Jan. 1, 1946. T. A. NEWKIRK 2,391,917

BAND SWITCH MECHANISM FOR TRANSMISSION LINES

Filed Jan. 29, 1945 3 Sheets-Sheet 1

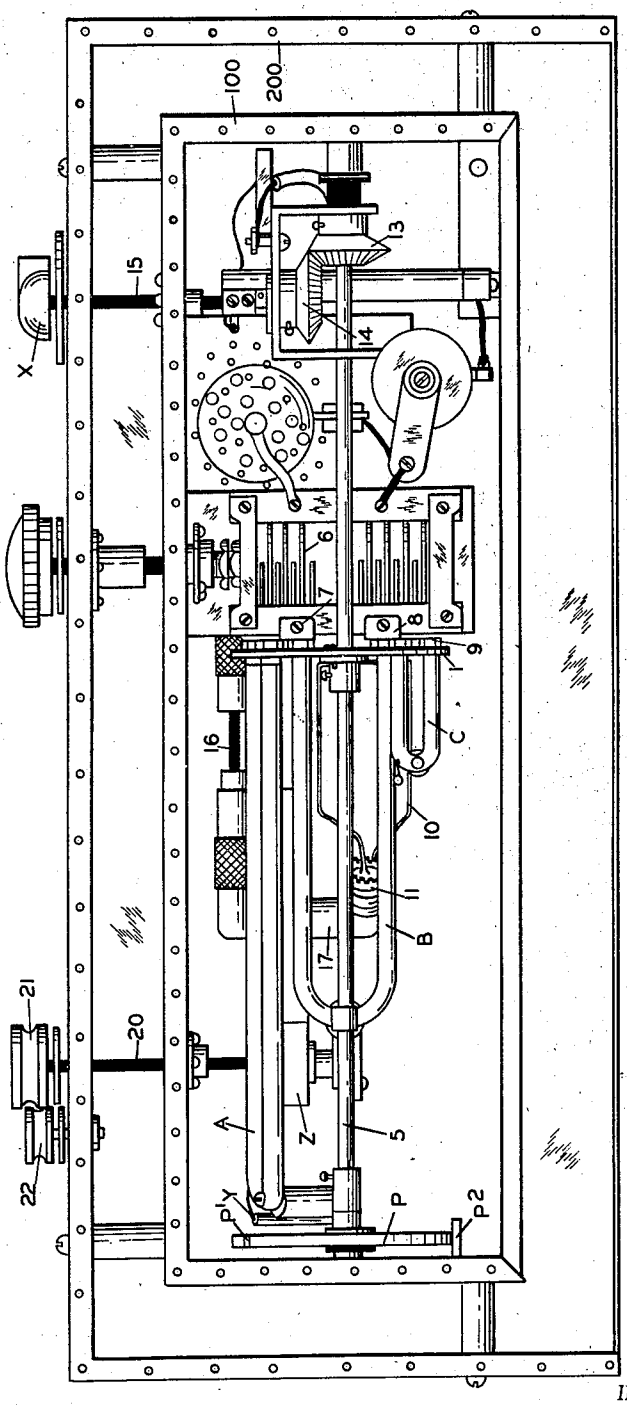


FIG. 1

INVENTOR.
THOMAS A. NEWKIRK

BY William D. Hall

ATTORNEY

Jan. 1, 1946. T. A. NEWKIRK 2,391,917

BAND SWITCH MECHANISM FOR TRANSMISSION LINES

Filed Jan. 29, 1945 3 Sheets-Sheet 2

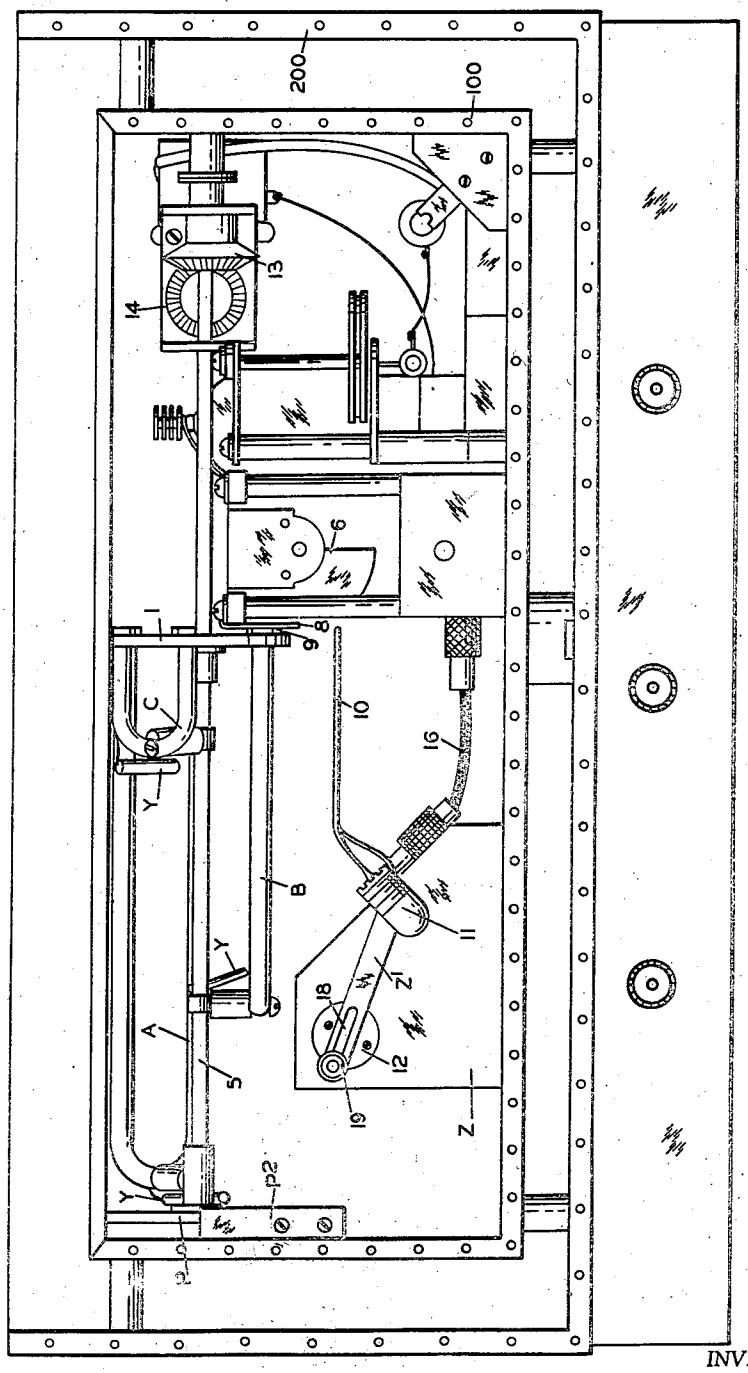


FIG. 2

INVENTOR.
THOMAS A. NEWKIRK

BY William D. Hall.

ATTORNEY

Jan. 1, 1946. T. A. NEWKIRK 2,391,917

BAND SWITCH MECHANISM FOR TRANSMISSION LINES

Filed Jan. 29, 1945 3 Sheets-Sheet 3

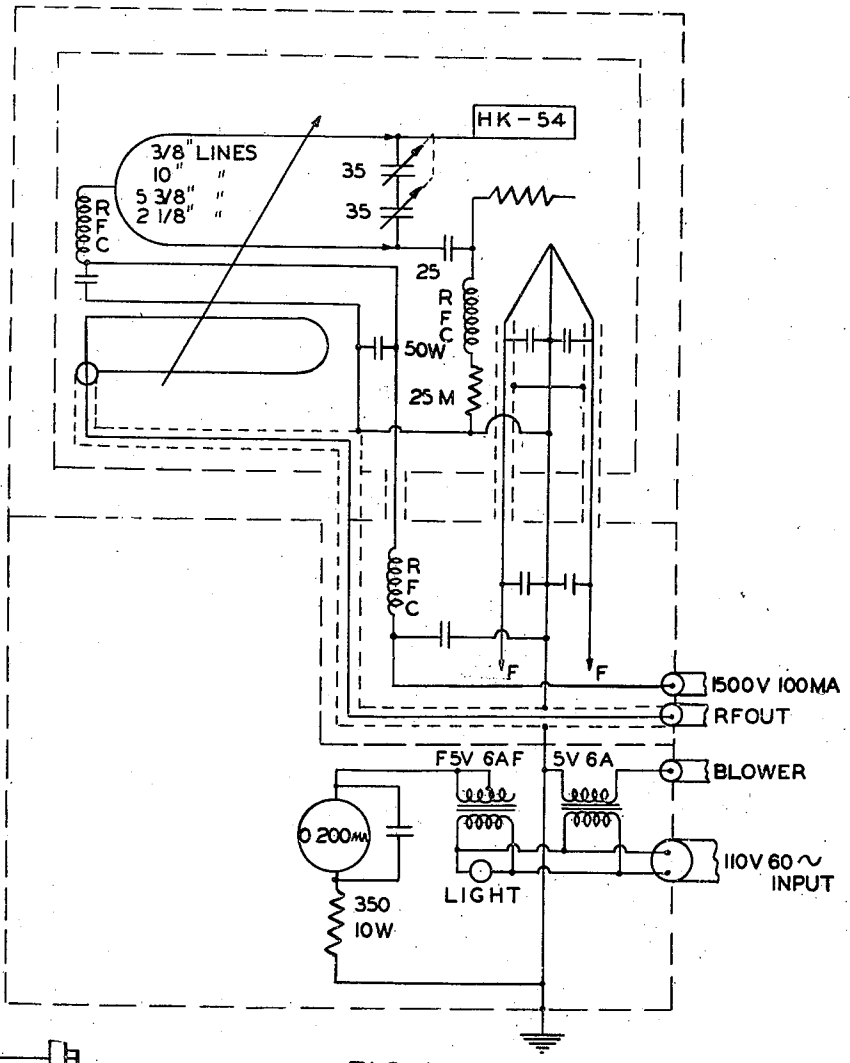


FIG. 4

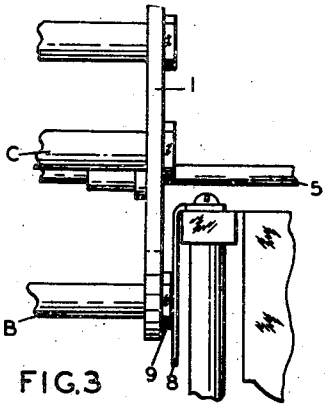


FIG. 3

INVENTOR.
THOMAS A. NEWKIRK

BY William A. Hall.

ATTORNEY

Patented Jan. 1, 1946 2,391,917

UNITED STATES PATENT OFFICE

2,391,917

BAND SWITCH MECHANISM FOR TRANSMISSION LINES

Thomas A. Newkirk, Fairfield, Ohio

Application January 29, 1945, Serial No. 575,107

4 Claims. (Cl. 250—40)

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

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The invention to be hereinafter described relates to an oscillator.

The main objects of the invention are to provide a simple, efficient and compact oscillator capable of much finer control adjustment than in constructions heretofore known.

In order to more clearly disclose the construction, operation and use of the invention reference should be had to the accompanying drawings forming part of the present application.

Throughout the several figures of the drawings like reference characters designate the same parts in the different views.

In the drawings:

Fig. 1 is a top plan view with case or container top and rear removed;

Fig. 2 is a rear view with rear wall and top of case removed;

Fig. 3 is a detail view showing the arrangement of wiping contacts between the ganged condenser and the respective line; and

Fig. 4 is a diagrammatic view representing circuits of the oscillator.

Within a suitable rectangular cabinet, frame, box or housing 100 properly and adequately insulated from an outer supporting and protecting case or frame 200 are mounted in the desired order and arrangement the various parts of the oscillator including those elements and combinations making up this invention.

Suitably journaled in the ends of housing 100 and extending longitudinally therethrough from end to end is a shaft 5. Shaft 5 is properly insulated and is used, also, as the D. C. voltage feed line. It is provided with a mitre or bevel gear 13 meshing with and driven by a second similar gear 14 on the manually operated shaft 15. Preferably, shaft 15 is provided with a knob X by which it may be operated and which, in turn, may be provided with an arrow or other index or pointer adapted to cooperate with suitable graduations on the adjacent surface of case 200. By such cooperation, the extent of rotation of shaft 5 may be clearly indicated thereby informing the user of the relative positions of the oscillator element for every position of the knob with respect to the dial or graduations. At the opposite end the shaft is provided with a disc P fixed to and rotatable therewith. It is provided with a plurality of peripheral notches P' distributed at intervals for a purpose to be later disclosed. Adjacent disc P, on the end wall or other suitable part of case 100 is disposed a yielding brake shoe P2 in the form of a leaf spring provided with a wedge shaped lug adapted to drop into the V-notches. The force of the spring is sufficient to exert a brake effect on the disc P and shaft 5, preventing slipping of shaft 5, yet not too great to be forced back to permit escape of the lug from its notch for desired rotation of the shaft, all for a purpose to be hereinafter set forth.

Secured to and rotatable with shaft 5 is a disc turret 1 of suitable insulating material such as Mycalex. By repeated trial and test Mycalex has been definitely established as the most satisfactory material for that element so far as is known to this applicant.

Suitably mounted on turret disc 1 and rotatable therewith are a plurality of lines A, B and C, here shown as three. Preferably, they are spaced approximately equidistantly about the axis of rotation of disc 1 which is also the axis of rotation of shaft 5. In the present invention, using three lines, each line comprises a U-shaped conducting tube of brass or other suitable material. The two ends of each tube are securely anchored in disc 1 in any suitable and well known manner, such as by pairs of units threaded on the ends and binding the tube to the disc, as will be well understood. In the present invention, the outer nut of each pair is a cap nut 9 the surface of which is smoothed off to provide ample wiping contact but least practicable obstruction or friction to the contact plate of the condenser, as will hereinafter appear. Lines A, B and C, respectively, receive their power from the feed shaft 5 through choke coils Y delivering to the cold spot at the loop or band of the particular horseshoe or line.

It will be noticed that the three lines are of different lengths graduated from least to greatest. Each is tunable over its respective radio frequency band. The three are arranged in three overlapping bands which may be, for instance, from 70 mc. to 170 mc.

In accordance with this invention, the respective lines A, B and C are, selectively, brought into circuit with the ganged tuning condenser 6 of usual and well known type. For this purpose, the ganged condenser is provided with ordinary wiping-contact plates 7 and 8. As the shaft 5 is rotated by shaft 15, gear 14 and knob X to bring one or another of lines A, B and C in circuit through contacts 7, 8 and 9, the pointer on X will indicate that fact on the cooperating dial and,

at the same time, the lug or brake shoe will drop into the corresponding notch P' and yieldingly secure the parts in that relative position.

When it is desired to switch to the next line it is only necessary to apply sufficient force to X to force P' out of engagement and then turn X to the desired preselected line indication, when the parts will again, similarly, become yieldingly locked in operative position at that line contact or circuit. In this way, by this invention, using a revoluble turret disc, a plurality of lines each having different resonant characteristics may be selectively brought into and cut out of the circuit of a variable condenser, a single partial rotation effecting the cutting in of one and the cutting out of another.

The out-put is through the usual coaxial out-put cable 16 terminating in the out-put coupling marked RF out. It runs back to a well known type of coaxial elbow 17 which is mounted in desired position in the Bakelite block Z suitably anchored in the inner case 100. Elbow 17 is provided with one end section swingingly or rockably threaded into or connected to the remainder of the elbow so that as the swinging portion rocks around the axis of the elbow, a branch at right angles to the axis will swing in the orc of a circle perpendicular to the axis of the elbow. This swingable branch 11 carries an out-put coupling or pick-up loop 10. The position of 11, relative to turret disc 1 is such that as 11 is rocked or swung it will move loop 10 toward or from the adjacent edge of disc 1. It may also be stated, at this point, that the respective lines are brought into circuit at a point adjacent elbow 17. So, as branch 11 is rocked, it will move out-put coupling loop 11 relatively to whichever line (A, B or C) may, at the time, be adjacent thereto. That swing will be toward or from the line. Preferably, section 17 is provided with a radially directed arm Z' provided with a longitudinal slot 18 adapted to slidably receive a pin 19 fixed to the face of a disc 12 near the edge thereof. Disc 12 is carried on the inner end of a short shaft 20 journaled in the cases 100 and 200 and rotatable by a knob 21. In order to prevent accidental alteration of any given adjustment of the loop 10 by vibration, jars, sudden shock or the like, shaft 20 is mounted with appreciable friction in its bearings in the cases 100 and 200. Various other means may be used to accomplish the same result. For instance, a yielding spring actuated lug similar to that hereinbefore described, could be used.

By providing a lever arm Z' a much wider range of adjustment of the loop 10 toward and from the respective line is possible than may be had by simple swinging of section 11 about the axis of 17 by a knob concentric therewith. Lever Z', accordingly gives a much finer or more sensitive control. To further increase the range of adjustment and the sensitivity of control a vernier may be geared to the usual graduated disc of 21, in usual and well known manner. The knob 22 of the vernier is shown but it is not believed necessary or desirable to further illustrate such usual and well known construction and arrangement.

At this point it will not be out of place to state, although it is a well known fact, that as the loop 10 moves toward the respective line the out-put increases, and as it moves away the out-put decreases, the variation bearing a definite relation to the distance between the loop and the respective line. So, by greatly increasing the sensitivity of the control of the out-put the out-put itself may be controlled with correspondingly increased degree.

While the invention has been described as used as an oscillator it will be well understood by those skilled in the art that the invention may be used in other ways as, for instance, as parts of an amplifier tank.

It is thought that the construction, operation and use of the invention will be clear from the preceding detailed description.

Changes may be made in the construction, arrangement and disposition of various parts of the invention within the scope of the appended claims, without departing from the field of the invention and it is meant to include all such within this application wherein only one preferred form of the invention has been shown, purely by way of illustration and with no thought or intent of, in any degree, limiting the invention thereby.

Having thus described my invention what I claim and desire to protect by Letters Patent is:

1. An oscillator of the character described comprising a revoluble member, a plurality of tubular lines carried thereby, a tuning condenser, means for moving said revoluble member to selectively establish connection between said lines and said condenser, a coupling loop associated with said tubular lines and means for moving said loop relatively to said tubular lines.

2. An oscillator of the character described comprising a revoluble member, a plurality of tubular lines carried thereby, a tuning condenser, means for moving said revoluble member to selectively establish connection between said lines and said condenser, a coupling loop associated with said tubular lines, a lever arm connected to and operating said loop and means for rocking said lever arm.

3. An oscillator of the character described comprising a revoluble shaft, a disc carried thereby, means for revolving said shaft, means for yieldingly securing said disc in predetermined position, a plurality of tubular lines of differing wave bands carried thereby, a variable tuning condenser, means for rotating said disc to selectively connect said lines with said condenser, a coupling loop associated with said lines and movably mounted adjacent said disc and means for moving said loop relatively to said tubular lines in their respective operative positions.

4. An oscillator of the character described comprising a revoluble shaft, a disc carried thereby, means for revolving said shaft, means for yieldingly securing said disc in predetermined position, a plurality of tubular lines of differing wave bands carried thereby and spaced from each other circumferentially thereof, a variable tuning condenser adjacent said disc and having wiping contact therewith, means for rotating said disc to selectively connect said lines with said condenser through said wiping contacts, a rockably mounted coupling loop associated with said lines, a lever arm for operating said loop, means for operating said lever arm to move said loop relatively to said tubular lines in their respective operative positions.

THOMAS A. NEWKIRK.