No. 843,275. PATENTED FEB. 5, 1907.

S. A. HUNTLEY.

WATER ELEVATING MACHINE.

APPLICATION FILED APR. 24, 1905.

3 SHEETS—SHEET 1.

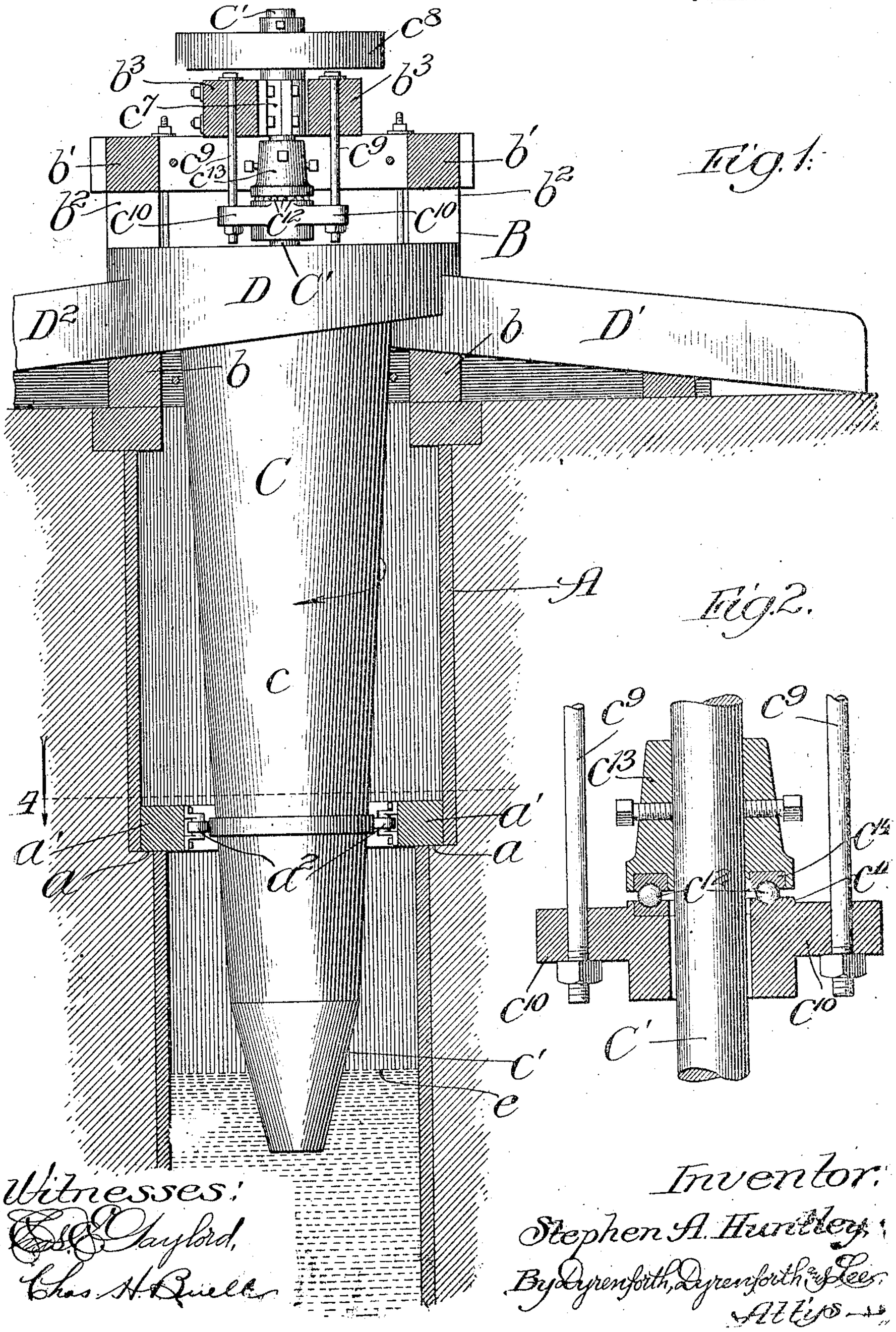

Fig. 1.

Fig. 2.

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3 SHEETS—SHEET 2.

Fig. 3.

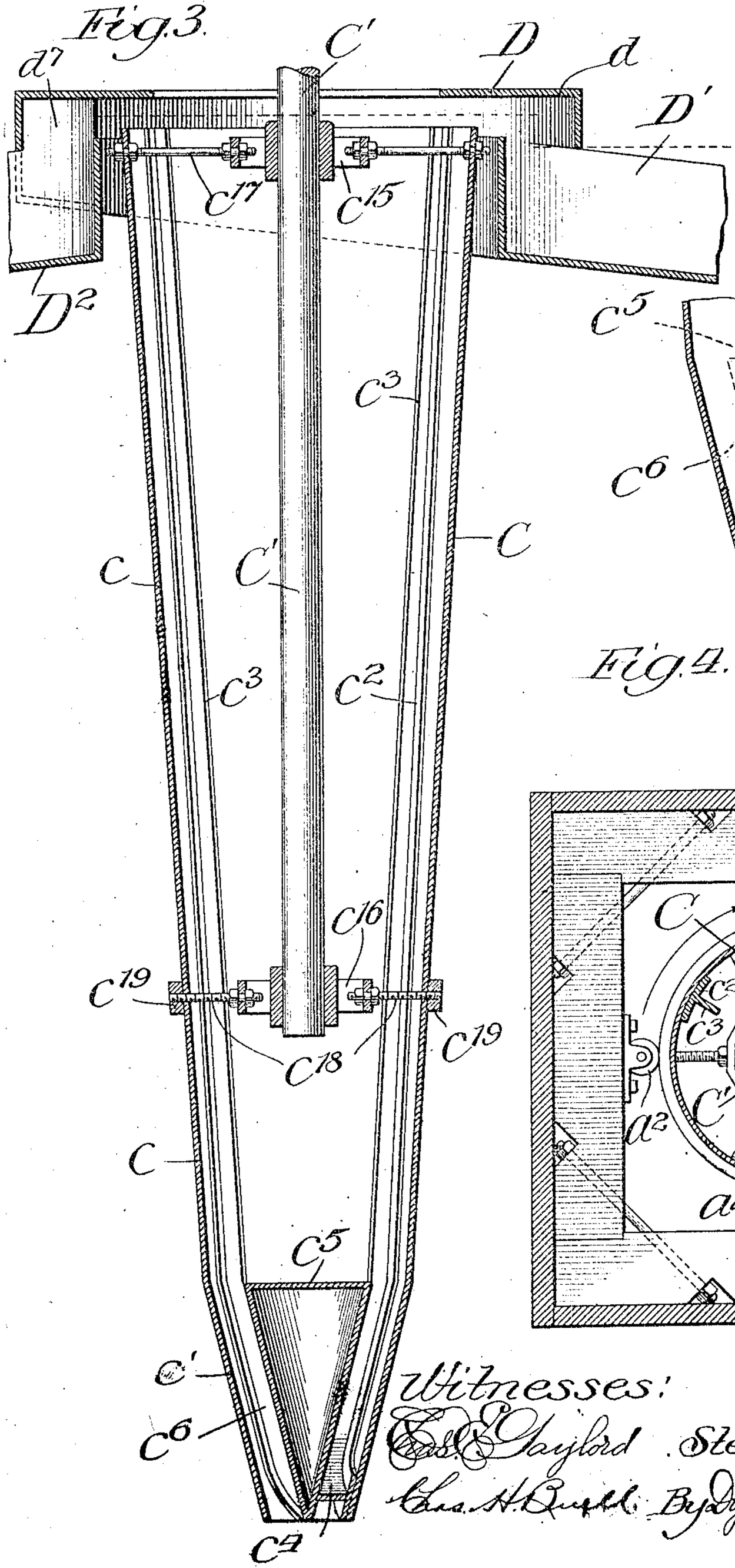


Fig. 5.

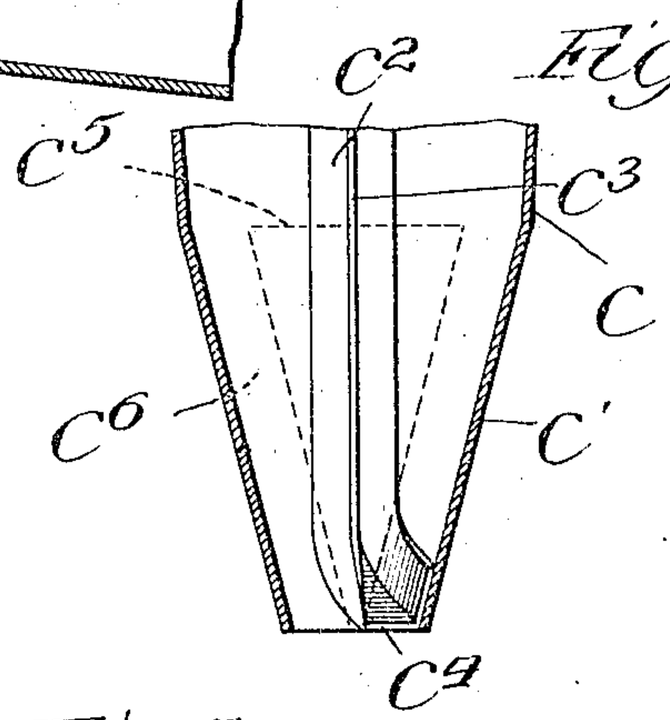
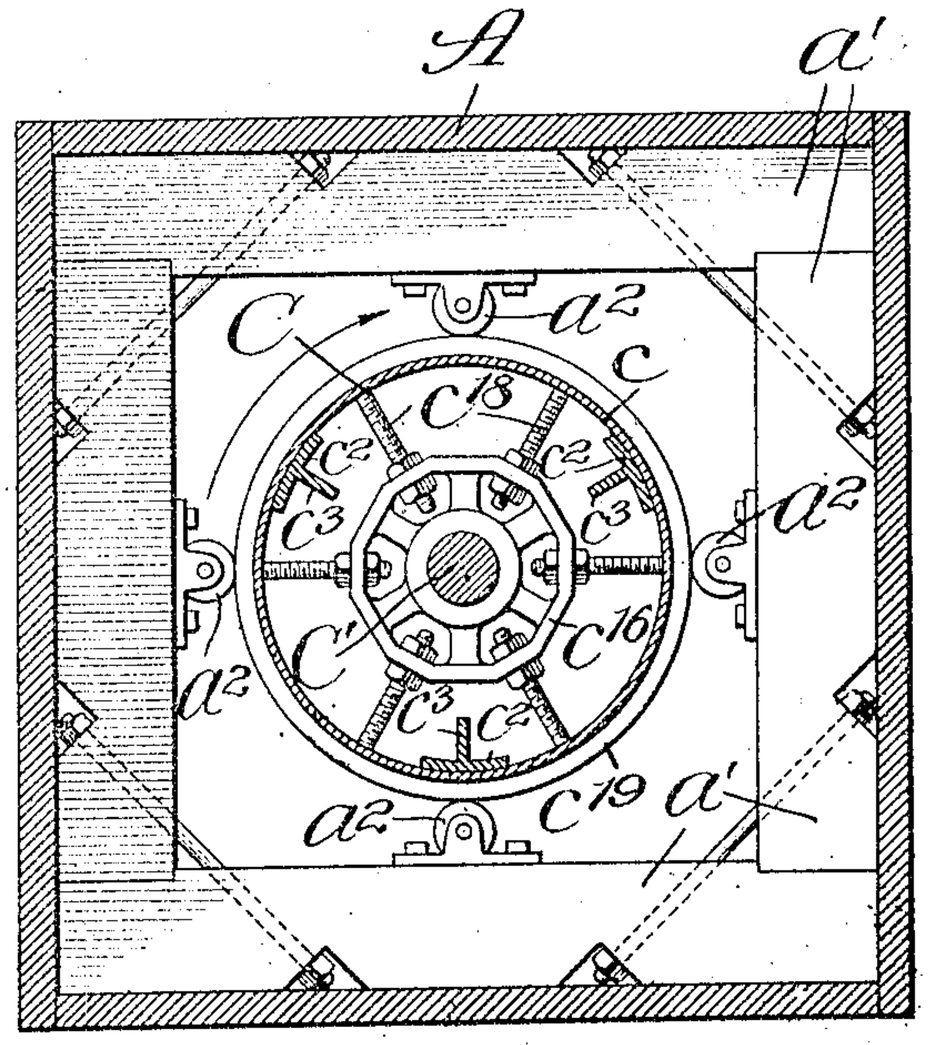


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 6.

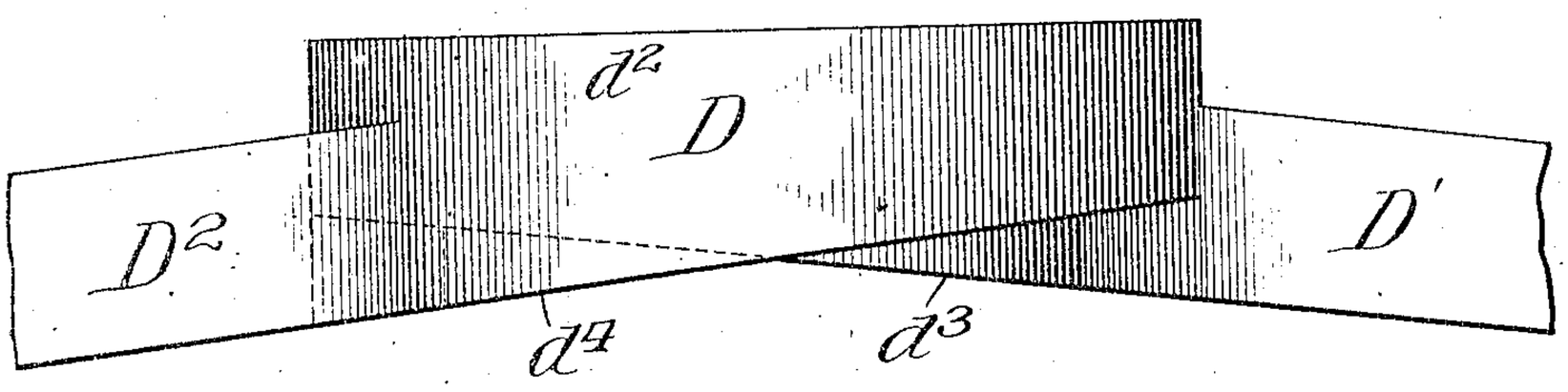
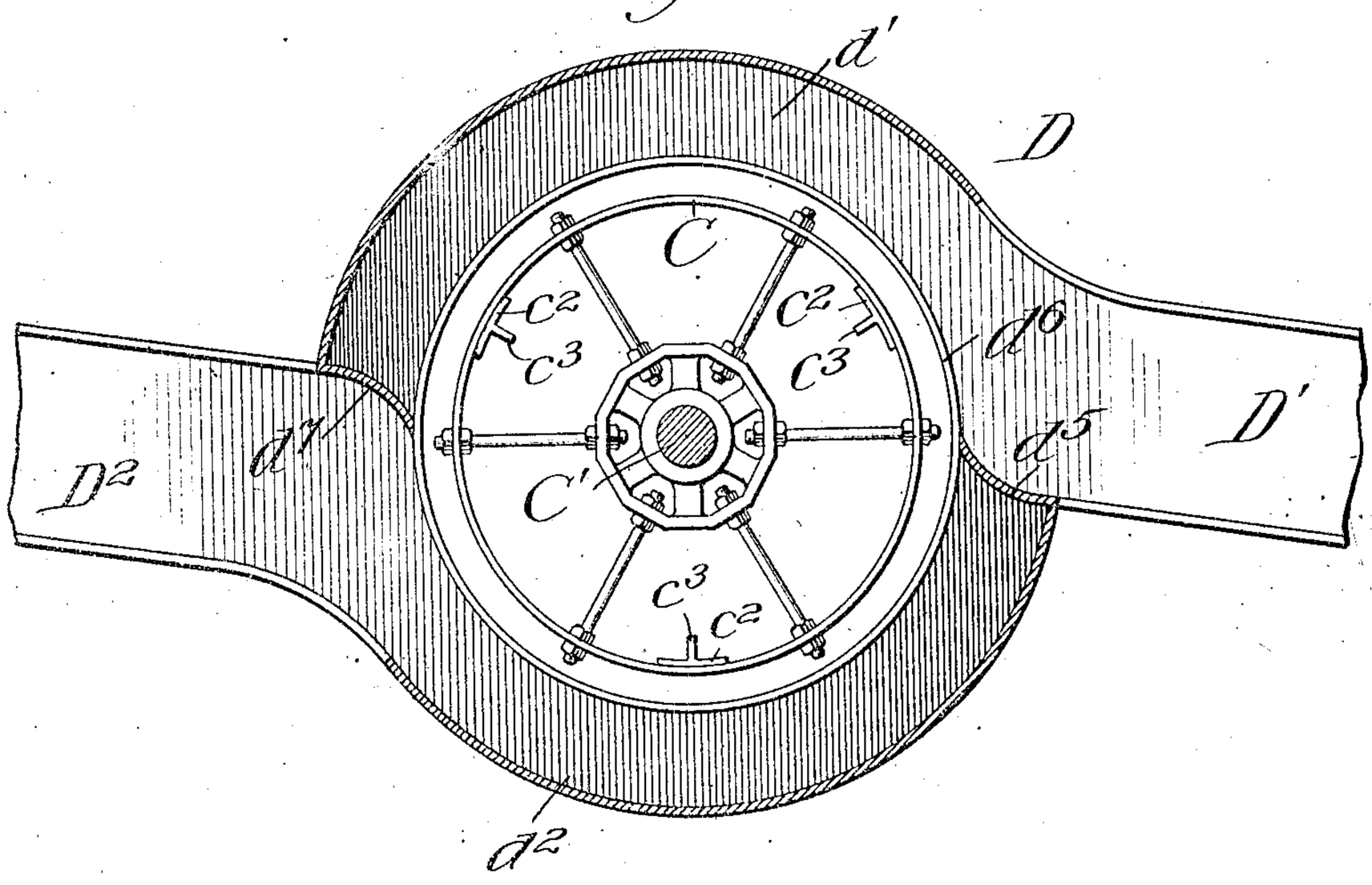


Fig. 7.



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UNITED STATES PATENT OFFICE.

STEPHEN A. HUNTLEY, OF CASPER, WYOMING.

WATER-ELEVATING MACHINE.

No. 843,275. Specification of Letters Patent. Patented Feb. 5, 1907.

Application filed April 24, 1905. Serial No. 257,158.

To all whom it may concern:

Be it known that I, STEPHEN A. HUNTLEY, a citizen of the United States, residing at Casper, in the county of Natrona and State of Wyoming, have invented a new and useful Improvement in Water-Elevating Machines, of which the following is a specification.

My invention relates particularly to valveless pumps or water-elevating machines particularly adapted to elevate large volumes of water a moderate distance regardless of the presence of heavy sediment therein, such as sand, gravel, or the like.

My primary object is to provide a machine of the character indicated of exceedingly cheap and durable construction and of the highest attainable efficiency.

In my construction provision is made for an unobstructed passage of water through the pump, thereby to secure a maximum flow with a minimum of power and to guard against clogging of the machine, and the construction is such as to admit of wide variation in capacity, enabling machines of varying cost to be produced with little variation in efficiency. Furthermore, a feature of prime importance is that the pump is free from ordinary liability of getting out of repair, while the bearings are so located as to be free from danger of being cut out by sand getting into them. Where the machine is employed for purposes of irrigation, the value of the features suggested is evident.

My invention is illustrated in its preferred embodiment in the accompanying drawings, in which—

Figure 1 represents a vertical sectional view of my improved machine in position for elevating water from a well; Fig. 2, an enlarged broken sectional view showing details of an antifriction-bearing serving to support a rotary shell employed; Fig. 3, an enlarged broken vertical section showing a detail of construction of the rotary shell and the annular trough at the upper end thereof; Fig. 4, a transverse section taken as indicated at line 4 of Fig. 1; Fig. 5, a sectional view of the lower portion of the shell, showing the manner of curving the lower end of one of the internal ribs thereof; Fig. 6, a broken elevational view of the annular trough and discharge-spouts connected therewith, and Fig. 7 a sectional view taken as indicated at line 7 of Fig. 3.

In the construction shown, A represents a well; B, the frame of my improved machine, surmounting the well; C, a rotary shell suspended from the frame B through the medium of a shaft C′ and dipping into the well, and D an annular trough encircling the upper end of the shell and provided on opposite sides with discharge-spouts D′ D². The well A is preferably formed with an internal shoulder *a*, supporting timbers *a*′, equipped with rollers *a*². The frame B preferably comprises a lower rectangular frame *b*, an upper rectangular frame *b*′, vertical connecting-timbers *b*² at the corners of said frames, and a pair of timbers *b*³, supported centrally above the frame *b*′. The shell C preferably is approximately cone-shaped, comprising an upper portion *c* of given taper and a lower portion *c*′ of greater taper. The cone is equipped internally with vertical ribs *c*², shown three in number, and comprising T-irons having their webs or stems *c*³ projecting inwardly toward each other. The lower ends of the ribs are preferably curved in a common direction, so that the webs *c*³ present at their lower ends inclined blades *c*⁴, adapted to scoop up or draw in the water as the shell rotates. Within the small end of the shell between the ribs is secured a downwardly-tapering hollow closed body *c*⁵, between which and the adjacent portion of the shell is an annular passage *c*⁶, divided vertically by the ribs. The body *c*⁵ serves to exclude from the lower end of the shell all the water not brought within the range of the ribs, so that all unnecessary inertia is avoided. Moreover, the body *c*⁵ aids in supporting the shell. The shaft C′ extends through the axis of the annular trough D and at its upper end passes through a centering bearing *c*⁷, attached to one of the timbers *b*³, above which the shaft is equipped with a pulley *c*⁸, through which motion is imparted from any suitable source of power. Adjustably suspended from the timbers *b*³ by means of bolts *c*⁹ is a hanger *c*¹⁰, provided on its upper surface with a horizontal race member *c*¹¹, supporting balls *c*¹². Secured upon the shaft above the hanger is a collar *c*¹³, provided with a race member *c*¹⁴, supported on the balls *c*¹². It will be noted that the rods *c*⁹, which are equipped with nuts, may be employed to level the hanger *c*¹⁰, regardless of any imperfections in the construction of the machine or of failure to set the machine perfectly plumb.

As shown in Fig. 2, the shaft C′ passes loosely through the hanger *c*¹⁰. The shaft

C′ and the shell C are coaxial, and the shaft has secured thereon an upper spider c^{15} and a lower spider c^{16}. The spider c^{15} is adjustable to enable it to be centered by means of radial bolts c^{17}, whose inner ends are connected with the spider and whose outer ends are connected with the shell. The spider c^{16} is adjustably connected with the shell by radial bolts c^{18}, whose inner ends are secured to the spider and whose outer ends have screw connection with the shell and with a band c^{19}, encircling the shell. The band c^{19} forms a track upon which the rollers a^2 bear, thus preventing the shell from vibrating or swinging while in operation.

The annular trough D has an annular top d, whose inner edge preferably projects over the upper end of the shell C far enough to prevent water from being thrown outside the trough. The trough is divided into a compartment d', with which the spout D′ is in communication, and a compartment d^2, with which the spout D^2 is in communication. The section d' has an inclined bottom d^3, and the section d^2 has an inclined bottom d^4. A curved partition d^5, forming a continuation of one wall of the spout D′, joins the inner wall d^6 of the annular trough, and a curved wall d^7, forming a continuation of one wall of the spout D^2, joins the wall d^6 at a point diametrically opposite the junction between said wall and the wall d^5. The walls d^5 d^7 thus form the dividing-walls between the compartments d' d^2.

The operation of the machine is as follows: The lower end of the shell C is immersed in water—say to a height indicated by the dotted line e—and the shell is rapidly rotated through the medium of the pulley c^8. The rotation of the shell in the direction indicated by the arrow causes the water to be drawn into the shell by the inclined portions c^4 of the internal ribs of the shell, and the water is confined, so that when it encounters the vertical portions of the ribs it is caused to acquire the same speed of rotation as the shell, thereby creating a centrifugal force, which serves in elevating the water to the top of the machine, where it is discharged into the annular trough, from whence it passes through the spouts D′ D^2. The spouts D′ D^2 may be connected with an irrigating-ditch, or the water may be piped where desired to be used as required.

The annular trough is designed to conduct away large volumes of water and still to be of moderate size, so that it will fit conveniently within the frame B. Experience has demonstrated that this is an important consideration where economy of construction and convenience for transportation purposes are necessary, inasmuch as a machine built upon this principle readily will deliver more water than can be taken care of if the discharge-spout be not properly constructed. Variations in form and proportions are of course feasible; but the construction shown is well adapted to its purposes.

While it would be within the scope of my invention to alter the construction at the lower end of the shell, so that the machine would depend wholly upon centrifugal action to induce a flow of water into the shell, it is evident that the inclined blades c^4 serve the useful function of drawing large quantities of water within the centrifugal influence of the rotating shell without impeding the passage or rendering the machine liable to become clogged.

In cases where it is desired to use the machine for the primary purpose of elevating sand—as may be desirable, for instance, where gold is to be separated from auriferous sands—the internal body c^5 may be omitted from the construction. However, it is evident that the passage c^6 enlarges from bottom to top, so that there is no tendency of the machine to clog when constructed as shown.

Changes in details of construction are contemplated. Hence no undue limitation should be understood from the foregoing detailed description.

What I regard as new, and desire to secure by Letters Patent, is—

1. A pump of the character set forth, comprising a rotating shell having an upwardly-flaring inner surface equipped with a longitudinal rib serving to induce the water to rotate with the shell, and an inclined blade at the lower end of the shell and rotating therewith, upon which the water may rise to come within the rotating influence of the longitudinal rib, thereby to acquire centrifugal force, for the purpose set forth.

2. A pump of the character set forth, comprising a rotating upwardly-flaring shell equipped with internal ribs extending from near its lower end to near its upper end, and equipped, also, at its lower end with an internal central body rotating with the shell and serving to confine the water between itself and the shell, whereby such water as enters the shell will be caused to acquire centrifugal force, for the purpose set forth.

3. In a pump of the character set forth, the combination of an upwardly-flaring rotating shell equipped internally with longitudinal ribs, an internal body located in the lower end of the shell, and inclined blades between said body and the adjacent portion of the shell, for the purpose set forth.

4. In a pump of the character set forth, the combination of a suitable frame, an annular trough supported thereon and provided with a discharge-passage, a shaft extending through said annular trough, an adjustable hanger supporting said shaft, means connected with the shaft above said trough for rotating said shaft, a shell suspended from and

fixed to rotate with said shaft, and lateral bearings for the shell above the lower end thereof, for the purpose set forth.

5. In a pump of the character set forth, the combination of a shaft, shaft-supporting means connected with the upper portion thereof, shaft-rotating means connected with the upper end of the shaft, an upwardly-flaring shell into which the lower end of the shaft projects, adjustable connecting means between the shaft and shell for centering the shaft with relation to the shell, and an annular trough encircling the upper end of the shell, for the purpose set forth.

6. In a water-elevating machine, the combination of a well having an internal shoulder, a frame supported on said shoulder and equipped with inwardly-presented rollers, a frame supported above said well and equipped with an annular trough, a shaft extending through said trough and journaled in and supported on said second-named frame, shaft-rotating means connected with the shaft above said trough and a shell suspended from said shaft to rotate therewith and engaged circumferentially by said rollers, for the purpose set forth.

STEPHEN A. HUNTLEY.

In presence of—
F. M. WIRTZ,
J. H. LANDES