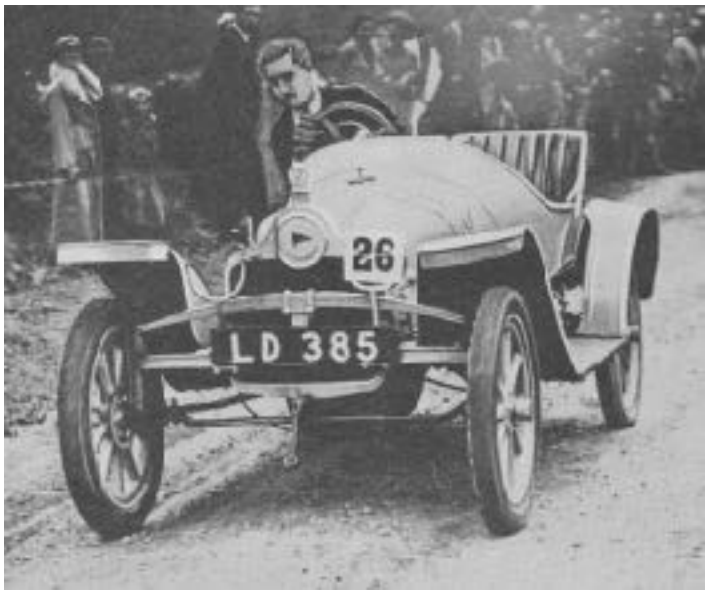
Automobile Blind Alleys and Lost Causes

A collection of articles about innovations in automobile designs that where before their time or failed to fulfil their promise at the time and some that might have, with a bit of luck.

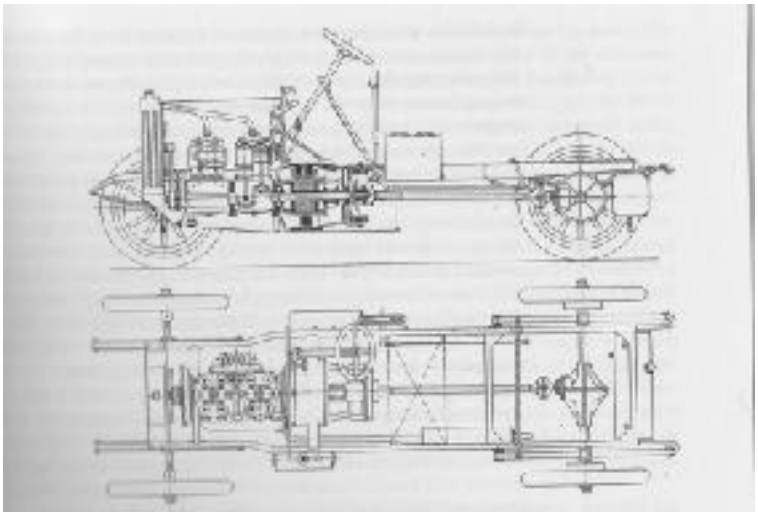
I.F.S.

The popular image of the automobile before the end of the nineteenth century is at first resembling a horse drawn carriage without a horse but the addition of an engine and transmission, then quickly changing to what became the dominant format of front engine, rear wheel drive, retaining the beam axles and cart springs of horse drawn vehicle, that was produced in evolving form for the next forty years. That is not the full picture as early as the eighteen nineties some engineers produced machines that a simple description of their specification would seem very modern. I have come across the story of an automobile pioneer from my local area in Somerset, England, who produced a number of machines with a two litre engine transversely mounted in the mid position driving the rear wheels, which was common at the time, with independent front suspension, that was not. Despite the size of the engine these where lightweight machines that sported two bicycle style front forks and wheels linked by a transverse leaf spring. This layout wasn't suitable for heavier machines and wasn't copied. A couple of machines of the period that were produced with independent front suspension, the Decauville of 1899 and the Sizaire-Naudin of 1908 were lightweight machines and it was the Morgan cycle car first produced in 1910 and then later their cars, that continued to use Morgan style independent front suspension into modern times. So apart from the Morgans independent front suspension was forgotten until the appearance of the early front wheel drive cars such as the Alvis and Tracta sports cars and the BSA and DKW light cars of the late twenties early thirties and these were decades before independent front suspension was in universal use.

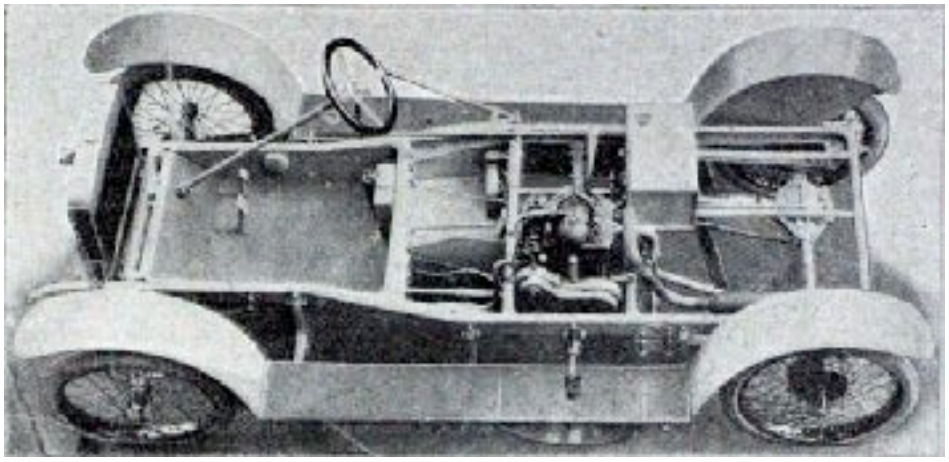


Hybrid

I believe that the general public are not aware that this is the second time around for the electric automobile. The first time being from the eighteen eighties until the nineteen twenties, with some makers hanging on until the nineteen thirties. The early electric automobile was so much easier to drive and manage compared to the contemporary internal combustion powered machines, but a limited performance and range compared to the rapidly improving gasoline type's worked against it. Some manufacturers replaced the batteries with an engine and generator and others added an engine and generator, but kept the batteries, producing the first hybrids, such as the Belgian Pieper hybrid shown below. It has taken almost ninety years for the type to repeated. Range is still a problem with the contemporary electric car, but battery technology continues to improve.

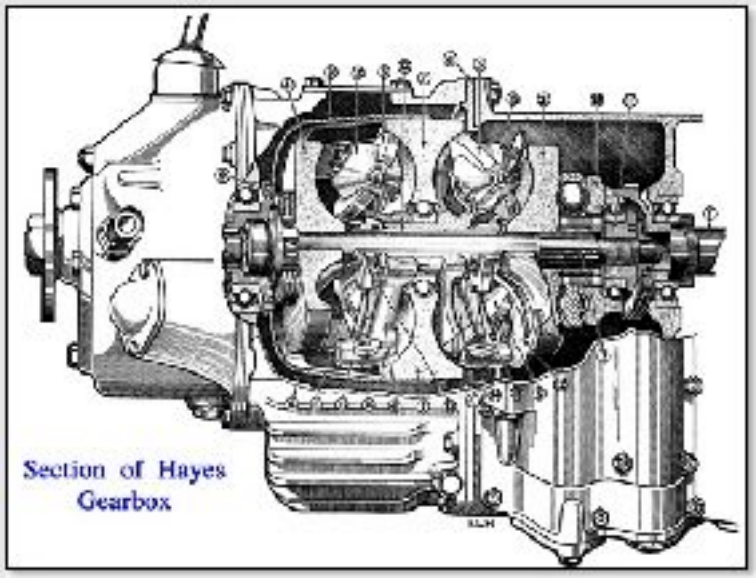


C.V.T.
Stepped ratio transmissions have been almost universally used in automobiles from their beginnings, by belts and pulleys at first. The sliding-mesh gearbox dominated for the next thirty years, then evolving in to the constant-mesh and finally the synchromesh gearbox that is still with us today. It is hard to imagine today how difficulty it was to change gear in cars of that period and required drivers to learn a special technique called double de-clutching. Henry Ford solved the problem in the Model T, by using a lightly stressed engine and a transmission with only two ratios. This had its drawbacks and most designers found the need for more steps in the transmission. A simple form of infinitely variable transmission has long been attractive to designers and one of the earliest of these was used in the GWK lightcar, produced between 1912 and 1919 in the UK. It was form of friction drive. I can find no better way to describe it by quoting from Edwardian cars by Ernest F Carter, written in 1955. *Designed along very original lines, with many points of exceptional interest, the G.W.K. made two radical departures from accepted design. The engine was not placed under the bonnet at the front end of the car, but at the back of the passenger's seat; and an infinitely variable friction drive was used in place of the orthodox cog gears.*



Due to placing of the engine amidships the weight distribution was excellent, being greater on the rear wheels than on the front ones; as should be the case. The seats were not placed so far back to give leg-room, as was usual, but were well forward, ample leg-room being obtained under the dummy bonnet.
The engine was a two-cylinder side-by-side 76x92mm. With an RAC rating of 9.2h.p.
The starting handle projected through the nearside of the chassis so that it could couple up with the transverse crankshaft of the engine, of which the flywheel rotated in the same plane as the road wheels. No gearbox or clutch in the accepted form was used, the engine flywheel being of large diameter and smooth surface which acted as a driver friction disk, at right-angles to which was another friction disk the periphery of which was lined with replaceable material. This later disc was mounted on a castellated shaft which allowed it to be moved across the face of the flywheel, thus providing different gear ratios and reverse.
The action of the clutch was furnished by means of a pedal, which when lightly pressed lifted the second disc out of contact with the flywheel. No separate brake pedal was fitted, the clutch pedal acting in that capacity when fully depressed. When this was done the friction disc was lifted still further away from the flywheel and forced a brake-drum carried on the same shaft as the disc, back against a fixed shoe attached to the chassis. This formed a very efficient cardon-shaft brake which imposed the minimum strain on the whole transmission.

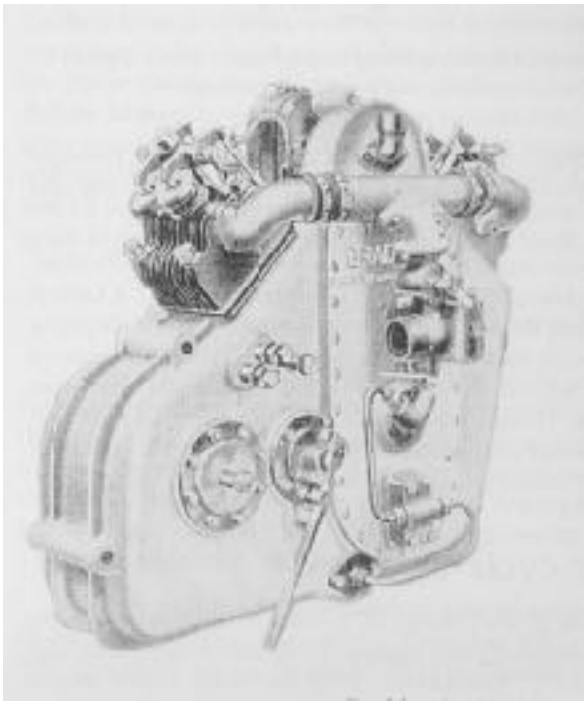
Drive from the second friction-disc was by cardon-shaft offset from the longitudinal centre-line of the car, to a final differential and bevel drive located nearer to the offside than the nearside rear wheel. Torque reaction was by a tubular member lying alongside the cardon-Shaft, and steering was by rack and pinion. The G.W.K. however, passed out of production after a few years, the main objection to its friction drive being the difficulty experienced in obtaining and maintaining sufficient pressure between the friction discs to ensure that they did not slip when starting or climbing steep hills.When slip occurred a flat was worn on the edge of the driven disc which soon rendered it useless.
This and other attempts at an infinitely variable transmissions, through out the next forty plus years, such as the Hayes Toroidal rollers box and others, proved not to be practicable. That is



until DAF produced the 750, in the nineteen sixties, that had a transmission consisting of vee belts and cone shaped pulleys. This was the first successful CVT transmission and has since been developed in various forms.

Hot Oil

Granville Bradshaw was a designer of aero engines, motor cycles and cars, and many other items over a span of fifty years. From 1913 to the early 1920's his designs for air cooled flat twin aero, motor cycles, and light car engines were advanced but not successful due to lack of development and commercial pressures beyond his control. His air cooled radial aero engines suffered the same fate. Air cooled engines where usually noisy and cooling could be marginal compared to water-cooled units, but Bradshaw didn't like water cooling and all the plumbing required.



It wasn't until the nineteen forties that anti-freeze was available for use in water-cooled automobile engines and during low temperature weather it was necessary to drain the coolant water from the engine through the drain cock low in the cylinder block, refilling it with water before starting up.

His solution to both problems, was the oil cooled engine. In all engines the lower half, the crankcase and sump contributes to its cooling by radiating heat with the help of the lubricating oil.

His idea was to increase the volume of the oil in the engine and include the cylinders within it. Only the cylinder heads being air-cooled. A range of single and twin cylinder engines were produced between 1920 and 1928 and installed in various makes of motor-cycles. The only automobile application was a 1094cc Vee twin unit specially designed for the Belsize-Bradshaw light car produced between 1921 and 1923. The car failed alone with many others of its type, after the introduction of the Austin Seven in 1923.

The idea lapsed until 1985 when Suzuki produced a 750cc motor-cycle engine that a large oil flow and an oil-cooler. Acknowledging Bradshaw's pioneering work.

Search For Volkswagen

Josef Ganz was a German engineer/ Journalist, that had in the nineteen twenties and thirties a passionate desire to persuade the German motor industry to produce technically advance machines, and the creation of a peoples car for Germany, a Volkswagen. A light streamlined low priced machines with good handling and ride with the help of independent suspension all round, in comparison to the generally big, heavy, expensive machines in the then almost universal Panhard format of front mounted engine driving the rear live/beam axle by a propeller shaft, with a

beam axle front suspension with cart springs. Usually on a heavy high slung chassis with a upright body poised on the top. The German auto industry was not alone in producing cars of this description. In the UK, Ford produces cars fitting that description into the fifties.
Although bitterly resented at first, in time his ideas where recognised and he became a consultant to a number of companies the included Mercedes Benz, helping them modernise their chassis designs.
Ganz admired the work of Rumbler, for streamlining, a mid engine layout and rear wheel drive by swing axle. Jaray, for his streamlining pioneering and Ledwinka, for his lightweight designs with backbone chassis and swing axle rear wheel drive. The driven swing axle provided independent suspension and was a relatively simple step forward from the beam axle and was a practical solution to improving ride performance long before more complex systems where developed.

He developed the concept of an ultralight mid/rear-engined rear wheel drive automobile with a tubular backbone chassis, independent suspension all round, utilising swing axles at the rear. He constructed a number of prototypes throughout the nineteen thirties and by the middle of the decade the Gutrob company in Germany produced the Standard Superior, based on his designs, as did other companies based on his patents. But by the end of the decade he had left Germany and was forgotten.

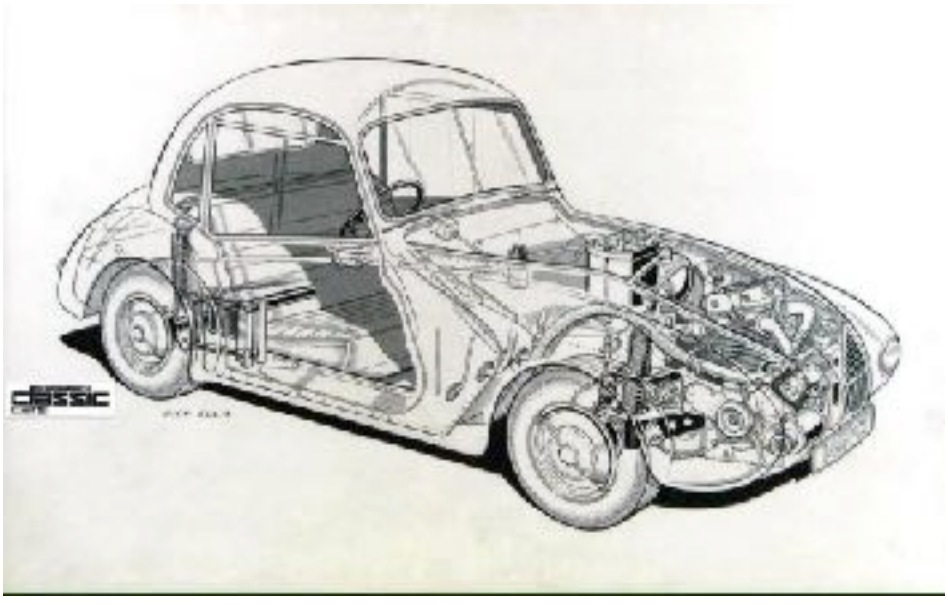
In the nineteen fifties and sixties the need for low priced automobiles had not gone away and machines who's design followed the principles that Ganz had envisioned but utilising the latest construction methods not available to him, provided transport for many in Europe. Machines as diverse as the four wheeled version of the BMW Isetta, the Messerschmidt T 500 Tiger, the Glas Goggomobil, the NSU Prinz and the Fiat Nova 500 and 600 models. The European quadricycle of today, now with front wheel drive, fulfil the roll previously filled by the cars listed above, for short range and city motoring.
Many of electric quadricycle's, the latest manifestation of the Ganz concept had returned to rear engined rear wheel drive layout, just to show that a good concept is never forgotten.

Specials
In British motorsport, in the first half of the twentieth century there was a sub culture of competitors that competed with Specials, Cars created often in the home garage, built from reworked components of production cars used in a manner not envisaged by the original manufacturers. They ranged from the superb Lightweight Special, created by Alec Issigonis for sprint racing and hill climbs in the nineteen thirties, to the Lotus Mk1 created by Colin Chapman for mud plugging trials in the forties, both using Austin seven components. Around the same time as Colin Chapman was creating the first Lotus, two garage owning brothers Eric and Roy Hazeldine built their first car, a mid engined light roadster. The Ford Eight one litre engine and gearbox was mounted transversely behind the seats with chain drive to the live rear axle. The suspension had more in common with cars of the nineteen twenties than the new cars of the forties, in fact it was very much like the G.W.K. of forty years earlier, apart from the transmission, whom I am sure they had never heard of. They didn't use it for competition but did take part in thousand mile reliability trial sponsored by a national newspaper. They built and sold a number of replicas, (New cars where almost unattainable at that time due the government orders that exports had priority.) and in the early nineteen fifties produced an electric version of their car, in conjunction with the Battery Manufacturing Association, replacing the engine and gearbox with a electric motor and batteries.

The BMC Hazelcar of which only six were produced.

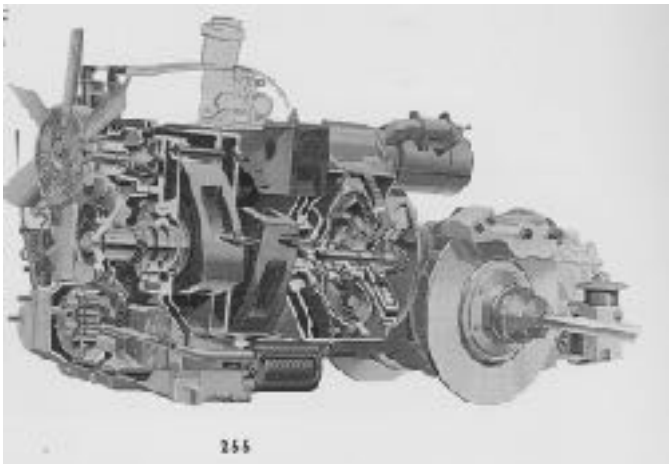
The limiting factor being the lead acid batteries, giving the car very limited performance and range.
As for the other special builders mention, Alec Issigonis next design the Morris Minor sold over a million copies and as for Colin Chapman by the time he had got to the Mk6 he had left specials behind become a maker of kits for home completion, an activity that grew out of the special building movement.

Duncan Dragonfly
Ian Duncan had worked with Sir Roy Feddon the great aero engine designer at The Bristol Aeroplane Company and when Feddon set up his own company to design aero engine as well as a car project, he became his Chief engineer. A prototype of the car had been produced but was not a success. By then Duncan had fallen out with Feddon and left the company to start Duncan Industries, one of who's activities was producing coach built bodies for Healey and Alvis cars. There was another reason Duncan had set up Duncan Industries, it was to enable him to design and build a small car. Learning from the problems experienced with the Feddon car, he decided to do the opposite and use a front engine, front wheel drive layout, with the 500cc BSA motorcycle twin cylinder engine gearbox unit mounted transversely, ahead of the chain driven final drive that consisted of a differential and drive shafts with universal joints at the inner end and Tracta constant velocity joints at the outer end. This was in forties and until developed versions of the Rzeppa CV joint became available in the nineteen fifties the Tracta joint was widely used in front wheel and four wheel drive vehicles. The wishbone front suspension and dead axle located by radius rods rear suspension was sprung by rubber in compression struts designed by his friend Alex Moulton. All mounted in a stresses skin chassisles body unit and finally instead of using what would be normal for the time, sixteen inch wheels, he used twelve inch wheels as used by the American Crosley Motors. A bench seat for three completed the layout. The result was a sleek little car with a top speed of 65MPH, good for small cars at the time, of a size the would become very familiar in the coming decades in Britain, the year was nineteen forty eight. Its name the Duncan Dragonfly. Unfortunately there was ever only one Dragonfly and it was purchased by the Austin Motor Company along the rights to its design and incidentally the services of it designer



Ian Duncan. Len Lord the then boss of Austin was considering producing a successor to Austin Seven that had been out of production for ten years and had brought in Duncan to assist in its design. The resulting design had no resemblance to the Dragonfly and the only feature of its design utilised was the stresses skin chassisles body unit that Duncan and an other engineer Ken Garrett created for new Austin Model the A30 of nineteen fifty one. A design feature that would become almost universal in automobile in years to come. Only the Saab 92 first produced the previous year had preceded its use in modern times. It was another decade and a merger with Morris Motors before a car with a similar specifications was produced at Austin.

The last NSU
The Neekarsulmer Strickmaschinen Union, NSU. Began making bicycles in1879 and their first powered four wheeled machines in 1888 for a Heir Daimler. They became famous for their motorcycles and at times between 1904 and 1977 produced cars. From 1958 until 1973 they produced light cars with a transversely mounted engine located at the back, the Prinz series. One of these was the Prinz Wankel Spider, this was in 1964 and it was one of the first if not the first production car with a Wankel rotary engine. NSU had taken Dr Felix Wankel's original concept and produced it in the form that is used today. Their next model with a Wankel engine was the Ro 80 of 1967. It was a completely new groundbreaking design. The twin rotor rotary engine drove the front wheels via a torque converter a servo operated clutch and a three speed gear box. The suspension was by struts at the front and struts and trailing arms at the rear and servo assisted disc brakes all round. The shape of the unitary chassis/ body unit was developed with



the aid of a wind tunnel and was of an attractive form and it deservedly was voted Car of the Year 1968. Unfortunately the cost of developing the new car and the cost of warranty repairs for the rotary engine that had not been sufficiently developed for series production, left the company in financial difficulties. In 1969 NSU merged with Audi as the junior partner, with their models being phased out. The Ro 80 survived until 1977 and was the last badged NSU car to be produced. So ended rotary engine powered cars in Europe.
Incidentally NSU had developed a less radical version of the Ro 80 but hadn't put it in production and it was sold as the Volkswagen K70 in 1969. Volkswagen had by then having taken over Audi and NSU and I think the K70 was the first front wheel drive car with a VW badge.