Aug. 28, 1928. 1,682,258

E. B. TAIT

ROTARY PUMP

Filed Nov. 26, 1926 2 Sheets-Sheet 1

Fig.1.

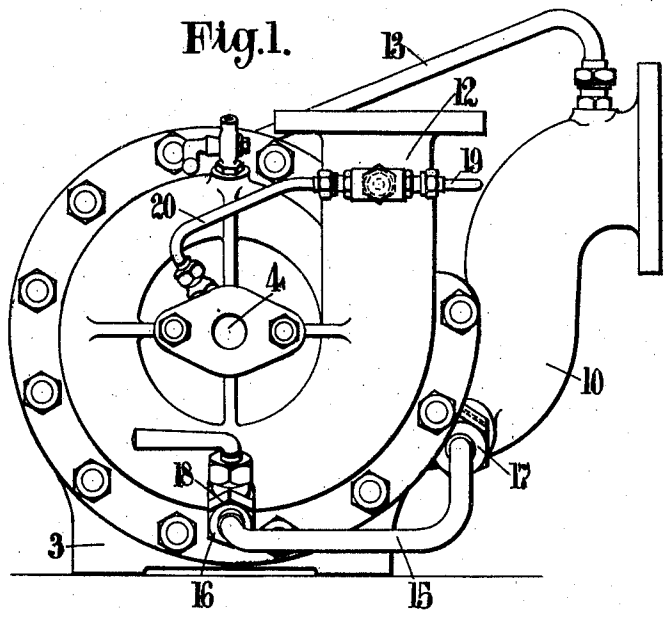
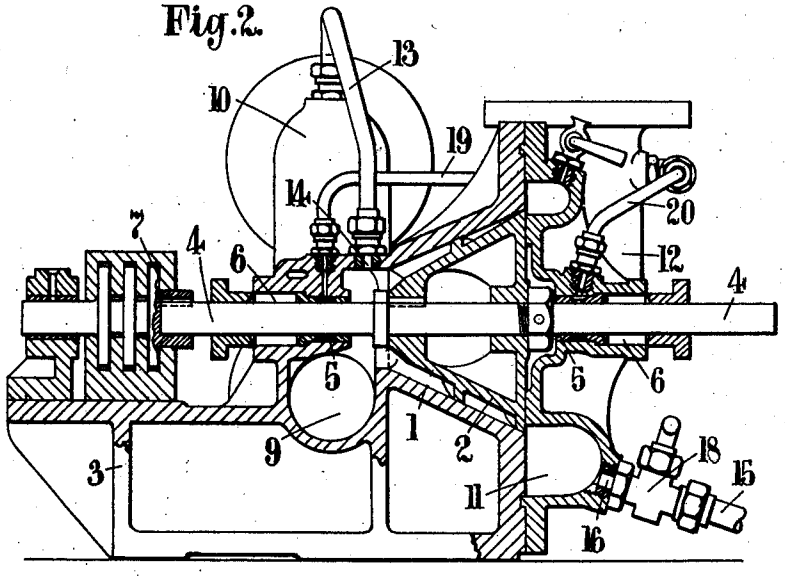


Fig.2.



INVENTOR

Edward Berry Tait

BY

Robert O. Phillips

ATTORNEY

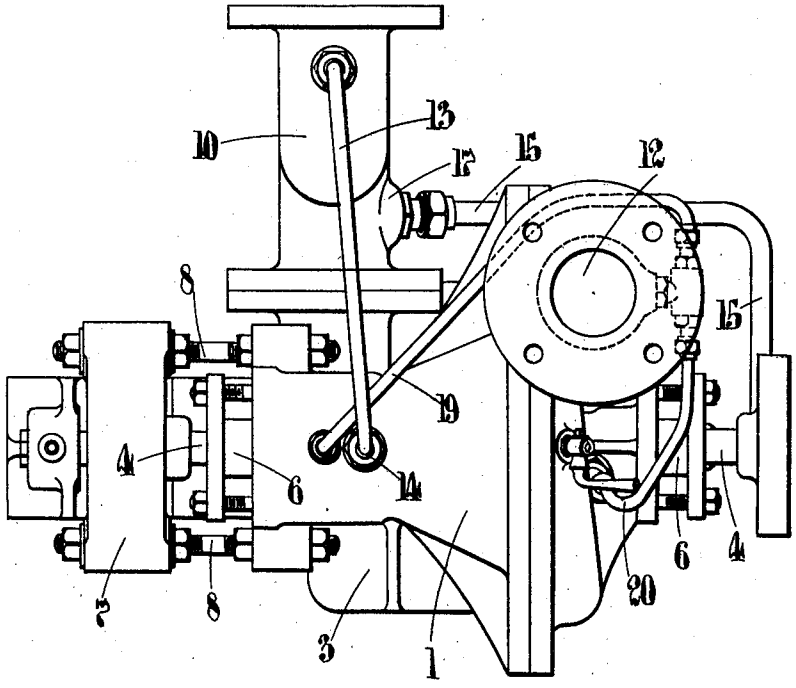
Aug. 28, 1928. 1,682,258

E. B. TAIT

ROTARY PUMP

Filed Nov. 26, 1926 2 Sheets-Sheet 2

Fig. 3.



INVENTOR
Edward Berry Tait.

BY
Robert D. Phillips
ATTORNEY

Patented Aug. 28, 1928. 1,682,258

UNITED STATES PATENT OFFICE.

EDWARD BERRY TAIT, OF COLCHESTER, ENGLAND.

ROTARY PUMP.

Application filed November 26, 1926, Serial No. 150,961, and in Great Britain December 15, 1925.

This invention relates to rotary pumps of the screw or worm type, and it has for its object to improve the efficiency of this type of pump and to make it more convenient to handle and run.

According to my invention the screw or worm of the pump hereinafter called the "rotor" consists of a body of conical form having a screw thread on its coned exterior surface, the relative sizes and shapes of said rotor and of the pump chamber in which said rotor revolves being suitably proportioned and arranged according to the duty the pump is designed to perform. At the smaller end of the pump is an inlet chamber and at the larger end of said pump chamber is a discharge chamber which is of a volute or other suitable form and is provided with a suitable outlet. The inlet branch is raised to any desired height relative to the inlet chamber in order to ensure a certain amount of water remaining in the pump when it is stopped irrespective of whether the suction pipe is fitted with a non-return valve or not or whether the level of the water from which the pump is drawing relative to the position of the pump. To ensure this by preventing the water in the pump from siphoning out an air connection is made between the upper part of the inlet chamber and the highest part of the inlet branch so that when the pump is stopped any siphon action in the inlet or suction pipe which would operate to draw all the water out of the pump is automatically destroyed when the water level in the pump falls below the opening of said air connection into the inlet chamber which ensures that the pump will remain charged with water and so be ready to function again even if the suction pipe is empty.

In order to seal the fine clearance between the tip of the thread on the rotor and the pump chamber when starting the pump and while the air in the inlet and suction pipe is being exhausted a suitable connection is provided between the discharge outlet below the level of the water therein when the pump is stopped and the suction inlet which permits of water flowing from the discharge outlet into the suction inlet which entering the revolving rotor is thrown by centrifugal force to the tip of the worm thread and thus operates to seal the clearance space between said tip and the face of the pump chamber.

In the accompanying drawing Figure 1 is a view in end elevation of the preferred form of my invention. Figure 2 is a view in longitudinal sectional elevation thereof, and Figure 3 is a view in plan thereof.

Throughout the views similar parts are marked with like numerals of reference.

The pump chamber 1 is cone-shaped and within it is mounted a cone-shaped rotor 2 which comprises a body with an external screw thread also of conical form. The chamber 1 is mounted on a suitable foundation 3 and the rotor 2 is mounted on a shaft 4 which runs in suitable bearings 5 and stuffing boxes 6 in the casing of the pump, a thrust bearing 7 being provided at that end of the pump casing adjacent to the smaller end of the pump chamber to take up the end thrust of said shaft.

To enable the rotor 2 to be set up to reduce the clearance between the tip of its screw thread and the face of the pump chamber 1, means such as the set screws 8 are provided for the purpose of adjusting the position of the thrust bearing 7 relating to the casing of the pump.

The smaller end of the pump chamber 1 opens into an inlet or suction chamber 9 into which the inlet branch 10 leads. This inlet pipe is carried to such a height above the chamber 1 as will ensure a certain amount of water remaining in the pump when same is stopped if no foot valve is fitted to the suction pipe and if the level of the water from which the pump is drawing is at a lower level than the inlet or suction chamber. The inlet branch 10 is adapted to be connected to the suction pipe—not shown in the drawings—in any convenient manner. The larger end of the pump chamber 1 opens into a volute discharging chamber 11 having a delivery outlet 12 which is adapted to receive the discharging pipe.

To prevent the water retained in the pump when the pump is stopped from being siphoned out by the back flow in the suction pipe a pipe 13 is run from the highest point of the inlet branch 10 to a point 14 in the upper part of the suction chamber 9.

When starting up under the above conditions, the rotor when revolving draws the contained water in the suction chamber and inlet branch and discharges it, together with the water contained in the annular space between the body of the rotor and the pump chamber, into the discharging chamber and thus to the delivery outlet. This water is

prevented from flowing back by the continued rotation of the rotor which then exhausts the air from the inlet branch and suction pipe thus creating a vacuum which causes the water to rise in the suction pipe and fill the pump.

In order to seal the fine clearance between the tip of the screw thread of the rotor and the pump chamber when starting and during the discharge of the air in the suction pipe a pipe 15 is run from a point 16 in the discharge outlet below the level of the water therein when the pump is stopped to any convenient point at the suction end of the pump such for instance as the point 17 in the inlet branch 10, a stop cock 18 being provided to open and close this passage.

The bearings 5 may be water cooled as shown in Figure 2, to which end said bearings are connected by pipes 19 and 20 with the discharge outlet 12.

What I claim is:—

1. The combination in a rotary pump of the screw type, of a cone-shaped chamber provided at its smaller end with an inlet and at its larger end with an outlet, a cone-shaped screw mounted to rotate in said pump chamber, an inlet suction chamber at the smaller end of the pump chamber an inlet branch to said suction chamber which rises above the highest part of the pump chamber, a discharge chamber at the larger end of the pump chamber having a delivery outlet, a pipe connecting the highest part of the suction chamber with the highest point in the inlet branch, and a pipe connecting the discharge chamber below the level of the water in same when the pump is stopped and any convenient part of the inlet branch contiguous to the suction chamber.

2. The combination in a rotary pump of the screw type, of a cone-shaped chamber provided at its smaller end with an inlet and at its larger end with an outlet, a cone-shaped screw rotor rotating in said chamber, a suction chamber at the smaller end of the pump chamber, an inlet branch to said suction chamber, a discharge chamber at the larger end of the pump chamber, a delivery pipe from said discharge chamber, a pipe connecting the suction chamber at its highest point with the inlet branch at a level above the suction chamber, a pipe connecting the lower part of the discharge chamber with the inlet branch contiguous to the suction chamber, and means for controlling the flow through said pipe.

3. The combination in a rotary pump of the screw type, of a cone-shaped chamber provided at its smaller end with an inlet and at its larger end with an outlet, a cone-shaped screw rotor rotating in said chamber, a suction chamber at the smaller end of the pump chamber, an inlet branch to said suction chamber, a discharge chamber at the larger end of the pump chamber, a delivery pipe from said discharge chamber, a pipe connecting the suction chamber at its highest point with the inlet branch at a level above the suction chamber, a pipe connecting the lower part of the discharge chamber with the inlet branch adjacent to the suction chamber, a cock in said pipe, and a water connection between the bearings of the shaft and the discharge chamber of the pump.

EDWARD BERRY TAIT.