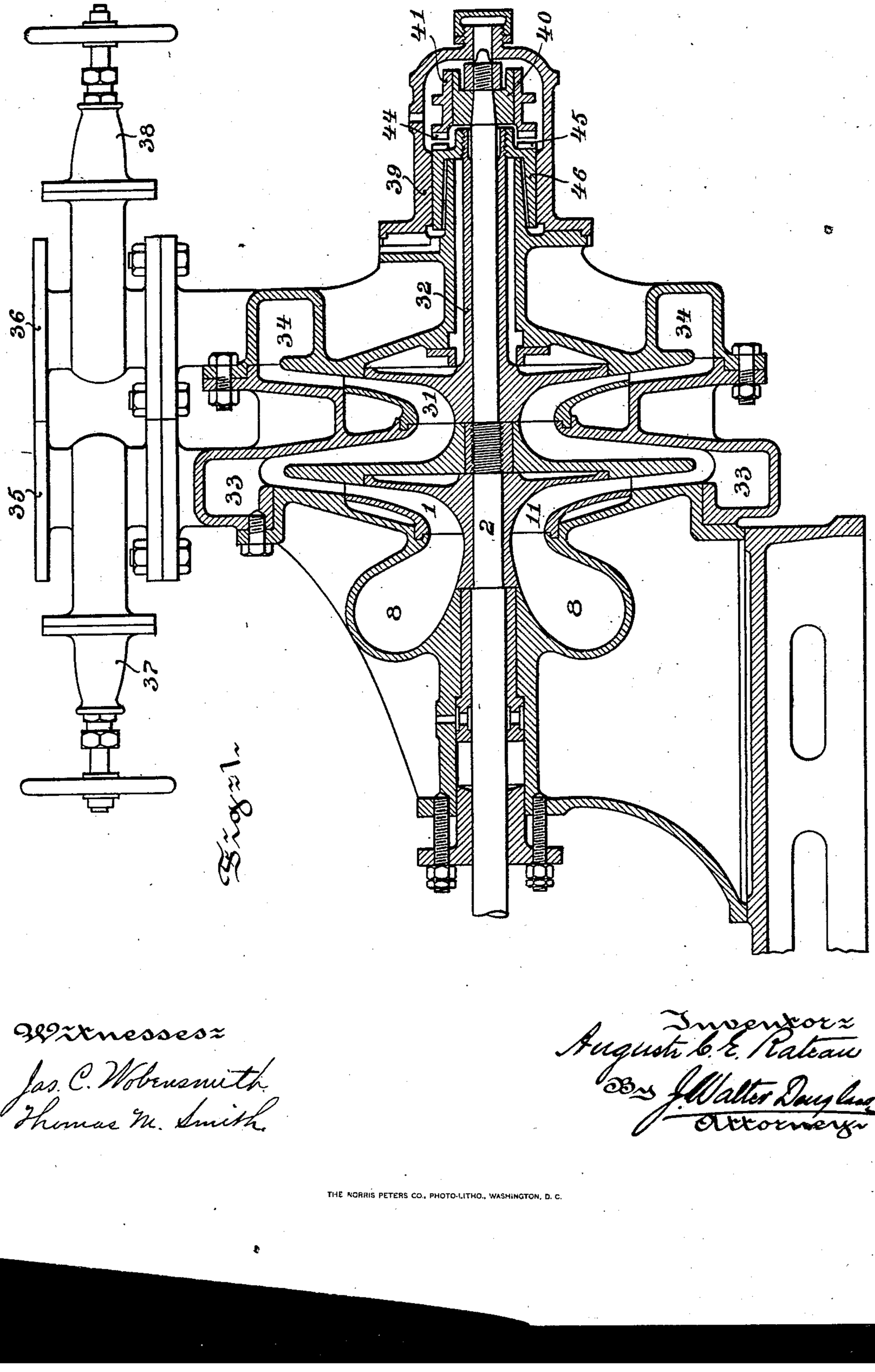
No. 730,842. PATENTED JUNE 9, 1903.

A. C. E. RATEAU.

CENTRIFUGAL PUMP.

APPLICATION FILED NOV. 11, 1902.

NO MODEL. 3 SHEETS—SHEET 1.



Witnesses:
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Thomas M. Smith.

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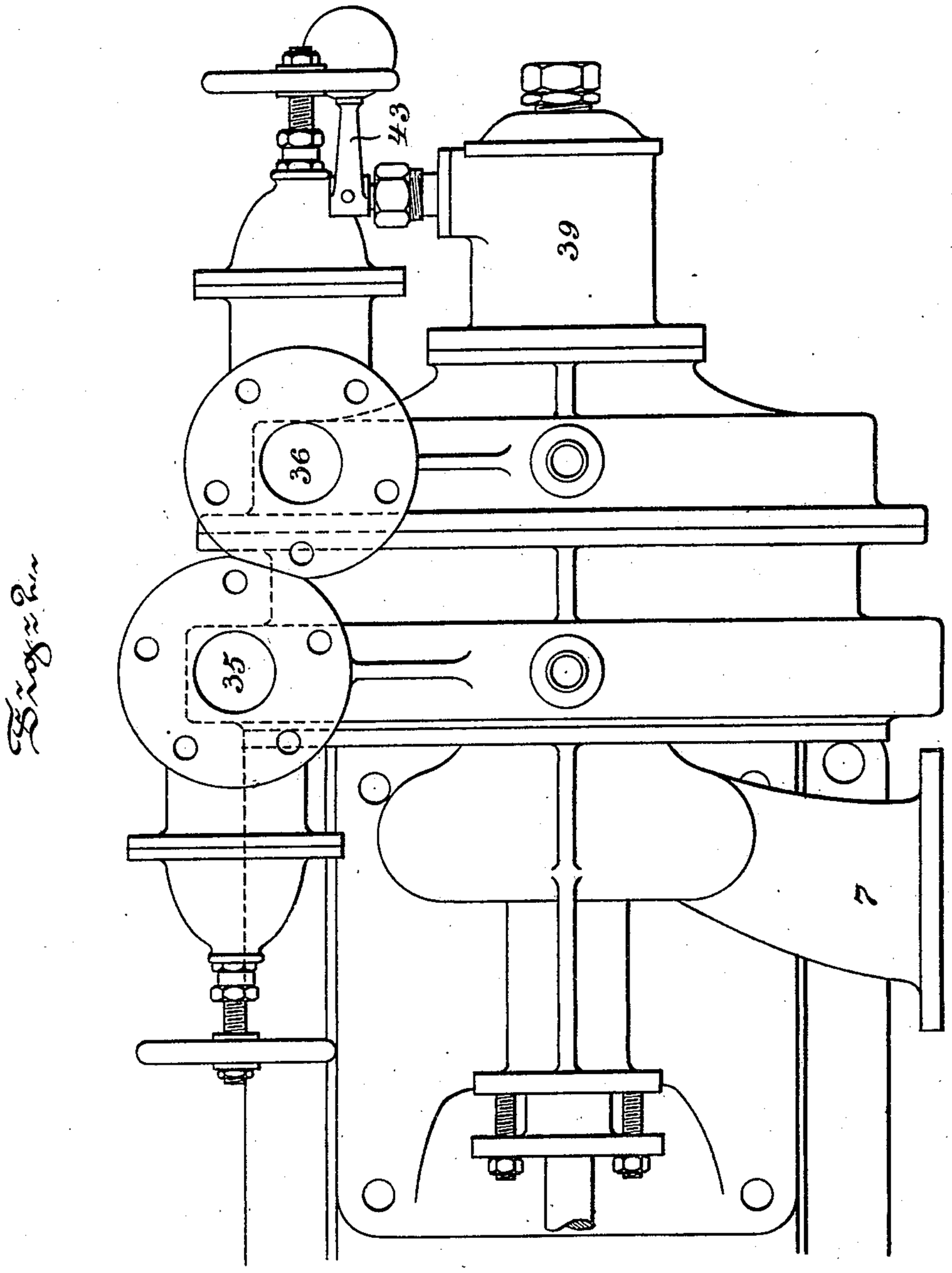
NO MODEL. 3 SHEETS—SHEET 2.



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NO MODEL. 3 SHEETS—SHEET 3.

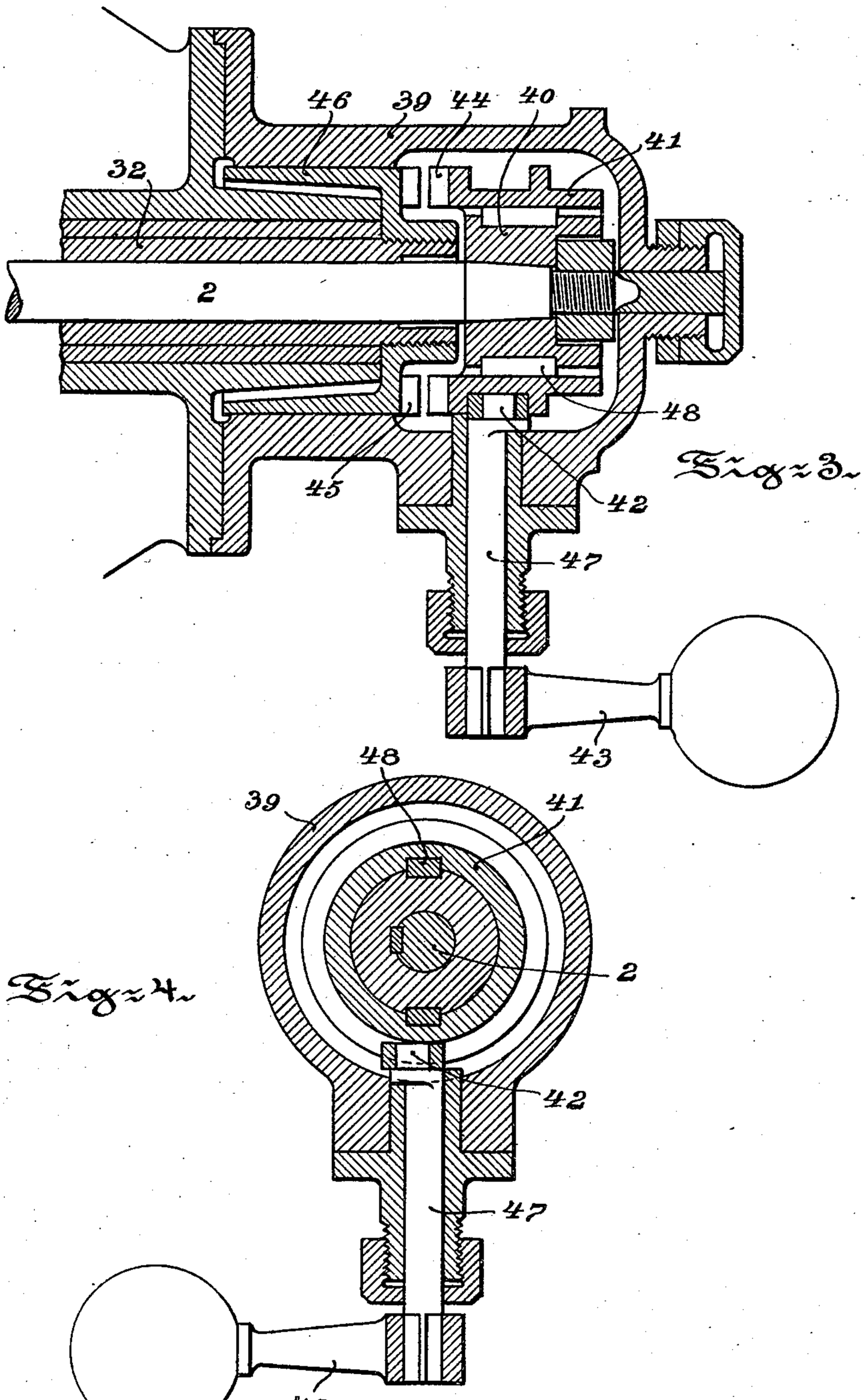

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

AUGUSTE CAMILLE EDMOND RATEAU, OF PARIS, FRANCE.

CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 730,842, dated June 9, 1903.

Original application filed October 7, 1901, Serial No. 77,825. Divided and this application filed November 11, 1902. Serial No. 130,841. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTE CAMILLE EDMOND RATEAU, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

My invention has relation to a centrifugal turbine-pump, and in such connection it relates to the construction and arrangement of such a pump.

In an application for patent filed by me on October 7, 1901, under the Serial No. 77,825, and of which application the present application is a division, there is described a centrifugal pump in which a series of turbines are arranged side by side upon a common shaft in order that the liquid or fluid may be pumped to a great height. In the former application means for preventing churning of the fluid or liquid in the passages of the pump are described, as well as means for taking up and relieving the longitudinal thrust upon the shaft.

In my present application a pump of the same general type forms the basis for the improvements herein claimed.

The object of my present invention is, however, to provide a pump wherein without altering the speed the liquid or fluid may be raised to different heights.

In carrying out my invention there is provided a main shaft, upon which one or a series of turbines is or are secured, and in addition thereto a sleeve or hollow shaft surrounding the main shaft, and to which sleeve another turbine or other series of turbines is or are secured. There is also provided a valve-controlled discharge for each series of turbines and a means whereby the main shaft and sleeve may be coupled to permit both sets or series of turbines to coöperate in forcing the fluid through one discharge to a great height or uncoupled to permit but one set or series of turbines to force the fluid through the other discharge to a lesser height.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a vertical sectional view of a pump embodying main features of my invention in its simplest form. Fig. 2 is a top or plan view thereof. Fig. 3 is a horizontal sectional view, enlarged, of the preferred form of coupling or uncoupling the two shafts carrying the turbines; and Fig. 4 is a transverse sectional view of Fig. 3.

Referring to the drawings, the pump is illustrated in its simplest form having but two turbines 1 and 31. It will of course be understood that these two turbines may be replaced by two series of corresponding turbines arranged and coacting in the manner hereinafter set forth without departing from the spirit of my invention. The turbine 1, which is next adjacent to the circular chamber 8 of the inlet 7 for the fluid, is keyed or otherwise secured directly to the main shaft 2, which is preferably solid. The other turbine 31 is secured to a sleeve or hollow spindle 32, loosely surrounding the shaft 2. The turbine 1 is provided with a volute 33 or discharge-chamber entering a delivery-pipe 35, controlled by the cock or valve 37. The other turbine 31 is also provided with a separate volute 34, entering a second delivery-pipe 36, controlled by a cock or valve 38. Referring now to Figs. 3 and 4, upon the end of the shaft 2 is secured a head 40, on which slides a coupling-collar 41. The collar 41 has on its inner periphery guide or channel ways, into which extend the keys or splines 48, carried by the head 40, so that while the clutch or coupling collar 41 turns with the head 40 and shaft 2 it may be slid back and forth upon the head 40, as desired. On the external periphery of the collar 41 is formed an annular groove into which fits an eccentric or cam 42, carried at the end of the crank-shaft 47, operated by a weighted arm or handle 43. When the weighted arm 43 is raised at right angles to the position shown in Figs. 3 and 4, the shaft 47 turns the eccentric 42, which, moving in the groove of the coupling-collar 41, slides that collar inward. A reverse movement of the weighted arm 43 slides the collar 41 outward. The inner face of the coupling-collar 41 is provided with a series of teeth 44, adapted when the collar 41 is slid inward to engage the teeth 45, projecting

from the outer end of a sleeve 46, forming an extension on the hollow spindle 32. When the teeth of the collar 41 are in engagement with the teeth of the sleeve 46, the shaft 2 transmits its movement to the hollow spindle 32, and both turbines 1 and 31 turn together. When, however, the collar 41 is disengaged from the sleeve 46, the shaft 2 and its turbine 1 continue to turn; but the turbine 31 and spindle 32 remain inoperative. In the operation of the pump when the fluid is to be lifted to its greatest height the valve 37 of the discharge-pipe 35 is closed, and the valve 38 of the pipe 36 is opened. The hollow spindle 32 and main shaft 2 are coupled, and the fluid is forced through both rotating turbines 1 and 31 and delivered through the volute 34 into the pipe 36. When, however, the fluid is to be lifted to the lesser height, the valve 38 of the pipe 36 is closed and the valve 37 of the pipe 35 is opened. The hollow spindle 32 and its turbine 31 are uncoupled from the shaft 2, and the fluid is forced by the first turbine 1 directly into the pipe 35 through the volute 33 and the fluid does not traverse the second turbine 31. It is obvious that the turbine 1 may be replaced by a series of turbines arranged side by side upon the common shaft 2 and that a series of turbines 31 may be arranged on the hollow spindle 32 instead of a single turbine and thus increased pressure be obtained. In such an instance the fluid traverses first the series of turbines 1 before it enters the first in series of turbines 31, and the operation is the same as hereinbefore described. It will also be understood that the diameters of the turbines 1 and 31 may, if desired, be either coequal, as illustrated in the drawings, or may vary in extent to obtain varying pressures. Each turbine 1 or 31 may have the means for preventing churning, as described in my former application, Serial No. 77,825, and the longitudinal thrust on the main shaft may be relieved, as described in said former application, by making the coupling-sleeve 46 the pressure-equalizing piston.

Having thus described the nature and object of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a centrifugal pump, a main shaft, a series of one or more turbines carried by said main shaft, an inlet leading to said turbines and a discharge therefrom, in combination with a hollow spindle surrounding the main shaft, a second series of one or more turbines carried by the hollow spindle and arranged to receive the liquid discharged from the first series of turbines, a second discharge leading from the second series of turbines, means for controlling both discharges, and means for coupling and uncoupling the hollow spindle and main shaft.

2. In a centrifugal pump, a main shaft, a turbine carried by said main shaft, a fluid-inlet leading to said turbine, a volute or discharge chamber leading from said turbine, a hollow spindle surrounding the main shaft, a second turbine carried by said spindle and communicating on its inlet side with the volute of the first turbine, a second volute into which the second turbine discharges, a coupling mechanism arranged to connect or disconnect the spindle and main shaft, a discharge-pipe leading from the first volute, a valve controlling said pipe, a second discharge-pipe leading from the second volute, and a valve controlling said second pipe.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

AUGUSTE CAMILLE EDMOND RATEAU.

Witnesses:
G. DE MESTIEL,
AUGUSTUS E. INGRAM.