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C. F. TOPHAM

PUMPING APPARATUS FOR VISCOUS LIQUIDS

Filed Feb. 6, 1923

Fig. 1.

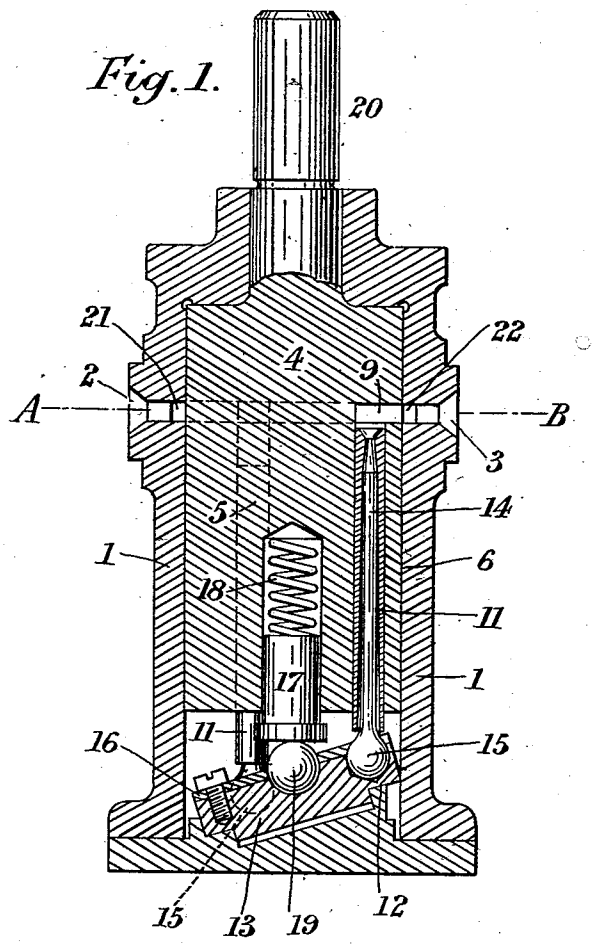
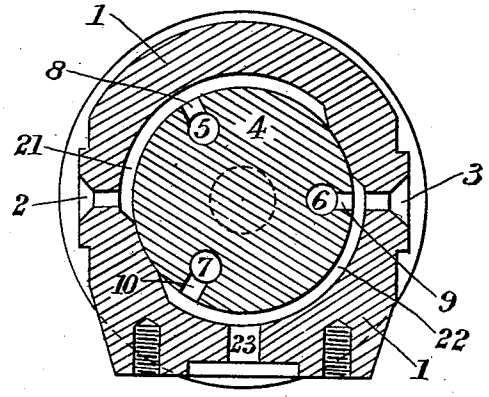


Fig. 2.



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PUMPING APPARATUS FOR VISCOUS LIQUIDS.

Application filed February 6, 1923. Serial No. 617,315.

To all whom it may concern:

Be it known that I, CHARLES FRED TOPHAM, a subject of the King of Great Britain, residing at The Gable, Holbrook Lane, Coventry, in the county of Warwick, England, have invented new and useful Improvements in Pumping Apparatus for Viscous Liquids, of which the following is a specification.

This invention relates to apparatus of the type described in the specification of British Letters Patent No. 17,876, A. D. 1907, the object of the present invention being to provide an improved pump of the said type which improved pump is very simple and inexpensive in construction and one which will operate very efficiently and with great ease.

The apparatus to which this invention relates comprises a cylindrical casing having, rotatable in it, a cylindrical body with borings parallel with its axis and constituting cylinders in which plungers are caused to reciprocate in such a way that the said plungers draw in the matter being pumped (such for instance as viscose being used in the manufacture of artificial silk) and afterwards force it out, as passages in the cylindrical body, communicating with the cylinders therein, successively pass inlet and outlet passages in the casing. According to this invention the plungers are reciprocated, each positively in both directions, by a cam-plate rotating upon an inclined cam, or seating, at the end of the casing. The said plungers are hollow and each of them is provided with an internal flexible, or flexibly connected, rod attached to the plunger near its head, the other end of the said rod being connected with the cam-plate so that the plungers are reciprocated by the cam-plate, the cam-plate being held to its bearings on the inclined cam, or seating, by a central, and preferably resiliently mounted, piece carried axially in the cylindrical body and bearing by spring pressure upon the central part of the cam-plate, preferably with the intervention of a ball engaging a socket in the cam-plate.

The following description of a construction of pump in accordance with this invention, together with the accompanying drawing, will make clearer the nature of this invention, and explain how it can be performed, but I do not limit myself to the precise details which are hereinafter described.

In the drawings, Figure 1 shews in vertical section and Figure 2 in transverse section (on the line A B Figure 1) sufficient of the apparatus in accordance with this invention.

The pump-casing 1 is provided with concentric opposite passages 21 and 22 (respectively in communication with the pump inlet 2 and the pump outlet 3) and contains the cylindrical body 4 capable of being rotated in the said casing, by any usual, or suitable, means and provided (in the case illustrated) with three borings 5, 6 and 7, constituting cylinders parallel with the axis of the casing 1 and cylindrical body 4, passages 8, 9 and 10 from the said cylinders 5, 6 and 7 coming successively into communication with the said inlet 2 and outlet 3, through the passages 21 and 22, as the cylindrical body 4, is rotated. There is a tubular, or hollow, plunger 11 in each of the said cylinders, these plungers being reciprocated so that they make their suction strokes when in communication with the inlet 2 and their forcing, or discharge, strokes when in communication with the outlet 3. Between the inner end of the cylindrical body 4, and the opposed end of the casing is a space and on the cover of the casing at this end is a stationary cam, or inclined cam, seating, 12, opposite to the ends of the cylinders and plungers, and upon this cam, or seating, is mounted a cam-plate 13 capable of rotation upon the said cam, or seating, 12. Each plunger 11, is connected with the cam-plate 13, by means of a flexible rod 14, terminating in a spherical end-piece 15 which is seated in a corresponding recess in the cam-plate 13, and retained therein by a cover 16 secured to the cam-plate 13, by screws, for instance, the said cover having openings in it through which the flexible rods can pass, the said openings being of a size less than the diameter of the spherical end-pieces 15 of the plunger rods so as to retain the said end-pieces in connection with the cam-plate. The other ends of the flexible rods 14 are riveted into the heads of the plungers 11. The interiors of the plungers can be bored tapering inwards towards the ends where the rods 14 are connected, to afford space to accommodate the flexing movements of the plunger-rods. As the cam-plate 13 is ro-

tated on the cam, or inclined seating, 12, the portions thereof to which the plungers are connected will successively approach to, and recede from, the end of the cylindrical body 4, thereby positively and directly moving each of the plungers in both the suction and forcing, or discharging, directions in the requisite order in their cylinders.

It is preferred to prolong the open end-portion of the plungers 11 so that in all positions they protrude sufficiently from the cylinders to prevent the plunger-rods 14 from having too great deflection.

The cam-plate 13 can be maintained in contact with the cam, or inclined seating, 12 by means of a piece 17 projecting from an axial hole in the cylindrical body 4 and pressed outwards by a coiling spring 18, the protruding end of the said piece bearing upon a ball 19, which fits in a spherical recess in the centre of the cam-plate. Although in the pump illustrated in the drawings, rotary motion is transmitted from the rotating cylindrical body 4 to the cam-plate 13 through the medium of the plungers and plunger rods, the invention is not necessarily limited to this precise method of causing the cam-plate to rotate with the cylindrical body.

As in the other pumps of this type, the cylindrical body 4 has a protruding shaft 20, which can be driven by any suitable means to work the pump.

An opening 23, adapted for an air vessel, is shewn in Figure 2 branching off from the passage 22 in communication with the outlet 3.

The invention is not limited to the precise details hereinbefore described and illustrated as they can be varied without departing from the nature of the invention; for instance, the lower end of the pump may be made adjustable, as shewn in Figure 6 of the aforesaid specification No. 17876, A. D. 1907; and a liner may be employed between the casing and the cylindrical body, as illustrated in Figure 5 of the said specification.

Although the pump described is provided with three borings constituting cylinders other numbers can be used, but it is preferred to have at least three of such cylinders.

What I claim is:—

1. In apparatus for pumping viscous liquids, a pump casing having inlet and outlet ports, a rotatable body fitting within the casing, said body having longitudinally extending cylinder openings and associated ports, the latter successively establishing communication with the ports in the casing on the rotation of said body with respect to the casing, hollow plungers reciprocating in said cylinder openings, the length of said plungers being considerably greater than their diameter, a rotatable cam plate inclined to the axis of the rotatable body, and rods extending from said hollow plungers and flexibly connecting the latter with the inclined cam plate, and means for rotating the body member within the casing to cause the hollow plungers to reciprocate by reason of their connection with the cam plate.

2. In apparatus for pumping viscous liquids a pump casing having inlet and outlet ports, a rotatable body fitting within the casing, said body having longitudinally extending cylinder openings and associated ports, the latter successively establishing communication with the ports in the casing on the rotation of said body with respect to the casing, hollow plungers reciprocating in said cylinder openings, the length of said plungers being considerably greater than their diameter, a rotatable cam plate inclined to the axis of the rotatable body, and flexible rods extending from said hollow plungers to the inclined cam plate and flexibly connected with the latter, and means for rotating the body member within the casing to cause the hollow plungers to reciprocate by reason of their connection with the cam.

3. In apparatus for pumping viscous liquids, a pump casing having opposite bosses apertured to afford inlet and outlet ports, a rotatable body fitting within the casing, said body having longitudinally extending cylinder openings and associated ports, the latter successively establishing communication with the ports in the casing on the rotation of said body with respect to the casing, hollow plungers reciprocating in said cylinder openings, the length of said plungers being considerably greater than their diameter, a rotatable cam plate inclined to the axis of the rotatable body, and flexible rods jointed to said cam plate and extending therefrom toward the heads of the hollow plungers and connected thereto, and means for rotating the body member within the casing to cause the hollow plungers to reciprocate by reason of their flexible connection with the cam plate.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES FRED TOPHAM.

Witnesses:

J. ALEC. LLOYD,

ANNIE L. WADE.