In a World of Weird Wireless

Radio off the Beaten Track

THE ever-widening fields in which the principle of radio in its primary sense is applied are amazing. Its adaptation in the scientific and industrial worlds alone is enormous. The following enlightening article (by D'Orsay Bell, M.A., published by "Wireless World") reveals just a few of the astonishing and varied uses to which this marvel of science is applied.

NO, it is not a misprint for "Wired," as you thought it was. Weird Wireless, as opposed to the ordinary forms of radio (wireless telegraphy, wired wireless, television and so on) about which the readers of radio journals know most that is worth knowing, is that large branch of radio about which they know nothing. Do I realise what I am saying? I do. Am I not giving utterance to an unwarrantable and gratuitous piece of impertinence? I am not.

I have never, for instance, come across any animated correspondence on the subject of Paint and Varnish Radio. And yet paint and varnish radio is a very important—an increasingly important—subject. The research laboratories of P. and V. manufacturing concerns are studying by radio technique, the effects which heat and cold, oxidation and so on, produce on the latest products. Particularly useful here is what might be called an "ultra" edition of the Ultra-micrometer. If two circuits, each kept oscillating by a valve, are almost but not quite in tune and are carefully coupled together, the very least change in tune in the one will produce a great change in current in the other.

In the Thoma variation of the ultra-micrometer, a slight increase in the thickness of a paint film alters the capacity of a condenser, brings out infinitesimal change of tune in one circuit, and gives such a magnified result in the other circuit that the change in the thickness of the film can be recorded and studied very easily.

Radio Robots.

IT is said that this new "tool" is enabling the research people to investigate the why and wherefore of important actions going on in their paints, the very existence of which was unknown till now. But this is only one way in which wireless technique is being used in the paint industry. There is a most attractive superhuman gadget which analyses the colours of paints (and writes down the results) quite automatically and five times as accurately as can be done by the human eye.

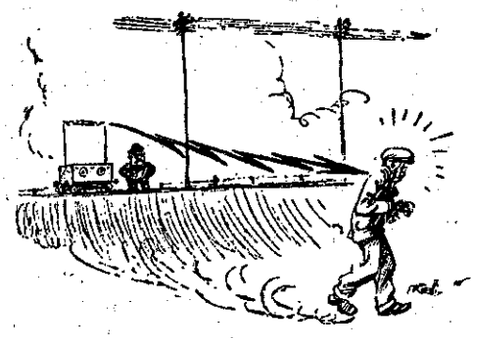
This machine flashes a beam of light (red, for instance) backwards and forwards between the sample under test and a standard colour. If the red beam is reflected more by the standard than by the sample, the result—thanks to the help of a photo-electric cell such as is used in photo-telegraphy and television—is a pulsating current. This, after passing through valve-amplifiers, sets a little motor buzzing round and altering things so that the red beam now divides its attention between the sample and a second standard colour: if this does not correspond exactly to the sample, the motor keeps on buzzing round and tries a third standard, and so it goes on till a standard is encountered which gives an exactly equal reflection.

When this happens, there is no pulsating current to drive the motor, which comes to rest with a feeling of duty well done. The machine makes a note of that particular standard, switches on a test beam of another colour, and the whole process goes on all over again. The complete colour analysis takes only a few minutes, which is far quicker than can be done by human beings.

Out in the Great Open Spaces.

LET us leave the stuffy laboratory and get into the vast open spaces of America, Canada and Australia. Here, screen heroes in khaki shirts and shorts are busily using short-wave valve generators to explore for oil and minerals. Various methods are used, but one favourite plan is to compare the velocity of sound waves through the ground with that of short radio waves. The latter keep their velocity constant, while the sound waves vary theirs according to the nature of the soil; the presence of oil, in particular, has a marked effect. The method usually employed involves the use of direction-finding loop aerials—plus the usual valve amplifiers.

In fact, practically the whole resources of modern wireless are being concentrated on the unwarrantable spying-out of these harmless and carefully-concealed minerals, oils, and so



Sacking the Foreman.

on. It is pleasant to be able to relate that occasionally the victims get a bit of their own back; it is reported from Wiesbaden that listeners-in have been worried by a strange kind of interference, rather like atmospherics, but more regular, and this has now been found to come from the radio-active mineral springs under the town. Perhaps that will teach people to let well—and spring—alone.

Fresh Developments.

EVERY day seems to bring fresh developments which clamour for notice. Piezo-electric quartz, that high-brow laboratory phenomenon which was so promptly seized on to keep radio transmitters to their proper wavelength, is now being used to register variations of pressure in water mains; so is the effect of capacity change on a heterodyne note, one plate of a condenser being forced in toward its second plate by an increasing pressure.

The photo-electric cell—direct descendant of Elster and Geitel's "academic" experiment where light falling on to a spark-gap stopped the spark—is now used for about as many purposes as an Austin Seven. Apart from its jobs in picture telegraphy and television, it counts the traffic passing through the big tunnel joining New York to New Jersey; it judges the winning horse in a race; it sorts and counts mass-produced goods; it is used in chemical works to decide when enough alkali—for instance—has been added to complete a reaction (some of you may remember the titration tests at school, when the critical last drop suddenly wiped away every trace of colour from a whole big flask-full of coloured liquid; the photo-electric cell watches for this, and when it happens, turns off the tap).

It, as well as its brother the selenium cell, is used as a burglar alrm; another burglar alarm, by the way, is one in which the action—or the mere presence—of the burglar upsets the tuning of the grid circuit of an oscillating valve, and causes an anode current change which works a relay. The condenser-microphone, which some engineers swear by for broadcasting, is now being used by doctors to give them a record of their patient' heart-beats. Thanks to the valve emplifier, the tiny resistance-changes in the human body, due to emotion of various kinds, can now be recorded—and this procedure, it is said, is going to be very valuable in studying the effects of drugs and in investigating nervous fatigue.

Noises in gear boxes, ball-bearing and other machinery, and noises indicating insulation trouble and the consequent danger of breakdown in big transformers, are being tracked down by microphone and valve amplifier; the ordinary, normal running noises being filtered out by electrical filters such as are used in wireless, so that the trouble-noises can be distinguished.

FLAWS in steel axles are now being looked for by rotating the axle rapidly and exploring with an instrument rather like the magnet arrangement of a telephone receiver—the disturbances induced in the telephone windings by the presence of a flaw rapidly passing by are detected after amplification in the usual valve amplifier. A similar process is applied to steel wire ropes—but here the rope remains still, and the magnetic flux rotates. Think of the accidents which may arise from flaws in axles and wire ropes, and you see how beneficial to man are these new applications of radio technique.

At least one company exists in America for testing railway lines for flaws and other defects in the rails; it provides a specially equipped railway truck which runs over the track at about five miles an hour. Two brushes, a little distance apart, continually conduct direct cur-

(Continued on page 28.)

Upsetting the Grid-Circuit.