From Philip Dingle, Michigan USA.

Engines having their cylinders disposed in horizontal disposition on either side of a central crankshaft are relatively uncommon and are generally seen as a little bit quirky since they do not conform to the prevailing paradigm of in-line or vee format. Horizontally opposed [HO] format engines have several advantages and yet in spite of this they are not the dominant architecture for automotive applications. An argument often advanced, usually by the uninitiated, for why this should be so is that HO engines tend to be more expensive, are possibly heavier, and introduce packaging difficulties when installed between the front wheels of conventional vehicles.

In the case of Jowett Cars, it is clear why they adopted the HO layout back in 1910 for their light car: they likely asked themselves the question: "Why should we build a conventional 4-cylinder engine for our car when a flat twin will do the job just as well. We are trying to build a low cost car, and a twin has to be cheaper to build and to run than a 4-cylinder". If 4 cylinders in-line is the baseline, a 3-cylinder engine should be cheaper but is unacceptable from the balance and vibration point of view. However, while 2-cylinder in-line is not great from a balance point of view, an opposed twin is very good, and compared to the baseline it will be cheaper to run and has the additional benefit of a lower Road Tax burden. That strategy served Jowett very well right up to the late 1930's.

By the time the Javelin was designed, Jowett's horizontally opposed engine "brand" was well established, and it was entirely sensible for the Javelin engine to be HO too. Interestingly, there were a number of other HO engines being designed around that same mid-1940's period, and it may be interesting to have a very brief look at some of them.

<u>The Monaco Aero-engine</u>: This was an air cooled flat four of 3.6 litres (Bore & Stroke = 4.375" x 3.635") with a 100 HP rating at 2800 rev/min. It was designed and developed by Monaco Motor & Engineering of Watford, Herts who were well known pre-war in the motor sports field, and was introduced to the press in 1946. Pictures show a neat looking engine not dissimilar to the prevailing American Lycoming and Continental aero-engines, with pushrod operated valves from a single central camshaft mounted below the crankshaft. Nevertheless, it looks to be well thought out with cross-flow cylinder heads (exhausts on top to minimize thermal issues), and an end-loaded crankshaft in a barrel crankcase, which is a direction that Gerald Palmer said he wished he had taken in retrospect. It would seem that the Monaco engine never found a suitable British airframe and thus never reached series production.

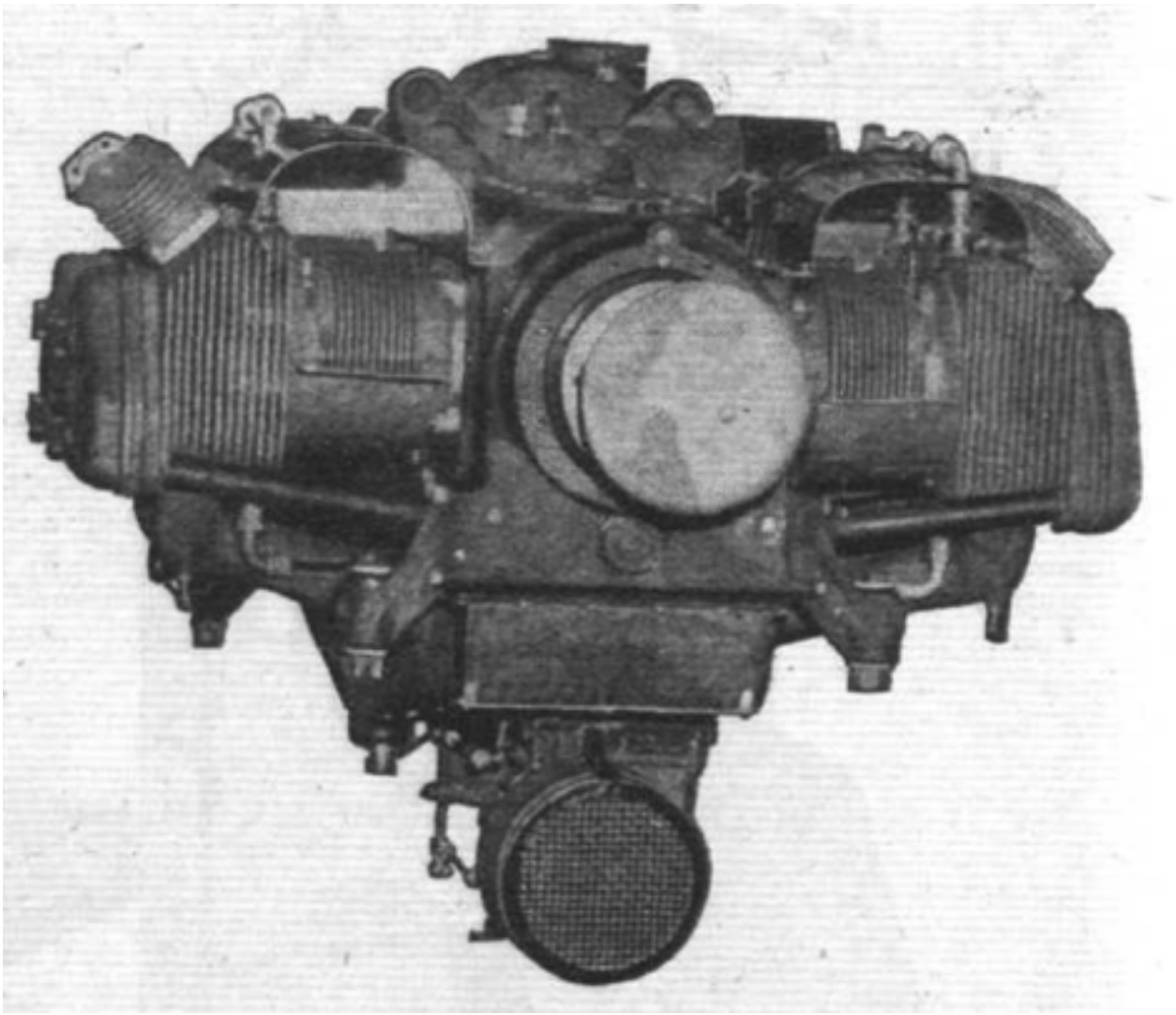

Figure 1: The Monaco Flat Four Light Airplane Engine (1946)

The Nuffield Aero-engine: This engine also introduced in 1946 was also very much in the mold of the American light aircraft engines. Like the Monaco engine, it too was rated at 100 HP, but at 2600 rev/min on a compression ratio of 6.3:1 from 3.86 litres (B&S = 4.375" x 3.875"). This engine seems to have been vaporware since it disappeared without trace by 1948, and since the bore and stroke dimensions were the same as the Lycoming O-235 [introduced in 1940 and still in production], it was likely a licensed design anyway.

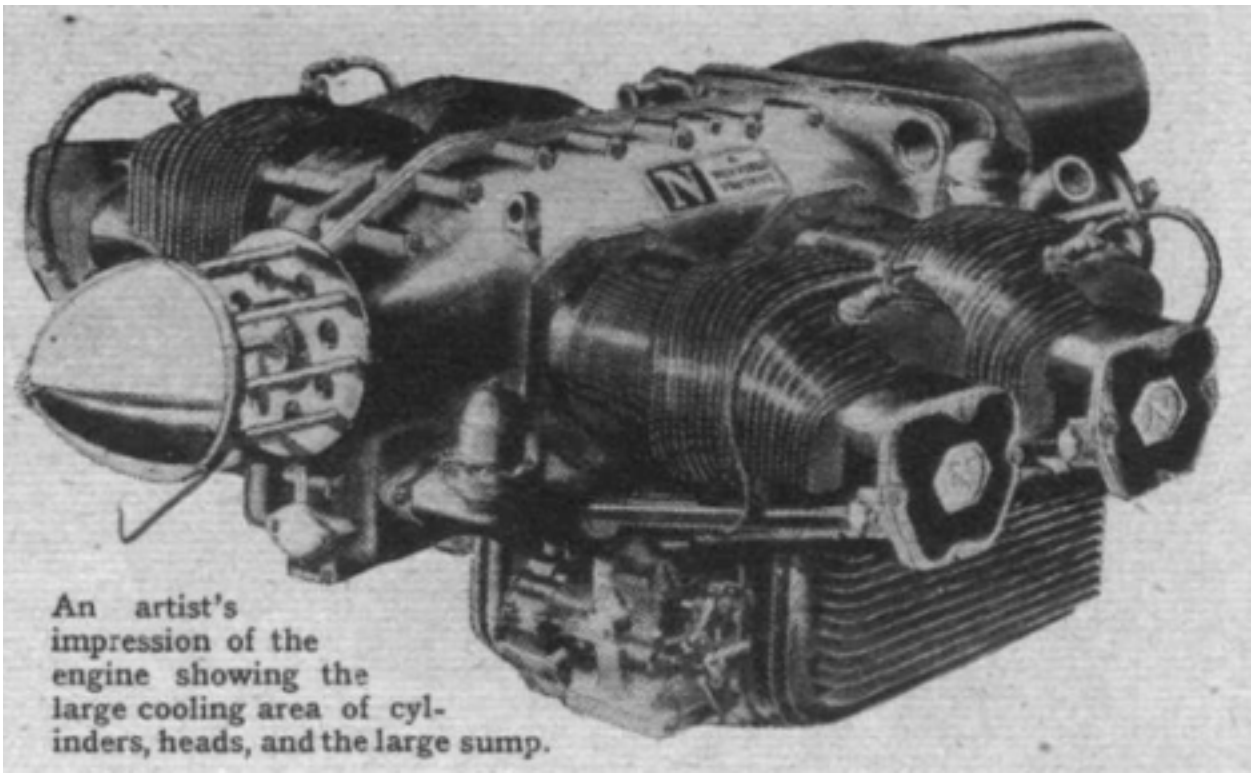

Figure 2: The Nuffield Flat Four Light Airplane Engine (1946)

The Jameson Aero-engine: Technically, a most interesting engine, it too was introduced in 1946 by Jameson Aero Engines Ltd. of Ewell, Surrey. Another air-cooled flat four intended for the light aircraft market, it displaced 3.28 litres from a bore and stroke of 4.125" x 3.75" and gave 110 BHP at 3,300 rev/min. This engine looks to be well designed, with the crankcase being particularly impressive. It seems that Jameson were also machine tool designers and there also seems to be some implied connection with Rolls-Royce or Ricardo. There are however two strange features: a three-bearing two-throw crankshaft as opposed to the four-throw crank adopted by virtually all other flat four engines, and a strange theory about mixture preparation which probably would not hold up to modern understanding in this area. Nevertheless in comparison with the Jowett engine, it is interesting to note that the long induction runners from the single central carburetor to the inlet ports results in a lower peak torque speed (2,000 as against 3,000 rev/min). The valve train is particularly interesting, having a separate camshaft per cylinder bank with long pushrods clustered centrally between the cylinders but with a rocker mechanism enabling a desirable pent-roof combustion chamber.

Although this engine persisted in the news for a couple of years with connections to a number of airframe builders, regrettably nothing came of it and it disappeared without trace like many of the other engines covered here.

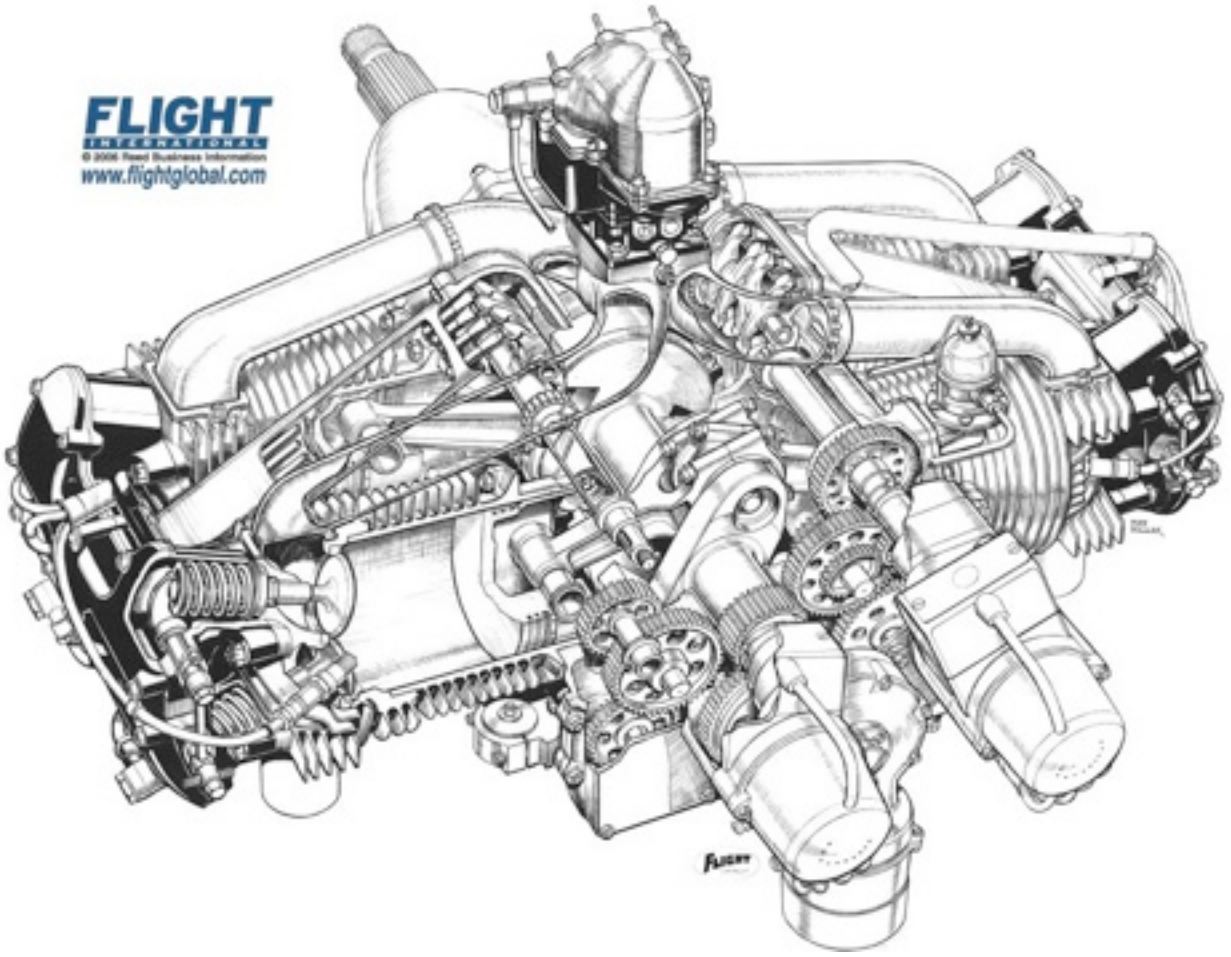

Figure 3: The Jameson Flat Four Light Airplane Engine (1946)

The Rotol AGP Engine: This engine was designed during the 2nd World War by a well known engineer of that era who rejoiced in the name of Pobjoy, and introduced in 1943. Available in flat twin, four and six cylinder arrangements, it was intended for auxiliary power generation duties on aircraft. Built in relatively small numbers, the 6-cylinder version had a capacity of 2.64 litres from a bore of 86 mm by 76 mm stroke. The engine was rated at 60 HP at 3,750 rev/min and12,000 ft altitude; its maximum rating at ground level was 96 HP at 4250 rev/min which in terms of horsepower per litre is slightly more than the Javelin rating. Not being located in the air stream, this engine used ducted air cooling.

This engine is interesting and unusual in that it is an automotive sized single sleeve valve engine; in fact it would seem to be the basis for an ideal drop-in replacement engine for the Jupiter except that it is air cooled. Although it is of larger displacement, it is in fact slightly narrower than the Jowett engine probably due to the shorter stroke and sleeve valve architecture. The use of sleeve valves can be put down to the fact that Rotol was an offshoot of Rolls-Royce and Bristol and that Mr. Pobjoy was a disciple

of Sir Roy Fedden. Another interesting aspect of this engine was that the crankshaft featured oval webs as can be seen in the cross-section, and that even the six cylinder version used 180° crank pin spacing rather than the more usual 120° which must have given an a strange exhaust note.

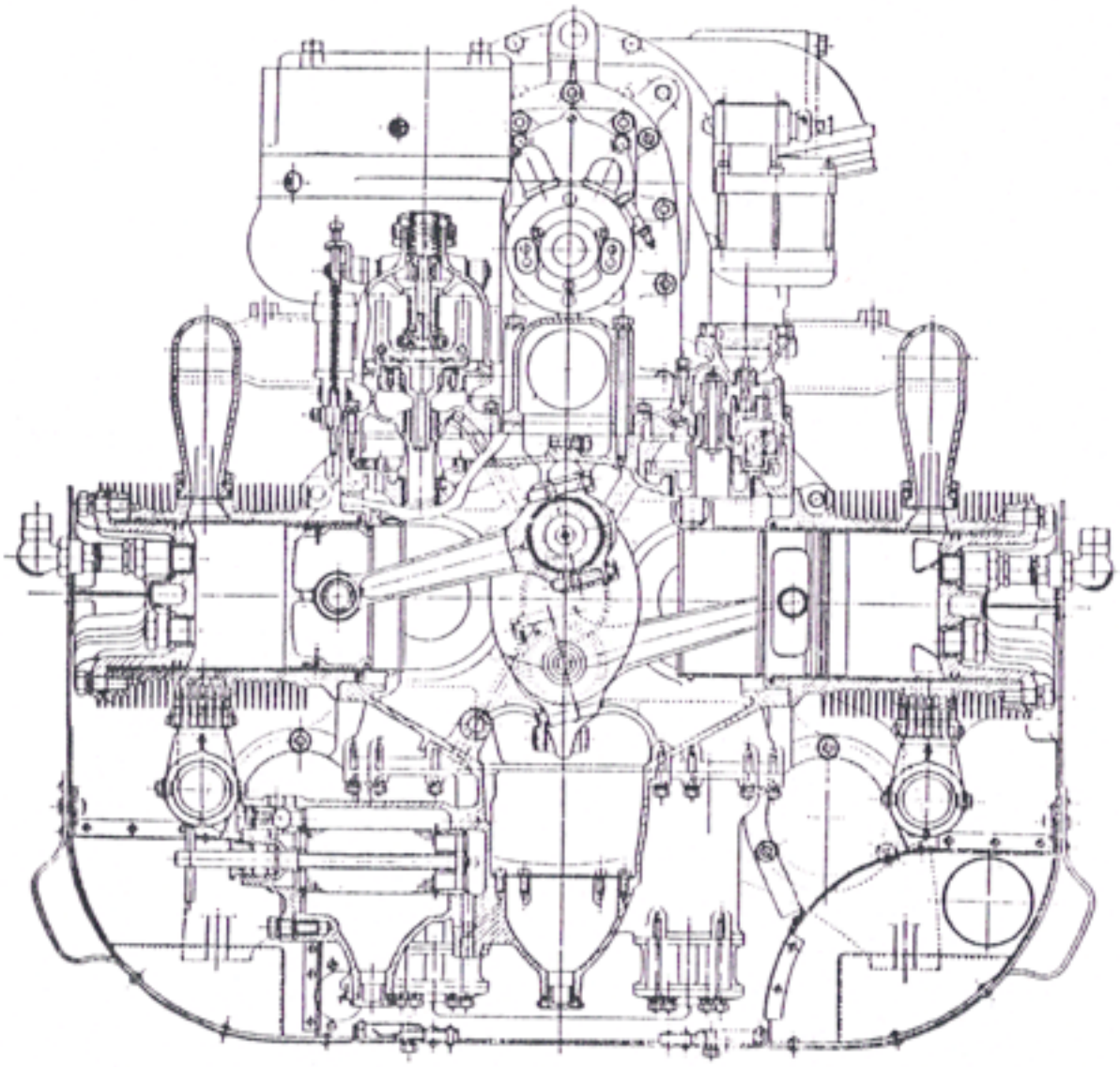

Figure 4: The Rotol Auxilliary Generating Plant Flat Six Engine (1943)

The Sir Roy Fedden Ltd. Flat Six Aero Engine: Sir Roy Fedden had been the driving force and master-mind behind the development of the Bristol family of radial aero-engines, but at the end of the war he formed his own company to develop a post-war car, a turbo-prop aero-engine, and a light aircraft piston engine. This latter engine was a ducted air-cooled flat six of either 4.6 L or 5.3 L depending on the source referenced. Like the Rotol engine, this was a sleeve valve unit of 4.3" x 3.75" bore & stroke which

delivered 138 BHP at 2,500 rev/min (take-off), and interestingly although a larger capacity and longer stroke engine than the Javelin, its width across the cylinder heads is the same [approx. 32"]. An example of this engine may be seen in the Kensington Science Museum, and there is a strong Jowett connection in that Charles Grandfield worked for RFL and specifically on the development of this engine immediately prior to joining Jowetts Cars Ltd. Interestingly, this engine had [mechanical] fuel injection of US manufacture, probably because the prospective lead customer was American. Designed for submerged installation within the wing, the engine was no more than 14" high. Regrettably the market for this engine never materialized and RFL was obliged to close down.

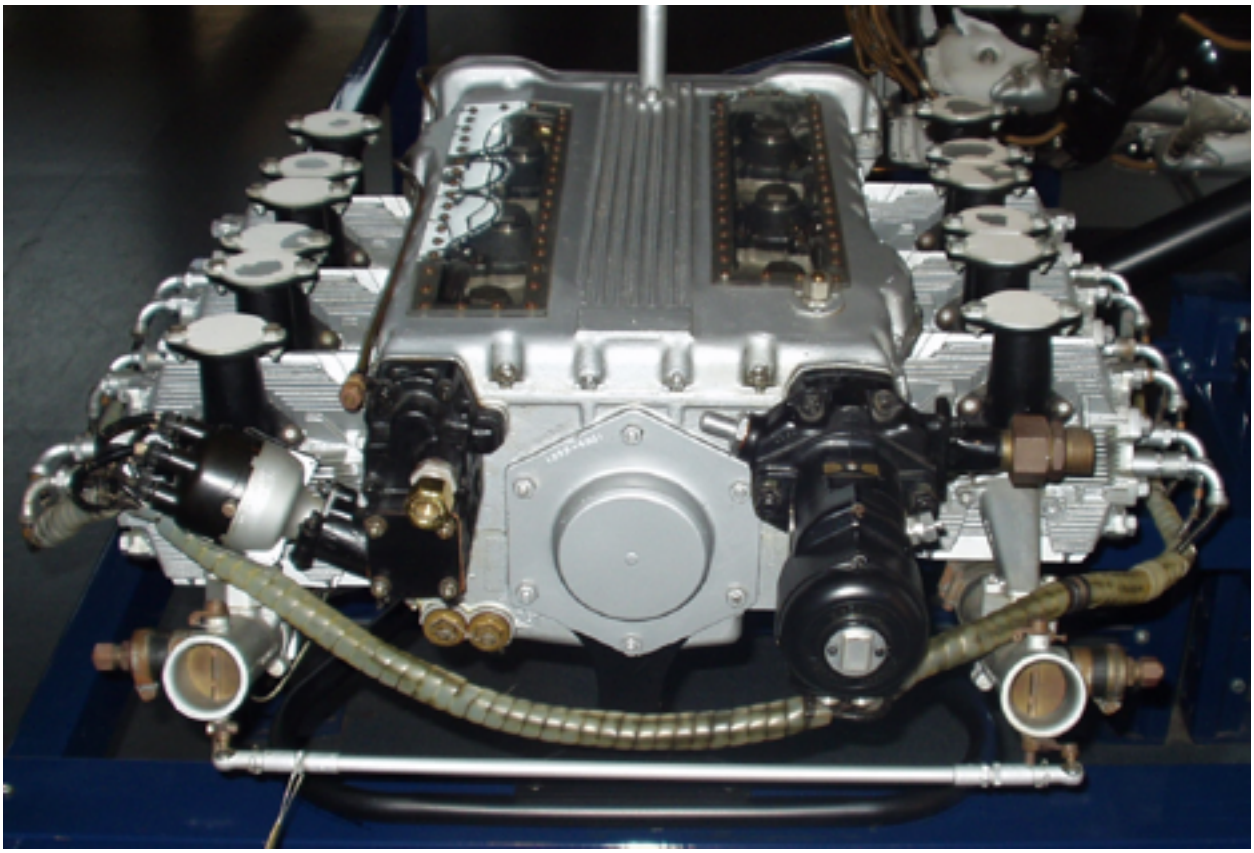

Figure 5: The Roy Fedden Ltd Flat Six Light Airplane Engine (1947)

Other HO Engines: The engines above were all in the design and development stage close to the same time as the Javelin engine, and although it happens that they are all light aircraft engines with quite different design objectives from that of an automotive engine, they are nevertheless a record of the state of the engine arts as of the mid forties. There are a number of pre-war flat fours such as the air-cooled Tatra and Volkswagen engines designed by Ledwinka and Porsche respectively but not too many water cooled examples. In the late Jowett period, that is to say the early 1950's, Hotchkiss introduced the Gregoire car with 2.0 litre water cooled flat four. Then,

although there is absolutely nothing in common with Jowett other than the HO layout, D Napier & Sons announced the Nomad compound diesel engine, a very advanced 3,000+ horsepower 41 litre flat 12 cylinder 2-stroke design integrated with a turbine that promised outstanding fuel economy. Unfortunately again there were no takers, so it too went nowhere. A great shame.

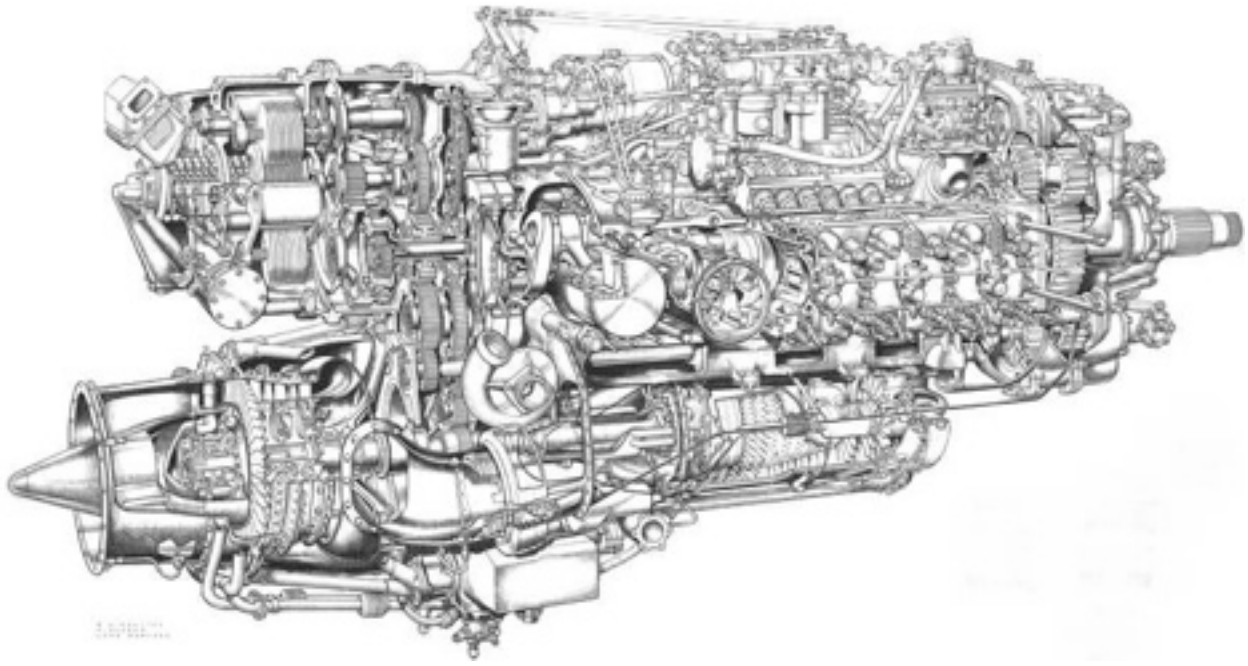

Figure 6: The Napier Nomad Compound Diesel-Turbine Aero Engine (1954)