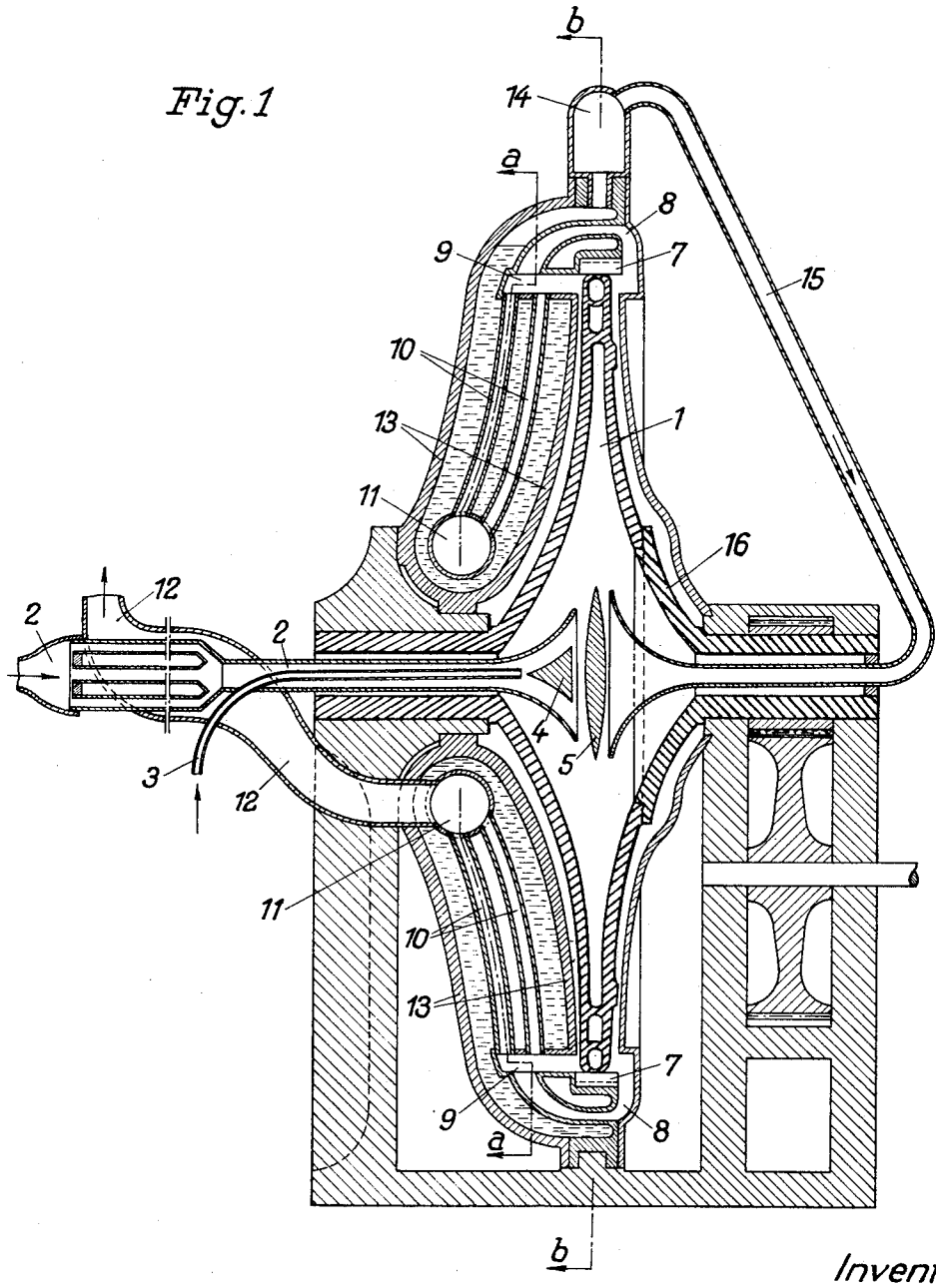
Nov. 8, 1932. G. V. ZETTERBERG 1,887,001

COMBINED GAS AND STEAM TURBINE

Filed Sept. 15, 1930 2 Sheets-Sheet 1

Fig. 1



Inventor:

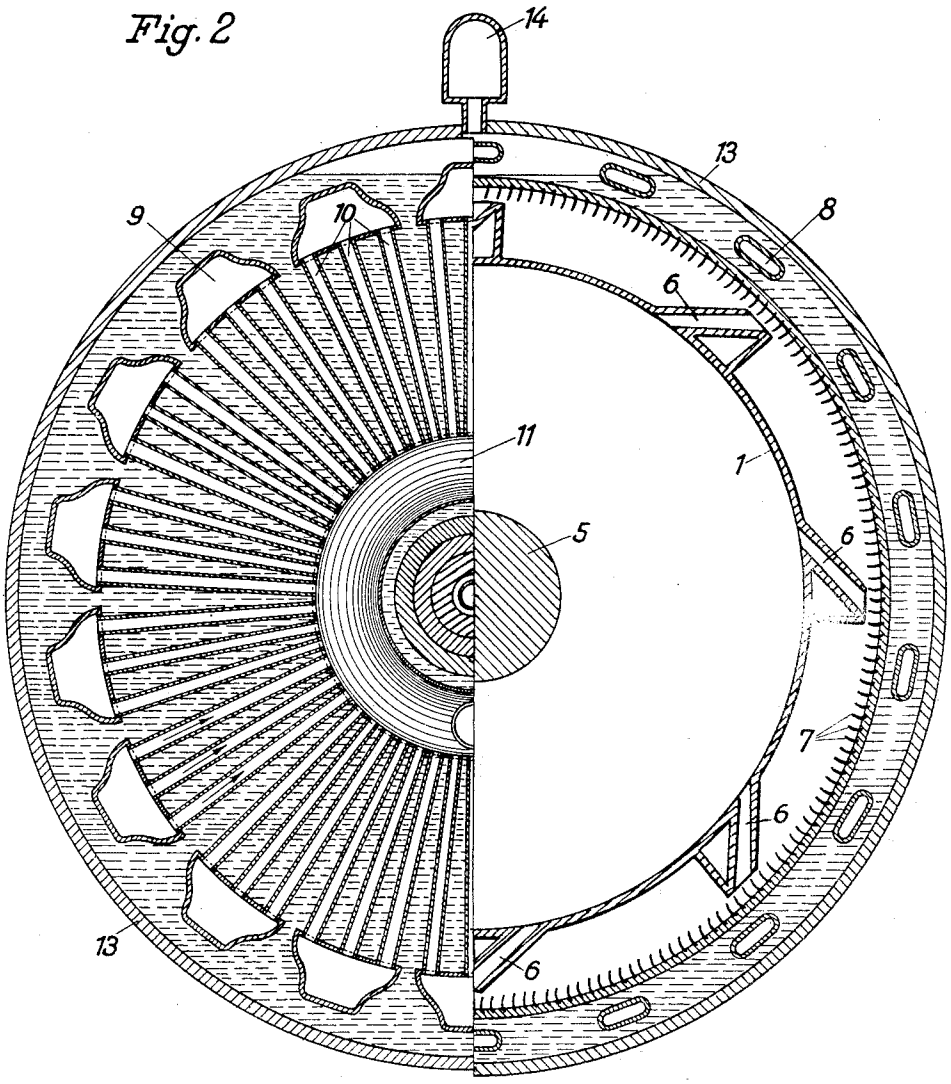
Gust. Zetterberg.

Nov. 8, 1932. G. V. ZETTERBERG 1,887,001

COMBINED GAS AND STEAM TURBINE

Filed Sept. 15, 1930 2 Sheets-Sheet 2

Fig. 2



Inventor:

Gust. Zetterberg.

Patented Nov. 8, 1932

1,887,001

UNITED STATES PATENT OFFICE

GUSTAF VIKTOR ZETTERBERG, OF OR, SWEDEN

COMBINED GAS AND STEAM TURBINE

Application filed September 15, 1930, Serial No. 482,140, and in Sweden November 29, 1929.

This invention relates to a turbine for combined gas and steam drive which is distinguished in that the fuel combusts continually in the impeller, so that the gases from combustion act merely by their expansion, the heat produced at the combustion being at the same time utilized by a steam generator which surrounds the impeller. The generated steam is supplied to the impeller through the hollow shaft of the same and admixed with the gas from combustion, whereupon the combined energy of the gases and of the steam effect the movement of the impeller.

An embodiment of the invention is illustrated by way of example in the accompanying drawings in their application to a reaction turbine:

Fig. 1 is a vertical section through the machine,

Fig. 2 is a cross section partially on line *a*—*a* and partially on line *b*—*b* of Fig. 1.

1 designates the impeller. 2 is the pipe for the supply of compressed air. 3 is the supply pipe for the fuel, both pipes 2 and 3 being arranged in the hollow shaft of the impeller. 4 is an ignition cone or similar device arranged in the impeller through which the ignition of the fuels is effected. 5 is a device for spreading out and distributing the gases from combustion. 6 are discharge nozzles arranged in the periphery of the impeller near the stationary blades 7. 8 are conduits which conduct the gases from combustion to the distributing space 9 whence they are conducted through pipes 10 to an annular collecting chamber 11 from which the gases from combustion are discharged through a pipe 12. The pipe 10 and the collecting space 11 are arranged in a steam generator. The pipe 12 closes the pipe 2 for the compressed air and the supply pipe 3 for the fuel, whereby a heat exchanging device is produced in which the air as well as the fuel are preliminarily heated. The steam generator is designated by 13 and surrounds one side or both sides of the impeller. The heat produced in the impeller is absorbed by the steam generator and the steam thus generated is accumulated in a steam dome 14 from which it is supplied to the impeller through a pipe 15 and the hollow shaft of the impeller. The steam is distributed by the distributing device 5 and then admixed with the gases from combustion. 16 is a cover on the impeller which has to be removed for inserting the different elements into the impeller.

I claim:—

A turbine with combined gas and steam drive, comprising in combination a hollow impeller, a hollow shaft of said impeller, a supply pipe for fuel and a supply pipe for air in said hollow shaft, an ignition cone for igniting the fuel combusting in the impeller, a steam generator surrounding said impeller communicating with said hollow shaft of said impeller, so that the steam is admixed in the impeller with the gases from combustion, a pipe for discharging the gas from the impeller ending in said steam generator and an axially arranged heat exchanging apparatus for preheating the fuel and the air.

In testimony whereof I affix my signature.

GUSTAF VIKTOR ZETTERBERG.