a key connection with a coupling disk 25, which is in turn engaged with a squared portion 26 of the shaft 16, and held in place on the latter by a screw 27 and washer 28. As best shown in Fig. III, the gear pinion 10 is confined within a circular bight 29 of a hollow 30 within the casing 12, said hollow being afforded by an irregular opening in the medial component 14, and walled in by the side components 13 and 15 of said casing, see Figs. II and IV. Referring again to Fig. III, it will be observed that the hollow 30 of the casing 12 also has a straight wider portion 31 beneath the circular bight 29, previously referred to, to accommodate with a snug sliding fit, a piston member 32 which

is generally rectangular in configuration and formed at the top end with a circular bight 33 to confine the gear 11.

The fluid to be pumped enters through an inlet port 34 in the side component 13 of the casing 12, and communicates by way of a connecting duct 35, with the suction chamber 36 of the pump defined within the casing by a lateral recession of the hollow 30 at the region of intermesh of the gears 10 and 11. From the suction chamber 36, the fluid is carried by the teeth of the gear wheels 10 and 11 around the circular bights 29 and 33, respectively of the intermediate casing component 14 and the piston member 32, to the pressure chamber 38 of the pump which is defined by a lateral recession of the casing hollow 30 opposite the suction chamber 36. From the pressure chamber 38, the fluid flows downward through a vertical passage constituted by a groove 39 in one side edge of the piston member 32, see Figs. III, IV and V, and is thereby conducted to the bottom of the straight portion 31 of the casing hollow 30 beneath said piston member and finally discharged through an outlet port 40 in the side wall component 15 of the casing 12.

By virtue of the described arrangement, it will be seen that the piston member 32 is subjected to and influenced by the delivery pressure of the pump, and thereby urged upward in the straight portion 31 of the casing hollow 30. Accordingly, the floating gear 11 carried by the piston member 32 is at all times maintained in intimate meshing relation with the positionally fixed gear wheel 10, so that the possibility of leakage between the suction and pressure chambers 36 and 38 of the pump is effectively obviated.

The movement of the piston member 32 is limited by a central upward lug projection 41 at the bottom of the casing hollow 30, said projection being beveled off as at 42 in Fig. II to provide communication between said casing hollow and an outlet port 40 in the side component 15 of the casing 12. The casing components 13, 14 and 15 may be detachably secured together in any convenient manner, for example, by socket wrench-screw bolts 43 whereof the heads are recessed in the side component 15 of the casing 12, and whereof the threaded shanks take into tapped openings in the opposite side component 13.

Having thus described my invention, I claim:

1. In a gear pump, a casing; a pair of intermeshing gears, one of said gears being positionally fixed within the casing; and a rectangular piston member within the casing floatingly carrying the other gear in a circular bight therein, said piston member being responsive to the delivery pressure of the pump by way of a passage therein for capacity to maintain the last mentioned gear in intimate meshing relation with the positionally fixed gear.

2. In a gear pump, a casing; a pair of intermeshing gears, one of said gears being confined to rotate within a circular bight of a hollow within the casing; a rectangular piston block with a circular bight therein accommodating the second gear, said piston being slidable with a snug fit in a straight portion of the casing hollow and having a groove along one edge constituting a fluid flow passage between the pressure chamber of the pump and a space behind the piston, whereby the last mentioned gear is maintained in intimate meshing relation with the first mentioned gear by the delivery pressure of the fluid being pumped, and a beveled abutment in the casing hollow to limit movement of the piston while providing communication between said hollow and the outlet port of the pump.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this third day of October, 1930.

CHARLES W. LAWSER.