

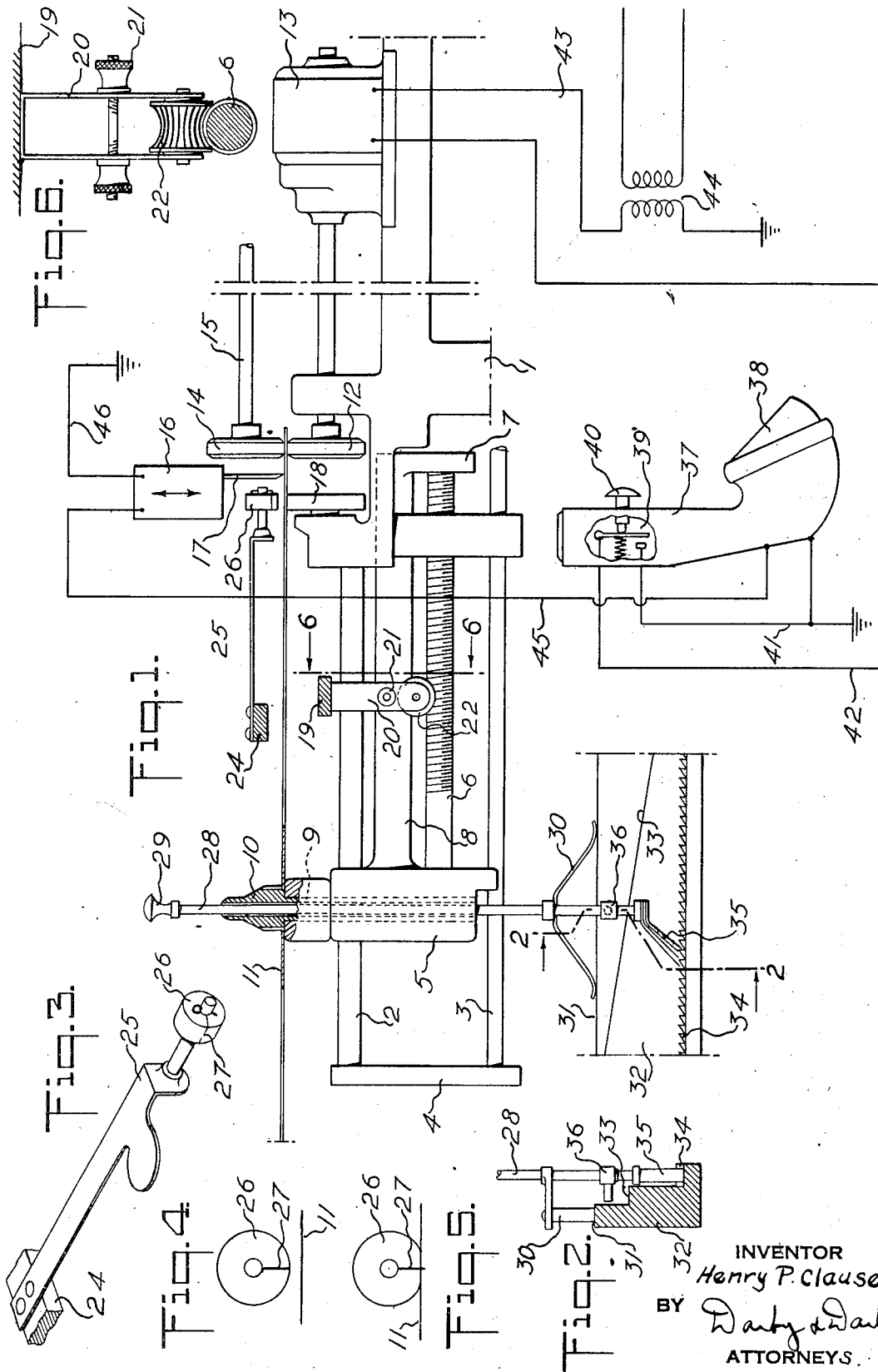
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DICTATION MACHINE

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DICTATION MACHINE

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This invention relates to improvements in dictation recording and reproducing machines.

A broad object of the invention is to provide an improved form of sound recording and reproducing machine characterized by the features of small size, light weight, compactness, and low cost.

One of the objects of this invention is to provide a useful sound machine of this type employing no amplifier or other current source of any kind in connection with the sound circuits.

Another object of the invention is to provide in a machine of this type a combined recording and reproducing head which requires no change in the operating conditions thereof for either recording or reproduction.

A further object of the invention is to provide a simple separate stop control for the machine which directly controls the drive motor for the mechanism by starting and stopping it.

Another object of the invention is to provide an exceedingly simple construction for a correction marker for use in the machine for applying cross marks to the sound record grooves to introduce audible clicks or sounds during reproduction to indicate the approach of a point for correction.

Another practical object of the invention is to provide a novel form of variable back spacing device for automatically bodily back spacing the sound record variable distances depending upon the relative position of the record and the reproducer whereby substantially the same amount of back spacing with regard to the average number of words reproduced is secured, all by a simple manual operation.

Other and more detailed objects of the invention will be apparent from the following description of a practical embodiment thereof such as illustrated in the attached drawing.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, all as will be described in detail below.

In the drawing,

Figure 1 is a somewhat diagrammatic view with some parts broken away and some parts in cross-section, of a mechanism embodying the novel features referred to above;

Figure 2 is a cross-sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a perspective view of the correction marking device;

Figure 4 is an end elevational view of the correction marking device in normal retracted position;

Figure 5 is a similar view in active position; and Figure 6 is a cross-sectional view taken on the line 6—6 of Figure 1.

The subject matter of this invention has been shown as applied to a sound recording and reproducing machine of the type disclosed in full and complete detail in United States Patent No. 2,296,870, granted September 29, 1942, for Sound recording and reproducing. As the disclosure proceeds it will be apparent that the features of the invention especially as claimed are of broader application, but on the other hand are of special value in a machine of the type disclosed in the above patent.

Briefly, the machine disclosed in that patent employs a longitudinally movable carriage mounted upon guide ways and having the record receiving spindle journaled therein onto which the record tablet in the form of a disc is keyed for rotation therewith. The record is caused to revolve by the application of friction drive wheels to the opposite faces thereof. The spindle rotates with the record and mechanism is provided, as will be described later, for causing the carriage to move slowly in a radial direction with respect to the tablet as a result of the rotation of the spindle. The record tablet consists of a thin disc of suitable size and material which is preferably quite thin and flexible.

A machine of this nature, and as disclosed in the above patent, is a relatively complicated, large and expensive device adapted particularly for use at fixed stations. The broad object of this invention is to devise a portable machine of this general nature which is relatively small in size, light in weight, simple in construction and inexpensive. By way of example, it is proposed to construct a machine of this general type having the physical proportions of 4" x 6" x 7½", with a total volume of about 180 cubic inches and weighing less than ten pounds, and possibly as little as seven and one-half pounds. Commensurate with this design the record disc will be a diameter of about 7½" and a thickness of about 7½ mils. With such a machine it is proposed to record about 218 lines to the radial inch in the form of a continuous spiral beginning near the center of the disc and terminating near the periphery thereof. Such a record would operate at a speed of about 22 ft. per minute and will have a time capacity of 32 minutes of recording per side. In a further example a 6" record will hold 20 minutes of recording per side and 16 minute record will have a total diameter of about 5½" under the conditions defined above. By

way of further example a 12 minute record will have an overall diameter of about $4\frac{3}{4}$ " and will give the record about twice the recording capacity of other types of sound recording machines now available. In addition it is proposed to incorporate in this machine the additional practical functions of sound recording and reproduction without amplifiers and the other usual sound appurtenances by the use of a single simple sound recording and reproducing device of a combined microphone and loud speaker. There is also to be incorporated the simple mechanism for correction marking on the record and an automatic device for variably back spacing the record for play back in amounts proportional to the distance of the reproducer in the center of the record in order that substantially the same amount in the number of words of play back will be produced for all positions of the reproducer with respect to the center of the record tablet.

Referring now to the figures there is illustrated a portion of a suitable supporting framework 1, on which is mounted a pair of rods 2 and 3 united at their outer end by a cross-tie member 4 to provide a pair of parallel spaced rolls on which a carriage 5 is slidably mounted. One end of a threaded shaft 6 is journaled in the carriage 5 and the other end is journaled for rotation in the transverse extension 7 of an arm 8 unitary with the housing 5. Journaled in the carriage 5 is a hollow shaft 9 which is connected by means of gears such as a worm and worm wheel with the shaft 6, all in accordance with the disclosure of these features in the above mentioned patent. The upper end of the hollow shaft 9 is provided with a key member 10 upon which the record disc 11 having a serrated central opening is mounted for keying the two together for conjoint rotation.

The under surface of the record tablet 11 is engaged by a friction wheel 12 which is caused to continuously revolve when the machine is in use by a motor 13 mounted on the framework 1. Rotatably mounted on the shaft 15 is a combination idler friction wheel 14 adapted to engage the other side of the disc 11 at a point opposite the wheel 12. At 16 is diagrammatically illustrated the sound recording and reproducing head having a stylus 17 for engaging the upper face of the record 11 at a point opposite the rotatable anvil wheel 18 journaled on the framework 1. The head 16 may be of any suitable and well known construction, and might, for example, be of the piezo electric crystal, magnetic or electrostatic type.

Secured to a fixed part 19 of the machine is a depending U-shaped bracket 20 in which is rotatably mounted a helical worm wheel 22 in engagement with properly mated threads formed on the shaft 6. Extending between the arms of the bracket 20 is a rod threaded at its ends to receive the thumb nuts 21 by means of which the frictional resistance to rotation of the nut 22 can be adjusted.

On a fixed bar 24 of the machine is mounted a spring arm 25 on the end of which is journaled a freely rotatable friction roller 26 which has embedded therein a sharpened cutter knife 27 extending axially thereof. When the spring arm 25 is in normal retracted position as shown in Figure 1, the friction roller 26 is out of engagement with the record 11.

Slidably mounted in the hollow shaft 9 is a rod 28 the upper end of which extends above the key member 10 and is provided with a knob 29.

The rod 28 extends completely through the housing or carriage 5 to a point below it and is provided with a flat spring 30 which is fixedly secured thereto. The spring 30 rests upon the top edge 31 of a bar 32 secured to a suitable fixed support in the machine so as to lie parallel to the path of travel of the carriage 5. Formed on one side of the bar 32 is a straight inclined cam or stopping ledge 33. Likewise formed on one side of the bar 32 is a rack or toothed ledge 34 positioned to engage a spring finger 35 which is preferably built up of a plurality of thin spring leaves as illustrated in Figure 1. Secured to the rod 28 at a point above the stop ledge 33 is a collar 36 having a transversely extending pin which overlies the ledge.

At 37 is diagrammatically illustrated a combined microphone and loud speaker preferably of the hand type provided with mouth and ear piece 38 behind which the usual electro-magnetic sound actuated and sound producing unit is mounted within the housing of the instrument. Mounted in the handle of the instrument is a switch 39 normally held open by a spring as shown, and provided with a finger piece operator 40 by means of which it may be closed. One terminal of the switch and one terminal of the microphone loud speaker unit are connected to ground by the wire 41. The other terminal of the switch is connected by wire 42 to one terminal of the motor 13 and the other terminal is connected to ground through the secondary of the power supply transformer 44, the primary of which is connected to any suitable power source, such as the usual A. C. circuit of a building. The other terminal of the microphone loud speaker unit is connected by wire 45 to the head 16 whose other terminal is grounded by the wire 46.

The operation of this machine will be described in full detail. It may be noted that in the actual machine, mechanism in which there would be no novelty in a broad sense, may be provided for raising and lowering the head 16 to move its stylus out of and into engagement with the record and for raising the friction wheel 14. With these parts raised the carriage 5 is moved to its extreme left hand position, Figure 1, causing the relatively fixed nut 22 to revolve on its axis. A fresh record tablet is impaled on the key member 10 and the carriage then moved to the extreme right, during which the relatively fixed nut is rotated in the opposite direction. When the carriage is at its extreme right hand position the head 16 is dropped back to the position shown so that its stylus engages the record near its center, which is the point for beginning recording. The idler friction wheel 14 is simultaneously or independently moved into contact with the record to grip the record between it and the drive friction wheel 12. The machine is now ready for recording and in order to record the operator picks up the hand set and closes switch 39 whereupon motor 13 rotates the friction wheel 12 and causes the record tablet 11 to rotate at the proper speed. The operator then speaks into the microphone 38 to energize the head 16 to form a permanent record of the spoken sounds on the record tablet. In order that the head 16 function efficiently as a recorder and a reproducer it is desirable that its stylus engage the record tablet under a relatively light pressure so that a rather shallow record groove is formed in relation to that normally formed on machines of this type. For example, it is proposed that the record groove in this machine will have a depth of about $\frac{1}{4}$ of a mil. It is not

intended that a record produced on this machine will be played back many times, and it is probable that with such a light recording it can be played back usefully only four or five times, which will be quite satisfactory for a machine of this type.

Another important advantage of the shallow record groove is that both sides of the record can be employed since the recording on one side does not distort the surface of the record on the other side notwithstanding its thinness. It is not necessary to back up the record at the stylus as has already been demonstrated in connection with the standard machine of this type, and especially here where the pressure of the stylus is so light on the record there is no need whatsoever for backing the record up in order to get a good record.

At any time during recording the machine may be stopped by simply raising the button 40 so that switch 39 opens. A machine of this type has practically no tendency to overrun so that none of the record is wasted even if the machine is frequently stopped.

The carriage 5 will be caused to progress slowly to the left, as for example a distance of about 0.005 inch for each rotation of the record by reason of the fact that the rotating record will cause the tubular shaft 9 to rotate and through its gear connection with the threaded shaft 6 cause it to rotate also. The threaded shaft 6 being engaged by the relatively fixed nut 22 will be caused to move slowly in a longitudinal direction, moving the carriage and record tablet with it. The frictional resistance to rotation of the nut 22 which can be varied by the thumb nut 21 is such that the carriage will be moved as the record revolves, although it is not sufficiently great to prevent bodily movement of the carriage by hand when desired, at which time the nut itself revolves.

If at any time during recording it is desired to indicate a correction which is to follow a warning marking may be made on the record tablet by depressing the spring support 25 so as to move the compressible friction wheel 26 into engagement therewith. As illustrated in Figure 5, when so forced into engagement with the record the knife 27 will be caused to project sufficiently so as to make an impression in the surface of the record once for each rotation of the wheel 26 which, of course, is being driven by the movement of the record. The width of the knife 27 is such that these marks which extend radially of the record and therefore transversely of the record grooves, will overlap several of the grooves so that as a correction point is approached the stylus 17 in running over these marks will cause the reproduction of audible sounds or clicks from the loud speaker 38. The rotatable anvil 18 picks up the record at the point of engagement of the record device therewith to permit this marking action.

In order to back space the record for play back purposes the button 29 is depressed at any point during recording to cause the rod 28 to move downwardly until the pin in the collar 36 engages the adjacent portion of the ledge 33. This results from the fact that the spring finger 35 engages the adjacent tooth of the rack 34 and as pressure continues downwardly carriage 5 is caused to move back to the right a distance depending upon the relative position of the pin on the collar 36 and the ledge 33. As the carriage moves slowly from left to right, it will be seen that the distance which the rod 28 may be depressed will be gradually reduced by reason of the fact that the distance between the pin on

the collar 36 and the ledge 33 is gradually decreasing. Thus at the beginning of recording rod 28 may be depressed the greatest amount, while near the end of the recording it can be depressed but the minimum amount. On the other hand, it may be depressed variable amounts between these limits depending upon the position of the carriage in a radial direction.

When the stylus 17 is near the beginning of the record where the ratio of the record grooves are a minimum it will be seen that the record must be back spaced a maximum amount, that is a distance of every record groove in order to get a given number of words played back. However, as the periphery of the record is reached, that is when the carriage is near its extreme left hand position the ratio of the record grooves will approach a maximum and each full groove will obviously contain many more words than a full groove near the center of the record. Thus if the carriage moves to the left the back spacing device causes the carriage to step back a less and less distance as the length of the grooves in each convolution increases, so that approximately an equal number of words will be played back for one depression of the rod 28. The spring 30, of course, returns the rod 28 to normal position when it is released. The pawl 35 is made of a plurality of separate spring leaves in order to insure no lost motion in the back spacing device by reason of the relative position thereof with respect to the rack 34.

It is to be noted that there will be no difficulty in back spacing the record even though it is engaged by the stylus 17 and gripped by the wheels 12 and 14, especially when the record is in motion. The parts being in motion does not tend to cause relative sliding movement with respect to the record, and as for the stylus it simply has a relative movement in a radial direction as the carriage moves back. The pressure of the stylus on the record is light so as not to materially interfere with the movement, and although it may scratch the record across the grooves, this is not a serious incidence of its operation.

In order to completely play back the record the head 16 and the shaft 15 are raised, the carriage 5 is moved back to the extreme right and the shaft 15 and head 16 depressed, switch 39 is closed without any circuit changes. The head 16 generates an electrical current in accordance with the sounds recorded in the grooves to actuate the loud speaker 38 sufficiently so that intelligent reproduction can be heard at the ear piece. It is apparent therefore that even during recording any part of the record can be played back at any time, and that when a substantial amount of the record is to be played back the carriage will be moved as described by hand rather than by the back spacing device.

It is believed that the above description of the operation of this device will be sufficient to fully acquaint those skilled in the art with the nature and capabilities thereof. I, of course, appreciate that many changes in the details of construction of the device may be accomplished by those skilled in the art without departure from the novel objects of this invention, and I therefore do not desire to be strictly limited to the disclosure, but rather by the appended claims.

What is claimed is:

1. A sound recording and reproducing device including a record support, a sound recording and reproducing head having a single stylus positioned to engage a record when mounted on said support

for recording or reproduction, means for causing relative forward movement between said support and head including a motor, a combined microphone and loud speaker directly electrically connected to said head, and means for causing relative backspacing movement between said support and head while said motor continues its forward drive.

2. In the combination of claim 1, said support being mounted for movement in a direction radial of the record and said driving means applying power to the record.

3. In the combination of claim 1, said means for causing relative movement including a relatively fixed nut engaging the threaded member attached to said support and movable therewith.

4. In the combination of claim 1, said means for causing relative movement including a relatively fixed nut engaging the threaded member attached to said support and movable therewith, said nut being driven by said threaded member when said support is manually moved.

5. In the combination of claim 1, correction marking device including a support adjacent the record when mounted thereon having a compressible roller for engaging the record in which is embedded a marking implement.

6. In the combination of claim 1, a correction marking device including a compressible roller having a marking knife embedded therein, a resilient support for said roller depressible to forcefully move the roller into engagement with said record.

7. In the combination of claim 1, said backspacing means back spacing said support a distance depending upon its relative position with respect to said head.

8. In the combination of claim 1, said backspacing means back spacing said support a distance depending upon its relative position with respect to said head, and including a fixed rack and cooperating pawl and a stop for permitting variable movement thereof.

9. In a sound recording and reproducing machine the combination including a carriage having a record receiving spindle journaled therein, means for engaging a record when mounted on said spindle for causing rotation thereof, means driven by said spindle for causing radial movement of the carriage in relation to the record, a sound head having a stylus positioned to engage a record when mounted on said spindle, and means mounted on said carriage and manually operable for back spacing the carriage a distance proportional to its relative position with respect to either of its extremes of movement.

10. In the combination of claim 9, said last means including a reciprocable member mounted on said carriage, a fixed cam ledge positioned adjacent the path of movement of said carriage, and a lug mounted on said reciprocable member for engaging said ledge at a point in the travel of said carriage.

11. In the combination of claim 9, said last means including a reciprocable member mounted on said carriage, a fixed cam ledge positioned adjacent the path of movement of said carriage, a lug mounted on said reciprocable member for engaging said ledge at a point in the travel of said carriage, and including a fixed rack and a pawl mounted on said reciprocable member for engagement therewith when depressed.

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