From the Governor of Victoria to the Governor of Tasmania:

"Victoria salutes her sister State Tasmania."—TALBOT.

The Prime Minister of the Commonwealth to the people of Tasmania.

"Australia, tirelessly subduing her great distances by rail and wire to-day, enlists the waves of the ether in perfecting the union between her people in Tasmania and upon the mainland."

There can surely be no question as to the desirability of establishing wireless telegraphy stations around the coasts of New Zealand, in fact, it would seem in every respect an ideal country for the adoption of this most useful and up-to-date method of communicating between the shore and ships at sea between the mainland and isolated islands, and between ships at sea, more especially when one considers the large proportion of the inhabitants who are constantly travelling round the coasts in passenger steamers The additional sense of security when travelling on a vessel equipped with the Marconi system has only to be experienced *once* to be fully realised, but this feeling of safety and of not being cut off is not merely confined to the passenger, but is also appreciated by all his, or her, friends and relatives on shore.

The Marconi Company has established the first wireless telegraph stations in New Zealand, namely, at the Exhibition at Christchurch, where there is a station installed in the Post Office annexe, which is in daily communication with a station at Islington, demonstrations being given constantly, when he who wishes may see this marvellous invention in actual work. Let us hope that, in its small way, it is the forerunner of a comprehensive scheme for the entire colony.

Thus we bring to a close our cursory history of an invention which has increased the facilities for human intercourse, forged new links between lands separated by the sea, aided journalism, given new data to the meteorologist, provided a safeguard for future geographical explorations, and added to the pleasure, while it has diminished the peril, of ocean travel.

Details of the Marconi System.

By G.A.P.

The arrangements for working the Marconi installation are sure to be much discussed during the next few months, by reason of the negotiations pending between the Government of this country and the Marconi Company for the use of their system here Another reason is the discussion which has been going on at the recent conference in Berlin, at which the German Government attempted, but failed, to generalise the use of all installations. A third reason is the claim put forward by the Danish inventor, Valdemar Poulsen, for the discovery of a system of tuning wireless messages so as to render them absolutely safe from interruption and discovery of the kind sometimes known to have been experienced in the working of some existing systems of wireless telegraphy Sir William Preece, it will be remembered, declared a few days ago, having heard the Danish inventor explain his system during a lecture in London, that the same was certain to supersede all known systems This produced many comments in the New Zealand press, which in their turn obtained from Captain Walker, the representative in Australasia of the Marconi Company, a letter of explanation to the effect that, firstly, Sir William Preece is not an authority on a subject which does not lie within the sphere of his expert experience, and, secondly, that Marconi had tried the system of continuous sparks, which is the foundation of the Poulsen invention, and after many experiments discarded it for his own, the distinctive feature of which is the intermittent sparking system It is further claimed for the Marconi system that it is capable of being "tuned" or syntonised, as the electricians call it, with just as good results as any that can have been obtained by the Poulsen process, or any other for that matter.

With reference to this point, Mr White, of the Engineer-in-Chief's department of the General Post Office, London, dealing with the Marconi system, says in his little book on Wireless Telegraphy. "It is found that the best syntonic effects are obtained with a comparatively weak coupling. There is a limit, of course, to the extent to which the coupling can be weakened If carried too far, then the current of energy supplied to the aerial circuit, and radiated therefrom, would be insufficient to produce effects at any great distance. A strong coupling would correspond to the case in horology where the balance-wheel was connected as closely as possible to the driving system, the earlier forms of clock mechanism being of this character. Both in horology and in radio-telegraphy it is good policy to have the connection between the oscillating system and the source of energy as far apart as possible." For these reasons we give subjoined an illustration of one of the transmitting and receiving processes of the Marconi system for comparatively limited distances

The Text Book of the International School publishes the following with the remark that the arrangement of the transmitting and receiving apparatus patented by Marconi, and said to be used by him, is shown in the figure.

TRANSMITTING APPARATUS.

The essential part of the transmitting apparatus is an induction, or Ruhmkorff, coil, as it is commonly called. The primary winding *p* and the secondary winding *s* of the Ruhmkorff coil are both wound upon the same iron core, which is here represented, merely for the sake of clearness, as lying between the two coils *p* and *s*. The current may be rapidly interrupted by almost any form of interrupter, and a condenser *C* must be connected across the break *c d*. The condenser reduces the sparking between *c* and *d*, and also improves the action of the coil by causing a more sudden interruption of the current that flows from the battery *B* through the primary *p*. Both *d* and *c*, where they come in contact with each other, are tipped with platinum to better resist corrosion and fusion Marconi says he found it advantageous to rapidly revolve the contact *d* by means of an electric motor of some kind geared to the wheel *h* By this means the platinum contact surfaces on *d* and *c* are kept smooth, and any tendency to stick is removed, and also they last longer.

When the key *K* is closed a constant stream of sparks will pass between the large centre sphere and the two smaller spheres, one on each side. The

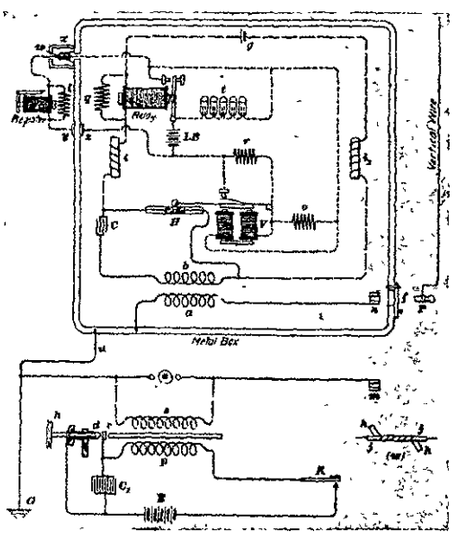

DIAGRAM OF THE MARCONI TRANSMITTING AND RECEIVING APPARATUS

total air gap usually varies from ½ in to 2 ins, but the coil must be powerful enough to give an 8 or 10-inch spark One of these small spheres is grounded, and the other connected to a long vertical wire

The current in the oscillator (merely the circuit from the top of the vertical wire through *m* to the ground *G*) surges back and forth between 100,000,000 and 200,000,000 times per second each time it does so it charges or discharges the long vertical wire. The charging and discharging currents flow up and down the vertical wire, and consequently produce electro-magnetic waves that are projected out into space, as horizontal circular waves, from every part of the vertical wire Furthermore, on account of the static disturbances that are produced in the surrounding space between the vertical wire and the surface of the earth, due to the electro-static capacity of the vertical wire, it is probable that so-called electric waves, which vibrate up and down in vertical planes, are also projected out into space.

Since these waves spread out through space in all directions, it is evident that another vertical wire, if not too far distant, will be cut by some of them. The waves that cut the second vertical wire seem to set up oscillating currents that follow it down to the earth.

RECEIVING APPARATUS.

To prevent the oscillations generated at a station from acting on its own coherer and rapidly destroying the same, Marconi encloses all the receiving apparatus, with the exception of the Morse register, in a metal box, and leads the wire connecting to the register through a coil encased in bands of tinfoil, the tinfoil being connected to earth The box is usually made of iron, merely because it is the cheapest material. The metal need be only 1/26 or 1/16 of an inch thick. The hole at *f* should be securely closed by a metal door when transmitting. To receive, the door is opened and the plug *P* inserted in the receptacle *n*. The current waves that slide or follow down the vertical wire pass through the primary winding *a* of a step-up *induction coil*, or *transformer*, as it may be called, when they pass through the metal of the box and the wire *u* to the ground *G*. The secondary *b* of this coil is connected in series with a condenser *C* and a coherer *H*.

The induction coil or transformer *a b* should be in tune, or *syntony*, as it is called, with the electrical oscillations transmitted the most appropriate number of turns and the most appropriate size of wire varying with the length of the wave. Marconi says in one of his patents that he obtained the best results (presumably for 10-inch waves) by using a transformer which he duly described. This has been improved upon considerably since the first of the operations of the Marconi Company.

RATE OF WORKING.

By means of the key *K* the current flowing in the primary coil may be broken up into ordinary Morse signals. This will cause waves to be projected into space according to the Morse code To be sure, each dot consists of millions of waves, but all waves cease when the key is opened. The key *K* used by Marconi when in America was not an ordinary telegraph key in the strictest sense, although it was somewhat similar It had a longer lever (about 14 to 18 inches) pivoted at about its middle but instead of a finger button there was a handle extending upwards about three inches. The key was moved up and down over a wide gap in order to break the spark in the primary circuit when it was opened This accounts for the fact that the speed of twelve or fifteen words a minute seems to be about the best so far attained, while ten words is a good average speed.*

MULTIPLEX WORKING

"By means of loose coupling" says Mr White, "Marconi has succeeded in designing an apparatus for what may be termed wireless multiplex working"

RADIATION OF WAVES CONFINED TO CERTAIN DIRECTIONS

According to a note written in March last by Mr. Marconi, and communicated to the Royal Society a few days later by Dr Fleming, F R S, "when a horizontal conductor is substituted for the usual vertical apparatus it receives with maximum efficiency only when the transmitter is situated in the vertical plane of the said horizontal receiving conductor and in such a direction that the end connected to the detector and to the ground is pointing towards the transmitting station. The wireless telegraph station on H M S *Furious* consisted of an ordinary vertical wire about fifty metres in length connected to a suitable spark gap. The station on the ship transmitted at intervals, and the ship followed a course describing an arc of about 180° round Poldhu keeping a distance varying up to sixteen miles. By means of the horizontal wire arrangement the bearing of the ship from Poldhu could be determined at any time by noting on which particular wire or wires the reception of signals was strongest and also by observing which wires were non-receptive"

Here we have the method employed in finding ships at sea for purposes of communication In this direction Marconi announced his intention of making further experiments.

* Since the above was written the average speed has been increased to thirty words.—ED. PROGRESS