

## PATENT SPECIFICATION



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425,046

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Complete Specification Accepted: March 5, 1935.

## PROVISIONAL SPECIFICATION

## Improvements in and relating to Propulsion of Aircraft

I, GEFREY ALAN STENNING, of 63, Queens Park Road, Brighton, British Nationality, do hereby declare the nature of this invention to be as follows:—

5 By means of an automatic blow lamp provided with a jet capable of travelling forward with its ejecting gas, or by means of an internal combustion chamber, or a compressed air chamber or a gas chamber, 10 any of which latter being capable of projecting an arm or extended jet out of which comes an ejection of gas or air, the

arm or jet itself travelling forward some or part of the way, in the direction of the stream of gas or air, by this means then, 15 this said ejection of gas or air is made to impinge upon a relatively larger mass of air, by which means suitable depressions and compressions of air pressure are produced, the which being particularly suitable 20 for the propulsion of aircraft.

Dated the fifth day of September, 1933.  
G. A. STENNING.

## COMPLETE SPECIFICATION

## Improvements in and relating to Propulsion of Aircraft

I, GEFREY ALAN STENNING, of 63, Queen's Park Road, Brighton, Sussex, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

25 This invention relates to propulsion means for aircraft and consists in ejecting fluid from a jet which is driven in the direction of the issuing fluid while said fluid issues, so that a zone of low pressure connected with the outer atmosphere is 30 created within the craft.

35 By suitably arranging the connection between the low pressure zone and the outer atmosphere by, say, a number of slots or holes suitably placed in the wing surfaces of an aeroplane, the consequent air displacement is caused to effect propulsion of the craft through the air. The fluid ejected from the jet is advantageously used in known manner to assist 40 propulsion by fluid jet reaction. The manner in which a vacuum formed within an aircraft may be utilised to effect movement of the craft will present no difficulty to those skilled in the art and this invention resides principally in the manner by 45 which a sufficiently high vacuum can be attained.

50 The invention is illustrated by the accompanying drawings which show a construction of apparatus according to the invention and in which—

55 Fig. 1 is a sectional diagrammatic plan of two internal combustion engines with the piston rods broken short;

[Price 1/-]

Fig. 2 is a sectional plan of two cylinders arranged end to end which are adapted to be placed between the engine cylinders shown in Fig. 1; 60

Fig. 3 is a sectional view on an enlarged scale of a jet; 65

Figs. 4a, 4b and 4c are views of details of the engine construction, Fig. 4b being a section on Fig. 4a.

Referring to the drawings—one only of the cylinders shown in each of Figs. 1 and 2 will be described in detail as the other cylinder in each Fig. is a duplicate of the first. In Fig. 1 the engine cylinder 1 is provided with a head 2 in which is 70 fixedly arranged a member 3 having a cam-shaped surface which projects into the cylinder space. The other end of the cylinder is closed by a check valve in the form of a fixed plate 4 having ports 5 and a bottom plate 6 held to the plate 4 by 75 springs 7. An inlet valve 8 is provided adjacent the head 2 and the movement of the valve is effected by valve operating gear of known type which is not shown. 80 A port 9 is formed in the cylinder wall adjacent the plate 4 and a pipe lead 10 communicates with both the port 9 and the valve 8 and also with a fuel pipe lead 11. Arranged to reciprocate in the cylinder 85 1 is a piston 12 mounted on a hollow rod 13 by a spider 33. The rod 13 is carried to the face of the piston 12 and the opening thus formed in the piston is closed by a valve 14 shown in detail in Figs. 4a, 4b and 4c. The 90 valve 14 is pivotally mounted on the piston by a pin 15. It is provided with a

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bevelled surface 16 in order to permit smooth engagement of the valve with the end of the cam 3. As the piston moves towards the top of its stroke the cam 3 first displaces the valve 14 and at the same time enters the orifice in the piston and closes it when the charge in the combustion chamber is exploded. Explosion may be effected by known means which may vary with the type of engine used. For example, a spark plug not shown may be employed for this purpose. When explosion occurs the piston is forced outwards away from the cam 3, the opening in the piston being thus fully exposed and allowing the explosion gases to pass into the hollow piston rod 13. When the piston reaches the end of its stroke a cam member 17 fixed on the plate 6 engages with a cam member 18 fixed to the valve 14 and projecting downwards through the piston and returns the valve to the position in which the orifice in the piston head is closed. The piston is slotted at 19 to permit the necessary movement of the cam member 18 to take place. When the piston 12 moves back towards the head of the cylinder the check valve 5, 6 opens and admits air to the lower cylinder space 32, closing again when the suction in this part of the cylinder disappears. During the time in the outward stroke of the piston when the valve 8 is open air admitted through the check valve passes through the pipe lead 10 and past the valve 8. A second engine cylinder is shown in Fig. 1 and the piston rod in this cylinder is mechanically connected with the rod in the cylinder described above so that the return movement of the piston in one cylinder is effected as a result of the explosion in the other cylinder. The mechanical connection of the piston rods is made by means of the rod 20 shown in Fig. 2. This rod 20 connects the rods 13, 13 and, together with each rod forms a jet 21 as shown in Fig. 3. Each jet comprises a plug 22 fixed in a rod 13, a number of ports 23 being formed in the plug to allow the gases in the rod to pass out through suitably shaped passages into cylindrical vessels 24. Fixed in the plug and forming the inner boundary of the passages leading from the ports 23 is a member 25 fixed to the rod 20. As shown in Fig. 2 there are arranged two similar vessels 24 in each of which reciprocates a jet 21. A port 26 is formed at the top or engine end of each vessel and a pipe lead 27 communicates with both ports. Outlet ports 28 in each vessel communicate with a common outlet pipe 29. It will be appreciated that as a discharging jet moves towards the separating wall 30, the air in the particular vessel will be forced towards the outlet 28. The movement of the jet in the direction of movement of the gases ejected from it results in a far greater mass of air in the vessel being forced towards the outlet 28 than would be the case with a stationary jet. This action results in the production of a vacuum at the port 26. A pipe lead 31 may then communicate with slots or holes formed in what may be termed the useful surfaces of the craft to communicate with the outer atmosphere and produce motion of the craft. It will be appreciated that the disposition of the various parts of the apparatus described is capable of modification both as regards each other and the direction of motion of the craft. In the drawings the vessels 24, 24 preferably run substantially fore and aft, the right hand of the Figs. facing the front.

The air and gases leaving the pipe lead 29 may be discharged into the outer air to produce a fluid jet reaction in known manner.

The apparatus shown effects movement of the jet 21 in the direction of movement of the issuing gases and it is to be understood that the invention is not restricted to such particular means of effecting this movement of the jet.

While in the above-described arrangement the jet is caused to move over a straight line path, the invention is not restricted to such a motion and the jet may, for example, be caused to move over a circular or other curved path. In the preceding description two cylinders are described, but it will be apparent that a large number may be employed.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Propulsion means for aircraft in which fluid under pressure is ejected from a jet driven in the direction of the issuing fluid while said fluid issues so that a zone of low pressure connected with the outer atmosphere is created within the craft.
2. Propulsion means as claimed in Claim 1, in which the jet discharges into a vessel open at each end to the outer atmosphere.
3. Propulsion means as claimed in Claim 1 or 2, in which the zone of low pressure is open to the outer atmosphere through orifices in the useful surfaces of the craft.
4. Propulsion means as claimed in any of Claims 1 to 3, in which the fluid

ejected from the jet is discharged from the machine to employ the reaction effect of the fluid jet.

5 5. Propulsion means as claimed in any of Claims 2 to 4, in which the fluid ejected from the jet and the air induced from the atmosphere by the zone of low pressure is discharged from the craft through a common outlet in the vessel.

10 6. Propulsion means as claimed in any of the preceding claims, comprising an internal combustion engine in which a hollow piston rod is provided with a discharge opening at the end remote from the piston and a valve in the piston head is adapted to be opened after explosion to permit the explosion gases to be discharged through the piston rod.

20 7. Propulsion means as claimed in Claim 6 in which the discharge end of the rod is arranged to move in a vessel open at one end to the front and at the other to the rear of the craft.

25 8. Propulsion means as claimed in Claim 6 or 7, in which the engine cylinder is closed at the end adjacent the jet by a check valve, and a pipe lead opening into the cylinder at this end is

arranged to supply the necessary air for combustion. 30

9. Propulsion means as claimed in Claim 6, 7 or 8, in which a projecting cam on the cylinder head is arranged to displace a valve member on the piston and to enter an orifice therein and a cam member on the bottom closure plate of the cylinder is arranged to engage with and move the valve member back to the closed position at the bottom of the piston stroke. 40

10. Propulsion means as claimed in any of Claims 6 to 9, in which a pair of engine cylinders are each arranged to eject explosion gases into one of a pair of vessels each connected at both ends with the outer atmosphere. 45

11. Propulsion means, substantially as described with reference to the accompanying drawings.

Dated this 28th day of August, 1934.

ABEL & IMRAY,  
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W.C. 2,  
Agents for the Applicant.

[This Drawing is a reproduction of the Original on a reduced scale.]

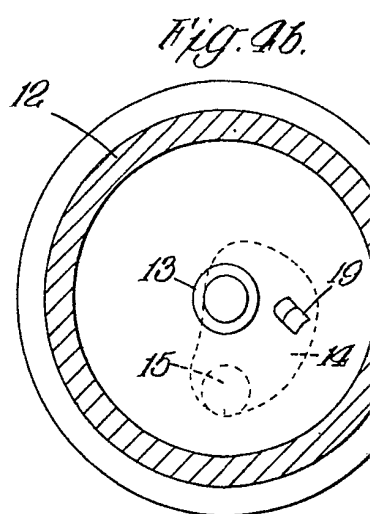
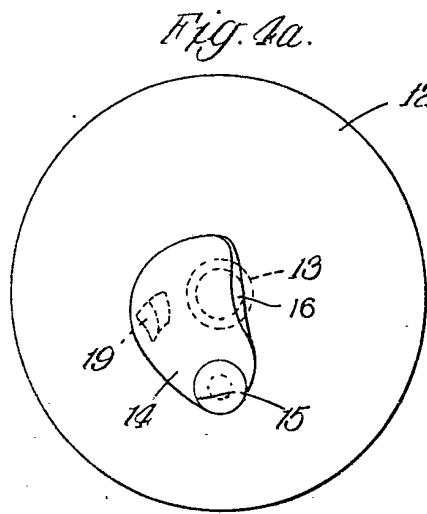
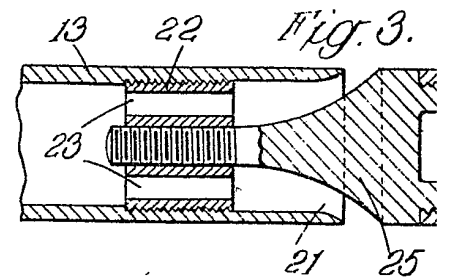
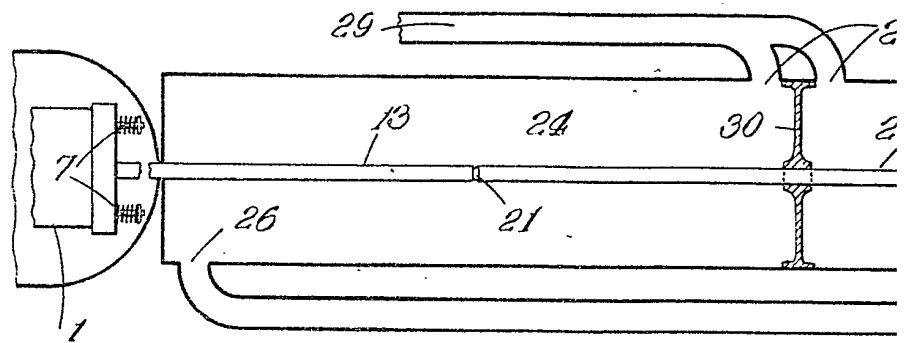
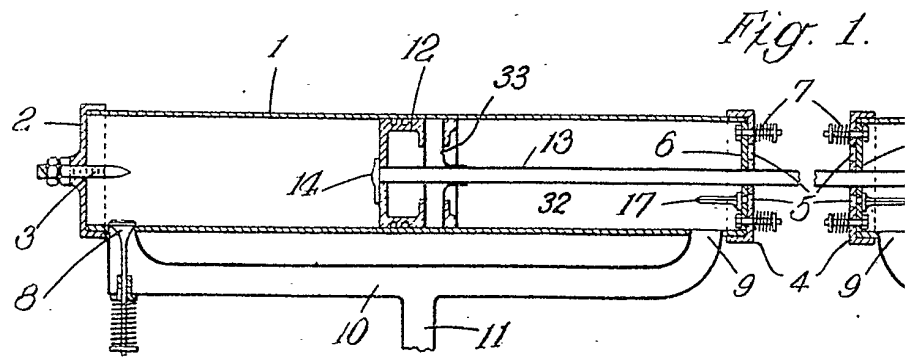


Fig. 1.

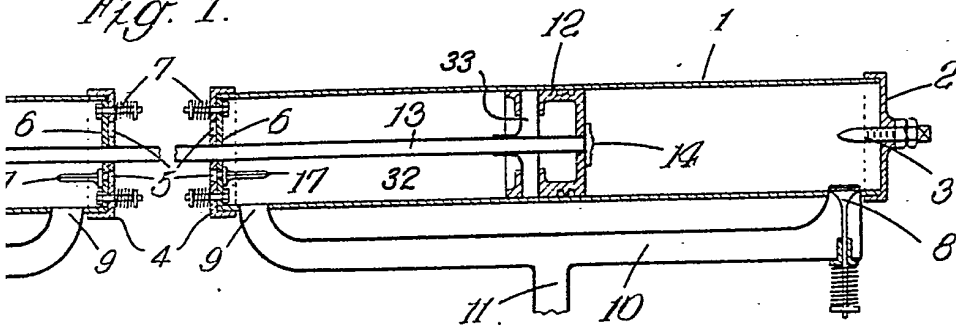


Fig. 2.

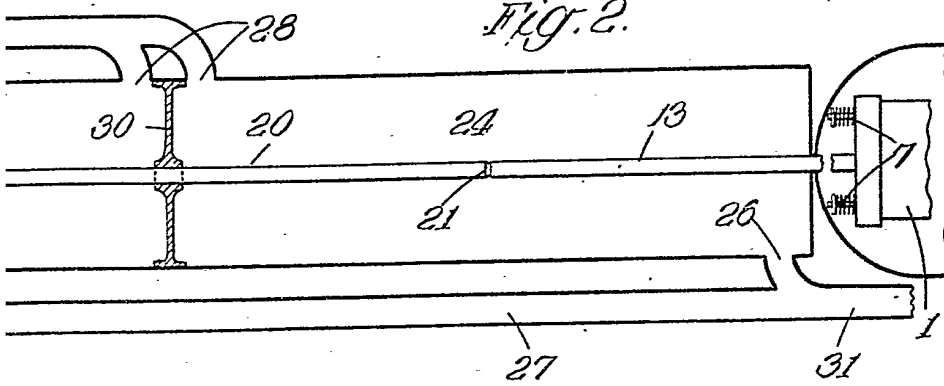


Fig. 3.

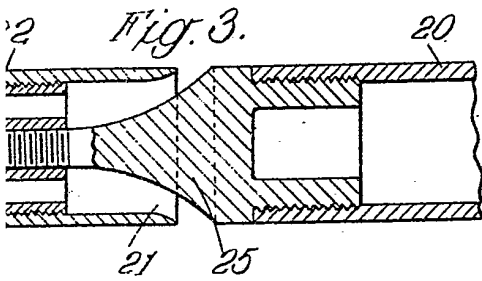


Fig. 4b.

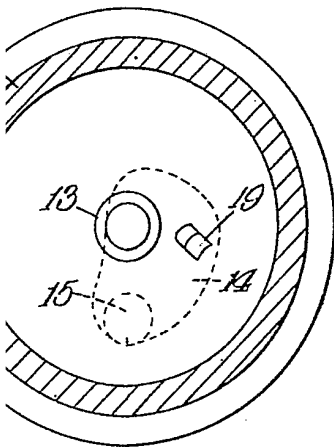
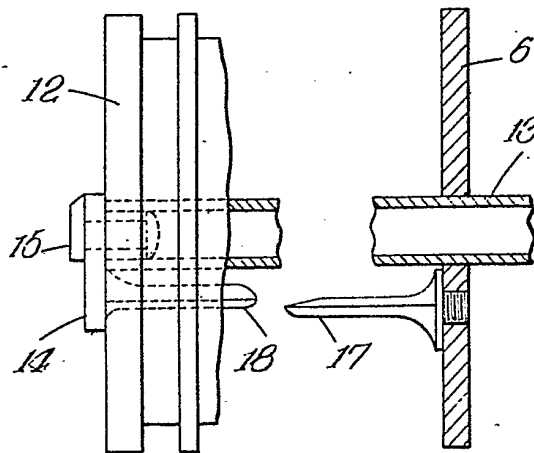
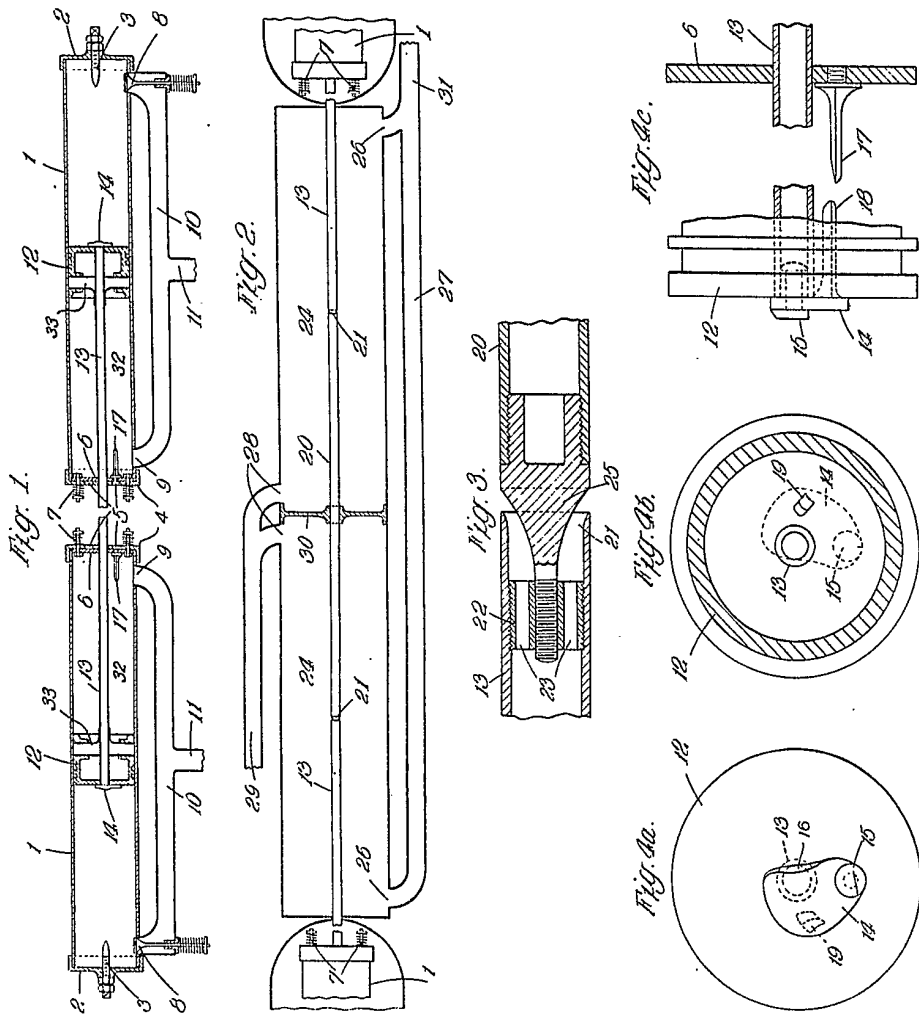


Fig. 4c.





[This Drawing is a reproduction of the Original on a reduced scale.]