

July 13, 1948.

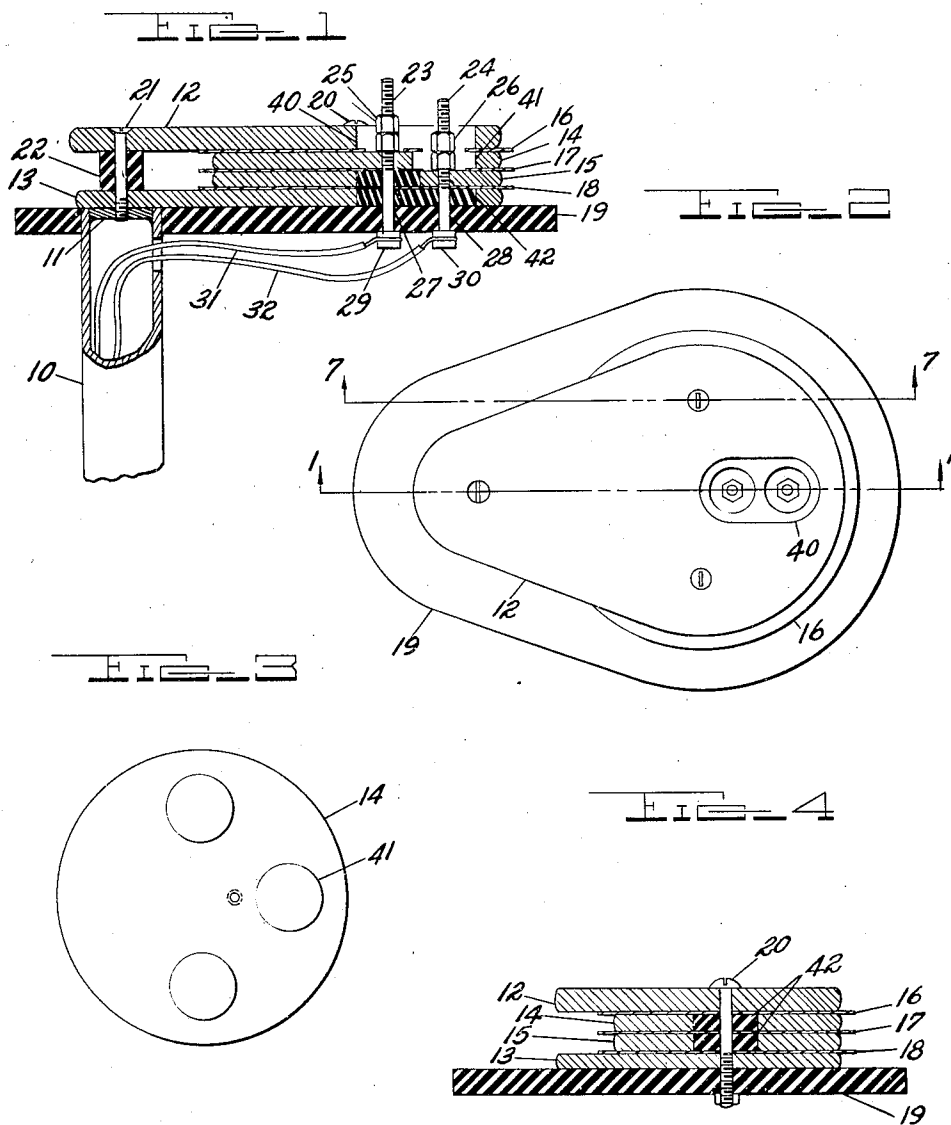
R. M. PAGE ET AL

2,445,256

FILAMENT BYPASS CONDENSER

Filed Aug. 25, 1942

2 Sheets-Sheet 1



Inventors
Robert M. Page
Merril F. Distad
M. F. Distad
Attorney

July 13, 1948.

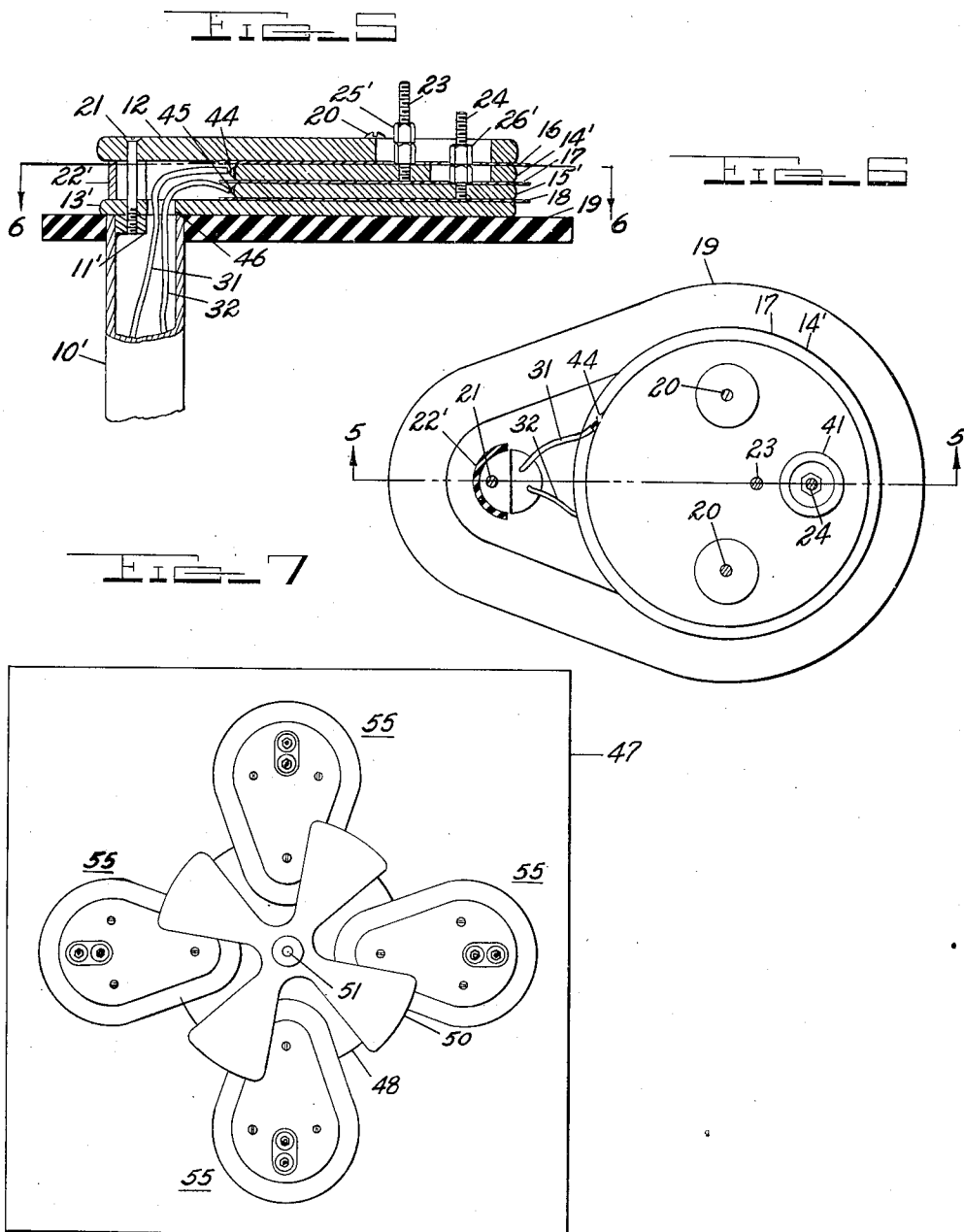
R. M. PAGE ET AL

2,445,256

FILAMENT BYPASS CONDENSER

Filed Aug. 25, 1942

2 Sheets-Sheet 2



Inventors
 Robert M. Page
 Merril F. Distad
M. F. Distad
 Attorney

334

UNITED STATES PATENT OFFICE

2,445,256

FILAMENT BY-PASS CONDENSER

Robert M. Page, Washington, D. C., and Merrill F.
Distad, Cheverly, Md.

Application August 25, 1942, Serial No. 456,044

6 Claims. (Cl. 250—16)

(Granted under the act of March 3, 1883, as
amended April 30, 1928; 370 O. G. 757)

1

This invention relates to a filament bypass condenser assembly especially suited for use with high voltage oscillator tubes mounted in a ring.

Under circumstances which require the generation of pulses of high frequency oscillations at high power levels it has been found advantageous to employ a number of oscillator tubes in a ring mounting using filament frames for coupling to a concentric transmission line which couples in turn to the antenna. Such a construction is disclosed in the application of R. M. Page et al., Ser. No. 456,045, filed August 25, 1942, for Oscillators.

With such a construction it is desirable to employ the filament frames as conduits for the filament leads and to provide a compact rugged bypass condenser assembly between the filament leads and between the leads and the ends of the frames adjacent the oscillator tubes. It is an object of this invention to provide a bypass condenser meeting the above requirements.

It is a further object of this invention to provide a bypass condenser assembly which will constitute a unitary compact rigid assembly providing bypass capacity between the two filament leads and an oscillator tube and between each of said leads and the filament frame associated therewith.

It is another object of this invention to provide such an assembly which will also act as a supporting and mounting means for the oscillator tube associated therewith.

It is still another object of this invention to provide such an assembly which will act as a rigid mechanical connecting means between an oscillator tube and a filament frame associated therewith.

It is a still further object of this invention to provide such an assembly which will possess a shape adapting it for incorporation into a ring mounted multiple tube oscillator intended for operation at high voltages. It is still another object of this invention to provide such assembly which, when incorporated into a ring-mounted multiple tube oscillator, will lend itself readily to tuning by a butterfly type tuning means common to all the assemblies in the oscillator.

Other objects of the invention will become apparent from a careful consideration of the following description when taken together with the accompanying drawings in which:

Fig. 1 is an elevational view taken partly in section along the line 1—1 of Fig. 2 showing the

2

bypass condenser assembly embodying the invention;

Fig. 2 is a plan view of the assembly at Fig. 1;

Fig. 3 is a plan view of one of the intermediate condenser plates of the assembly;

Fig. 4 is a cross-sectional view of the assembly shown in Fig. 2 taken along the line 7—7;

Fig. 5 is an elevational view taken partly in section along the line 5—5 of Fig. 6 showing a second embodiment of the invention;

Fig. 6 is a plan view of the assembly shown in Fig. 5, and

Fig. 7 is a plan view of a portion of a ring mounted multiple tube oscillator unit showing four of the condenser assemblies as they would be mounted in such a unit and showing a butterfly type tuning vane positioned for use therewith.

Referring now to the embodiment of the invention shown in Figs. 1 to 4, reference character 10 indicates a tubular filament frame adapted for use as a coupling means between the filament of an oscillator tube of a ring mounted multiple tube oscillator and a transmission line coupled to an antenna. The employment of a filament frame for this purpose is disclosed in the above mentioned application of Page et al. Soldered or welded inside the upper end of the filament frame and flush therewith is a conducting disk 11. The condenser assembly proper is comprised of an upper condenser plate 12 and a lower condenser plate 13 having identical configuration which is more readily seen in Fig. 2. These plates form a portion of a stacked condenser which includes two intermediate plates 14 and 15, all the plates being separated one from the other by disks of dielectric material indicated at 16, 17 and 18. The condenser plates 14 and 15 and the dielectric disks 16, 17 and 18 are circular in shape as indicated in Fig. 3, the disks of dielectric material being sufficiently larger in diameter than the circular condenser plates to afford protection against flashover at high voltages. For this purpose also the edges of the condenser plates are rounded. The condenser when assembled in an oscillator is usually mounted on a disc-like supporting member of insulating material such as indicated at 19. The condenser rests on top of this disc and the filament frame 10 extends downwardly through a hole bored for that purpose. The condenser is bound tightly together and rigidly held on the disc 19 by means of a pair of bolts 20 which are tapped into the lower plate 13. The condenser is rigidly mounted on the filament frame 10 with the axis of the frame extending normal to the lateral surfaces of the

3

condenser plates by means of a screw-headed bolt 21 extending through both upper and lower condenser plates and being tapped into disk 11. The head of this bolt is counter-sunk into the plate 12 to avoid projecting points or ridges. A spacing cylinder 22, preferably of a dielectric material surrounds the bolt 21.

The oscillator tube associated with this condenser assembly is intended to be mounted directly on the assembly and to be supported at least partially thereby. Such tubes are provided with a pair of downwardly directed filament terminals such as shown in Fig. 1 at 23 and 24. These terminals are received in a pair of pin vise connectors 25 and 26 which are in turn conductively attached to a pair of downwardly extending lugs 27 and 28, the lug 27 having a tapped connection to the condenser plate 14 and the lug 28 having a similar connection to condenser plate 15. These lugs extend downwardly through the supporting plate 19 and terminate below it in terminal posts 29 and 30 to which the ends of filament leads 31 and 32 are secured. After leaving the terminal posts the leads 31 and 32 enter the filament frame 10 through a hole formed near the upper end thereof and continue downwardly throughout its length.

The top condenser plate 12 of the stack has a cutaway portion indicated at 40 surrounding the pin vise connectors and spaced far enough therefrom to avoid flashover. The condenser plate 14 is also provided with a cut-out portion 41 surrounding the location of the pin vise connector 26 for the same purpose. Where the lugs 27 and 28 pass through condenser plates from which they are required to be insulated, insulating washers such as that indicated at 42 are provided. In all cases the disks of dielectric material positioned between the condenser plates are extended to fit snugly about the lugs 27 and 28 as they pass therethrough.

Figs. 5 and 6 illustrate a second embodiment of the invention possessing many features similar to that of the first embodiment. However, in this form of the invention filament terminals 23 and 24 are held in pin vise connectors 25' and 26' which have their lower portions tapped into the intermediate condenser plates 14' and 15' respectively, which portions terminate in those condenser plates. The filament leads 31 and 32 are soldered to the condenser plates 14' and 15' respectively as indicated at 44 and 45 and then passed through a hole 46 formed in the lower condenser plate 13' and located above the upper end of the filament frame 10'. The filament leads then continue downwardly through the filament frame as before.

In this form of the invention the condenser assembly is attached to the filament frame by means of the screw-headed bolt 21 which is tapped into a block 11' soldered or welded into the top of the filament frame 10' which block is of a size to allow the leads 31 and 32 to pass by it into the frame. The spacer member 22' is semi-cylindrical in form for the same purpose. The condenser stack is secured into a unit and securely held to the insulating supporting disk 13 by bolts 20 as before.

Fig. 4 shows a cross-section of the condenser assembly taken along the line 7-7 of Fig. 2 but which could equally well have been taken from a condenser assembly of the type shown in Figs. 5 and 6. This view indicates the manner in which the bolts 20 are lead through the top and bottom

4

plates 12 and 13 to which they are conductively connected but are maintained insulated from intermediate plates 14 and 15 by the use of insulating washers 42.

Fig. 7 illustrates the manner in which condenser assemblies of the type described above are utilized in building up a multiple tube ring mounted oscillator. Four condenser assemblies indicated by the reference character 55 are shown mounted on a base plate 47 from which they would normally be separated by insulating stand-offs. This base plate is formed with the circular central hole indicated at 48 over which the tapered ends of the condenser assemblies protrude. The amount of protrusion is sufficient so that the filament frames attached to each of the assemblies may pass downwardly through a hole sufficiently removed from its edge to prevent flashover. Centrally positioned about the hole is a butterfly tuning vane 50 having four identical arms each underlying an identical portion of the top condenser plate 12 of one of the condenser assemblies. Movement of the tuning vane 50 about its axis 51 thus simultaneously tunes all the assemblies.

It will be seen that applicants have contributed to the art a condenser assembly which is admirably adapted to use in multiple tube ring mounted oscillators employing filament frames for coupling purposes and which possesses a number of outstanding advantages for this use. The frame is compact and rugged, amply protected from flashover at high voltages, provides support for an electronic tube, lends itself to firm connection to a filament frame and to gang tuning by means of a butterfly type tuning vane and, by virtue of its configuration, is adapted to the multiple mounting of oscillator tubes in the minimum amount of space.

It should be understood that the practice of the invention is not limited to the embodiments illustrated and described but is circumscribed only by the scope and limitations of the appended claims.

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

We claim:

1. In combination, a pair of conductors constituting the filament leads of an oscillator tube, a tubular conducting member surrounding said conductors for a portion of their length and insulated therefrom, said conducting member forming transmission means for coupling the radio frequency output of said tube to an antenna feed line, and means forming a radio frequency bypass between said conductors and between each of said conductors and said conducting member, said means comprising a stack of four condenser plates, dielectric material separating said plates, means rigidly and conductively connecting the two outermost of said plates to one end of said conducting member, means conductively connecting each of said conductors to a separate one of the intermediate plates of said stack, and means insulating each of said conductors from the remainder of said plates.

2. In combination for use in a multiple tube oscillator, a pair of conductors constituting the filament leads of an oscillator tube, a tubular conducting member constituting a filament frame for coupling the output of said tube to an antenna feed line, said conducting member surrounding said conductors for a portion of their length and

5

being insulated therefrom and means forming a radio frequency bypass between said conductors and between each of said conductors and said conducting member, said means comprising a stack of four condenser plates, dielectric material separating said plates, means rigidly and conductively connecting the two outermost of said plates together and to one end of said conducting member to form a unitary assembly with the axis of said conducting member extending normal to the lateral surfaces of said plates, said conductors extending into said stack in parallelism to said axis, means rigidly and conductively connecting each of said conductors to a separate one of the intermediate plates of said stack, and means insulating each of said conductors from the remainder of said plates.

3. A condenser constituting a rigid mechanical interconnection between an electronic tube and a filament frame encasing the filament leads of said tube for a portion of their length, said condenser serving as a rigid mounting and supporting means for said tube and providing a radio frequency bypass means between said filament leads and between each of said leads and said frame, said condenser comprising a stack of four condenser plates, dielectric means separating said plates, means binding said stack into a unitary assembly, means rigidly and conductively connecting the two outermost of said plates together and to one end of said frame with the axis of said frame extending substantially normal to the lateral surface of said condenser plates, means rigidly connecting each of the filament terminals of said tube to a separate one of the intermediate plates of said stack, and means connecting each of said filament leads to a separate one of said intermediate plates.

4. A condenser comprising a stack of condenser plates, dielectric means separating said plates, the intermediate ones of said plates being symmetrically shaped, the two outermost of said plates each having a portion of similar shape to that of said intermediate plates and being formed with a co-planar tongue-like portion extending rigidly therefrom, means clamping said stack together into a unitary assembly, a plurality of rigid conductors extending through said stack in mutual parallelism, means conductively connecting each of said conductors to a separate one of said intermediate plates, means insulating said conductors from the remainder of said condenser said conductors having means formed at their exposed ends to receive and rigidly hold the terminal pins of an electronic tube, and means conductively and rigidly connecting said tongue-like portions of said outermost plates.

6

5. A condenser comprising a stack of condenser plates, dielectric means separating said plates, the intermediate ones of said plates being symmetrically shaped, the two outermost of said plates each having a portion of similar shape to that of said intermediate plates and being formed with a co-planar tongue-like portion extending rigidly therefrom, means clamping said stack together into a unitary assembly, a plurality of conducting rods extending through said stack in mutual parallelism, each of said rods being tapped into one of said intermediate plates, means insulating said rods from the remainder of said condenser, terminal connection means formed on both ends of each of said rods, the terminal connection means at an adjacent end of each of said rods being formed to receive and rigidly hold the terminal pins of an electronic tube whereby said condenser rigidly supports said tube on an axis normal to the lateral surface of said condenser plates, and means conductively and rigidly connecting said tongue-like portions of said outermost plates.

6. A condenser comprising a stack of condenser plates, dielectric means separating said plates, the intermediate ones of said plates being symmetrically shaped, the two outermost of said plates each having a portion of similar shape to that of said intermediate plates and being formed with a co-planar tongue-like portion extending rigidly therefrom, means clamping said stack together into a unitary assembly, a terminal connection means formed on each of said intermediate plates and extending outwardly therefrom through said stack, said connection means being insulated from the remainder of said condenser said connection means being so formed as to receive and rigidly hold the terminal pins of an electronic tube, whereby said condenser rigidly supports said tube on an axis normal to the lateral surface of said condenser plates, and means conductively and rigidly connecting said tongue-like portions of said outermost plates.

ROBERT M. PAGE.
MERRIL F. DISTAD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,588,438	Bliss	June 15, 1926
2,205,852	Hollmann	June 25, 1940
2,216,176	Hollmann	Oct. 1, 1940