THE ODYSSEY OF BERT HINKLER

(Concluded from previous issue.)

LONDON, June 30, 1920.

The amazing Mr. Bert Hinkler arrived back at Croydon on June 9 complete with *Baby Avro* and 35 h.p. Green engine. Having arrived in Rome, as related in the last issue of this journal, he came to the conclusion that he wanted a better stock of spare parts than he had taken with him, and specially he wished to acquire further information concerning certain ailments from which the valves of his engine had been suffering, which, as previously related, had been giving a little trouble.

Therefore, being Mr. Bert Hinkler, instead of staying in Rome and carrying on a lengthy correspondence with people in London on the subject of spare parts and valve troubles, he merely flew back to London to investigate the matter in person. The journey back to London from Rome seemed to him merely an incident in his Odyssey, which, like the journey of the great original Odysseus, is liable to be interrupted by such trifling affairs.

He left Rome on June 7, flew towards the North-west as far as the coast, and thence across on a compass course for Nice. When well on his way across the sea, as he said, situated in the middle of a blue bowl consisting of the sky above and the sea below and a blue haze all round, limiting visibility to a few miles, one of his valves cut out, so not being quite sure of his whereabouts he turned north and sighted Genoa. Thence he flew west along the coast. After flying for a time he saw a town, but having only a small scale map with him he could not be sure of its identity, till, flying down low, he recognised it as Monte Carlo, from photographs which he had seen of it in *The Aeroplane*.

As the little Green engine was still running sufficiently well on three cylinders to keep him in the air he continued along the coast to Nice, where he landed on the so-called "Aerodrome of California." There he put in a fresh valve and spent the night.

The following day he left Nice and flew to Lyons, where he was delayed for the night. He flew the next day to Paris, left in the afternoon, and arrived at Croydon in the evening. In the course of the next day he visited the offices of *The Aeroplane* and of the Green Engine Company, at which latter place he arranged to go down to the works during the week and study the valve question further. On the same evening, June 10, he flew down to Southampton for the week-end.

So far as one can gather, Mr. Hinkler has no intention of giving up his idea of flying to Australia, and he merely regards his journey from Rome to England as an amusing interlude in his serious task. In fact, as one has mentioned above, he merely returned in order to carry on business verbally instead of by correspondence so as to save time on the over-all length of his journey.

As previously stated, he is in no hurry, for owing to the little war that is going on in Arabia he could not get across to Mesopotamia even if he reached Egypt in quick time.

Meantime his flight to Rome and back on his tiny machine is sufficient to put him in the very first class of the world's aviators and aerial navigators. It is also extraordinarily fine evidence of the efficiency of the little *Avro* and the Green engine, for, notwithstanding the valve troubles which caused the return journey, the engine has more than proved its efficiency. It turned out eventually that all the valve trouble was caused by a strange breed of valve-guide which had been fitted to the engine in the course of its long life, though not by the Green Engine Co.

The following figures concerning Mr. Hinkler's journeyings up to the present are of interest:—

May 31—London, 4.50; Turin, 14.20.
June 3—Turin, 9.40; Rome, 16.20.
June 7—Rome, 5.45; Nice, 12.10.
June 8—Nice, 8.20; Lyon, 12.30.
June 9—Lyons, 8.15; Paris, 12.30.
June 9—Paris, 17.30; Croydon, 20.50.
June 10—Croydon, 5.50; Hamble, 6.50.

The total distance covered, including detours over the Gulf of Genoa caused by fog, works out at about 2,250 miles.

The total petrol consumption was 75 gallons.

The total flying time was 34½ hours.—C.G.G.

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RECEPTION WITH ELECTRONIC VALVES

BY

RAYMOND EVANS.

[The subject of "valve" reception is so complex that no attempt will be made here to present even a technical explanation of the theory of the "electronic valve," or to confine it to one article. The necessary data will be given in a series of articles, by which the experimenter will be enabled to launch forth upon the infinite possibilities of this wonderful receiver.—*Ed.*]

PART I.

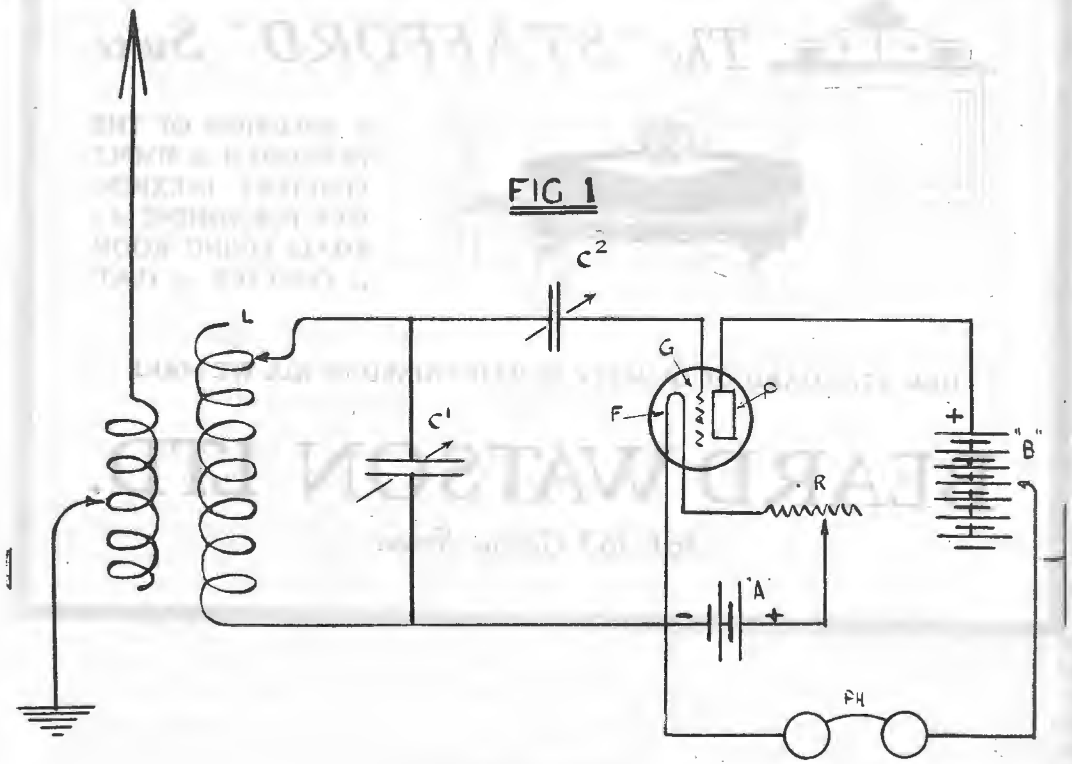
In these articles the term "valve" applies to the partially exhausted vacuum tube which encloses the three elements, namely, "filament," "plate" and "grid." Some valves are provided with two filaments, which, in the case of the novice, is a valuable consideration, as No. 2 filament is in readiness to take up the running immediately No. 1 gives out.

The illustration on page 342 shows the "Expanse A" valve and is a very good example of the above type. These valves are extremely sensitive and are readily adaptable to the experimenter's requirements, whether for use as detectors or amplifiers, and with careful use have a remarkably long life. A "valve" of the above pattern has been in use for the past three years and is still doing good work for a certain local experimenter.

In the "Expanse" valve the filaments, which are of thorium tungsten, are arranged in parallel in the centre of the tube, three silk-covered conductors being provided for the necessary connections, though, of course, as only one filament is burned at a time, only two of these conductors require to be used. Surrounding the filaments is the "grid"—composed of a coil of wire securely anchored in place and provided with a copper terminal conductor covered with green silk. The outer element, generally referred to as the "plate" or "wing," is composed of aluminium and almost wholly encloses both grid and filament and, like its fellow elements, has also a terminal conductor covered with red silk. These coloured silk coverings should be carefully noted, as they are purposely made distinctive, to enable it to be quickly determined which is which of the various elements of the valve when making connections.

In order to operate the "Expanse" valve successfully, a battery of from four to six volts will be required to light the filament. This should preferably be of the storage pattern, as ordinary primary dry or wet cells will not satisfactorily supply the current required for any appreciable

FIG 1



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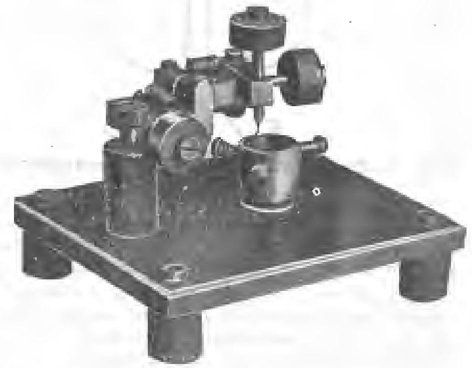

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time. A good make of accumulator should be selected and always kept well charged.

The "Expanse" valve, in its most sensitive state, consumes approximately one *ampère* of current, being regulated by a small adjustable rheostat of about 5 *ohms*.

In referring to the filament battery in these articles, use will be made of the terms "A," or low potential battery. A battery, somewhat larger, will be required for use on the plate element of the valve. This will be called the "B," or high potential battery.

As the amount of current consumed in the plate circuit is extremely small, ordinary dry cells can be used, provided, of course, allowance is made for an adjustment of voltage of the whole battery. This is usually effected by means of a switching arrangement, permitting the cutting in or out of single cells as required.

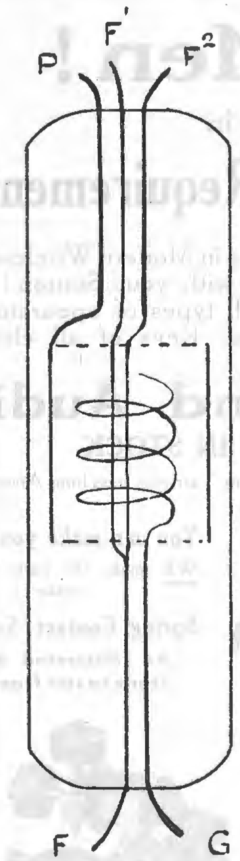

Fig. 2—The Valve—Showing Arrangement of Elements.

Expanse "A" valves require an average plate voltage of 24 volts, though, of course, the constants of each individual valve may vary, necessitating the use of as low a voltage as 15 and as high as 35. The plate voltage in all valves is dependent upon the exact degree of exhaustion of the valve and also upon the spacing and composition of its elements.

The circuits to which the "Expanse" valve can be adapted are many and varied, but the simple scheme of connections shown in *Figure 1* will not only serve to illustrate its use as a detector of spark signals, but will also provide a simple circuit for the reader's first experiment in valve reception. The condenser, C^2, is known as the grid condenser, and its capacity is, in most cases, constant, though a slight variation is desirable, in order that a wider range can be obtained when using various valves.

The grid condenser is connected between the grid and the upper terminal of the secondary coil of the receiving tuner, as shown. Its function is to store up the currents, which are rectified by the valve action between the grid and the filament, which charge and discharge through this condenser, during which the reception of damped oscillations decreases and increases the plate current at an audible frequency.

Rectification takes place in the valve as follows: The electronic emission of the filament is in the direction of the grid, and, according to the electronic theory, negative electricity can pass from the filament to the grid, but not in the opposite direction. When a train of radio frequency oscillations is impressed upon the grid circuit, one half cycle of each oscillation in the incoming wave-train tends to increase the charge in the grid condenser, thus rectifying the wave-train. When the incoming oscillations tend to charge the grid to a negative potential, no current flows from the grid to the filament, but when the grid is charged to a positive potential, current passes from the grid to the filament. The grid condenser, therefore, receives unidirectional charge, but only during the wave-train; accordingly, a charge of increasing strength accumulates in the grid condenser, which is negative on the grid side. This obstructs the passage of the electrons from the filament to the plate, causing a drop in the value of the plate current. At the end of an incoming wave-train the charge in the grid condenser leaks off, either through the valve itself or a special leak resistance of several thousand *ohms*, shunted across the terminals of the grid condenser. The grid then returns to normal potential and likewise the plate current. During the period of rectification of the incoming oscillations there is a variation of the grid potential at a radio frequency; the plate current rising and falling at a similar frequency, which, being above audibility, is not heard in the telephones. This repeated current, nevertheless, can be put to most useful account in the regenerative and amplification circuits, to be described later in this series.

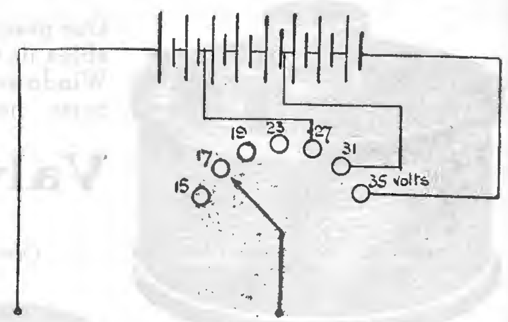

Fig. 3—Method of Connecting "B" Battery of Flashlight Cells.

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In the circuit (*Figure I.*), L represents the secondary coil of the tuner, C^1 the secondary tuning condenser, C^2 the grid condenser and R the rheostat. In making use of this circuit for the first time, the experimenter must familiarise himself with the reception of spark signals, as follows: Make the necessary adjustments to the primary and secondary of the tuner, in order to tune in the desired wave-length, as when using a crystal detector, finally utilising the secondary condenser for fine tuning and intensification. The "A" battery rheostat must be gradually opened up, allowing the valve filament to light up to a medium degree of brilliancy. The most sensitive adjustment of the filament for use on spark signals will be found to be that just below the characteristic "frying" or "hissing" sound which will be evident in the telephones. *Figure 3* will give an indication as to the method adopted in order to arrange for a variation of voltage from the "B" battery. This shows the voltage to be adjustable in steps from 15 to 35. The exact amount of "B" battery voltage required for any valve must be found by experiment; as already explained, this depends upon the characteristics of the valve itself. It would be well to begin with an average, say, of 24 or 25 volts, then increase or decrease and note results.

Should the valve at any adjustment suddenly become enveloped in a bluish glow, this is an indication that the "B" battery voltage is too high and is considered to be harmful to the stability of the valve, if allowed to remain. When the experimenter is familiar with the arrangements for the valve control, an attempt could then be made to tune in, say, a 600-*metre* wave, making ample use of the secondary condenser, coupling and filament rheostat. The circuit already described does not lend itself well to amplification, but as the subject of amplifiers will be treated at length at a later stage, it may merely be mentioned here that some degree of amplification can be obtained as follows: Regenerative coupling, by which amplification is generally obtained, is secured by coupling the plate and grid circuits inductively, conductively or electrostatically. In the aforementioned circuit, electrostatic coupling may be furnished by the valve itself, though it is very liable to result in considerable distortion of the received signal.

[Modern circuits for the reception of both damped and continuous waves will be dealt with in our next issue.—ED.]

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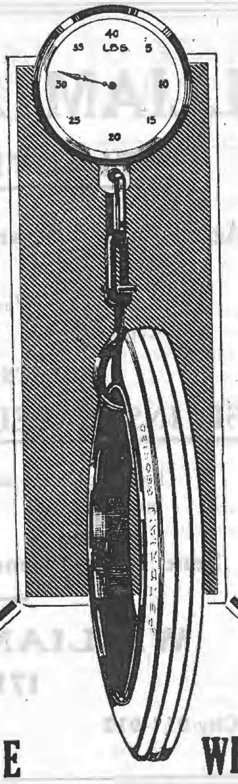
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BY

EDWARD J. HART

Lieutenants Parer and McIntosh.

ON a recent Sunday evening—August 22, to be precise—five young men sat at a table in the Winter Garden of the Hotel Australia, Sydney, and, over cocktails and cigarettes, discussed the Sydney-Melbourne air route.

Two of them were Lieutenant Raymond John Paul Parer and Lieutenant John Cowe McIntosh, who, a few hours earlier, had landed their *D.H.9* at the Mascot Aerodrome, Sydney—from London, "*viâ* ports." Their companions were: Captain George Campbell Matthews, A.F.C. (who, in his Sopwith *Wallaby*, had accompanied the *D.H.9* across India, from Karachi to Calcutta); Captain E. J. Jones, M.C., D.F.C., who, a couple of days before, had flown the Prince of Wales' mail from South Australia to Sydney, and delivered it aboard the *Renown;* the last of the party was the writer.

Lieutenants Parer and McIntosh at Sydney.

Photographed immediately after their landing a the Mascot Aerodrome, Sunday, August 22, 1920.
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