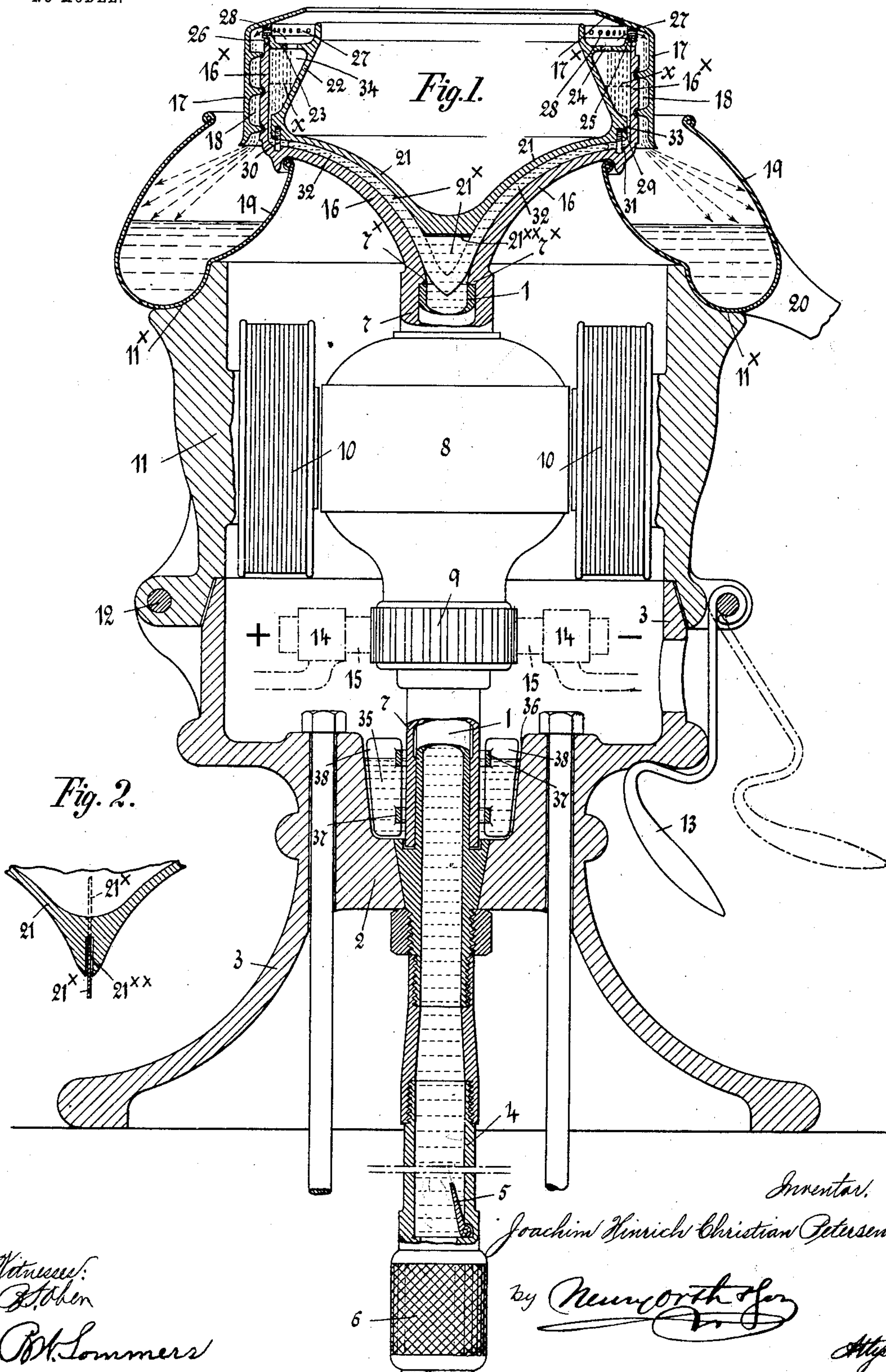


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CENTRIFUGAL PUMP.

APPLICATION FILED OCT. 15, 1902.

NO MODEL.





# UNITED STATES PATENT OFFICE.

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## CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 735,901, dated August 11, 1903.

Application filed October 15, 1902. Serial No. 127,416. (No model.)

*To all whom it may concern:*

Be it known that I, JOACHIM HINRICH CHRISTIAN PETERSEN, a subject of the German Emperor, and a resident of Hamburg, in the German Empire, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

The present invention relates to improvements in centrifugal pumps of that class in which the fluid by the rapid rotation of a suction-head arranged above the top end of the suction-pipe is caused to ascend through a central suction-pipe and is driven outwardly through the chamber or outlet-passage of the said suction-head into a suitable discharge-gutter.

The object of the improvements is to provide means whereby the refilling of the pumping device with fluid (which filling up has been up to date absolutely necessary for the priming or starting of such pumps) may be dispensed with and the pump set in operation at any time by simply starting the motor driving the suction-head.

The invention consists in providing within the suction-head above its funnel or cone-shaped suction-chamber and in communication with the latter and the discharge-ways of the suction-head an annular chamber, in which when the motor of the pump is stopped and the foot-valve of the suction-pipe closes the necessary amount of fluid for priming or starting the pump is retained.

With this end in view my invention comprises also the details of construction, combination, and arrangement of parts, substantially as hereinafter fully set forth, and particularly pointed out in the claims.

The rotatable sleeve carrying an armature and field-magnets secured to the casing form subject-matter in my application, Serial No. 84,965, filed December 6, 1901.

In the accompanying sheet of drawings I have shown in Figure 1 a central vertical section of a centrifugal pump constructed in accordance with and embodying my invention. The pump is supposed to be in operation. Fig. 2 is a detailed view showing the point of the cone-body inserted into the suction-head in cross-section, taken at right angles to the section shown in Fig. 1.

Similar numerals refer to similar parts.

The suction-pipe 1 is fastened by suitable means in the base or partition 2 of a suitable frame or standard 3. To the lower end of the suction-pipe 1 is connected the pipe-conduit 4, leading to the place from which the fluid is to be pumped. This pipe-conduit 4 is provided in well-known manner with a foot-valve 5 and a strainer 6, both of well-known construction.

Upon the suction-pipe 1 is rotatably mounted a socket 7, carrying an armature 8 and a commutator 9 of a suitable electric motor, the electromagnets 10 of which are fastened to a preferably cylindrical casing 11, fitting over and resting upon the upper edge of the frame 3. The casing 11 is hinged to the frame at 12 and provided with a turn-handle 13, adapted to clamp the case 11 to the frame 3, as this is obvious from the drawings without further explanation.

Within the cylindrical top chamber of the frame 3 there are mounted the brush-holders 14, supporting the brushes 15, sliding upon the commutator. The conducting-wires leading to and connected with the said brushes are not shown in the drawings.

The socket 7, which may be suspended from the suction-pipe 1 by means of a shoulder 7<sup>x</sup>, provided in the bore of the said socket, carries the suction-head proper. This latter consists of a bell or funnel shaped body 16, having an upright flange 16<sup>x</sup> and being attached to the upper end of the socket in any suitable manner, but preferably made in one piece therewith, as shown in the drawings. Upon a thread provided on the outer periphery of the flange 16<sup>x</sup> is screwed an inverted cup 17. The threads of the flange 16<sup>x</sup> and cup 17 are so shaped and dimensioned as to leave a spiral discharge passage or passages 18 between the flange 16<sup>x</sup> and cup 17.

Below the suction-head or, more properly, the discharge-ways 18 is arranged a suitable annular gutter 19 for collecting the fluid discharged through the helical ways 18, as will be explained later on. The gutter 19, being provided with a spout 20 or the like, rests upon a suitable bearing or supporting-face 11<sup>x</sup> of the annular casing 11, surrounding or encircling the electric motor.

In the interior of the bell-mouthed body 16



is inserted a hollow whip-top-like body composed of a cone-shaped lower part 21 and a truncated cone-shaped upper part 22, both parts being suitably united with each other at their bases. The external periphery of the cone part 22 is provided with a protruding horizontal plate or gallery 23, having a plurality of perforations or outlet-holes 24 and an annular hook-shaped edge or lip 25, overlying or resting upon the upper edge of the flange 16<sup>x</sup> or a packing 26, respectively. When the inverted cup 17 17<sup>x</sup> has been screwed down, its annular rib 27, provided with outlet-passages 28, is bearing upon the lip 25, and by pressing the same against the packing-ring and the edge of the flange 16<sup>x</sup> secures an air and water tight joint between the said flange and the lip. For keeping the double-cone-shaped body 21 22 in the proper position within the suction-head and the proper distance apart from the walls of such suction-head 16 16<sup>x</sup> the central portion 29 of the said body is furnished with a plurality of studs or pins 30, engaging suitable recesses 31 in the suction-head. The diameter, dimension, and shape of the double-cone-shaped body 21 22 are such that a trumpet-shaped suction-passage 32, decreasing in thickness, is formed between the suction-head 16 and the cone 21, an annular passage 33 of a relatively small diameter between the flange 16<sup>x</sup> and the central portion 29, and an annular tapering chamber 34 of increasing diameter between the flange 16<sup>x</sup>, the cone 22, and the gallery 23, the said chamber 34 overlying the annular passage 33, as this is clearly shown in the drawings.

The external surface of the cone 21 is mounted or provided with two or more radial ribs 21<sup>x</sup>, running from the top or point of the said cone to its base and forming, when the cone-body 21 22 is inserted into the suction-head, partitions within the trumpet-shaped passage 32. The object of the partitions, serving at the same time as spacing-ribs between the cones 16 and 21, is to support the revolving suction-head and cone-body in taking around the fluid ascending between them and to thus prevent the bulk of the fluid from sliding in the trumpet-shaped passage 32 in an opposite direction as the suction-head is revolved. In the example shown there are provided two of such ribs or partitions 21<sup>x</sup>, made in one piece and put in a suitable slot 21<sup>xx</sup>, cut in the point of the cone 21, as this is evident from the drawings.

In order to secure lubrication of the socket 7 and the suction-pipe 1, serving as the axle for the former, and at the same time to prevent that air may enter from beneath into the socket 7, the arrangement is such that the foot of the said socket runs in an oil-bath 35. For preventing the oil in the oil-pit 36 from being taken around by the revolving socket 7 a drag device, composed of supporting-

ring 37 and radial vertical blades 38, may be inserted into the oil-pit. By this means the oil is prevented from forming a vortex through which air might pass to the foot of the socket.

The function or action of my improved suction-pump is as follows: When the pump is set into operation for the very first time, the electric motor is to be started and the suction-head—that is to say, the passages 34 33 32—to be filled up with water. After the pump has thus been primed the sucking action of the suction-head revolving at a very high speed causes the fluid to ascend to open the foot-valve and flow up through the pipe-conduit 4, the suction-pipe 1, the trumpet-shaped passage 32, and the annular passage 33. The fluid flowing out at the top of the latter is at once subjected to the centrifugal action and forced outwardly against the wall of the flange 16<sup>x</sup>. When a sufficient quantity of fluid has been accumulated within the chamber 34 in the manner shown, the fluid is forced up by the continued centrifugal action through the outlets 24 and 28 into the inverted cup 17 17<sup>x</sup>, whence it is discharged through the discharge-ways 18 into the gutter 19, finally issuing through the spout 21 as a continuous stream or jet. When the pump or its motor, respectively, is stopped, the fluid wall in the chamber 34 collapses and the foot-valve 5 closes under the weight of the water column in the suction-pipes, a certain amount of fluid of course flowing back through the foot-valve during its closing movement; but this amount of fluid is in comparison with the bulk of fluid remaining in the chamber 34 so small that it does not materially alter the height of the fluid-level in the said chamber. The level of the fluid in this chamber when the pump is at a standstill is approximately indicated in the drawings by a horizontal dotted line *x*, and it is this bulk of fluid overlying the annular passage 33 which insures a reliable priming of the pump without refilling whatever when the pump is to be started again. For setting the pump in operation it is therefore only necessary to start the motor. Thus the pump may be used at any time without special priming by refilling the suction-head. If the chamber 34 were not provided, the retaining of a certain bulk of fluid overlying the passage 33 would not be possible. Said chamber or its equivalent would then come in direct contact or communication with the external air, whereby the sucking action of the passages 33 and 32 would be suppressed or annulled and priming before every use of the pump made necessary. The above statements have been proved to be true by a great many of careful experiments.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a centrifugal pump, a revoluble suction-head seated on the end of the suction-



pipe and having an upright flange, a double-cone-shaped part carried within the head spaced therefrom, and cooperating with said head to form a suction-channel diminishing in section toward its end and to form a chamber at said end, an inverted cup having an internal thread screwed on said flange to form a spiral discharge-passage between the threads and flange, substantially as and for the purpose set forth.

2. In a centrifugal pump, a suction-pipe, a revoluble suction-head having a flange, a double-cone-shaped part in said head and having a perforated lip to fit the edge of the flange, a chamber formed behind the flange, an inverted cup having internal threads screwed to the flange to hold the double-cone-shaped part in place and form spiral discharge-passages, substantially as and for the purpose set forth.

3. In a centrifugal pump, the combination with a revoluble suction-head having an upright flange; of a part therein formed of substantially two cones, and an annular priming-chamber between one of the cones and the

flange, substantially as and for the purpose set forth.

4. In a centrifugal pump, the combination with a revoluble suction-head having an upright flange; of a part therein formed of substantially two cones united at their bases, a horizontal perforated plate extending from one of the cones to the upright flange to form an annular priming-chamber, substantially as and for the purpose set forth.

5. In a centrifugal pump, the combination with a revoluble suction-head having an upright flange; of an inverted cup screwed on the exterior of the flange, thereby forming spiral discharge-passages, a part in the head formed of substantially two cones united at their bases, a horizontal plate having perforations therein between one of the cones and the flange, and outlet-passages to discharge into the spiral discharge-passages, substantially as and for the purpose set forth.

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Witnesses:

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