

RADIO

THIRD ELEMENT IN THE VACUUM TUBE

Grid Added to Fleming Valve by Dr. Lee DeForest Was a Big Improvement.

Any device which will pass electricity in one direction and will shut off or partially obstruct the flow in the opposite direction is termed a rectifier, because when connected in the path of an alternating current it will suppress one-half of each cycle and therefore the current will be converted by pulsating direct current. A rectifier also is said to possess unidirectional conductivity, meaning, of course, that it will conduct electricity in one direction only.

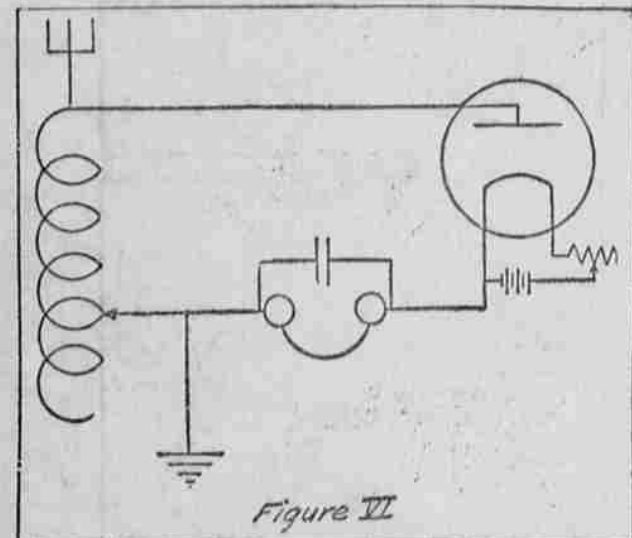


Figure VI

Due to its ability to rectify high frequency alternating currents the vacuum tube can be used in a radio receiver as a detector.

Fig. VI is a simple radio receiving circuit employing this type of two-element vacuum tube in place of a crystal detector.

Dr. J. A. Fleming of London, England, was the first to use a two-element tube of the type just described as a medium of rectifying high frequency radio currents. Fleming called his product a valve because it would let current flow in one direction but not in the other direction. The Fleming valve as a forerunner of the vacuum tube of today marked a very important step in the progress of the radio art.

The Fleming valve, however, in its original form was not much better than other forms of rectifiers then in use and, owing to the greater ruggedness and ease of manipulation of the latter, did not come into general use as a detector.

Dr. Lee DeForest, an American, greatly improved the Fleming valve by adding a third electrode called the grid, which served the function of a control element and thus made it possible to utilize the tube for receiving signals and to control more powerful local currents. The three-electrode vacuum tube of DeForest is the tube used so extensively today.

The third element which is called a grid and from which the three-electrode vacuum tube derives its name, was placed by DeForest between the filament and the plate in the path of the electrons. The grid is a perforated plate or mesh of fine wire through the openings of which the electrons must pass in their journey from the filament to the plate.

Fig. VII is a diagrammatic sketch of the circuit of a three-electrode vacuum tube and is identical in the same as the sketch in Fig. VI for a two-element vacuum tube with the addition of the grid.

The pin oak will drop. The pin oak in the fall has brilliant foliage and is especially desirable where a trunkless tree is wanted that is, where it is desired to have the foliage extend from the ground to the top of the tree. The tendency of the limbs of the pin oak is to drop.

Leaves It to Judge. "I would much rather you did not," replied a man at Shoreline (Portland) county court when Judge Oliver remarked, "All right, you will keep quiet."

Worth Remembering. Don't worry if you stumble. Some day you'll be the only thing that can't fall down.

dition of the grid circuit F-J-K-L. The battery in the grid circuit is called the "C" battery.

As a start let us suppose that "C" battery voltage is zero. The operation of the three-electrode tube would then be exactly like that of a two-electrode tube, just as though there were no grid. Like a two-electrode tube when the filament C-D is brought to incandescence by the "A" battery a steady stream of electrons will be given off, which will be drawn over to the plate E. Plate E is maintained at a positive potential with respect to the filament by the "B" battery.

Now if the grid is made positive with respect to the filament, it is possible to accelerate the flow of the electron stream from the filament to the plate. If the grid is made negative with respect to the filament, the flow of the electron stream from the filament to the plate will be retarded. Or in other words, by making the grid positive or negative with respect to the filament, it is possible to increase or decrease the space charge. The third electrode or grid thus offers a means of controlling the current in the

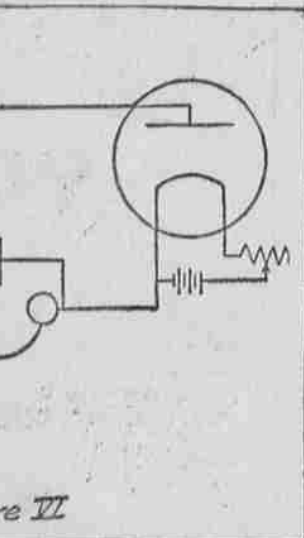


Figure VII

plate circuit without changing the plate potential or the filament temperature.

The characteristic curve of a three-electrode vacuum tube is shown in Fig. VIII. This diagram shows the relation of grid potential to plate current, assuming that the filament temperature and plate voltage remain constant.

It can be seen from the curve that by applying a negative potential of value E to the grid, the plate current can be reduced to zero. The negative charge on the grid will have the effect of a negative potential E with respect to the filament, making the negative charge so strong around the filament that the electrons cannot leave it. On the other hand, if a positive potential of value F is applied

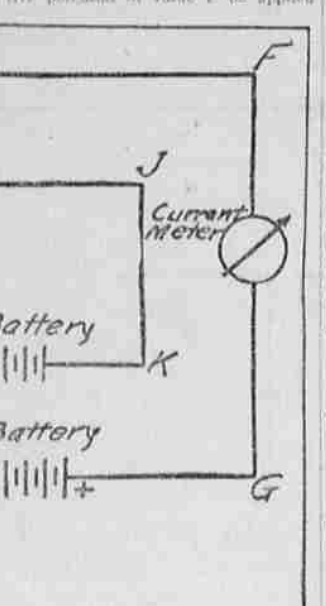


Figure VIII

to the grid with respect to the filament, the maximum or saturation current will flow in the plate circuit. Applying a positive potential greater than F to the grid with respect to the filament will not cause an increase in the

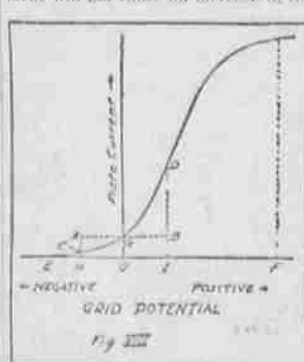


Figure IX

plate current because the electrons given off are being attracted to the plate and grid.

When the grid is maintained positive with respect to the filament a small current will flow in the grid circuit. Because of its being positive it will attract the electrons and have a charge given up to it by them.

Churches

All church notices must be in the hands of the editor by 4 p. m. Friday afternoon.

LATTER-DAY SAINTS—Regular services at the Tabernacle, Sunday school commences at 10:30 a. m. Sacramental services at 12:15 o'clock p. m. Mutual Improvement Association, Sunday at 7:30 p. m. Priesthood and Relief Society meeting at 7:30 p. m. Primary association at the Tabernacle Tuesday, for children, 4 p. m. Primary association on north side at the little chapel, for children, Thursday, at 4 p. m. Religion class at Tabernacle Thursday at 2:30 and 4 p. m. Religion class at the chapel on north side at 2:30 and 4 p. m. Tuesday. Regular choir practice at the Tabernacle Thursday at 7 p. m. The public is cordially invited to attend any or all of our services.—David I. Stoddard, Bishop.

First Church of Christ, Scientist—Corner of First and Washington, Sunday morning service at 11 o'clock. Subject: "Is the Universe, Including Man, Evolved by Atomic Forces?" Sunday school at 9:45 a. m. Wednesday evening meeting at 8 o'clock. Reading room open to the public every Monday, Wednesday and Saturday from two to four. All are welcome to attend our services.

Christian Church—Bible school meets at 9:45. There is a class for everyone. Christian Endeavor, both junior and senior, at 7:00 o'clock. Teaching by the pastor at 11:00 and 8:00. You are most cordially invited to all services.—O. W. Jones, minister.

Presbyterian Church—When riches take wings, when customers pass by on the other side, when sorrow comes, when the physician shakes his head slowly and you know there is no hope—God remains. The only stable thing in the universe is God and those who worship Him truly receive the rewards of a just and righteous ruler. God is ready to help you if you say so. Come in the regular services on Sunday with the weekly schedule running for the last Sunday until fall. The music will be in charge of Mrs. A. L. Richardson and the minister will preach. Come and bring others.—W. C. Ross, minister.

The First Methodist Episcopal Church—Bible school will be the place for the holding of the evening service. It is a beauty spot. No place could be more appropriate for a good service of prayer and praise and good fellowship than the park. It will be opened by a song service at 7:00 o'clock, and will last sixty minutes. Please note the change in the hour. Autos will be in waiting at the church at 6:15 for all who wish to go. The Sacrament of the Lord's Supper will be administered at the forenoon and vice. Bible school at 9:45. Claude Cooper, superintendent. The Epworth League will be held at an hour to accommodate the park service.—G. H. Quigley, minister.

Lutheran Church—Services Sunday morning at 11:00 o'clock.—Rev. Hansstead, pastor.

First Baptist Church—Sunday school at 10 a. m., G. R. Hagan, superintendent. Sermon, 11 a. m. Subject: "The Rich Fool." Good music by choir and congregation. Mrs. F. S. Jester, director. Young People's Society at 7 p. m. Miss Daisy Rolan, leader. Some special music by Miss Robbs and Mr. Butler. The attached union was held last Sunday. Sermon at 8 p. m. Subject: "Something for Everybody." Songs and short talks before sermon. Rev. H. L. Loe of Cove will give his sermon lecture at the church Tuesday evening, June 27. The building committee has made fine progress with the parsonage this week. Let every member come forward with work or cash in the subscriptions that there may be no delay. There is room for all.—A. R. Sifton, Minister.

Sermonette

RADIOS. Realizing it or not, each of us constantly sends forth into space the characteristics of his own personality. For good or for ill the messages we send out are "picked up" by those similarly in tune with us, even though they be at the ends of the universe. Not more than this: The great Central Sending Station is the Divine Human mind at the very center or inmost of all that outwardly is. From Him—the First Broadcasting Station of all—constantly radiate messages of goodness and truth, of courage and love. Every time you begin these unbroken radiations of his intelligence and power have vibrated the "antenna" of the listening soul, charging it with the life and being. When you are going to sleep to-night, type out your mental broadcast.

JAPAN TO SEEK NEW OIL FIELDS

(By Associated Press) TOKIO, June 16.—The department of agriculture and commerce has decided to start systematic investigation into the possibilities of the oil fields in this country. For this purpose an oil field investigation party will shortly be organized, consisting of engineers, experts and assistants. The party will start on a tour of inspection in the early part of June, beginning with Akita and Aomori Prefectures. On the basis of the results of

the investigations thus conducted, the government will formulate its future plan of oil control, according to the newspaper Chuo, in view of the increasing demand for oil for use in war and other traffic services.

The Beaten Road. Sincerely is like traveling in a plain, beaten road, which commonly brings a man sooner to his journey's end than by-ways, in which men often lose themselves.—Thilston.

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