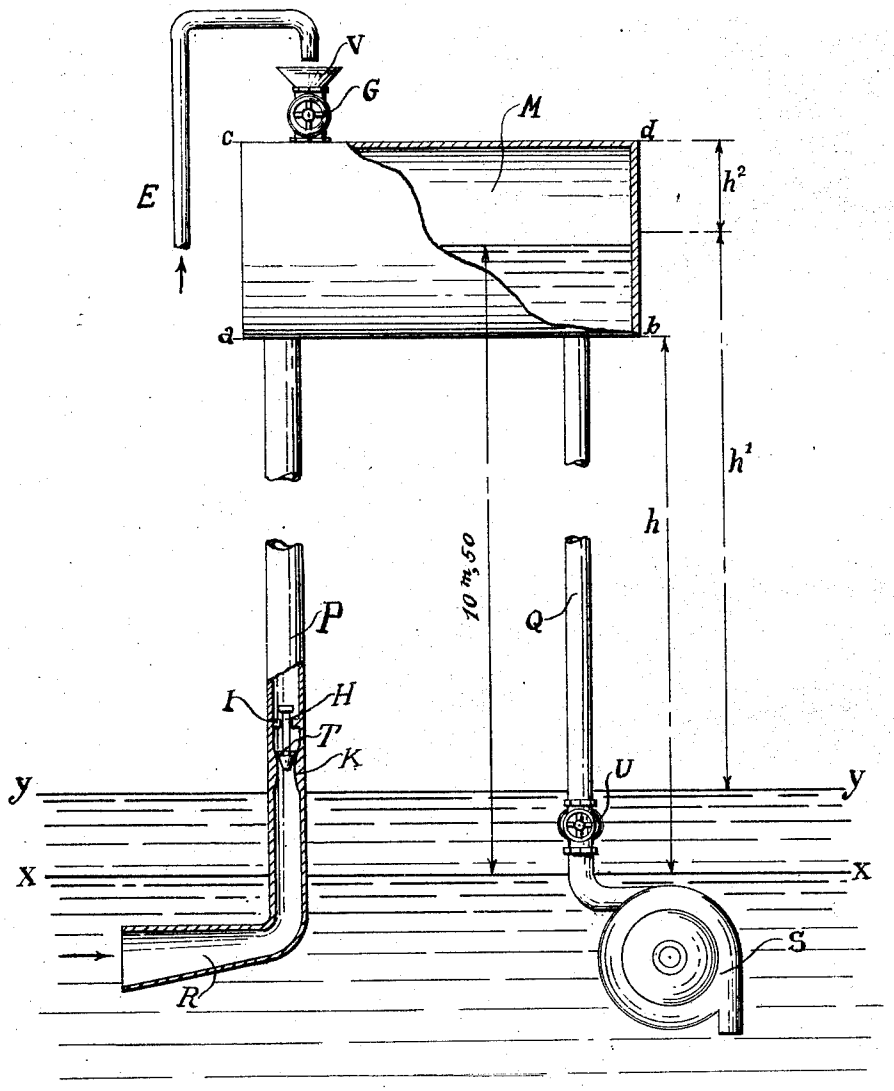
Dec. 31, 1929. P. GRASSET 1,742,068

MARITIME RAM WITH BAROMETRIC CHAMBER

Filed May 13, 1926



Inventor

Paul Grasset,

By William C. Linton.

Attorney

Patented Dec. 31, 1929

1,742,068

UNITED STATES PATENT OFFICE

PAUL GRASSET, OF VERSAILLES, FRANCE

MARITIME RAM WITH BAROMETRIC CHAMBER

Application filed May 13, 1926, Serial No. 108,828, and in France May 16, 1925.

The present invention relates to maritime rams, and has for an object the provision of a system or apparatus adapted to utilize the force of the waves to elevate water in a reservoir or tank placed above the sea level, and to utilize this water by directing it to one or more turbines or other motive machines.

The invention more specifically aims to provide a device of the character mentioned having a closed and air-tight reservoir or tank wherein a total or partial vacuum is created and maintained thereby permitting said reservoir and consequently, the turbine or other motive machine actuated by the water from said reservoir to be placed at a much higher point than could possibly be done if left to the atmospheric pressure and impulsion of the waves alone.

It is also amongst the principal objects of the invention to provide the system with a tank or reservoir so constructed and disposed that impulses of the waves will constitute a source of energy which may be utilized in a continuous and regular manner, thus obtaining at all times, a constant load upon the motive machine or turbine, and whereby the system will remain unaffected by the great variability of the impulses of the sea.

Other important objects and advantages of the invention will be in part obvious and in part pointed out hereinafter.

In order that the invention and its mode of operation may be readily understood by those skilled in the art I have in the accompanying drawings set out a possible embodiment of the invention.

Having more particular reference to these drawings, wherein like characters of reference will designate corresponding parts throughout, my improved device may be stated to comprise a closed and air-tight reservoir or tank M made of suitable material such as plate iron, brick-work, reinforced concrete or the like, and wherein a vacuum is produced and maintained. The reservoir M, in practice, may be mounted upon any suitable support such as uprights or columns (not shown) and is supported in such a manner that the bottom *a*—*b* of said reservoir is situated above the minimum level X—X corresponding to low tide by the height h which is less than the column of water equilibrating the atmospheric pressure, or 10.50 meters. The top *c*—*d* of the reservoir M is situated above the maximum level Y—Y corresponding to high tide by a distance approximately equaling h^1 plus h^2, h^1 being the height corresponding to the column of water equilibrating the atmospheric pressure or 10.50 meters, and h^2 being an additional height whose value should be such that the reservoir M may store up the water which is elevated into it.

Formed at the upper portion of the reservoir M is an inlet provided with a funnel-like extension V having a valve G mounted therein, and adapted to receive and direct to said reservoir, water from the discharge pipe E of any suitable known type of pump (not shown).

Fixed to and downwardly extending from the bottom *a*—*b* of the reservoir M, is a pipe P having its lower end bent at substantially horizontal position and enlarged to form a funnel-like portion R lying in the path of the incoming waves, which will strike into said funnel-like portion R of the pipe P and cause the water to be forced upwardly into the reservoir M. A check valve T provided with a stem H passing through guides I, is arranged within the pipe P and cooperates with the seat K for preventing the return of the water after being upwardly driven by the incoming waves.

Also fixed to and downwardly extending from the bottom *a*—*b* of the reservoir M, is a second pipe Q connected at its lower end to a turbine S or other motive machine. As shown in the drawings, the turbine S is disposed below the lower sea level X—X, if it is to be constantly submerged, but it is to be understood, that the turbine S need not be constantly submerged and may be mounted at any suitable point on the pipe Q. A valve U is disposed in said pipe Q above the turbine S for regulating or cutting off the communication between the reservoir M and the turbine S.

In operation, a vacuum is first produced in the reservoir M. This vacuum is produced by any suitable means but I prefer using the

construction shown in the drawings. The valves T and U are closed, and by means of a pump (not shown) whose delivery pipe illustrated at E, the reservoir M is filled with water through the funnel-like portion V until the water runs out therefrom. The water is now at a level above the top *c—d* of the reservoir M. The valve G is then closed and the valve U opened. The water will then descend in the reservoir M to a level counterbalancing the atmospheric pressure upon the surface of the sea, and the vacuum will thus be produced in the chamber M above that level.

The kinetic energy due to the movements of the waves of the sea will be taken in by the funnel-like portion R, and the resulting impulse will raise the water up through the pipe P into the reservoir M. Since the water is unable to descend through the pipe P by reason of the check valve T, it will be stored in the reservoir M and therefrom directed through the pipe Q to the turbine S and will set the latter in operation.

The resulting impulses will occur at frequent intervals and this will constitute a source of energy which may be utilized in a continuous and regular manner, by reason of the capacity of the reservoir M. I thus obtain a constant load upon the turbine S, and the arrangement will remain unaffected by the great variability of the impulses of the sea.

According to the variable power of the sea, whereby an increased volume of water is supplied when the sea is agitated, the reservoir M will supply a greater or less number of turbines according to the height at which it is situated, and the intakes for said reservoir will supply the turbines according to the amount of water which is momentarily stored up in the reservoir M.

Of course, it is to be understood, that the vacuum produced within the reservoir M does not increase the charge of water nor permit any material gain in hydraulic head, but the advantages obtained thereby are of another practical order. It permits the installation of the turbine at a level which will be that of the highest tide and to make it possible to place the fixed reservoir M and consequently the turbine S in a position where they will not be submerged at high tide.

The advantages will be better understood by way of the following example. Supposing that a difference of level of 5 meters exists between the highest and lowest tide, that the impulsions due to the waves raise the water for 2 meters and that the vacuum in the reservoir M corresponds to a water column of 8 meters, it will then be possible to install the turbine S at 8 meters above the level of the lowest tide and to place said turbine at any point on the pipe Q of the reservoir M. Due to the vacuum, the tank M may also be positioned at a much higher point than could be possibly done if left to atmospheric pressure and impulsion of the waves alone.

Manifestly, the construction shown is capable of considerable modification, and such modification as is within the spirit of my claims I consider within the spirit of my invention.

I claim:

1. A wave power generator comprising in combination a closed reservoir positioned above the waves, means for producing a vacuum in said reservoir to permit the positioning of the latter at a distance above the waves greater than it could possibly be done if left to the atmospheric pressure and impulsion of the waves alone, a pipe having a horizontal funnel in the path of the waves for passing water from the waves into said reservoir, a check valve therein, a turbine, a second pipe for discharging water from the reservoir to the turbine, and a control valve therein.

2. A wave power generator comprising in combination with means for receiving and upwardly directing water from the waves, a motive machine, and means for directing the water to the motive machine, of a closed reservoir for storing the water from the waves, and means for producing a vacuum in said reservoir to permit the positioning of the latter and of the motive machine at a distance above the waves greater than it could possibly be done if left to the atmospheric pressure and impulsion of the waves alone.

In testimony whereof I have affixed my signature.

PAUL GRASSET.