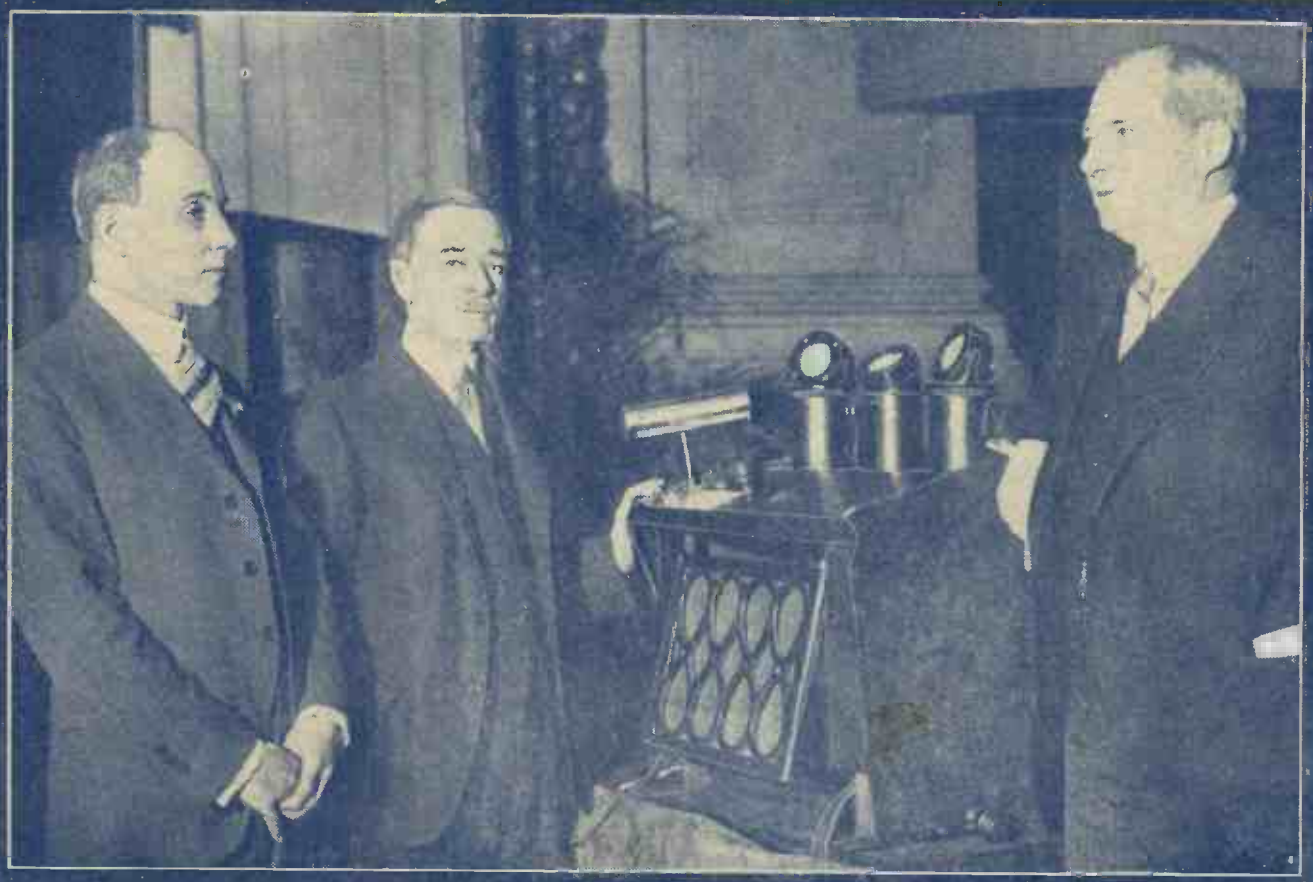
POPULAR WIRELESS, March 31st, 1928. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

BUILD THE "POCKET MONEY" AMPLIFIER

Popular Wireless

Every Thursday PRICE 3d.

No. 304. Vol. XIII. INCORPORATING "WIRELESS" March 31st, 1928.



SPECIAL FEATURES IN THIS ISSUE

Ganging Your Own Condensers. "Pick-Up" Programmes
A Disturbing Fault. "Secret Forces" and Television
THE "HARTLEY" ONE-VALVER
Frame Aerial Reception. Is Selectivity Worth While?
Hints for the Handy Man, etc., etc.,

Radio-telephony linked the two sections of a recent meeting of electrical engineers in such a way that speakers in either section—one in London and the other in New York—could address the whole meeting by means of microphones and loud speakers. The above photograph shows some of the speakers at the American end.

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No Dry Batteries **No Accumulators**

"Cosmos-Met-Vick" A.C. Valves, Green Spot and Red Spot, are the result of investigation and experiment by one of the finest Research organisations in this Country.

They provide the complete solution for, and, in conjunction with the use of Met-Vick Eliminators, overcome all the difficulties of direct operation from the Electric Light Supply.

"Met-Vick-Cosmos" A.C. Valves not only provide the solution of the complete operation of wireless sets for the Electric Light Mains, but they also provide great volume and extreme selectivity free from distortion. By their use you can switch on your set like electric light, and yet lose nothing in effect. In fact a mains operated set with Met-Vick-Cosmos A.C. Valves is a much better set.

See what Mr. A. P. Castellain says in the "Wireless World" for March 7th:—

"Remarkably High Mutual Conductance—

For the AC/G valve the mutual conductance is enormous when judged by ordinary valve standards—about 2 milliamperes per volt for an amplification factor of 36—and the heater current is only 1 ampere at 4 volts. The latter figures are quite comparable with valves of the 4½ volt 0·8 ampere L.S. class. For the AC/R valve the amplification factor is about 10, and the mutual conductance 4 milliamperes per volt, giving an A.C. resistance of about 2,500 ohms."

The writer continues by comparing the Cosmos AC/R Valve, very advantageously with other makes of valves for similar duties.

Note also what Mr. G. A. Exeter, the London Area Manager of the Radio Society of Great Britain says about the "Cosmos-Met-Vick" A.C. Valve:—

"..... in view of the results I have obtained upon trial, under decidedly adverse conditions, I now think you are indeed to be congratulated upon producing a great improvement in the technique of radio. **Undoubtedly this is the valve of the future.**"

The power handling capacity of the AC/R Valve is as great as that necessary for Public Address Service and is sufficient for operating "moving coil" Loud Speakers to the greatest advantage

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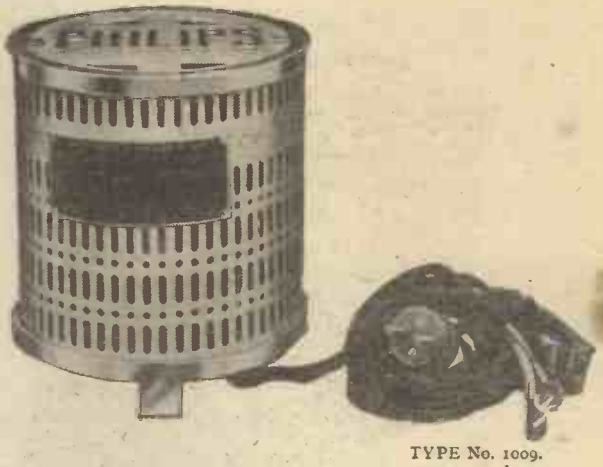

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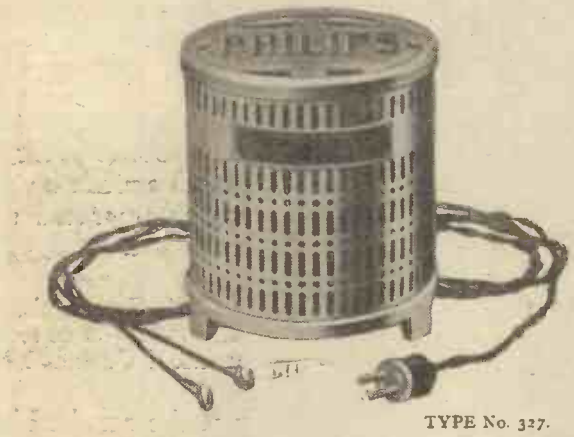

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Popular Wireless

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RADIO NOTES AND NEWS.

The Continental Relays—Regional Wireless—Have You Heard Harbin?—Eiffel Tower's Wave-length—Opportunity Knocks—The "Progressive" Four—A New Idea.

The World in A.D. 2000.

THE issue of the "Daily Mail" for January 1st, 2000, which I have obtained from the "Ideal Home" Exhibition, presents a somewhat nerve-racking picture of what the life and times of the human race may be then. Aircraft, radio and television bulk largely in the letterpress, which includes a "fill-up" to the effect that a crystal set dated 1923 has been placed in the British Museum, and an account of the murder by a woman of her husband, whom she shot at Tiflis "by a beam fired from some place unknown."

Our Chemical Lesson.

THE fact that a man was injured recently by the explosion of an accumulator, near which he had held a naked flame, renders it worth while to remind readers that a "gassing" accumulator is evolving an explosive mixture of gases. The "Manchester Evening News," I observe, informs the public that, when on charge, a battery develops sulphur dioxide gas, which is highly combustible. Except that it is not sulphur dioxide and that sulphur dioxide is not combustible in air, but will, in fact, *put a light out*, the "M.E.N.'s "chemistry is correct.

What "Gassing" Is.

WHEN an accumulator is fully charged, the chemical reactions between the electrolyte and "the plates" are completed. If the charging current is maintained after this stage is reached, it splits up the water of the electrolyte, so that the cell discharges a mixture of hydrogen and oxygen. Hydrogen by itself will burn but not explode; but when mixed with air, *as it would be at the vent-holes of the battery*, it will explode violently if a flame be applied to it. Moreover, a mixture of H and O also is explosive. But there is no danger at all unless a naked light or glowing body is very near the battery.

The Continental Relays.

THE line relays from Liège and Cologne were a great success, especially the Cologne job, and it looks as though for this particular work the line and submarine cable are more reliable and effective than the wireless relay. As a radio man, I am chilled to the marrow at this, but as a "listener" I rejoice to think that the road seems clear to the extension of the B.B.C.'s programmes to the genius of capitals of Europe. Barcelona has one of the finest opera-houses in Europe. What about it, B.B.C.?

Tragedy of Imagination.

THERE was a young sailor of Bristol,
Who thought he heard Mars on a crystal.
But his friends wouldn't "bite,"
So he shot himself right
Through the head with a loud-speaking pistol.

More Listeners—or More Payers?

THE latest figures I have seen in regard to P.O. licences are little short of amazing. At the end of February the number of licence-holders in Great Britain was 2,451,051, an increase of about 33,000 over the January total. I read that the B.B.C. attributes this to the founding of new homes by marriages and the improvement of its programmes. But I am wondering whether it may not be partially due to the prosecution by the P.O. of listeners who have sets without licences. Anyway, it looks as though the B.B.C. finances are on velvet.—which is good for all of us. Or ought to be.

Radio and Employment.

LOOKING at that total of licence-holders, I cannot help smiling when I recollect that in 1922 a newspaper telephoned to me and asked whether I thought that the (then) proposed wireless telephone broadcasts would affect the unemployment problem. I said that I thought it would not affect it noticeably (which has proved correct), but that it would require the services of "hundreds of people." Well, I suppose I ought to have said hundreds of thousands. But at that time neither Sir J. Reith nor Captain P. P. Eckersley was appointed; in fact, there was no B.B.C.

More Sceptics.

MR. ELSTON'S letter in our number of March 10th, has caused a lot more sceptics to bob up. In a very piquant letter, T. M. (Tylorstown) suggests that the alleged loud-speaker results reported in respect of distant and numerous stations are nothing more than noises, because of distortion and "threshold" effect. I am afraid I must agree that there is a tendency to over strain reaction and amplification in order to get distant stations in the log, but so long as the signals are fairly recognisable I think reception may be claimed,

Limits of O-v-2.

T. M. says that with O-v-2 it is impossible to get *pure* full loud-speaker volume at more than 100 miles from Daventry or 25 miles from a local station, using a full P.M.G. aerial. I have not tried that, and will wait to learn readers' opinions. I will, however, say that my last set was a

(*Continued on next page.*)

THEREMIN IN NEW YORK.

Prof. Theremin, whose "music from the air" recently created much amusement, some speculation, and a fair amount of controversy in this country, is now in New York, where he is busy endeavouring to mystify the Americans with his "magic box" (seen above). It is, of course, in essentials, an oscillating radio set, the "music" being controlled by a sort of hand-capacity effect.

NOTES AND NEWS.

(Continued from previous page.)

straight det. with reaction and one L.F. stage, and on this 5 X X always came in at comfortable loud-speaker strength and only a little weaker than 2 L O; also, it was sufficiently pure in tone for domestic listening. Distance to 2 L O about 12 miles and to 5 X X about 90 miles.

Regional Wireless.

I UNDERSTAND that there is to be a grouping of the northern English stations and that a choice will be given to the listeners of a "national" or a "regional" programme. The B.B.C. is no doubt working out its problems as well as it can, and I do not wish to obtrude premature criticism, but frankly I do not see the necessity for either of those kinds of programme. The average person, I am convinced, wants just a *good* programme, let it be as cosmopolitan as you please.

The Right Idea.

TALKING of programmes, I recall that I have often said that the entertainment side of broadcasting ought to be run by people who have had successful experience in public entertainment. Hence, I note with subdued pleasure that this fact has been recognised *and acted upon* in America, where a Radio Programme Corporation was formed three years ago, run by men who have been brought up to cater for popular amusement. Cables and wireless are gradually joining forces! Why not broadcasting, music halls and theatres?

Have You Heard Harbin?

REPORT says that C O H B (Harbin, China) has been broadcasting since January 1st on 445 metres. Has anyone here heard it? A pretty far cry, I admit, for such a long wave, but it is not an impossible performance. No doubt it can be recognised by the words "Chu Chin Chow," or by jokes about bobbed pigtails.

Eiffel Tower's Wave-length.

DUE to the decision of the Washington Conference that the band for long-wave stations shall be 1,340 to 1,875 metres, the wave-length of the Eiffel Tower station, now 2,650 metres, is to be altered to 1,400 metres this year. It is probable that the power will be raised to 100 kw.

Meat for Sceptics.

SINCE commenting upon Mr. Elston's letter, I have seen a report about Mr. W. R. Pierce, Junr., of Rhode Island, U.S.A. This gentleman is 17 years old, and claims to have logged 694 stations in 41 different countries, on a two-valve set. He says that the loudest European station is E A J 22, Salamanca. Yes, it *would* be. Well, gentlemen, let us pull up our socks and listen some more. Maybe we have missed one or two stations.

Radio in America.

THE STOCK EXCHANGE gambling in shares of the Radio Corporation of America has attracted so much notice in the English Press that I have had a look at the R.C.A. balance sheet for 1927; it is sensational. Net income, $11,799,659. After reserving for amortisation of patents, income tax, foreign investments, pension fund and general reserve, the surplus is $8,478,319. Machinery and tools are *written down to* $1, and the patent account by $1,000,000. After paying dividends of 7 per cent on Preferred Stock and placing $4,500,000 to reserve for plant, the surplus is $7,029,621, or something over £1,400,000. Wow!

Opportunity Knocks.

KEEN radio amateurs are wanted by the Royal Corps of Signals, Territorial Army. You understand, no doubt, a good deal about radio in general, but here is a chance for you to get free instruction in its theory and practice and to be paid for it. Why not turn yourself from an amateur into a competent radio man.

SHORT WAVES.

A loud speaker, with a radius of over four miles, has been constructed. This should give an added impetus to attempts to establish a new high-flying record.—"Humorist."

* * *

The only difference between electricity and wireless is that an electric installation often fuses and a radio refuses.

* * *

Many are grateful for the B.B.C.'s S.O.S.—pitality.—"Daily Mirror."

* * *

Teacher: Can you name to me something that talks, sings and plays that wasn't in existence a hundred years ago?

Bright Pupil: Yes, me.—"News of the World."

* * *

In Athens there is a monument to Adam. But in every place where there is a loud speaker there is a monument to Eve.

* * *

PERSONAL.

Young man with one pair headphones, five valves, two condensers, two tuning coils wishes to meet a young lady with some H.T. and L.T. batteries, two transformers, some busbar wire and a panel. Object: matrimony and a complete set.—"Radio News."

* * *

Uneasy lies the head that wears a crown. But uneasier lies the head that has fallen asleep with the headphones on.

* * *

Some critics of the B.B.C.
Don't want these serious talks at all;
They think the programmes ought to be
Quite frivolous, or musical.

Time thus devoted is just rot,
They say with frank hostility;
And for the present they are not
Devoted to the B.B.C.!
—"Bulletin and Scots Pictorial."

You never know when you may be glad of your knowledge and skill.

Answer the Knock!

YOUR obligations are simply that you agree to present yourself for instruction for a certain number of hours per year; you can put in as much extra time as you like. You will receive expert instruction in radio and knowledge of the latest Army equipment, and a *free* fortnight's holiday at the annual camp in the summer, being, in addition, paid for every day at the camp. Call any day, 10 a.m. to 2 p.m. at 56th (1st London) Divisional Signals Headquarters, 51, Calthorpe St., London, W.C.1.

A Real Beginner.

MR. J. R. ARMSTRONG KELLY, Donnybrook Estate, Box 180, Salisbury, S. Rhodesia, who is growing baccy and amusing himself with chess and one newspaper a week, got hold of a copy of "P.W.", the first radio paper he had ever seen, and is now filled with a divine discontent. He wants to build a set, and wonders whether a "P.W." reader will advise him how to go about it. As this may be the nucleus of a "P.W." colony, I propose to spend another paragraph on Mr. Kelly.

Which Shall He Build?

OUR friend wants to be able to receive J B, 500 miles away, besides England, America and Continentals, if possible. Moreover, situated as he is, he requires data as to all the necessary parts and their prices, delivery free by parcel post via Beira, for cash with order. Here's a chance for some kindly reader, or a club, to use experience in the cause of radio and work out a complete specification; but for the learner's sake I recommend that a set be chosen for which a "P.W." back number can be supplied.

The "Progressive" Four.

I MENTION that because there is no doubt that "P.W.", "M.W." and "Constructor" articles have made construction as simple as A B C. As proof of this witness a letter from E. B. (Barnham) to Mr. P. W. Harris. E. B. says that he has no less than 25 youngsters making up the "Progressive" Four, only one of whom has made an error. Our Mr. Dowding, designer of the set in question, is having his hats made to measure now. E. B. hopes that Mr. Harris is keeping in the best of spirits, and Mr. Harris, authorises me to say that he is very "well preserved" indeed.

Transmitting Note.

WILL all who are interested in observing amateur transmissions note that Mr. C. A. Webb, 38, Oakhill Road, Putney, S.W.15, has been allotted the call sign 5 W B, and transmits on 90 metres and 150-200 metres. He would be glad to have reports about the signals from all and sundry, either in this country or any other.

Readers' Results.

AN analysis of the letters on hand shows that the most popular "P.W." circuit published this year is the "Sydney" Two, and the results obtained with it prove that it can do what was claimed for it. Most of the writers succeeded in getting Australia, though the rest got a number of American stations and are no less enthusiastic in their comments.

A New Idea.

A THREE-MILE swim in the river Yarra was the cause, earlier this month, of a lot of public interest in Australia, and 3 L O broadcast an account of the race from start to finish. Now why not apply the same idea to Channel-swimming, so that there shall be no more dubious hoaxes. We could go to bed knowing that the swimmer was half-way across and catching buns as cleverly as a seal catches fish, and wake to learn that he or she is in sight of Dover Harbour but involved in a school of mackerel which is tickling him or her and impeding progress with laughter, etc., etc.

ARIEL.

"PICK-UP" PROGRAMMES

Why not "broadcast" your own musical items? This is easily done, as this article shows.

By K. D. ROGERS.

IF you possess a two or three-valve set using a detector valve and one or two low-frequency stages (in all probability you do, because this is the most popular type of set in this country), and if you have an old gramophone or some apology for a gramophone, you can very simply arrange your own programmes, just how and when you want them, and with very little expense.

You have all heard of the gramophone pick-up, that little device which is fitted on the tone-arm of a gramophone in place of the usual sound-box, and which when connected up to an amplifier, enables you to reproduce the record placed on the gramophone *via your loud speaker*, the reproduction being, in most cases, very much better than that obtainable with an ordinary gramophone.

Not Expensive.

When you are using a pick-up, you do not use the gramophone at all, the only portion of the instrument that you employ is the tone-arm and the turn-table, which of course means the motor as well. So you see you may have a hopeless gramophone, when considered from a gramophone point of view, but as long as the turn-table and motor are all right and capable of running at constant speed, and as long as there is a tone-arm (which by the way you can purchase for about five or six shillings if the one you have is badly battered), you have all the elements of a gramophone as required for pick-up work.

If you have not such a gramophone, have no motor or turn-table, you can very easily buy one for about thirty shillings, a really reliable one, and this, mounted on a box with a suitable tone-arm and a pick-up, will provide you with all the pleasure you could get from a thirty or forty guinea gramophone, provided, of course, that your set is reasonably pure in reproduction, and that you have a reasonably good loud speaker. A pick-up, such as the Lissen, can be obtained for 15s. only.

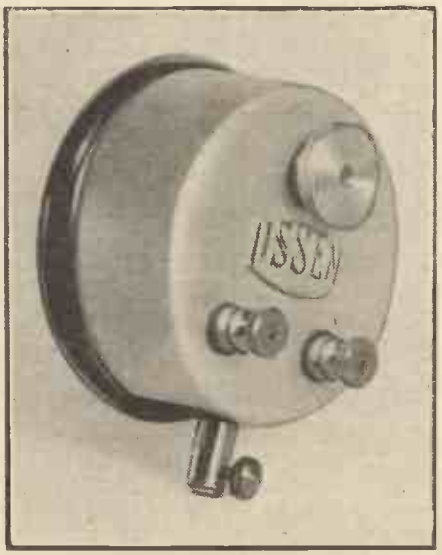
No Set Alterations.

Now what do you have to do to make that pick-up work with your set? As I said before, all that has to be done is to fix it on to your gramophone tone-arm and then set the motor going with the record, place a needle in the pick-up, and lay it on to the record, and that is that end of the business. The other end consists in connecting the two ends of the pick-up, which by the way should be of the high resistance variety, to your valve receiver.

No alteration in this latter is necessary. All you need is a little adaptor which you can plug into the detector valve holder of the set, the valve being placed on the top of the adaptor, which has special sockets for it. The adaptor is connected to the two ends of the pick-up.

Suitable plug-in adaptors are available for practically any pick-up at varying prices from about 3s. 6d. upwards. There may be slight alterations necessary in the set if you use a four-pin adaptor, because the original grid circuit of the set should really be broken.

But if you use an adaptor that only has three pins, or if you are supplied with an adaptor with four pins and you cut off the grid *pin* of the adaptor, leaving the *socket*,



A neat little pick-up that is marketed for the modest sum of 15s.

then your set will be absolutely fool-proof as regards the pick-up. All you have to do is to connect the pick-up between the grid *socket* of your adaptor, which will of course, have a little terminal, and one filament *pin*, the filament pin making contact with its socket.

Collecting the "Pick-up."

Now you must choose that filament pin so that it plugs into the filament socket of your detector valve holder in the set which goes to L.T. negative. If you connect it to the one which plugs into L.T. positive you will find that you get distortion, because the valve will be operating at the wrong end of its curve, and you will be running into grid current.

So all you have to watch for is that the adaptor on your pick-up plugs into your valve detector sockets in such a way that the filament pin which is connected on the adaptor to the pick-up, plugs into the filament socket on the valve holder which is connected to low-tension negative. Whether it goes to L.T. negative through a rheostat or not does not matter.

The plate pin, of course, will go into the plate socket and the grid pin is already cut off, so that the grid of the *adaptor* only makes contact with your *pick-up* and the valve, and does not plug into the grid socket of the original valve holder in the set.

Simple Volume Control.

The valve is inserted in the adaptor, which itself is inserted into the valve holder on the set. The set is switched on, the pick-up laid on the record, and there you are. The music comes out of the loud speaker. Nothing in the set has to be altered at all, neither H.T. nor grid bias.

It is useful in pick-ups to have a volume control. This usually consists of a 500,000-ohm potentiometer, which is connected right across the pick-up, and the slider of the potentiometer is then taken to the grid socket of the adaptor, instead of the end of the pick-up being taken there, so that you have the pick-up across the volume control, the slider of the volume control going to the grid socket of the adaptor, and then the filament pin and the volume control going to the other end of the pick-up.

I hope I have made this reasonably clear. It is rather difficult to make it quite clear in a short article, but the few points you have to watch when fitting a pick-up to a set are just those mentioned, and the rest entails no alteration or particular care whatsoever.

Further Details.

A detector with one stage of note magnification is quite enough for most records, but if you have two stages of note magnification so much the better. Should you have an H.F. valve in front of the detector, it should be switched off. It need not be disconnected, just the filament turned out, or the valve removed while the pick-up is in action For pick-up work you use just the detector and the note magnifying stages.

For those who are more interested in pick-ups and gramophone work in conjunction with their sets I would draw their attention to the special gramophone section in "Modern Wireless" every month. This section goes into the matter far more deeply and gives details concerning the use of pick-ups with various sets, discusses records suitable for pick-up work, different types of pick-ups, hints and tips and so on. You will find it worth while to try your set as a gramophone reproducer and once tried I do not think you will regret the initial outlay and trouble.

"SECRET FORCES" & TELEVISION.

By THE EDITOR.

"WHAT is the secret behind all the conflicting statements about television?" is a question Mr. William J. Brittain asked during his lecture on "My Television Journey" to the Hull Literary and Philosophical Society. Mr. Brittain pointed out that Mr. Baird has been able to announce that he has flashed a face across the Atlantic and enabled a sweetheart in London and her lover in mid-ocean to meet.

The Bell Telephone Company in America has achieved a demonstration of television in the home, and television sets are now on sale in London, and books and periodicals concerning television seem to be taking up the subject with great gusto.

"But," said Mr. Brittain, "against these amazing evidences of progress have been put up a series of statements by eminent scientists suggesting that television is years away, and culminating in a £1,000 challenge to Mr. Baird to give a television demonstration of five simple objects."

"Ducks and Drakes."

Mr. Brittain suggested that there was a secret behind these two "opposing tornados" which nullified each other, and left the ordinary man wondering what way, if any, the television wind was blowing.

Mr. Brittain then proceeded to make a statement which calls for explanation. "It is necessary," he said, "for the public to know of these two secret and powerful groups which are playing ducks and drakes with the fortunes of television."

Exactly what Mr. Brittain means by that statement we are at a loss to know. But in the course of his lecture he went on to say that television has been achieved by Baird and by two large Companies in America, and other workers such as Jenkins in America, Dieckman and Mihaly in Germany and Belin and Holweck in Paris, all of whom are doing excellent work.

"Crude Toys."

"It must be realised, however," continued Mr. Brittain, "that only a face and shoulders of a person have been televised. It must be remembered, too, that television across the Atlantic is an achievement of little more difficulty than televising from one room to another. A scene at a theatre or a horse race cannot be attempted. And the sets now on sale are but crude toys which would not receive television if it were being broadcast. Machines equally advanced were made last century.

"In trying to realise what is the exact position of television," said Mr. Brittain, "the public must know of the two opposed forces, take the statements of both sides, and find the truth between the two."

In making statements like this, Mr. Brittain—no doubt quite legitimately in his rôle of popular lecturer—suggests that there is some "secret force" at work, and the innuendo is undoubtedly that POPULAR WIRELESS is one of these forces. But we would again point out that there is nothing secret in our desire to clarify the position with regard to television, and there is certainly nothing secret in our attempt to warn amateurs that they must take a very large pinch of salt when they read in the daily newspapers the exaggerated and sensational statements in connection with television.

Adverse criticism of a new branch of wireless science like television is undoubtedly not going to be popular. We have risked earning unpopularity among a large section of our readers in being so candid with regard to television, but we have done so because we feel that in the long run if we were to follow in the footsteps of those hysterical people who, on the strength of certain crude experiments which eminent scientists regard as the limit certain systems are capable of achieving, and attempt to convince the public that television in the home is very nearly an accomplished fact, and that before very long a real television service will be started, we should be far more unpopular!

A novel test for a tuning coil is to make it light a Neon lamp by power picked up from a local oscillator.

We have yet to find, as we have already stated, any scientist of repute who will substantiate fantastic television theories; just as we have yet to find a scientist of repute who will be so dogmatic as to state that true television will never be possible.

We again reiterate that our views, concisely expressed, are these: That by the known systems of television, especially the mechanical systems, the optimistic forecasts of television critics will never be realised. And we again reiterate that not until System X (which is the unknown system) has been discovered will it be possible for moving pictures, in any reasonable detail, to be televised by wireless.

Mr. Brittain, we suggest, should carefully read the articles we have published in connection with television in this journal and in "Modern Wireless," and in particular we would draw his attention to the details of the challenge which we issued to Mr. Baird, which, by the way, he has not yet accepted.

Mr. Brittain is undoubtedly a journalist who has devoted considerable time and attention to the various television systems being experimented with in various parts of the world and, with certain limitations, we have a respect for his opinions. But when he suggests that there are secrets behind television, and when he talks about two opposing forces, he is allowing his journalistic imagination to run away with him.

As far as we are concerned, our challenge to Mr. Baird was made in all friendliness, and only because Mr. Baird has so many good friends that they are inclined to put him on a pedestal and to acclaim his pioneer work as the final achievement of a genius who has solved the television problem and made it possible for amateurs to build their own sets at home, and so ultimately receive moving pictures by wireless from broadcast television stations.

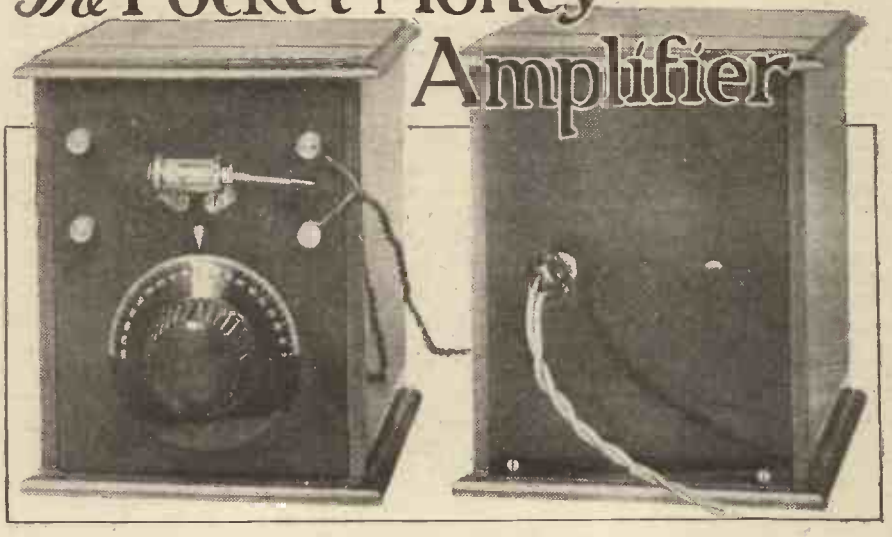
P.M.G. and Television.

That such a contingency is not likely at the moment, and indeed, not until some really reliable system has been invented, is borne out by the fact that the Postmaster-General stated recently in the House of Commons that wireless licences covering experiments in television have been issued to a number of persons, and he understood that tests had been carried out; but his technical advisers considered that the matter had not yet advanced beyond the experimental stage.

We can only repeat that we thoroughly agree with the scientists whom we have consulted on the problem of television and whose general attitude may be summed up in the concluding words written by Sir Oliver Lodge in our issue for March 17th. We venture to close this article by repeating the conclusion to Sir Oliver Lodge's article on "The Problem of Television":

"No one can say that anything is finally impossible; but it is fairly safe to say that a given development has not yet been achieved. As far as I know about the attitude of other scientific men I think I am in agreement with them. I shall rejoice if the labours of Mr. Baird and other workers in this country, and in America, are able to falsify this caution within what remains of my own life-time."

The "Pocket Money" Amplifier



THIS little unit has been designed to meet the demand for an amplifier that is capable of giving a consistently good degree of amplification without distortion, whatever the set used in conjunction with it, and provided one does not try to work off a super-regenerative or a really fierce reflex set, it fulfils this condition admirably.

It has other advantages in its compactness, simplicity, and low cost; and provision is made for the use of a gramophone pick-up without interfering in any way with the receiver in general use.

You can use this instrument with practically any set or with a gramophone pick-up. It gives extraordinarily good results although it is, as its name suggests, inexpensive and easy to build.
By the "P.W." Technical Staff.

The circuit employed is shown on another page and it will be seen that the first valve is coupled to the set with which it is to be used by means of an L.F. transformer, the coupling between the first and second valves being through a standard R.C. unit. The transformer stage is placed first to render the amplifier more adaptable, as it would be impossible to use a resistance-capacity coupled stage immediately after a reflex set such as the Hale or Trinadyne, for which a valve having a low amplification factor is essential.

Connecting a Pick-up.

The jack which breaks the connections between the secondary of the L.F. transformer and the grid-grid-bias circuit is to facilitate the connection of a gramophone pick-up of the high resistance magnetic type. It is not always possible to plug an adapter into the detector valve holder, as it may happen that there is no detector valve; the amplifier may be intended for use with a crystal set, or with a set employing a crystal detector, and in this case the pick-up is connected to the plug, which, when inserted in the jack, cuts out the secondary of the transformer and brings the pick-up into circuit instead.

The instructions given by the makers of the various pick-ups on the market state that the leads on the adapter should be changed over to find which connection gives the better results. This is to ensure that the pick-up is connected across the grid and grid return leads; with the amplifier this is unnecessary, as the jack contacts are already connected in the correct manner.

Very Simple.

Can see at a glance the simplicity of the lay-out, and the few holes which have to be drilled, the largest of which is $\frac{3}{8}$ in. in diameter, and which is to accommodate the double-circuit jack. The hole for the L.T. switch is only $\frac{5}{16}$ in. diameter, and those for the wood screws $\frac{1}{8}$ in. counter-sunk to take the heads of $\frac{5}{8}$ in. No. 3 wood screws.

The terminal strip should then be drilled according to the diagram provided, and the panel and strip may be fitted to the base board. When fitting the terminals to the strip it is as well to cut off the projecting shanks and fit soldering tags under the nuts.

This will be found of great assistance when wiring, as the bottom row of terminals will be rather difficult to reach otherwise. The other components may now be secured to the baseboard as shown in the wiring diagram, and here are one or two points worthy of consideration.

The L.F. transformer and R.C. unit should be kept as close to the panel as possible, to allow the valve holders to be kept away from the terminal strip, and before fitting the fixed resistors to the baseboard, turn the soldering tags round so that instead of being at right angles to the resistor, they are in line with it. They may then be placed quite close together, and the wiring will be simplified.

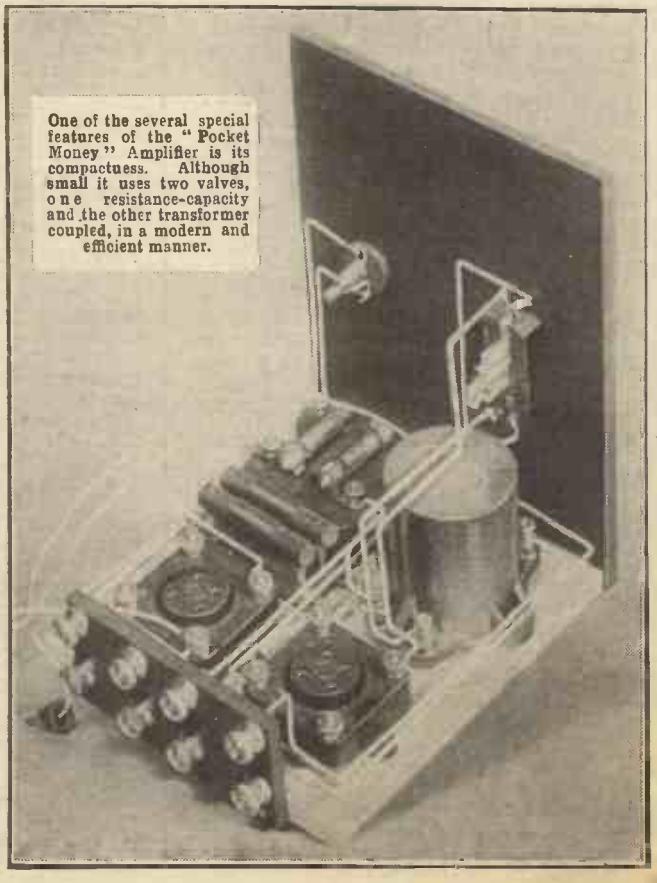
The Wiring.

This latter operation needs a little more care than is usually required, and it is essential that insulated wire should be used. The original amplifier was wired with Glazite

(*Continued on next page.*)

LIST OF COMPONENTS.

- **Panel, 8 in. × 6 in. × ¼ in. (any good branded material, Becol, Ebonart, Radion, Red Seal, etc.).**
- **Cabinet to fit, 6½ in. deep (original is by Peto-Scott).**
- **L.F. transformer (Lissen in original amplifier).**
- **R.C. Unit (Dubilier in original. Any good make, Lissen, etc.).**
- **2 Sprung valve holders (Benjamin, Bowyer-Lowe, B.T.H., Burndept, Burne-Jones, Igranic Lotus, Marconiphone, Pye, W.B., etc.).**
- **2 Fixed resistors (Burne-Jones in original. Any similar type, such as Cyldon, Dubilier, etc.).**
- **L.T. switch.**
- **Double circuit jack and plug (Lotus in original. Any good make, Bowyer-Lowe, Igranic, etc.).**
- **Terminal strip, 5 in. × 2 in. × ¼ in.**
- **8 Terminals.**
- **Wire, screws, etc.**



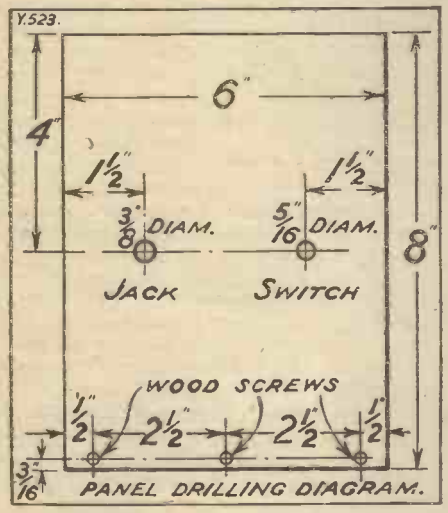
One of the several special features of the "Pocket Money" Amplifier is its compactness. Although small it uses two valves, one resistance-capacity and the other transformer coupled, in a modern and efficient manner.

THE "POCKET MONEY" AMPLIFIER.

(Continued from previous page.)

which, besides giving a neat appearance, is a perfect safeguard against short-circuits.

The query which always seems to crop up with this sort of wire concerns the best means of removing the insulation, at the same time leaving a clean end. The most satisfactory method, I find, is to cut it off with a sharp penknife by making a cut round the wire, and sliding the end off. Naturally, the cut must be right through the

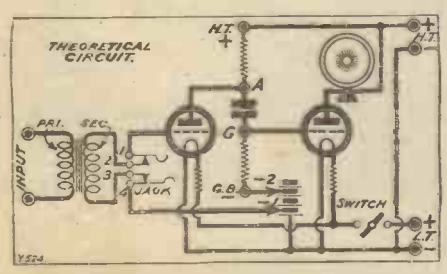


insulation, and must go right round the wire, but after a few attempts one acquires the knack of peeling it off as neatly as could be wished.

As the valve holders and, in fact, all the components except the resistors, switch, and jack have both terminals and soldering tags, one can carry out the wiring—which is not complicated—in the manner to which one is most accustomed.

Grid Bias.

The wiring itself, although needing care, is quite simple and there should be no difficulty experienced in carrying out this operation quite satisfactorily; the leads to the terminal strip being those which may prove a little tricky. To try to use a very



large soldering iron for these joints is hopeless, as there is not a great deal of room between the valve holders and the terminal strip, and to accomplish the soldering of the various leads to the terminals with any degree of success, a half-pound iron will be found essential. By cutting off the surplus terminal shanks, as suggested at the beginning of this article, and fitting soldering tags a lot of bother will be avoided, and this part of the work greatly facilitated.

The only flex leads in the assembly are those to the grid-bias battery, which is fitted in the back of the cabinet. The battery actually used was one made by Siemens, and this is provided with a cardboard flap which can be fixed to the cabinet by drawing pins. This, of course, is the 9-volt type, which is quite sufficient in the ordinary way, but should it be desired to use a super-power valve in the second stage, or at least, one which requires more than 9 volts grid bias, the battery will have to be placed outside the cabinet, and the leads extended.

Operating the Amplifier.

A few notes on the operation will not be out of place, and it may be mentioned that with standard R.C. and power valves the results obtained were really most satisfactory. Using a P.M.1 in the first stage and a P.M.2 in the second, the amplifier was tested in conjunction with a crystal set, a straight single-valver, and a single-valve reflex.

A B.T.H. B4 was used in the two single-valvers, and with each of them a most satisfactory degree of amplification was obtained. A gramophone pick-up was tested at the same time, and the volume delivered from the loud speaker was more than sufficient for any ordinary room. With the crystal sets the results were equally gratifying, but it was, of course, necessary to earth the L.T. negative terminal. This should also be done if a pick-up only is connected to the amplifier.

With Super-Power Valve.

To ascertain the performance of the amplifier under really strenuous conditions, it was again connected to the straight single-valve set, and the P.M.2 replaced by a P.M.252. The pick-up was refitted to the

(Continued on next page.)

POINT-TO-POINT CONNECTIONS.

Input terminals to OP and IP terminals of L.F. transformer. L.T.— terminal to H.T.— terminal, G.B. positive, and to one filament terminal of each valve holder. L.T. positive to one side of L.T. switch; other side of switch to one side of each fixed resistor; other side of each resistor to remaining filament terminal of corresponding valve holder.

Grid terminal of 1st valve holder to No. 1 contact of jack.

No. 2 contact to OS terminal of L.F. transformer.

No. 3 contact to IS terminal of L.F. transformer.

No. 4 contact to G.B. — 1.

NOTE.—Nos. 1 and 4 contacts are the two longest, and are the outer spring contacts.

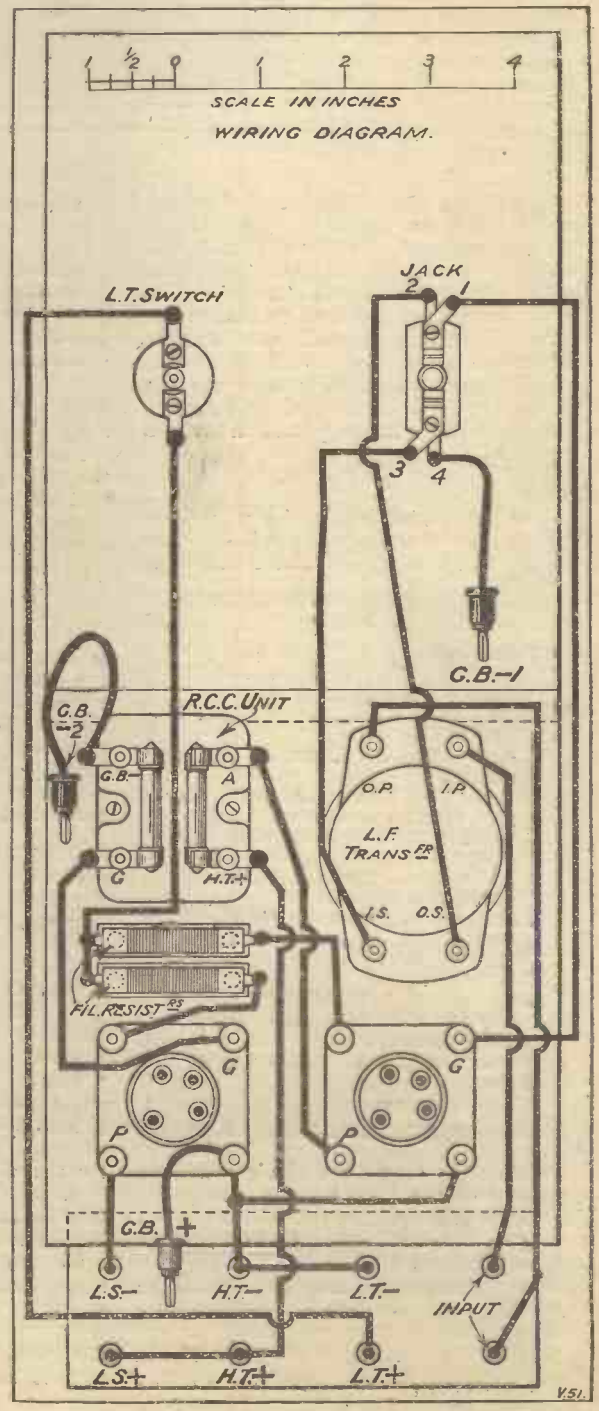
Plate terminal of 1st valve holder to "A" terminal of R.C. unit.

"H.T." terminal of unit to H.T. positive terminal, and to one L.S. terminal.

"G" terminal of unit to grid terminal of 2nd valve holder.

"G.B.—" terminal of unit to G.B.—2.

Plate terminal of 2nd valve holder to remaining L.S. terminal.



SOME PRACTICAL POINTS.

Generally speaking, the *higher* the aerial the better.

* * *

The use of a large shell insulator instead of a metal pulley will avoid the jamming of halyards at the mast head.

* * *

It is unsafe to use rope as a stay for masts, but the seven-strand galvanised wire sold for clothes lines is both cheap and effective.

* * *

If your earth is a buried one it is a good plan to drive a length of metal piping in the ground, and occasionally to pour water down this so as to moisten the soil around the earth plate.

* * *

If two equal resistances are connected *in series* with each other the total resistance is *twice* that of the resistance.

If two equal resistances are connected *in parallel* with each other the total resistance in the arrangement is *half* that of one of the resistances.

* * *

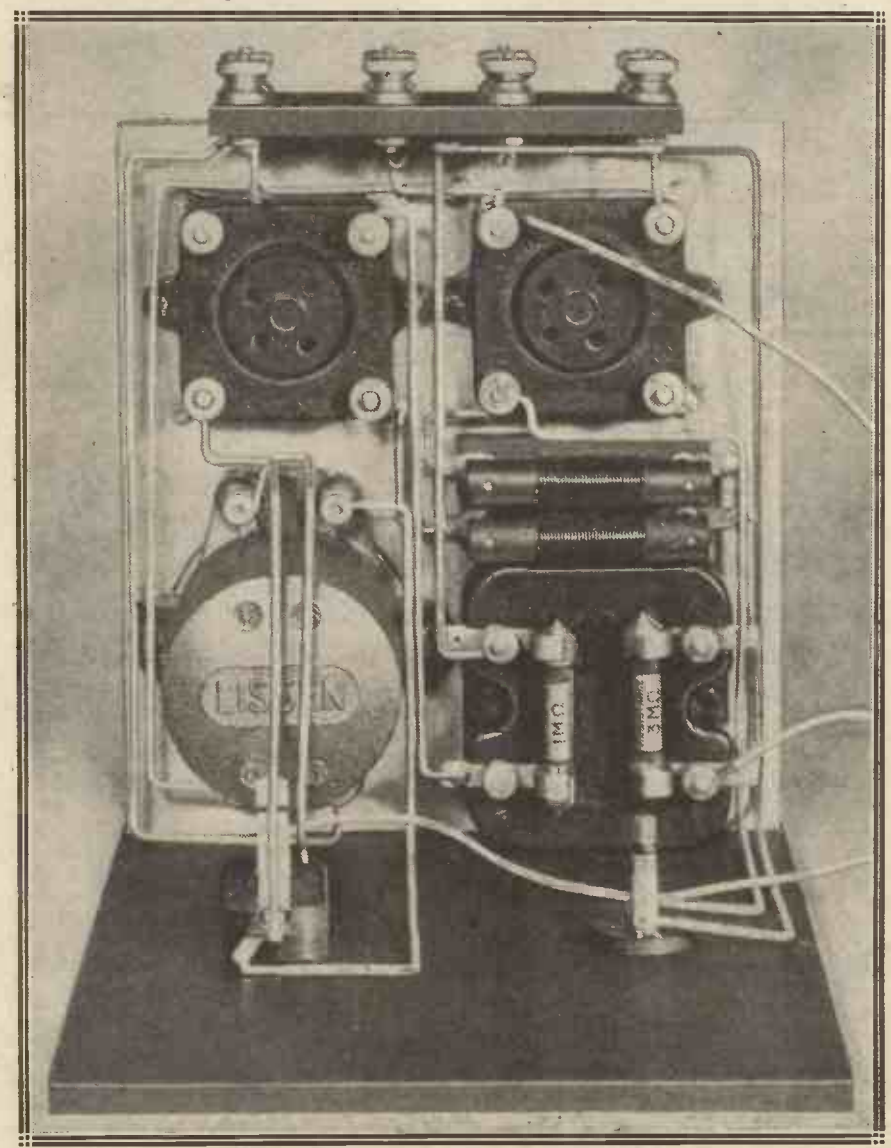
The permanent magnets of telephones or loud speakers are injured by mechanical shocks, so that the efficiency is lowered every time they are dropped or knocked over.

THE "POCKET MONEY" AMPLIFIER.

(*Continued from previous page.*)

4-pin adapter, and plugged into the valve holder of the single-valver; the detector valve was replaced. Unfortunately a large loud speaker was not available, and the one in use began to chatter when a fairly loud record was played, but on broadcasting the results were excellent.

The whole amplifier may be constructed for less than £2.



On the left can be seen the connections to the jack of the amplifier, while on the right is the L.T switch. Note the symmetrical and compactly grouped lay-out of components. The wiring is quite straightforward and is facilitated by this design.

SOME HINTS FOR THE CONSTRUCTOR.

How wireless receivers should be built.

By W. W. D.

WIRELESS-SET building these days has become more or less of a strenuous business, the amateur being so filled with all sorts of designs, blue prints, etc., gratis, that he finds that he really does not know exactly which type of set to build.

Not knowing much, and perhaps nothing about wireless, he looks at all and sundry and decides upon a particular set which appears so very simple to build. So off he goes, and this is where the advice part of this article comes in.

First of all, if you have decided upon the set you intend to build, BUILD IT. That is to say, get on with it and do not attempt to alter it half way through just because Jack Jones has another type that works so well, etc.

Follow the Directions.

Yours will work equally as well, perhaps better, so do not be misled. Remember the people who have written up the article on the set you are going to build KNOW something about it; and perhaps Jack Jones doesn't, and he may be the means of making your set a failure.

Immediately you begin you will find heaps of pals who have built sets galore, and rest assured you will NEVER build the RIGHT set; they all know better what you SHOULD have done.

Carry on is the advice, and be careful to carry out the instructions, and you may then rest assured you will get a SET all right.

Another piece of advice is this, that when you get going nicely DO NOT experiment with it. Remember that the people who wrote the article have already done all the experimenting necessary, but leave the set alone; and if you are then enthusiastic, try and get some more parts and do your experimenting. Then, when you feel that you want a change, try to make a deal with the first set.

Buy British.

The great point is this, that if you bought a piano or a gramophone you would never dream of tampering with it, so why tamper with a wireless design?

Don't be in a hurry; do all the work WELL and do not buy the very cheapest goods you can; it will not pay, and if you really take care and do as suggested by the article you will assuredly get a set that will be a pleasure and not a source of trouble.

Remember this and, if you like, call it a maxim. ANYTHING will NOT do for wireless, and that there is NOTHING TOO GOOD for wireless. Get the best you can afford, and by doing this you will save yourself no end of trouble later on, if not at the start.

As a last word, do not buy unknown valves, etc.; be British and BUY British goods. THEY ARE THE BEST.

TECHNICAL NOTES. By Dr. J. H. T. ROBERTS, F.Inst.P.

A NOVEL ACCUMULATOR

KW. AS MEASURE OF POPULARITY—AN INTERESTING LECTURE.

A Novel Accumulator.

READERS will remember that I mentioned, a short time back, an invention which had been sent to me in connection with accumulators and liquid rectifiers. this invention being for the purpose of igniting the mixed hydrogen and oxygen evolved during the working of the cell and converting back to water so as to avoid the necessity for topping up.

Several readers have written to me to point out that the ignition of these gases would probably fracture the containing vessel.

This, of course, is the first thing that occurs to one's mind, but you will remember that I remarked, at the time, that the case of the accumulator or rectifier should be made stronger than usual. At the same time those who have written to me may have perhaps an exaggerated idea of the instantaneous pressure developed when the mixed gases are ignited. If the ignition spark occurs sufficiently frequently the pressure developed may be comparatively small. In any case I understand that this invention has been fully tried out and that it is about to be adopted in the United States, so I suppose any possible snags of the kind which immediately suggest themselves have either proved to be of no serious account or else have been overcome.

Kw. as Measure of Popularity.

It has often been suggested that a useful addition to the multitude of meters and indicating systems employed by a broadcast transmitting station would be one which indicated the popularity of the programme or particular item which was being transmitted at the moment. Such a meter would, for instance, "go up" when any of the various types of popular item was being broadcast, but would certainly "go down" wherever a talk came on. Its indication would be equivalent to a sort of instantaneous referendum from the listening public as to the acceptability or otherwise of the item in question. Suggestions have, in fact, been seriously put forward that a kind of "absorption meter" might be provided, indicating the amount of the radiation from the transmitting station which was being absorbed by wireless aerials.

The above-mentioned idea forms excellent material for the humorist and the wag but, curiously enough, a meter has been found which, in a sense, gives an indication of the amount of listening-in. It proves to be none other than the load meter (or set of such meters) at the New York Edison Company's power station, and it might be said that the kilowatt hour has provided a "measuring stick" to determine the relative popularity of broadcast features. According to Mr. Arthur Williams, the Vice-President of the New York Edison Company, there was about 6,000 dollars' worth of extra electricity consumed on the night of the Tunney-Dempsey fight, which was attributed to people staying up late to listen to the description of the fight and to read the newspaper accounts that appeared in special editions shortly afterwards. The extra load carried by the company's generators did not fall off until about three o'clock in the morning.

An Interesting Lecture.

Those of you who are interested in the development of short-wave work and particularly of the Beam system, will find a very valuable paper in a recent issue of the Proceedings of the Institute of Radio Engineers (Volume 16, No. 1). The paper in question is by Senatore Marconi, and is very long and comprehensive, covering over 40 pages. It is a most useful and interesting history of the development of radio communication in general and, of course, deals specially with the experiments leading to the Beam system with which Senatore Marconi has been particularly associated. The paper is one which, in any case, cannot fail to prove extremely interesting to all wireless experimenters whether they specialise in short-waves or not.

(*Continued on page* 208.)

TRACKING THIEVES TELEGRAPHICALLY.

By means of the latest apparatus for transmitting photos, it is now possible to send very full descriptions of suspected or "wanted" malefactors either by radio or by land-line. Above is a "warrant," complete with finger print, received by the Berlin police by the Lorenz-Korn system. It is not television, for the process demands some minutes to "get over" just the one picture, but the result is remarkably successful.

NEWS FROM SAVOY HILL. FROM OUR OWN CORRESPONDENTS.

PROGRAMME PLANS FOR EASTER

NEWCASTLE'S SCANDINAVIAN PROGRAMME—LIVERPOOL FEATURES.

Programme Plans for Easter

IN accordance with the practice of the B.B.C., the programmes on Good Friday, April 6th, will be in keeping with the solemnity of the occasion, the hours of transmission being restricted to those of an ordinary Sunday, except that there will be no break between the afternoon and evening programmes. The afternoon concert from London will be given by the Casano Octet, following which, at 5.15 p.m., a Children's Service, conducted by the Rev. A. R. Brown Wilkinson, M.C., of St. Christopher's College, will be relayed from Bournemouth.

At 6 o'clock Masefield's play "Good Friday" will be taken from Glasgow, and at 7 o'clock a service will be heard from St. Anne's Church, Manchester. The evening concert will take the form of a National Symphony Concert, conducted by Sir Henry Wood, and relayed from the Queen's Hall, the music from which will consist of excerpts from Wagner's "Parsifal." The interval will be made between 8.50 and 9.10 p.m. for the news bulletin and local announcements.

The programmes from 5 G B consist of a performance of the St. Matthew Passion by Bach, the great sacred music drama which was first performed at Leipzig on Good Friday, 1729, since when it has become firmly established as one of the finest sacred musical works of all time. Later there will be a concert of chamber music followed by a religious service from Manchester, and then a concert of vocal and instrumental works provided from London.

Easter Sunday will be marked by the broadcasting at 10.30 a.m. of Matins from York Minister with an address by the Archbishop of York. This service will be heard from London and 5 G B, as well as other stations. The afternoon programme from London is to be provided by the Wireless Military Band, while the evening service

(*Continued on page* 205.)

MAKING YOUR SET STABLE

How, in an inexpensive and simple manner, you can eliminate howls and other noises due to battery coupling and, incidentally, make your H.T. batteries last longer.

By W. JAMES.

A VERY popular receiver has three valves. The first is a detector, that also provides reaction, which is resistance-capacity coupled to the second valve. The second valve is transformer-coupled to the third or output valve.

Such a receiver may be connected as in Fig. 1. Here R_1 is the anode resistance joined to the detector valve, C the coupling condenser, and R_2 the grid leak; T is the transformer that is used to couple the second and third valves. You will notice that a common high tension is applied to all three anode circuits, and that a bypass condenser, C_1, of 2 microfarads is connected across the high-tension battery.

"Common" Batteries.

A common grid-bias battery is also used, but only a small part of it is applied to the grid of valve V_2 through the grid leak R_2. The point we wish to bring out is that the receiver has one battery for the high-tension circuits, one for the filaments, and one for the grid circuits. It therefore follows that if either of these batteries have resistance the valves have a common coupling. This is undesirable.

We can ignore the filament circuit and for the moment the grid circuit. We will confine ourselves to the high-tension supply

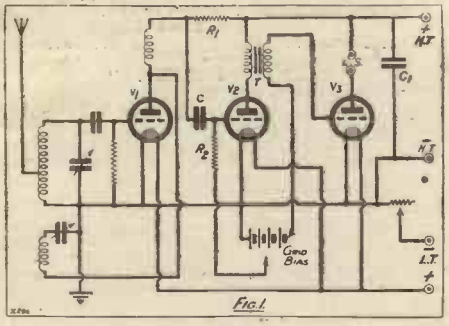


Fig. 1.

and the anode circuits of the valves. The internal resistance of a new battery is generally negligibly small, but after it has been used for a length of time, depending on its capacity and the construction of the battery, its resistance increases to such a value that the behaviour of the circuit is modified.

When the high-tension circuit has a negligibly low resistance it is quite fair to assume that the amplification-frequency characteristics of the receiver are exactly what one would expect them to be from a knowledge of the characteristics of the individual stages. We can, in fact, look upon the circuit as though it had separate high-tension batteries for each valve. But when the high-tension supply has an appreciable resistance the individual anode circuits are no longer isolated. They are united through a resistance common to them all.

Cause of "Howling."

This greatly modifies the performance of the receiver. Distortion may be produced, "motor-boating" may occur, and, in some cases, a howl may be emitted by the loud speaker.

You will see that the behaviour of the receiver must change when resistance is present in the high-tension supply, if you consider what happens when a signal is applied to the last valve. The anode current of this valve rises and falls according to the signal voltage applied to the grid. This varying current flows through the loud speaker, and, of course, actuates it, but it also flows through the high-tension supply. Voltages corresponding to the signal are, therefore, produced across the high-tension supply. But the same high tension is applied to all three valves. Therefore, the varying voltage is applied to all the valves. This is passed through the amplifier and tends to increase or decrease the fluctuating currents.

Preventing the Trouble.

In bad cases the coupling produces a howl which shows that self oscillation has set in. The problem is, therefore, how best can one arrange the circuit that the evil effects of the resistance of the high-tension supply are minimised.

The first thing to be done is to reverse the primary *or* the secondary winding of the intervalve transformer T. Notice that only *one* of the windings has to be reversed, and it does not matter much whether it is the primary or the secondary.

As a rule it is the OP terminal of the primary that goes to the anode of the valve, and the OS terminal of the secondary that goes to the grid. The effect should be tried of joining the IP terminal to the plate, *or* the IS terminal to the grid.

The effect of changing over one of the windings as suggested is to help stabilise the receiver. The effect produced on the quality of reproduction is as a rule quite negligible.

The next change that should be made to the circuit will be understood by referring to Fig. 2. In this drawing we show the first and second valves only of the receiver, but we have modified the anode circuit of the detector. We have added a further resistance, R_3, to the anode circuit and a bypass condenser, C_2.

The value of R_3 may be approximately the same as that of R_1, and condenser C_2 should be of 2 microfarads.

I have found that a receiver having the transformer arranged as described, and with this additional anode resistance and bypass condenser, gives very good quality and does not howl or "motor-boat." For this reason it would be a good thing to include the stabilising device R_3, C_2 in a receiver.

Dry batteries soon develop a high internal resistance. This does not mean that their terminal voltage is much less than their rated voltage, and, in fact, the harmful effects of the battery's resistance may be very noticeable long before the battery is discharged. The expense of the stabilising resistance and condenser is saved because a battery can be used for a longer period. It is a common experience that the battery may develop such a resistance that the receiver "motor-boats" long before its voltage has fallen to a point which would warrant it being replaced. The stabiliser helps prevent this.

The "Stabiliser" in Use.

If the stabiliser is added to an existing receiver the working of the reaction circuit may be altered. A little more capacity will have to be put in to make the circuit oscillate, or if the circuit was one which only oscillated when reaction coudenser was all in it will be necessary to add a few more turns

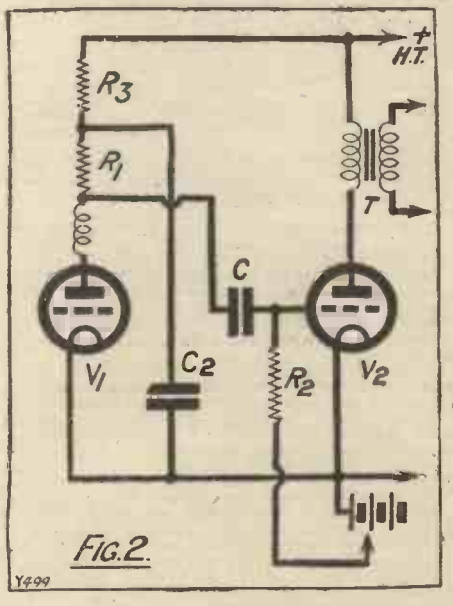


FIG. 2.

to the reaction coil. The correct number can soon be found by trial. Even when a battery eliminator is used there is an advantage in modifying the receiver as described. Certain high-tension eliminators have a circuit for the detector which includes a high resistance and a bypass condenser, but even so, the extra filtering provided by the resistance and condenser is worth having

If you are already having trouble with your receiver, and it is exhibiting any of the above-mentioned symptoms, it is very probable that "battery-coupling" is the cause, as it is a frequent source of such faults. But it may happen that an error in design or connections is at the bottom of it—the "stabiliser" is not a "cure-all"!

CORRESPONDENCE.

OUR £1,000 TELEVISION CHALLENGE

"REGIONAL" TWO ON SHORT WAVES —"THAT RADIO SCEPTIC."

Letters from readers discussing interesting and topical wireless events, or recording unusual experiences, are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

FROM SIR OLIVER LODGE.

The Editor, POPULAR WIRELESS.

Dear Sir—Near the end of my last article on "Television" I made reference to the use of cathode rays, or moving electrons, as the only things likely to be sufficiently docile and controllable to be used as the agents for television. No material things are likely to be able to move quick enough; but electrons respond so instantaneously that if devices can be invented for utilising them, the theoretical difficulties connected with the required rapidity of motion would begin to disappear, both from the sender and receiver, especially as photo-electric response is almost infinitely rapid.

When I wrote my article I had entirely forgotten that a suggestion to the same effect was made long ago by Mr. A. A. Campbell Swinton, F.R.S. on several occasions, and I think it will be a convenience to your readers if I give references to his utterances, so that they may look them up. They are as follows:

A letter to "Nature," June 18th, 1908 p. 151, entitled "Distant Electric Vision."

Presidential Address to the Röntgen Society, on November 7th, 1911, reported in "Nature" of December 7th, 1911, p. 191, "Scientific Progress and Prospects."

A Paper read before the Radio Society of Great Britain on March 26th, 1924, on "The Possibilities of Television."

I am, Sir,
Yours faithfully,
OLIVER LODGE.

OUR £1,000 TELEVISION CHALLENGE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I would just like to say that I am heartily in accordance with your challenge to Mr. Baird, and I also think that your terms set down in the challenge are extremely lenient, especially if the present television claims are true.

If you will permit me, I would like to suggest that in the event of Mr. Baird declining your challenge, you still keep the offer of £1,000 open to any inventor who can come forward and perform the feat according to your terms.*

A prize of £1,000 would greatly stimulate invention in this direction and may bring forth many valuable discoveries. I, for one, would perfect my own ideas, which I think will greatly improve the present apparatus. Of course, less than £1,000 could be offered, that is your part of the business. I just suggest offering a prize.

Yours truly,
RONALD L. MANSE.
London, E.C.1.

[*This suggestion is under consideration.—The Editor.]

The Editor, POPULAR WIRELESS.

Dear Sir,—I have read with interest your article and that of Sir Oliver Lodge on Television. I gather that in your view Mr. Baird has encountered a cul-de-sac, as it were, in his line of television experimenting, and his refusal to accept your challenge and the opportunity indicate that he is conscious of his limitations.

What I am curious to know is—assuming the Press account of the "Berengaria" incident is true—how is it he cannot accept your challenge?

Yours,
THOS. J. COE.
New Malden, Surrey.

The Editor, POPULAR WIRELESS.

Dear Sir,—The attitude adopted by "P.W." with regard to Television rather surprised me. But having read the issue for March 10th, 1928, and the challenge to Mr. Baird, I have been convinced that "P.W." is in earnest, and have therefore changed my opinion.

Every new thing seems to be deprecated—it was always so. From telescopes to the Atlantic cable, from gunpowder to aeroplanes—all have been deprecated. Why do not the "velvet-edged" pessimists learn a lesson, with all the preceding failures of pessimists to make pessimistic predictions before them?

If the science of electricity had had as much publicity two or three hundred years ago, as television and ordinary wireless are having to-day both wireless and television would have been beyond their infancy a hundred years ago. Present systems of television seem to lead to dead ends. So did the first methods employed in wireless, until Marconi showed the way. The difficulties always get solved.

The chief difficulty with regard to television seems to be the light-sensitive device.

Probably the television sets of the future will not employ a large screen, but two small ones, viewed through eyepieces—like the stereoscope. This, to some extent, will solve the problem of bright light at the receiving end. The variation of intensity of the light is another problem. A clue might be found to this in experiments relating to the Interference of Light, and Fresnel's Mirror Experiment.

The challenge made to Mr. Baird interests me very much. The conditions seem to be very reasonable, all things considered, and I am sure all readers of "P.W." and others as well will follow developments with interest.

P. S. ROBSON.
Barras Bridge, Newcastle-upon-Tyne.

The Editor, POPULAR WIRELESS.

Dear Sir,—Your challenge to Mr. Baird, as published in your issue of March 10th, is distinctly interesting, and because progress in this intriguing quest is much to be desired, I hope to hear that Mr. Baird has accepted it.

It might not be necessary to jump to the conclusion that no progress has been made in the Baird system, even if Mr. Baird should not take up the challenge, but if he is really ready to demonstrate in the positive way you have suggested, the demonstration would immensely quicken the practical interest and give direction to the research of many who already believe in the possibility of television, but are in doubt as to the line of experiment by which it may most hopefully be sought.

Yours faithfully,
J. S. MOULD
(Sales Manager),
Igranic Electric Co., Ltd.,
147, Queen Victoria Street, London.

The Editor, POPULAR WIRELESS.

Dear Sir,—The controversy regarding Television has undoubtedly reached the stage when it becomes highly desirable to raise the veil of mystery surrounding its possibilities and limitations. If, as we understand, the £1,000 challenge is designed to prove whether or no television in its present state of development can fulfil the expectations which have been aroused in the public mind, then we congratulate you in performing a public service. In the interest of all concerned, including the inventors, we sincerely hope that the challenge will be accepted, and the present possibilities and limitations of Television made widely known.—Yours faithfully,

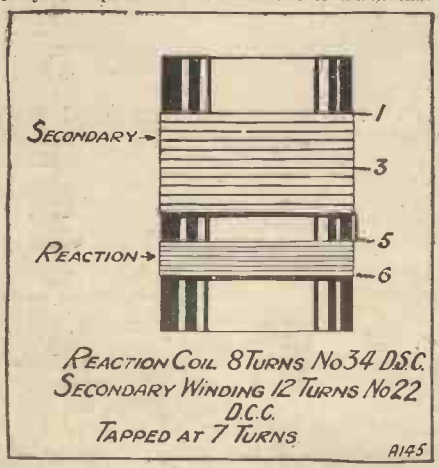
D. BURNE-JONES
(Managing Director),
Burne-Jones & Co., Ltd.
288, Borough High Street, S.E.1.

"TELEVISION," "PHOTO-RADIO," AND "FACSIMILE."

The Editor, POPULAR WIRELESS.

Dear Sir,—In a paragraph which recently appeared in a number of newspapers dealing with an advertisement—concerning the Province of Buenos Aires Loan—transmitted by wireless from New York to London, the process by which this advertisement was transmitted was described as Television, and the heading put up "Advertisements by Television." This is not correct.

Seeing that Television is now frequently mentioned in the newspapers, we think it might not be out of place if we draw your attention to the fact that there is a distinct difference between Television and Photo-radio or Facsimile transmission. Television is essentially the reproduction at a distance of things that



are actually happening at the moment. This has not yet been put into practice commercially.

Photo-radio or Facsimile transmission is, on the other hand, the transmission by electrical means of still pictures and of documents and diagrams of various kinds which are received in the exact form in which they are transmitted. This system has been in commercial use between the Radio Corporation of America's station in New York and the Marconi Company's station in London, since May, 1926.

As references to these different processes are likely to be frequent in the near future, you might find it useful to draw the attention of your sub-editors to this fundamental distinction between these methods.

Yours faithfully,
W. G. RICHARDS,
Chief of Publicity Department,
Marconi's Wireless Telegraph Co., Ltd.,

[NOTE.—The confusion referred to above chiefly concerns the daily Press. We have not noticed errors of this nature in "P.W." or in our technical contemporaries.—Editor.]

"REGIONAL" TWO ON SHORT WAVES.

The Editor, POPULAR WIRELESS.

Dear Sir,—I recently built the "Regional" Two, as described in "P.W." No. 286. It gave excellent results on the medium and long waves, bringing in 44 stations on the 'phones and several at loud-speaker strength. I decided to wind a coil and try for K D K A on 62·5 metres. This station came through at excellent strength from 11.15 p.m. ('phones). Quality was good and a very slight, quick fading was experienced, but this gave no trouble. I give a diagram of the coil in case any reader should be interested. A small condenser, such as that used in the "Sydney" Two, must be connected in series with the aerial lead. I am going to build a smaller coil and try for 2 X A F and P C J J in the near future.

Yours sincerely,
K. D. H. SELF.
Hornchurch, Essex.

THE "VARIACTOR."

The Editor, POPULAR WIRELESS.

Dear Sir,—Re the "Variactor Two," published in your issue of January 7th, I made up the one-valve part from a collection of odds and ends, and, with two small alterations, I find it the handiest and best one-valver I have ever tried. With little trouble I can get from ten to twelve stations including Madrid, Toulouse and the big German stations. I found that with the loading coil at back of baseboard sufficient reaction could not be obtained. Arguing that if the variometer reached to one side it ought equally to reach to the other, I placed the loading coil to opposite side of variometer and was surprised at the improvement. Then, to save pulling out big coil when altering a broadcast wave-length, I fitted a home-made two-way switch, so that I could cut out large coil completely. This, with two separate aerial terminals, makes the handiest set anyone could wish for. I have tried it on four different aerials including an indoor aerial, and with a P.M.1 for detector—it is the goods!

Thanking you for such circuits as this.

Yours truly,
W. SMITH.
Great Yarmouth.

"THAT RADIO SCEPTIC!"

The Editor, POPULAR WIRELESS.

Dear Sir,—After reading Mr. Elston's letter in to-day's "P.W.," I feel I must reply to it. I have been a reader of "P.W." practically from the first issue, and have got a great deal of useful information from it. I constructed a three-valve receiver (Det. and 2 L.F.) from details given in "P.W," which will tune from 60 to 3,000 metres, using home-made honeycomb coils, and will bring in fifteen stations on the loud speaker and a great number on the 'phones, which I think speaks very well for "P.W." circuits. I might add that my aerial is rather badly screened by buildings, and is not very high, being eighteen feet at the lead-in end, and thirty-five feet the other.

Wishing your paper every success.

Yours faithfully,
E. J. WALKER.
Ware, Herts.

The Editor, POPULAR WIRELESS.

Dear Sir,—I should like to say a few candid words to Mr. B. Elston. On the nights of March 2nd and 3rd, I received 49 low-wave European stations (details enclosed for Editor's perusal) on a cone speaker. In the early morning of March 4th I logged 18 U.S.A. stations on headphones (I await confirmation from "World Radio"). On March 5th I picked up W G Y at 11.25 p.m. At 12.15 a.m. I transferred him to loud speaker, which he worked at weak strength. While reception conditions may have been exceptional, I rarely have any trouble in picking up plenty of stations. A passage from Mr. Dowding's excellent article reads: "My practised hand was soon able to rope them in from all over the continent." Here is the crux of the whole matter. Other essentials I find are good layout, components, and detector valve. These results were obtained with a modified 0—v—2 placed on the market by a popular valve maker.

Yours faithfully,
W. A. E. ROWETT.
Cornwall.

THOSE "ROLLING-IN" STATIONS.

The Editor, POPULAR WIRELESS.

Dear Sir,—I greatly enjoyed reading the letter of "A Radio Sceptic," as I think some of the performances of the amateurs must make even Mr. Marconi gasp. Witness E.C.'s letter from Co. Wicklow, on February 18th last, describing his "Q. and A." Set, a straight two. I will quote his words:

"The stations rolled in one after another, altogether between 35 and 40."

Now, I have made quite a few in the last three years, but if this reader can do this on two, I shall give my three away, and buy a gramophone.

Yours sincerely,
"OLD TIMER."

A DISTURBING FAULT.

Possibly your set might not have developed this trouble, but you never know———

By H. J. B. C.

METAL panels for use in wireless receiving sets are no doubt proving very popular in many quarters, and deservedly so, for not only are they cheap and of pleasing appearance, but in a set designed specially for employing a metal panel the amount of wiring can be reduced by taking advantage of the metallic connection provided by the panel itself.

A Recent Experience.

Particular care must be exercised, however, to ensure that the incorporation of this particular arrangement does not lead to a personification of the phrase concerning "a good servant but a bad master." This was brought home to me very forcibly just recently through the location of rather

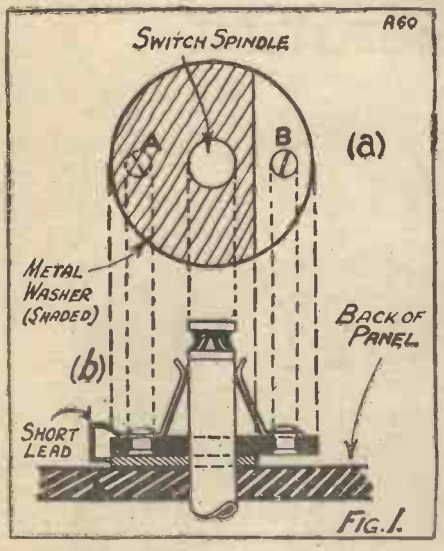


FIG. 1.

an unusual fault in a two-valve receiver I had cause to examine.

The set was situated in one room of the house, with a loud-speaker jack in the drawing-room, and it appears that the procedure always adopted was to switch on the set, then retire to the drawing-room and insert the loud-speaker plug into the jack for the evening's entertainment. When the programme was finished the plug was withdrawn and then one of the family was deputed to go and switch off the set.

Always "On."

It transpired that the accumulators (two being kept in alternate use to prevent any break in the use of the set) only lasted for about a sixth of their expected time, while the H.T. battery ran down in a relatively short period. Further questioning elicited the information that the average nightly use was for four hours—i.e. one sixth of a day.

The similarity between these two proportions caused me to suggest that the set had not been properly switched off, and in consequence the valves were consuming current day and night.

The set was accordingly taken from its cabinet, the L.T. switch examined, and the fault at once revealed. A metal panel was in use, and the switch had been packed at the back with washers and one side of the switch was joined to the top washer by a short lead, see Fig. 1 (b).

This particular washer had a segment cut away to prevent it touching the other switch contact, but, unfortunately, during the process of mounting, or as the result of a loose nut, it had slipped from the position shown in Fig. 1 (a).

Now the screw holding contact B in place projected slightly at the back, with the result that the washer was shorting contacts A and B, and hence the valve filaments were switched on all the time irrespective of the position of the push-pull switch.

OVERCOMING RESISTANCE.

THE picnic party was forced to remain on one side of the river owing to the sudden rising of the floods. *Galvan Ometer*, a huge *Pole*, volunteered to swim for aid, but they knew that the *resistance* of the swift *current* would *ampere* him.

"We shall have to get *ohm* by the *bridge*," said one gentleman with a large *joule*. But when they reached this, they found that it was sagging in the middle. "I am positive I can *volt* that *gap*," said *Galvan Ometer*. There were cries in the *negative*, but "*Watts* that to me!" he cried, determined to risk it and *cell* his life for his friends. He laid his *switch* down, and bundled himself up into a *coil*. After a *series* of swings, he let go, and describing an *arc*, landed safely on the other side. Examining the broken part, he exclaimed: "It's only these two *ions* which have snapped—that's the key to the whole thing. I'll soon fix them so that you can come across on these two *parallel beams*."

They cheered; and Mr. *A. M. Meter* said: "*Anode* 'e could do it, lad, yet I would have been filled with re-Morse if he had perished. Yes, he is a brave fellow."

E. W. H.

FLEXIBILITY WITH THE "HARTLEY."

THE increase in selectivity of the Hartley over the more common circuits of a detector valve is due to two causes: (*a*) the reduction of damping caused by the valve itself, and (*b*) the reduction of damping caused by the aerial.

The Hartley circuit is indicated in Fig. 1, where A.C. is the combined tuning and reaction coil. The coil is generally tapped at the mid-point B—the part A B is in series with the aerial, and also connected across grid and filament of the valve; the other part of the coil is used for reaction.

If our coil is not centre-tapped, but tapped say at one-quarter way down from one end, in Figs. 2 and 3 we can alter the selectivity

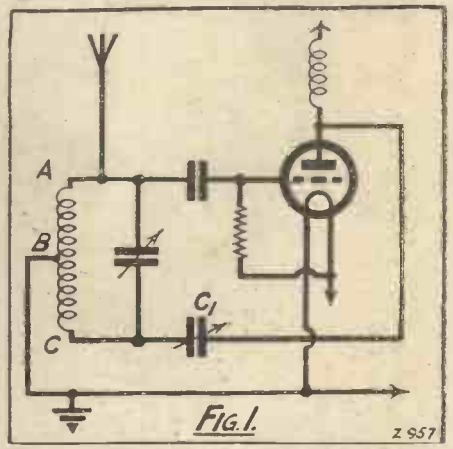


FIG. 1. Z 957

by interchanging the connections at A and C. To change from Fig. 2 to Fig. 3 it is only necessary to reverse the coil in its holder, which can easily be arranged for in any home-made coil.

If a multi-tapped coil is available the selectivity may be varied in steps. Simply by altering the position of the tap B, and

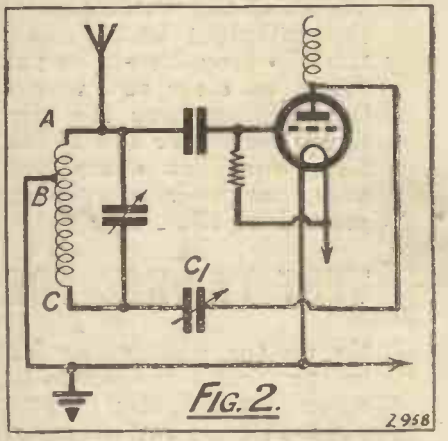


FIG. 2. Z 958

no dead ends are formed at any tapping. Incidently, variation of the tapping point gives a rough control over reaction which may be very useful, particularly if a small capacity is used at C_1, and the set is required to cover a large range of wavelength.

P. G. B.

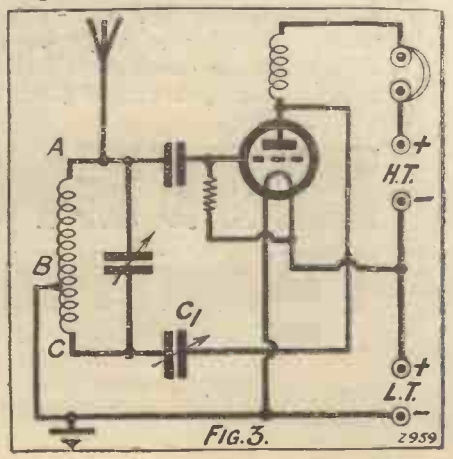
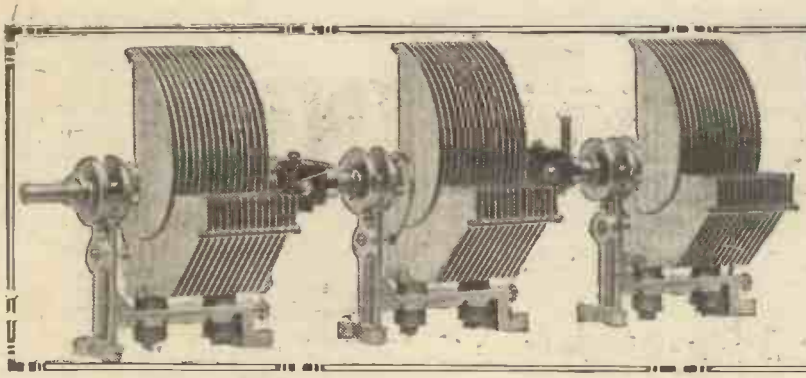


FIG. 3. Z 959



Ganging Your Own Condensers

Details of a simple method of making your own "gang" condensers.

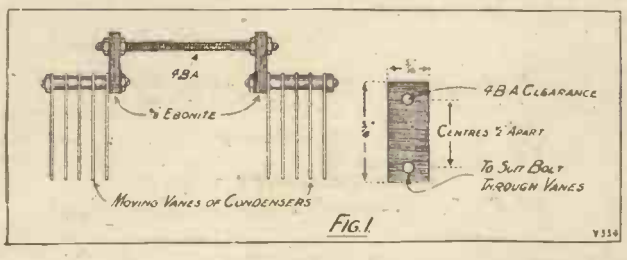
By A. V. D. Hort, B.A.

THE tuning of a receiver which has one or more tuned H.F. stages is greatly simplified by the use of gang-controlled condensers. The tuning coils must, of course, be matched, or nearly so, and it is then vastly simpler to rotate the variable condensers together, with one knob, than to adjust separate dials to the correct readings.

The condensers now obtainable in ganged form are coupled together by means of their spindles. This method of coupling is not easy with existing single condensers, and it is a job which is hardly possible in most amateur workshops. There is one type of condenser, however, which lends itself to ganging by another method. An example of a two-gang condenser constructed in this way is shown in one of the diagrams. The components to use are S.L.F. condensers with long moving vanes held together at their outer ends with some form of clip or bolt.

Easy to Construct.

The coupling shown in Fig. 1 is the simplest. Here the moving vanes are held at their ends by a bolt. To make the coupling, take out this bolt and put in a slightly longer one. Clamp on this an ebonite strip of the dimensions given, and fix a 4 B.A. rod of the required length at the other end of the strip. The second condenser is fastened to the other end of the rod in a similar manner. This form of coupling is easy to construct, but it does not permit of much adjustment of one of the condensers independently of the other. A slight difference in the settings of the vanes can be obtained by slacking the nuts at one end of the coupling, turning the ebonite strip through a small angle and tightening up.

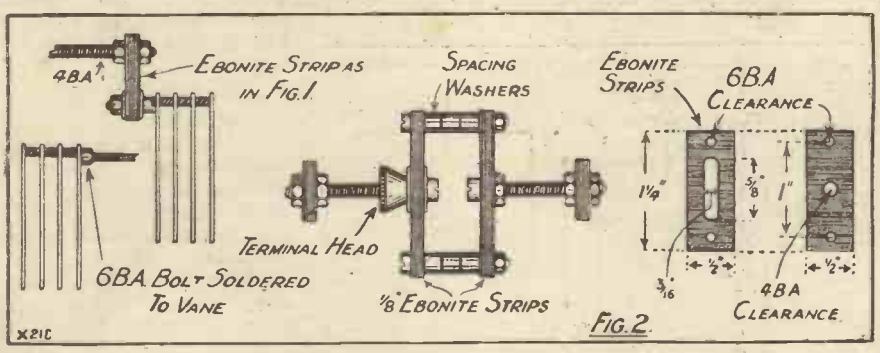


More Satisfactory Type.

This, of course, throws the 4 B.A. rod out of line and tends to twist the moving vanes, but provided that the difference between the two condensers is not too great, no harm will be done.

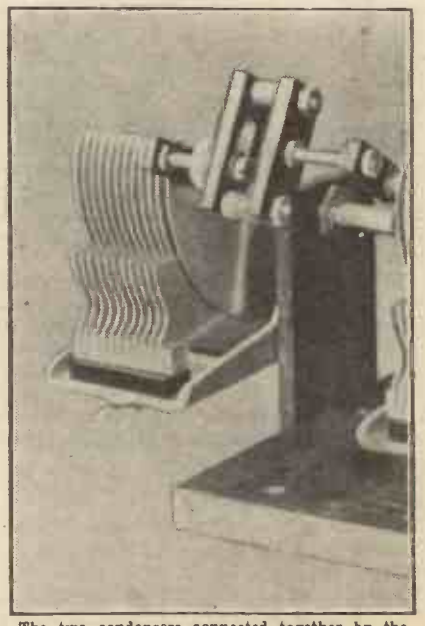
In Fig. 2 are given details of a much more satisfactory type of coupling. It is a bit more troublesome to make, but it gives a fine adjustment without throwing the coupling out of line. A pair of condensers fitted with this coupling are shown in the photograph, which illustrates also the method of mounting them. In these condensers a bolt through the ends of the vanes would cause a short-circuit with the fixed vanes, since the moving vanes do not overhang the fixed ones. A fibre strip is, therefore, fitted to the ends of the moving vanes. The coupling is fixed to the condensers by means of cheeseheaded 6 B.A. bolts soldered to the outside moving vanes.

Independent adjustment of one condenser relative to the other is effected by slackening the terminal head on one side of the coupling, sliding the bolt along the slot in the required direction and tightening the terminal head again. If you need a wider range of adjustment, make the slotted ebonite strip and the strip opposite to it longer. The slot should be wide enough to allow free play for the 4 B.A. bolt, as the latter has to move through an arc of a circle in making the adjustment.



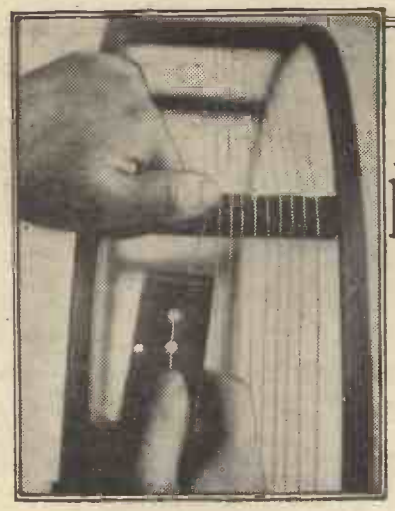
The Friction Adjustments.

The friction adjustment of the condensers is important. The front one should be normal. Slack the spindle of the rear one until the vanes will fall back of themselves when they are lifted. There will then be no risk of straining the coupling or the vanes. The front condenser is mounted on the panel in the usual way. The rear one is supported by a metal bracket standing on an ebonite base, or on a vertical strip of ebonite fixed to the baseboard with brackets or against a block of wood as in the photograph. Be specially careful to align the condensers as exactly as possible. If they are out of line, they will not turn smoothly.



The two condensers connected together by the method explained above.

You will not have the vernier balancing adjustments provided on commercial models, but it is very easy to employ what is known as a "trimming condenser." This is a small "vernier" condenser of say ·0001 mfds. connected across one of the sections of your home-made gang for balancing.



FRAME AERIAL RECEPTION

Some practical notes on the subject.

By J. ENGLISH.

THE frame aerial is perhaps one of the most neglected of wireless devices. Presumably everybody knows what a frame aerial is, but most amateurs fight shy of using one. It is quite a common belief that a frame aerial is very inefficient, and apart from self-contained portable sets one rarely sees a frame aerial in use unless it is with a super-heterodyne receiver.

This general belief that frame aerials are too inefficient to be worth while probably arises from using too small a frame and using it incorrectly. Frame aerials for successful use with a modest receiver require careful consideration; properly used they are then far from inefficient and possess important advantages over the outside aerial.

Ignoring for the moment the degree of efficiency, the case for the frame aerial is quite a strong one. It is compact and easily transportable, it is cheaply and easily constructed, it is free from the dangers of lightning and minimises atmospherics and interference. Above all it increases selectivity, and has the well-known property of directional reception. A long list of merits you may say, but useless without some degree of efficiency as an aerial. This I hope to show is far higher than is generally believed. A modest receiver, such as a detector and one or two L.F. stages is ample for DX work.

Constructional Details.

The frame aerial should have a side of at least 3 ft.; but more than 3 ft. 6 in. is unnecessary. The construction of the former upon which the frame is wound should be rigid, using the least material possible. The frame winding must be well insulated, space wound, using for preference stranded wire, of which there are several kinds specially manufactured for this purpose. For a wave-length range of approximately 200 to 550 metres using a ·0003 mfd. tuning condenser, 14 turns are required. Three of these comprise the reaction winding as described below.

The receiver attached to the frame aerial requires to be simple, straightforward and efficient. A regenerative detector must be used for fullest sensitivity and upon the manner of applying and controlling reaction hinges the whole success of frame aerial reception. Maximum signal strength depends upon delicate tuning at the stage prior to oscillation.

Smooth Reaction Control.

Undoubtedly the best method is to react straight into the frame, as shown in the theoretical diagram on this page. The usual form of capacity control is used and, with proper adjustments of H.T. and filament voltages, a very smooth reaction control is possible. Given this super-smooth control, plus a slow-motion tuning condenser, it is surprising how far one can reach out with a receiver like this. Careful tuning is necessary for the best results, but modern condensers simplify the operation greatly. Of course, the receiver will not give loud-speaker results on any station other than the local, but during both summer and winter months, I have toured Europe on the 'phones on many evenings, stations a thousand miles away coming in with extraordinary clarity. Atmospherics have always been considerably less than with outside aerial and fading not so marked.

When searching for distant signals the frame is rotated until one position gives the strongest heterodyne note, the receiver being in a state of gentle oscillation. Reaction is then carefully slackened off until the receiver is in the pre-oscillation state, the tuning condenser being moved at the same time to keep in tune. A final adjustment of this condenser then produces maximum signal strength.

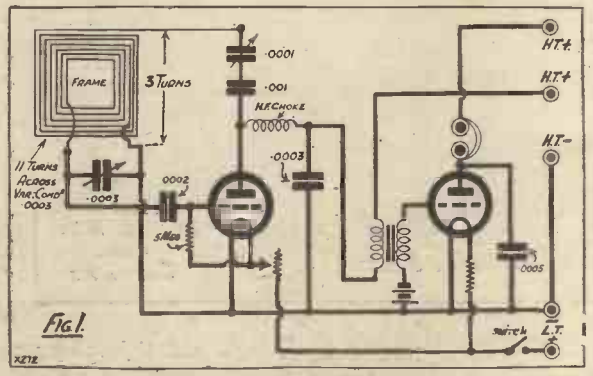
The peculiar effect is noticed of a sudden jump in signal strength when the tuning condenser is exactly in tune, with the set just off oscillation. Although signals may be coming in well and the set appear to be in tune, there is just one critical setting where maximum signals are heard. Without the modern slow-motion devices it is difficult to obtain this fine tuning. Hand capacity effects, however, although they can be troublesome, can be largely avoided by careful design and construction.

Short-Wave Possibilities.

It is well known that the efficiency of the frame aerial increases as the wave-length decreases. This opens up possibilities for short-wave reception where the efficiency of the frame may approach that of the ordinary small aerial. As a basis of experiment the frame should have 3 to 4 turns, with a variable tapping for the filament lead. Alternatively a modified Hartley circuit can be used.

One of the essentials for satisfactory results on all wave-lengths is the elimination of receiver noises. When there is a perfectly quiet "background" weak signals are naturally more easily readable.

The desired state of affairs can be secured by using reasonably fresh H.T. and grid-bias batteries, a reliable grid leak and condenser, and a transformer free from leakage.



A simple but efficient frame aerial circuit.

RADIO JOTTINGS.

A record for amateur telephony in daylight was recently established by G 5 H S, of London, and U 6 Z A T, of Los Angeles, California.

* * *

The musical instruments used by one of the bands whose dance music is broadcast regularly by W J Z, New York, are valued at over £2,000.

* * *

Radio on railway trains is becoming increasingly popular on the Continent, and successful experiments have recently been carried out on the Warsaw railway.

* * *

An enterprising New York newspaper, "The Evening Telegram," has announced that its radio department is investigating the possibilities of transmission on a wave-length of only three-quarters of a metre.

* * *

Owing to the interruptions caused by storm and floods to the ordinary telegraphic and telephonic communication, the Government of Ceylon have been experimenting with a portable wireless receiving and transmitting set capable of communicating over a range of 300 miles.

* * *

It has been officially computed that the world contains no less than 18,000,000 radio receiving sets.

* * *

The first direct wireless messages between England and Australia were transmitted from Carnarvon on September 22nd, 1918, and were picked up in Sydney, New South Wales.

* * *

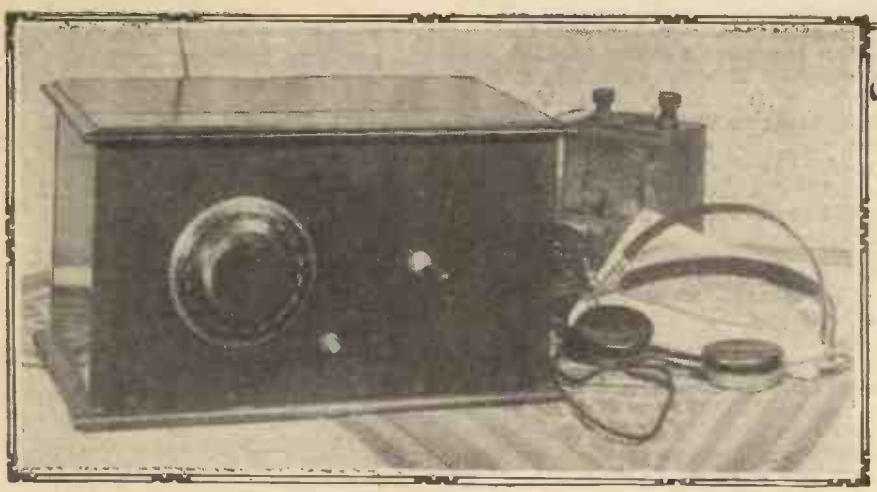
Four thousand metres is the longest wave-length used in Europe for broadcasting, this being one of the wave-lengths of the Berlin Koenigswusterhausen station.

* * *

The Belfast Station was opened on November 4th, 1923.

* * *

The crystal as a wireless detector was discovered by an American, General Dunwoody, in 1906.



The "HARTLEY" ONE-VALVER

Here is a fascinatingly simple and efficient little set—just the one to give you real DX results. It is a special design of the "P.W." Research Department, and has been given exhaustive tests.

Described by G. P. KENDALL, B.Sc.

IT always seems to me rather a curious thing that one of the most efficient and fascinating forms of the single-valve reaction circuit, namely the Hartley, should also be one of the most neglected. Probably this is due to some extent to the fact that one form or another of the popular Reinartz has now become almost standard practice for the detector circuit, and so experimenters are ceasing to pay much attention to other arrangements.

COMPONENTS REQUIRED.

- 1 Panel, 12 in. × 7 in. × ¼ in. or ⅜ in. (any good branded material).
- 1 Cabinet to fit, with baseboard 9 in. deep (Artcraft, Bond, Camco, Makerimport, Pickett, Raymond, etc.).
- 1 ·0005 mfd. variable condenser with slow-motion or vernier dial (Ripault in original. Any good make).
- 1 On-and-off switch (Benjamin, Bowyer-Lowe, Igranic, Lissen, Lotus, etc.).
- 1 Panel-mounting neutrodyne condenser (Peto-Scott in original. Any standard make).
- 2 Board-mounting coil sockets (L. & P., Lotus, Magnum, Peto-Scott, etc.).
- 1 ·0003 mfd. fixed condenser (Clarke, Dubilier, Goltone, Lissen, Mullard, T.C.C., etc.).
- 1 2-megohm grid leak with holder or other mounting (Dubilier, Igranic, Lissen, Mullard, etc.).
- 1 Sprung valve socket (Benjamin, Burndept, Burne-Jones, B.T.H., Cosmos, Igranic, Lotus, Marconiphone, Precision, Pye, W.B., etc.).
- 1 Baseboard filament rheostat (Igranic, Lissen, or similar type).
- 1 H.F. choke (Bowyer-Lowe, Burne-Jones, Cosmos, Lissen, Igranic, R.I. & Varley, etc.).
- 1 Terminal strip, 8 in. × 1½ in. × ¼ in.
- 8 Terminals (plain type, or engraved, such as Belling & Lee, Eelex, Igranic, etc.).
- Wire, screws, short piece of flex, etc.

Why the Reinartz?

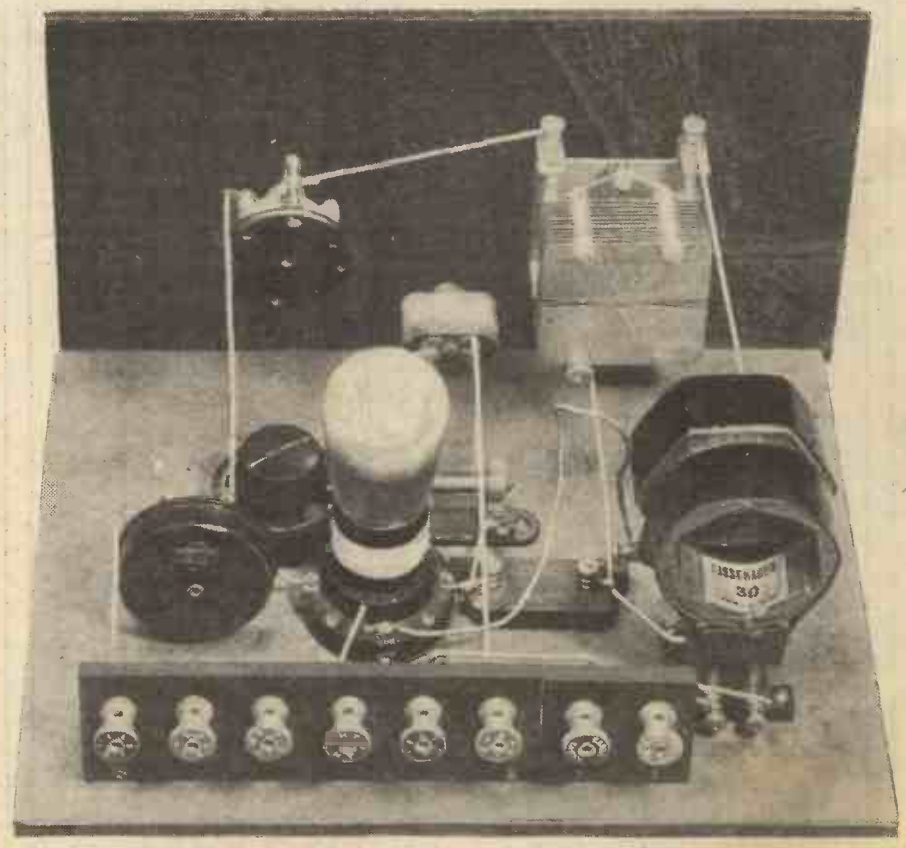
No doubt the Reinartz circuit has a number of very solid advantages, such as the possibility of obtaining beautifully smooth reaction control, reasonably good selectivity, ease of control, and so on, but it does not follow necessarily that it is the best possible arrangement for a detector valve. For example, there is the question of cost, and it must not be forgotten that the Reinartz requires two variable condensers, although one of these may be of the relatively cheap type of ·0001 mfd. developed for reaction purposes. Again it must not be assumed that the Reinartz necessarily gives the loudest possible signals that can be obtained with a detector valve.

Tricky Circuits.

As a matter of fact, there are a number of special circuits which, when working at their best, will beat the average Reinartz for signal strength, although, of course, it does not follow that they have quite all the other advantages of the Reinartz. Many of these circuits are admittedly a little difficult to operate, troublesome to adjust so that reaction is smooth, and so on. Many of them possess some slight drawback or other which is not present in the Reinartz, but nevertheless they form a very fascinating field for those who have acquired a little skill in handling wireless receivers, and can appreciate the very good results obtainable by the expenditure of just a little time in practising their operation.

The Hartley forms a very good example of a circuit of this kind, giving the possibility, as it does, of particularly good

(*Continued on next page.*)



You will gain a good idea of the simplicity of the receiver from this back-of-panel photograph. Note the two plug-in coils which are used and the small reaction control condenser.

THE "HARTLEY" ONE-VALVER.

(Continued from previous page.)

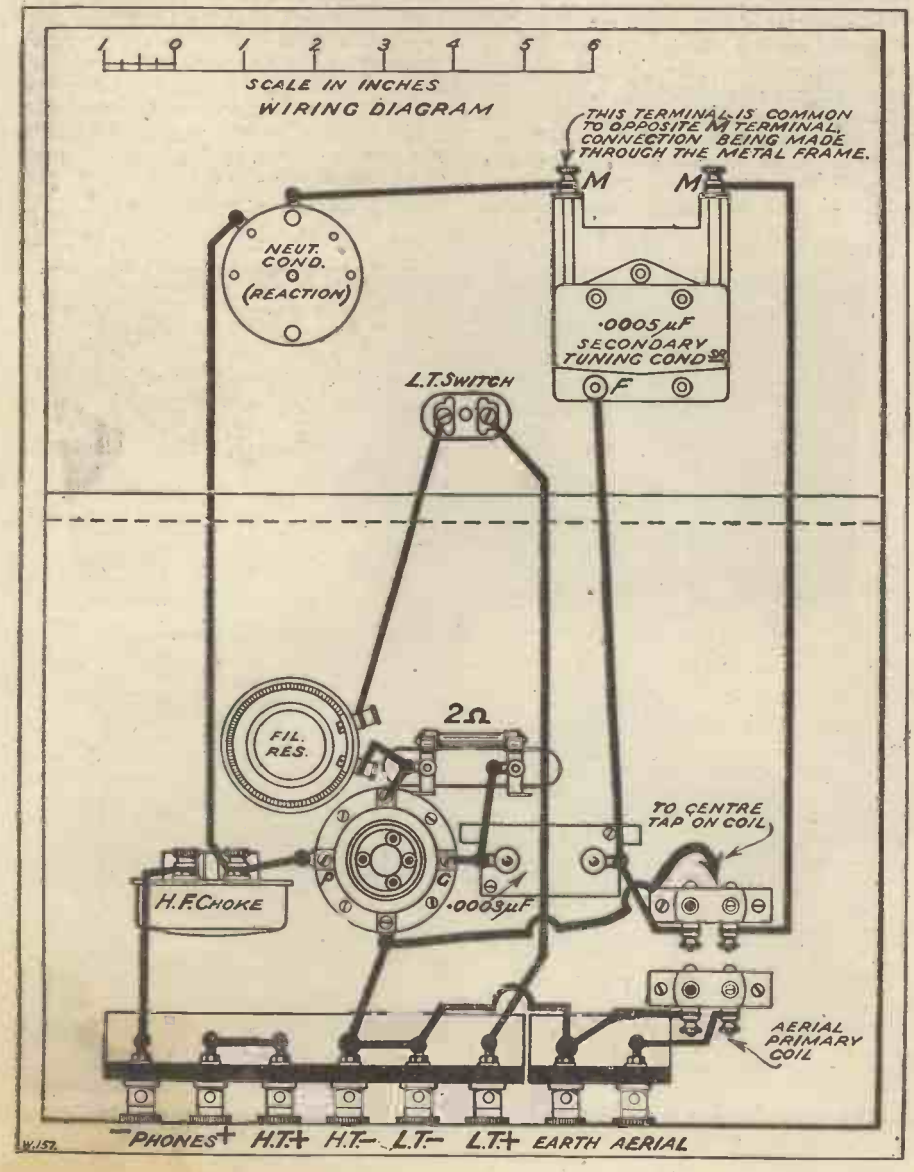
signals, coupled with smooth reaction control with very few of the disadvantages associated with so many of these special circuits. Its particular advantages are relative cheapness, in that only one full size tuning condenser is needed, the reaction control being obtained by what is usually called a neutrodyne condenser and, further, high sensitivity and selectivity. When properly designed and well-built, the only real drawback which can be regarded as inherent in the circuit is that of a slight difficulty in tuning which results from the fact that neither side of the variable condenser can be connected to earth, so that there may be some slight trouble with hand-capacity effects. This difficulty, however, can usually be got over almost completely by the use of a good vernier dial with an operating knob which is separated from the main body of the condenser so that one's hand does not approach very closely while tuning in.

When this is done a well-designed Hartley receiver can prove a most fascinating set to operate and can be strongly recommended to those who have tried ordinary single-valve reaction circuits, and feel that they would like something a little more specialised and capable of giving finer results in the hands of an operator prepared to cultivate just a little delicacy of touch.

Cheap But Good.

It has seemed to me such a pity that the merits of this very excellent little circuit should be neglected that a special design has been prepared by the "P.W." Research Department, to enable those readers who are interested in this sort of thing to try it out for themselves. The set has been carefully designed so as to be very simple, and, of course, as cheap as possible as consistent with really good results.

The set has been built on the American plan of a vertical front panel carrying the tuning and reaction controls and the on-and-off switch, with all the rest of the components neatly arranged on the base-board inside the cabinet, and although this, maybe, is slightly more expensive than the flat-topped cabinet, it is perhaps the only extravagance which has been committed, and it is still possible to build the set for about two pounds, even if quite a good cabinet is purchased ready-made, instead of being made at home.



POINT-TO-POINT CONNECTIONS.

One filament socket of the valve holder to one end of the grid-leak holder, and to one side of the filament resistance.

Other side of resistance to one side of the L.T. switch.

Remaining side of switch to the L.T. + terminal.

L.T. − to H.T. − terminal, to the remaining filament socket of the valve holder, to the centre tap on the aerial secondary coil via a flexible lead, to the earth terminal and to the socket of the aerial primary coil holder.

Aerial terminal to the plug of the aerial primary coil holder.

Grid of valve holder to one side of the ·0003 mfd. fixed grid condenser, and to the remaining end of the grid-leak holder.

Other side of the ·0003 mfd. grid condenser to the socket of the secondary aerial coil holder and to the fixed vanes of the ·0005 mfd. secondary tuning condenser.

Plug of secondary aerial coil holder to one moving vanes terminal on the ·0005 mfd. secondary tuning condenser.

Remaining moving vanes terminal on the tuning condenser to one side of the reaction condenser. (With other makes of condensers used for the secondary tuning this lead will be joined to the moving vanes terminal which is also joined to the plug of the secondary coil holder.)

Plate of valve holder to one side of the H.F. choke and to the remaining side of the reaction condenser.

Remaining side of the H.F. choke to the 'phones − terminal.

'Phones + terminal to the H.T. + terminal.

This completes the wiring.

The circuit is reproduced on these pages, and those who are skilled in reading circuit diagrams will perhaps be interested to take a look at it at this point. A separate coupled aerial circuit is provided of the semi-aperiodic type, and this is one of the special features of this particular design. This feature is, as a matter of fact, particularly helpful in these days, when most people value highly the power to cut out their local station and receive foreigners and 5 G B when desired, and this is easily achieved in most places by the choice of a suitable size of coil for the aerial. For the ordinary broadcast band of 250 to 550 metres, the coil will usually be about a 35, although a smaller coil may sometimes be necessary to increase selectivity.

Selectivity.

You will find that the larger this coil within limits, that is to say, up to about No. 40, the stronger the signals for any given station, but if the coil is made too big you may find that selectivity will suffer seriously. Thus, you should aim at using as large a coil as you can without getting into trouble with your local station. With small, and indoor, aerials, you will naturally use the larger size of coil. On the longer band of waves (5 X X, etc.) a No. 100 will usually be correct for the aerial circuit.

(Continued on page 191.)

YOU GET MORE FROM MARCONIPHONE L.T. ACCUMULATORS

Why are Marconiphone Accumulators so extraordinarily long-lived? What is the secret behind their marked superiority? It lies in the plates—the heart of every accumulator. For only in Marconiphone can you obtain plates built from the new formulæ especially to resist acid attack. Remember, too, that all parts of Marconiphone Accumulators are protected against sulphuric acid fumes; the separators are made from the finest ebonite; the substantial celluloid container allows easy inspection of acid level, and a host of other features ensure unfailing service under all conditions.

Write now for full particulars. Marconiphone Accumulators are sold by most Wireless Dealers.

	Without crates. £ s. d.	Complete with crates. £ s. d.
2 volt, 20 amp. hours	11 3	15 3
2 volt, 30 amp. hours	13 6	18 6
2 volt, 40 amp. hours	16 0	1 1 0
4 volt, 20 amp. hours	1 2 6	1 7 0
4 volt, 30 amp. hours	1 7 0	1 13 0
4 volt, 40 amp. hours	1 12 0	1 18 0
6 volt, 20 amp. hours	1 13 9	1 19 3
6 volt, 30 amp. hours	2 0 6	2 7 0
6 volt, 40 amp. hours	2 8 0	2 14 6

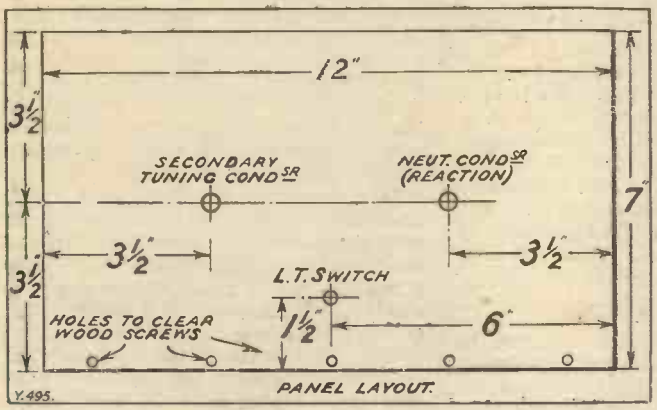
THE MARCONIPHONE COMPANY LTD. (Dept. P.), 210-212, Tottenham Court Road, LONDON, W.1.

B.S.90

THE "HARTLEY" ONE-VALVER.

(*Continued from page* 188.)

Coupled to this aerial coil is a secondary which is tuned by a variable condenser connected across its two ends in the ordinary manner, and this will be a No. 60 for the ordinary broadcast band, or a No. 250 for the 5 X X range. This coil, it will be noted, is of the centre-tapped variety, and in the circuit diagram you will see that this centre tap is connected to the filament and to earth.



One side of the tuned circuit goes to the grid of the detector valve via the grid condenser, and the other end is taken to one side of the little reaction condenser, and through this to the anode of the valve. The anode circuit, of course, contains the usual H.F. choke and the telephones. At this point you will see what is meant by saying that neither side of the tuning condenser is at earth potential in this circuit.

Efficient on Short Waves.

It is interesting to note in passing that one of the advantages of this circuit is that it is also quite useful on the short waves, and one can pick up the short-wave transmissions such as K D K A, 2 X A F, A F C, and so on, with the use of suitable short-wave coils, sets of which can now be obtained from a number of manufacturers, among others Messrs. Clarke and Igranic.

When using these coils, of course, the lead from the filament which normally goes to the centre tap of the coil (a terminal on the broadcast and long-wave sizes) will need to be furnished with a tapping clip, so that you can make connection on one of the turns of the bare wire coils used for the shorter waves.

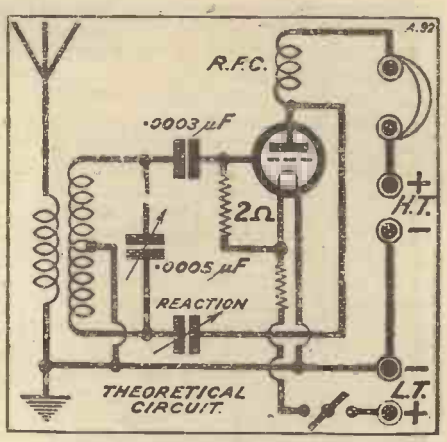
Easy to Build.

The construction of this little set is really so simple that little can be said about it, since if you use single-hole fixing components there are only three holes to be drilled in the panel, and you will merely have to screw the panel to the baseboard, mount the coil sockets, grid condenser, leak, valve socket, rheostat and H.F. choke upon the baseboard with the terminal strip, and you can then carry out the wiring-up operation.

Wiring again is extremely simple, as you will see from the photographs and wiring diagram, and there is nothing critical about it. If you follow the lay-out fairly closely, you will find that the wiring automatically becomes very simple and there is little need to take any great pains in spacing out.

You will see in the photographs that the original wiring was done on the straight point-to-point system, running wires by practically the shortest paths possible from one terminal or soldering tag to the next. This makes quite an efficient arrangement but, of course, you can if you like try the right angle method, which no doubt looks very much neater although there may be some slight theoretical sacrifice of efficiency (probably not measurable with so simple a set). The wiring can naturally be carried out with practically any material the constructor chooses, such as bare wire covered with Systoflex, bare wire without covering, covered wire such as Glazite, a special material such as Junit, and so on.

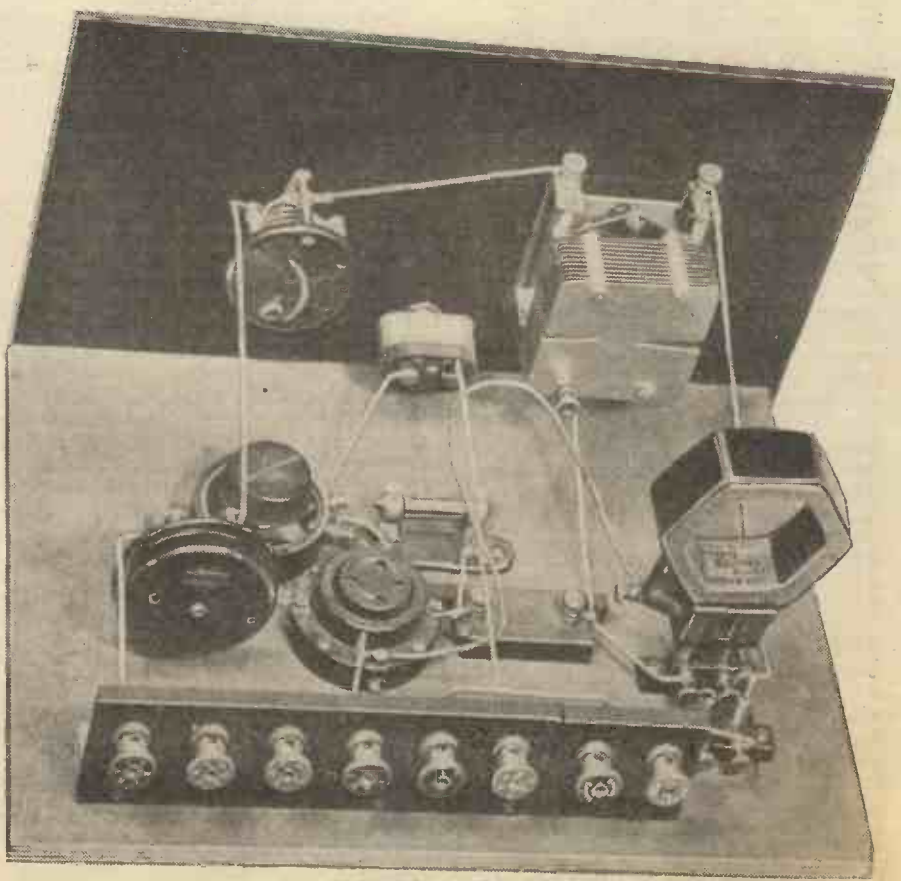
One final point before leaving the details of construction. The particular variable condenser used in this set was the Ripault, which has two terminals connected to the moving plates. You will see that three wires go to the variable condenser, although two of these are both connected to the moving plates by the two terminals just referred to, and if you choose some other make of condenser these two wires will naturally be placed under the same terminal, namely that for the moving plates.



On the original set we did not actually fit a a slow-motion dial, because the set would naturally be handled for its tests by skilled operators, but I would strongly advise that a very good vernier dial, with a knob placed at some little distance from the main body of the condenser, should be chosen by any constructor who desires to follow out this design.

Turning to operating details, the first important point to be considered is that of the kind of valve to use. Very good results have been obtained on test with a valve of the H.F. type, or even the R.C.C. type, namely, high impedance, high amplification factor, and good results will be obtained if either 2- or 6-volt types are used. Naturally, you will expect to obtain slightly better results with a 6-volt valve in most cases but, of course, the economy of the 2-volter is a very attractive feature.

(*Continued on page* 207.)



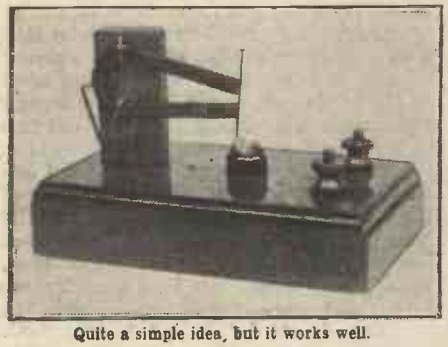
The terminals from left to right are : 'Phones minus, 'Phones plus, H.T. plus, H.T. minus, L.T. minus, L.T. plus, Earth and Aerial.

HINTS FOR THE HANDY MAN.

A selection of short and practical articles from various contributors.

A Magnet Detector.

A CRYSTAL detector constructed on the principle of the article depicted in the photo, can prove to be a very useful device for the crystal enthusiast The illustration is self-explanatory, and therefore little need be said about the actual construction of the detector. It will be seen, however, that the magnet holding the pin which makes contact with the crystal is attached by means of two metal staples to an upright post which is screwed down to a baseboard. The latter screw should not be too tightly driven home, nor should the staples holding the magnet be too firmly driven into the wood. The magnet will then be free to be pushed slightly backwards and forwards through the staples, and also slightly from side to side by rotating the wooden post on its supporting screw.



Quite a simple idea, but it works well.

The great advantage of a detector of this nature, which, of course, can be constructed in many different patterns, is that the pin contact to the crystal is held securely and firmly, and also that it is entirely vibration-proof. By moving the magnet backwards or forwards, or from side to side slightly, almost the whole area of the crystal will be capable of being explored for sensitive spots.

Connections are taken from the underside of the crystal cup to a suitable terminal, and also from the magnet itself to another terminal.

Care should be taken to solder the wire connection to the magnet with the absolute minimum of heat. For this purpose, Wood's metal is best used. A little of the red enamel should be scraped off the end of the magnet, and the end of the wire, previously cleaned and tinned with ordinary solder, should be secured as rapidly as possible to the bared end of the magnet with the aid of a few blobs of Wood's metal. As there will be no strain on this joint, its actual strength is a matter of little consequence.

Finally, when the detector is not in use, the pin should always be allowed to adhere to the poles of the magnet in order to act as a "keeper," and thus to conserve the strength of the magnet.

Aerial and Earth Leads.

Here is a good idea for aerial and earth leads. Equip the end of each lead with a spade terminal in the usual manner. To the spade terminal of each lead secure a Clix plug also, by simply placing the spade between the insulated bush and the nut of the plug. The idea is simple enough, but its advantages lie in its many useful adaptions.

For instance, when connecting the lines to a set equipped with terminals, the spade ends are used. Connecting to a set equipped with sockets, the plugs are used. Finally, to earth the aerial, one socket is just plugged into the other. The plugs are easily attached to or taken off the spade terminals with the fingers.

Dusty Panels.

It does not seem to be realised by some wireless enthusiasts that a dusty panel is by no means desirable. In sets of the old type, where panels are arranged in a sloping position with external valve holders, the dust is in the habit of getting round the legs, etc., thus causing faulty insulation. In any case, it cannot be over emphasised that dust is an undesirable commodity. Panels should therefore be periodically dusted with a camel-hair brush and kept scrupulously clean.

Leatherette Radio Cabinets.

American cloth or leatherette may be put to a number of uses by the wireless constructor, especially by those who are accustomed to making their own cabinets. Where the constructor is not particularly good at cabinet work, or has no time to give such work a first-class finish, a rough cabinet may be knocked up from even unplaned deal and an extremely pleasing finish applied by giving it a complete covering of American cloth or leatherette of any desired tint, black usually presenting the neatest appearance. Owing to the cheapness of this material a considerable amount of expenditure may be saved in the direction of cabinets.

Wood Filling.

Where cabinets are put together by amateur constructors with screws, a good wood filling is essential. All screw heads should be countersunk below the surface of the wood. When the work has been sandpapered the dust obtained in this operation should be carefully collected. If this is mixed with seccotine, or pure gum arabic and water, an excellent natural wood filling may be obtained.

This is carefully worked into all cracks and crevices, and screw head or nail punch recesses, and left till hard and dry. A final sandpaper will render all defects absolutely invisible, the filling used being the actual colour of the wood from which the cabinet is constructed.

Sheet Fibre.

There are numerous uses to which sheet fibre can be put. This material may be obtained in two colours, black and brick red, and in varying thicknesses. The thin fibre lends itself admirably to such purposes as shaped loud-speaker flares, where the sides are of flat-shaped pieces of wood, the fibre being used for the curved sections.

Washers of any size or description can be quickly made from this material, and spacers also. Cone loud speakers of extremely rigid and good tone-producing types are easy to construct. Templates which are often extremely useful things to have, such as valve or panel-drilling templates of any kind, if made from fibre, will stand a considerable amount of wear and tear, in addition to acting as extremely true guides for work of this nature.

Old panels may be utilised over again by placing over them a sheet of fibre, the panel terminals, etc., acting as ample security. Where wood panels are used an ebonite appearance may be given in a similar manner.

Retaining Accurate Coil Adjustment.

In some forms of coil-holders, and particularly after such articles have been subjected to a good deal of wear, it often becomes rather a tricky task to retain a fine degree of close coupling between the two coils, the larger and weightier of the coils tending, under these conditions, to fall back slightly.

Naturally, the true remedy for a trouble like this is to dissemble the coil holder, and to take up any wear by means of washers of one form or another.

In times of emergency, however, the trouble may be cured by adopting the very simple mode of procedure illustrated in the accompanying photograph. Procure a not too tightly fitting rubber band, and slip this over the coil sockets in the manner shown. Of course, if the tension of the rubber band is too great, both coils will be pulled together. On the other hand, provided a rubber band which is not too tight has been employed, it will not influence the *limited* movements of the coils, but will merely serve to check any slight falling-back movement of the heavier coil. In most cases an accurate and stable coupling will thus readily be obtained.

Interesting Facts.

Continous fiddling with the adjustment of a crystal receiver is not only unnecessary, but is often responsible for corresponding clicks in the receivers of your neighbours.

* * *

Reaction is a good servant but a bad master.

* * *

If you are nervous of lightning use an outdoor earth arrester, which is very cheap and can easily be fitted.

The rubber band is shown here slipped over a coil holder.

APPARATUS TESTED

EFFICIENT DETECTORS—THE "BROWN BUDGET"—A "CELESTION" LOUD SPEAKER—AN EXCELLENT L.F. TRANSFORMER.

* *

Traders and manufacturers are invited to submit wireless sets and components to the "P.W." Technical Department for test. All tests are carried out with strict impartiality in the "P.W." testing-room, under the supervision of the Technical Editor, and the general reader is asked to note that this weekly article is also intended to provide a reliable and unbiased guide as to what to buy and what to avoid.—EDITOR.

EFFICIENT DETECTORS.

MESSRS. N. M. C. DETECTORS, of Princes Parade, Finchley, London, N.3, recently sent us a range of their new crystal detectors. There are three varieties which sell at 6d., 1s., and 1s. 6d. They can be obtained, post free, at these prices. The detectors are of the semi-permanent variety and can be used with good effects in such circuits as the Hale, and other reflexes. Iron Pyrites is the crystal employed, and the specimens sent us are the best that we have come across. The 1s. 6d. detector, which is known as the Azure label, comprises a practically perfect piece of the crystal.

THE "BROWN BUDGET."

This is the name of Messrs. S. G. Brown's monthly journal. It is mainly concerned with the activities of this go-ahead and interesting firm, but it makes absorbing reading, and we would like to take this opportunity of extending our appreciation and thanks for the copies regularly sent us.

A "CELESTION" LOUD SPEAKER.

No doubt a very large number of our readers would consider £7 5s. too much to pay for a loud speaker; this is the price of the "Celestion" model C.12 in oak. In mahogany it is £7 10s. It is admittedly a lot of money, but we think that if efficiency and appearance are taken into consideration it is very well worth it. It is always worth while buying the best of anything that one can afford, and nowadays, in radio, like in most other things, price is a pretty fair guide to quality. We know of one or two exceptions, but the rule is a fairly safe one.

To obtain a better speaker than this model C.12 Celestion one would have to pay very much more money. As a matter of fact a move up into the moving-coil class would, in our opinion, be necessary. The C.12 is a cabinet cone and its construction and finish are so good that one stamps it "de luxe" at a glance. A point in its favour is that it is not particularly large, being only 6 in. in depth, and 14 in. × 14 in.

It has a splendid projection, every vibration coming cleanly away from the cone, and we know of but one or two other cones which have less coloration. Speech is decidedly of moving-coil quality. There is no appreciable resonance and both bass and high notes are faithfully dealt with. The speaker is rather more sensitive than the majority, but it is capable of handling heavy inputs. We found it perfectly satisfactory on each of the several sets with which it was tested, ranging from two valves to a multi-valver of the super kind.

(*Continued on page* 196.)

APPARATUS TESTED

(*Continued from page* 194.)

It is some time since we have experienced so much pleasure during a loud-speaker test, and we have no hesitation in saying that we consider this "Celestion" a long way ahead of its class. Those of our readers who have the opportunity should endeavour to hear it in operation. We are sure they will agree with us when we say it is a revelation in what sound design and construction mean to such an instrument.

A CORRECTION.

An advertisement concerning the well-known H.T. Eliminators produced by Messrs. E. K. Cole, Ltd., appeared in page 118 of our March 17th issue. Unfortunately, in connection with the address of that firm, the word "EKCO" was incorrectly spelt. The correct and full address is as follows: E. K. Cole, Ltd., Dept. A, "EKCO" Works, London Road, Leigh-on-Sea.

AN EXCELLENT L.F. TRANSFORMER.

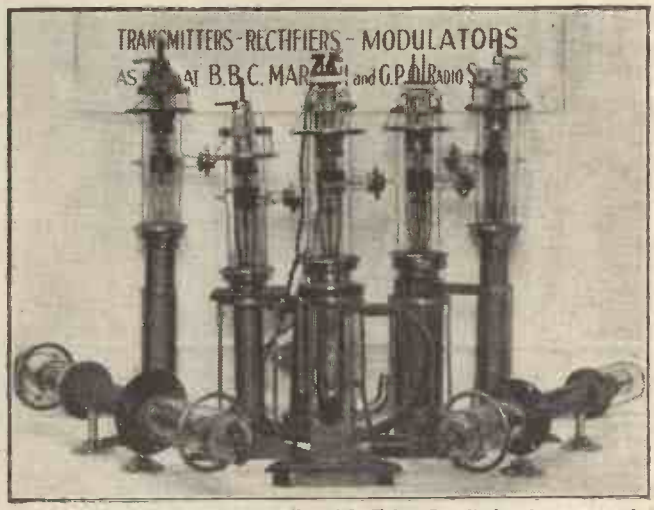
In the usual way the size and weight of an L.F. transformer are, to a certain extent, indications of its efficiency. They may mean that either there is a large amount of iron in the magnetic circuit or that there are ample windings, or both. And in the past we have advised constructors to be wary of transformers of very light construction for these reasons.

But it seems that we shall now have to revise our ideas in this connection, for the new Mullard L.F. Transformer is both small and light, and yet it is extremely efficient. It is not much larger or heavier than the average R.C.C. coupler.

Of course, its internal structure is far from conventional, new things must be done to achieve such a revolutionary design. The transformer is called the "Permacore," because it incorporates a special iron having this name. This special metal has an exceedingly high permeability so that it allows a high flux density to be used in an iron circuit of very small dimensions. It can therefore handle heavy currents without reaching "saturation."

The primary is wound with silver and the secondary with nickel wire. The former provides the advantages of good conductivity and capability of resisting deterioration, and the latter introduces excellent magnetic properties and a high resistance just where they are required. And as the makers claim, the use of these special windings provides permanent and robust construction apart from decidedly improved electrical characteristics. We also agree with their claim that "The amplification of the Mullard transformer is large, smooth and uniform from 250 cycles upward, and below this limit gives a large percentage of its amplification even at 50 cycles. All the bass notes that are wanted are given and there is no shrillness whatever."

In short, it is a very excellent transformer, indeed, and having the additional advantage of extreme compactness and lightness it is certain to achieve wide popularity among discriminating constructors. And as a transformer for portable sets it is absolutely ideal and has no rivals.



☞ At a recent London exhibition the M.O. Valve Co. displayed a range of water-cooled "Osram" transmitting valves. One, as can be seen above, has its anode cut away to show the glowing filament, a glass water-jacket being substituted for the usual metal casing to reveal the circulating water.

All Editorial Communications to be addressed to The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts and photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work, carried out with a view to improving the technique of wireless receivers. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS.

MAKING THE FILADYNE OSCILLATE.

F. E. L. (Motherwell, Scotland).—"I have got a Filadyne going and, although I can pick up Glasgow very well, I feel I am not getting the best out of the set, because it will not oscillate properly. Perhaps it is my own fault, because I am using a cheap foreign valve, but as a matter of fact a friend of mine has used one of the same kind in a rather different circuit and got excellent results, and it was this which persuaded me to try it. Is there anything I can do to make the set oscillate properly? If it will do this I feel sure I shall be able to get plenty of foreign stations on it like my friend."

With such an unusual circuit as the Filadyne it is customary to find that certain changes in the lay-out or components have a great effect upon the operation of the circuit. If, for instance, you have omitted to place a condenser across the telephones this would be quite sufficient to prevent the set from oscillating, and slight variations of coupling or of tapping points will very often overcome the difficulty.

One ingenious Scottish reader has hit upon a method of making the set oscillate which you might like to try, as it is very simple. He simply connects a 35-turn coil in series with the lead which goes from plate to potentiometer and couples this coil to that to which the aerial is connected. He found when using a cheap foreign valve that this made all the difference between faulty operation and good easy oscillation, so that we should certainly try the method, particularly as it is an interesting circuit to experiment with, the results frequently being phenomenal for one valve.

VOLUME CONTROL WITHOUT DISTORTION.

W. P. (Newbury, Berks).—"In order to get distortionless reception the set must have resistance coupling throughout, but I am a bit puzzled about the volume control.

"The loud speaker is of the moving-coil type, and I understand it will not be very easy to overload this, but all the same I do not want to keep the neighbours awake at night when I am listening in, and I should like to have some method of cutting down the volume if necessary. But the important point is that it is essential that this must not interfere with the quality of reception. Quality is everything, in my opinion. What can you recommend as being the least likely to introduce distortion?"

We think that the most satisfactory method in your case would be to use a high-resistance potentiometer operating on the grid of the first low-frequency valve. Suitable resistances are now being marketed,

(*Continued on page* 200.)

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 198.)

and the ends of the resistance are connected between the coupling condenser and the negative grid-bias tapping just like a grid leak; but instead of the coupling condenser being connected also to the grid, this latter is joined to the slider on the potentiometer, and thus one can apply to the grid of the valve either the full voltage developed across the resistance, or some lower value according as the slider is moved down towards negative G.B. This is an efficient and distortionless method.

BY-PASS CONDENSERS.

S. W. (Chipping Norton, Oxon).—"The set I am building is a detector and two L.F. amplifiers, and I notice that connected to the plate of the second amplifier is a ·0005 mfd. fixed condenser, the other side of which goes to the L.T. negative lead. I cannot understand the function of this condenser, especially as it is connected right across the valve so as to join up the filament with the plate. What is its purpose?"

The condenser is placed in this position with the idea of improving the quality of reception. Despite the precautions taken in coupling the valve to the preceding one, it often happens that a trace of high frequency gets into the low-frequency stage of the set, due to stray H.F. impulses reaching the grid of the valve.

If this happens corresponding currents at high frequency will tend to flow in this circuit and will result in a certain slight distortion occurring. In order to prevent this a ·0005 mfd. fixed condenser is connected between the filament and plate so that any impulses of high frequency which tend to flow in the valve can pass across this fixed condenser instead of choosing the alternative route via the L.F. transformer or resistance, and so spoiling the purity of reception.

THE "PROGRESSIVE" THREE.

S. R. P. (Streatham, London, S.W.16).—"Please accept my congratulations in your having evolved such an interesting set as the above. My last set was the Two-Valve Reinartz, built from POPULAR WIRELESS free blue print, and I thought this was pretty good; but the 'Progressive' Three is indeed an eye-opener.

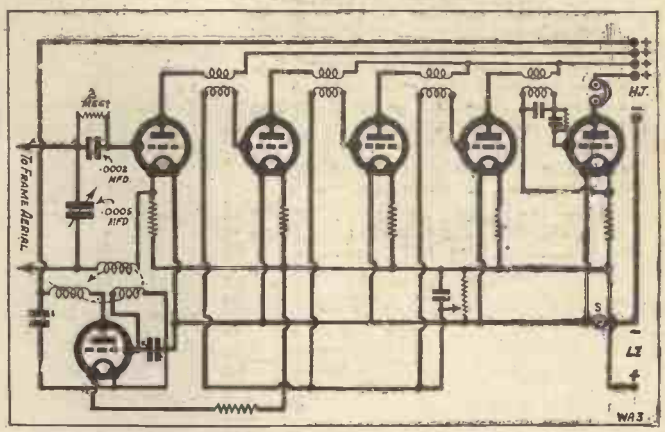
"My aerial, a single, is about 20 ft. high and 50 ft. long, earth of heavy stranded cable about 5 ft. long. My reaction condenser is not first class and I am changing this, and at the moment I am using low-cost valves of the 2-volt, ·06 type. Continentals, station after station, come in well, but I am unable to resolve other British stations when 2 L O and 5 G B are working.

"Such results are of course quite ordinary, but I venture to say that it was not predicted that K D K A would have been received without an aerial under the following conditions:

"I wound a coil with 20-gauge bare copper wire, 14 turns on a 3 in. diameter former, and connected the 9th turn to the base pin, leaving 5 turns for reaction. With the flex lead from the ·0003 variable to the 14th turn (that is the top), centre-tapped coil removed from set, and flex from fixed condenser disconnected and hanging loose, K D K A came in at fair headphone strength, and with flex from the fixed condenser joined to the aerial lead itself free from the set connections I got very good headphone strength, sufficient, in fact, to operate a Lissen loud-speaker unit. There was very little interference and hardly any atmospheric effects, every word being clear and distinct. This was, I believe, on Thursday night, February 2nd, time about 12.45. The strange part of it to me was that I could get no results whatever if I placed a centre-tapped

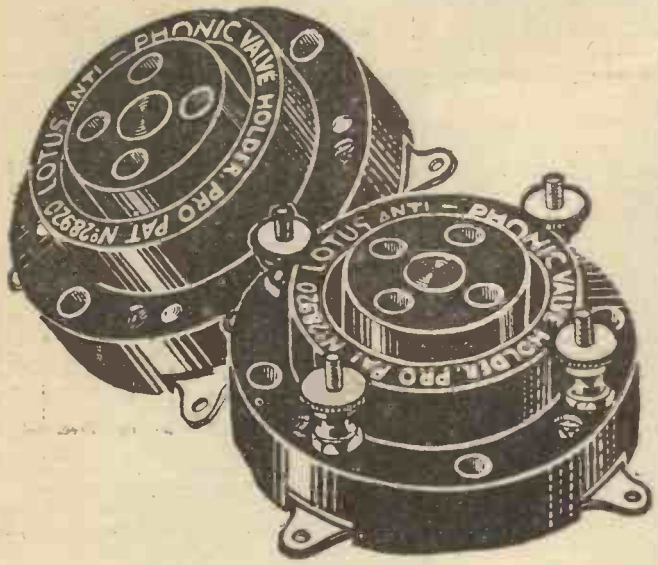
(*Continued on page* 202.)

A SIX-VALVE SUPER-HET.



The correct connections for a six-valve super-het are shown above.

In last week's "What is Wrong?" diagram, part of the H.T. battery was shorted, there was no "2nd detector," the tuning condenser was ten times too large, and the by-pass condenser should have been connected to the slider of the potentiometer. Also a loud speaker was shown, though no L.F. amplification was provided, and it is usual (though not essential) in such circuits to allow for reaction on to the frame aerial.



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Lotus Valve Holders cut out all microphonic noises. They produce pure, clear reception, absorb shocks and protect the valves.

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NO VALVE LIKE IT

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 200.)

aerial coil of any value in the position allocated to one in the original lay-out."

"The reason of this achievement under these strange conditions may be quite simple to an expert, but I have a lot to learn about wireless, and I wondered whether I had in my experimenting unconsciously stumbled across something which may be interesting?"

What was happening in this case was that you were in effect cutting out the first valve and receiving the short waves directly on the detector portion of the set. It is a peculiarity of short-wave signals that they hop across space in a most amazing way, so that even if the aerial lead is only brought quite close to the coil they pass across the intervening space, which forms a kind of natural condenser, and find their way to the grid circuit. As your 9-turn coil was tuned to K D K A, the signals were impressed upon the grid of the detector valve and thus operated your telephones in the ordinary way.

When the leads from the aerial were joined to the ·0002 mfd. fixed condenser at the point where this is tapped to the grid coil you were in effect switching out the H.F. valve, but when you plugged the coil in the centre-tapped aerial holder the aerial was connected through this coil to earth and most of the signals choose this path instead of the alternative path via the short-wave coil in the detector.

"P.W." TECHNICAL QUERY DEPARTMENT

Is Your Set "Going Good"?

Perhaps some mysterious noise has appeared and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers an *unrivalled* service.

Full details, including a revised scale of charges, can be obtained direct from the Technical Query Dept., "Popular Wireless," Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do: On receipt of this an Application Form will be sent to you free and post free, immediately. This application will place you under no obligation whatever, but having the form you will know exactly what information we require to have before us in order to solve your problems.

Your experience constitutes an interesting instance of how powerful is the penetration of the short wave, even where the aerial system is anything but conventional, and similar instances of short-wave peculiarities are coming to light daily. As this is your first three-valve set we should like to take this opportunity of congratulating you [illegible]

THE POSITION OF THE LOUD SPEAKER.

"Old Stager," (Merstham, Surrey).—"We have been happily married for more years than I care to remember, but now we are falling out about the position of the loud speaker! Both my wife and myself are musical enthusiasts, and there is not much played at 2 L O that one of us does not listen to, one way or another. But whereas I like the loud speaker placed on the table in the middle of the room (loudest), my wife insists that it sounds better when it is placed near the window. I cannot convince her that the position of the loud speaker has no effect upon the reproduction. (Possibly you know what women are?) So that if you would write to me I can assure her that her idea is all nonsense, and I should be able to have the

(*Continued on page* 204.)

ADVERTISEMENTS

As far as possible all advertisements appearing in "P.W." are subjected to careful scrutiny before publication, but should any reader experience delay or difficulty in getting orders fulfilled or should the goods supplied not be as advertised, information should be sent to the Advertisement Manager, "Popular Wireless," 4, Ludgate Circus, London, E.C.4.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 202.)

loud speaker as near to me as she has it to her, and peace will thus be restored in our once happy home."

In a great many instances the position of the loud speaker *does* alter the "tone" of the reproduction. This is on account of the fact that the sound waves set up by the loud speaker are reflected by neighbouring surfaces. And the character of this reflected wave will obviously be different if the sounds reflect from a perfectly flat surface, such as a wall, than when the surface is a broken one such as perhaps a heavy curtain or other soft furnishing material. It is therefore quite probable that in your case there is a scientific explanation for the difference noted by your wife.

(We do not go so far as to say, however, that there is any need to draw your wife's attention to this fact. We do know what women are!)

THE BARGAIN HUNTER.

E. K. (Canonbury, London, N.).—"The boy is very keen on wireless, but the other Saturday he spent a shilling on a big choke (apparently ex-Government) which he picked up on a stall in the Farringdon Road. The man who sold it to him said he could 'protect his loud speaker with it,' whatever that means, but although he told the boy some story about connecting it in the place of the loud speaker we have not so far succeeded in making any use of it. It is marked 50H, and it appears to be O.K. because you can hear clicks from it when a battery is connected across it with the telephones. Is there any use to which we could put it on the set?"

Apparently you have got a bargain, for if it is a good choke it is certainly exceedingly cheap at a shilling, and it *can* be used to protect the loud-speaker windings as stated. In a great many sets the H.T. current passes from the battery through the loud-speaker windings to the plate of the valve. This main current does not operate the loud speaker, but is, from the loud speaker's point of view, so much waste.

Output Filter Connections.

What causes the sound is the *variation* in this current, and by means of the L.F. choke we have a method of operating the loud speaker by the variations without the necessity to pass a heavy, steady current through the windings. Thus the loud speaker is relieved of a comparatively heavy load, and if long leads are used the danger of leakage across these leads is entirely obviated. In fact, there are several distinct advantages about the method, which is called "filtering" the loud-speaker output.

In addition to the choke, however, you require a large fixed condenser of one or two, or more, mfds., and then all you have to do to get the advantages of the filter is to connect up as follows:

Disconnect the loud speaker from its terminals and join the choke across these. Now join one side of the large fixed condenser to that side of the choke which is connected to the plate of the last valve. Join the remaining terminal of the large condenser to one side of the loud speaker. The remaining side of the loud speaker is now joined to any point of the set connected to the filament of the last valve, probably H.T. negative or L.T. plus, or earth.

If you draw a sketch of this arrangement you will find that the steady H.T. current now passes through the windings of the choke direct to the plate of the valve. There is an alternative path to the plate from H.T. negative via the fixed condenser and the loud speaker, but the fixed condenser is an effective barrier to any direct current getting through this way. Steady current passes easily through the choke, but the varying current caused by the speech frequencies has great difficulty in overcoming the impedance of the choke, and therefore such variations in current find a much easier path through the alternative route consisting of the fixed condenser and the loud speaker. In this journey they operate the loud speaker just as well as if it were connected in the plate circuit of the valve. If you try the method we feel convinced that you will be delighted with the results.

BACK NUMBERS OF "P.W."

J. W. F. (Hounslow).—"Where can I get back numbers of POPULAR WIRELESS?"

Application for back numbers should be made to The Amalgamated Press, Ltd. (Back Number Dept.), Bear Alley, Farringdon Street, E.C.4, Price 4d. per copy.

NEWS FROM SAVOY HILL.

(*Continued from page* 178.)

at 8 p.m. will be relayed from Carlisle Cathedral. 5 G B listeners will hear a symphony concert during the afternoon, and Bach's Cantata for Easter Day, followed at 6.30 by a service from Birmingham Cathedral. The evening concert will consist of music by the Wireless String Orchestra for London, and a programme by the Birmingham Police Band for 5 G B.

An attraction from London on Bank Holiday, Easter Monday, will be a burlesque pantomime by Mabel Constanduros filling the first part of the evening programme, after which the Wireless Military Band, under Mr. Walton O'Donnell, will give a programme of popular music, and there will, of course, be dance music until midnight. The alternative from 5 G B consists of a concert of chamber music and a play until 10 p.m., when there will be dance music until 11.15.

Newcastle's Scandinavian Programme.

The many Scandinavian interests on Tyneside have induced the Newcastle station to arrange a special Scandinavian Programme on Tuesday, April 10th. Mr. Edgar L. Bainton, of the Conservatoire of Music, Newcastle, is to be the conductor, and the artistes include the distinguished Norwegian pianist, Madame Johanne Stockmarr, and Miss Gundrun Nordraak, both of whom will be making their first appearance in the local studio. Madame Stockmarr will include among her items Grieg's Concerto and pieces by Sibelius. Svendsen, Sinding and other Scandinavian composers.

Liverpool Features.

Merseyside listeners have their own special programme from the Liverpool Station in the last part of the evening transmission on Monday, April 16th, when a pianoforte recital will be given by Norman Henderson, the brilliant young Liverpool pianist, who has already achieved fame both in this country and on the Continent. There will also be two short plays, "The Family Group," a farcical comedy, the scene of which is set in a photographer's studio, and "Witch-Wife," which is a play of terror, the action taking place in a Devonshire farm-house in the year 1697.

The first of these plays is by Mabel Constanduros, while the other play was written by her in collaboration with Michael Hogan. Songs will also be sung by Constance Astington (soprano), and some violin solos played by John P. Sheridan, who will be using an instrument made by Stradivarius.

Music from Leamington.

The first concert of the season from Jephson Gardens, Leamington Spa, will be broadcast from 5 G B on Tuesday, April 10th, when a programme of music will be given by the Band of H.M. Royal Artillery (Mounted), conducted by Mr. T. J. Hillier. Their items will include a suite of Three Light Pieces (Fletcher), the Overture to "The Sicilian Vespers," and a selection of "Songs of the Fair" (Easthope Martin). Songs will also be sung by Walter Glynne (tenor), and other items given by Myra B. Johnson (entertainer). A permanent line has been installed between the Birmingham studio and Leamington Spa.

SHORT-WAVE NOTES.

By W. L. S.

THE use of H.F. amplication for short-wave receivers seems to be achieving a considerable measure of popularity among those who are enthusiastic enough to take the necessary trouble.

True, it necessitates one or more extra tuning controls, which make really quick searching rather difficult, but there is a great deal of "certainty" in the performance which such a set will put up.

One may always argue that all the signals which are available will make themselves heard on an ordinary oscillating detector, but with a set incorporating H.F. stages greater selectivity can be obtained, and signals which would be smothered in mush on the average two-valver may be cleared of all such noise and received intelligibly. The short-waver with one or two stages of H.F. is the ideal set for those who wish to receive short-wave broadcast with something more than ordinary regularity.

It is surprising now to reflect that it is only a matter of about a year since it was believed impracticable to obtain any high-frequency amplification of signals below about 150 metres! This is the more surprising in view of the fact that perfectly ordinary circuits will now do the work; as a matter of fact, the straight circuit has been found considerably more successful for this purpose than any of the freak or unusual circuits that have yet been tried.

Effect of Locality.

Different localities have greater effects upon short-wave work than upon ordinary broadcast reception. I have recently moved from a rather low and screened situation to a locality which, while not particularly high, is at the same time comparatively open and free from screening. The difference in reception is amazing.

On the whole, distant stations do not seem to be received at better strengths than before, but quite a different set of stations is heard. Several of the old familiars are now inaudible, and stations that were often eagerly listened for, but never heard, at the old station now come through with great vigour.

Transmission, strangely enough, does not seem to have been affected to such a great extent. The same directional properties seem to persist; the aerial still runs due east and west. Strong reports are still received from the same stations as before.

However, as the apparatus has only been installed for a matter of three weeks, it is probably somewhat premature to try to sum up the conditions.

I am of the general opinion that a good earth is preferable to a counterpoise for short-wave work. By a good earth is meant a large, buried plate or mat, not a water-pipe connection, and a short lead is certainly desirable.

For those who are not in a position to instal this arrangement, I certainly recommend a counterpoise, but it is well worth one's while to try an earth in comparison with the other before making a final decision.

THE "HARTLEY" ONE-VALVER.

(Continued from page 191.)

The success of a little circuit like this depends very largely upon proper adjustment of the valve, and you must be prepared to spend a little time securing just the right combination of high-tension voltage and filament current for the best signals and smoothest reaction control. You are likely to find with most valves that a somewhat higher value of H.T. will be necessary than is usually the case with reaction circuits, smooth control being usually obtained with something like 60 to 65 volts on the average.

Tuning Without Interfering.

Searching with a set of this type requires just a little practice to get the hang of running over the scale of the tuning condenser without actually oscillating, yet keeping the set on the very edge of oscillation, so that it is in its most sensitive condition. It is worth while to obtain this knack, and once acquired you will find that there is considerable satisfaction in feeling that you have learnt the method employed by all skilful operators, and one moreover which ensures your picking up any station within the limits of the set, yet causing no possible interference with anybody.

Finally, just a word as to the results which you will get. On test, this little set proved to be very good and noticeably above the average of single-valve reaction circuits, and quite a long string of foreign stations were logged with it.

Regarding Results Reports.

Now, I always think that it is very misleading to give a string like this without comment, and to leave the constructor to imagine that he will be able to duplicate these results immediately. It must be remembered that on test the set is handled by a very skilled operator, who usually has at his disposal a highly accurate wavemeter for identifying stations quickly so that in a very short time he can make a really wonderful "catch."

As a matter of fact, to give such a report without a really definite warning is rather misleading, and I propose to try and give the reader some idea of what he is likely to do under his own conditions and without too great a degree of skill in operation.

Well, with a reasonably efficient outdoor aerial, it should be quite easy to hear at least a dozen foreign stations at clear 'phone strength provided that you do not live in a particularly bad locality, either with regard to reception conditions or with regard to bad jamming from a very nearby local station. On the longer wavelengths there should be something like a further six stations which will come in at good and clear headphone strength, so that you may quite well expect something like twenty stations in the course of time as you gain skill in manipulating the controls.

NEXT WEEK.

Full details will be given of

THE "INDUCTO-CRYS,"

something new and highly efficient in the way of crystal sets.

ORDER YOUR COPY NOW.

TECHNICAL NOTES.

(*Continued from page* 178.)

Aerial Overhaul.

After a receiver has been in operation for some time it will generally be found that reception can be much improved by overhauling the aerial system. This is specially true in the winter when, owing to the usually damp conditions and the prevalence of fogs, the insulators are liable to be covered with a more or less conducting film of soot and other dirt. In most cases, it will be found that merely wiping the insulators with a dry cloth will bring about a noticeable improvement in reception. Various cleaners may be used for the insulators, the commonly recommended ones being alcohol (methylated spirit), benzene, and carbon tetra-chloride (separately, of course—not mixed together). When the aerial is lowered for the cleaning of the insulators, the aerial wire itself should be carefully examined to make sure that it has not become rotten at any part, otherwise there may be a breakage when it is again hoisted, and it may be inconvenient to get certain parts down again. Most listeners are apt to neglect their aerials, imagining that once installed an aerial should last and function efficiently for ever. As a matter of fact, the aerial ought to have more attention than some of the other parts of the set, as it is exposed to all kinds of destructive influences. An aerial overhaul is a job which is commonly shirked and put off till some other day, but as a matter of fact, it is well worth while, not only for the improvement in the loudness of local stations which may thereby be obtained, but for the great increase in sensitivity if you go in for distant reception.

Winding Wire.

Talking about wire, you know how annoying it is when winding a coil, or one of the windings of a transformer, to come across an awkward joint in the wire which upsets the evenness of the layers (in the case of a transformer winding) and leaves you with a horrible suspicion that the covering may be chafed and that trouble may be in store.

It would certainly be a great advantage to be able to obtain an absolutely continuous length on a reel without any joint and also, in the case of enamelled wire, to be sure that the enamel was really pliable and not liable to crack.

The "KEW" enamel copper wire made by Kent Bros. Electric Wire Company and E. H. Phillips, Ltd., is guaranteed to be in continuous lengths per reel without any joints and the copper wire to be absolutely dead-to-gauge.

The enamel covering is claimed to be entirely free from liability to crack or peel and the thickness of the covering does not vary throughout the entire length of a reel of wire. Moreover—and this is a very important point—the enamel covering is free from pinholes: you will appreciate the value of this when using enamel wire for fairly high voltages.

A Useful Dodge.

A reader in the Isle of Wight, referring to my recent note about holding short lengths of busbar by means of a pair of pliers, has kindly sent me a draughtsman's ruling pen which he says he finds very useful in place of the pliers. When you want to solder a short piece of busbar in position in some more or less inaccessible place, you simply insert the length of wire at a suitable angle in the jaws of the draughtsman's pen, tightening up the screw and then holding in position whilst the soldering is done.

My correspondent states that the idea is not new, but that he has himself found it very useful. As a matter of fact, I believe I mentioned this idea in this journal some considerable time ago, and I know that the dodge is one which is often used by experimenters and constructors. At the same time I am, of course, very much obliged to my correspondent for his letter and to all the numerous readers who, from week to week, send me useful suggestions. In fact, many of the most useful ideas which I am able to pass on this way come originally from readers who are kind enough to write and send them to me.

Sound and Sight.

One of the most remarkable things about radio is the immense stimulus which it has given to developments in all kinds of related sciences. I am thinking particularly, at the moment, of the developments in the recording of sound by means of light and the simultaneous reproduction of cinematograph pictures and sound.

The recording of the sound is done by means of a "light" process on a part of the film and the reproduction is effected by means of a beam of light projected through the film and varying in intensity as the different parts of the film pass through the machine. The light, of course, falls upon a photo-electric device by means of which variations in an electric current are set up these being amplified in the usual way.

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