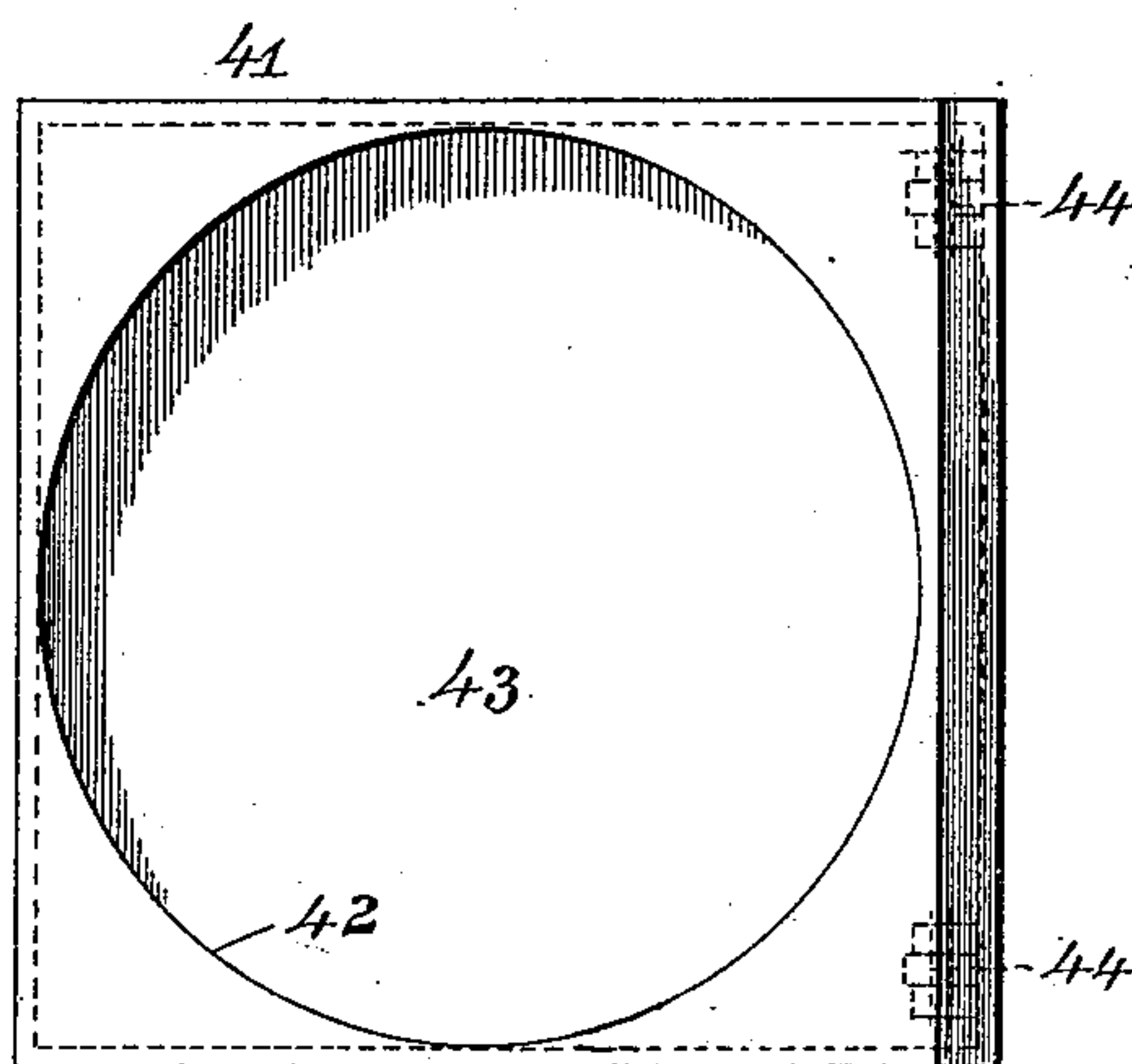
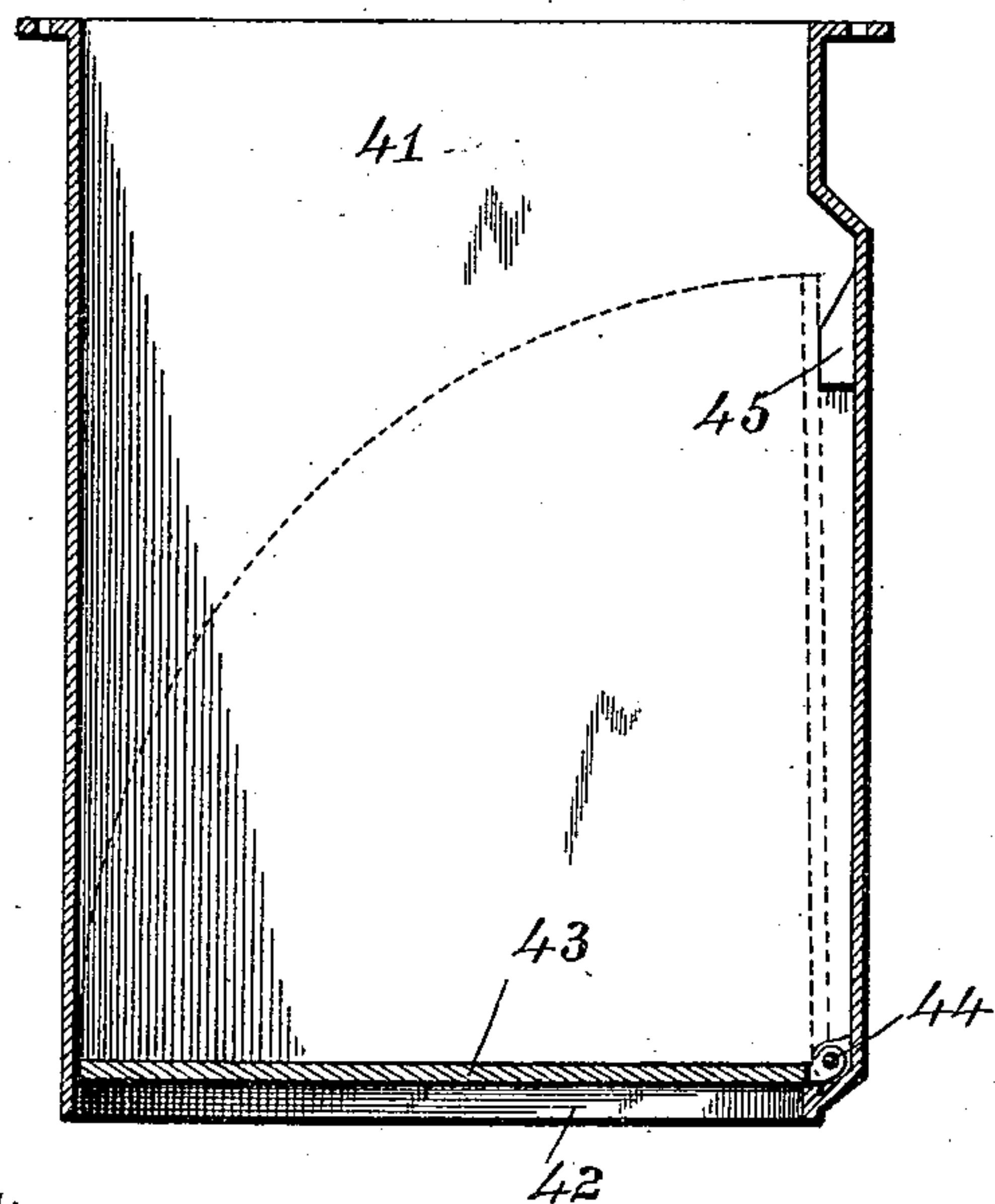


2 Sheets—Sheet 1.

No. 562,157.

Patented June 16, 1896.



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CENTRIFUGAL PUMP.

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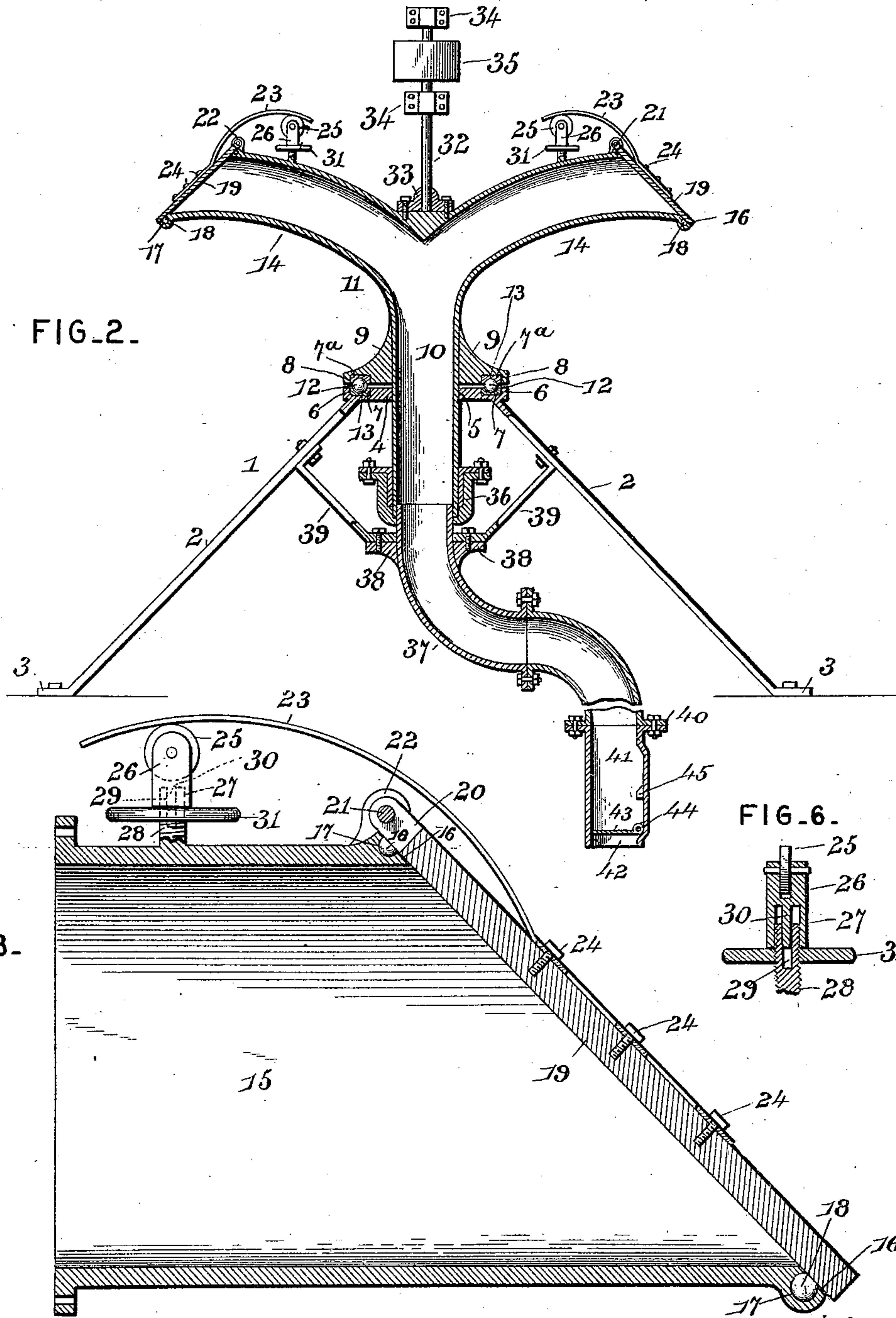


FIG. 3.

FIG. 6.

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# UNITED STATES PATENT OFFICE.

WILLIAM ELIHU SEANOR AND DONALD ANGUS MCCASKILL, OF LYTTON,  
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## CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 562,157, dated June 16, 1896.

Application filed February 2, 1895. Serial No. 537,115. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM ELIHU SEANOR and DONALD ANGUS MCCASKILL, citizens of the United States, residing at Lytton, in the Province of British Columbia, Canada, have invented a new and useful Centrifugal Pump, of which the following is a specification.

This invention relates to centrifugal pumps; and it has for its object to provide a new and useful construction of pump of this character having a large capacity and powerful suction, whereby the same shall be especially adapted for use in connection with suction dredging and similar apparatus.

With this and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a top plan view of a centrifugal pump constructed in accordance with this invention. Fig. 2 is a central vertical sectional view thereof. Fig. 3 is an enlarged detail sectional view of the valved outer end of one of the tubular wheel-arms. Fig. 4 is an enlarged detail sectional view of the foot-valve attachment for the suction-pipe. Fig. 5 is a bottom plan view of the construction illustrated in Fig. 4. Fig. 6 is an enlarged detail sectional view of the tension-regulating device.

Referring to the accompanying drawings, 1 designates a supporting frame or stand consisting of a series of inclined standards 2, provided at their lower ends with feet-flanges 3, that are adapted to be secured to a suitable supporting-base on which the pump is operated. The inclined supporting-standards 2 of the frame or stand 1 support at their upper ends a horizontal stationary bearing-plate 4, that is provided therein with a central bearing-opening 5, and in its upper side with a circular groove or recess 6, to removably receive a grooved bearing-ring 7, that is arranged directly opposite and below an opposing ring 7<sup>a</sup>, that is removably seated in the circular groove or recess 8, formed in the lower side of the revolving bearing-collar 9, which works directly above the bearing-plate 4, and is secured exteriorly on the vertical hub-pipe 10 of the

revolving pump-wheel 11. A series of bearing-balls 12 are interposed between the opposite rings 7 and 7<sup>a</sup>, and work in the grooves 13 of said rings, and thereby complete a ball-bearing support for the revolving pump-wheel 11, that provides for the elevation and discharge of liquids under the suction induced by the centrifugal action incident to the revolving of the wheel.

The revolving pump-wheel 11 consists of a vertical hub-pipe 10 and diametrically opposite tubular wheel-arms 14, projected outward from opposite sides and the upper end of the hub-pipe 10, with which said arms communicate, and the latter, as well as the hub-pipe, is preferably truly cylindrical in shape, it being noted at this point that the hub-pipe 10 of the wheel works in and extends below the central bearing-opening 5 of the stationary bearing-plate 4. The diametrically opposite tubular wheel-arms 14 are elliptically curved outward and upward from the upper end of the hub-pipe 10, and the sharpest curvature of the elliptic curve of said wheel-arms is at the inner ends of said arms where they merge into the upper end of the pipe 10, and by reason of this curvature of the wheel-arms no material resistance is offered to solid matter, such as stones and the like, as such solid matter passes from the central hub-pipe of the wheel into the wheel-arms to be discharged from the wheel as the said arms are revolved.

In addition to the upward and outward elliptical curvature of the diametrically opposite tubular wheel-arms 14 the said arms are radially curved horizontally with respect to the vertical disposition of the pipe 10, and in this disposition the said wheel-arms are reversely curved with respect to each other. The horizontal radial curvature of the wheel-arms provides for the discharge of the water in a direction that will produce the greatest centrifugal action and insure a powerful suction within the wheel for the elevation and discharge of large quantities of water, together with rock and any other foreign solid substances that are sufficiently small to pass through the pipe 10 and the arms 14.

The wheel-arms 14 are preferably provided at their outer ends with a detachable tubular section 15, which admits of short sections of



piping being added to the arms 14, for the purpose of regulating the length thereof, as may be found necessary or desirable; but whether the wheel-arms are or are not provided with the detachable end sections 15, one of which is illustrated in Fig. 3 of the drawings, the said wheel-arms are provided at their extreme outer discharging ends with the inclined valve-seats 16, provided in their faces with the packing-grooves 17, to receive suitable packing-rings 18, that project out of the grooves and form air and water tight joints with the self-adjusting flap-valves 19, that are arranged to work automatically over the outer inclined valve-seats 16, so as to raise and lower to accommodate the discharge of the pump to the flow of water, rock, or other material passing through the pump.

The self-adjusting flap-valves 19 consist of suitable plates of a size sufficient to inclose the outer discharging ends of the wheel-arms, and said valves 19 have extended from the upper edges thereof the hinge-straps 20, that are connected at their ends to the pintles 21, fitted in the lugs 22, arranged at the upper side of the inclined valve-seat 16, at the outer end of the arms 14, and this hinge connection for the flap-valves allows the same to readily rise and lower over the inclined seats to accommodate the water and other substances that are being discharged by the pump. The said flap-valves are normally held closed on their seats by means of the valve-adjusting springs 23. The valve-adjusting springs 23 are secured fast at one end to the outer sides of the valves 19, by means of screws 24, and the free ends of said springs extend over the hinges for the valves and bear on the vertically-adjustable rollers 25. The vertically-adjustable rollers 25, that are arranged under the free ends of the springs 23, are mounted in bearing-frames 26, that are provided with socketed lower sides 27, loosely fitting over the upper ends of the stationary exteriorly-threaded posts 28, that are also provided with squared longitudinally-disposed sockets 29, to loosely receive the square sliding stems 30, projected from the under side of the bearing-frames 26. Interiorly-threaded adjusting-nuts 31 are arranged to work on the exteriorly-threaded posts 28, under the bearing-frames 26, to adjust the rollers 25 and provide for regulating the tension of the valve-adjusting springs 23.

The pump-wheel 11 is given the necessary rotation through the medium of a drive-shaft 32, suitably attached at its lower end, as at 33, to the center of the wheel at the top thereof, and is mounted in suitably-arranged bearings 34, between which is preferably located the band-pulley 35, that is mounted on the shaft and is adapted to receive the belt for transmitting motion to the wheel. The lower end of the vertical hub-pipe 10 of said pump-wheel is located below the stationary bearing-plate 4, and turns within a stuffing-box 36, that is fitted on the upper end of the station-

ary suction-pipe 37. The upper end of the stationary suction-pipe 37 fits within the lower end of the hub-pipe 10, to provide a direct connection between the two pipes, and said stationary suction-pipe 37 has fitted thereon an attaching-collar 38, that is bolted or otherwise suitably secured to a supporting-bracket 39, arranged within and secured to the standards 2 of the supporting frame or stand 1.

The stationary suction-pipe 37 is extended by means of suitable pipe-sections, in the usual way, to the point desired, and at its lower end the said pipe is provided with the attaching-flange 40, onto which is detachably bolted the upper flanged end of the foot-valve box 41. At its upper end the interior diameter of the foot-valve box 41 agrees with the interior diameter of the suction-pipe 37, and at its lower inlet end 42 the interior diameter of the foot-valve box 41 is slightly less than the interior diameter of the suction-pipe, so that rock and other substances too large to pass through the pump cannot enter into the suction-pipe. The foot-valve box 41 is preferably squared intermediate of its upper and lower ends to accommodate for movement therein the inwardly-opening foot-valve 43, that is hinged at one edge, as at 44, at one side of the box near the lower inner end thereof, and at the same side of the box to which the valve is hinged is located an inwardly-projecting stop-lug 45, that forms a stop for the valve 43, when opened, and prevents the valve from reaching a position from which it could not be returned to its seat.

From the above it is thought that the construction, operation, and many advantages of the herein-described centrifugal pump will be readily apparent without further description, and it will be understood that changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a centrifugal pump, a revolving pump-wheel consisting of a central vertical hub-pipe, and separate tubular wheel-arms projected outwardly from the upper end of said hub-pipe and provided at their outer ends with valve-seats, self opening and closing flap-valves hinged to the wheel-arms and working over the valve-seats thereof, springs secured at one end to the valves and extending over the hinges of the latter, and adjusting devices mounted on the wheel-arms and carrying rollers bearing under the free ends of the springs, substantially as set forth.

2. In a centrifugal pump, a supporting frame or stand having an elevated stationary bearing-plate provided with a bearing-opening therein, a revolving pump-wheel having a vertical hub-pipe working in and projected below the bearing-opening of said bearing-plate, a stationary suction-pipe mounted with-



in the frame or stand below the bearing-plate and having its upper extremity loosely fitting in the lower extremity of said hub-pipe, and a stuffing-box fitted on the upper end of the suction-pipe and loosely receiving the lower end of said hub-pipe, substantially as set forth.

3. In a centrifugal pump, a revolving pump-wheel consisting of a central hub-pipe, and separate tubular wheel-arms projected outwardly from said hub-pipe and provided at their outer ends with detachable sections having inclined grooved valve-seats, packing fitted in and projecting beyond the grooves in said valve-seats, self opening and closing hinged flap-valves arranged to work over the inclined valve-seats, valve-adjusting springs secured fast at one end to the outer sides of the valves and extending over the hinges at the upper edges of the valves, stationary exteriorly-threaded posts fitted on the wheel-arms and provided with longitudinally-disposed sockets, vertically-adjustable bearing-frames carrying rollers bearing under the free ends of the springs, said bearing-frames working over said stationary posts and provided with stems sliding in the sockets of the posts, and adjusting-nuts mounted on the stationary posts under said bearing-frames, substantially as set forth.

4. In a centrifugal pump, the combination of a supporting frame or stand having a stationary bearing-plate, a grooved bearing-ring removably fitted in said stationary bearing-plate, a revolving pump-wheel having a vertical hub-pipe projecting below the stationary bearing-plate, a bearing-collar fitted on said hub-pipe above the stationary bearing-plate, a grooved bearing-ring removably fitted in said collar opposite the bearing-ring of said bearing-plate, bearing-balls arranged in the grooves of and between said bearing-rings, a stationary suction-pipe supported within said frame or stand in alinement with and fitting in the hub-pipe of the wheel, and a stuffing-box fitted on the upper end of said suction-pipe and receiving the lower end of said hub-pipe, substantially as set forth.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

WILLIAM ELIHU SEANOR.

DONALD ANGUS McCASKILL.

Witnesses as to the signature of William Elihu Seanor:

WM. C. HAYWOOD,

W. L. LEONARD.

Witnesses for D. A. McCaskill:

E. E. SHERWOOD,

C. H. PURCELL.