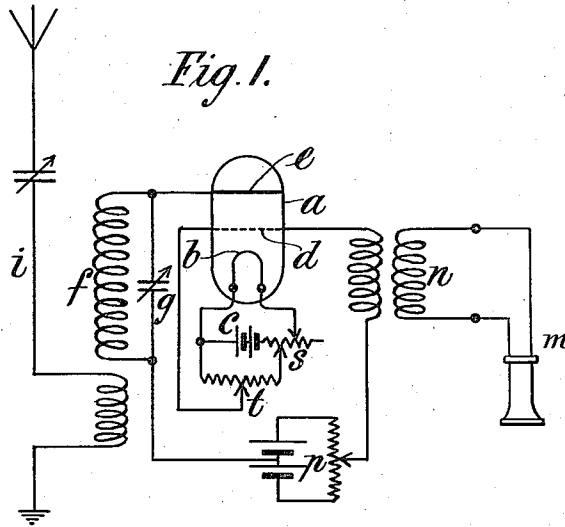
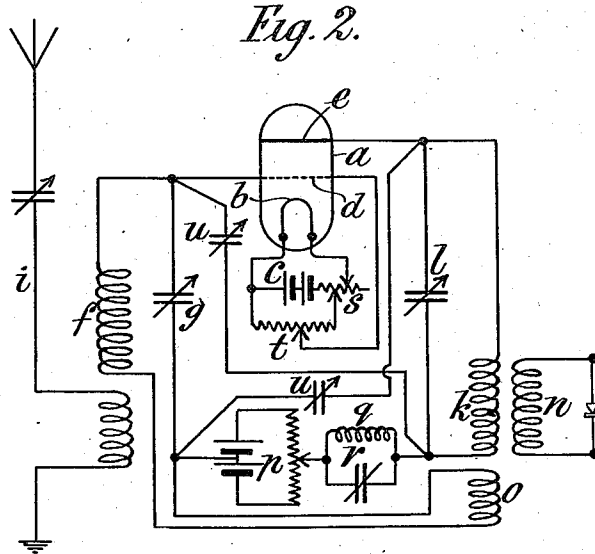
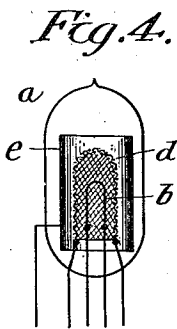
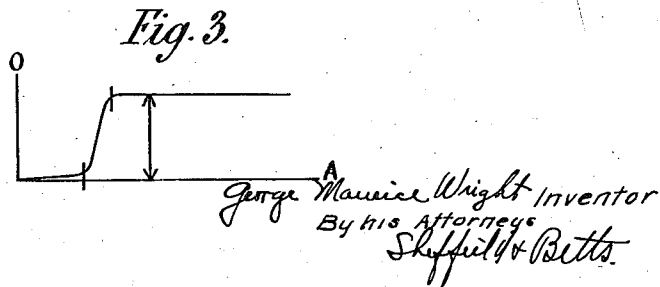


G. M. WRIGHT.
VALVE RECEIVER FOR WIRELESS SIGNALS.
APPLICATION FILED MAR. 13, 1917.

1,243,789.

Patented Oct. 23, 1917.



UNITED STATES PATENT OFFICE.

GEORGE MAURICE WRIGHT, OF LONDON, ENGLAND, ASSIGNOR TO MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

VALVE-RECEIVER FOR WIRELESS SIGNALS.

1,243,789.

Specification of Letters Patent.

Patented Oct. 23, 1917.

Application filed March 13, 1917. Serial No. 154,580.

To all whom it may concern:

Be it known that I, GEORGE MAURICE WRIGHT, a subject of the King of Great Britain, and resident of Marconi House, Strand, London, England, have invented a new and useful Improvement in Valve-
Receivers for Wireless Signals, of which the following is a specification.

This invention relates to receivers of wireless signals which comprise a vacuous vessel containing a heated filament, a grid and an anode.

According to this invention I connect the oscillatory circuit carrying the oscillations to be detected to the grid and anode, and I provide means for applying a steady potential to the grid with respect to the filament, and I am thus enabled to limit the current which can flow in the anode circuit.

One important result of this will be that the sounds caused by atmospherics in a telephone will be reduced and will thus be prevented from overpowering the sounds caused by the signals which it is desired to detect.

With this arrangement the space between the grid and anode constitutes a detector or conductive coupling of extreme sensitiveness for very small values of limiting current, the limiting current being decided by the brilliancy of the filament and the potential at which the grid is maintained with respect to the filament.

I prefer a brightly glowing filament and a potential adjusted to give a very small limiting value to a dull filament and a potential of a higher value.

A very small potential difference between the anode and grid is necessary for adjustment, at the most a small part of a volt as distinguished from tubes employed for magnifying. I find that the tubes work best at the highest possible vacua and I prefer grids of a fine mesh.

My invention is illustrated by the accompanying drawings, Figure 1 of which is a diagram showing my invention adapted for use as a detector and Fig. 2 is a modification in which two tuned oscillatory circuits are employed connected to each other by a conductive coupling. Fig. 3 shows a curve of current for different potentials on the anode, the abscissæ A representing potentials and the ordinates O current. Fig. 4 shows a modified form of valve in which the grid

and anode are so formed that they completely surround the filament.

In Fig. 1, *a* is a vacuous tube containing a grid *d*, anode *e* and filament *b* heated by battery *c* in series with a resistance *s* for adjusting the brilliancy of the filament. Though the grid and anode are shown in the conventional manner, I prefer to so form the grid that it completely surrounds the filament, and the anode that it surrounds the grid. This construction is shown in vertical section in Fig. 4. An inductance *f*, coupled to an aerial *i* and shunted by a condenser *g*, is connected to the anode *e* and through a potentiometer *p* to the grid *d*, and is coupled to a telephone receiver *m* by coupling *n*. The grid *d* is also connected by a variable contact to a resistance *t* across the battery *c*. For a given position of this variable contact on the resistance *t*, a certain limiting current can flow across the space between *d* and *e* with a given brilliancy of the filament. This maximum current I call the saturation limit or saturation current. The circuits are so arranged that the brilliancy of the filament can be adjusted by *s*, the potential of the grid can be adjusted by *t*, and the most sensitive point on the rectifying curve can be utilized by *p*, so that signals can be heard in the telephone, the maximum strength of these signals being limited by the adjustment of *t*. That is to say, by varying the potential applied to the grid with respect to the filament, the operator can make only a small portion of the filament effective, and can secure a condition such that the current increase will quickly rise to a maximum the maximum amount of the current being limited at the same time as desired. This gives a sensitive detector for the incoming signals, but prevents overpowering noises from static disturbances.

In Fig. 2, signals in the aerial are transferred inductively to the circuit *f g*, and the space between the grid *d* and the anode *e* acts as a conductive coupling between the two circuits *f g* and *h l* by completing a circuit through *h, g, o*, potentiometer *p, o*, and *f* the circuit *h, l* being coupled to the detector circuit *n*. The limiting value of the current is controlled, as before, by *t* and the sensitive point is found by the potentiometer *p*. *g* is a choke coil and *r* a condenser shunting it, and *o* is a reaction coil for balancing ac-

cidental electro-magnetic coupling between the circuits. In place of c , or in addition, condensers u may be inserted, as shown, condensers u furnishing a discharge path
5 around k for stray oscillations of high frequency. The circuit is arranged to transfer the high frequency current through it to the detector circuit n with any required limitation of signals.

10 This is necessary since the strength of the received signals varies greatly and the operator cannot conveniently receive signals of more than a certain strength. Moreover, sounds caused by static disturbances might
15 otherwise be louder than the signals and overpower the latter. This limitation of the signals and other responsive sounds in the receiving circuit is obtained by varying the current in the filament b so as to control
20 the brilliancy thereof, and consequently the quantity of electrons which may be given off by the filament, as well as by varying the position of the contact at t to control the potential between filament b and grid g .
25 The latter adjustment is the preferred one and is used as far as possible, being more efficient, since the distinctness of the received signals is maintained practically unimpaired, although their maximum loudness is limited. This result is due to the
30 quick rise of the current to its maximum, the rate of increase of the current increasing with the brilliancy of the filament and the maximum current for a given brilliancy being determined by the position of the contact at t . The method of limiting the received signals by reducing the brilliancy of the filament is disclosed in British patent 8926 of 1915.

40 What I claim is:

1. In a three-element vacuum detector, comprising anode, grid, filament and heating battery, a resistance connected across the battery, and a conductor connected at one
45 end directly to the grid and at the other end by an adjustable contact to the resistance, said filament and heating battery being otherwise disconnected from said anode and grid.

50 2. The combination of a vacuum vessel containing a grid, an anode, and a filament, a battery connected to the terminals of said filament, a resistance connected across said battery, a conductor connected at one end
55 to said grid and at the other end to an adjustable contact on said resistance, in com-

bination with means for impressing the oscillations to be detected on the grid and anode only, all for the purpose described.

3. The combination of a vacuum vessel, 60 containing a filament, a grid, and an anode, means for heating the filament to varying degrees of brilliancy, a normally fixed potential applied to the grid and having a value of the same order as the potential 65 drop across the filament, means for adjusting this potential to obtain any required saturation limit, and an oscillatory circuit connected to the anode and to the grid, said adjusting means being connected to said 70 oscillatory circuit only at said grid.

4. The combination of a vacuum vessel containing a grid, an anode, and a filament, a heating battery connected to the terminals of said filament, a resistance connected 75 across said battery, a conductor connected at one end directly to said grid and at the other end to an adjustable contact on said resistance, and an oscillating system for receiving signals connected to said grid and 80 anode, said system including means for applying an adjustable potential across said grid and anode, said filament and heating battery being entirely disconnected from said system except for the connection of said 85 conductor directly to said grid.

5. The method of operating a vacuum container having a filament and anode therein, with a grid intermediate said anode and filament, which consists in impressing a con- 90 tinuous E. M. F. on said filament, impressing a portion only of said E. M. F. between the grid and filament, and impressing intermittent potential impulses across the grid and anode, but none between the filament 95 and grid.

6. The combination of a vacuum vessel containing a grid, an anode, and a filament, means for impressing a desired continuous potential across said filament, means for im- 100 pressing between said filament and grid a portion only of said continuous potential, and means for impressing oscillations to be received between said grid and anode only, the connections being such that no intermittent potential impulses are impressed on 105 said filaments.

In testimony that I claim the foregoing as my invention, I have signed my name this 16th day of February, 1917.

GEORGE MAURICE WRIGHT.