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COMBINED OSCILLATORY RECIPROCATORY SELF CENTERING PUMP

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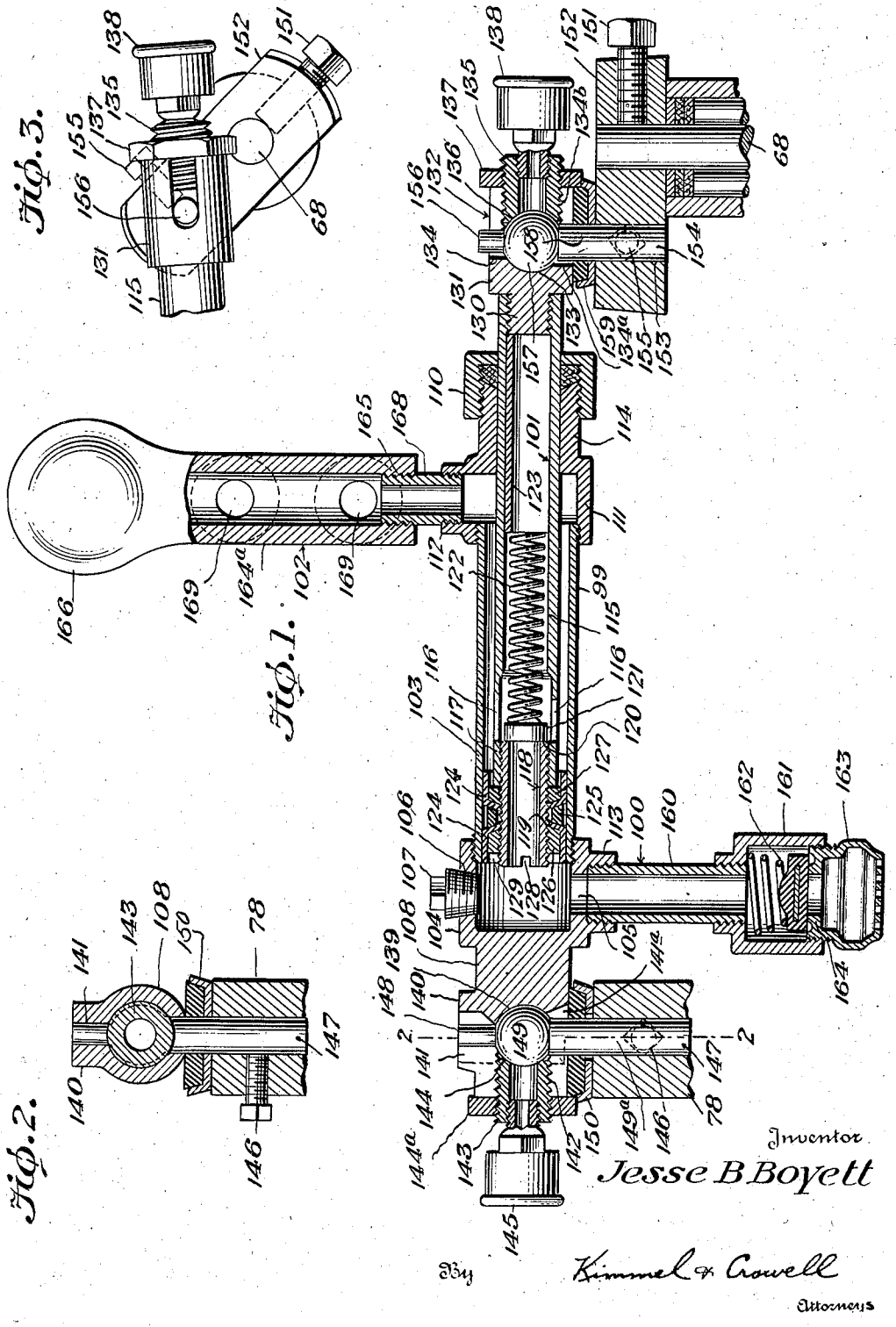


Fig. 1.

Fig. 2.

Fig. 3.

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COMBINED OSCILLATORY RECIPROCATORY SELF-CENTERING PUMP

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2 Claims. (Cl. 103—178)

My invention relates to a combined oscillatory reciprocatory self-centering pump.

The pump structure, in accordance with my invention is designed primarily for use in connection with machines for the spraying of plants by any suitable solution for relieving them of diseases, noxious insects and the like, but it is to be understood that a pump, in accordance with my invention is to be used in any connection or for any purpose for which it is found applicable.

The object of my invention is to provide, in a manner as hereinafter set forth an oscillatory-reciprocatory self-centering pump for expelling liquids, fluids and solutions.

A further object of my invention is to provide, in a manner as hereinafter set forth, an oscillatory-reciprocatory self-centering pump having a valve controlled tubular combined suction and expelling plunger.

A further object of my invention is to provide, in a manner as hereinafter referred to a pump of the class referred to including a reciprocatory plunger operated without the employment of connecting rods and with the pump so constructed, so arranged and so supported whereby side strain is completely eliminated on the plunger during the operation of the latter resulting in the life of the plunger being materially increased.

A further object of my invention is to provide, in a manner as hereinafter set forth an oscillatory-reciprocatory pump which can be mounted horizontally, vertically or in any other position suspended at its ends upon universal joint connections having means to prevent the pump from rocking during the operation thereof.

A further object of my invention is to provide, in a manner as hereinafter set forth, an oscillatory-reciprocatory pump suspended at one end upon a universal joint connection to form a pivot for said end and at its other end suspended upon a universal joint connection carried by the operating means for the plunger of the pump thereby eliminating the employment of connecting rods.

Further objects of my invention are to provide, in a manner as hereinafter set forth, an oscillatory-reciprocatory self-centering pump which is simple in its construction and arrangement, strong, durable, compact, thoroughly efficient in its use, readily assembled, conveniently repaired when occasion requires and comparatively inexpensive to set up.

With the foregoing and other objects which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically described, and are as illustrated in the accompanying drawing, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawing:

Figure 1 illustrates in longitudinal section a self-centering pump in accordance with my invention,

Figure 2 is a section on line 2—2, Figure 1, and

Figure 3 is a fragmentary view in top plan illustrating the driven end of the pump.

There is illustrated an upstanding rotatable operating shaft 68 for the pump and which may be driven from any suitable means (not shown). There is also illustrated an upstanding stationary socket forming member 78.

The pump structure, which is mounted in a manner to provide for the bodily oscillation thereof includes a pump body 99, a valve controlled suction pipe 100, a reciprocatory plunger 101 and an air chamber forming element 102. The pump body 99 consists of cylinder 103 open at each end, a hollow head 104 open at its rear, formed with an opening 105 in its bottom and an opening 106 in its top normally closed by a plug 107, an outwardly directed extension 108 at the front of the head 104 and a stuffing box element 110 secured to and extending rearwardly from the inner end of cylinder 103. The element 110 is formed with a portion 111 of enlarged inner diameter provided at its top with an upstanding tubular extension 112 which is internally threaded. The cylinder 103 extends into the inner side of head 104 and threadedly engages therewith. The head 104 has an integral internally threaded collar 113 at its bottom which communicates with opening 105. The inner diameter of the part 114 of stuffing box element 110 corresponds to that of the major portion of the length of the plunger 101.

The plunger 101 comprises a tubular member 115 which is open at each end and its body, in proximity to its forward end, is provided with a pair of diametrically opposed discharge outlets 116. The body of the member 115, at its forward end, is reduced, as at 117, to form the forward portion of member 115 of greater inner diameter than the remaining portion of said body. The outlets 116 are arranged in the reduced forward end 117 adjacent the forward end of member 115. The forward and rear ends of member 115 are internally threaded. The member 115 travels against the inner face of the part 114 of element

110. Extending into and threadedly engaging with the forward end of member 115 is the plunger head 118 consisting of a peripherally threaded cylindrical member 119 having its rear end constituting a valve seat 120 for a spring controlled check valve 121 arranged within member 115. The portion of enlarged inner diameter of member 115 provides a clearance for valve 121. The controlling spring 122 for valve 121 is arranged within member 115 and is interposed between valve 121 and an abutment 123 which is positioned in and bodily moves with member 115. Arranged upon member 119 is a pair of oppositely disposed spaced cup washers 124. A spacer 125 is arranged between washers 124. Threadedly engaging with members 119 is a pair of lock nuts 126, 127. The nut 126 locks the member 119 to member 115. The nuts 126, 127 lock the cup washers on member 119. The latter is formed with notches 128 to facilitate the screwing thereof into member 115. The nut 126 has notches 129 to facilitate the screwing thereof on member 119. The washers 124 travel against the inner face of cylinder 103. The rear end of member 115 is closed by the stem 130 which projects from the head 131 of a plug 132. The head 131 is formed with a spherical-shaped socket 133, a slot 134 in its top opening into socket 133, an opening 134a in its bottom leading from socket 133 and an annular socket 134b extending from the outer end of head 131 and communicating with socket 133. The wall of socket 133 is threaded. Threadedly engaging with the wall of socket 133 is a peripherally threaded tubular wear take-up element 135 having a beveled inner end 136. The element 135 is secured in position by a lock nut 137. Extending into the inner end of element 135, as well as being secured thereto is a lubricant cup 138. The extension 108 is provided intermediate its ends with a spherical shaped socket 139, a skeleton rectangular boss 140 on its top, a slot 141 opening into the boss and into socket 139, a slot 141a opening at the bottom of the extension and into socket 139 and a socket 142 opening into socket 139. The wall of socket 142 is threaded. Threadedly engaging with the wall of socket 142 is a peripherally threaded tubular wear take-up element 143 having a beveled inner end 144. The element 143 is secured in position by a lock nut 144a. Extending into the outer end of element 143, as well as being secured thereto, is a lubricant cup 145.

Mounted in the socket forming member 78, as well as being secured thereto by a set screw 146, is a vertically disposed post 147 having a reduced upper end part 148 and a spherical enlargement 149 from which the part 148 extends. The enlargement 149' is mounted in the socket 139. The part 148 extends through slot 141 into boss 140. The part 149a of post 147 extends downwardly through slot 141a. Interposed between extension 108 and socket forming member 78 is a grease retainer 150 through which extends part 149a of post 147. The extension 108 and post 147 coact to provide a universal joint supporting connection or pivot for the forward end of the pump structure and the tank.

The upper end of shaft 68 has secured thereto by a set screw 151 a crank arm 152 formed with a vertical opening 153 into which the lower end of a vertically disposed shiftable post 154 is anchored to arm 152 by a set screw 155 whereby the post 154 will be bodily carried with arm 152. The post 154, at its upper end, has a reduced part 156. The post 154 is also provided with a spherical enlargement 157 from which part 156 extends upwardly. The enlargement 157 is arranged in socket 133. The part 156 extends into the slot 134. The part 158 of post 154 extends downwardly through opening 134a. Interposed between head 131 and arm 152 is a grease retainer 159 through which extends the part 158 of post 154. The retainer 159 is carried by crank arm 152. The plug 132 coacts with the post 154 to provide a universal joint supporting connection between the rear end of the pump structure and its operating means.

The universal joint supporting connections form a centering means for the pump plunger 101 with respect to the pump body and the latter with respect to the plunger during the oscillatory movement of the pump structure simultaneously with the reciprocatory movement of the plunger. The universal joint supporting connections also eliminate the employment of connecting rods for the pump structure, as well as eliminate excessive wear and side strain on the plunger during the reciprocation of the latter. The adjustable wear take-up elements compensate for wear of the spherical enlargements of the posts and the walls of the sockets in which said enlargements are seated.

The suction pipe 100 which is adapted to lead from a source of supply is of suitable length to depend into such source, and it includes an upstanding tubular pipe member 160 open at and provided with peripheral threads at each end and which may be of rigid or flexible material. The upper end of member 160 is secured to collar 113. The lower end of member 160 communicates with and is connected to the housing 161 of a spring controlled metallic reinforced resilient check valve 162 to prevent the solution from running back into the source of supply on the expelling stroke of the plunger. Secured to the lower end of and depending from housing 161 is a strainer element 163 providing a seat for valve 162.

The air chamber forming element 102 consists of an upstanding body 164a having a tubular part 165 which opens at its upper end in a hollow spherical enlargement 166. The part 165 and enlargement 166 provide the air chamber. The part 165 is open at its lower end and has connected to such end a tubular nipple 168 which is connected to and opens into the tubular extension 112 of element 110. The part 165 is formed with openings 169 which are adapted to communicate with discharge lines not shown. In certain uses or applications of this pump structure, it may not be necessary to have an air chamber mounted on the pump, and therefore the air chamber herein described may or may not be included in the general structure according as use or application of the pump may require.

The outlets 116, cylindrical member 119, spring controlled valve 121 and abutment 123 provide the plunger with a valve controlled passage between the suction pipe 100 and the outlet of the pump body 99.

On the suction stroke of the plunger, the valve 121 is closed and the solution is drawn into the intake end of cylinder 103 and also into the head 118. The solution drawn into the cylinder on the suction stroke of the plunger is shut off from the air chamber by the cup washers and the closed position of valve 121. On the expelling stroke of the plunger the solution passes through head 118, unseats valve 121 and passes through outlets 116 to the air chamber and is discharged from the latter. The valve 162 is opened on the suction stroke of the plunger but is closed on the ex-

pelling stroke of the latter. After the initial operation of the plunger there will always be at the rear of the cup washers a body of solution to provide for a continuous discharge on the operation of the machine. The pump cylinder is oscillated during the operation of the pump and simultaneously with the plunger.

What I claim is:

1. In a pump structure, a horizontally disposed oscillatory hollow body provided with an intake and an outlet, a combined oscillatory-reciprocatory plunger operating within and bodily oscillating said body in unison therewith, an upstanding horizontally revoluble means at the outer end of the plunger, and an upstanding stationary means at that end of said body opposite the outer end of the plunger, said revoluble and stationary means coacting for centering the plunger during its operation, said revoluble means imparting a combined oscillatory-reciprocatory movement to the plunger, and said stationary and revoluble means providing supports for said body and plunger.

2. In a pumping structure, a head having a hollow portion open at one end, said portion being formed with an intake at right angles to said end, means for pivotally mounting said head outwardly adjacent to said hollow portion, a cylinder open at each end and connected at one end to the said end of said portion, a hollow outlet structure encompassing and connected to the other end of the cylinder, said structure extended from and permanently communicating at its inner end with the said other end of the cylinder, a hollow plunger structure operating in said cylinder and through the inner end of said outlet structure, said plunger structure formed of two parts of different outer diameters, said part of smaller diameter bearing against the inner face of and extending inwardly and outwardly with respect to the inner end of said outlet structure, said part of larger diameter bearing against the inner face of said cylinder, said part of reduced outer diameter being provided intermediate its ends with means for establishing communication between the interior of the plunger structure and said cylinder, said plunger structure being provided therein with a valve controlled fluid conductor between its inner end and said means for controlling communication between said hollow portion and said means, an eccentrically mounted revoluble member, a pivot fixed to said member, and means for loosely connecting said pivot with and for closing the outer end of the plunger structure.

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