

June 26, 1928.

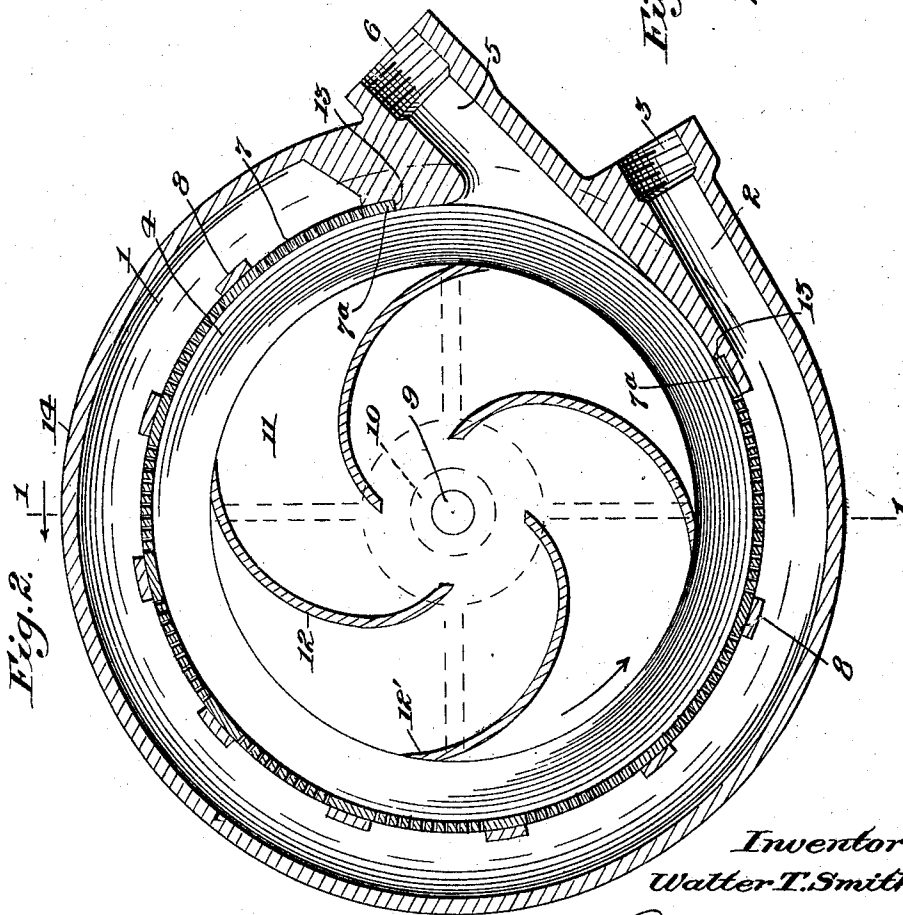
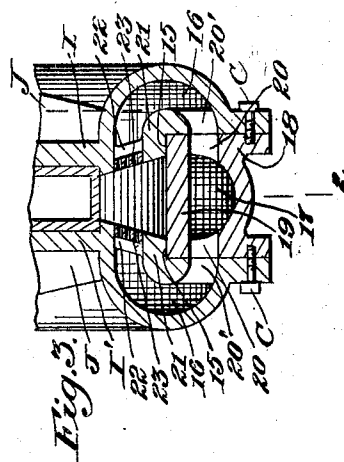
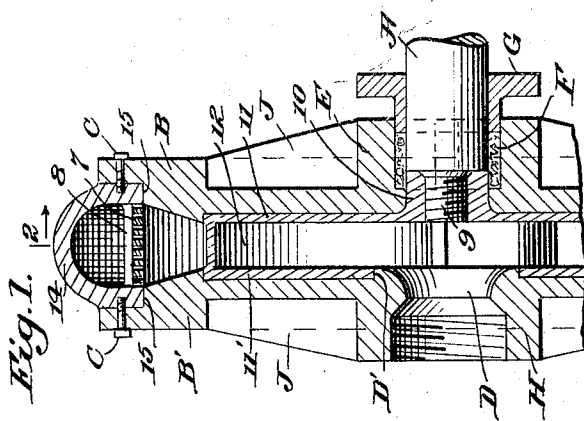
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W. T. SMITH

PUMP

Filed April 2, 1927

2 Sheets-Sheet 1



Inventor:
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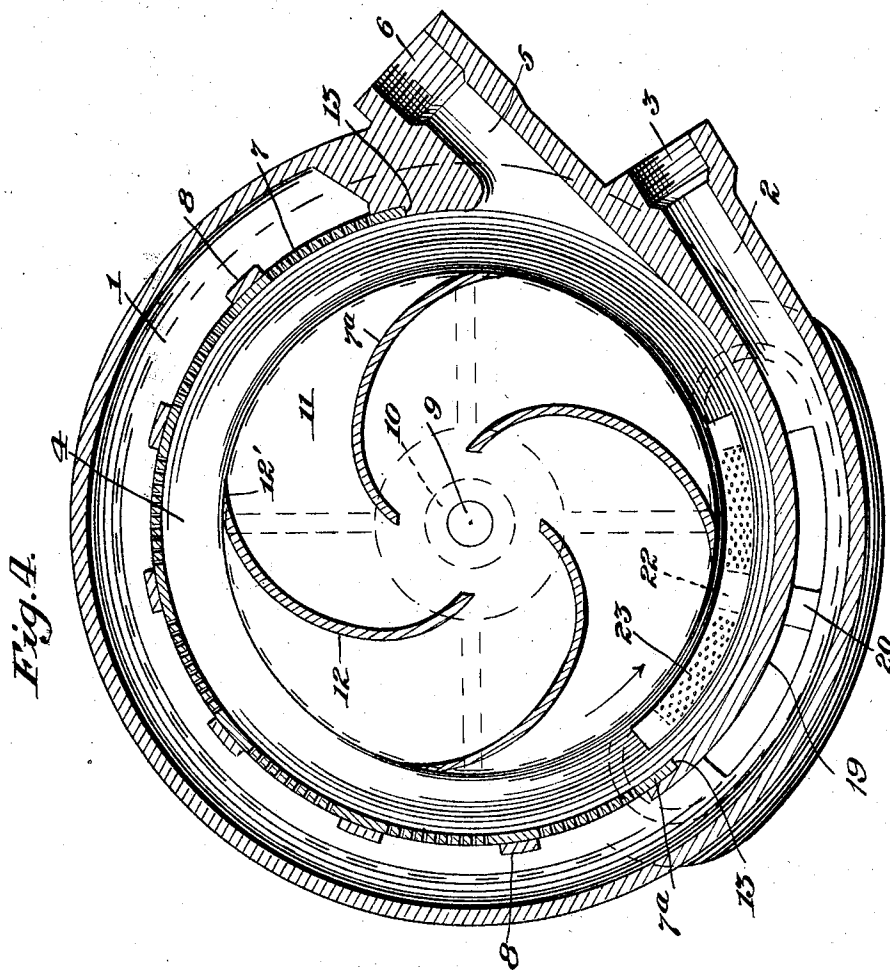
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Filed April 2, 1927

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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PUMP.

Application filed April 2, 1927. Serial No. 180,524.

This invention relates to pumps, more particularly to pump casings used in connection more particularly with hydraulic dredging operations. Heretofore it has been usual to pump up the water carrying solid matter in suspension into the bins of sea-going barges or dredges and allowing the solid matter to settle out. This procedure involves considerable delay.

The broad purpose of my invention is to provide a casing in combination with a pump runner or impeller for the purpose of separating, during the pumping operation, the liquids and the solid matter carried in suspension thereby, and more or less concentrating the latter into a solid or semi-solid or soupy state and to discharge such concentrate independently through one outlet and to discharge the water or other fluid through another independent outlet, the concentrate being received in a suitable bin or other storage means.

Further objects are to provide a novel casing having two concentric nearly annular chambers separated by a straining means and having suitable discharges and being concentric with an impeller; to provide in such a casing a readily removable and renewable strainer element; to provide a simple casing composed of a plurality of parts capable of quick assemblage and separation; to provide a novel annular band construction constituting the outer annular chamber and discharge; to combine the strainer element and said outer annular band member in such manner as to facilitate the insertion and removal of such strainer element and to confine it against outward distortion; and to provide a suitable runner having specially designed vanes in combination with the casing formed to provide two peripherally extending concentric chambers divided by a strainer element whereby the liquid being acted upon will be forced outward, the clarified liquid passing through the strainer element into the outer chamber and the more solid material being retained in the inner chamber and the contents of both of such chambers being acted upon by the pressure created by the rotation of said runner to force said contents of both of said chambers out of the respective discharges thereof, all of which objects among others are accomplished by the construction, combination and arrangement of parts herein-

after more particularly set forth and described.

In the accompanying drawings, in which only several of the possible embodiments of my invention are shown and described for the purpose of illustrating my invention and the practice thereof as by law required, but with no intention of being limited thereto, it being recognized by me that it is capable of embodiment in a number of other forms.

Fig. 1 represents a sectional view of a device embodying my invention taken on line 1—1 of Fig. 2;

Fig. 2 represents a sectional view thereof taken at right angles to Fig. 1, on line 2—2 of said figure;

Fig. 3 represents a fragmentary sectional view, similar to Fig. 1, of a modified casing construction; and

Figure 4, a view similar to Fig. 1, of a further modification.

Referring now in detail to the drawings, A designates the rotary impeller shaft passing through bushing E of end plate B of the casing, said runner being, of course, disposed in the interior of the casing, which casing comprises said end plate B, an opposite end plate B', and an annular band element 14 fitting against the annular shoulders of said end plates with its radially inner side edges and being held assembled with said end plates by any suitable means such as, for instance, screws C extending through said end plates into said annular member 14.

End plate B' is provided with an inwardly flaring intake or inlet D which has an axially outward extending internally screw threaded hub or bushing H into which the externally screw threaded end of the suction pipe, not shown, may be screwed, as usual.

Any usual packing F may be arranged about the shaft A in the bushing E of plate B and will be packed by the gland-nut G as usual.

Each of said plates B and B' may be provided with reinforcing radially extending webs such as J and the said end plates and annular member 14 will be of such material and of such thickness as may be required by the material being acted upon and the operating pressures in the interior of the casing, which pressures in dredging operations usually vary from 40 to 125 pounds

to the sq. in. The annular band 14 is to be concaved in its interior face to provide an outer chamber 1 which extends about the casing from a point adjacent to the discharge outlet 5 of chamber 4 to a point underneath and closely adjacent to said outlet 5 and there is in communication with its discharge outlet 2 which it internally screw threaded to receive the externally screw threaded end of the liquids discharge pipe, not shown. The outlet 5 of chamber 4 may be internally screw-threaded as at 6 to receive the externally screw-threaded end of the concentrate discharge pipe, not shown.

Said member 14 is provided with radially extending shoulders 13 closely adjacent to, and on each side of, outlet 5 and will have some provision for radially confining the strainer element 7, for instance, integral cross bars 8 arranged at equidistant points between said shoulders 13 and arranged in a radial direction closely adjacent to the radially inner edges of said member 14 and said bars 8 may extend entirely across the outer chamber 1 or may be of any suitable construction suitable to their function.

The strainer element 7, of relatively heavy perforated sheet metal, is forced into place against said bars 8 and is spread in a peripheral direction until its ends 7^a are in tight contact with the respective shoulders 13 when the strainer element 7 as a whole is under compression holding the said straining element tightly against said bars 8 and shoulders 13. Said strainer element 7 will have perforations of such size as best suited to the materials being acted upon and may have imperforate parts which in assembled relation will register with the respective bars 8 as illustrated thereby preserving the strength of the strainer element as a whole.

The shaft A may have a reduced externally screw-threaded end 9 receiving the internally screw-threaded hub 10 of the impeller or runner as usual.

Said runner comprises two end plates 11 and 11' having between them curvilinearly disposed vanes 12, the plate 11' having a central intake opening registering with the opening D in plate B' to permit the intake of the materials to be acted upon and the said end plates 11 and 11' and vanes 12 all extend preferably to the same distance radially and will be spaced, as illustrated, at an appreciable distance radially from the straining element 7, such annular interval constituting an inner concentric concentrate chamber 4, above mentioned, communicating with discharge 5 as stated.

The interval between the path of travel of the radial outer ends of the vanes 12 and the straining element 7 will vary in accordance with the nature of the material being acted upon and to this end the particular

runner that may be in any particular casing may be easily removed and replaced by a similar, but different size runner, as is obvious.

The plate B' may be formed with an inwardly extending annular shoulder D' as shown in Figure 1, concentric with, and adjacent to, central inlet opening D, said shoulder D' extending into the central opening in end plate 11' and serving to center the intake end of the runner or impeller.

The operation may be briefly stated as follows:

The impeller rotates in the direction of the arrow, Figure 2, and draws the water and matter in suspension through the opening D and then forces the water through the strainer element 7 into the outer chamber 1 and the solid or semi-solid material radially outward into the chamber 4 wherein it is retained by the strainer element 7 in a solid or semi-solid or soupy state and the material in both said chambers, being under pressure generated by the rotation of said runner and the curvilinear form of the blades thereof is forced outward by said pressure through the independent discharge outlets 2 and 5 respectively of said chambers through their respective discharge pipes, not shown, to their respective separate points of discharge.

In the modified form shown in Figure 3 the operation is in all respects the same as in the preferred form above described, and the construction is the same as in said preferred form except in the following respects: Instead of the annular member 14, an annular member 18 is substituted said annular member 18 having a radially inner peripheral band 19 fitting against annular shoulders 15 of rims 21 supported in position by inner radially extending bars or struts 22 and similar radially outer struts 20' formed integrally with side plates I and I' and extending in the interior of said plates. Strainer elements 23 are arranged in an annular band in each plate L and L' and bear against the equi-distantly spaced radial struts or bars 22 of the respective plates I and I', said straining elements 23, together with said rims 21, constituting the end walls of the inner annular chamber 4 and said band 19 constituting the annularly outer wall thereof. Said element 18 is provided with an annular chamber 17 between said inner band element 19 and said outer part 18, said parts being held spaced by radial integral portions or struts 20 permitting between them communication between said outer chamber 17 and said inner chamber 4 by means of annularly extending communication passages 16 extending in an axial direction in said plates I and I' from the straining element 23 around the rims 24 to the respective adjacent ends of the annular

band element 18 where they communicate through the spaces between the radially outer struts 20 with the intervals between the spacing struts 20 and so permit communication between said chambers 4 and 17 to allow the water discharged through the straining elements 22 to pass into the outer chamber 17 and be discharged through its discharge outlet 2.

10 In Figure 4 the two previous embodiments are merged in a single embodiment providing the radial holes in the strainer 7 over the top portion and for roughly two-thirds of the periphery of the inner chamber 4 and the lateral holes in the strainers 23 at the bottom, while the radially inner face of the imperforate element 19 presents a smooth unbroken surface on which the solid or semi-solid matter rests and moves in the final stages of the discharge.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A pump casing comprising an endless annular member having its inner face sharply concave in cross-section to form an annularly extending chamber in said member, two end plates, and means for removably securing said plates against the respective ends of said member, in combination with an impeller mounted to rotate in said casing and of such diameter as to leave a distinct annular chamber between said impeller and the chamber in said annular member, and an annularly extending straining element mounted in said casing and so located therein as to permit communication between said chambers thereof, said casing being provided with two distinct discharge ports respectively communicating with, and permitting the independent discharge of the contents of, the respective annularly extending chambers.

2. A pump casing comprising an endless annular member having its inner face sharply concave in cross-section to form an annularly extending chamber in said member, two end plates, and means for removably securing said plates against the respective ends of said member, in combination with an impeller mounted to rotate in said casing and of such diameter as to leave a distinct annular chamber between said impeller and the chamber in said annular member, and an annularly extending removable straining element mounted in said casing and so located therein as to permit communication between said chambers thereof, said casing being provided with two distinct discharge ports respectively communicating with, and permitting the independent discharge of the contents of, the respective annularly extending chambers.

3. A pump casing comprising an endless annular member having its inner face

sharply concave in cross-section to form an annularly extending outer chamber in said member, two end plates, and means for removably securing said plates against the respective ends of said member, in combination with an impeller mounted to rotate in said casing and of such diameter as to leave a distinct inner annular chamber between said impeller and the chamber in said annular member, and an annularly extending straining element mounted in said casing and constituting the outer peripheral wall of said inner chamber permitting communication between said chambers thereof, said casing being provided with two distinct discharge ports respectively communicating with, and permitting the independent discharge of the contents of, the respective annularly extending chambers.

4. A pump casing comprising an endless annular member having its inner face sharply concave in cross-section to form an annularly extending chamber in said member and provided with stops extending axially from its inner face, two end plates, and means for removably securing said plates against the respective ends of said member, in combination with an impeller mounted to rotate in said casing and of such diameter as to leave a distinct annular chamber between said impeller and the chamber in said annular member, and an annularly extending straining element fitted in said annular member, confined therein against radial expansion by said stops, constituting the partition between said chambers, and permitting the liquid in the inner chamber to be forced into the outer chamber, said casing being provided with two distinct discharge ports respectively communicating with, and permitting the independent discharge of the contents of, the respective annularly extending chambers.

5. A pump casing comprising an endless annular member having its inner face sharply concave in cross-section to form an annularly extending chamber in said member and provided with stops extending axially from its inner face and formed with two opposed peripherally presented shoulders, two end plates, and means for removably securing said plates against the respective ends of said member, in combination with an impeller mounted to rotate in said casing and of such diameter as to leave a distinct annular chamber between said impeller and the chamber in said annular member, and an annularly extending straining element removably fitted in said annular member, having its ends in engagement with said shoulders respectively and being under compression and being held against radial expansion by said stops, said straining element constituting the partition between

said chambers and permitting the liquid in the inner chamber to be forced off into the outer chamber, said casing being provided with two distinct discharge ports respectively communicating with, and permitting the independent discharge of the contents of, the respective annularly extending chambers.

6. A pump casing comprising an endless annular member having its inner face sharply concave in cross-section to form an annularly extending chamber in said member, said casing having a further chamber and being formed with an intake, and said annular member being formed with a discharge outlet communicating directly with the chamber therein and with a further and distinct outlet having imperforate walls extending through the chamber in said member and being in direct communication with the other chamber in said casing.

7. A pump casing consisting of an endless annular member having its inner face sharply concave in cross-section to form an annularly extending chamber in said member, two end plates of unbroken area except for the usual central bore in one to receive the drive shaft and the intake opening in the other, and means for removably securing said plates against the respective ends of said member said member being formed with two independent discharge outlets, one of which communicates directly with the

chamber therein, and the other of which is out of communication with said chamber and in direct communication with the interior of said casing radially inward of said chamber.

8. A pump casing comprising an annular member having its inner face cupped in cross-section to form an annularly extending chamber and being formed with two independent discharge outlets, one being in direct communication with said chamber and the other having imperforate walls extending through said chamber.

9. A pump casing consisting of an endless radially outer annular member having its inner face cupped in cross-section to form an annularly extending chamber and formed with two independent discharge outlets, one of which is in direct communication with said chamber and the other of which extends through said member out of communication with the chamber therein, in combination with end plates removably applied to the respective ends of said member, and means for removably securing said plates to said member, each of said plates being formed with an annular shoulder snugly fitting within the respective annular edges of said member.

In testimony whereof, I have signed my name to this specification at New Orleans, Louisiana, this 22 day of March, 1927.

WALTER T. SMITH.