## ELECTRICITY.

**Wireless Telephony, Dynamo Electric Machinery.**

### Wireless Telephony.

De Forest, of wireless fame, has grown bold with success. Having made the record in the China Sea, during the Japanese war, in the installation set up by the *Times* in the steamer so famously commanded by Captain Colquhoun, a record subscribed to by the Russian and Japanese admirals, who hinted that spies are always hung, and by the British admiral, who feared he could not do anything to help his fellow countryman in case of misadventure, this inventor has now taken to telephony without wires, and is promising the world to bring the opera house to every man's private residence, for an initial cost of £3 for a pole on his roof, and an expense of four shillings a month during the opera season. For this bagatelle the customer will hear any opera that may be in the repertory of any company. Instead of repairing at 9 a.m. to the front of the opera house in the hope (often vain) of getting a place near the door, which is to open in ten hours' time, he waits calmly till he has digested his dinner, turns on the receiver, and hears the whole thing from beginning to end. No bad air, no boredom; no need, therefore, to go out for refreshment or to wish he were dead until the end of the stick's interminable song, which is beginning to be out of tune. Just lay down the receiver, and there you are—immediate relief! Cheapness, comfort, and the artistic paradise!

This is, however, in the region of promise; truly marvellous, but still only promissory. The electricians of the French Army have been doing things just as marvellous. Even more so. They have established easy communication between Paris and Dieppe, they talk comfortably with the station at Pointe de Raz, on the Bay of Biscay (Finisterre), and they are about to astonish the weak nerves at Tangier, of murderous Arabs, over-zealous German consuls, and Foreign Legion deserters, Sultans and preachers of Holy Wars.

The Italians, on their side, take second place to none. They have the Professor Majorana, and they are proud of their compatriot in the decisive demonstrative way that the Latins show their pride in their own. They have gone back to the history of ancient Rome for their warrant. It is written, they say, of old—no doubt in one of the Sybilline books destroyed after the first refusals of Numa Pompilius, to listen to the ravings of the Sybil—that two sons of Italy shall be the first to write and talk across space by means invisible, both of whose names shall be of the same letters all but one. Of course these are Marconi and Majorana, which are very much nearer together than anything that ever came out of Grimm's law in the matter of philology; so what more can you want? This Signor has been working for five years by means of a hydraulic microphone, and has done wonderfully, the Italian nation declares, though he has not gone more than three miles across space with his invisibly produced talk. But what is mere distance? And, besides, was not the Signor Majorana talking without wires five years ago, before that spurious batch of pretenders and imitators got their unholy ears in touch with the Bay of Biscay and the Mediterranean, which they have the characteristic impudence to call a French lake? Moreover, if the Italian Government had only been as prodigal of the national funds as these reckless, boasting Frenchmen, there is no saying how far the Signor would not have been sending his far more melodious voice in this year of grace. But what would you? At all events, the Signor was the first in the field, if not quite the farthest out. Which shows the correctness of the old Sybil, who did so much for the best King the Romans ever had. Again, has not the Signor said that his instruments are very much better adapted for long distances than those of De Forest, who has kept ahead of these Gallic boasters at any rate? He admits that the De Forest mechanism is similar, but his is the better for all that, being better adapted to great things. His instruments, we know at the same time of our own knowledge, culled from the Italian press, which is, as every one is aware who is aware of anything, the best in the world, are in use in the Italian fleet, the officers of which are able to communicate with each other quite as readily, as are the Americans, who rely for their fleet communications on the De Forest, and the English, who, to give them their due, have some merits of their own, rely on Marconi.

### The Parsons & Law Method of Regulating Dynamo Electric Machinery

(Specially Contributed by the Hon. Chas. A. Parsons.)

In dynamo electric machinery (both continuous and alternating) it has been found that on account of armature reaction and ohmic loss the excitation has to be increased as the external load is increased. This is usually done by compound winding, or by alteration of the field rheostat.

Further, it has been found that when iron forming part of a magnetic circuit is subjected to an alternating flux superimposed on a continuous flux, the latter is reduced, that is, the magnetic resistance is apparently increased.

According to the following method of regulation there are provided means for the regulation of dynamo electric machinery, utilising the latter principle in a new manner

The method of regulation consists in the use of a leakage path provided between the poles of a magnet, which path can be subjected to an alternating magneto motive, whereby the amount of leakage can be regulated at will by varying the current producing such alternating force.

I have repeatedly on examining cars in for repair been able to lift off the connecting link after removing the leather grease bags, and on one or two occasions the link has actually dropped off, and the rest of the car has been in much the same condition. I also know instances where the nut has jumped the threads on the shell, with disastrous results. An example of this came under my notice, the distorted condition of the screw threads being clearly seen, and to an observant eye the cause was at once apparent on a further glance The joint became detached when the car was coasting down a long hill. This involved serious injuries to all in the car. It was evident that whoever had put this joint up had forgotten to insert the lynch pin or it had dropped out, which is not at all likely; but, notwithstanding this, the nut was hard up to its work—a rather remarkable thing when one takes into consideration the vibration it would have to endure.

The car had previously given trouble with the steering gear, and in each case the cause was identical; the joints had been adjusted up till the back and front halves of the cup were in contact with each other, thus partially encircling the ball, which was also worn, when, of course, no further adjustment was possible, and they should have been taken out and replaced by new ones at an earlier stage.

It is obvious that in this case the halves of the cup, being of gunmetal, would wear rapidly, and to such an extent as to allow the ball to come out, and this is precisely what had occurred, and, to make matters worse, the sides of the shell also bulged out for the reason already noted.

From the foregoing it will be evident that for a ball joint to be satisfactory it should be constructed rather more heavily than is generally the case, and I have found the following proportions successful in practice: The thickness of the shell should not be less than one eighth the diameter of the ball, and the clearance between the ball and the inside of the shell should not exceed 1-32nd in for balls of 1in. in diameter, and correspondingly less for smaller sizes, whilst it is advisable, and is now a general practice, to make the halves of the cup of some hard material, case hardened steel for preference.. The depth (inside) of the cap nut varies considerably, but a suitable proportion is three-fifths the diameter of the ball.

Apart from all other considerations, however, the difficulties attending the lubrication of this type of joint are serious, and I have yet to find a ball joint which is entirely satisfactory in this respect.

It also consists in the method of applying this device to alternators coupled in parallel to multipolar machines, and to polyphase machines.

According to one form there is provided for example in the pole piece of a dynamo or alternator a ring, preferably of laminated iron, concentric with the armature. In such an arrangement the E.M.F. derived from the armature will be that from the lines of force crossing the ring. This ring is wound with a winding through which an alternating current is passed, whereby the leakage due to the ring is reduced, and thus more lines of force will pass through the armature, and the voltage will be increased and compensation for armature reaction thus effected. Instead of adding a single ring, a series of such rings connected to two or more of the pole pieces may be employed, or only part of a ring may be used, the main magnets acting as the remainder. The windings on the ring or rings may be in a number of sections suited to the number of phases of the alternating current. It is not necessary that the rings entirely surround the armature, but they may form or be attached to projections from the pole pieces, or in any other way, provided that they act as a leakage path, carrying a certain proportion of the flux which does not pass through the armature. One form of this is well known, in which the pole pieces are provided with projections, between which the leakage path is situated, carrying a winding to which an alternating current is applied.

The rings may be provided with an air gap, which may further be varied, and thus effect an adjustment to meet different working conditions. In an alternator either the exciter magnets or the main magnets or both may be provided with a ring or rings, and the main current or a portion of the same, which may or may not be transformed, passed round them. As the load rises, therefore, the magnetic resistance of these rings is increased, whereby more lines of force are driven through the armature, and thus even with a low-power factor the voltage can be maintained or even increased automatically. Either the main magnets or the exciter magnets may be provided with this device, but the latter is preferred, as the inductive loss of voltage in the leakage path winding is smaller.

In the case of several alternators running in parallel, equalising wires—similar to those known in conjunction with compound dynamo electric machines—may be provided to connect the various slip rings of the alternators on the various leakage paths; or the leakage paths of the various machines may be excited either with or without subdivision or transformation by the sum of the currents of the coupled machines, that is to say, the leakage path may be inserted in the main leads away from the power station or in a transformer circuit connected to the same. In this latter case equalising wires may be applied to the transformed circuits.

It will be obvious that the use of a leakage path composed of a ring or part of a ring is not essential, as any suitable bar of iron or any other more or less "magnetic" material connecting the pole pieces may be used.