

W. G. DODD.
 ROTARY ENGINE.
 APPLICATION FILED NOV. 6, 1908.

948,692.

Patented Feb. 8, 1910.

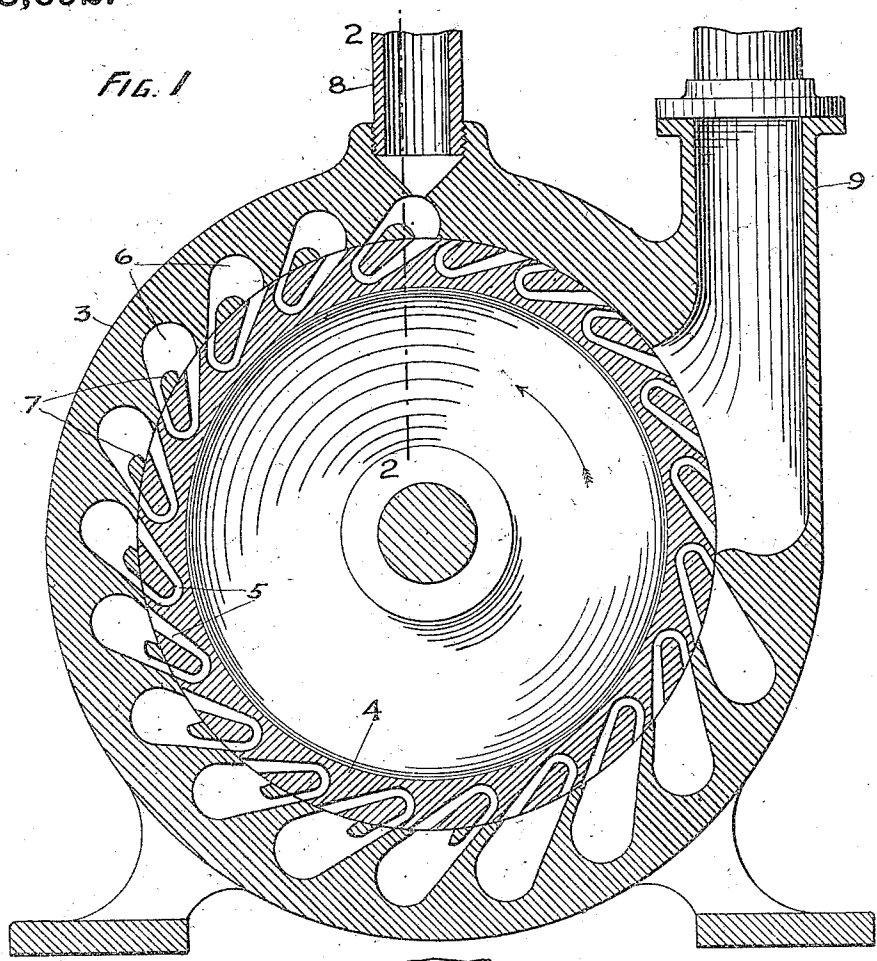
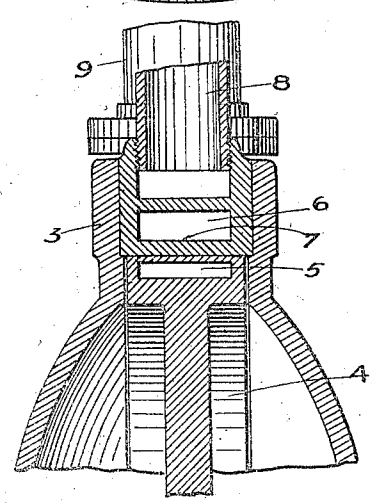


FIG. 2



WITNESSES
G. L. Thedner
Levan Boellor

INVENTOR
Willis G. Dodd
 By *F. M. Wright*
 Attorney.

UNITED STATES PATENT OFFICE.

WILLIS G. DODD, OF SAN FRANCISCO, CALIFORNIA.

ROTARY ENGINE

948,692.

Specification of Letter Patent.

Patented Feb. 8, 1910.

Application filed November 6, 1905. Serial No. 461,436.

To all whom it may concern:

Be it known that I, WILLIS G. DODD, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to rotary engines adapted to be driven by any expansive fluid, and the object of the invention is to provide a motor of high efficiency with a moderate peripheral speed of the rotor.

For this purpose the invention comprises a casing having a series of steam chambers the capacities of which vary in accordance with the ratio of expansion desired, and a rotor in said casing, the periphery of which contains a series of reactionary nozzles, which rotor is so constructed as to momentarily confine the steam in said chambers before permitting of the passage therefrom through said reactionary nozzles into the next chambers of the series.

The invention also resides in other novel features hereinafter described and pointed out in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a side section of my engine, and Fig. 2 is a vertical cross section of the same.

3 is the casing, and 4 is the rotor.

5 are reactionary nozzles of any section desired.

6 are the steam chambers.

7 are bridges extending across the outlets of a portion of the steam chambers, the purpose of which will be hereinafter explained.

8 is an inlet through which the impelling medium is introduced.

9 is the outlet or exhaust.

The direction of rotation is indicated by the curved arrow.

While the drawing shows a single motor in which the available energy contained in the steam is converted into useful work by successive drops in pressure, or stages, it is obvious that this device may be compounded, tripled, or quadrupled, as the requirements of each particular case may demand.

Considering the prior state of the art it is thought that the operation will be understood which briefly is as follows: the steam at an initial pressure of, for example, 100 pounds, enters at 8, and is introduced into the reactionary nozzle 5, and is discharged into the first of the steam chambers 6, and in doing so imparts to the rotor a forward impulse; so that the rotor, momentarily confines the steam within this chamber; but, owing to the momentum thus obtained, the rotor immediately thereafter again opens the passage into the chamber, and this operation is repeated successively, filling closing and discharging each of the chambers 6, until the steam escapes into the outlet or exhaust 9, thus impelling the rotor forward by a series of rapidly recurring momentary impulses as each steam chamber is filled and discharged.

The steam in passing through the nozzles and the respective steam chambers has been finally reduced in pressure to approximately four pounds, upon reaching the last chamber of the series and has increased in volume approximately twenty times and each nozzle of the rotor must therefore be of sufficient area to discharge or exhaust this volume of steam with the velocity due to the pressure, approximately thirty thousand feet per minute. It is obvious, therefore, that if the steam were permitted to freely enter the nozzle of the rotor and be discharged into the first steam chambers of the series at the initial pressure, with the attendant velocity due to its pressure, approximately fifty-five thousand feet per minute, unless the peripheral speed of the rotor approximated one half the velocity of the steam, to obviate which is one of the objects of this invention, there would be but little opportunity afforded for proper expansion to take place and the highest efficiency would not be attained, and it is desirable therefore that the admission of steam to the first chambers of the series should be as far as possible under control.

For the purpose of cutting off, and controlling the quantity of, steam to be admitted to the nozzle of the rotor and discharged into the steam chambers, the bridges

7, extending across the outlets of the steam chambers are employed where required, and, by increasing or diminishing the width of these bridges, the opening of the receiving end of the nozzle is controlled, that is, an earlier or later cut-off is obtained, and only that quantity of steam is admitted under initial pressure, and passed through the various steam chambers of the series, as will permit of a proper ratio of expansion. Thus an efficient conversion of the energy contained in the steam into useful work is obtained, and at a moderate peripheral speed of the rotor, approximating fifteen thousand feet per minute.

From the above description, it will be seen that my steam engine differs in principle from turbines in which there is a continuous and uninterrupted flow of steam from the inlet to the outlet, and which derive their force from the momentum, and pressure upon the rotor, of the continuously flowing steam. In my engine there is no such continuous flow, but, when the rotor arrives at the position shown in Fig. 1, the steam, which, after various degrees of expansion, has entered the several steam chambers 6, is momentarily arrested and confined in said chambers. Each of the chambers 6 thus forms a steam reservoir like that formed by the steam chest of a reciprocating steam engine. When the rotor next moves so that the inlet and outlet portions of the reactionary nozzles 5 respectively connect two adjacent steam chambers or reservoirs, then a momentary impulse takes place at each reactionary nozzle. Hence the rotor is impelled by a series of rapidly recurring impulses at the various nozzles in the rotor, and in this respect my invention differs from the ordinary turbine.

A further improvement consists in the form of the nozzles in the rotor. The inlet and the outlet of each nozzle are symmetrically arranged on the two sides of the central plane transverse to the axis of the rotor, the result of which is that the steam, in passing through said nozzle, is given no deflection or movement whatever in a direction parallel with the axis of the rotor, but moves wholly in a plane perpendicular to said axis. Consequently the propulsive action of the steam is wholly in the direction of rotation.

While I have herein shown the bridges 7 for the purpose of cutting off and momentarily confining the steam in the steam chambers, other constructions may be employed for the same purpose without departing from the spirit of my invention.

The reactionary nozzles here shown, successively filling and discharging the steam chambers, and the varying cut-off employed enabling the impelling medium to be held in

control during the various stages of expansion until its available energy has been converted into useful work, are believed to be new in a rotor of this class, and therefore

I claim:—

1. A rotary steam engine, comprising a casing and a rotor adapted to rotate therein, the casing containing a series of steam chambers, and the rotor having a series of passages, each passage being adapted to connect in succession each pair of adjacent steam chambers to permit the steam to flow from one of said chambers to the next in the series, and the rotor being provided with means arranged to confine the steam in said chambers while said passage is moving from a position connecting one pair of adjacent chambers to a position connecting the next pair of adjacent chambers, substantially as described.
2. A rotary steam engine comprising a casing within which are located a series of independent steam chambers of constantly increasing volumetric capacity, from the inlet toward the outlet, a rotor within the periphery of which are located a series of reactionary nozzles, adapted to successively connect each steam chamber with the next of the series, the casing being provided with means for cutting off and momentarily confining the steam within the said chambers whereby an intermittent flow of the steam in its passage through the engine is obtained and a succession of forward impulses are imparted to the rotor, substantially as described.
3. A rotary steam engine, comprising a casing and a rotor adapted to rotate therein, the casing containing a series of steam chambers, and the rotor having a series of passages, each passage having an inlet and outlet both rearwardly directed, and each passage being adapted to connect in succession each pair of adjacent steam chambers to permit the steam to flow from one of said chambers to the next in the series, and the rotor being provided with means arranged to confine the steam in said chambers while said passage is moving from a position connecting one pair of adjacent chambers to a position connecting the next pair of adjacent chambers, substantially as described.
4. A rotary engine comprising a casing having from the inlet toward the outlet a series of steam chambers, a rotor rotatable therein having a series of passages for the steam, said casing being provided with a series of devices for cutting off the steam passing from one steam chamber to the next of the series, for periods progressively diminishing from the inlet toward the outlet, substantially as described.
5. A rotary steam engine comprising a casing within which are located a series of independent expansion chambers of con-

stantly increasing volumetric capacity, in
combination with a rotor within the periph-
ery of which are located a series of rear-
wardly directed reactionary nozzles, which
5 successively connect and discharge from
their inlet toward their outlet, each chamber
of the series into the chamber next preceding
it, whereby a succession of forward impulses
is given to the rotor, and the energy con-
10 tained in the steam is converted into work

through a series of expansion stages substan-
tially as described.

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

WILLIS G. DODD.

Witnesses:

FRANCIS M. WRIGHT,

D. B. RICHARDS.