

Congratulations!  
Allen

F. C. GOODALE.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED JUNE 26, 1908.

944,608.

Patented Dec. 28, 1909.  
2 SHEETS—SHEET 1.

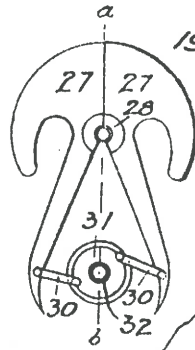
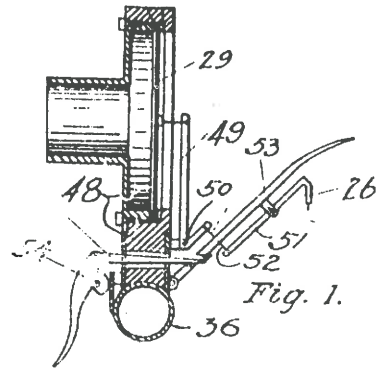
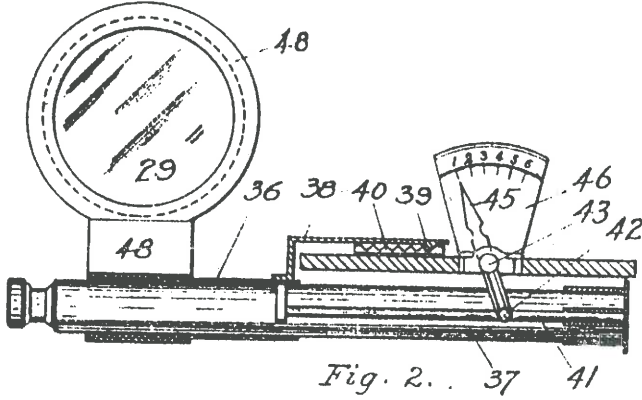


Fig. 3.

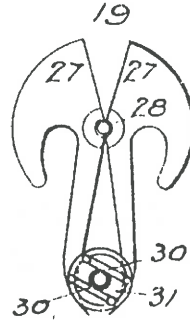


Fig. 4.

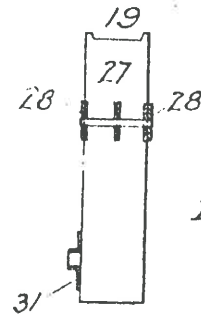


Fig. 5.

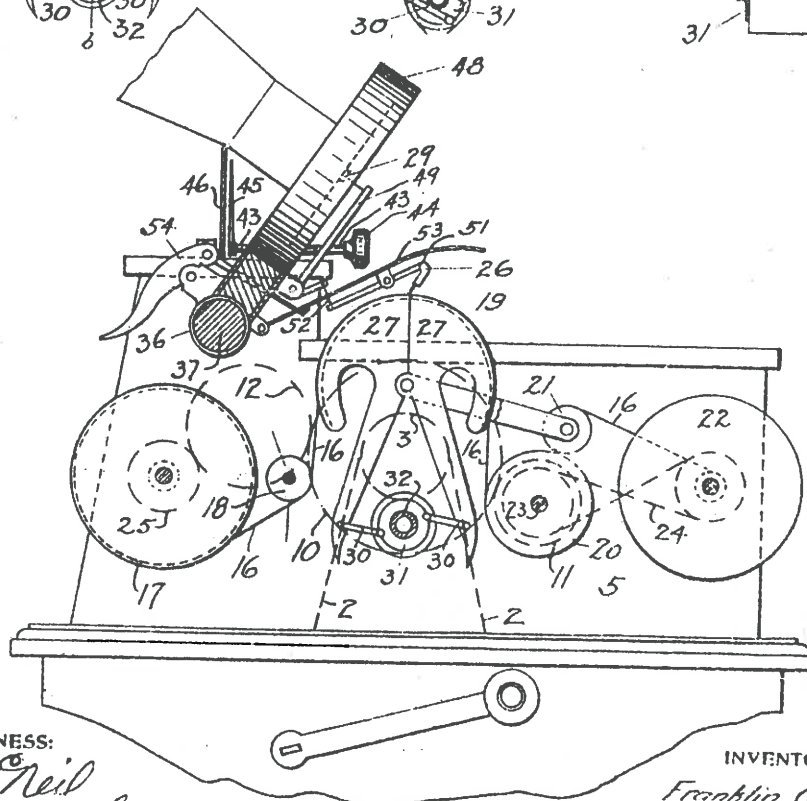


Fig. 6.

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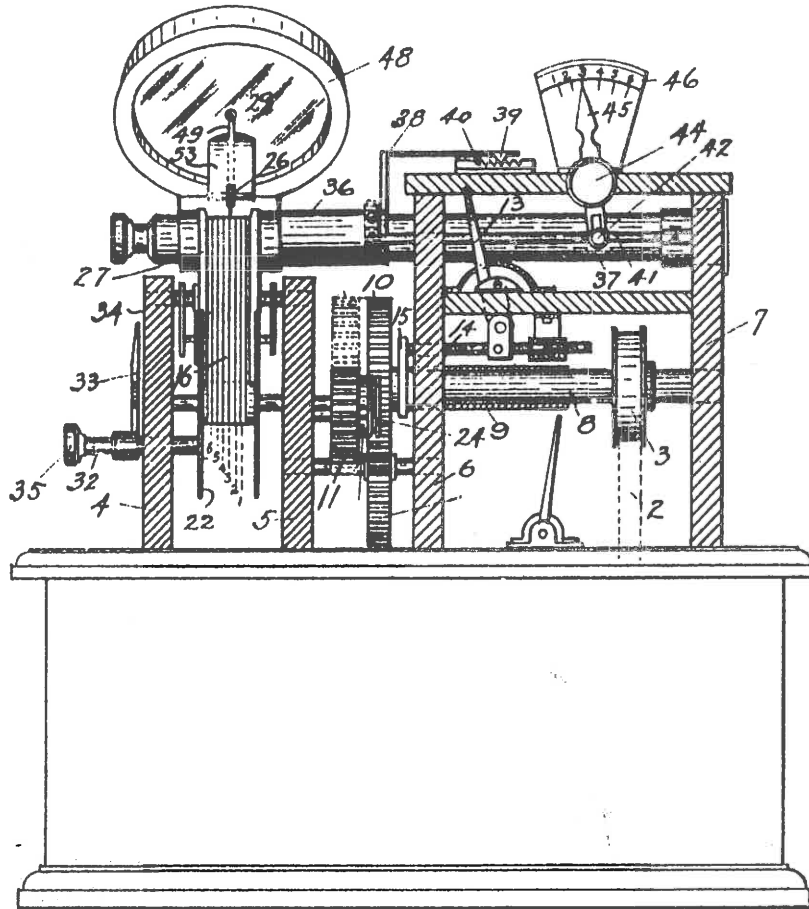


Fig. 7.

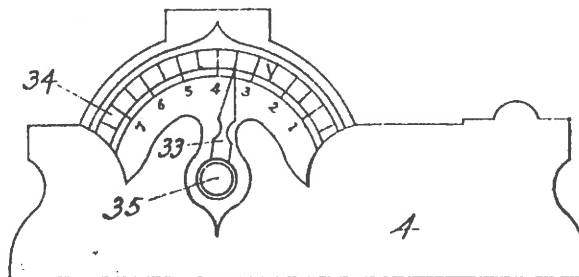


Fig. 8.

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# UNITED STATES PATENT OFFICE.

FRANKLIN C. GOODALE, OF TACOMA, WASHINGTON.

SOUND-REPRODUCING MACHINE.

944,608.

Specification of Letters Patent.

Patented Dec. 28, 1909.

Application filed June 26, 1908. Serial No. 440,468.

*To all whom it may concern:*

Be it known that I, FRANKLIN C. GOODALE, a citizen of the United States of America, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to sound reproducing machines, and especially to those adapted to use a flexible ribbon on which the record has been made, and has for its object to provide a device whereby the intensity of the sound may be varied at will without changing the speed of operation or the form or size of the horn.

Other objects are to simplify and cheapen the mechanism and to increase the length of time that a record may be operated, and to diminish the bulk of the record thus making the machine much more convenient and salable than those at present in use.

I attain these objects by the mechanisms and devices illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of the reproducing mechanism; Fig. 2 is a front view thereof showing the device for shifting the reproducer from one set of records to another parallel set; Figs. 3 and 4 are front views of the sound amplifier in its closed and opened positions respectively; Fig. 5 is a vertical section thereof on the line *a—b* in Fig. 3; Fig. 6 is a side view of the machine with one of its standards removed in order to show the mechanism; Fig. 7 is a rear view of the machine, and Fig. 8 is a view of the dial of the device for controlling the sound amplifier.

Similar numerals of reference refer to similar parts throughout the several views.

The great objection and drawback to the commercial use of sound reproducing machines is found in the limited time that they may be operated on account of the form of record. This fact is well known to all those who have daily use of the machine for commercial purposes, as well as those who use the machine for the reproduction of musical compositions, and it is with this drawback in view that I have devised the hereinafter described machine. Besides this, the circumstances under which such a machine may be used will vary from time to time

and therefore the loudness of the sound which is suitable to some circumstances would not be suitable to others, and it is desirable and even necessary to have means for controlling the loudness of the sound at will.

Referring now to the drawings, the motor mechanism by means of which the machine is driven is preferably mounted within the box 1, which acts as the base for the machine. The driving belt 2 passes through the top of the box and engages the pulley 3 suitably mounted on the machine. The machine itself is mounted between the parallel frames 4, 5, 6 and 7, which are secured to the top of the box 1, and is driven from the said pulley 3 by the following means: The said pulley 3 is mounted on a shaft 8 which has a sleeve 9 rotating therewith but slidably mounted thereon, and the said sleeve 9 carries a gear 10 adapted to drive either one of two gears 11 and 12, according to the position in which said gear 10 may be placed. This position is controlled by means of a lever 13 pivoted to the frame work of the machine and connecting with the slidable sleeve 9 by means of a bar 14 carrying a yoke 15 engaging in a collar in said sleeve 9, so that by moving the lever 13 from one position to the other the gear 10 is slid from engagement with one gear 11 to engagement with the other gear 12. The purpose of this arrangement is to provide a mechanism for rewinding the record ribbon 16 after it has been run through the machine, and this rewinding is preferably done at a higher rate of speed than the unwinding thereof when the record is being used. The record consists of a continuous ribbon 16 of suitable flexible material prepared to receive on its surface the impressions from a diaphragm with a stylus adapted to record the sound waves received thereby thereon. The record ribbon thus prepared and inscribed is wound on a reel 17 and passes therefrom past the idler roller 18, over the guide and sound amplifier 19, and then part way around the driving drum 20, and the second idler 21, and so on to the reel 22 on which it is temporarily wound. The record ribbon 16 is driven by frictional contact with the driving drum 20, which may be made of any suitable material having sufficient friction between it and the material of which the record ribbon is made, so that the turning of the drum 20 will draw the ribbon 16 through the machine. The driving drum 20

is mounted on the same shaft 23 as the above mentioned gear 11 and is driven thereby when the large gear 10 engages the said gear, 11. A cross belt 24 mounted on the shaft 23 beside the driving drum 20 engages the temporary take-up reel 22 and drives it so that as the record ribbon 16 is unwound from one reel 17 it is wound on the other. When the main gear 10 engages the other gear 12, to rewind the ribbon 16, it acts through a train of gears consisting of the said gear 10, a large gear 12 and a smaller gear 25 engaging therewith and on the shaft of which the record ribbon reel 17 is mounted. Since the action passes through one more gear when in this position than when in the driving position the direction of motion is reversed without reversing the direction of the main gear, and since the last gear 25 of the train is smaller than the gear 11 of the driving drum, the rewinding action is correspondingly faster than the unwinding action.

The ribbon 16 as it passes from one drum to the other, slides over a device which I have called the sound amplifier. The reproducing point 26 engages the record ribbon 16 at a point exactly in the middle of this amplifier. The amplifier consists of a pair of non-rotative curved and flanged bodies 27 over which the record 16 slides, and which are hinged together at 28 and are separable at their upper surface where the record ribbon 16 slides. I have found that when these two surfaces are in contact the vibration of the reproducer point 26 is much less than when they are separated, and that the extent of the vibration thereof increases with the distance between the said parts of the amplifier. The reason for this is that the ribbon 16 being flexible and being in tension at this point where it engages the reproducing point, is itself vibrated and greatly increases the vibration of the reproducing point 26, so that the vibration of the diaphragm 29 operated by the reproducing point 26 is increased. The extent of the opening between the two parts 27 of the amplifier is governed by means of a pair of links 30 secured to a disk 31 mounted on a rod 32, which is suitably mounted in the frame work of the machine and which carries a pointer 33 adjacent to a dial 34 secured to the frame of the machine, and which has a small knob 35 at its end whereby it may be turned so that the pointer 33 shall indicate on the dial 34 any desired number. As the pointer 33 is swung on the dial from right to left (see Fig. 8) the distance between the parts 27 of the amplifier, over which the record ribbon 16 has to pass, increases from naught to a maximum, hence it is evident that any desired loudness within the compass of the machine may be attained by turning the rod 32 so that the pointer will indicate on the dial the

desired distance between the parts of the amplifier.

It is evident from the above that the reproducer does not have to move in this machine, since the reproducing point 26 always occupies the same position, as the record is made in a straight line on the record ribbon. But, since the record is itself a very minute line, it is evident that I can, without materially increasing the size of the record ribbon, place a number of records on the same ribbon side by side, and all that is necessary to do to shift the machine from one record to the other is to shift the reproducer so that the point 26 thereof will engage whichever one of the records on the ribbon it is desired to have reproduced. I have indicated six records on the ribbon illustrated in the drawings, but it is evident that this may be changed to any desired number. The entire reproducing device is mounted on a sleeve 36 which is slidable on a rod 37 mounted in the frame of the machine, a spring 38 having a pawl 39 at its end engages in the rack 40 mounted on the frame of the machine so that the sleeve 36 will be held by the said pawl 39 and rack 40 in any position in which it may be placed. In order to shift it from one position to another a bar 41 is fastened to the sleeve 36 and is moved longitudinally by the lever 42 which is secured to a transverse horizontal rod 43 having a knob 44 at one end whereby it may be turned, and having a pointer 45 at its other end, adjacent to a dial 46 mounted on the frame of the machine. This dial 46 has figures thereon which correspond to the notches or teeth of the rack 40 and with the records on the record ribbon 16 so that if it is desired to reproduce record No. 1 the pointer 45 is made to indicate on the dial 46 the figure 1, or if any of the other records are to be reproduced the corresponding number on the dial is indicated by the pointer.

The reproducing mechanism itself consists of the usual diaphragm 29 mounted in suitable framework 48 and engaged at its center by the long end 49 of a lever pivoted to the frame at 50. This pivoted lever is acted on in my invention by a second pivoted lever 51 which is connected thereto by a link 52 and which carries at its other end the reproducing point 26. By this arrangement I have increased the leverage of the reproducing point 26 so as to make the machine much more sensitive. The diaphragm 29 and first lever are fixed in position except as to the adjustments for reproducing various records, as above described, but the second lever 51 is removable from the record by means of a hanger 53 to which the second lever 51 is pivoted and which is itself pivoted to the frame work 48 of the diaphragm and which is engaged by a thumb



lever 54 to lift it from its engaging position when it is desired to remove it from the ribbon either for rewinding or for changing from one record to the other.

5 It is evident from the above that the field of usefulness of such a sound reproducing machine has been greatly increased in several ways. In the first place, the length of the ribbon wound on the reel 17 can be made  
10 to take a record several hours in length, since the ribbon is itself very thin; further, a single ribbon can have a number of separate records thereon, any one of which may be reproduced at any time; and further, the  
15 intensity of the sound can be varied at will to satisfy the circumstances under which the reproduction is to be made.

Having described my invention, what I claim is:

20 1. In a device of the class described, the combination of a record support, a flexible record-body engaging the same, and sound-producing means engaging said record-body, said record-support comprising connected  
25 members adapted to be brought together to form a continuous surface, or separated to form spaced-apart surfaces.

30 2. In a device of the class described, the combination of a record-support, a flexible record-body engaging the same, and sound-producing means engaging said record-body, said record-support including members pivoted together and adapted to be brought together to form a continuous surface or separated to form spaced-apart surfaces.  
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40 3. In a device of the class described, the combination of a record-support, a flexible record-body engaging said record-support, and sound-producing means engaging said record-body, said record-support embracing two pivoted together members having rounded upper surfaces, and means adapted to separate said members, or bring them together.  
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50 4. A device of the class described comprising a record-support formed of two pivoted together members, a flexible record-body engaging said record-support, sound-producing means engaging said flexible record-body, a slidable sleeve carrying said sound-producing means, means for supporting said sleeve, and means for actuating said sleeve, said sleeve having applied thereto a spring-pawl and a rack engaged by said pawl.  
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60 5. A device of the class described comprising a record-support formed of two pivoted together members, a flexible record-body engaging said record-support, sound-producing means engaging said flexible record-body, a slidable sleeve, a spring-pawl attached to said sleeve, a rack engaged by said

pawl, a lever having connected thereto a registering pointer, and means of connection between said lever and said sleeve.

6. A device of the class described, comprising a record-support formed of two pivoted together members, a flexible record-body engaging said record-support, sound-producing means, a slidable sleeve carrying said sound-producing means, and means for effecting the movement and retention of said sleeve at required points of adjustment, said sound-producing means including a lever connected to the diaphragm thereof, means for actuating said lever, and a second lever connected to the aforesaid lever and carrying means engaging said flexible record-body.  
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7. In a sound reproducing machine, the combination of a pair of record supports with free space therebetween; a flexible record body engaging said supports and passing over the space therebetween; and sound producing means engaging said record body at a point between said supports.  
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8. In a sound reproducing machine, the combination of a pair of record supports with free space therebetween; means for adjusting said supports relatively to each other whereby the space therebetween is adjusted; a flexible record body engaging said supports and passing over the space therebetween; and sound producing means engaging said record body at a point between said supports.  
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9. In a sound reproducing machine, a sound amplifier comprising a pair of adjustable supports with space therebetween, over which the record body passes, and at the median point of which the sound producing means engages the record body.  
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10. In a sound reproducing machine, the combination of a pair of flanged record supports with free space therebetween; a flexible record body guided by and engaging said flanged supports and passing over the space therebetween; and sound producing means engaging said record body at a point between said supports.  
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11. In a sound reproducing machine, the combination of a pair of record supports hinged together; a controlling rod adjustably supported in the machine; and a pair of links secured to said record supports and to opposite sides of said controlling rod, whereby the adjustment of said rod adjusts the relative positions of said record supports.  
115

In testimony whereof I affix my signature in presence of two witnesses.

FRANKLIN C. GOODALE.

Witnesses:

PEARL GOODALE,  
CALEB BENSERT.

*Pearl was his wife!*

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