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The ELECTRICAL AND ENGINEERING REVIEW

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Limitations of Electric Vehicles Will Soon be Bridged.

Mr. W. J. Cowell who was one of the Commonwealth's pioneer petrol motorists of the early days, has virtually been Mr. Bowker's business mentor in the two years of courageous and bold endeavour, research, and practical construction work which preceded the recent successful trial of the car on a non-stop run of 94 miles. To Mr. Cowell goes the credit for having been the one who mainly made it financially possible for this work to be done, and for having had the vision to foresee the world-wide significance of Mr. Bowker's ideas when they were still in the embryonic stage.

The following article outlines some of the chief points of interest about the car and its history, and the career of the designer, who seems to bid fair to rank along with those other major discoverers of great new principles—or new applications of existing principles—whose names shine so brightly in the firmament of science, engineering and industry.

To start with the car itself—for that is how John Bowker would have it, the car and its implications for our nation and our Allies being all-important to him, and John Bowker as far as his own sake is concerned being of very little importance to this most modest, retiring, and publicity-shy of inventors.

It should be first be briefly recalled that the chief limitation to the usefulness and popularity of electric vehicles—numerous though they have become for retail deliveries, etc., in England, Germany, America and elsewhere—has been

JOHN BOWKER DEVELOPS REVOLUTIONARY CAR

their low range of 35 miles' running on one charging of the batteries.

And now Mr. Bowker has overcome this handicap by demonstrating an actual range of 94 miles, with a prospect—supported by two outstanding independent expert investigators—of this being increased to 150 miles by a substan-

together too ridiculously impossible. The crude average speed was 24 m.p.h. on the 94-mile run, and there are indications that this also will be further improved upon. Even if it were not, there would be an immense scope for vehicles of the capabilities that can now be contemplated.

You may ask. What is the sec-

deavouring to explain the reason for the lack of popularity of electric road transport and why petrol cars are used even by electric supply authorities. One article even points out, rather humorously, that a certain electric supply company has an advertisement painted on the rear of its own petrol waggon just above the exhaust pipe, reading: "Use electricity—no smoke—no fumes."

"Another article points out that only in road transport has the use of electricity failed to achieve popularity. My own impressions are firstly, the world is petrol minded and secondly the world demands speed and flexibility, even at the expense of economy, and, therefore until an electric car capable of a higher speed with a much greater range can be developed, its use was definitely limited to delivery services.

"The reasons for these disabilities in electric road transport have chiefly been attributed to the limitations of the storage battery. It was accepted as a basic fact that a storage battery had a definite weight and size for a given amount of electric power storage; and consequently, the range of the car was largely governed by this factor. Further, owing to the nature of the storage battery, the percentage of efficiency was governed by the amount of current drawn from it in a given time, so that high speeds demanding the use of more current reduced the percentage efficiency of the battery, roughly in inverse proportion to the amount of current used. Therefore, as the range of the car is reduced by high speeds, one sees a compromise arrived at around about 15 m.p.h., with a range under average conditions of 40 to 50 miles or even less.

"One can safely say that despite intensive research into the battery question over a period of years no outstanding improvement has been

(Continued on page 3)



The Bowker Electric Car as fashioned in a model for Milady.

tial improvement upon the electric motors which had to be used in the model car at the time of the trials.

Because of the extraordinarily low running cost of only one shilling for re-charging of the batteries at night charging rates in Adelaide, it can readily be seen that this vehicle opens up vistas of cheap transport which previously would have been thought al-

ret of Mr. Bowker's success in achieving results which an expenditure of over £20,000 by a great motor car organisation in U.S.A. is said to have failed to wrest from the bourne of Nature's or Science's unrevealed mysteries?

Mr. Bowker's answer is as follows:—

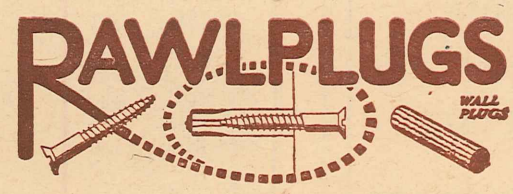
Storage Battery Limitations.
One may read many articles en-

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NEW PRINCIPLES IN "BOWKER'S" ELECTRIC CAR

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effected in its relation to electric road transport.

Money Spent On Petrol.

"Prior to my present investigations, I had given a lot of thought to road transport. In his recent book 'The Century of Science—1840 to 1940,' Dr. F. Sherwood points out that modern transport has created modern war. This is probably true, but most certainly petrol transport, owing to its nature, is a crushing burden in our economic life. A man using a petrol car for business reasons may be compelled to pay from 20 to 30 per cent. of his earnings to maintain his car. Imagine the beneficial results to this Country if the huge amount spent annually on petrol were instead spent, for example, on housing. The housing problem would vanish, as would also many others: I also believe that a successful system of electric road transport will have incalculable value in many other ways. This was the position, as I saw it, 18 months ago, coupled with the fact that the British Empire was engaged in a war in which ultimate victory would be largely dependent upon an adequate fuel supply, and I decided as my contribution to investigate the field of electric transportation.

"Believing that the battery question, from the chemical point of view, presented a formidable problem, I decided to approach the subject from its electrical and mechanical aspects. Early in my investigations I was helped considerably by a study of the operation of the simple pendulum. I believed from this study that the beneficial effects of conservation and conversion of energy, as applied to the storage battery, would be cumulative. I venture to suggest

that when this important fact is correctly interpreted by electrical men they will alter their past pessimistic attitude towards the electric car and will be stimulated into fresh activity in this field. I am glad to say there are already indications of this.

"Basing my work on this theory I commenced by taking the battery weight factor as inevitable and I gradually evolved electrical equivalents of the pendulum's operation, following this with more or less crude designs of electrical devices for putting this principle into effect in an electric car.

"The months passed by quickly, but from thousands of miles' running in an experimental car we had valuable data and experience of the operation of the appliances. I believed that we could now construct a commercial version of our experimental car and achieve something unusual in electric road transport performance. The second car we had made is in the small car class being designed for four persons, though, of course, the principles are perfectly applicable to larger cars and trucks.

Fifty-Year-Old Belief.

"I claimed a possible range of 100 miles at an average speed of about 30 m.p.h. My critics were soon busy, which, of course, was to be expected, owing to the apparently lavish nature of these claims.

"Those who stated that my claims were impossible of accomplishment apparently based their opinions on a half century belief that no appreciable increase in speed or range could be effected unless the chemical properties of the battery were radically altered.

"My contention is that the battery weight is a purely relative factor, and further, I contend that electric car manufacturers have been influenced too much by petrol car design by not treating the el-

ectric car as an entirely different medium of transport.

Furthermore, I contend that the nature of the storage battery supply demands different electrical treatment from that of energy from supply undertakings.

"I cannot go into all the details of the exact nature of my investigations, but in support of my contentions will quote one or two examples. Instead of controlling the momentum of the car by mechanical brakes I use an electric system which not only controls the momentum of the car but at the same time puts the energy back into the batteries instead of dissipating it into brake bands. This, quite apart from the aspects of economy and efficiency, increases the safety of the car. Furthermore, instead of using standard switch gear I use a low loss system. As we have seen, every ampere of current saved increases the efficiency of the batteries, and every amp. recovered further increases this efficiency.

"We continue our work with confidence knowing that the degree of our success will be the Empire's gain, and will, I believe, foreshadow an era of what may be termed the people's car, for, among other reasons, 100 miles on one charging of the batteries costs only about 1/- at the night charging rate, or 2/- at day rates. Also this electric car will be much cheaper to construct and maintain than a petrol vehicle.

"Regarding queries with reference to the charging and life of batteries I can say that charging facilities have been greatly improved of late years, and that no difficulty need be experienced in this direction. The length of time for charging varies according to the conditions and the type of charging device, but with a suitable

charger, batteries can be completely recharged in about two hours although six or seven hours would be the normal time of charging, but obviously this question is associated with that of range. Charging can be done by simply plugging into the electric main and an automatic cut-out operates when the batteries are fully charged. Furthermore, a meter in the car indicates the rate of discharge and the amount of current still available, thus serving the same purpose as a petrol gauge.

"From our experience we believe that the life of the batteries will not differ greatly from their life in a petrol car."

The foregoing particulars were given by Mr. Bowker in a broadcast.

Minimum of Attention.

A statement made available to the "E. & E. Review," by Mr. W.J. Cowell points out that electric cars require a minimum of attention, and their average life is estimated to be 15 to 20 years, and in some cases, indeed, up to 30 years. Beyond the replacing of batteries about every three years, maintenance, according to English and Continental experience is practically a negligible quantity. Some of the vehicles have been in service for 20 years without a major overhaul.

Mr. Cowell said he had been told that a large U.S.A. motor corporation had in the past spent £20,000 in research regarding electric cars and then came to the conclusion that owing to their existing disabilities of low range and speed, electric cars were useless as a commercial proposition and would

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NEW PRINCIPLES IN "BOWKER'S" ELECTRIC CAR

(Continued from page 3)

not be improved upon until there was a radical alteration in the storage battery. This was probably the conclusion arrived at by every scientist, engineer and experimenter in the world hitherto.

"Now, Mr. Bowker, who previously had a number of successful inventions to his credit in the X-Ray field, has come to the fore and upset all these preconceived ideas with an entirely new principle and several inventions all now proven beyond any possible shadow of doubt. As transport, apart from food, is perhaps the most important thing in the world, I and others believe his inventions, revolutionising and cheapening transport methods, will prove, when their extent and nature are fully disclosed and demonstrated, possibly the most epoch making of all time," Mr. Cowell said.

"The nations are fighting for the sources of oil supplies. In this connection Mr. Bowker's discoveries may well prove as important a force as petroleum and at a mere fraction of its cost and for this reason must surely be a factor towards eliminating wars."

Brief Technical Details.

Either A.C. or D.C. current can be used. The present demonstration vehicle is a four-passenger car; but the same principles are applicable to cars or trucks of any size, whether made specially for incorporation of the Bowker principles or converted from existing models.

The controls of the car are very similar in their operation to those of a petrol vehicle. They consist of:—

The electric speed regulator attached to the steering gear (patented).

The combination magnetic regenerative and mechanical braking system (patented).

The impulse remote control system (patented).

Furthermore, the car incorporates a new principle of low loss transmission (patented).

The chassis is of a complete channel construction with standard longitudinal springs in rear and with transverse spring at front.

There are no mechanical features such as gears or differential.

The batteries are situated under folding seats for easy inspection and attention.

The body design and construction are based on aircraft principles as regards weight and wind resistance.

While standard lead acid batteries are specified—24 were used in the 94-mile run—the Edison type nickel iron alkali battery, although most expensive will add to the efficiency and have a longer life. The life for the lead battery we estimate at three years, for the Edison type cell, 15 years.

The car is fitted with an automatic charging system, cutting off when batteries are fully charged.

The advantages claimed for this car can be given as follows:—

Low cost of manufacture owing to simple components, and simplicity of construction.

Availability of all materials locally.

The low selling and running cost suggesting a rapidly enlarging market providing for extra service facilities for recharging and attention.

Low after-service cost.

Long life owing to simplicity of operation and relative absence of moving parts.

Manoeuvrability and rapid acceleration in traffic.

The absence of carbon monoxide.

Low centre of gravity owing to low position and weight of batteries, ensuring good road holding qualities.

Short length of car ensuring easy manipulation in congested areas.

Simplicity of controls owing to absence of mechanical interlocks. No noise.

Fire risk largely eliminated.

Estimated cost of manufacture on a production basis of 100 cars including body and batteries is well under £200.

The car is not yet in production, but arrangements are in train regarding supply of materials, etc. It is understood that a report has been made to the Commonwealth Government on it by Mr. W. H. Schneider, B.E., B. Com., lecturer in mechanical engineering at the University of Adelaide, and Department of Supply representative at the Adelaide School of Mines for substitute fuels advice and test services.

The Inventor's Career.

Mr. Bowker was born in Melbourne, and began work with an electrical firm there as a lad of 14. Two years later, so that he could learn X-Ray technology, he gave his services honorarily for two nights a week at the Homeopathic Hospital. In 1921 Mr. Bowker was appointed X-Ray technician to Dr. H. Flecker, of Melbourne, now of Cairns. Four years later he took charge of the X-Ray and electro-medical departments of the Austin Hospital, Melbourne. Subsequently he became honorary wireless technologist to the Homeopathic and Epworth Hospitals.

In 1929 Mr. Bowker was invited

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to go to France where he met Madame Curie (discover of radium), attended notable convocations of X-Ray experts, and furthered his studies in X-Ray technology. Between 1932 and 1938 he supervised installation of several of the largest X-Ray plants in Australia, and published a book, "X-Ray Apparatus and Technique," the only book on this subject written by an Australian.

Credit belongs to Mr. Bowker for some noteworthy inventions and advances in the sphere of X-Ray, and now he has followed this record of brilliant achievement in one field of science and industry by attaining in another field a feat of unfettered imagination—ever allied with a strong sense of concrete realities. Yet withal his character and his work on the electric car have been stamped by a modest humility and by a spirit of national service.

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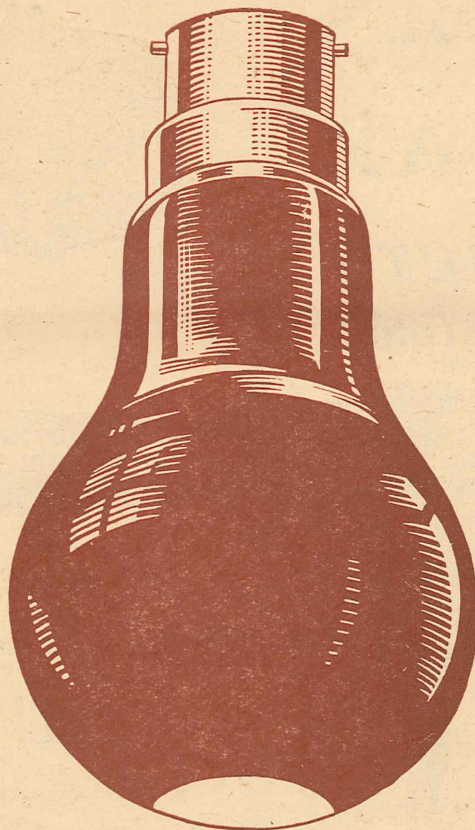
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