Harold Bate

1908 - 1982

Engineer, Inventor

&

Devon’s original eco-warrior

Presented by Andy Greener

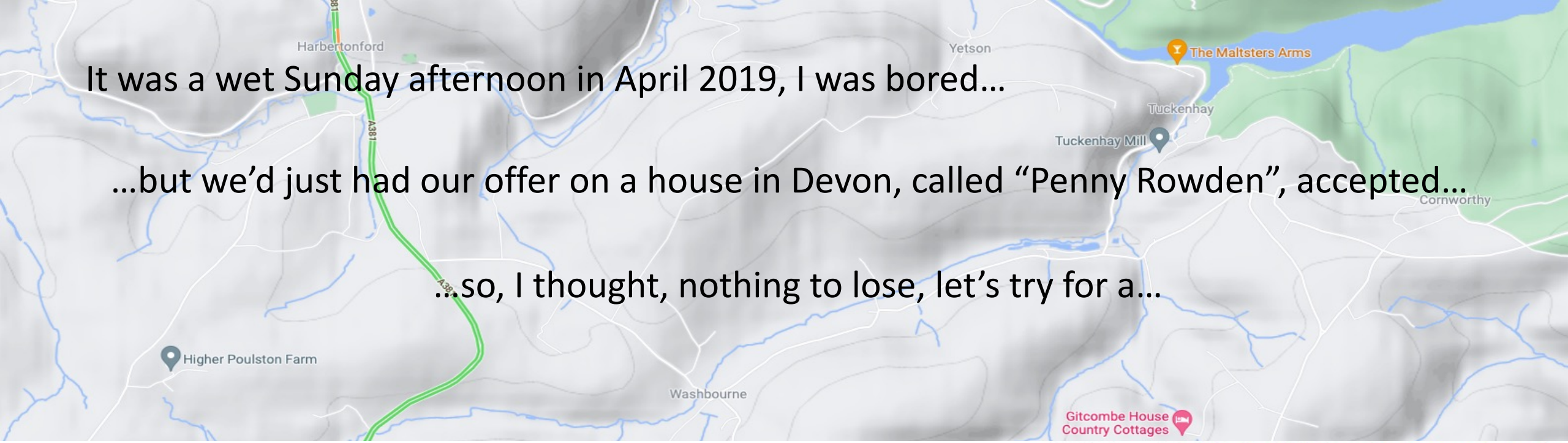
on 2nd March 2022

to the West Dart History Group

It was a wet Sunday afternoon in April 2019, I was bored…

…but we'd just had our offer on a house in Devon, called "Penny Rowden", accepted…

…so, I thought, nothing to lose, let's try for a…



Not logged in Talk Contributions Create account Log in

Article Talk Read Edit View history Search Wikipedia

WIKIPEDIA
The Free Encyclopedia

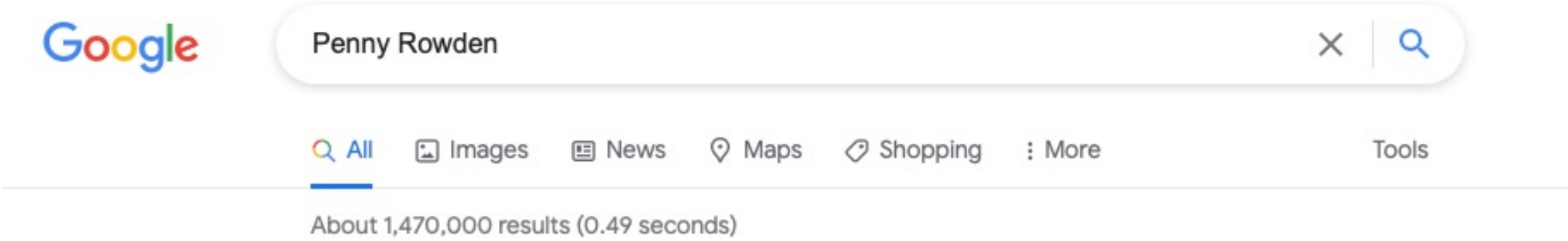
Main page
Contents
Current events
Random article
About Wikipedia

Googlewhack

From Wikipedia, the free encyclopedia

A **Googlewhack** is a contest to find a Google Search query that returns a single result. A Googlewhack must consist of two words found in a dictionary and is only considered legitimate if both of the search terms appear in the result.

Published googlewhacks are short-lived since when published to a website, the new number of hits will become at least two: one to the original hit found, and one to the publishing site.[1]



No Googlewhack unfortunately, just under 1.5 million search results (thanks to various estate agents, Rightmove, AirBnB and a very nice-sounding lady accountant from West Sussex called Penny Rowden!)

But around the bottom of page five, I came across an unlikely link to a US environmental magazine from the early 70's…

Environment: Science and Policy for Sustainable Development

Publishes research on the environment and development, highlighting global environmental policy and environmental science to achieve sustainable development.

LETTERS

Blast Correction

The estimate of lethal radius of 3,280 feet for the weapon described in "The Big Bomb" in your November 1971 issue is seriously in error. A much more reasonable estimate is 120-160 feet . . . Because the lethal radius estimate in "The Big Bomb" is much too large, estimates on area in which wildlife have been affected by bomb drops are very much too great. Rather than 116,400 acres being affected, a more reasonable estimate is 150-300 acres.

WILFRED E. BAKER, *Manager*
Terminal Ballistics and Engineering Dynamics Section
Southwest Research Institute
San Antonio, Texas

The author replies: I am heartened to learn that the BLU-82/B "Commando Vault" bomb may not be as indiscriminately lethal as was reported to us by the Air Force Chief of Combat Operations in Saigon at an official briefing last August. Although Dr. Baker's calculations lead me to believe that his theoretical lethal radius is more nearly accurate than the presumably empirical one I quoted, I still think that it is conservative by a factor of perhaps three. In his calculations Dr. Baker scales down from published data on a spherical blast wave produced by a one-kiloton atomic bomb, whereas it is conceivable that the Commando Vault directs more of its energy in the horizontal plane. Moreover, Dr. Baker's estimate overlooks lethality from secondary blast effects. A definitive resolution of this mattes will have to await the release of relevant data by the Department of Defense, something it has to date refused to do.

ARTHUR H. WESTING
Windham College
Putney, Vermont

Gasbuggy

Readers of the lead article in last month's magazine on methane gas production who would like to correspond with Mr. Harold Bate, who has developed the method of generating the gas for use in his car should write: Mr. Harold Bate, Penny Rowden, Galckawton, Totnes Devon, England TQ9 7DN.

A money order for $2.40 will bring you the description of the device used on the car to convert it to methane gas, and installation instructions. For $29.00, one can receive the device itself, and the plans for the methane generation facility.

JOHN TANTON, M.D.
Petoskey, Michigan

Out of Date

This is in reference to your article "Seventeen Million Years" appearing on page 42 of the November 1971 issue of *Environment*.

In that article you have two pictures and a caption which indicate that W. R. Grace & Co. is the source of the pictures and that Nuclear Fuel Services is a subsidiary of W. R. Grace & Co.

Grace's interest in this subsidiary was sold to Getty Oil Company on March 31, 1969.

As we have had a number of inquiries concerning this article, I would appreciate it if you would make a correction in the next issue of your publication.

RICHARD L. MOORE
Vice President of Public Relations and Communications Division
W. R. Grace & Co.
New York, New York

Clean Steam

There is a definite need for outstanding and informative articles such as are found in your magazine. However, I am discouraged by the misleading article in the December 1971 edition entitled "Power from the Earth." . . . The authors state that considerable disagreement exists in the area of cost analysis and that they will not attempt to discuss it in detail. Yet, they spend the better part of two pages discussing cost analysis and fail to mention that the 1970 United Nations Symposium on Geothermal Power stated that the cost of power is 3.2 mills per kwh [kilowatt-hour] at Larderello, Italy, and 4.91 mills per kwh at the Geysers, U.S.A. (ST/TAO/Ser. C/216, page 6). No mention was made in this article about the generous tax break and depletion allowance given the geothermal power developments. The statement on page 26 of the article mentions the cost of drilling, as stated in the United Nations Report of 1970, in the "United States" is $[illegible] meter; my copy of this report stated: "The average cost per meter for a 1,000-[illegible] in Japan was $98, though costs as high as $172 per meter have been reported during the first phases of drilling a new geothermal field. "In the case of a United Nations [not United States] project, the average cost for several wells of a depth of 1,000 meters was $55 per meter, excluding transportation, assembly and dismantling costs for the drilling rig" (ST/TAO/Ser. C/216, page 11).

Geothermal development requires an average of 20 to 40 acres of land per megawatt, exclusive of roads, pipelines, power plants and related facilities. Could one easily visualize "100,000 megawatts" (page 32 of the article) of geothermal power development estimated for the western United States? I tend to agree with Donald E. White of the United States Geological Survey who says that the total world's yearly geothermal production potential is 60,000 megawatts (*Scientific American*, Sept. 1971, page 67). Is not this estimate a more reasonable one?

Dr. Rex, of the University of California at Riverside, stated at a recent hearing on geothermal power at Lake Co., California, that each well at the Geysers in Sonoma Co., California, vents 1,000 pounds of hydrogen sulfide gas into the air each day! The State of California has set a maximum limit of 0.03 ppm [part per million] of hydrogen sulfide in the air for safety and comfort. No mention is made in this article of the existing ammonia and boron pollution in the water of geothermal areas and the numerous other problems with non-condensing gases and mineral salts. Noise and odor are serious problems, yet they also were not covered by this article.

The authors are apparently unaware that the experimental isobutane power plant had been established last year at Brady, Nevada, with no great success; in fact, another attempt to succeed in this process at another location failed totally within a three-week period because the pipelines were completely clogged with carbonates (Rogers Engineering Company, personal communication).

Was it not another significant understatement to say that Union Oil has recently been "making inquiries concerning geothermal land leases" (page 34 of the article)? Union Oil is one of the principal developers of the Geysers, largest dry steam development in the world!

The concept of geothermal development being synonymous with "[illegible]pollution" is a dangerous misconception. Geothermal development can be made compatible with the environment only when uniform minimum standards and controls are established. These, at present, do not exist! Unfortunately, those entrusted with setting standards and controlling the industry are also the ones who strongly advocate intensive geothermal development. Will the "Power From The Earth" article REALLY contribute to a better understanding of geothermal power and its effect on our environment?

JOHN T. O'ROURKE
Engineering Geologist
Member, Sierra Club
Geothermal Subcommittee
San Anselmo, California

Windham College
Putney, Vermont

Gasbuggy

Readers of the lead article in last month's magazine on methane gas production who would like to correspond with Mr. Harold Bate, who has developed the method of generating the gas for use in his car should write: Mr. Harold Bate, Penny Rowden, Galckawton, Totnes Devon, England TQ9 7DN.

A money order for $2.40 will bring you the description of the device used on the car to convert it to methane gas, and installation instructions. For $29.00, one can receive the device itself, and the plans for the methane generation facility.

JOHN TANTON, M.D.
Petoskey, Michigan

“The Chicken poo car”

BBC Nationwide

Originally broadcast on the 8th of September 1971
Reporter: Jack Pizzey

by way of an introduction to Harold…

You can view the video used in the presentation by clicking here: Chicken poo car, 1971, BBC Archive

- 1908: Born in Stoke-on-Trent
- Apprentice mechanic with the Potteries Traction company
- Maintenance engineer with the Stafford Coal and Iron Company
  - Submarine escape devices
  - Advanced independent suspension systems for vehicles
- 1937: Lost a leg in a road accident
- 1947: 8-year, 380,000 mile tour of Africa with his wife (Evelyn) and daughter (Marina) in an ex-Army landrover
  - Prospected for gold, diamonds and uranium in Rhodesia and Tanganyika
  - Fought off bandits and lived off of wild game for long periods
- 1955: Returned to England (settling in Brixham)
  - Worked as an electrical contractor
  - Started a ferry-boat/pleasure-boat service
  - Drove a taxi
  - Started working on the convertor and methane generation
- 1957: Invented the Bate Auto Gas converter
- 1966: Bought Penny Rowden on the proceeds of converter sales

MOTHER EARTH NEWS
THE ORIGINAL GUIDE TO LIVING WISELY

To be sure, Harold Bate has invented nothing new in the way of a basic process. Methane has been forming naturally in swamps and waste organic matter since long before man walked the earth and many ingenious experimenters have harnessed this source of fuel in the past. But Harold does seem to be the first to have actually put the whole idea on a workable, homestead, "anybody can do it" basis.

Published in the USA on July 1st, 1971

Bate’s car
Sweet as a nut

The national Film Board of Canada

You can view the video used in the presentation by clicking here: Bate's Car: Sweet as a Nut

Gas production - The Bate recipe & process

- 75% animal droppings (half pig and half chicken)
- 25% straw
- Stack and douse with water, leave exposed to the air for about a week
- Load 300lb into an air-tight steel container, gently heat to 85˚F
- Wait 4 – 7 days for gas production to start (1 day with a “starter”)
- When the pressure reaches 20 p.s.i. start drawing off gas with a compressor and pump into a high-pressure 4.5 gal gas ”bottle”, filtering out small quantities of phosphoric acid and ammonia in the process. Methane liquifies at 1110 p.s.i.
- This is equivalent to about 7 gallons (31 litres) of petrol
- Gas production will continue for several weeks, eventually producing the equivalent of about 50 gallons (225 litres) of petrol

Efficacy

Caloric values per liquid pound:

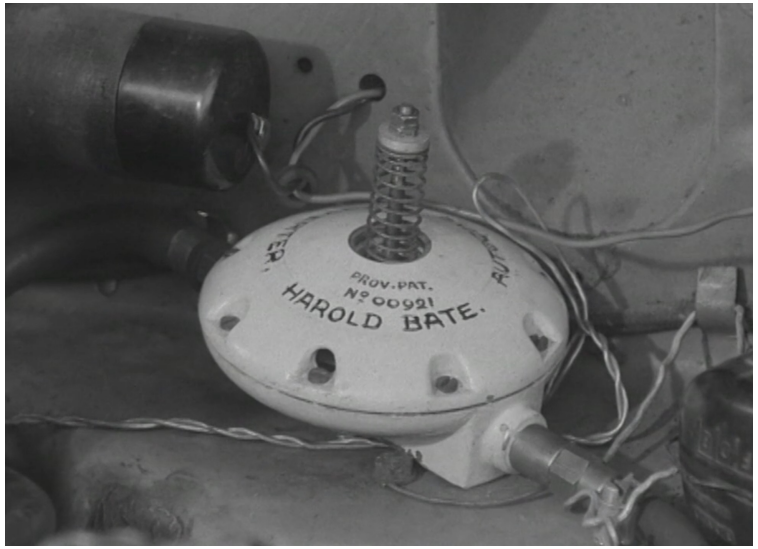
Petrol	19,000 BTU
Methane	22,000 BTU

Combustion efficiency:

Petrol	27%
Methane	97%

- Engines run cleaner and smoother on methane
- Methane doesn't dilute or contaminate motor oil, unlike petrol
- Methane doesn't deposit carbon on piston heads, etc
- Methane exhaust gas is mostly CO_2 and water vapour, petrol exhaust contains unburnt hydrocarbons as well

The Auto Gas Converter



- Patented (No. 00921)
- Approved by the Ministry of Transport
  - "We've looked into it," Frank Standing, information officer for the ministry said, "and the device works perfectly. However, as to mass use, that seems doubtful. There is simply not enough of a supply of chicken manure to provide fuel for cars on a mass basis.” [National Enquirer, June 1970]
- AA and RAC recommended
- “Thousands of cars around the world have been fitted with Bate’s device [Rolling Stone magazine, July 6, 1972]
- In 1972 Harold was selling 15-20 converters a week [by his own admission]
- Supplied to the Chicago and Los Angeles police departments [allegedly]

17/12/70.

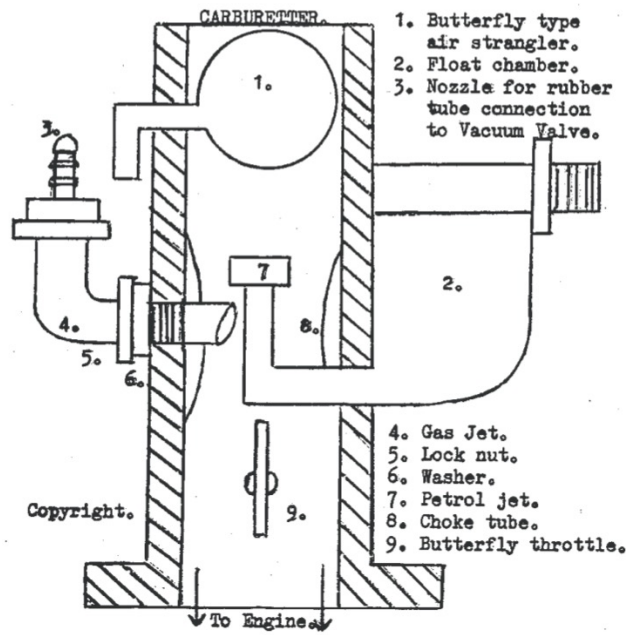
Harold Bate;
Penny Rowden;
Blackawton;
Totnes. Devon.
England. T Q 9. 7 D N.

Mr Ron Carroll;
P.O. Box. 160.
Cary;
North Carolina;
27511.
U.S.A.

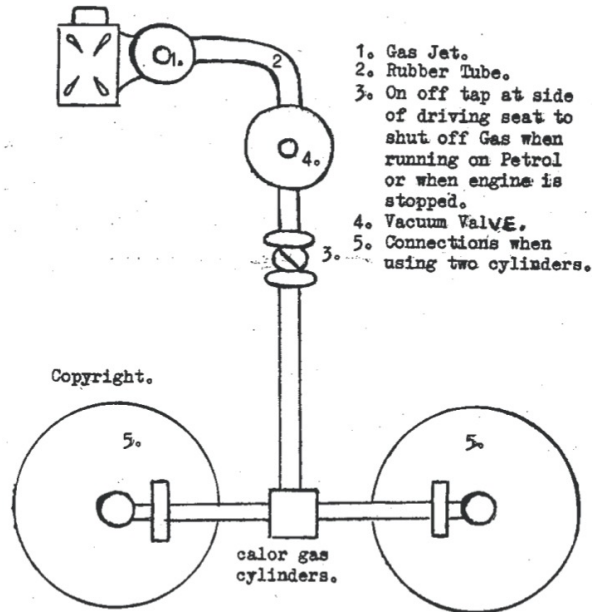
Dear Mr Carroll;

Please find enclosed -
1. Gas Converter Device.
1. Gas Jet for carburetter; Extra Jets - 1. Dollar each.
1. Set of Instructions and Drawings (Gas Device)
1. Set of Instructions and Drawings (Methane Gas Production)

Yours Sincerely;
H. Bate.
Harold Bate.



1. Butterfly type air strangler.
2. Float chamber.
3. Nozzle for rubber tube connection to Vacuum Valve.
4. Gas Jet.
5. Lock nut.
6. Washer.
7. Petrol jet.
8. Choke tube.
9. Butterfly throttle.



1. Gas Jet.
2. Rubber Tube.
3. On off tap at side of driving seat to shut off Gas when running on Petrol or when engine is stopped.
4. Vacuum Valve.
5. Connections when using two cylinders.

World Copyright Reserved

Methane Gas Production

By HAROLD BATE

Methane Gas when mixed with ten times its volume of air or twice its volume of Oxygen when ignited constitutes a mixture which is highly expansive forming Carbon Dioxide and water vapour, and when used as a fuel to drive an internal combustion engine Methane Gas contains more useful power and a much higher efficiency than Diesel or Petroleum fuels. In many coal mines methane is present and mixed with air is known as fire damp. Methane Gas is also produced from all kinds of decaying vegetable and animal matter, leaves, grass, straw, weeds, etc. Nearly pure Methane Gas is composed of :—

Methane	89.61
Nitrogen	9.61
Carbon Dioxide	0.23
Oxygen	0.55

Calorific value B.T.U. per lb. :—

Methane	22,000
Petrol	19,000
Propane	19,944
Butane	19,680

For quick production with large volume, farmyard manure, especially pig and fowl manure are recommended. The contents of the domestic septic tank are also suitable.

METHANE GAS PRODUCTION FROM MANURE AND WASTE MATTER

The preparation of farmyard manures and waste matter for the formation of Gas is done in two stages. The first stage is aerobic prefermentation. This is usually caused by making a compost pile of manure—chopped straw—and any other vegetable waste. The pile is dowsed with water and left for about a week exposed to the air. During this period, urine is broken down to Ammonium Carbonate and intake of Oxygen. Some of the complex sugars and starches are broken down and the formation of Butric Acid which is believed to be inimical to the growth of the Methane producing organism in the latter Anaerobic stage of the process is prevented.

Stage two : When the prefermentation is complete, the material is placed in an air tight container called a DIGESTER where under suitable temperature conditions Anaerobic fermentation takes place. At first, the Gas contains little or no Methane and may consist of almost — almost entirely — of Carbon Dioxide. Small quantities of Hydrogen Sulphide and Ammonia may also be present. After a week or so—depending on conditions—Gas rich in Methane is evolved in useful quantities. The Digester will still continue to produce Gas for several weeks but this will gradually become reduced. If the manure and waste matter instead of being formed into a compost heap on the ground—it is placed directly into a Digester and air is bubbled through the Digest, none of the liquid contents are lost and prefermentation will take place more quickly. The Gas is collected in a Gas Holder and used as required.

When an industrial waste as against farm masure is very concentrated containing 1% or more of solids as in the case of distilling, dairy, packing house and other wastes, Methane fermentation offers an attractive method of treatment. Many types of organic matter can be used to produce Methane Gas but a good mixture is pig manure, straw and poultry manure. Manure to provide the Nitrogen, straw and/or vegetable waste to form Carbon. Half pig manure mixed with chopped bedding straw and half poultry or cattle manure or slurry forms a good mixture.

1 cwt. of manure = 500 cu. ft. of gas or more.

METHANE GAS PRODUCERS

One of the simplest types of Methane Gas producers consists of a pit dug in the ground and lined with brick or concrete ; or a tank built on to a low stlage above ground. A useful size would measure approx. 10 ft. diameter by 10 ft. deep, or 10 ft. square. The Gas Holder can be the same size or larger. Whatever container is used the cover must be air tight when placed in position.

Where the sewage from a domestic dwelling drains into a septic tank, the tank forms a ready made Methane Gas Producer. To prepare the septic tank for the production of Methane Gas, a non return flap valve is fixed on to the sewer pipe where it enters the tank. This is to stop the gas escaping by way of the sewer pipe, as shown on the drawing. Next, the septic tank vent pipe is drilled and a gas tap fitted. Any other opening in the vent is sealed up. A hole is then made in the tank cover and a thermostatic electric immersion heater is fitted in the same manner as it would be in a domestic water heating system. The length of the heater should be the longest obtainable so that it will go well down into the digest. The thermostat should be set so that it gives a steady heat of 85 deg. Fah. to 90 deg. Fah. Another small hole is made in the cover to enable a thermometer to be inserted into the digest now and then to check the temperature. This hole must be fitted with a gas tight stopper. If the tank is built above ground on a low stlage, the digest can be heated by a gas ring, and as soon as the gas is generated the ring can be connected to the producer gas holder. The production of gas will then be automatic. Another cheap method of applying heat to a septic tank is to run a steam pipe through the contents and connect it to the domestic hot water supply.

The whole secret of the production of Methane Gas lies mostly in the maintenance of the digest at a temperature of 85 deg. Fah. to 90 deg. Fah. If the temperature rises above 104 deg. Fah. the bacterial digestion of the contents of the gas producer will cease and gas will not be produced. A good average temperature lies between 84 deg. Fah. to 88 deg. Fah. In hot climates no artificial heating is required, especially in Africa and India. In most parts of these countries the heat from the sun is quite sufficient for the efficient running of the Methane Gas Producer.

COMPRESSING GAS INTO HIGH PRESSURE GAS BOTTLES

A suitable High Pressure Compressor for filing Gas Bottles is shown on the drawings. This is the type used for filling aqualung diving bottles. Gas bottles should be under water while filling. Gas outlet on compressor must be fitted with a good filter and pressure gauge reading to 3,000 per square inch.

It must be understood that the author of the information detailed in these papers cannot be held responsible for any accidental damage to persons or property arising from the construction or use of the apparatus described.

HAROLD BATE
PENNY ROWDEN, BLACKAWTON, TOTNES, DEVON, ENGLAND

Suitable compressors, high pressure ex-W.D. gas bottles and fittings can be obtained at reasonable prices from Messrs. B. Pryce, 157 Malden Road, Cheam, Surrey.

Immersion heaters, thermostats and various fittings from Messrs. Proops Bros. Ltd., 52 Tottenham Court Road, London, W.1.

High pressure air gauges from L. Veysey and Machinery Mart, Mill Street, Crediton, Devon.

Compressors and high pressure air bottles can also be obtained from C. W. Wheelhouse, 11-13 Bell Road, Hounslow, Middlesex.

Pat. Pending — Copyright

Equipping a Petrol Engined Vehicle to run on Gas or Petrol

By HAROLD BATE
Penny Rowden, Blackawton, Totnes, Devon, England. T Q 9. 7 D N.

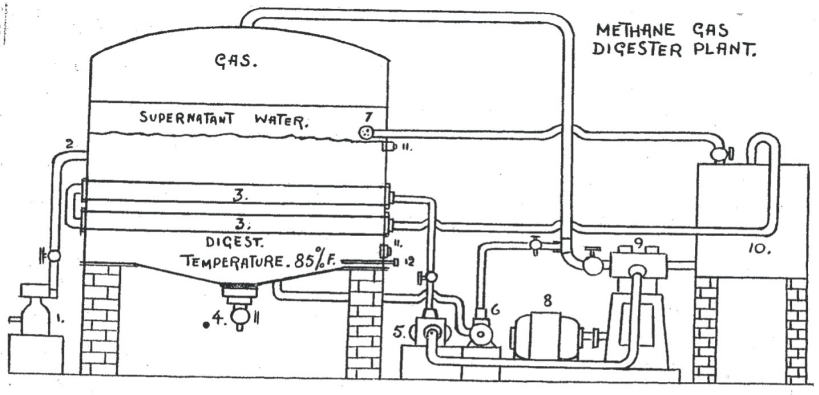
For the scheme to be a success, it must be safe, require very little alteration to the standard equipment of the vehicle, require no extra driving controls and to be automatic in operation. This has been achieved by fitting a special jet to the standard carburettor and connecting this jet to a suction operated vacuum valve.

The valve automatically supplies the gas according to the demand of the engine ; once set, the mixture of air and gas is automatic. A pull-on push-off motor cycle type petrol tap is fitted between the carburettor and the fuel pump ; this tap can be operated from the dashboard of a car by fitting an extension rod, enabling the petrol supply to be turned off when changing over to gas with the vehicle in motion. ON NO ACCOUNT SHOULD THIS TAP BE FITTED BETWEEN THE FUEL PUMP AND THE PETROL TANK AS THIS WOULD CAUSE DAMAGE TO THE FUEL PUMP. If the fuel pump is electric, it will only be necessary to connect a switch in the battery supply wire ; the wires can be extended to the dashboard so that the pump can be switched on or off with the vehicle in motion.

CONNECTING UP AND STARTING THE ENGINE

There must be a clear passage through the pipe-line from the gas container to the vacuum valve ; no restrictions, i.e. : regulating valve, non-return valve or filters, as these would cause freezing and are not necessary as no flash-back can occur through the vacuum valve. The outlet end of the valve is connected by approx. 12" of Calor Gas Rubber Tubing to the gas jet in the carburettor ; the inlet end of the valve is connected by rubber or copper tube via the on/off gas tap to the gas container. The vacuum valve must not be connected directly to the gas container or it will freeze. To start the engine on gas, drain the carburettor and turn off the petrol, turn on the gas and adjust the valve by the S.A. screw on top of the compression spring so that the gas can just be heard escaping into the carburettor ; the adjustment will give a slow tick-over and will ensure instant starting on the coldest morning ; set the air strangler on the carburettor approx. ¼ open and press the starter. It is essential that the carburettor is fitted with a variable air strangler—usually a butterfly type at the air intake ; if it is not, one can be fitted by drilling a ¼" hole through each side of the carburettor near the air intake end and fitting a ¼" brass spindle with a metal disc screwed to the centre of the spindle ; the metal disc should be approx. the diameter of the carburettor intake ; this will enable the air supply to be controlled as this is a very important part of the set-up, so when the engine is running on gas a considerable amount of air is drawn in through the petrol jets in the carburettor. A suitable position will be found in which to set the air strangler so that the engine answers to all positions of the throttle ; the air strangler will then not need altering while running or starting on gas. For engines

* or start on Petrol & switch over to Gas.



1. Slurry or Sludge Pump.
2. Digester tank. (30. tons manure weekly)
3. Heater Coil.
4. Sludge outlet.
5. Heater Coil circulating Pump.
6. Gas recirculating Pump. (for breaking up scum.)
7. Supernatant water run off.
8. Electric Generator.
9. Engine.
10. Hot water Tank; Can be heated independently by Gas when engine is not running.
11. Digest level inspection Plugs.
12. Thermometer.

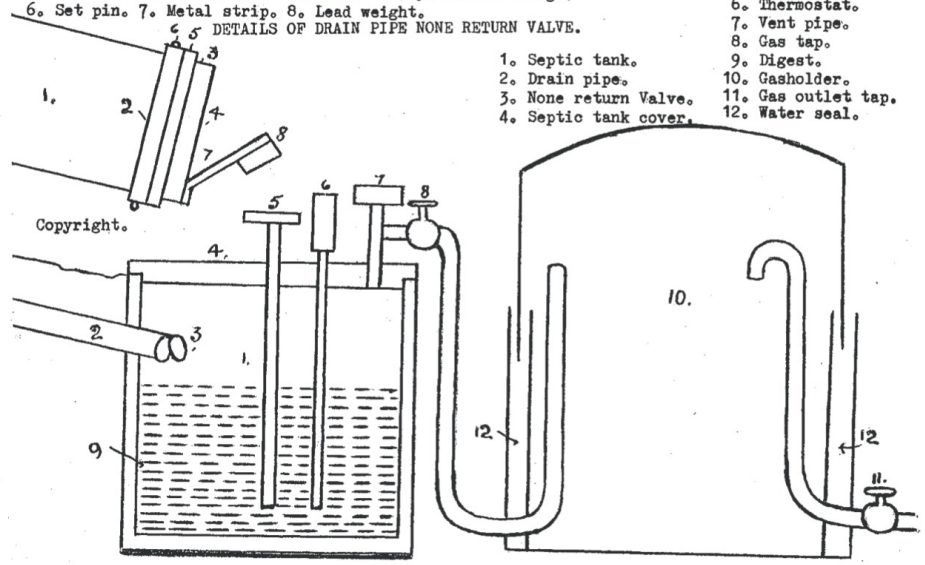
Copyright.

DIGESTER TANK SIZES.

20,000. Birds—Tank - 12ft. dia. X 10ft.
12,000. " - " - 10. " X 8.
6,000. " - " - 8. " X 6.
3,000. " - " - 6. " X 4.

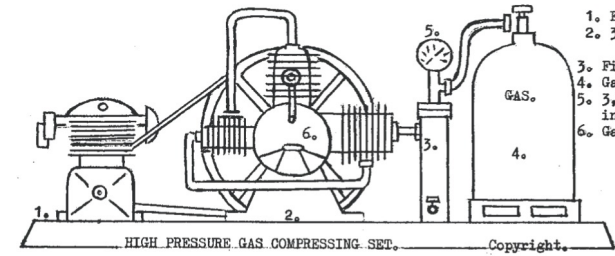
Pipes & Digester Heater Tubes - Size -
1. inch. B.S.P. upwards according to size of Digester tank.

Slurry or sludge Entrance Pipe -
4. inch upwards.



1. Septic tank drain pipe. 2. Wood or metal ring.
3. Leather disc fastened to wood disc 4.) 5. Leather hinge.
6. Set pin. 7. Metal strip. 8. Lead weight.

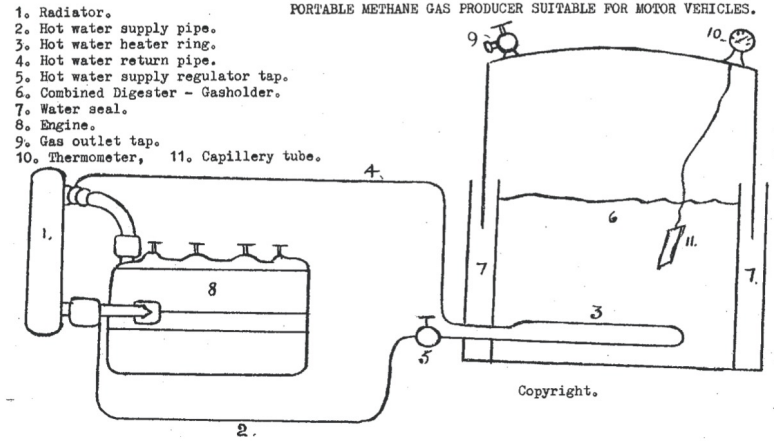
1. Septic tank.
2. Drain pipe.
3. None return Valve.
4. Septic tank cover.
5. Immersion heater.
6. Thermostat.
7. Vent pipe.
8. Gas tap.
9. Digest.
10. Gasholder.
11. Gas outlet tap.
12. Water seal.



1. Engine - 2½. H.P.
2. 3 stage compressor. (2,500lb. P.S.I.)
3. Filter.
4. Gas bottle.
5. 3,000 lb. per sq inch Gauge.
6. Gas intake.

PORTABLE METHANE GAS PRODUCER SUITABLE FOR MOTOR VEHICLES.

1. Radiator.
2. Hot water supply pipe.
3. Hot water heater ring.
4. Hot water return pipe.
5. Hot water supply regulator tap.
6. Combined Digester - Gasholder.
7. Water seal.
8. Engine.
9. Gas outlet tap.
10. Thermometer, 11. Capillery tube.



Local recollections

John Drew, farmer at Blackdown Farm since 1971 recalls:

- Harold paid him £1,000 in cash in 1971 for a field adjacent to Penny Rowden, an amount large enough in those days to cause consternation at his solicitor's office!
- Harold attended a number of local shows [e.g. Stoneleigh] to demonstrate his converter, and always took a policeman friend of his along for "protection", allegedly from the "oil companies" who were trying to buy him out (or worse)
- Blackdown Farm was the source of Harold's pig manure and in the early seventies John estimates that they hosted 15 to 20 film crews from all over the world
- The local postman was exasperated by the sacks of letters that arrived every day

Making a name for himself…

1970?, unknown publication

Harold's pig-power car invention gives the green light to road hogs

Harold Bate's car — and a source of fuel

THE LAST MAN to worry about the world's energy crisis will be Harold Bate.

For even if petrol rationing does come, he will still be able to drive as far as he likes—in a car powered by *pigs*.

For six years Mr. Bate has run his 1955 Hillman Minx without using a gallon of petrol.

The secret fuel that keeps him cruising at up to 70 miles an hour is a powerful gas extracted from pig manure.

Instead of stopping at a garage for a gallon of four-star, Mr. Bate visits the local piggeries near his home in Bishopsnion, Devon, now and then for a hundredweight of pig manure.

The 62-year-old farmer is convinced that the answer to the Energy Crunch — the predicted world shortage of natural fuels—is simple.

Any excrement produces methane as it degenerates. And methane—which is the same as North Sea Gas—is a valuable and easily tapped source of power.

Device

He has developed and patented an "autogas converter" device which can be fitted to any car to enable it to run on the odourless gas.

A methane-driven car goes faster, never "knocks," pulls better, never needs a decoke, and the only exhaust is a little water vapour and carbon monoxide.

Mr. Bate first had the idea of using natural gas as a motor fuel back during the Suez crisis of 1956 when he realised then that the Western world was almost wholly dependent on the Middle East for petroleum products.

Now he hopes to market his invention world-wide. He has had thousands of orders from the U.S., supplied the Chicago and Los Angeles police forces and every week gets nearly 150 letters.

He believes a fuel that is clean, non-polluting, perpetually plentiful and cheap—roughly a penny a gallon—cannot be ignored much longer.

Inventor's laboratory: Where Harold Bate's idea became a reality

ENERGY RESEARCH POLICY ALTERNATIVES

HEARING

BEFORE THE

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS UNITED STATES SENATE

Pursuant to S. Res. 45
A National Fuels and Energy Policy Study

NINETY-SECOND CONGRESS

SECOND SESSION

ON

EXISTING FEDERAL ENERGY RESEARCH AND DEVELOPMENT POLICIES AND FUTURE TECHNOLOGICAL OPTIONS

JUNE 7, 1972

Serial No. 92–30

Printed for the use of the
Committee on Interior and Insular Affairs

U.S. GOVERNMENT PRINTING OFFICE

51–842 O WASHINGTON : 1972

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 – Price $5.25

[From The Rolling Stone, July 6, 1972]

THIS MAN INVENTED THE CHICKEN CAR

(By Charles Alverson)

BLACKAWTON, DEVON.—There's a little old man down here who claims he can make your car run on chicken manure.
Bullshit, you say?

That, too, as well as horse shit, pig shit and just about every other kind of dung. In fact, says Harold Bate, a wild-haired old man wearing a bow-tie and cracked horn rimmed glasses, with any sort of manure and a bit of not-too-expensive equipment, you can liberate yourself from the giant petroleum companies completely.

The secret is methane, the natural result of the decomposition of organic material, especially manure. For the most part, this gas bubbles slowly away into the atmosphere, but about 15 years ago, during the Suez crisis when gasoline was in short supply here, Bate got an idea.

"I was messing around making fertilizer," he says, "and I saw methane bubbling out. I asked myself: why not put it into a car?"

So he did. But first he had to invent his "Autogas Converter Device," a smallish, flying-saucer shaped gadget weighing a pound and a quarter, which enables any automobile to run on gas rather than gasoline. This applies not only to methane but to bottled gasses such as propane, butane, and acetylene. The converter is installed between the carburetor and the gas cylinder.

Fitting the converter to a car, although not quite as simple as Bate claims it is, requires only a hole drilled and threaded into the carburetor, various lengths of copper and rubber tubing and a few fittings. Then, with the flick of a switch, you're off running on gas and Standard Oil can go eat it. Although Bate claims cleaner, cooler running, and high-octane performance, perhaps the main advantage, at least in Britain and the Continent where a gallon of gasoline costs at least 75 cents and can run as high as a dollar, is economy. Even on purchased bottle gas, you can cut fuel costs by nearly one half. The savings are really spectacular, Bate insists, if you produce your own methane with his patented "gas digester," plans for which he'll sell you for about $2.50. Bate claims that 15 pigs produce enough manure to make 300 cubic feet of methane a week. That's the equivalent of about nine gallons of gasoline at, Bate figures, about two and a half cents a gallon.

For the more ambitious, Bate includes plans for a methane-producing device with a tank 12 feet in diameter and ten feet high, which calls for 30 tons of manure a week. This, however, in turn requires something like 20,000 chickens. There's also a portable digester which Bate says could be carried about in the trunk of a car. You can even turn a septic tank or cess pit into a methane producer, Bate says, and he'll show you how to do it.

Bate's plans for all these are clear if a bit scanty in detail, but he cautiously adds the disclaimer that he: "cannot be held responsible for any accidental damage to persons or property arising from the construction or use of the apparatus described."

Of course, not everybody has room to keep 15 pigs, much less 20,000 chickens, and Bate, despite abundant publicity, is generally considered a bit of a nutcase. He's never quite forgiven the Ministry of Agriculture for referring to him as the lunatic fringe. Most people admit that his process works, even the major petroleum companies. The Automobile Association and Royal Automobile Club recommend his converter, and it was even tested and passed by the Ministry of Transport some years ago.

Thousands of cars around the world have been fitted with Bate's device, and taxis from London to Milan have converted to cheaper running with gas. In Italy some service stations offer "Metano" for the minority of drivers who have gone over to methane propulsion. Gas-propelled vehicles have long been used inside large factories where gasoline exhaust would be a danger.

Bate says that, economy aside, the great advantage of gas is its cleanliness. Methane, for instance, offers a 94 to 98 per cent combustion rate compared to about 27 per cent for gasoline. It's this fact that has made Bate's converter so popular in the United States, he says. Eco freaks have so successfully spread his doctrine that most of the hundreds of letters he gets each month are from Americans anxious to do their part against pollution.

Prior to becoming Mr. Chicken Man, Bate led a varied and colorful life. Born in the Midlands, he lost a leg in a road accident when he was in his early thirties and found he couldn't get a job. So he loaded his wife and daughter in a car and caravan and set off for Africa. There followed ten years of wandering about prospecting for gold, diamonds and uranium. Bate allows that he found "some gold," but apparently not enough, for when he returned to England he settled on the Devon coast and ran a taxi and pleasure boat service.

About six years ago his autogas converter became profitable enough for Bate to buy Penny Rowden, a six-acre farm at the end of a dead-end lane a few miles from Totnes, Devon. There, in a ramshackle 450-year-old farm house surrounded by junk cars, bicycle parts and tons of odds and ends, he tries to keep up with demands for his converter. He said he sold six dozen in the last three weeks, and in the first four months of this year gave over thirty interviews and demonstrations.

In fact, Bate has been so busy demonstrating his process that he hasn't had enough methane left over to run his 1953 Hillman, the much-famed Chicken Car. He's had to resort to buying bottled gas and even on occasion gasoline.

From outward appearances, Bate doesn't look as though he's getting rich from his invention, although some of his neighbors around Penny Rowden think he is. "I supply the working man with my converter at a price he can afford ($15 in Great Britain, about $30 in the States, including postage)," Bate says. "I'm not out to make a big fortune."

The methane digester and converter aren't Bate's only inventions. He's also got a patent on a method for turning fresh chicken manure, which is too chemically potent to be used on crops, into excellent fertilizer at the cost of only a penny a ton. He says that Britain currently produces 250 tons of chicken shit a year that nobody knows what to do with.

Bate also recently completed perfecting what he claims is a self-propelling bicycle which translates bumps in the road into forward action. "The problem," he says, "is stopping the bicycle." The secret is a couple of flywheels and a rising and falling bicycle seat, but he won't say more, except that he'll soon be selling the bicycle conversion kit for about 12 bucks.

Daily Mirror
June 1973

DAILY MIRROR, Saturday, June 23, 1973 Page 3

NOW GEORGE BEST GETS A BLACK EYE

By ALASTAIR McQUEEN

SOCCER star George Best flew to Spain last night with a swollen and bloodshot eye—the result of a punch-up with a student a few hours earlier.

Best, 26, wearing dark glasses to hide his injured eye, was unrepentant about the incident—the latest episode in his stormy career.

He said: "What do you do if someone hits you? Just let them?"

The former Manchester United idol was with a friend in his E-type Jaguar when the incident happened.

The student approached Best's car as it waited at traffic lights in Manchester's city centre.

Best said: "This bloke came up and shouted 'Call yourself a footballer.'

"Then he kicked the car and carried on shouting. I got out and went round to him and he swung a punch which landed in my eye.

"I hit him back. Only a couple of punches were thrown.

"I stopped turning the other cheek a long time ago."

Earlier yesterday, Best had been to see a specialist who gave him the all-clear on a leg injury that put him in hospital six weeks ago.

A police spokesman said last night that no action would be taken over the incident.

SUCCESS SMELLS SWEET TO HAROLD

THE world energy crisis has brought a boom for inventor Harold Bates.

For Harold, a 65-year-old engineer, has perfected a car that runs on high-octane manure.

And businessmen all over the world, with warnings about dwindling oil supplies ringing in their ears, are suddenly becoming interested. About 150 letters a day are arriving at Harold's cottage in Blackawton, Devon.

Harold's secret is a converter that distils methane gas from manure — preferably pig manure.

"The greater the stink the higher the octane," he claims.

Or, as they say, it's an ill wind . .

Nixon signs nuclear arms pact

SMILING and sipping champagne, President Nixon and Russian leader Leonid Brezhnev yesterday signed a pact guarding against "accidental" nuclear war.

They signed it in the White House before flying to California to continue their summit talks at Nixon's San Clemente home.

Under yesterday's agreement both countries will be "obliged" to stay clear of military showdowns.

A new Tour ends—See Page 7.

"For Harold, a 65-year-old engineer, has perfected a car that runs on high-octane manure."

" "The greater the stink the higher the octane," he claims.

Or, as they say, it's an ill wind…"

The Express & Star newspaper, 3rd August 1973

ECCENTRIC TALES have drifted up from Devon in the past and rumours that the world's energy crisis had finally been solved in the tiny Devon village of Blackawton merely confirmed the general suspicion.

But other than chasing rainbows there is not much to do in Blackawton on a Saturday afternoon, and besides, the local farmers in the Forces Tavern claimed that this particular rumour was incontestably true.

Thus, driving along the steep circuitous tracks which pass for roads in this part of Devon, one finally arrives at the home of Mr Harold Bate, who has invented a magical contraption he calls the "autogas converter device," which changes chicken and pig manure into a potent non-pollutive methane gas.

Mr Bate, who is 65 and invented the device in 1957, is accustomed to the sudden appearances of journalists and other non-believers at his almost inaccessible Devon home.

He treats visitors with a kind of New Testament forbearance. The heathen arrive, he likes to say, and before departing they have usually paid the £9 for his converter and a full set of instructions explaining how they, too, can run their modern lawnmowers, boats, motorbikes and cars on good olfashioned manure.

"The lights are going out all over the world," he says. "Manure is the only alternative. The oil supplies are drying up, the world's running out of secondary fuels and nuclear power is still donkey's years away. But, as

-3 AUG 1973

"Eccentric tales have drifted up from Devon in the past and rumours that the world's energy crisis had finally been solved in the tiny Devon village of Blackawton merely confirmed the general suspicion."

"… the local farmers in the Forces Tavern claimed that this particular rumour was incontestably true."

"He treats visitors with a kind of New Testament forbearance. The heathen arrive, he likes to say, and before departing they have usually paid the £9 for his converter and a full set of instructions…"

Daily Mirror
November 18th 1974

SO WHO NEEDS PETROL ANYWAY?

TODAY four star grade petrol goes up to 62½p a gallon, courtesy of Mr. Denis Healey, Chancellor of the Exchequer.

And that's a five-star knock at motorists where it hurts most: in the pocket.

But who needs petrol? There are plenty of other alternative fuels available that will run a car just as well.

Wonderful fuels . . . like water, margarine, whisky, red wine, cow pats, and salad oil.

Fancy a trip up the motorway on a tankful of high-octane benzedrine or four-star French dressing? It's not so daft as you think.

by DONALD WALKER

Run

They are some of the unlikely substances that people have been trying to convert into liquid energy to run cars.

The list also includes sewage sludge, wood spirit, lard, cooking oil, all forms of farmyard dung, water mixed with spirit, natural gas and hydrogen.

The story of the search for fuel to replace petrol is eccentric, with some wild claims as yet unfulfilled.

The most mysterious of these stories began nearly sixty years ago and featured a Mr. John Andrews.

He claimed that tap water plus his secret ingredient was as good as petrol.

He interested people in America and Britain in his concoction . . . then vanished, never to reappear.

If it all sounds like the figment of an overwrought imagination, I should tell you that water-as-fuel experiments have been repeated recently.

Last month a middle-aged Frenchman, Jean Chambrin, demonstrated an engine that ran on water and alcohol magically combined.

The alcohol, Chambrin claims, can be Scotch—or even red wine, though that gums up the plugs.

And last year an American professor, Walter Ewbank, completed a method of blending water and petrol to produce a satisfactory fuel.

GAS DRIVEN: This shoppers' bus is being tried out by the West Germans in Bonn.

Gas

Here is a rundown of other unusual fuels and ways of extending that expensive gallon of petrol.

● **COW - PATS, pig-droppings and other farmyard dung.** It is the combustible methane gas from these substances that runs the car. Several people have invented methods of distilling this and filtering it to an engine.

Best known is former electrical and mechanical engineer Mr. Harold Bate, now 66 and living in Blackawton, Devon. His £20 conversion kit is on the market.

● **SALAD OIL, margarine, lard and other oils.** Here it is the motor that matters—the extraordinary Stirling engine being developed in Eindhoven, Holland. Other similar engines are being worked on in America.

The development of the Stirling has spanned nearly 40 years and is now, at last, nearing completion.

The unit can use almost any burnable substance. Slight letdown: for convenience, the Stirling is currently being run on—petrol.

● **HYDROGEN.** There's nothing new about using liquid hydrogen as fuel—it's carried rockets into Space. But work is going on in America to bring it down to earth.

● **NATURAL GAS and other gases.** Here the combustible matter is propane and petrol engines must be converted. The method was used in war-time Britain, and present-day conversions of taxis and lorries in this country and buses and trucks in Russia have been successful.

● **SEWAGE SLUDGE.** Once again it's the methane gas that runs the engine. A Midlands drainage authority has converted some of its vans to run on the sludge-gas.

● **WOOD SPIRIT (also called methyl alcohol or methanol).** ICI have proved that this can be made artificially. It may be one of the real answers to the fuel problem.

Methanol is added to petrol to "stretch" a gallon and British scientists have already run a car on a petrol containing 6 per cent. methanol.

”**Cow-pats, pig-droppings and other farmyard dung**. It is the combustible methane gas from these substances that runs the car. Several people have invented methods of distilling this and filtering it to an engine.

Best known is former electrical and mechanical engineer Mr. Harold Bate, now 66 and living in Blackawton, Devon. His £20 conversion kit is on the market.”

8th September 1977

Energy Minister Wedgwood Benn Opens Energy Exhibition At Olympia

"Inventor Harold Bate explains to Mr Benn his method of running a car at twentieth of the usual cost. His fual [sic] is literally chicken feed, by using highly toxic chicken manure to produce methane gas."

Did it work? Was it practical?

Note: this a short, fair-use extract from the Film Board of Canada film: “Bate’s Car – Sweet as a Nut”

So that’s ok then! Harold seems to have a touching faith in south-coast provincial bank managers…

What could possibly go wrong?

March 1974

SPLUTTERS OVER A GAS ENGINE

By ROY SPICER

MANY motorists who spent nearly £30 each on a device to make their cars run on gas are claiming that it doesn't work properly.

And one of the directors of the company marketing the device, Mr. Harold Bate, 66, agrees with them.

He said: "It looks badly and does not deliver gas smoothly. If it is used in large cars it will create a sort of kangaroo effect—jerky stopping and starting."

For seventeen years Harold Bate has run his own car on a mixture of gas made from a mixture of pig and sheep manure.

And he quickly switched a single bottle made device to convert cars from petrol to gas.

Then, when the fuel crisis developed last year world attention focused on him.

Thousands of letters suddenly arrived at Mr. Bate's cottage in Blackawton, near Dartmouth, Devon, from motorists wanting to buy his device which will also use bottled gas.

He just couldn't make enough converters himself, so he linked up with two businessmen, Mr. Denis Bolton and Mr. Charles Abbott. They formed a company called Harold Bates Auto-Gas Convertors Ltd.

But Mr. Bate says he has had many complaints about the devices which cost £30-50.

'No approval'

They are going wrong, he claims, because the design has been changed without his approval.

Mr. Bolton said: "We changed the specification for production reasons but Mr. Bate agreed to this and confirmed that the new unit was O.K.

"There have been problems which we wanted to discuss but he has refused to leave his home to attend board meetings. He's not even on the phone.

"We have been selling these units at the rate of 200 a week. There have been only about half a dozen complaints.

"Some people don't realise that the unit is not suitable for all cars."

Mr. Bate claimed that when he was making the

Inventor Harold Bate

devices himself he got £60 to £70 a week.

"I refused to attend any board meeting until they promised to change the design back to my specification," he said.

"Now I want to break away from the company and start on my own again."

"He just couldn't make enough converters himself, so he linked up with two businessmen … They formed a company called Harold Bates Auto-Gas Convertors Ltd."

"We have been selling these units at the rate of 200 a week."

"Now I want to break away from the company and start on my own again."

Review of the Bate Autogas Convertor Device – Jerry Friedburg – May 1972

Harold Bate has made a great contribution to the world by publicizing the fact that you and I can operate our automobiles on low-emission fuel. His suggestion that we can actually produce one of those fuels – methane – from barnyard manure is also very exciting . . . but my experience leads me to believe that the famous patented Bate Autogas Convertor Device, designed to allow a standard automobile to run on methane, is not practical at all…

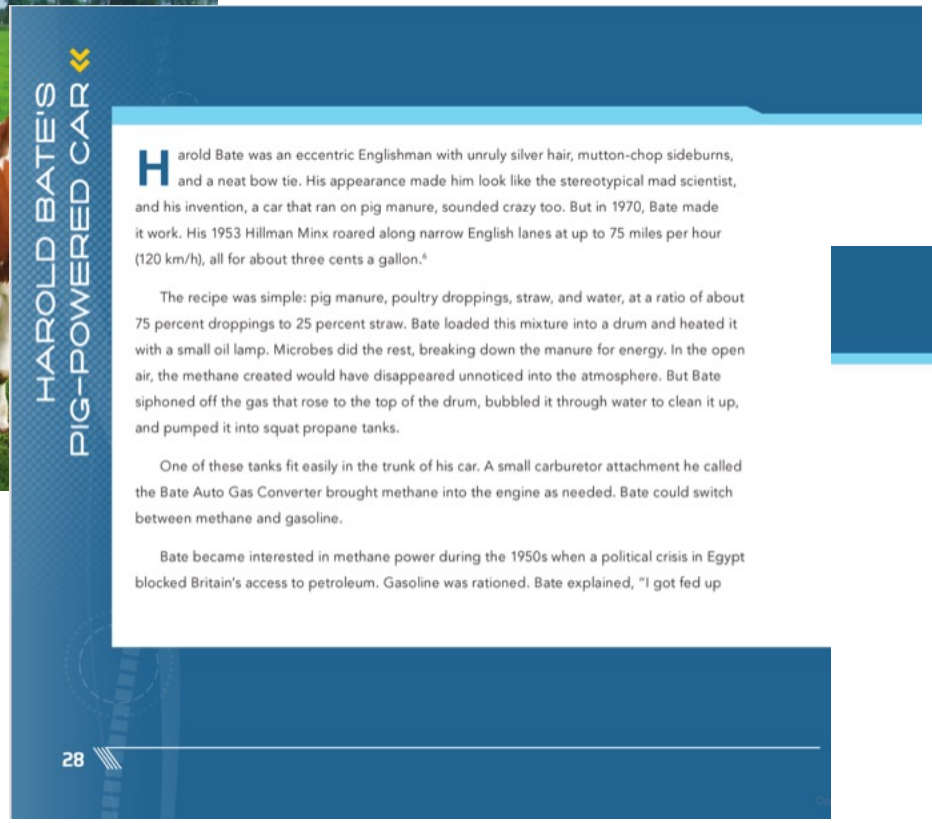
Δ … instructions accompanying the Bate unit state that "gas pressure from the bottle (to the convertor) should not exceed approximately 70 pounds per square inch" . . . so if you intend to compress your methane for range, you'll need a regulator in the line between the gas tank and the Bate Convertor. As a matter of fact, because methane pressure varied noticeably with changes in outside temperature and fuel level and because the Bate Convertor is sensitive to these changes, you'll need a regulator to stabilize the gas pressure anyway.

Δ Bate's unit offers no automatic or other positive shut-off protection in case the convertor leaks when your automobile's engine isn't running. I ran a test on the Bate device I had and, sure enough, it did leak under such conditions. That's dangerous.

Δ All in all, the Bate gadget is simply a single-stage demand regulator that must be supported by at least $150 in extra equipment if it's to work satisfactorily (even with compressed methane).

Gone but not forgotten…

Published in the US in 2013



HAROLD BATE'S PIG-POWERED CAR

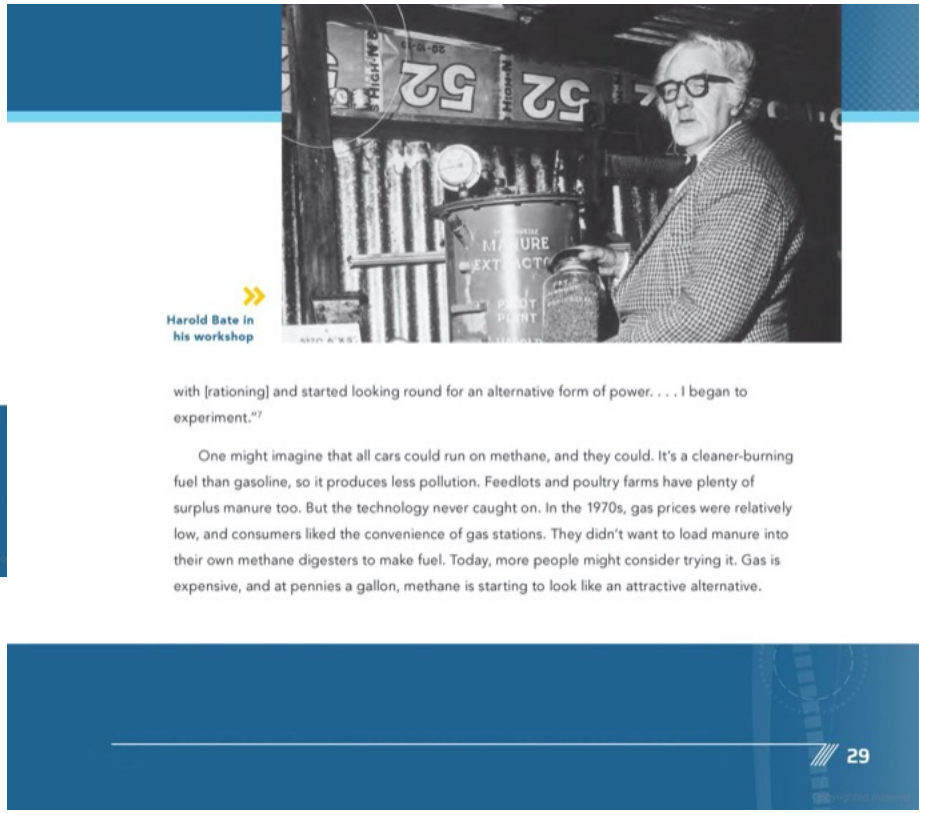
Harold Bate was an eccentric Englishman with unruly silver hair, mutton-chop sideburns, and a neat bow tie. His appearance made him look like the stereotypical mad scientist, and his invention, a car that ran on pig manure, sounded crazy too. But in 1970, Bate made it work. His 1953 Hillman Minx roared along narrow English lanes at up to 75 miles per hour (120 km/h), all for about three cents a gallon.[6]

The recipe was simple: pig manure, poultry droppings, straw, and water, at a ratio of about 75 percent droppings to 25 percent straw. Bate loaded this mixture into a drum and heated it with a small oil lamp. Microbes did the rest, breaking down the manure for energy. In the open air, the methane created would have disappeared unnoticed into the atmosphere. But Bate siphoned off the gas that rose to the top of the drum, bubbled it through water to clean it up, and pumped it into squat propane tanks.

One of these tanks fit easily in the trunk of his car. A small carburetor attachment he called the Bate Auto Gas Converter brought methane into the engine as needed. Bate could switch between methane and gasoline.

Bate became interested in methane power during the 1950s when a political crisis in Egypt blocked Britain's access to petroleum. Gasoline was rationed. Bate explained, "I got fed up

"… But the technology never caught on. In the 1970s, gas [petrol] prices were relatively low, and consumers like the convenience of gas stations. They didn't want to load manure into their own methane digesters to make fuel."



Harold Bate in his workshop

with [rationing] and started looking round for an alternative form of power. . . . I began to experiment."[7]

One might imagine that all cars could run on methane, and they could. It's a cleaner-burning fuel than gasoline, so it produces less pollution. Feedlots and poultry farms have plenty of surplus manure too. But the technology never caught on. In the 1970s, gas prices were relatively low, and consumers liked the convenience of gas stations. They didn't want to load manure into their own methane digesters to make fuel. Today, more people might consider trying it. Gas is expensive, and at pennies a gallon, methane is starting to look like an attractive alternative.

In 2018, the BBC ”Ideas” website had its own take on Harold’s contribution…

You can view the video used in the presentation by clicking here: Buckle up for a drive... in the chicken poo car, BBC Ideas
Note: there is some duplication of BBC material from the Jack Pizzey interview in the first half of this video that was removed from the presentation

The Potential Benefits of Biogas*

* Methane generated from bio-waste

“Sir, The debate over the use of hydrogen as a future carbon-neutral fuel is a distraction. We do not need hydrogen to meet carbon-zero targets, as there are more readily available alternatives.

The world dumps about 100 billion tonnes of biogenic waste into the environment every year, including food waste, sewage, animal slurries and agricultural residues, which ferment and produce methane. Were we to capture those wastes and their methane, we could produce renewable, carbon-negative energy known as biogas, as well as composts to return humus to our badly depleted soils.

The World Biogas Association (of which I am a former president) and the International Energy Agency estimate that capturing approximately half of this waste would cut greenhouse gas emissions by 10 per cent, and generate energy equivalent to 32 per cent of the natural gas used worldwide.

The technologies to do this exist. The problem is that collecting and treating these wastes is more expensive than dumping them, a quandary that can be solved only by legislative means. Governments would do well to look at their biowastes and get them into treatment urgently. In doing so they would reduce emissions and produce energy and compost — using technology that is available now and at a cost far lower than that of producing hydrogen.”

David Newman
Managing director, European Circular Bioeconomy Policy Initiative

(Letter to The Times, August 18, 2021)

The 2022 Perspective

- In the 1970s, the emphasis of environmental concerns was on pollution, not climate change – sustainability was not a “thing”
  - However, biogas (as we call it now) is a sustainable energy source
- Harold recognised that fossil fuels were a finite resource that would one day run out, but he was also motivated by reducing cost
  - Unfortunately US consumers weren’t (for the most part)
  - And the UK Govt wasn’t really interested
- Shifting from fossil fuels to renewable fuels would have needed massive infrastructure investment and the (international) political will to do so
  - But if we had, perhaps climate change would have been more contained

What of our hero?

- Ahead of his time?
  - Quite possibly
- A Visionary?
  - Not consciously, but maybe so in hindsight
- A Dreamer?
  - Maybe, but for the most noble of reasons
- A Revolutionary?
  - He could’ve been, had it caught on, or been promoted more effectively, or been adopted by Government
- An Inspiration?
  - Seemingly, but you can be the judge of that

Thank you for your attention!

Any Questions?

andy@pennyrowden.uk

A Challenge to the Group!

All the material in this presentation was obtained from online sources, one way or another, except for John Drew's personal recollections.

There's probably a lot more information about Harold Bate and his life out there in more traditional (offline) sources.

Would a real historian like to step up to the plate and add to our knowledge?

Selection of comments from the BBC Archive, Sept 2021, #OnThisDay 8th Sept 1971

“The petrol companies will have made sure this idea was buried at the time. Too harmful for their profits, like lots of ideas over the years.”

“He was probably bought out by the oil companies and told to go away you silly man. Because pure greed of the oil companies had taken over by then plus governments couldn't work out a way to tax it”

“I fail to see why people are so surprised by the idea of running vehicles on methane(natural gas). Pumping engines in sewage treatment plants have been run off the methane produced from the sewage for at least 60 to 70 years that I know of.”

“Biogas is pretty normal. Used often, where appropriate.”

“1.1 billion chickens were slaughtered for meat in the UK in 2017. That's an awful lot of manure to recycle and repurpose.”

“He sold conversions to run off compressed Town gas - it was illegal so the chicken poo was a cover story”

“The British eccentric exists for the benefit of mankind”

“Wonder did he suddenly die not long after that was broadcast…”

“Fantastic. If only we had more people like this nowadays. I wonder if his house still stands?” [Oh yes ☺]

“Why we not using this stuff now instead of going all electric”

“Proper British boffin. Mad as a French goose in a pâté factory.”

“Mr Bate and his cars powered by 'chicken by-products' were regular attendees at the Royal Show at Stoneleigh in the 1960s . Saw both the Hillman Minx in the Nationwide piece and its predecessor, a wartime Humber FWD, similar to the vehicles the BBC used during WWII for War Reporting!! There were some vehicles operating on methane gas in the 1960s ,but mainly used off the road.”

“He was always on Southwest news when I lived in Devon.”

“Exploitation of chickens...we take their eggs and nuggets already....”

“Was expecting to see the flux capacitor at some point. Liked his idea though.”

“The "Doc" got left in 1971 and is still trying to get back”