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E. E. RIES.

MEANS FOR INTENSIFYING TELEPHONOGRAPHIC RECORDS.

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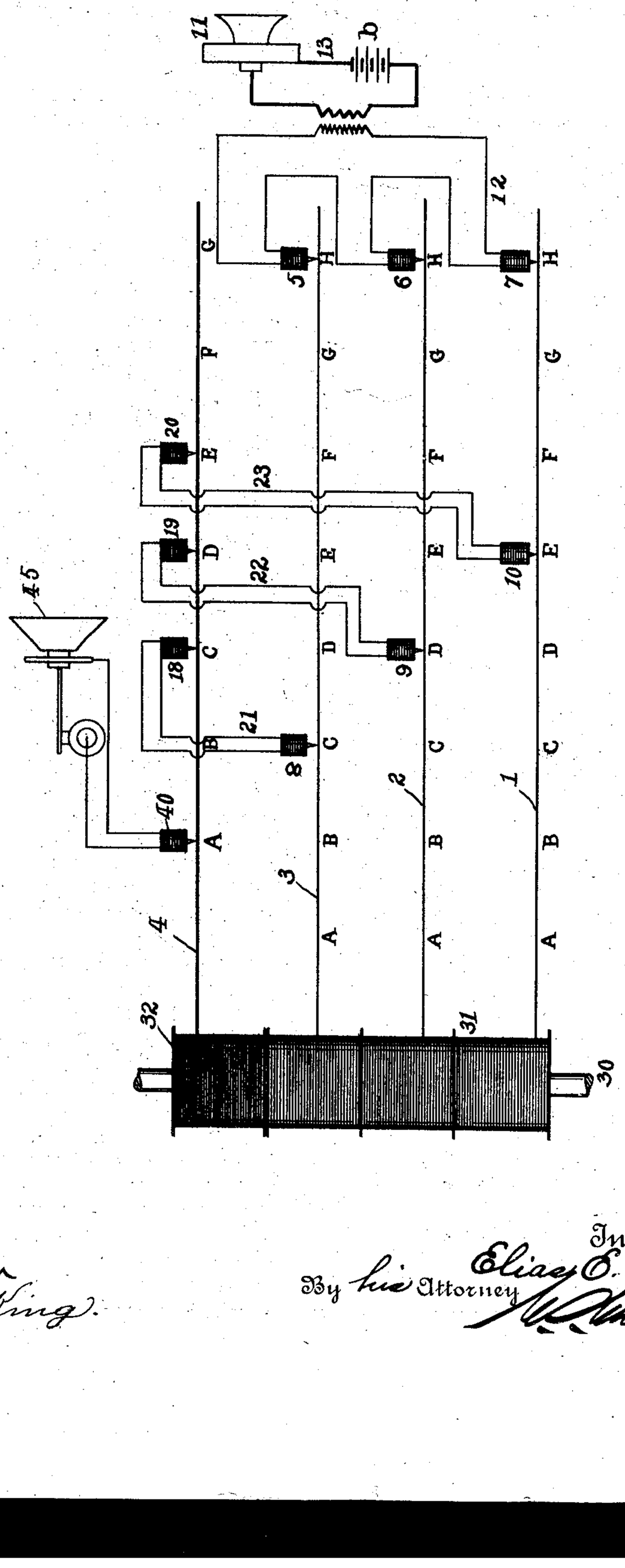
NO MODEL.



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UNITED STATES PATENT OFFICE.

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MEANS FOR INTENSIFYING TELEPHONOGRAPHIC RECORDS.

SPECIFICATION forming part of Letters Patent No. 768,541, dated August 23, 1904.

Application filed November 3, 1903. Serial No. 179,680. (No model.)

To all whom it may concern:

Be it known that I, ELIAS E. RIES, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Means for Intensifying Telephonographic Records, of which the following is a specification.

This invention relates to means for intensifying telephonographic records, and particularly to means for superimposing in a record medium like magnetic records. I may accomplish this result in different ways; but in every case the magnetic records will first be impressed into two or more magnetic record media, and the magnetic records so made will then be superimposed in a single record medium. The object of this superimposition is to intensify each magnetic record from which reproduction is to be made, and this intensification is effected by building up such magnetic records by superimposition—that is to say, by impressing a plurality of like magnetic impulses at the same point in a record medium, and thereby increasing the number of impressed magnetic lines of force and correspondingly increasing the volume of the sound reproduced from such an intensified magnetic record.

It is well known that in telephonographs as heretofore constructed one of the greatest difficulties has been to reproduce the magnetic records in such a manner as to obtain sounds of sufficient volume for commercial purposes, and this difficulty has been due principally to the fact that no adequate means has been employed for making a record of sufficient strength to reproduce in sufficient volume the sound represented thereby. An increase in the degree of magnetization of the record medium for representing a particular sound is representative of a corresponding increase in the amplitude of vibration of such sound-wave, and my present invention is based on the application of this principle to telephonographic apparatus and permits the reproduction of magnetic records with a great increase of volume of sound as compared with reproductions by ordinary telephonographs.

The drawing accompanying this specification and forming part of the present application illustrates diagrammatically a suitable means for recording and reproducing intensified magnetic records in accordance with my invention.

In the drawing I have illustrated means for forming a plurality of like magnetic records in a plurality of magnetic record media, which in the embodiment of the invention shown are illustrated as the usual steel record-wires. A plurality of like records are impressed into these record media or wires in any suitable manner, preferably by means of recording-magnets, such as 5, 6, and 7. The relative positions of these recording media with respect to each other and to the wires in which they impress the magnetic records are immaterial. The reproducing media for reproducing the records made by the magnets 5, 6, and 7 may also be of any suitable type and are illustrated as the usual reproducing-magnets similar to the recording-magnets 5, 6, and 7. The relative positions of these reproducing-magnets, which are designated, respectively, by 8, 9, and 10, with respect to each other and to the record media or wires from which they reproduce the records made by the magnets 5, 6, and 7 are also immaterial. The relative positions of the respective pairs of recording and reproducing magnets 5 8, 6 9, and 7 10 are, however, important, and by spacing these pairs of recording and reproducing media at different intervals I am enabled to transfer the records of a plurality of record media or wires to a single record medium without any interference of the transferred magnetic records with one another and to superimpose all of such transferred records in a single record medium. In the construction illustrated the interval between the recording and reproducing media or magnets 5 and 8 is greater than that between the corresponding pair 6 and 9, and the interval between the magnets 6 and 9 is greater than that between the magnets 7 and 10. These magnets coöperate with the three recording media or wires numbered 1, 2, and 3, and the positions of successive magnetic records on each wire is indicated by the letters A to H, these letters being spaced at considerable distances apart for the sake of clearness. From this view it will be clear that the

respective pairs of recording media for the three wires are arranged in stepped relation and that the number of magnetic records impressed between the recording and reproducing points of the respective wires varies by one, the wire 3 having one more record impressed between these points than the wire 2 and the wire 2 having one more than the wire 1.

While my invention is not limited to the transfer of all of the impressed records of a plurality of record media to another record medium, I prefer to make use of a plurality of record media or wires on which the magnetic records are made and from which such records may be transferred to another record medium or wire into which the magnetic records may be permanently impressed in superimposition, while the record media from which these magnetic records are transferred may constitute temporary records.

The recording media or magnets 5, 6, and 7 may be connected in circuit in any suitable manner with a transmitter, such as 11, they being preferably connected in series in a secondary circuit 12 in inductive relation with a primary circuit 13, including a source of energy or battery *b* and the transmitter. The like magnetic records impressed by the magnets 5, 6, and 7 and reproduced by the magnets 8, 9, and 10 with a difference in phase relation between the respective sets of recording and reproducing magnets may be recorded on a suitable record medium, such as the wire 4, by recording transfer media, such as the recording-magnets 18, 19, and 20, which are similar to those shown at 5, 6, and 7. These magnets 18, 19, and 20 are connected with the respective reproducing-magnets 8, 9, and 10 by suitable wires, such as 21, 22, and 23, and are separated by intervals corresponding to the difference in phase relation between the respective pairs of recording and reproducing magnets—that is, a difference of one magnetic record or impulse. The positions of the transferred magnetic records superimposed in the wire 4 are indicated by the letters A to G, inclusive, these letters denoting the positions of the magnetic records, as in the record media 1, 2, and 3, a difference in position being, however, indicated between the wires 1, 2, and 3 and the wire 4.

All of the record-wires may be supplied from and wound on reels or spools carried by a common driver or shaft 30, the wires 1, 2, and 3 being preferably delivered from and wound onto a three-part reel or spool, such as 31, which is insertible in place and removable therefrom as a single element, each spool being suitably secured to its shaft—as, for example, by a spline. (Not shown.) The wire 4 may be supplied and wound up in the same manner as the wires 1, 2, and 3, a similar reel, such as 32, being shown for the purpose, this reel being also secured to the driver or shaft, preferably in the same manner as the spool 31. The reel 32 is, however, preferably separate from the reel 31 in order that it may be removed to constitute a permanent record, whereas the reel 31 need not carry wires which make permanent records. By means of the rotary driver or carrier 30 it will be obvious that all of the wires may be advanced in synchronism with one another, the wire on which the permanent records are made being moved at the same rate of speed as the other wires, although the magnetic records impressed thereinto in superimposition have a different phase relation from the records made in the wires 1, 2, and 3, the successive records carried by the wires 1, 2, and 3 being impressed in advance of those of the wire 4 in point of time.

From the foregoing description of the means for recording and reproducing like magnetic records of a plurality of record media and for transferring the reproduced magnetic records to and superimposing them in a common record medium or wire it will be seen that like magnetic records of the wires 1, 2, and 3 are successively superimposed in a common record medium or wire. The magnetic record indicated by the letter C, for example, is first transferred to the record-wire 4 by the magnets 10 and 20, and the transferred magnetic record C, carried by the wire 4, then passes on in the travel of the wires to the point indicated by D, at which time the like magnetic record C of the wire 2 will be in position to be transferred by the reproducing and transferring magnets 9 and 19, the latter of which will impress the magnetic record C of the wire 2 at the same point in the wire 4 that the transferred record C of the wire 1 was impressed. The wires will thus travel in synchronism until the magnetic record C of the wire 3 is in position to be reproduced by the magnet 8, when the intensified magnetic record made by impressing like records C of the wires 1 and 2 into the wire 4 in superimposition will be under the recording-poles of the transfer-magnet 18, and the record C of the wire 3 will be transferred by the magnets 8 and 18 to the wire 4 and also impressed thereinto and superimposed with respect to the like records C, previously impressed into said wire. Thus an intensified record consisting of as many like impressed magnetic impulses as desired is made in the wire 4, and from such an intensified record sounds of large volume as compared with the sounds ordinarily obtained from telephonographic records may be produced. It will be noticed that the operation just described is continuously going on and that each of the magnets 10, 9, and 8 transfers successively the records of the wire associated therewith, the magnets 10 and 20 transferring a record first, the magnets 9 and 19 transferring a like record while the magnets 10 and 20 are transferring the next succeeding record, and the

magnets 8 and 18 transferring a record like the first one transferred while the magnets 9 and 19 are transferring the second record and the magnets 10 and 20 are transferring a new or third record, as will be clear by referring to the drawing, in which C, D, and E represent the three records thus transferred.

The intensified records of the medium or wire 4 may be reproduced in any desired manner, as by means of a reproducing-magnet 40, similar to the other magnets shown, this reproducing-magnet 40 being connected in circuit with a suitable receiver, such as 45, which may be a receiver of the loud-speaking-telephone type capable of reproducing a full volume of sound corresponding to the intensified magnetic record made at each point in the medium 4, where like records have been impressed and superimposed. Such a loud-speaking receiver is especially desirable for use in reproducing my intensified magnetic records before large audiences or at any public reproduction where it is necessary to reproduce the sounds in large volume. It may be used to great advantage in reproducing sounds transmitted for considerable distances—as, for example, from one city to another remote from the first—in which case it is only necessary to connect the devices shown in the drawing in the circuit at the receiving end of the line. In this way grand-opera music, speeches, and all other matters of sufficient public interest and importance may be transmitted from any point over the usual telephone-wires and disseminated and reproduced at one or many points remote from the source of transmission.

From the foregoing description of my invention it will be seen that the principal feature thereof is the provision of means for producing a composite or built-up phonograpic or magnetic record by subjecting a given portion of the record medium to repeated or successive recording actions, each of the several operations required to produce the complete composite record being of such a character as to produce in the record medium an impression or partial record differing in some characteristic, either as to depth, intensity, contrast, definition, or otherwise, as compared with the impressions or partial records produced by the other operations of forming the composite record and all combining to produce a single record of great strength or volume of sound.

What I claim is—

1. The combination with a plurality of magnetic record media, of means for impressing into said media like magnetic records, and means for superimposing in a single record medium like magnetic records of said record media.

2. The combination with a plurality of magnetic record media, of means for impressing into said media like magnetic records, and means for superimposing in another record medium like magnetic records of said first record media.

3. The combination with a plurality of magnetic record media, and with means for advancing the same in synchronism, of means for impressing into said media like magnetic records, and means for superimposing in a single record medium moving at the same rate like magnetic records of said first record media.

4. The combination with a plurality of magnetic record media, and with means for advancing the same in synchronism, of means for impressing into said media like magnetic records, and means for superimposing in another record medium moving at the same rate like magnetic records of said first record media.

5. The combination with a plurality of magnetic record media, of means for impressing into said media like magnetic records, and means for successively superimposing in a single record medium like magnetic records of said record media.

6. The combination with a plurality of magnetic record media, of means for impressing into said media like magnetic records, and means for successively superimposing in another record medium like magnetic records of said first record media.

7. The combination with a plurality of magnetic record media, of recording and reproducing media disposed at different intervals along said record media for impressing into said record media like magnetic records and reproducing the same, and means for successively superimposing in a single record medium like magnetic records of said record media.

8. The combination with a plurality of magnetic record media, of recording and reproducing media disposed at different intervals along said record media for impressing into said record media like magnetic records and reproducing the same, and means for successively transferring to and superimposing in another record medium like magnetic records reproduced from said record media.

9. The combination with a plurality of magnetic record media, of recording and reproducing media disposed at different intervals along said record media for impressing into said record media like magnetic records and reproducing the same, and recording transfer media controlled respectively by said reproducing media and disposed at different points in the length of another record medium for successively transferring to and superimposing in said record medium like magnetic records reproduced from said first record media.

10. The combination with a plurality of magnetic record media, of a transmitter, a plurality of recording media connected in series one for each of said record media, a plurality of reproducing media one for each of said record media and disposed at different intervals from said recording media respec-

tively, and recording transfer media controlled respectively by said reproducing media and disposed at different points in the length of another record medium for successively transferring to and superimposing in such record medium like magnetic records reproduced from said first record media.

11. The combination with a plurality of magnetic record media, of means for impressing into said media like magnetic records, means for superimposing in a single record medium like magnetic records of said record media, and a reproducing medium for simultaneously reproducing a plurality of superimposed like magnetic records.

12. The combination with a plurality of magnetic record-wires, and with means for advancing the same in synchronism, of means for impressing into said wires like magnetic records, and means for superimposing in a single record-wire like magnetic records of said record-wires.

13. The combination with a rotary carrier, of a plurality of spools carried thereby one of which is separately removable therefrom, record-wires carried by said spools, means for impressing into some of said wires like magnetic records, and means for superimposing in the wire carried by said separately-removable spool like magnetic records of said other wires.

14. The combination with a rotary carrier, of a plurality of spools carried thereby one of which is separately removable therefrom, record-wires carried by said spools, recording and reproducing media disposed at different intervals along some of said wires for impressing into said wires like magnetic records and reproducing the same, and means for superimposing in the wire carried by said separately-removable spool like magnetic records of said other wires.

15. The combination with a telephonic transmitter, of a plurality of magnetic record media, means controlled by said transmitter for impressing into said media like magnetic records, means for superimposing in a single record medium like magnetic records of said record media, and a telephonic reproducing-receiver controlled by the superimposed records of said record medium.

16. The combination with a magnetic record medium having superimposed like magnetic records impressed thereinto, of a telephonic reproducing-receiver controlled by said superimposed records, and means for moving one of said elements relatively to the other.

17. The combination with a record medium having superimposed like records impressed thereinto, of a loud-speaking reproducer controlled by said superimposed records, and means for moving one of said elements relatively to the other.

18. The combination with a phonographic-record medium, of means for subjecting each one of a plurality of points in said medium to successive recording actions and thereby superimposing a plurality of records and producing a composite phonographic record.

19. The combination with a phonographic-record medium, of means for subjecting a given portion of said medium to successive like recording actions and thereby producing an intensified composite phonographic record.

20. The combination with a magnetic record medium, of means for subjecting a given portion of said medium to successive magnetic impulses and thereby producing a composite magnetic record.

21. The combination with a magnetic record medium, of means for subjecting a given portion of said medium to successive like magnetic impulses and thereby producing an intensified composite magnetic record.

22. That improvement in the art of forming magnetic records which consists in forming a plurality of corresponding magnetic records, and superimposing said records in a single record medium.

Signed at New York, in the county of New York and State of New York, this 31st day of October, A. D. 1903.

ELIAS E. RIES.

Witnesses:
WM. GOLDBURG,
E. G. ALFAIN.