Oct. 9, 1956 M. G. HANDSCHIN ET AL 2,766,328

DEVICE FOR THE ERASURE OF RECORDINGS ON MAGNETIC SOUND CARRIERS IN THE FORM OF DISCS OR ENDLESS TAPES

Filed Oct. 16, 1950

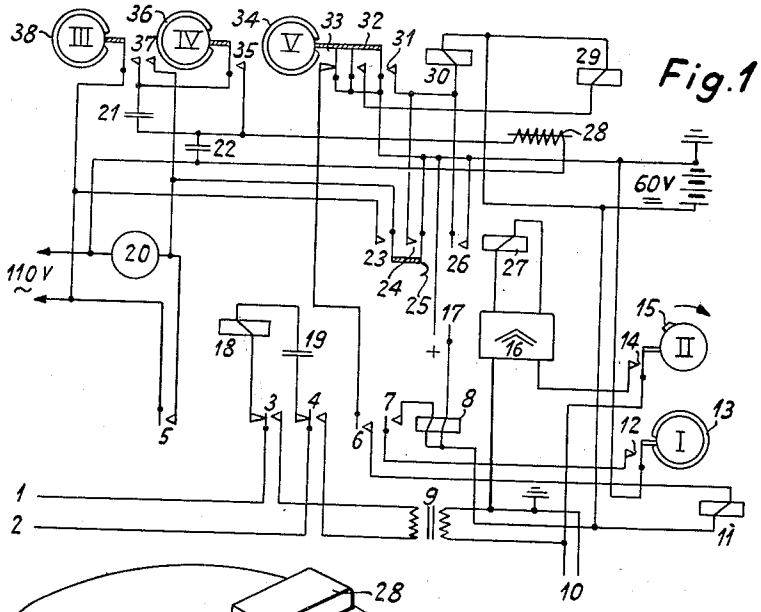


Fig. 1

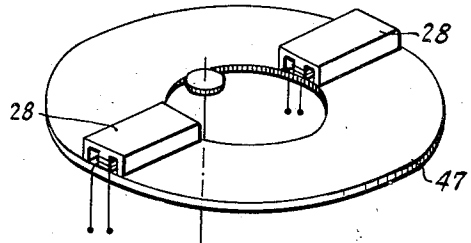


Fig. 2

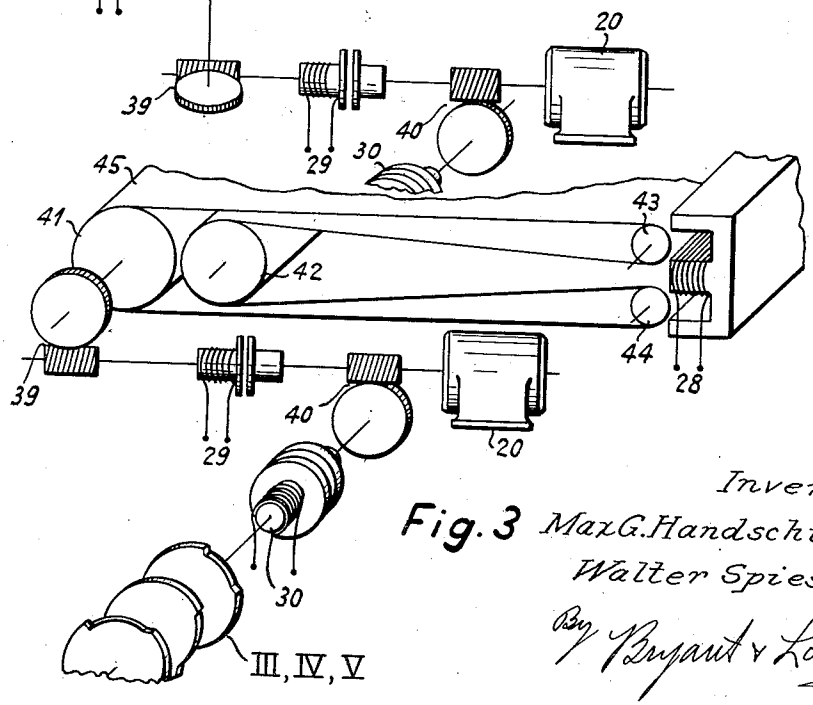


Fig. 3

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United States Patent Office

2,766,328

Patented Oct. 9, 1956

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DEVICE FOR THE ERASURE OF RECORDINGS ON MAGNETIC SOUND CARRIERS IN THE FORM OF DISCS OR ENDLESS TAPES

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Application October 16, 1950, Serial No. 190,357

5 Claims. (Cl. 179—100.2)

Recordings on the sound carriers used on dictaphones, telephonographs etc. are erased by means of A. C. magnets. To erase such recordings completely considerable time is required because the entire length of the sound carrier on which recordings have been made must be pulled past the A. C. magnet. Gearings have become known which produce normal recording speed in one direction of sound carrier travel and much greater erasing speed in the other direction. However devices of this type are rather complicated and consequently expensive.

On apparatus of this kind employing endless tapes as sound carriers the A. C. magnet used for erasing, the so-called erasing head, has usually been located close to the electromagnet used for recording, the so-called speaker reproducer head, previous recordings being erased by this arrangement immediately before another recording is made. However, this arrangement has the great disadvantage that it does not satisfactorily obviate the possibility of an unauthorised person hearing the recording. If, for example, a first recording lasts 25 minutes and the one following only 5 minutes, then only that part of the previous recording is erased which corresponds to the second recording time of 5 minutes. Thus it is always possible to hear the part of the previous recording that remained intact. To obviate this shortcoming apparatus with sound carriers in the shape of discs or endless tapes have been provided with broad erasing heads which facilitated erasing in a complete revolution of the disc or one complete turn of the tape. But such an arrangement has the disadvantage that, if the erasing head is switched off quickly, an undesirable and very disturbing recording is left behind due to the collapsing magnet field of the erasing magnet. This disadvantage was rectified by equipping the erasing head instead of with a switch with a rotary resistance which gradually diminishes the resistance of the erasing head. But this type of arrangement requires additionally a clutch and gearing. It is further to be taken into consideration that even with this arrangement the erasing time is still quite considerable. This shortcoming is particularly obvious with a fully automatic telephonograph because in such a case the time taken by erasing is actual waiting time.

The present invention obviates all these shortcomings with sound carriers in the shape of discs or tapes by providing several erasing positions spaced comparatively wide apart whereby the movement of the sound carrier in respect of the erasing path is reduced, two condensers being provided of which, when the erasing magnet is switched off, first one can be connected in series and then the other in parallel to the erasing magnet.

The accompanying drawing gives diagrammatic representations of two of many possible ways of performing the present invention.

Fig. 1 is a wiring diagram.

Fig. 2 is an erasing arrangement for a disc-type sound carrier and

Fig. 3 is a similar arrangement for a sound carrier of the endless tape type.

In Fig. 1 a section of the wiring diagram of a fully automatic telephonograph is shown as far as this is necessary for the explanation of the erasing process. A ringing current originating from any telephone subscriber energises a relay **18** through contacts **3** and **4** and a condenser **19**. The relay **18** closes its contact **17**, whereby a relay **8** is excited from ground, contact **17**, solenoid winding of relay **8** and battery **60**. Relay **8** reverses its contacts **3** and **4** and closes its contacts **5**, **7** and **8**. A motor **20** is connected through contact **5**. Furthermore, a line **1**, **2** to the telephone network is connected to a repeater **9**, so that the connection between the telephonograph and the telephone net is maintained. A mechanical connection is now made over the circuit from ground, contact **33**, contact **6**, coupling magnet **11** and battery **60** between motor **20** and two cam discs I and II, whereby the latter are set in rotation as indicated by the arrow. The caller will now hear the reproduction of a reproducing device over line **10** (by means of known members not shown in Fig. 1). By closing a cam switch **12** of cam disc I the relay **8** is kept attracted over the circuit: ground, cam switch **12**, contact **7**, holding winding of relay **8** and battery.

Let it now be assumed that the caller has heard the reproduction. He will now receive in known manner over line **10** an instruction to erase, i. e. at that moment an amplifier **16** is connected to the repeater **9** over a cam switch **14** of cam disc II. If the caller obeys the instruction to erase, a relay **27** at the output end of the amplifier **16** is excited over the circuit: line **1**, contact **3**, repeater **9**, contact **4**, line **2** and from the secondary side of repeater **9** over the amplifier **16** and the cam switch **14** of cam disc II whereupon it closes its contacts **23**, **24** and **26**. This effects the excitation of an electromagnetic coupling **30** and thus three more cam discs III, IV and V as well as the motor **20** are brought into action, the cam discs mentioned beginning to rotate in the direction indicated by the arrow. The coupling **30** is excited over the circuit: ground, contact **26**, coupling **30** and battery **60** and held over the circuit: ground, contact **31** of cam disc V, coupling **30** and battery **60**. The rotation of the cam discs III, IV and V closes contacts **37**, **35**, **32** and **31** and opens contact **33**. The closing of contact **32** excites a second electromagnetic coupling **29** over the circuit: ground, contact **32**, coupling **29** and battery and a sound carrier is set in motion. At the same time an erasing magnet **28** is impressed with an A. C. current over the circuit: A. C. net, contact **37**, contact **35**, erasing magnet **28** and A. C. net.

According to the present invention the erasing magnet **28** is, in the case of a disc-type sound carrier, arranged as two erasing magnets facing each other at 180° whereby two erasing positions are provided on the sound carrier so that now only half a revolution of the disc is required to erase all recordings, whereas in the case of a tape-type sound carrier the erasing magnet **28** is arranged on the centre leg of an E-shaped magnetic core, the sound carrying tape being conveyed by a driving roller **41** over two rollers **43** and **44** placed in front of the poles of the erasing magnet and then returned over a fourth roller **42** placed close to the driving roller in such a manner that the erasing process occurs simultaneously at two places of the sound carrying tape which are at a maximum distance from each other in respect of the tape surface, whereby in this arrangement, too, the tape has to traverse only half the way to effect complete erasure of all recordings. To ensure that all recordings are erased completely it is, of course, necessary for the erasing operation to be performed in both cases for a little more than the exact half of the path traversed by the sound tape to revolve half way round.

Fig. 2 shows these details in connection with a disc-

type sound carrier 47. The erasing magnet 28 is arranged as this case in two erasing heads facing each other at 180°. On either erasing head the magnetic flow passes through the sound carrier in four places, because it emerges from the centre core leg, penetrates the sound carrier in the form of two flux paths, and emerges from it again in two places whence it goes to the two outside legs of the magnetic iron and vice versa. But each erasing head represents only one erasing position. Thus, in this case there are two erasing positions placed at a maximum distance apart. During the erasing process the disc-type sound carrier 47 is driven by motor 20 through the coupling 29 and a gear 39. Another gear 40 drives through a coupling 30 the cam discs III, IV and V; the drive mechanism for cam discs I and II, these discs themselves and coupling 11 are not shown in the drawing. Nor is the speaker and reproducing head shown in Fig. 2.

Fig. 3 shows the same arrangement for a sound carrier in the shape of an endless tape. The sound carrying tape 45 is set in motion by a driving roller 41 which itself is driven through coupling 29 and gear 39 by motor 20. The tape 45 is taken by a driving roller 41 to the right over a roller 43, then back to a roller 42 located close to driving roller 41 and thence again to the right to a roller 44 and then returned to the driving roller 41. The two rollers 43 and 44 are located with one close above the other and the erasing magnet 28 with an E-shaped core is so arranged in respect of these two rollers that the magnetic flow produced in the centre leg is split into two branches of which the upper one flows over roller 43 to the upper outside leg and the lower one over roller 44 to the lower outside leg. This branched flux penetrates the sound carrier 45 in two places. In this fashion two erasing positions are produced separated by a maximum distance, whereby the erasing path is reduced to practically half. Cam discs III, IV and V are again driven by gear 40 and coupling 30. For the sake of simplification the drive mechanism of cam disc I and II and coupling 11 have not been shown in the drawing.

The gear ratios for the sound carrier drive have been so chosen that complete erasure is effected inside of a comparatively short time, for example within 3 seconds, quite irrespective of the duration of the recording made on the sound carrier which may have taken, for example, 5, 45 minutes, etc. If the erasing path had not been halved, the time taken in erasing would have been 6 seconds.

To prevent the undesirable and disturbing transient recording remaining on the sound carrier when the erasing magnet 28 is switched off abruptly, cam discs III and IV are so designed that contact 35 is opened about 100 milliseconds before contact 37. This brings into the circuit of the erasing magnet 28 a condenser 21 which considerably reduces the erasing magnet current. Thus, when contact 37 is opened the residual current which is thereby interrupted is comparatively small and in addition the erasing magnet is short-circuited over the condenser 22. The current induced at circuit opening when the magnetic field of erasing magnet 28 collapses slowly fades out into the oscillatory circuit formed by the erasing magnet 28 and the condenser 22, so that no impression is made on the sound carrier.

As soon as cam discs III, IV and V have returned to their starting positions, the couplings 29 and 30 become de-energised, i. e. the sound carrier, 45 or 47, and the cam discs III, IV and V become stationary. The closing of contact 33, on the other hand, again excites coupling 11 of the reproducing device and the caller can once again receive in the known manner an invitation from the reproducing device to start recording. After a short waiting period during which erasing may take place, for example after 3 seconds, the installation is thus ready to receive a new message.

The installation here described has the advantage that no complicated reversing gears with higher return speeds

are required for the erasing process and that no resistance rotating at slow speed is required for the switching off of the erasing magnet. The installation described may, of course, also be used on dictating machines etc., i. e. on installations that are not telecontrolled. Consequently, in a case of this nature the telecontrol members shown in Fig. 1 are dispensed with, whereas on the other hand an additional key 25 is provided. To effect an erasure, key 25 is depressed for a short time and contacts 23 and 24 are closed. This connects motor 20 over the circuit: A. C. net, contact 23, motor 20, A. C. net and sets it in motion. As soon as cam discs III, IV and V are rotating the motor 20 is held energized over contact 37. Coupling 30 is energised over the circuit: ground, contact 24, coupling 30, battery 60. All other functions remain the same. Irrespective of the time taken for the recording the erasing process is completed automatically within the time scheduled for it, for example within 3 seconds.

While the invention has been described in detail with respect to a preferred example and embodiment of the invention it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended, therefore, to cover all such changes and modifications as fall within the scope of the appended claims.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

1. In a sound recording and reproducing device of the type having magnetic sound recording and reproducing means, together with mechanism for moving a sound record with respect to said means to make a recording in the form of a magnetic track having a plurality of successive convolutions which lie generally parallel to one another, the improvement which comprises an arrangement for the rapid erasing of said track, including a plurality of magnetic erasing heads disposed adjacent the convolutions of said track, spaced apart in the direction of record motion and substantially equidistant from one another, each of said heads having an effective length sufficient to encompass within its erasing field corresponding portions of all of said convolutions simultaneously, and means for simultaneously energizing all of said erasing heads whereby to accomplish the erasing of records from all of said convolutions in a fraction of the time required for a single convolution to pass a given point.

2. The invention in accordance with claim 1, including a common alternating current supply circuit for all of said heads, a pair of damping condensers, and means for sequentially connecting one of said condensers in series with said circuit and thereafter connecting the other of said condensers in parallel with said heads.

3. The invention in accordance with claim 1, in which said sound record is a disc carrying a spiral track, and in which there are two of said erasing heads located 180° apart with respect to the axis of rotation of said disc.

4. The invention in accordance with claim 1, in which said sound record is in the form of an endless tape and said erasing magnets are two in number and are disposed at opposite extremities of the path traveled by said tape.

5. Apparatus for erasing a magnetic record from a record carrier having successive convolutions of a single continuous record thereon in parallel relationship, comprising means for establishing by means of an electric current a plurality of erasing fields each in an area simultaneously intersecting all of said convolutions, said respective fields being spaced apart equally along the full extent of the carrier in the direction of record motion, and means for moving said record carrier through said fields an amount substantially equal to the spacing of said fields to subject the complete length of all of said convolutions to the erasing action of said field, and means

for terminating the erasing action by first attenuating said current to a low value greater than zero and thereafter discharging the residual energy of the field.

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