Apr. 17, 1923.

1,452,091

P. OSTENBERG

PUMP MECHANISM

Filed Aug. 20, 1920

3 Sheets-Sheet 1

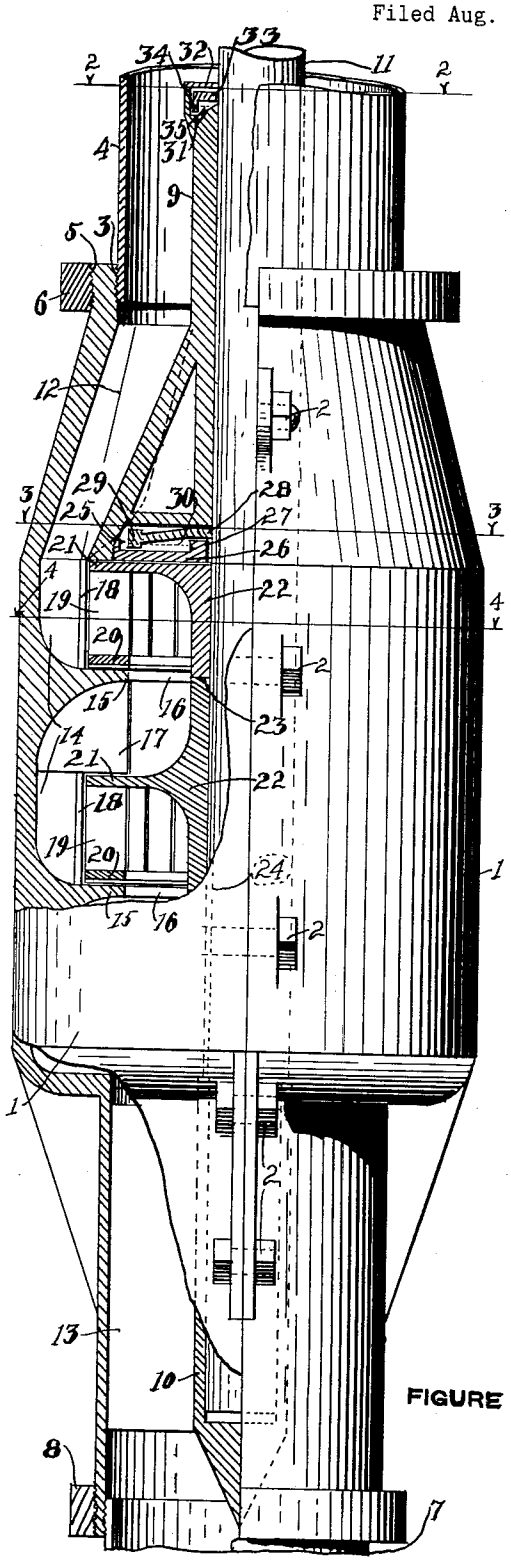


FIGURE 1

FIGURE 2

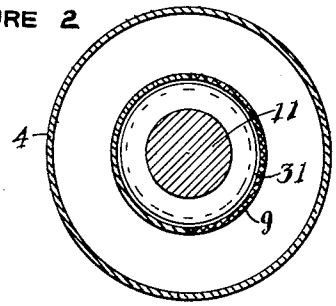
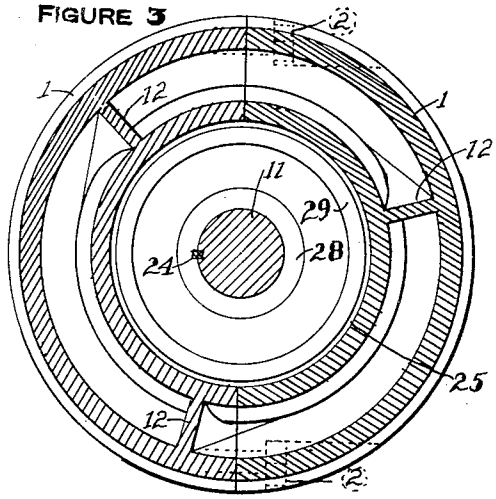


FIGURE 3



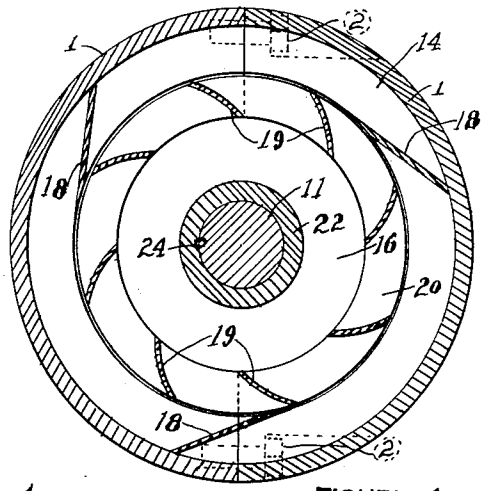


FIGURE 4

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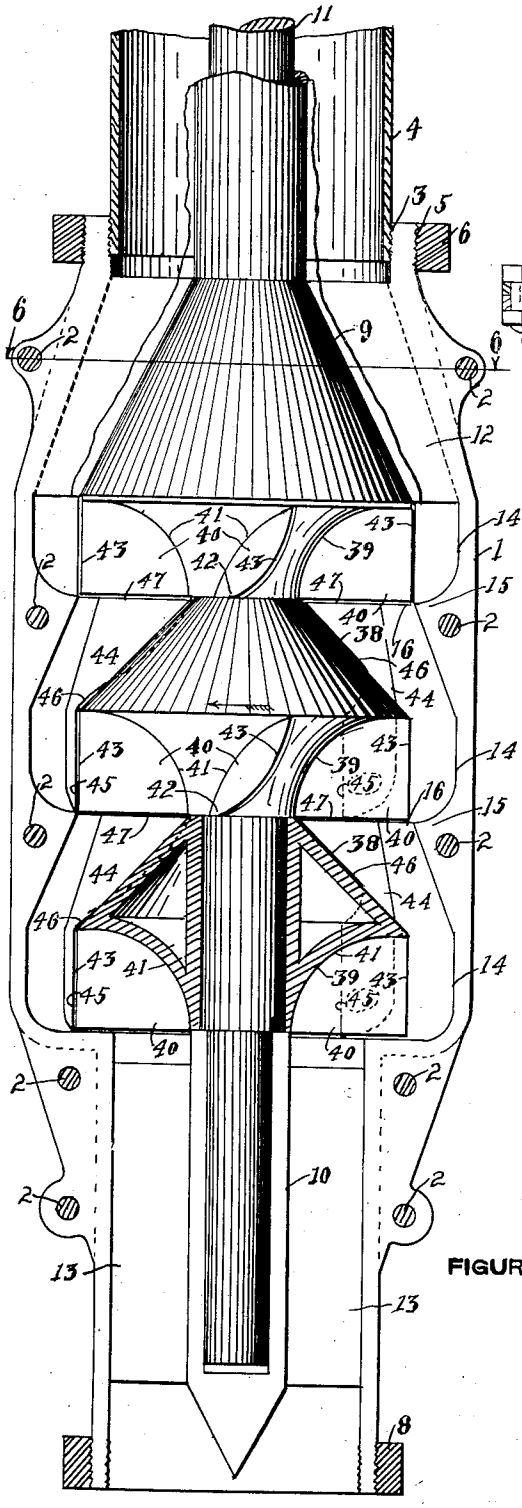

FIGURE 5

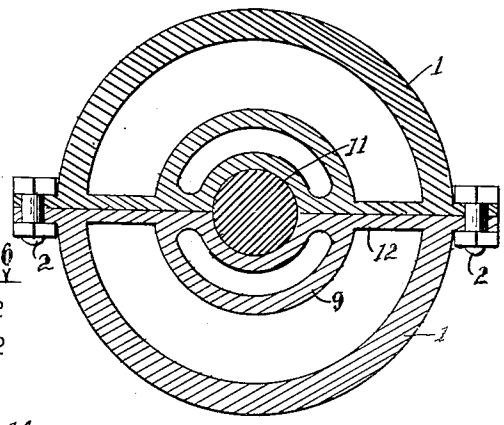

FIGURE 6

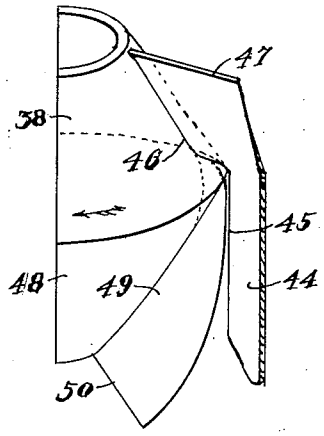

FIGURE 7

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PUMP MECHANISM

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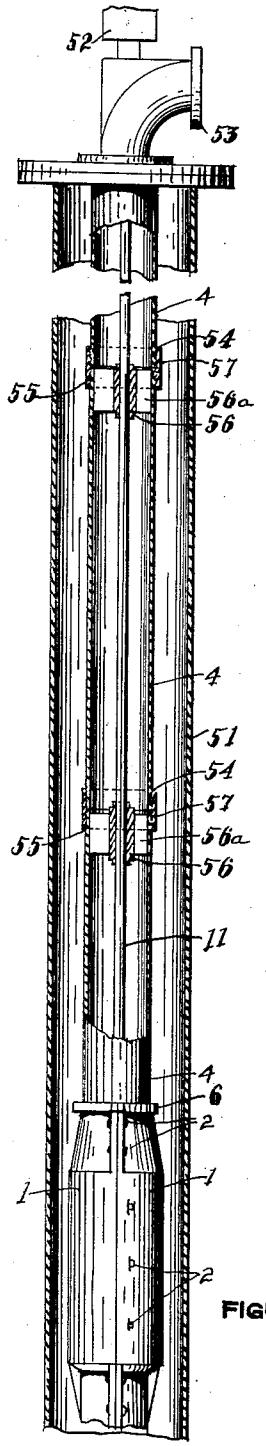

FIGURE 8

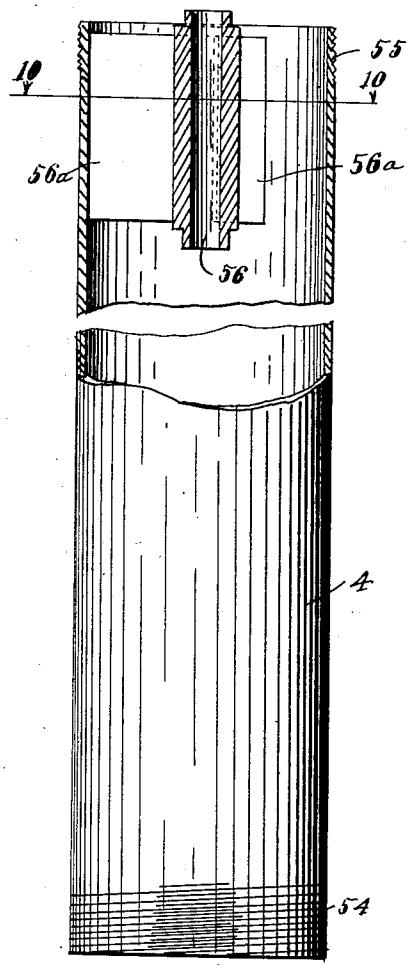

FIGURE 9

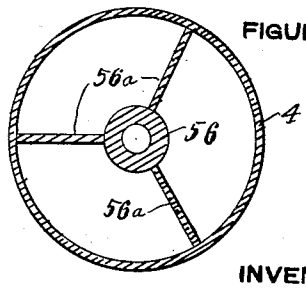

FIGURE 10

INVENTOR

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Patented Apr. 17, 1923. 1,452,091

UNITED STATES PATENT OFFICE.

PONTUS OSTENBERG, OF SAN JOSE, CALIFORNIA.

PUMP MECHANISM.

Application filed August 20, 1920. Serial No. 404,760.

To all whom it may concern:

Be it known that I, PONTUS OSTENBERG, a citizen of the United States, and resident of San Jose, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Pump Mechanisms, of which the following is a specification.

My invention relates particularly to centrifugal pumps, and it is the object of my invention to provide a pump mechanism that will be simple and compact in form, economical to manufacture, and highly efficient in operation. A further object is to provide a novel and effective means of preventing the access of water and material carried thereby to the pump bearing. A still further object is to provide a pump consisting of a minimum number of parts and capable of being quickly and easily assembled by unskilled labor.

In the drawing:

Figure 1 is a side elevation of one embodiment of my invention, parts being broken away.

Figure 2 is a section on line 2—2 of Figure 1.

Figure 3 is a section on line 3—3 of Figure 1.

Figure 4 is a section on line 4—4 of Figure 1.

Figure 5 is a view of one half of another embodiment of my invention, partly in section.

Figure 6 is a section on line 6—6 of Figure 5.

Figure 7 is a perspective view of one-half of another form of impeller and blade.

Figure 8 is a vetrical section through a portion of a well casing, showing a pump positioned therein, parts broken away.

Figure 9 is an enlarged view of one of the discharge casing sections shown in Figure 8, part broken away and part in section.

Figure 10 is a sectional view on line 10—10 of Figure 9.

Referring more particularly to the drawing, 1—1 indicate two halves of a pump bowl of uniform shape, size and proportions and held together by bolts 2. The assembled bowl presents an interiorly threaded upper discharge opening as 3 engaging a discharge casing section 4 and an externally threaded neck as 5 to engage a threaded collar 6, the said collar 6 being screwed into place after assembling the bowl in order to more securely bind the two halves together. The lower end of the bowl is similarly threaded to engage a suction pipe 7 and collar 8.

At 9 and 10 are upper and lower bearings for shaft 11 supported by webs as 12 and 13 respectively, each half of the bowl supporting one-half of the said bearings, the lower bearing being a step-bearing. Bowl 1—1 is provided with annular chambers 14 separated by flanges 15 forming openings 16 concentric with shaft 11. Each flange 15 has a plurality of depending vanes as 17 formed therein extending to the edge of opening 16, and a plurality of upstanding vanes 18 arranged to receive water discharged by blades 19.

Impeller blades 19 are spaced and secured at their lower ends by ring 20 and depend from an annular flange 21 mounted on shaft 11 by hub 22, the ends of the several hubs abutting as at 23 and secured to shaft 11 by key 24.

Formed in the lower portion of bearing 9 is a chamber 25 threaded to engage a closure 26 having an upstanding annular flange 27. At 28 is a collar secured to shaft 11 and carrying a ring 29 at its outer edge, the said ring extending downwardly to a point adjacent the bottom of chamber 25 in which a quantity of mercury is placed as indicated at 30. In the upper end of bearing 9 is a similar chamber 31 provided with a top 32. A collar 33 on shaft 11 carries a ring 34 extending down into said chamber into a quantity of mercury 35 placed therein.

In assembling the pump the two halves are formed and finished as described. The shaft with the several impellers thereon is then placed in position in one half of the bowl and then the other half is arranged thereon and the two halves are bolted together.

In operation the water is taken from each impeller by vanes 18 adjacent thereto where it is passed upwardly to vanes 17, thence inwardly and upwardly through openings 16 to the next impeller where the operation is repeated.

The revolving of rings 28 and 34 causes the mercury in chambers 25 and 31 to revolve rapidly, the centrifugal force of the revolving mercury carrying it outwardly in, but not out of the same chambers. It is apparent that the mercury, whether in a state of rest or revolving, effectually prevents the

entrance of water to bearing 9, the specific gravity of the mercury preventing passage of water around the edge of rings 29 and 34.

In Figures 5–6, each impeller has a cone shaped upper surface as 38 and a concave lower surface as 39, the latter having blades 40 thereon with their inner edges following the contour of said concave surface as at 41 but curved forwardly at the bottom as at 42, the outer edge 43 being somewhat more forwardly curved than the inner edge 41 so that the water is picked up by lower edge 42 and thrown outwardly with an upward twist.

In this embodiment each chamber 14 is provided with one or more vanes as 44 arranged tangentially with relation to the impeller and having a vertical edge as 45 to receive water from blades 40 and thence twisting upwardly to discharge the water vertically therefrom and gradually widening so that its inner edge closely approaches the upper surface of the adjacent runner as indicated at 46 and finally terminating in a horizontal edge 47 adjacent the lower edge of the blades 40 positioned thereabove. The particular advantage of this construction is that the water travels more nearly in a vertical direction than is commonly the case thereby materially increasing the efficiency of the pump by reducing frictional losses to a minimum. This embodiment of the pump is also made in two halves with vanes 44 cast therein so that in assembling it is only necessary to place the assembled impellers on the shaft in one half of the pump, and then place the other half of the pump bowl in position and bolt the two together as described.

In Figure 7 is shown a similar construction of impeller except that the lower surface 48 thereof is in the form of an inverted truncated cone and the blades 49 thereon are placed at a decided angle to a vertical plane as shown so that water picked up by lower edge 50 is, while moving upwardly, forced to move outwardly by surface 48 into chamber 14. The upper ends of blades 49 gradually narrow down until they merge with the upper edge of the surface 48.

The pump constructed in one of the forms above described is now suspended in a well casing 51 by means of the discharge casing sections 4 and shaft 11, the latter having a driving pulley mounted thereon as at 52 and casing 4 discharging at 53.

The discharge casing may be built up in the following manner. Each section 4 is externally threaded on one end as at 54 and at the other end as at 55. A suitable bearing 56 has, in the present case, three radially arranged webs welded thereto and these webs are in turn welded to the interior of casing section 4 at one end thereof as at 56. The requisite number of sections having been constructed in this manner and the pump having been arranged on shaft 11, a section 4 is screwed into the pump as described. A section is now secured to the first section by a collar 57 screwed on to the adjoining ends thereof as shown. In this manner the pump may be lowered any distance into a well, each discharge casing section having a bearing welded into one end thereof only, the shaft being held in alignment by the bearings in the several sections. It is evident that in this construction of pump mechanism the pump itself may be assembled and suspended in the well in a short space of time by unskilled labor without jeopardizing its durability or strength and at reduced cost in manufacture and installing over those types of pumps now commonly in use.

It is to be understood of course, that the disclosures made herein are to be considered as illustrative only and in no way to limit the scope of the appended claims.

I claim:—

1. An article of manufacture comprising a discharge casing section, a bearing arranged therein and supporting webs for said bearing mechanically attached to said casing section to form an integral part thereof.

2. In a pump, a bowl having axially aligned inlet and discharge openings concentrically arranged with relation to the axis of the bowl, a shaft bearing concentrically arranged in said bowl, and means for supporting said bearing in said bowl, said bowl and bearing being divided longitudinally into a plurality of parts, and means for securing said parts in operative relation to each other.

3. In a pump, a bowl having axially aligned inlet and discharge openings concentrically arranged with relation to the axis of the bowl, a shaft bearing concentrically arranged in the discharge opening in said bowl, a step bearing concentrically arranged in the inlet opening in said bowl, webs formed integrally with said bowl and said bearings for supporting said bearings, said bowl and bearings being divided longitudinally into a plurality of parts, and means for securing said parts in operative relation to each other.

4. In a pump, a shaft, a plurality of impellers fixedly mounted thereon without intervening bearings, and a bowl having a chamber formed therein in operative relation to each impeller, said bowl having axially aligned inlet and discharge openings, and openings connecting the several chambers, all of said openings being concentrically arranged with relation to the axis of the bowl, and said bowl being divided longitudinally into a plurality of parts whereby said impellers and shafts may be inserted sidewise therein, and means for

securing said parts, said shaft and said impellers in operative relation to each other.

5. An article of manufacture comprising a discharge casing section and a plurality of webs welded thereto and supporting a shaft bearing.

6. In a pump, an impeller mounted on a driving shaft and having an upper surface in the form of a truncated cone and a lower surface in the form of an inverted truncated cone, a blade arranged on said lower surface with its lower edge radially arranged with relation to the axis thereof and at the edge of the truncated portion thereof, said blade extending angularly with decreasing width to a point on the upper edge of said lower surface.

7. In a pump, a bowl having an annular chamber formed therein, an impeller having an upper surface in the form of a truncated cone and having impeller blades arranged on its lower surface operatively positioned with relation to said chamber, and a vane arranged in said chamber tangential to said impeller and adjacent the blades thereon and thence extending upwardly in close proximity to the upper surface of said impeller to a point adjacent the upper edge thereof.

PONTUS OSTENBERG.