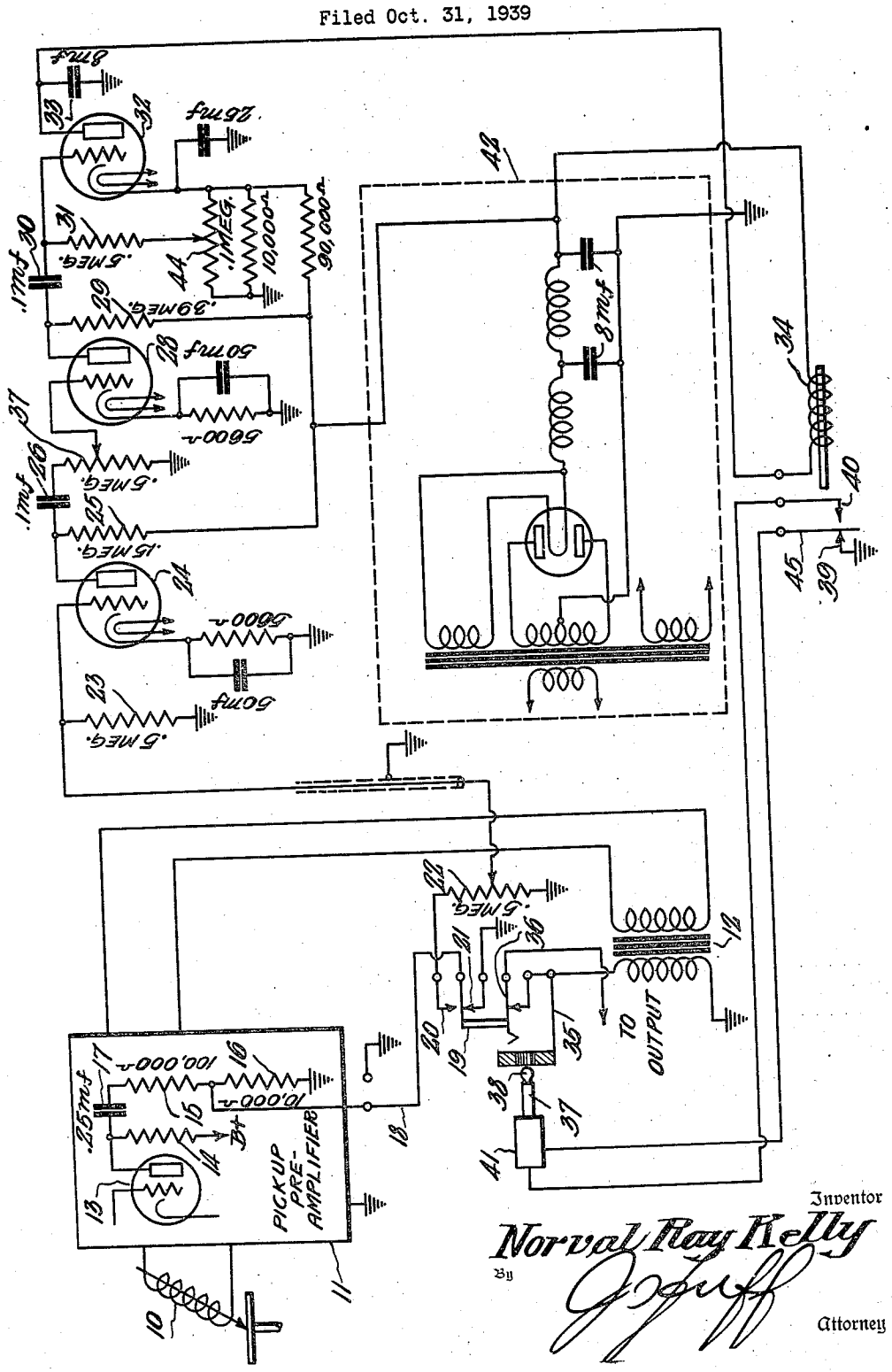
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SOUND REPRODUCING APPARATUS

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Inventor

Norval Ray Kelly

By

Attorney

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SOUND REPRODUCING APPARATUS

Norval Ray Kelly, Great Neck, N. Y., assignor to Radio Corporation of America, a corporation of Delaware

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3 Claims. (Cl. 179—100.4)

This invention relates to a signal cut-off relay and circuit therefor which is particularly adapted for cutting off the signal from such devices, for example, as a phonograph during intervals when it is desired not to reproduce sound.

The device is analogous to the ground noise reduction system used in film sound recording wherein the quantity of light striking the photoelectric cell is reduced at low sound amplitudes in order to reduce ground noise. The present apparatus differs therefrom, however, in opening the output circuit from the device when no signal of reproducible intensity is being produced.

The apparatus according to my invention is not limited to the use of phonographs, but may be used with any type of sound reproducing or transmitting circuit. In ordinary sound records, and even in practically all audio frequency circuits, there is a definite minimum level below which no desirable sound is transmitted. The desirable sounds are kept sufficiently above this minimum level to mask the various noises which may occur, such as surface noise from phonograph disc, ground noise from a sound record film, or even audience or room noise in a microphone circuit.

In the ordinary audio frequency circuit, these low level noises are transmitted and corresponding annoying sounds are reproduced. This is particularly noticeable in the broadcast of sound effects or the like where the intervals during which surface noise from a record may occur are comparatively long and where the overall amplification level from sound pickup to sound reproducer may be quite high.

In the apparatus according to my invention, I provide an auxiliary amplifier circuit and a relay circuit. The relay circuit is connected into the main transmission line from the sound translating device, and the amplifier circuit which actuates the relay is connected to the sound translating device or pickup, or to an intermediate amplifier connected thereto. When the sound reaches a predetermined level corresponding to the minimum level it is desired to reproduce, the auxiliary amplifier circuit actuates the relay, simultaneously short-circuiting the output from the sound translating device and opening the link circuit from that device to the apparatus in which the sound impulses are to be used. Conversely, when the sound level reaches the desired amplitude, the relay is moved in the other direction, the short circuit is removed, and the output from the sound translating device is again permitted to pass into the link circuit.

One object of the invention is to provide a device for eliminating background noise when a sound reproducer produces sound below a predetermined level.

Another object of the invention is to provide an apparatus for eliminating background noise in sound reproducers.

Other and incidental objects of the invention will be apparent to those skilled in the art from a reading of the following specification and an inspection of the accompanying drawing, in which:

The single figure is a schematic diagram of the circuit used.

An appropriate pickup or other sound translating device is indicated at 10. This device may be a magnetic phonograph pickup, as indicated, or photoelectric reproducer or microphone, or, in fact, any other source of audio frequency currents. The output from the device 10 is fed into a pre-amplifier generally indicated at 11, from which the sound output goes to the transformer 12, by which it is coupled to the output circuit.

In the pre-amplifier there is located a tube 13 which may be, for example, an RCA type 37. This tube may be one of the tubes in the amplifier functioning also in its usual way, or it may be an additional tube connected into the amplifier for the purpose of operating the apparatus of my invention. The output from this tube passes through the coupling condenser 17 and is distributed across the resistors 15 and 16. The lead 18 is connected between the resistors 15 and 16 and passes to the blade 19 of a jack. When the plug 41 is not inserted in the jack, the blade 19 is connected with the contact 21 which, in turn, is connected to ground, thereby grounding that part of the output of the tube 13 across R. 16 when the switch circuit is not in use, allowing the entire reproducing circuit to operate in a normal manner. When the plug 41 is inserted in the jack, the blade 19 is moved against the contact 20, which connects this output across the potentiometer 22. This potentiometer 22 adjusts the signal level at which the relay operates to disconnect the output. The signal from across the potentiometer 22 passes through an appropriate lead grounded by a terminating resistor 23 to an amplifier tube 24, which is coupled by an appropriate condenser 26 and the potentiometer 27 to a second tube 28. These tubes 24 and 28 may, for example, be of the RCA type 6F8G. Plate current is supplied from the power supply 42 to these tubes through the resistors 25 and 29, respectively. The output from the tube 28 is

passed through the coupling condenser 30 to the tube 32 which is provided with a grid resistor 31 and a grid bias adjustment potentiometer 44. The output circuit of the tube 32 is provided with a condenser 33 of sufficient size to bypass any audio frequency currents and thereby prevent chattering of the relay. This condenser 33 may have, for example, a capacity of 8 microfarads, and should be of paper construction rather than electrolytic. The output from the tube 32 is connected to the winding of the relay 34, preferably in such a fashion that when current does not pass through the relay 34 its blade 45 lies against the contact 39 and is grounded.

The transformer 12, as stated above, is connected to the output circuit. This transformer, however, is connected to the output circuit through the jack 35 and the contact 36 when the plug 41 is removed from the jack and the switching mechanism is inoperative. When the plug 41 is inserted in the jack, the connection from the output side of the transformer 12 passes through the leads connected to the plug 41, the sleeve 37 of the plug contacting with the jack 35, and the tip 38 connecting with the spring 36. The output circuit, therefore, goes through the contacts of the relay 34, including the blade 45 and the contact 40, when audio frequency current is being passed and current is flowing through the winding of the relay 34. When the signal ceases, the relay 34 is permitted to open, the movable blade 45 then contacting with the ground connection 39 and short-circuiting the output of the transformer 12, preventing the passage of any signal. When the signal again reaches the predetermined level, the relay 34 again moves the blade 45 into contact with 40, removing the short from the transformer and reconnecting the output circuit.

I claim as my invention:

1. In combination, an electrical phonographic translating device, an output circuit therefor, means connected in said output circuit for opening said circuit, and means connected to said translating device and said circuit opening means for causing said circuit opening means to open when the output is below a predetermined intensity and for causing said means to close said circuit when the said output is above said predetermined intensity, said predetermined intensity substantially corresponding with the surface noise level of said phonographic translating device and potentiometer means for adjusting and changing the predetermined intensity point.

2. In combination, an electrical phonographic translating device, an output circuit therefor, means connected in said output circuit for opening said circuit, and means connected to said translating device and said circuit opening means for causing said circuit opening means to open when the output is below a predetermined intensity and for causing said means to close said circuit when the said output is above said predetermined intensity, whereby ground noise from the phonograph record is eliminated during periods of no signal and potentiometer means for adjusting and changing the predetermined intensity point.

3. In combination, an input circuit, a phonographic translating device connected thereto, an output circuit, means for deriving a potential from said input circuit, an amplifier supplied with said potential and providing an output of substantially direct current, and a relay in said output circuit connected to the output of said amplifier in such a manner that said output circuit will be open when signals in said input circuit are below a predetermined level and said output circuit will be closed when the signals are above said predetermined level, said predetermined level substantially corresponding with the surface noise level of said phonographic translating device, and potentiometer means for adjusting and changing the predetermined level.

NORVAL RAY KELLY.