Oct. 6, 1953 J. O'D. SHEPHERD 2,654,609

DICTATION MACHINE

Filed June 15, 1949

FIG. 1

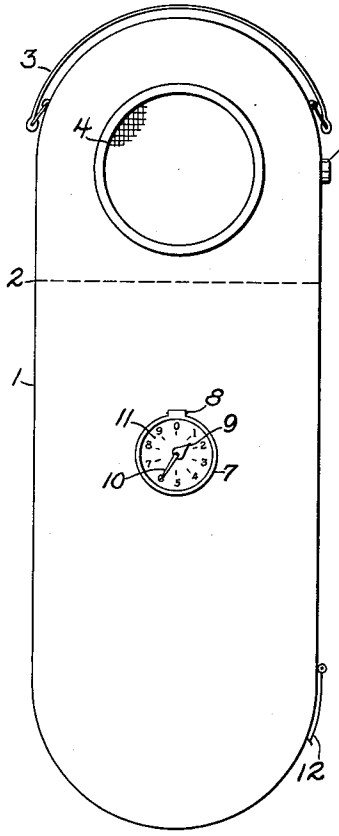


FIG. 2

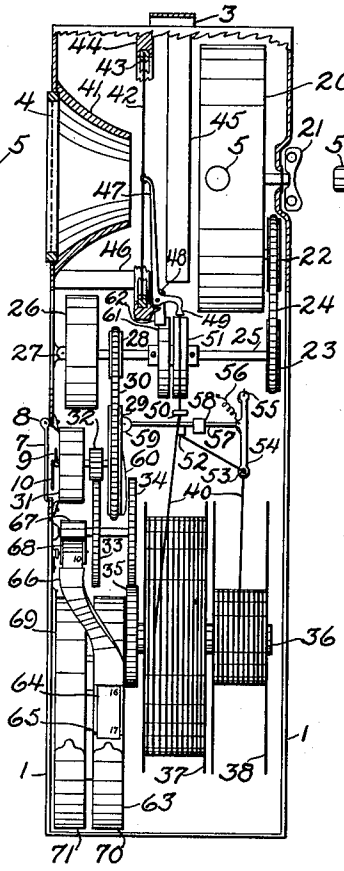


FIG. 3

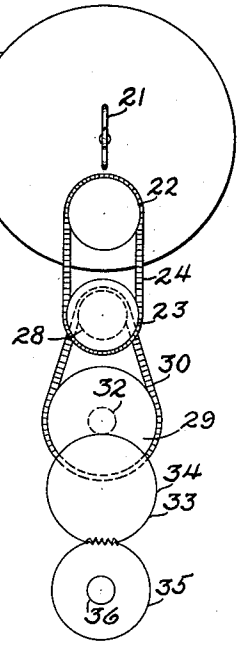


FIG. 4

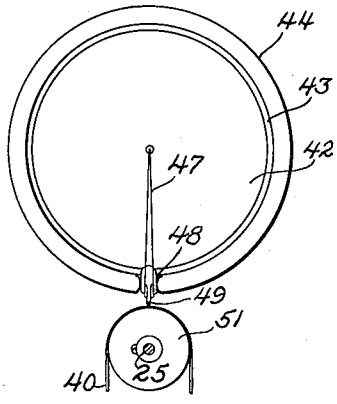
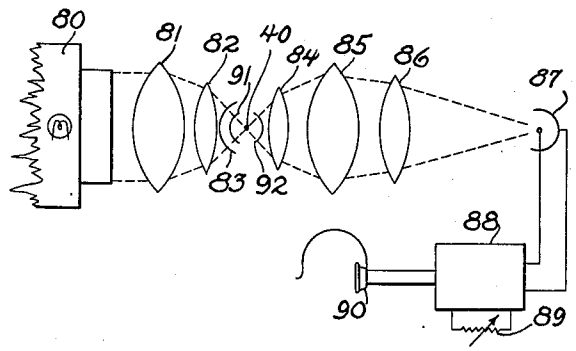


FIG. 5



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DICTATION MACHINE

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Continuation of application Serial No. 451,904, July 22, 1942. This application June 15, 1949, Serial No. 99,241

7 Claims. (Cl. 274—11)

1

This invention is in the field of sound recording and reproducing and, more particularly, relates to dictation machines. This application is a continuation of my application Serial No. 451,904, filed July 22, 1942, now abandoned.

Dictation machines commonly used in commerce employ a cylinder record made of a wax-like material which occupies substantial space. Such machines normally are driven by electric motors and are so heavy as to be considered only as semi-portable. Even the substitution of a spring motor for the electric driving means would not be expected to reduce the weight to where it would be conveniently carried. Its bulk would also be considerable by virtue of the size of the conventional records.

One of the objectives of the present invention is to provide a dictation machine weighing but a few pounds and of such dimensions that it may be conveniently carried, as for example, in a man's coat pocket. Its contemplated size is comparable with a small folding pocket camera. When dictating is to be done the machine may be held in one hand in proximity of the mouth, the motor started by a convenient button extending through the case and the record made. This provides executives, engineers and others with a convenient instrumentality for producing a dictated record wherever they may be.

Another object of this invention is to provide a portable dictation machine which is fully operable in any position in which it may be held.

A third object is to provide a rugged machine of this class without parts which are susceptive of displacement by any reasonably rough handling, even by being dropped a few feet.

Still another object is the provision of a machine of this class which will continue to operate satisfactorily while its orientation is being changed or while it is being shaken or jarred, as for example, in an airplane, automobile or other moving vehicle.

A still further object of this invention is to provide novel means for indicating instructions to a typist who may transcribe a dictated record.

Reference is hereby made to my application Serial No. 423,450, filed December 18, 1941, now Patent No. 2,497,142, issued February 14, 1950, of which this is a continuation-in-part. In each the use for record purposes of a filament is contemplated. This filament has the characteristics of transmitting light and, in effect, rotating polarized light. This may be of optically active material or comprise a core of optically neutral transparent material, such as celluloid, bearing an external layer of optically active material.

2

It may consist of a birefringent material, such as cellophane, which has an oriented grained structure. Filaments of this type have particular advantage for a portable dictation machine in that a substantial recording time of filament may be provided on a spool, the filament is rugged, may be recorded on by simple means not susceptive of damage by reasonable shock, and not requiring any particular orientation for proper operation. A sound actuated member may place undulations on such a filament to form a sound record. Such an undulatory record may be employed to modulate a scanning beam in a detectable manner to effect reproduction of the record. Oriented polarized light may be used for such a beam, in which case the signal record will in effect rotate the polarization in accordance with the signals or, as will be termed below, rotatively modulate it. A properly oriented polarizing medium, or the like, intersecting the beam below the filament will convert rotative modulations into intensity modulations detectable by a conventional photo-cell. The output of this cell may, through suitable interconnecting circuits including an amplifier, actuate a telephone receiver or other appropriate device. A filament of these types does not require processing before it is available for reproduction.

The present device has a spool to supply the filament and a takeup spool. A spring motor provides the driving power. A diaphragm with a pivoted lever connected to its center drives in response to sound waves a cutting or deforming member. The filament is presented to this member as it passes over a rotating wheel and the member cuts, engraves or deforms it to make a record consisting of undulations which may affect a scanning beam and comprising light rotative and/or refractive modulations.

A dial is provided to indicate the amount of filament which has been used or, as an alternative, the amount remaining available for use. A paper tape also is provided which is driven at a slower speed than the filament, with arrangements for noting on it by pencil, or the like, particular instructions for the transcriber.

This invention is set out by five figures of the drawing, as follows:

Figure 1 is a front view of the device;

Figure 2 is a side view with a removable section of the side and back omitted and the upper portion of the casing broken away to show the mechanical elements;

Figure 3 shows the main drive elements;

Figure 4 is a view of the diaphragm and associated elements as viewed from the right of Figure 2, showing the relation of the filament and the recording member, and

Figure 5 indicates an arrangement which may be used to reproduce from a filament record.

With reference to Figure 1, the device is enclosed in a casing 1 of appropriate material. The back portion below dashed line 2 and the bottom are removable for reloading, inspection, etc., in the same general manner that camera casings may be opened for this purpose. A handle 3 is arranged for carrying the instrument. An opening 4, covered by suitable mesh, a metal grill or the like, is provided for the user to talk into when dictating. A push button 5 starts the motor upon being pressed and stops it upon being released, the internal mechanism for accomplshing this operation being conventional as with amateur type moving picture cameras. A transparent lid 7 spring hinged at 8 covers a measuring device including a tens hand 9 and a units hand 10 operating over a decimally graduated scale 11. It is the purpose of this indicator to show the amount of recording filament used, or remaining to be used, and the graduations may be calibrated in feet or time units such as minutes. The hands are attached to their respective stems by friction and, by opening lid 7, they may be restored to zero. A hinged door 12 gives access to an internal paper tape for marking, as with a pencil, information for the transcriber.

Figure 2, which, as stated, is a side view of Figure 1 with the removable portion of the cover omitted and the upper or fixed part of the cover broken away to show the internal mechanism. Certain of the internal elements also are in cross section or broken away as will be understood. A conventional spring motor 20 is provided with a pivoted winding key 21. Grooved pulley 22, which is driven by the spring motor, drives pulley 23 by means of a tightly wound spring belt 24, or the like. Pulley 23 is affixed to shaft 25. This shaft is connected to a conventional friction governor 26 which may be similar to those used in spring driven phonographs or telephone dials. The governor casing is attached to the casing 1 of the device by hinge 27 so that it, together with shaft 25, may be moved downward somewhat to facilitate threading the device.

Grooved pulley 28, affixed to shaft 25, drives pulley 29 by spring belt 30. Pulley 29 drives conventional gearing enclosed in casing 31 to provide a decimal drive at proper speed to hands 9 and 10. Gear 32 is also driven by pulley 29 and meshes with gear 33. The latter gear is affixed to a shaft upon which also is affixed gear 34 which meshes with gear 35. The latter drives a spindle 36 upon which is mounted spool 37 carrying the supply of filament 40 and takeup spool 38. Spool 37 is relatively loose on the spindle. Spool 38 is friction driven by having the portion of the spindle upon which it is mounted covered with an appropriate friction material or other suitable arrangement. The gear ratios employed result in spindle 36 being rotated at such speed that the filament fed to spool 38 always will be under tension. The filament as it is being used will rotate spool 37 in the opposite direction to spindle 36 and spool 38 and the friction of the parts will maintain the filament under slight tension as it is supplied to the recording arrangements.

Behind the opening 4 is mouthpiece 41, shown in section, which directs the sound against diaphragm 42, said diaphragm being made of mica or other suitable material which will be actuated by sound waves. The diaphragm is flexibly mounted in a suitable ring of flexible material 43 in a circular carrier 44. Both of the latter are shown in section and portions thereof broken away. Acoustical barriers 45 and 46 are provided to reduce the amount of internal noise of the driving mechanism which will reach the diaphragm. A lever 47 is affixed to the middle of the diaphragm and is pivotally mounted at 48. This lever drives a cutting or deforming member 49 which engages the filament. This member may be a blade shaped element effective to place on the filament, as it is driven, hill and dale undulations in response to the actuation of the diaphragm by sound waves to make a record on the filament of said waves. A side view from the right of Figure 2 of these recording elements is shown by Figure 4. The diaphragm and associated elements will be recognized as being similar to sound boxes used with mechanical phonographs and recorders, and the like, and may be modified within the scope of its purpose in the skillful manners developed in those arts. The member 49 may be of sapphire or other suitable material, and may be arranged to be adjusted or removed. The carrier 44 may be mounted on rubber or the like to acoustically insulate it from the casing, and so may the mouthpiece 41.

The filament 40 passes from spool 37 through eyelet 50 which is in line with the groove of wheel 51 affixed to shaft 25. This wheel, or the groove thereof, is of a material such as rubber which will frictionally engage the filament. The wheel 51 is arranged to drive the filament at uniform speed as controlled by governor 26 and presents the filament to member 49 for recording. By the arrangements set out above, member 49 will be driven by the diaphragm 42 to cause the member to cut or deform, or both, the filament 40 as it is presented to the member by wheel 51 to result in a sound record of light rotative modulations being made on the filament. The filament passes from wheel 51 through an eyelet 52 in line with the wheel, and thence through an eyelet 53 of a level winder to takeup spool 38. The level winder may comprise a lever 54 pivoted at 55 and pulled to the left by spring 56. A shaft 57 passes through pivoted guide 58 and terminates on the left in roller 59. The side of wheel 29 carries a cam face 60 which imparts an oscillatory motion to wheel 59 and, therefore, the level winder 54 to effect even distribution of the filament on the takeup spool 38. Other conventional level winding arrangements may, of course, be employed.

Shaft 25 is journaled in the governor 26, which is hinged at 27, as set out above, and is maintained in its normal upward position shown by spring 24. This spring works against spring 30 but has a substantial lever arm advantage thereover. A pulley 61 is free to rotate, but not for longitudinal movement, on shaft 25. Arcuate shoe 62 attached to the lower portion of diaphragm carrier 44 is adapted to engage idler pulley 61. Since the pivot point 48 is also mounted on the diaphragm carrier, it follows that pulley 51 will normally present the filament 40 accurately to recording member 49.

A circular container 63 carries a roll of paper tape. A portion of tape 64 is being fed from slot 65. The exposed tape at 64 registers with the opening in the casing covered by 12 so that the tape may be marked with a pencil or the

like after opening the cover 12. This paper is fed through the rectangular conduit 66 which is for the purpose of shifting the paper to the left in line with rubber roller 67 which is driven by gear 33. The paper is held against roller 67 by idler roller 68 by a spring not shown. The paper tape is delivered into circular container 69 into which it will roll on itself. A friction driven spool may be enclosed in container 69 to take up the paper tape. Containers 63 and 69 have suitably mounted semi-circular covers 70 and 71, respectively, by which container 63 may be supplied with fresh tape and tape may be removed from container 69. The gearing drives the paper slowly at a predetermined speed with reference to the filament and it may be marked for guidance of the transcriber as set out. The tape may also carry numbers as shown at 64 corresponding to the reading on the dial 11, in which case the gear ratios employed in connection with the dial and paper tape drive will be chosen to maintain correspondence between the two. With the paper carrying measurements calibrated to recording time, footage of filament used or footage remaining, the dial and associated elements may be dispensed with and a transparent window 12 employed so that the measurements indicated by the tape may be observed.

Reproduction of sound may be made from the filament irrespective of its angular orientation around its longitudinal axis by means set out in my aforementioned patent application. A modification of such arrangement is shown by Figure 5. The filament 40, indicated in section, is driven, at the same speed as employed in recording, by means not shown. A light projector 80 projects a vertical ribbon of light through a lens system here shown as comprising lenses 81 and 82 which focus the ribbon of light on the filament 40. This focus is not a strict point but is slightly greater than the diameter of the filament so that the entire filament is bathed in a narrow beam, say 1 mil wide, the angular incidence of the edges of the beam being substantially 90°. A screen 83 is provided with a narrow slit, or the equivalent, to further control the width of the ribbon of light. A converging lens system shown here comprising lenses 84, 85 and 86 focuses the light ribbon into photocell 87. The output of this cell is connected to conventional amplifier 88 provided with conventional gain control 89. The output of this amplifier is connected to a telephone receiver 99, or other means for converting electric currents in the voice frequency range into sound.

A polarizing medium 91, such as Polaroid, is provided to intersect the incident beam of light and thereby polarize it. A similar medium 92 is provided and so oriented as normally to substantially extinguish the light beam. The presence of the filament 40 will rotate the beam to where it is visible to the photo-cell in amount depending upon the record at any instant of scanning. Modulations on the filament will result in the beam which passed through the filament being rotatively modulated in accordance with the record on it, with said rotative modulations being converted by medium 92 into intensity modulations detectable by the photocell.

Polarizing media, particularly those employing an iodide salt oriented to extinguish light, do not always completely do so, but transmit some light which, in the case of an iodide salt, is a shade of purple. A color filter may be employed intersecting the beam to provide light complementary to the color transmitted under the above mentioned conditions to result in substantially complete extinction of the rays. This color filter may be incorporated in the carrier for one or both of the polarizing media.

The light focused on the filament with these arrangements may result in the filament being subjected to a substantial and damaging amount of heat. Appropriate arrangements may be provided to extinguish the light when the filament is stopped or to intersect the beam except when the filament is in motion. The latter arrangements may be similar to those employed with moving picture projectors to interpose a so-called "fire screen" in the beam when the filament stops.

The reproducing machine may be provided with means to carry the paper tape and drive it at the same rate with respect to the filament as it was driven by the recorder, by gearing or the like which may be similar to that disclosed as part of the recorder, so that a section of paper is presented to the transcriber which corresponds to the filament being scanned so that he may observe the concurrent markings on the tape.

I may employ in claiming this invention terms such as "optically active" or "having light rotative characteristic" with respect to the material employed for the record medium. These may be considered as expressions relating to observable phenomena of certain light transmitting substances including materials, particularly of the cellulose group, having a grained structure the grains of which have been given predetermined orientation, to in effect rotate polarized light and thereby make visible, by their introduction into a polariscope, a beam of normally extinguished polarized light, or the converse. Terms such as "light rotative modulations" and others to this end may be considered as relating to the character of the record in its effect on a polarized scanning beam.

In claiming this invention I may also employ terms such as "portable dictation machine" in defining this invention. Inasmuch as the expression "portable" may be considered as a relative term, it will be understood that the meaning thereof intended in the claims is to a machine which is of such size, shape and weight that it may be carried in one hand and conveniently used while being held in one hand.

A wide variety of casing shapes may be employed in practicing this invention. Likewise, the driving arrangements may be varied widely from the detail shown. Other modifications may also be made within the scope of this invention as set out by the claims.

What is claimed is:

1. A dictation machine including a long flexible medium upon which a record of sound waves may be made, a pulley around which a portion of said medium is looped to be driven through frictional engagement by said pulley, means connected to said pulley to drive it, a diaphragm responsive to sound waves, a recording member operatively connected to, and driven by, said diaphragm to engage said medium at a point on said pulley to make a record of sound waves on said medium as said medium is being driven, a resilient mounting for said pulley tensioned toward said recording member, and limiting means operatively connected to said pulley to provide predetermined normal engagement of said medium by said recording member.

2. A dictation machine including a filamentary

recording medium, means to drive said medium, a casing, a recording head immovably mounted with respect to said casing and being responsive to sound waves, and means to resiliently maintain said sound head and said medium in operative engagement to make a record of sound waves on said medium as undulations thereon with substantially equal effectiveness for all orientations of the machine, said casing containing all of said structure and being of such size and shape as may be conveniently held in one hand during dictation.

3. A portable dictation machine which may be held in any position during dictation including a filamentary recording medium, a casing, drive means in said casing operably mounted to drive said recording medium, means to control the speed of said drive means, means responsive to sound waves to make a record of the sound waves on the medium as the medium is being driven, said last mentioned means including a diaphragm and a member actuated thereby, said diaphragm being mounted in said casing in fixed relation thereto, an opening in said casing to admit sound waves to said diaphragm, and means to cause said medium to resiliently engage said member to make a record on that medium with substantially equal effectiveness for all positions of the machine, said casing containing all of the aforementioned structure and being of such size and shape as may be conveniently held in one hand during dictation.

4. A portable dictation machine including a casing, an opening in said casing for admission of sound waves, a diaphragm inside said casing opposite said opening and adapted to be actuated by said sound waves, a motor in said casing, a flexible record medium inside said casing, means inside said casing to drive said record medium by said motor, means connected to and actuated by said diaphragm for placing on said medium a record of sound waves striking said diaphragm, a flexible tape inside said casing, a second opening in said casing through which indications may be placed on said tape, and drive means inside said casing operatively connected to said motor to drive said tape past said second opening and in registry therewith at a speed which is less than but in proportion to that of said record medium whereby indications may be placed on said tape at locations thereon which have a predetermined relationship to the record medium positions at the recording point.

5. A portable dictation machine including a casing, an opening in the casing for admission of sound waves, a diaphragm inside said casing opposite said opening and adapted to be actuated by sound waves, a motor in said casing, a flexible birefringent filament of random length inside said casing, means inside said casing to drive said filament by said motor, means connected to and actuated by said diaphragm for placing on said filament a record of sound waves striking said diaphragm, said record being of such character as to be reproducible by means including a scanning beam of polarized light, a flexible tape of random length stored inside said casing, a second opening in said casing through which indications may be placed on said tape, and drive means inside said casing operatively connected to said motor to drive said tape past said second opening and in registry therewith at a speed which is less than but in proportion to that of said filament whereby indications may be placed on said tape at locations thereon which have a predetermined relationship to the filament positions at the recording point.

6. A portable dictation machine including a casing, an opening in said casing for admission of sound waves, a diaphragm mounted inside said casing in a position to be struck by said sound waves entering said opening, a motor in said casing, a flexible record medium inside said casing, means inside said casing to drive said record medium by said motor, means connected to and actuated by said diaphragm for placing on said medium a record of sound waves striking said diaphragm, a flexible tape stored inside said casing, a second opening in said casing through which access may be had to said tape for placing indications thereon, and feed means inside said casing operatively connected to said motor to feed said tape along past said second opening and adjacent thereto at a speed which is less than but in proportion to that of said record medium so that indications may be placed on said tape through said second opening at locations on said tape which have a predetermined relationship to the record medium positions at the recording point.

7. A signal recorder including a housing, an elongated flexible record medium of random length in said housing, means to drive said medium past a recording point, means to record signals on said medium at said recording point as said medium is being driven, a flexible tape of random length stored within said housing, a wall of said housing being provided with an opening therethrough through which indications may be placed on said tape, means operatively connected to said driving means to drive said tape past said opening and in registry therewith at a continuous speed which is less than but in proportion to that of the record medium so that indications placed on said tape through said opening will be at locations on said tape which have predetermined relationships to said record medium at said recording point, said housing enclosing all of the aforementioned structure.

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