

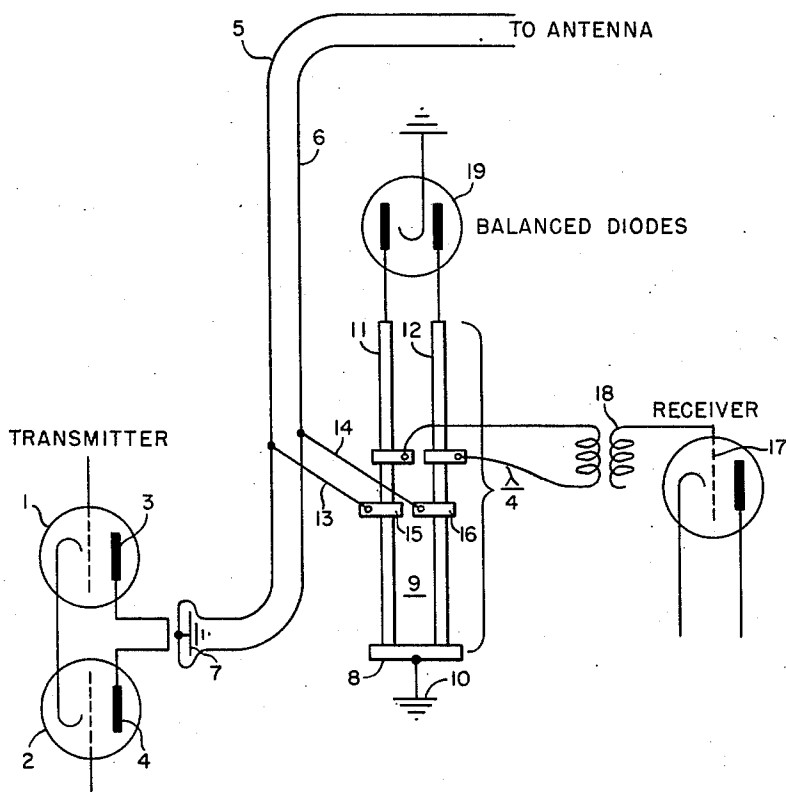
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IMPEDANCE CONTROL COUPLING AND DECOUPLING SYSTEM

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UNITED STATES PATENT OFFICE

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IMPEDANCE CONTROL COUPLING AND
DECOUPLING SYSTEM

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Original application March 29, 1940, Serial No.
326,640. Divided and this application February
13, 1948, Serial No. 8,264

2 Claims. (Cl. 333—13)

(Granted under Title 35, U. S. Code (1952),
sec. 266)

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This application is a division of application
Serial Number 326,640 filed March 29, 1940.

This invention relates to non-linear filter ele-
ments and particularly to a filter element adapted
to act as a high impedance shunt across a trans-
mission line at low potentials and as a low im-
pedance shunt for high potentials exceeding a
predetermined value.

It is accordingly a primary object of this in-
vention to provide a transmission line shunt
which acts as a high impedance for low poten-
tial line conditions and as a low impedance when
the line potentials exceed a predetermined value.

The invention comprises a quarter-wave line
section, shorted at one end, to which a transmis-
sion line may be connected at an intermediate
point. A discharge path is provided across the
other end of the line. The discharge path may
be a gas discharge tube.

By transformer action of the quarter-wave sec-
tion, the voltage across the discharge path is of
greater value than that carried by the line.
When the increased voltage reaches or exceeds
the discharge potential, the path becomes con-
ductive and line section is then effectively short
circuited at both ends. Consequently, for high
line potentials a low impedance shunt is pro-
vided.

The invention will be described in connection
with an exemplary utilization circuit disclosed in
application Serial No. 326,640 mentioned above.
In the drawing, the figure shows the invention
employed in a radio transmitting and receiving
system.

In the figure, a transmitter is diagrammatically
represented by tubes 1 and 2 having their anodes
3 and 4 coupled to antenna leads 5 and 6 which
are grounded at 7. Shorting bar 8 of a quarter-
wave parallel resonant line section 9 is grounded
at 10 and the two parallel members 11 and 12
thereof are connected to antenna leads 5 and 6
by leads 13 and 14. Elements 15 and 16 afford
means for coupling line 13—14 to the two con-
ductors 11 and 12 of the quarter-wave line sec-
tion 9. The line section 9 is connected to receiver
input grid 17 by a suitable transformer 18.

It is well known that a voltage antinode ex-
ists at the end of a quarter-wave resonant line
remote from the shorting bar and I have there-
fore provided the balanced diode 19 with an anode
thereof respectively connected to each of the
members 11 and 12 of resonant line 9. The diode
19 ignites and passes current at and above a pre-
determined voltage and thus provides a low im-
pedance shunt across line 13—14. This destroys
the impedance match of the receiver through to
lines 5 and 6 when the voltage impressed on diode

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19 is swung above the predetermined limit dur-
ing transmission. As disclosed in application
Serial No. 326,640, line 13—14 may be a quarter-
wave line acting as an impedance inverting de-
vice and serving to transfer a short circuit at
the resonant line 9 to a virtual open circuit across
the transmission line 5—6. During the reception
of energy, with transmitter tubes 1 and 2 inoper-
ative, the receiver is effectively matched through
to the antenna and consequently efficiently ab-
sorbs the energy from the antenna. Under these
conditions the quarter-wave section 9 acts as a
high impedance shunt across line 13—14.

The invention herein described and claimed
may be used and/or manufactured by or for
the Government of the United States of America
for governmental purpose without the payment
of any royalties thereon or therefor.

What is claimed is:

1. A filter element including a two conductor
line section having a length equal to one quarter
wavelength at a predetermined operating fre-
quency and having a discharge path connected
across one end, said line being short-circuited
at the other end and means for coupling a trans-
mission line across said two conductor line sec-
tion at a predetermined intermediate point, said
discharge path causing said line section to act
as a high impedance shunt across said transmis-
sion line at potentials below the discharge poten-
tial of said path and as a low impedance shunt
across the said transmission line for potentials
above the discharge potential of said path.

2. A filter element including a two conductor
line section having a length equal to one quarter
wave-length at a predetermined operating fre-
quency and having a gas discharge tube connected
across one end, said line being short-circuited
at the other end and means for coupling a trans-
mission line across said two conductor line sec-
tion at a predetermined intermediate point, said
discharge tube causing said line section to act as
a high impedance shunt across said transmission
line at potentials below the discharge potential
of said tube and as a low impedance shunt across
the said transmission line for potentials above
the discharge potential of said tube.

References Cited in the file of this patent

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