

(May 10, 1922)

ELECTRON TUBE AMPLIFIER USING 60 CYCLE ALTERNATING CURRENT
TO SUPPLY POWER FOR THE FILAMENTS AND PLATES

(Abstract of paper on this subject by P.D. Lowell to be published in Journal of American Institute of Electrical Engineers, probably the July number)

The Bureau of Standards of the Department of Commerce has developed in an experimental way a radio receiving set in which the usual batteries are eliminated, and connection is made instead to the ordinary electric lamp socket. The apparatus is an amplifier, which constitutes a receiving set when used with a simple tuner. It may be used with any type of antenna, i.e., with the ordinary elevated wire antenna, a coil antenna, or special forms of antenna. For more details than are given herein, the full paper should be consulted in the forthcoming number of the Journal A.I.E.E. A statement in the newspapers that the full paper would be published in May was in error.

The storage battery ordinarily required to light the filaments of the electron tubes is a drawback to the general use of radio sets. The battery must be charged from time to time, it is bulky and heavy, and the acid in it is a source of danger and damage in a household. In this amplifier both the filament storage battery and the dry battery used in the plate circuit are replaced by a special transformer and an electron-tube rectifier and accessories, the aggregate bulk and weight of which is less than that of the batteries. It uses a small 10-volt dry battery in the grid circuit which is required to deliver only a very small current and should have a life practically equal to the life of the battery if not used at all, i.e., at least several months. In order to reduce the hum of the alternating current, there are more adjustments to make than in the ordinary amplifier supplied from batteries.

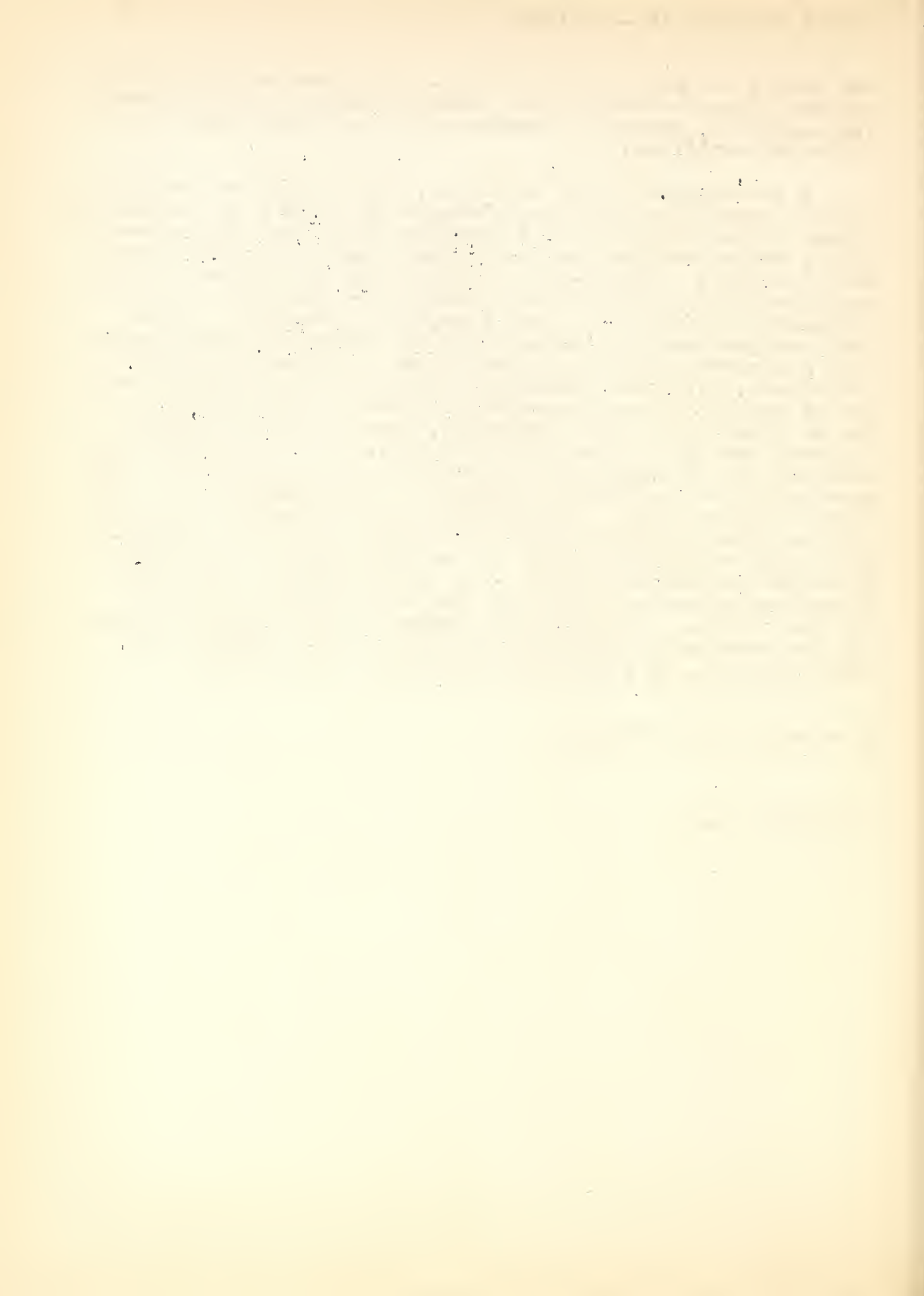
Of the parts which in this amplifier replace the storage battery in the ordinary amplifier, the special transformer is the only one the cost of which would approach the cost of a storage battery. The cost of the transformer would probably be mainly the labor of assembling. A statement was made in an early announcement of this amplifier that the storage battery is the most expensive part of the homemade radio receiving set. This may have been somewhat misleading, as the aggregate cost of the electron tubes in amplifiers which employ several tubes

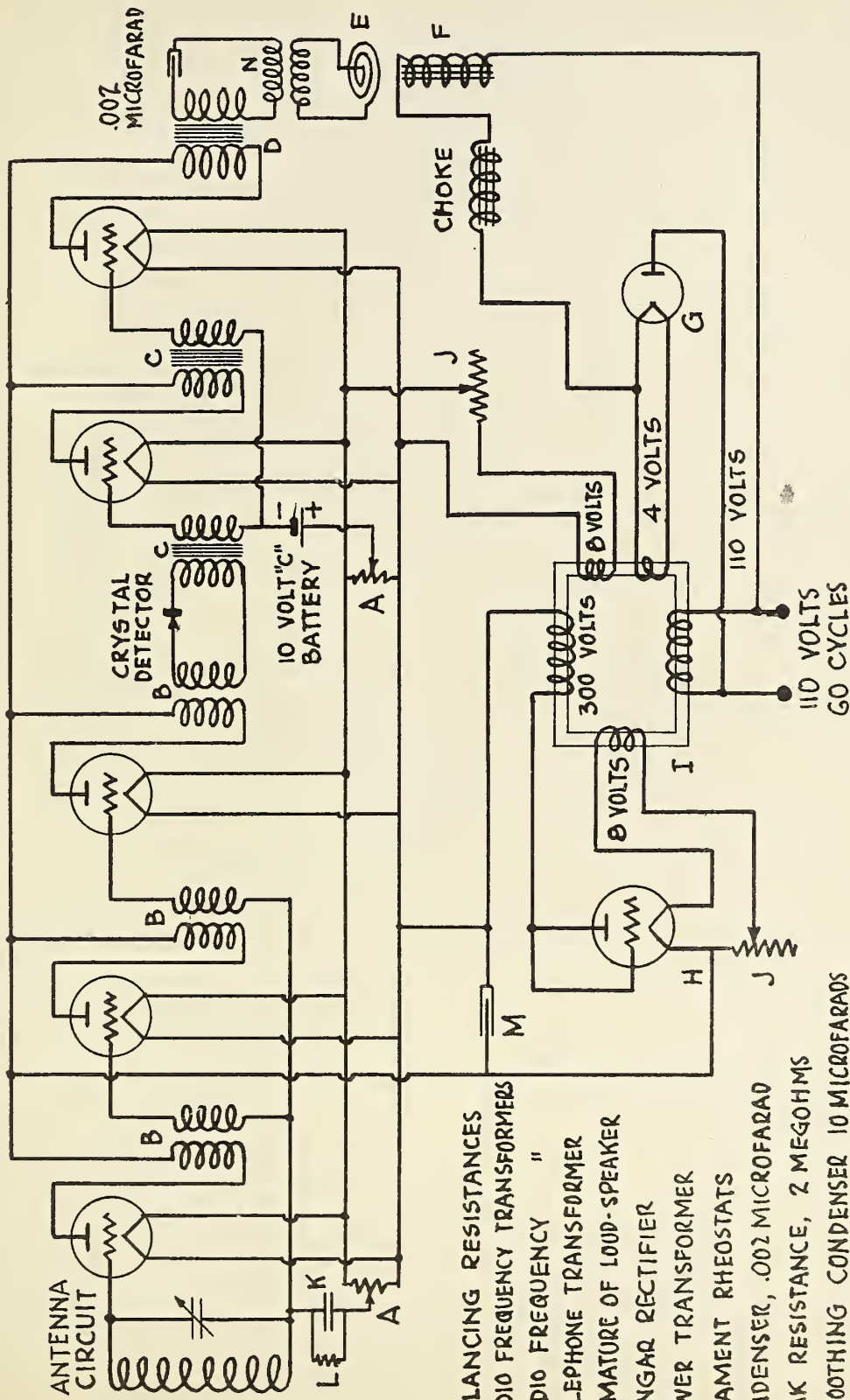
may exceed the cost of the battery. The cost of the battery, however, plus the cost of the usually necessary battery charging apparatus, generally exceeds any other item, even in an elaborate amplifier.

A few details of the amplifier, which utilizes 60-cycle current supply for both the filaments and plates of the electron tubes, are as follows: This amplifier has three radio-frequency stages and two audio-frequency stages, and uses a crystal detector. The 60-cycle current when used in an ordinary amplifier circuit introduces a strong 60-cycle note in the telephone receivers and makes reception impossible. This has been practically eliminated by the balancing resistances, grid condensers and special grid leaks of comparatively low resistance, telephone transformer in the output circuit, and use of crystal detector instead of electron tube detector. In the final form of the amplifier, there is only a slight residual hum which is not objectionable. The amplification obtained with ac supply was as good as that obtained with the same amplifier used with dc supply. The complete outfit is compact and portable. The amplifier as constructed operated most satisfactorily for wave lengths from 200 to 750 meters. This range was determined by the working range of the radio-frequency transformers used. By using suitable radio-frequency transformers, this range can be extended to receive any radio waves. The circuit diagram of the outfit, including the means of supplying current to a loud-speaking telephone receiver, is given in the attached illustration.

Attached: Circuit diagram

Washington, D.C.





- A-BALANCING RESISTANCES
- B-RADIO FREQUENCY TRANSFORMERS
- C-AUDIO FREQUENCY " "
- D- TELEPHONE TRANSFORMER
- E- ARMATURE OF LOUD-SPEAKER
- G- TUNGAR RECTIFIER
- I- POWER TRANSFORMER
- J- FILAMENT RHEOSTATS
- K- CONDENSER, .002 MICROFARAD
- L- LEAK RESISTANCE, 2 MEGOHMS
- M- SMOOTHING CONDENSER 10 MICROFARADS
- N- STEP DOWN TRANSFORMER FOR LOUD-SPEAKER
- H- PLATE VOLTAGE RECTIFIER

Five-stage amplifier, using crystal detector, and 60-cycle alternating current to supply power for the filaments and plates



