May 3, 1949. J. S. SHARPE 2,468,787

AERODYNAMIC IMPELLING DEVICE

Filed Sept. 9, 1943

FIG. 1.

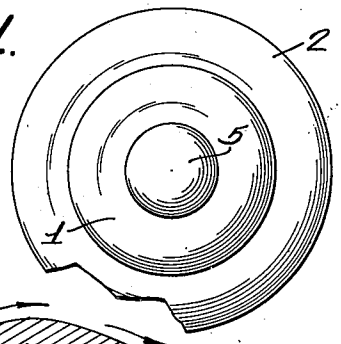
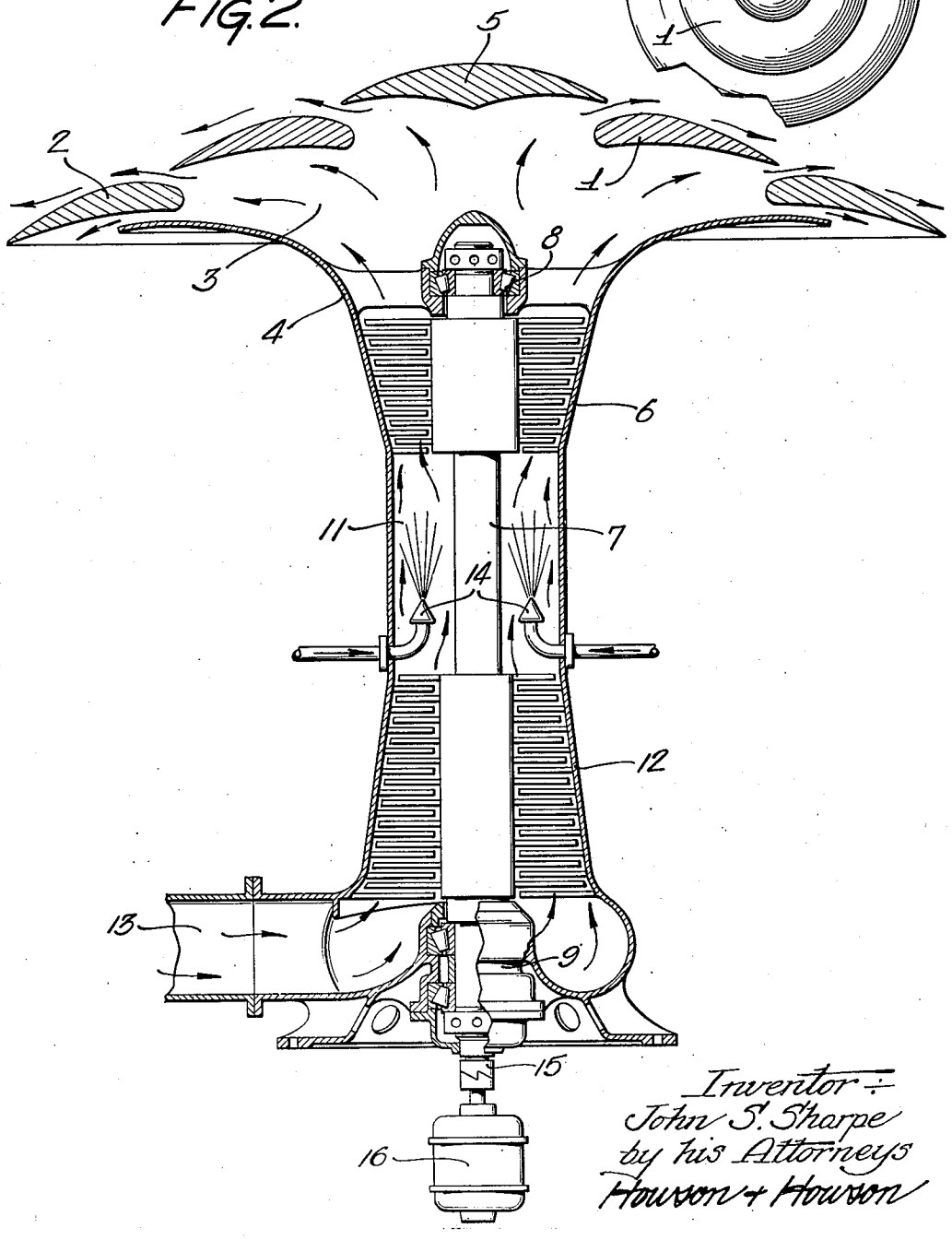


FIG. 2.



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2,468,787

AERODYNAMIC IMPELLING DEVICE

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3 Claims. (Cl. 253—36)

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This invention relates to improvements in aerodynamic devices of a type wherein the relative wind required for development of lift or thrust in an airfoil is obtainable through the medium of a flow generator attached to the airfoil and movable with the latter, and a principal object of the invention is to provide a practical device of this type.

To this primary end, the invention contemplates an airflow generator employing the combined factors of compression and heat to produce the relatively large volume of fluid required for effective reaction with the air foil.

In the attached drawings,

Figs. 1 and 2 are respectively top plan and vertical sectional views of a device made in accordance with my invention.

With reference to the drawings, the device consists primarily of one or more air foils preferably of annular form and with the entering edge at the inner periphery of the annulus. Two such air foils, designated respectively by the reference numerals 1 and 2, are employed in the illustrated embodiment of my invention, the air foil 1 being of smaller diameter than the air foil 2 and the two air foils being arranged in the wall of a chamber 3, the function of which will be hereinafter described. In the present instance, a casing 4, of which a portion forms the lower wall of the chamber 3 extends outwardly to the under side of the air foil 2. The air foil 1 is arranged so that its outer peripheral or trailing edge is slightly above and spaced from the inner peripheral edge of the air foil 2; and beyond the air foil 1, a circular element 5 which constitutes a part of the wall of the chamber 3, has its peripheral edge slightly above and in proximity to the inner peripheral edge of the air foil 1. The arrangement is such that the chamber 3 finds annular discharge openings between the air foils 1 and 2 and between the air foil 1 and the housing section 5, these openings being such that fluid discharging from the chamber 3 will be directed against the air foils 1 and 2 in a manner to develop lift in accordance with the known aerodynamic principles.

The device, in a preferred embodiment, further comprises a gas turbine 6 of the reaction type, the rotary elements of the turbine being carried by a shaft 7 which is journaled in suitable bearings 8 and 9. The turbine 6 is arranged to exhaust directly into the chamber 3. Actuation of the turbine 6 is effected by heated gases delivered from a combustion chamber 11. Compressed air is delivered to the combustion chamber from a compressor 12, preferably of the axial type, the rotary elements of this compressor being carried by the shaft 7 which, as shown, extends through the chamber 11. The intake 13 of the compressor is open to the atmosphere. The combustion chamber 11 comprises means for injecting a suitable fuel for combustion purposes. This means may vary widely and in the illustrated embodiment is shown as nozzles 14, 14 for introducing a liquid hydrocarbon.

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In operation, air drawn through the port 13 is compressed and delivered from the multi-stage compressor 12 to the combustion chamber 11. Combustion of the fuel-air mixture in this chamber heats the compressed air which then expands through the stages of the turbine 6 to the chamber 3. In the present instance, the sole function of the turbine 6 is to drive the compressor 12, and this turbine may be relatively small. Large volumes of the combustion product from the chamber 11 is thus delivered to the chamber 3 and escapes through the annular ports past the air foils 1 and 2.

It will be apparent that some means for starting the turbine-compressor unit will be required and to this end I provide on the outer projecting end 15 of the shaft 7 an electric motor 16 which, after performing its function, may be cut out during a normal operation of the device.

It is apparent also that there may be considerable modification of the aforedescribed apparatus without departing from the invention. It may, for example, be desirable to by-pass a part of the combustion product not required for operation of the turbine 6 directly from the chamber 11 to the chamber 3. Obviously also means other than that illustrated may be employed for directing the combustion product from the chamber 11 against the surfaces of the air foils 1 and 2. Furthermore, it is not essential that these air foils be of the annular form illustrated although this form has material advantages in control of the air flow over the air foil surfaces and for vertical lift where the device is used as a propelling medium.

I claim:

1. In an aerodynamic impelling device, means for producing a continual flow of expanding gases, a structure forming a chamber for the reception of said gases, the wall of said chamber being formed in part by two immediately adjacent annular airfoils which are spaced from each other and from other portions of the chamber wall in a manner to provide for the release of said gases to produce an aerodynamic impelling force, one of said annular airfoils having a trailing edge

of approximately the same length as the leading edge of the other of said annular airfoils.

2. In an aerodynamic impelling device, means for producing a continual flow of expanding gases, a structure forming a chamber for the reception of said gases, the wall of said chamber being formed in part by two immediately adjacent annular airfoils which are spaced from each other and from other portions of the chamber wall in a manner to provide for the release of said gases to produce an aerodynamic impelling force, one of said annular airfoils having a leading edge of materially greater length than the leading edge of the other of said annular airfoils.

3. In an aerodynamic impelling device, means for producing a continual flow of expanding gases, a structure forming a chamber for the reception of said gases, the wall of said chamber being formed in part by two immediately adjacent annular airfoils of different size which are spaced from each other and from other portions of the chamber wall in a manner to provide for the release of said gases to produce an aerodynamic impelling force, the smaller of said airfoils acting to deflect and impinge a portion of said expanding gases against, and adjacent the leading edge of, the larger of said airfoils.

JOHN S. SHARPE.

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