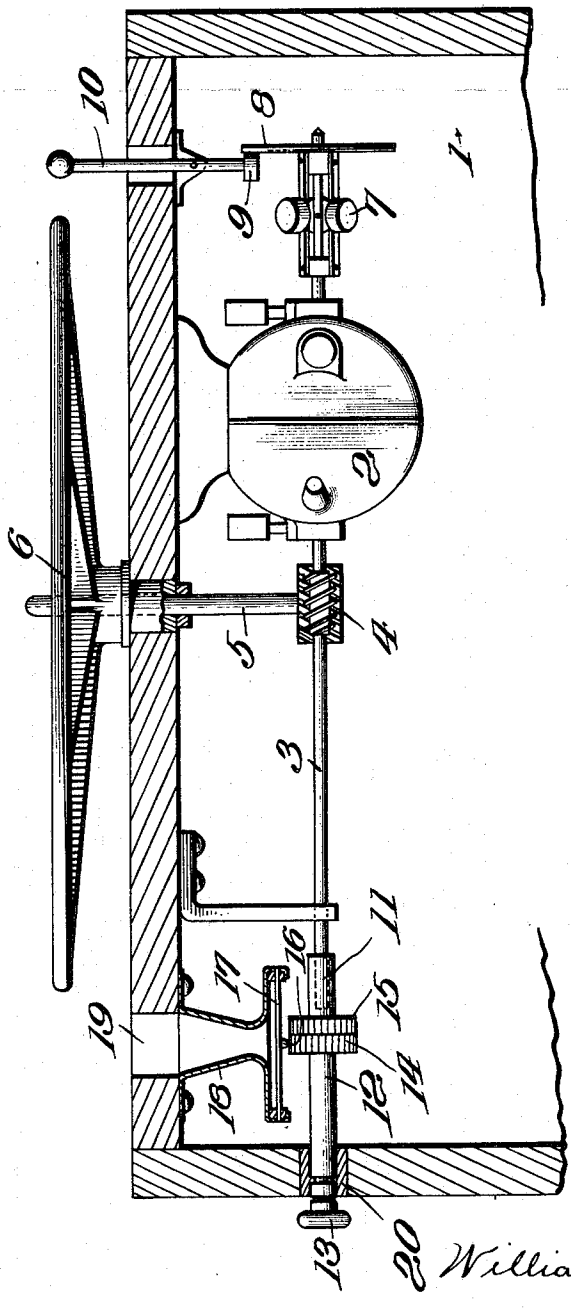
W. W. DEAN.

METHOD OF DETERMINING SPEED OF A ROTATING PART.

APPLICATION FILED MAY 31, 1917.

1,285,641. Patented Nov. 26, 1918.



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METHOD OF DETERMINING SPEED OF A ROTATING PART.

1,285,641. Specification of Letters Patent. Patented Nov. 26, 1918.

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To all whom it may concern:

Be it known that I, WILLIAM WARREN DEAN, a citizen of the United States, residing at Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Methods of Determining Speed of a Rotating Part, of which the following is a specification, reference being had to the accompanying drawing.

My invention consists of a method of determining the correct speed of machines, such as sound reproducing devices and the like, and has for its object the determination in a simplified manner of an exact speed, without the use of mechanical speed indicators or so-called "key" records, as heretofore employed.

Briefly stated, my invention consists in a method of determining when a certain speed is attained comprising the following steps; (*a*) providing a member having a predetermined number of mechanically formed teeth as hereinafter described, (*b*) moving said member at a predetermined speed having a definite relation to the driving speed of the device, (*c*) producing a sound by engaging said teeth by a suitable vibratory member, (*d*) comparing the sound emitted by said vibratory member with a sound of standard pitch produced by a pitch-pipe, tuning fork or the like, and (*e*) adjusting the speed or the driving means until the note produced by the said vibratory member corresponds to or bears a certain predetermined relation to the note of standard pitch. In this present application I shall claim the method herein disclosed exclusively, reserving for other applications detail disclosures and claims directed to the apparatus only. Here I shall describe and illustrate my invention with our form of apparatus, but it is obvious that the same may be practised with many other forms, without, however, departing from the appended claims.

The accompanying drawing is a view partly in section of a disk talking machine embodying my invention. I show such a device merely for illustration, as the method may be employed with many other devices for widely different purposes. It should be understood that the drawing is more or less diagrammatic, since it is unnecessary to give exact mechanical details for an understanding of the method involved.

The apparatus will first be briefly described, then I will proceed with general remarks concerning the method.

In the drawing I have shown a form of disk talking machine comprising the casing 1, in which is the electric motor 2, having the shaft 3, on which is mounted the worm gear 4, engaging a worm on the vertical drive shaft 5, upon which is mounted the record table 6. On the extreme right of the motor 2 is mounted a governor mechanism of any suitable type indicated at 7. Such arrangements are in common use, and the one I have shown may be considered of the type in which the friction disk 8 is drawn inwardly by the outward movement of the governor weights, thereby engaging the friction member 9 of felt, cork or the like, the said friction member being adjusted by means of the lever 10. By adjusting 10, the friction between 8 and 9 may be varied, and the speed of the entire device regulated thereby.

The left end of the shaft 3 engages by means of the sliding joint 11, a shaft 12, having a projecting handle 13. This shaft carries two toothed disks 14 and 15, the teeth on which are adapted to engage the point 16 on the diaphragm 17, mounted in a suitable casing 18, attached to the cabinet 1 and having a sound outlet 19.

The shaft 12, with the disks 14 and 15 attached thereto can be shifted endwise in the support 20, so that the teeth in either 14 or 15 may be engaged by the point 16; or 14 and 15 may be pushed sufficiently to the right, so that 16 will be entirely free.

For the sake of illustration, it will be presumed that shaft 3, revolves at the same speed as the shaft 5 and table 6. In some makes of machines, the table 6 revolves at 78 revolutions per minute, while in other makes it revolves at 80 or 90.

It is well known that considerable difficulty in accurately determining the speed of these machines is experienced. While many of them are provided with speed indicators, the indications depend largely upon mechanism liable to wear, with the result that while the indicator may read 78 or whatever the standard speed may be, the machine is not actually making that num-

ber of revolutions, but is usually running at a greater speed. To eliminate the necessity of relying on mechanical indicators, it has heretofore been customary to employ a "key record", such records consisting of a disk or cylinder having impressed thereon a certain selected sustained note. This "key record" would be placed on the machine and the speed of the latter adjusted until the reproduced sound corresponds with a pitch-pipe or tuning fork of the same pitch as the selected note on the record.

There are several objections to the employment of a "key record" as just described. Among these are difficulties in obtaining an absolutely correct sustained and uniform speed for the standard or master phonograph on which the master key record must be recorded. Secondly, the difficulty of procuring a standard note of exactly the correct pitch, this requiring accurate adjustment of the device producing the note or skill on the part of the person producing the same, if a cornet, clarinet or other wind instrument is used. Thirdly, the difficulties encountered in making duplicates of the master record, which difficulties are liable to introduce errors into the secondary record, and thereby destroy their accuracy. To eliminate these difficulties, I provide the disks 14 and 15 with a predetermined number of teeth bearing a certain mathematical relation to the speed of the table 6. I obtain the correct number of teeth required as follows:

First, I determine the tone of standard pitch to be employed as the master key. For the sake of illustration, I will designate A=435 vibrations per second. I now determine the number of revolutions per second of the disk 14 by dividing the number of revolutions of table 6 per minute by 60. In the case of a table making 78 revolutions per minute, the number of revolutions per second is 1.3. I now divide the number of vibrations per second of the standard note by the number of revolutions per second of the disk, and, using the figures just mentions, 435+1.3=334.59. I accordingly provide the disk 14 with 335 teeth; and if the same machine is required to drive records at 80 R. P. M., the disk 15 will have the suitable number of teeth determined by the formula just disclosed.

To obtain the correct speed of the instrument, it is merely necessary to start the motor, bringing the disk 14 or 15 having the proper number of teeth, into engagement with the point 16, whereupon a sound of certain pitch will be produced by the vibration of the diaphragm 17. The speed of the mechanism now regulated in the ordinary manner until said sound corresponds with that produced by a pitch-pipe or tuning fork producing the note A=435.

It will be observed that the number of teeth on the disk 14 is mathematically determined and cut or otherwise suitably formed on the said disk mechanically, therefore each disk is the same, thereby obviating all difficulties arising in connection with the use of "key records" for the purpose of producing the standard note; furthermore the teeth or other means on the disk 14 for vibrating the diaphragm 17 may be relatively large and substantial, and therefore not subject to such diminution or change, as affects the volume of sound, such as occurs with the indentations produced by sound waves recorded on an ordinary record.

I find a simple and cheap means of producing the disk 14 is to cast the same in "bakelite" or other similar material. The teeth may be of any desired formation, and may be of the "hill and dale" variety as employed in the well known Edison machine, or of the type used by the "Victrola".

And while I have shown the device as applied to a disk record machine, it will be understood that it may, with equal advantage, be applied to machines employing cylinder records; and while I show a diaphragm 17 for emitting the sound whereby the speed of the device may be determined, I do not limit myself to the employment of said diaphragm, as the ordinary reproducer of the machine itself may be employed by placing the needle or stylus directly upon the teeth of the disk 14 or in engagement with a member engaging said teeth. All such modifications I deem within the scope of the appended method claims.

I claim—

1. A herein described method of obtaining a predetermined speed in a driven member consisting in producing sound by a mathematically divided revoluble member moved by and in synchronism with the driven member, comparing said sound with the sound of known pitch and regulating the speed of the driven member until the sound produced thereby bears a certain relation to the sound of known pitch.

2. The herein described method of determining speed which consists of providing a member having a predetermined number of teeth, producing a sound by engaging said teeth by a vibratory member, comparing said sound with a sound of known pitch, and regulating the relative movement of said members until the sound produced thereby bears a certain predetermined relation to said sound of a known pitch.

3. The herein described method of determining speed which consists of providing a vibratory member, actuating said member by a revoluble means adapted to impart a predetermined definite number of mechanically generated impulses to said member in each revolution or part thereof, and comparing

the produced sound with a sound of known pitch.

4. The herein described method of determining the speed of sound reproducing mechanisms which consists of providing a vibratory member, and actuating means for vibrating the same positively driven by said mechanism whereby a mathematically predetermined number of mechanically generated vibrations are produced for each revolution of said mechanism, varying the speed of said mechanism and thereby varying the sound produced by said vibratory member, and comparing said sound with a standard sound.

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

WILLIAM WARREN DEAN.

Witnesses:
GEORGE R. CLOSE,
AMELIA G. COXFORD.