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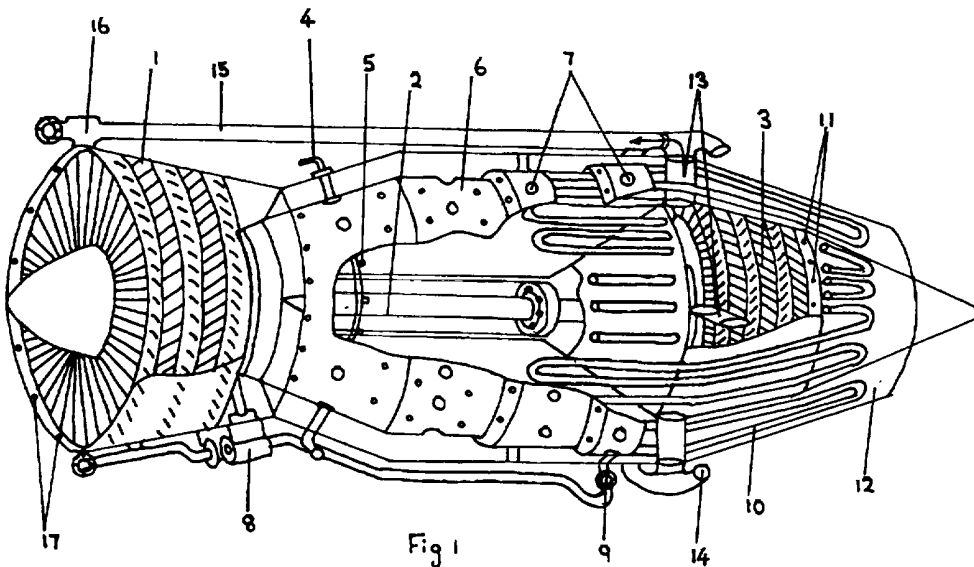
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(56) Documents Cited  
GB 1467801 A GB 1061351 A GB 0596696 A  
US 4333309 A  
PAJ Abstract JP55023325 ABV004057 WPI Abstract  
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(54) Abstract Title  
Turbojet with steam turbine

(57) The Thermo Induction Turbojet operates by drawing in air and compressing it in an axial flow compressor 1. Front here it is passed into combustion chamber 6 where it is mixed with fuel from nozzles 5 and burnt. The rapidly expanding hot gases pass around convoluted water tube 10 and over encased steam turbine 3, exiting through jet nozzle 12. Water supplied from pump 8 is force circulated through water tube 10. This cools the combustion chamber and produces high pressure steam. The steam is fed via nozzles 11 to steam turbine 3, thus rapidly rotating it, the connecting shaft 2 and compressor 1. Exhausted steam exits the turbine via ducts 13 and manifold 14. From here it travels via pipe 15 to a suitable condenser in the front of the engine. Condensed water is recirculated via pump 8.



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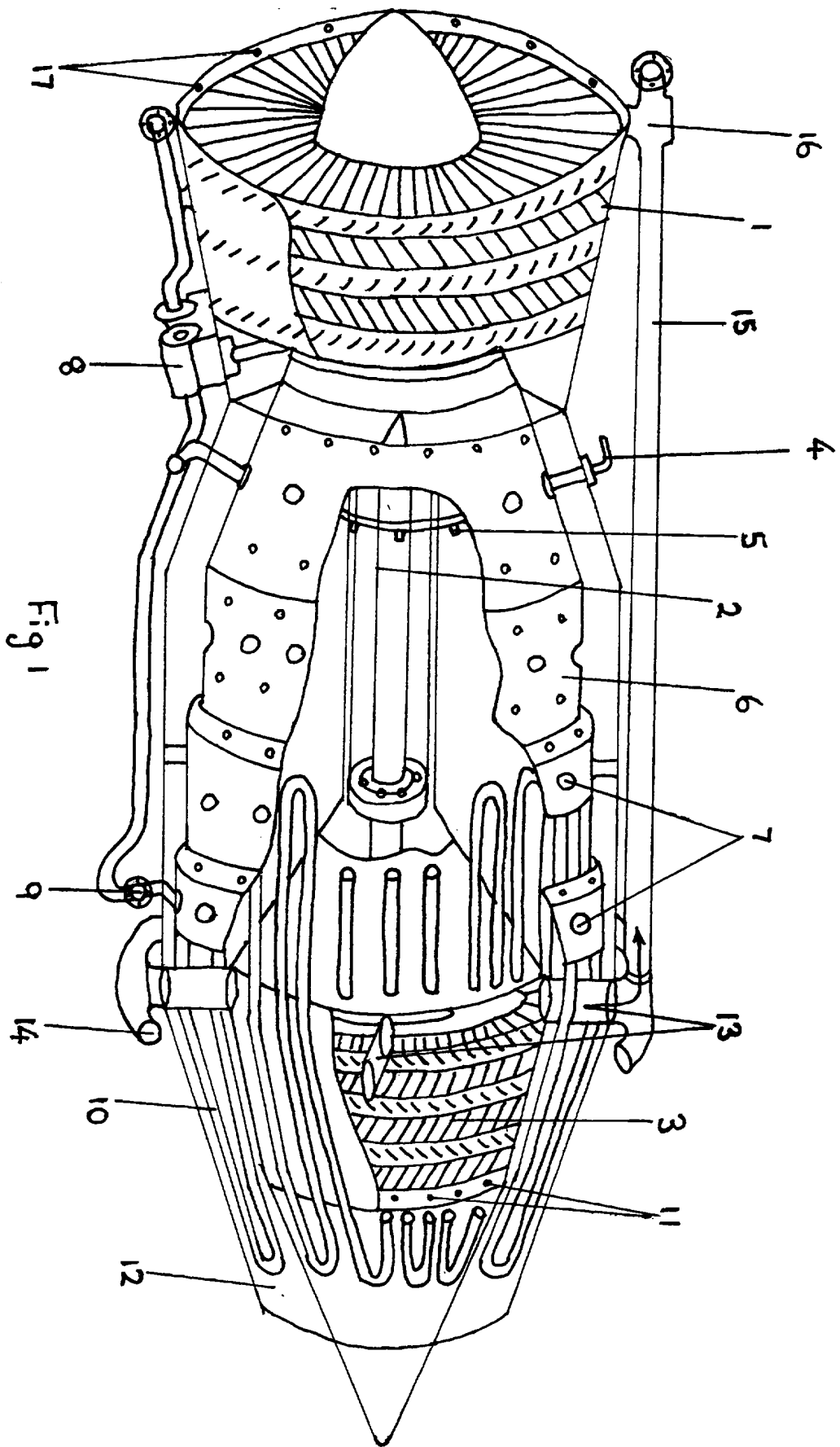


Fig 1

THERMO INDUCTION TURBOJET

This Invention relates to a Thermo Induction Turbojet.

Turbojets are in Common use world-wide in both civil and military applications.

Their construction consists of an air intake leading to a compressor, combustion chamber, turbine wheel, and jet nozzle. The turbine drives the compressor; both are mounted on the same shaft and form a rotative assembly. Thus, air is drawn in, "compressed", mixed with fuel, burnt and expanded. The hot gases, passing through and rotating the turbine assembly, before they exit the jet nozzle.

Turbojets in present use however, suffer certain design restrictions affecting their efficiency. As a net result, their fuel consumption is rather high.

The two main factors causing this are;

1. The Power Turbine extracts no less than two thirds of the total energy in the expanding gas stream, leaving only one-third for useful propulsion.
2. Because the engine has to be cooled by a large quantity of air, only a small amount can be passed to the Primary Flame Zone of the Combustion Chamber. The rest must be passed around the "hot core" of the engine to prevent it over-heating.

The Jet Engine proposed here would have a compressor and combustion chamber, as in common with other turbojets, but will have no turbine blades placed within the expanding gas stream. Instead placed towards the "hot end" of the engine. However, smaller in diameter, but still coupled to the compressor shaft. Would be a high-pressure multistage impulse steam turbine.

Running within its own casing and shielded from hot combustion gases. The turbine will draw its power from a continuous convoluted length of tube, or a suitable water jacket which is bonded to, or forms part of the combustion chamber inner wall and jet nozzle.

Through this continuous tube or water jacket, is pumped water, which has two purposes. One is to provide very high-pressure steam to rotate the turbine. Two is to ensure cooling of the parts in contact with the tube and prevent heat damage, much as in the combustion chamber of a Liquid Fuelled Rocket Motor. Such a method could greatly reduce or even eliminate the need for air-cooling.

On passing through the turbine, exhausted steam is passed to the exterior of the engine, through aerodynamically shaped exhaust ducts. From these to an encircling manifold, this feeds exhausted steam towards the intake area of the engine.

Here it would be passed through condenser tubes placed within the intake housing and condensed back to water. At this point, it can be recycled by means of the pump. Thus forming a "closed loop" system suitable for civil use. Alternatively, by means of a suitable valve and ducts in the intake housing, a certain amount of steam could be passed back into the engine. This is known to boost engine power and would be suitable for military application.

A specific embodiment of the invention, will now be described by way of example with reference to the accompanying drawing in which: -

Figure 1 Shows in cutaway detail, the basic features of the Thermo Induction Turbojet.

With the engine in start up mode, the axial flow compressor 1, connecting shaft 2, and steam turbine 3, are being rapidly rotated by an external source. The ignition will have been initiated by igniter 4 and combustion maintained by fuel flowing through injectors 5, and air flowing into combustion chamber 6 through holes 7.

Water under pressure from circulation pump 8, is fed into port 9 and around tube 10. Here the water absorbs heat and rapidly boils into super heated steam under great pressure.

It then enters the turbine 3 through steam nozzles 11 and rapidly rotates the whole assembly, thus bringing the engine up under its own power. Hot gases being emitted from jet nozzle 12. Exhausted steam passes out through aerodynamically shaped and shielded ducts 13, to the exterior of the engine.

Here the ducts join a circular manifold 14, which being connected to pipe 15 passes steam into a suitable condenser placed within the intake housing.

Condensed water is recirculated by pump 8 for civil use, or a certain amount of steam may be passed through the engine via valve 16 and ducts 17 for power boost in military applications.

## CLAIMS

1. A turbojet engine containing within, an axial flow compressor, a combustion chamber, steam turbine and jet exhaust.
2. A turbojet as claimed in Claim 1, where the axial flow compressor and steam turbine are connected by a shaft.
3. A turbojet as claimed in Claim 2, where a convoluted tube or water jacket is internally fitted towards the rear of the combustion chamber and jet exhaust.
4. A turbojet as claimed in Claim 3, where compressed air is supplied to the combustion chamber from the axial flow compressor.
5. A turbojet as claimed in Claim 4, where a mixture of fuel and air are burnt within the combustion chamber.
6. A turbojet as claimed in Claim 5, where the expanding hot gases are passed around the exterior of the convoluted tube or water jacket and exit the jet exhaust.
7. A turbojet as claimed in Claim 6, where water is force circulated through the convoluted tube or water jacket.
8. A turbojet as claimed in Claim 7, where high pressure steam is formed within the convoluted tube or water jacket and is fed to the steam turbine.
9. A turbojet as claimed in Claim 8, where the circulating water has a cooling effect on the combustion chamber.

10. A turbojet as claimed in Claim 9, where the turbine and compressor are rapidly rotated by the high pressure steam.
11. A turbojet as claimed in Claim 10, where exhaust steam is condensed back into water by a condenser at the front of the engine.
12. A turbojet as claimed in Claim 11, where the water is recycled and force circulated by a gear driven pump.



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Claims searched: 1-12

Examiner: C B VOSPER  
Date of search: 17 June 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK CI (Ed.Q): F1G(GBA,GCA,GCE,GCX,GHA); F1J(JBX,JDB)  
Int CI (Ed.6): F02C 1/00,1/04,1/08,3/00,3/04,3/20,3/30,7/00,7/12,7/16;  
F02K3/00,5/00  
Other: ONLINE: EPODOC, JAPIO, WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1467801 SHARMA (fig. 1; page 2, lines 27-71, noting lines 43-47 in particular)	1,2
X	GB 1061351 ROLLS- (whole document, noting steam turbine 26)	1-8 at least
X	GB 0596696 FAIREY (fig. 1; page 1 line 80 et seq., noting page 3, lines 70-77, in particular)	1-12
X	US 4333309 CORONEL (eg. fig. 1, col. 4, line 15 et seq.)	1-12
X	PAJ Abstract JP55023325 (NEMOTO),ABV004057	1,2 at least
X	WPI Abstract Accession No. 94-073088 [09] & RU2002088 (BOBOED) 30.01.93 (see abstract)	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.