

Aug. 9, 1932.

G. W. LANG

1,870,778

SOUND RECORDING METHOD

Filed Nov. 20, 1928

Fig. 1.

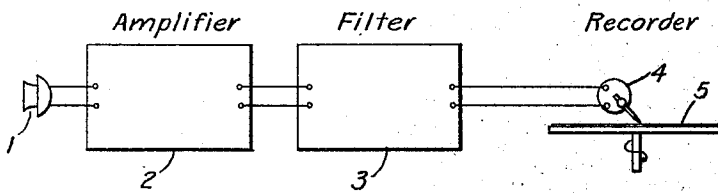
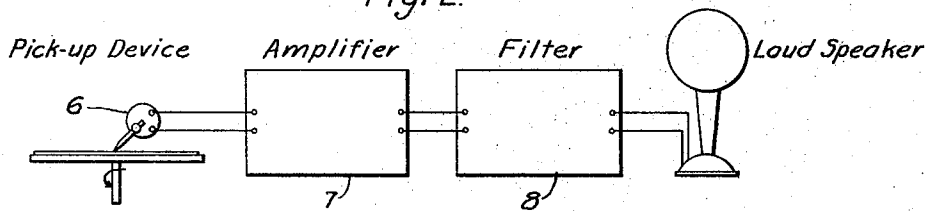


Fig. 2.



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SOUND RECORDING METHOD

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My invention relates to sound recording and reproducing methods and, more particularly, to the making of phonograph records and the reproducing of the recorded sound.

Within the past ten years, very remarkable strides have been made in the electro-mechanical recording of sounds on phonograph record blanks and in the reproduction of the recorded sounds through the use of electromagnetic pick-up devices followed by multi-stage amplifiers comprising thermionic tubes.

Although the original sounds can now be reproduced from phonographic records with great fidelity, however, the extraneous noise caused by needle-scratch still tends to be objectionable. It has previously been proposed to associate an electrical filter with the magnetic pick-up device in order that the currents representative of the scratch frequencies might be by-passed and thus be prevented from being impressed upon the input circuit of the amplifier. This procedure, however, has the drawback of eliminating, at the same time, many musical overtones and also the overtones and fundamental frequencies representing "s's" and "f's" in the record speech. A filter, therefore, causes a "muffled" reproduction of the recorded sounds which is quite unpleasant to the majority of listeners.

It is, accordingly, an object of my invention to provide a method whereby musical and other sounds may be recorded and thereafter reproduced from the record without, at the same time, introducing extraneous sounds caused by needle-scratch.

Another object of my invention is to provide a sound recording and reproducing method whereby extraneous sounds arising from needle scratch and other sources are eliminated without interfering with the fidelity of the sound reproduction.

Another object of my invention is to provide a method whereby a sound record may be made, which record, when reproduced, will give rise to sounds that are free from extraneous noises.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claim. The invention itself, however, both as to its or-

ganization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment, when read in connection with the accompanying drawing, in which:

Fig. 1 is a diagrammatic view of a recording system comprising a preferred embodiment of my invention, and,

Fig. 2 is a diagrammatic view of a reproducing system.

In carrying my invention into effect, I cause the desired sounds to be impressed upon any suitable device such as a carbon-button telephone transmitter 1, or a telephone transmitter of the electrostatic type which, when properly constructed, will convert the sound frequencies into electrical potential variations that are truly representative thereof.

The output from the telephone transmitter is preferably then amplified in an amplifying device 2 of any suitable type, and impressed upon the input terminals of an electrical filter 3 which has a rising characteristic. By rising characteristic, I mean that the filter is so proportioned and arranged that the attenuation of the currents representing sound frequencies is progressively less and less as the frequency becomes higher. In other words, the output of the electrical filter is representative of the original sounds, insofar as the frequencies appearing in the output are concerned, but the higher frequencies of the original sound are greatly over-emphasized.

I next cause the output from the electrical filter to be impressed upon a phonographic recording device 4, which device may advantageously be constructed in accordance with the disclosure in the patent to H. C. Harrison, No. 1,663,884.

If the recording device is operatively associated with a phonograph record blank 5, the record thus made will be a distorted one. In other words, the amplitude of the undulations in the needle track representative of the higher sound frequencies existing in the original sound will be greatly over-emphasized with respect to the undulations repre-

sentative of sounds at lower frequencies. Such a record is obviously not suitable for reproduction in the usual way and, as illustrated in Fig. 2, I provide a reproducing system comprising a pick-up device 6, an amplifier 7, and an electrical filter 8 having a drooping characteristic, the filter being so proportioned that it will progressively attenuate the higher frequencies.

Although I have shown and described only a single amplifier and a single filter in both the recording and reproducing system, this showing is not to be construed as limiting my invention. For example, a filter may well be interposed between the transmitter and the filter in Fig. 1, or an additional amplifier might be inserted between the filter and the recording device. A filter might also be disposed between the pick-up device and the amplifier in Fig. 2, and an additional amplifier could well be inserted between the filter and the loud speaker.

The noise introduced into the reproduced sound by the needle scratch is at frequencies in the neighborhood of from 4000 to 10,000 cycles. When, therefore, the output from the electromagnetic pick-up is passed through the electrical filter and the higher frequencies progressively attenuated, the needle-scratch frequencies will be lost, without, however, adversely affecting the proper amplitude relation which should exist between the high and low frequencies of the desired sounds.

For the purpose of this disclosure, it is not thought necessary to outline the procedure by which the several electrical filters may be designed since the formulæ involved are familiar to those skilled in the art.

Although I have described my invention as being preferably practiced through the use of electrical filters, it may equally as well be practiced by using mechanical filters. In other words, the sounds, during the recording process, may be impressed, as physical vibrations, upon a mechanical filter which disproportionately attenuates the lower frequencies, and the reproducer, instead of energizing an electrical amplifier, may itself be so mechanically constructed as to progressively attenuate the higher frequencies. I, of course, realize that the mechanical recording and reproduction of sound is no longer desirable, but I am calling attention to the fact that my invention may be utilized in connection therewith in order that the present disclosure shall be complete.

It is also entirely feasible to utilize the underlying principle of my invention in connection with photographic or magnetic recording of sound on films or wires, respectively, for use in connection with motion picture apparatus, phonographs, telegraphones, or the like.

It will thus be apparent that I have, by my

invention, provided an improved method of sound recording and reproduction which, if followed, will result in the reproduction of recorded sounds with remarkable fidelity. The absence of hiss, or needle scratch, is particularly noticeable in the event that it is desired to utilize the sound records made according to my invention in large auditoriums, theatres or the like, or in other situations where a high degree of amplification is necessary to obtain the requisite volume.

Since many modifications of the hereinbefore described method of sound recording and reproducing will be apparent to those skilled in the art to which it pertains, my invention is not to be restricted to the specific examples chosen for explanation, but is to be limited only by the prior art and by the scope of the appended claim.

I claim as my invention:

In a system in which sound is reproduced from a sound record by a mechanical pick-up device, the method of recording and reproducing sound which comprises converting said sound into electrical energy, amplifying the high frequencies of said energy more than the low frequencies of said energy, recording said sound on said record by means of said amplified energy, reproducing from said record said amplified energy, amplifying the low frequencies of said reproduced energy more than the high frequencies of said reproduced energy, and converting said reproduced energy into sound.

In testimony whereof, I have hereunto subscribed my name this 31 day of October 1928.

GEORGE W. LANG.