



The first tractor engines

By Ian M. Johnston, the Tractor Historian

An internal combustion engine is one in which the creation of energy occurs by the expansion of heated gases within the engine. This definition may appear somewhat simplistic, but would be hard to challenge owing to its lack of complexity. Plus, its literal interpretation permits the inclusion of *gunpowder* into this encapsulated account of the genesis of the internal combustion engine and its relationship to the farm tractor.

IN THE BEGINNING

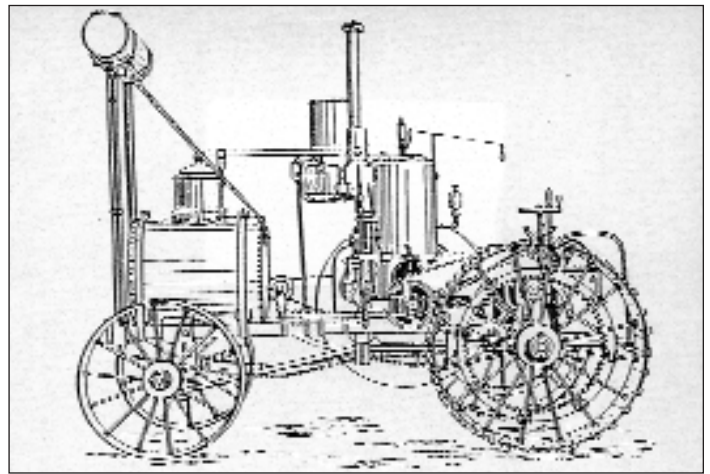
Even city stockbrokers and urban financial advisers are aware that steam engines operate basically from the result of an injection of steam being forced under pressure into a cylinder, etc, etc. The point here is that the steam is created in a boiler which is remote from the actual engine part of the engine — if you follow me? (Perhaps after all, that is a wee bit advanced for a financial adviser!).

The difference between a steamer and an internal combustion engine is that the latter obtains its energy from heated expanding gases, the entire process occurring within the engine, without the necessity of a remote boiler and heat source.

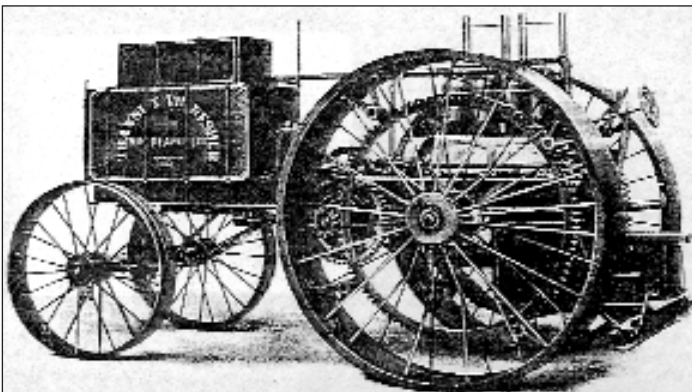
Now all the foregoing is patently obvious to tractorsmen, truckies and indeed most rural folk, who seem to know about these things instinctively. But how would you like to pull up at a service station and say “Fill



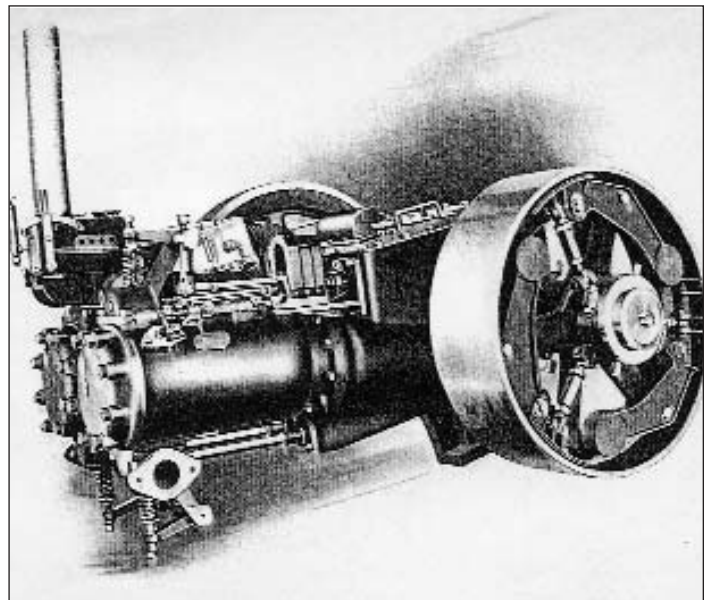
1892: The Froelich was powered by a Van Duzen vertical single cylinder engine with a bore and stroke of a whopping 14". It was considered that had the cylinder been placed horizontally, the end motion caused by the giant piston would have rendered the unit inoperable. Ignition was by a wet cell battery and contact points. (IMJ archives)



1894: The Van Duzen Gas and Gasoline Engine Co. of Cincinnati, Ohio, produced its own design engine in its tractor, but with different characteristics to the engine supplied to Froelich. It was started by a shot gun cartridge in a breech (similar to later Marshall and Field Marshall tractors) and then relied upon a platinum tube to retain the heat for ongoing ignition. (IMJ archives)



1907: The Transit Thresher Co. of Minnesota, used its own innovative design of four cylinder engine, with a 6x8 inch bore and stroke, in its Big Four at a time when other manufacturers favoured more simplistic single and twin cylinder engines. The firm was restructured in 1908 and became the Gas Traction Co. The tractor was eventually upgraded with a tubular cooling radiator replacing the thermal siphon system, and in 1912 came under the control of the Emerson Brantingham Implement Co. of Rockford, Illinois. (IMJ archives)



1912: The two cylinder Rumely Oil Pull engine is pictured complete with clutch, lubricator and magneto. (IMJ archives)

'er up please — with *gunpowder*"! Such a request would undoubtedly raise a few eyebrows and perhaps even be referred to the ASIO anti-terrorist folk in Canberra.

To be honest, it is unlikely that any of us would have a vehicle powered by an internal combustion engine fuelled with gunpowder. That is unless it was powered by a Hautefeuille engine!

Yes, in 1678, during the reign of Louis XIV, a French monk named Jean de Hautefeuille created the first internal combustion engine, when he invented a method of producing energy by repetitively burning a measured amount of black gunpowder within a cylinder. Other Europeans progressed the principle of gunpowder engines throughout the 18th Century. How many of these courageous pioneer designers perished as a result of their endeavours is open to speculation.

THE PRECURSOR: PETROLEUM

Prior to the availability of petroleum spirit, turpentine was the first liquid to be used as a fuel in an internal combustion engine. This occurred in 1794 when an Englishman Robert Street discovered the volatility of this distilled tree oil.

But the big breakthrough in the design of the internal combustion engine occurred in 1859, when Edwin C. Drake drilled the world's first commercial oil well at Titusville, Pennsylvania. During the following decades, thousands of oil wells were drilled and put into production making available a ready supply of petroleum fuel.



The engine of the Marshall Class C. Note the flying governor and the massive flywheel. The two cylinder unit produced around 30 hp. (Photo IMJ)

This proved to be the catalyst for the rush to design petrol engines.

The German scientist Nicholas Otto is credited with the design of the first commercially acceptable petrol engine. His single cylinder unit made four piston movements per each fuel detonation. In the first 10 years of production, there were no less than 30,000 of his engines produced. Otto's engine proved to be the forerunner

of today's modern four stroke engines.

By 1899, in the US alone, there were over 100 firms manufacturing petrol engines broadly based upon the Otto patents.

In 1892 Dr Rudolph Diesel experimented with an engine fuelled with coal dust. The dust was blown into the combustion chamber by compressed air. But, following a number of unplanned and

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1903: The Ivel, produced by Dan Albone, bicycle manufacturer of Biggleswade, England, was a lightweight compared to the early American tractors. Powered by a two cylinder horizontally opposed water cooled engine, the Ivel was the first British tractor to be exported in volume numbers. The example pictured is Australia's oldest tractor and is owned by Norm McKenzie. (Photo IMJ)



1909: Marshall and Sons of Gainsborough, England, introduced its Class C two cylinder tractor in 1909. The photo shows the author at the controls of a restored version owned by The Pioneer Village at Swan Hill, Victoria. The large tank above the front axle is a thermal siphon water cooling reservoir. The tractor was provided with a single speed gear. (Photo M. Daw)

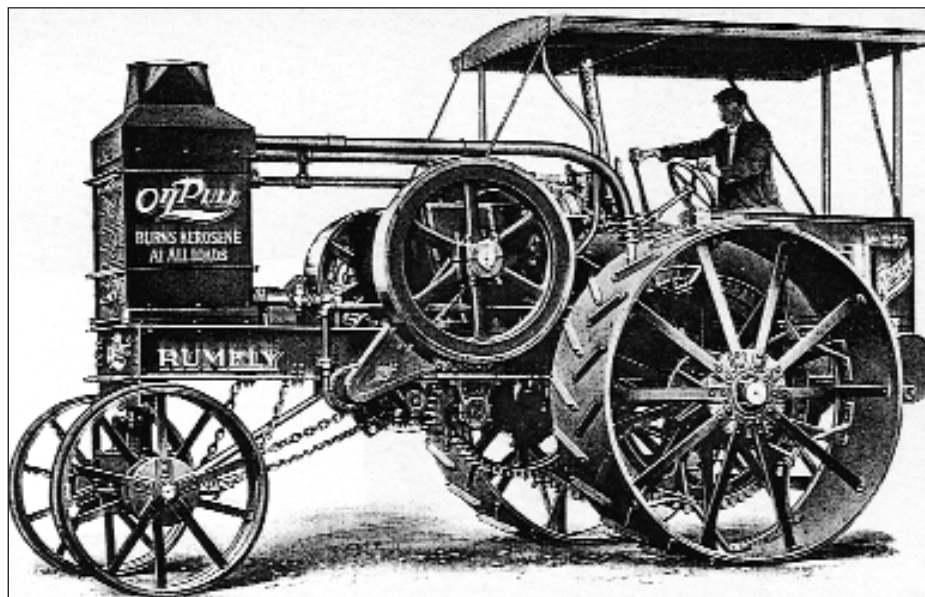
somewhat alarming explosions, the good doctor concluded that the challenges of perfecting the coal dust engines were proving to be too dangerous in relation to any possible benefits.

Accordingly, Dr Diesel directed his attentions to the possibility of using crude oil as an alternative fuel. In 1894 he successfully injected crude oil under pressure into a combustion chamber, in which the air had been compressed. The resultant pressure detonated the fuel and thus created compression ignition. The diesel engine had arrived!

THE FARM TRACTOR IS BORN

An American named John Froelich, a well sinker and thresherman, used a steam traction engine to haul his rigs to his farmer customers in his home state of Iowa. The lack of availability of clean uncontaminated water for the steamer proved to be a major problem. Accordingly in 1892, exhibiting considerable vision, he designed and built what is now accepted by historians as being the first tractor.

Unlike his steamer, Froelich's new machine was powered by an internal combustion petrol fuelled single cylinder engine, manufactured by the Van Duzen



1912: The 30–60 Rumely Oil Pull was a true heavyweight with an impressive reputation for reliability. Weighing in at around 12 tons, it featured 80 inch tall rear wheels mounted on 5.475 inch diameter rear axles. The twin cylinder engine produced 30 drawbar hp and 60 belt hp. (IMJ archives)

Gas and Gasoline Engine Company of Cincinnati. He used a crude transmission “borrowed” from a Robinson steamer.

It is recorded that the Froelich tractor powered a Case 40 x 58 thresher, driven by an endless belt, and during a 50 day period the threshing mill put through

72,000 bushels of grain.

Other tractor makers quickly followed on the heels of Froelich's innovation. They included Patterson (1892), Hackett (1893), Van Duzen, Otto and Lambert (1894), Huber (1898) and Norton (1899).

The dawning of the 20th Century saw a

proliferation of new tractor manufacturers. In the US, C.W. Hart and C.H. Parr entered tractor production in 1902 with a Hart Parr prototype. Other American tractor names included Electric Wheel and Dissinger (1904), Eason-Wysong and Ohio (1905), International Harvester and Transit (1907), Joy-McVicker and Russell (1909) and Gieser and Rumely Oil Pull (1910).

In Britain, the Hornsby-Ackroyd-Patent-Safety-Oil-Tractor was exhibited at the Royal Show held at Manchester in 1897. In 1902, Dan Albone — a bicycle manufacturer in Bedfordshire — introduced his Ivel three wheeled tractor. H.P. Saunderson unveiled his Saunderson tractor in 1904. In 1909, Marshall and Sons of Gainsborough produced a prototype tractor powered by a two cylinder petrol engine.

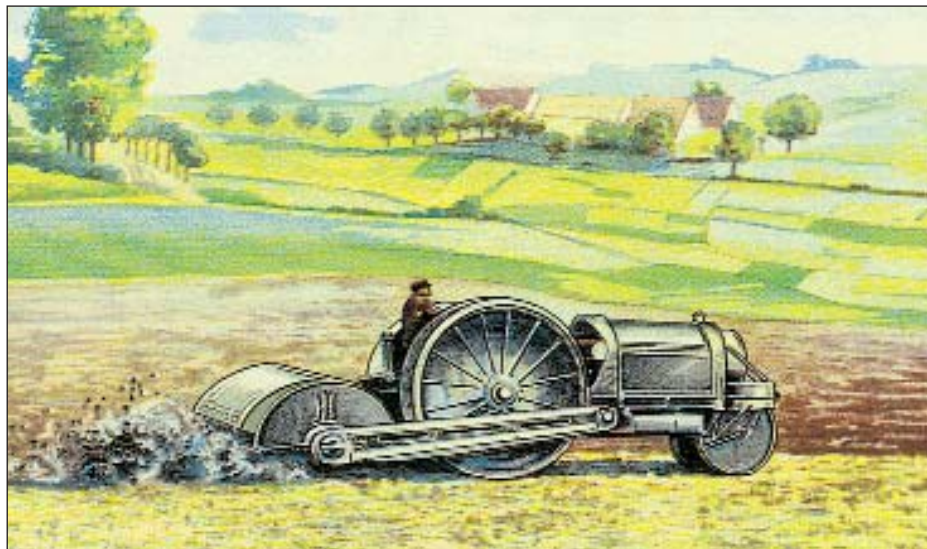
In Europe, tractors were first introduced commercially in 1907 by the German manufacturer Deutz and the French firm of Gougis and Bajae. Heinrich Lanz of Mannheim entered the tractor arena with the giant Lanbaumotor in 1912, powered by a Kamper four cylinder engine.

During these early embryonic days of tractor production, the internal combustion engines used, particularly by the North Americans, were often basically stationary engines mounted upon crude iron chassiss. They mainly consisted of single, twin and (more rarely) four cylinder engines of usually four stroke design.

The most common fuel was petrol, but the lower priced kerosene became popular with the development of manifold "hot boxes" which were heated by the exhaust gases, and which in turn warmed the kerosene enabling it to be vaporised. Thus, the tractors were started cold on petrol then, following a warm-up period, the heated kerosene was permitted to flow into the carburettor.

IN CONCLUSION

A modern-day farmer, cocooned within the luxury of his air-conditioned tractor cabin, confident and lulled by the purr of the big turbo-charged inter-cooled diesel engine, perhaps on occasion should reflect upon the origins of the internal combustion engine. Gunpowder — no less!!? Coal dust!!? Yes, but that was way back in pre-historic times — so who cares?



1912. The Lanz Landbaumotor was powered by a four cylinder Kamper petrol engine manufactured in Berlin. The attached Lanz rotary cultivator was possibly the first successful type produced commercially. It was chain driven and somewhat remarkably incorporated a hydraulic lift mechanism. Devotees of early tractors will note the similarity of the Lanz Landbaumotor to the American Wallis Bear. (Courtesy Lanz archives, Mannheim)

IAN'S MYSTERY TRACTOR

QUESTION: Can you identify the tractor under-going restoration?

CLUE: It is of American origin.

DEGREE OF DIFFICULTY: If you are old enough to remember when banks were friendly and kero fridges were the in thing, then the answer will be a breeze.

ANSWER: See page 80.

