

F. E. THORMEYER.
MEANS FOR RECORDING AND REPRODUCING LENGTHY SPEECHES, COMPOSITIONS, AND THE LIKE.
APPLICATION FILED OCT. 22, 1906. Patented May 27 1913

1,063,085.

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4 SHEETS—SHEET 1.

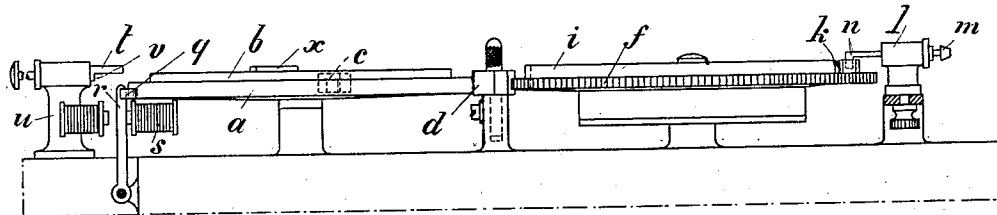


Fig. 1.

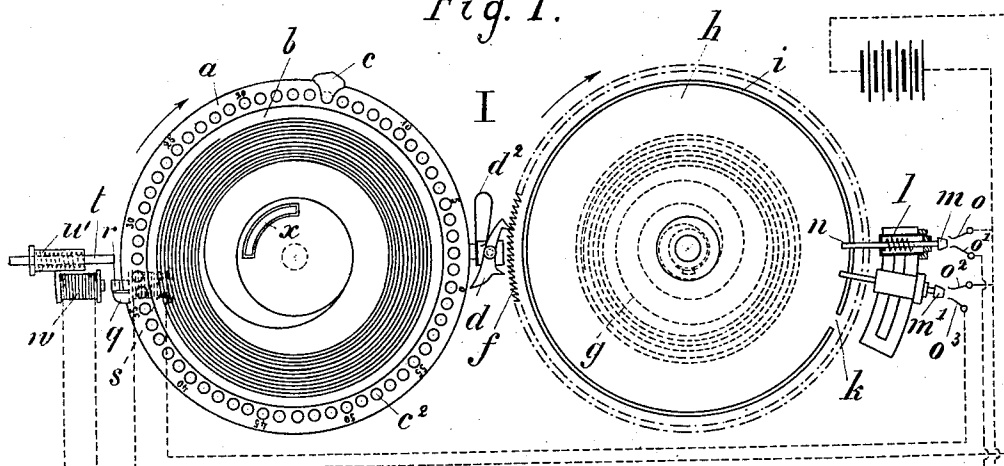
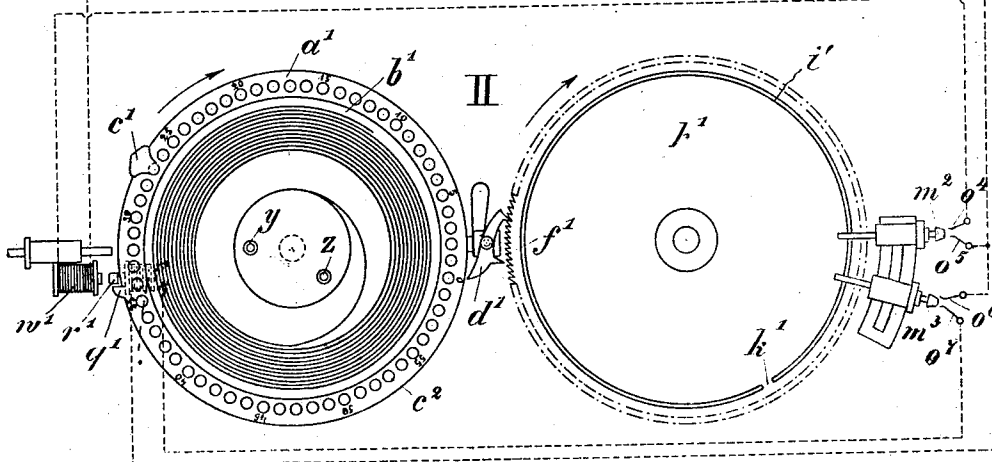


Fig. 2.



Witnesses.

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Fig. 9.

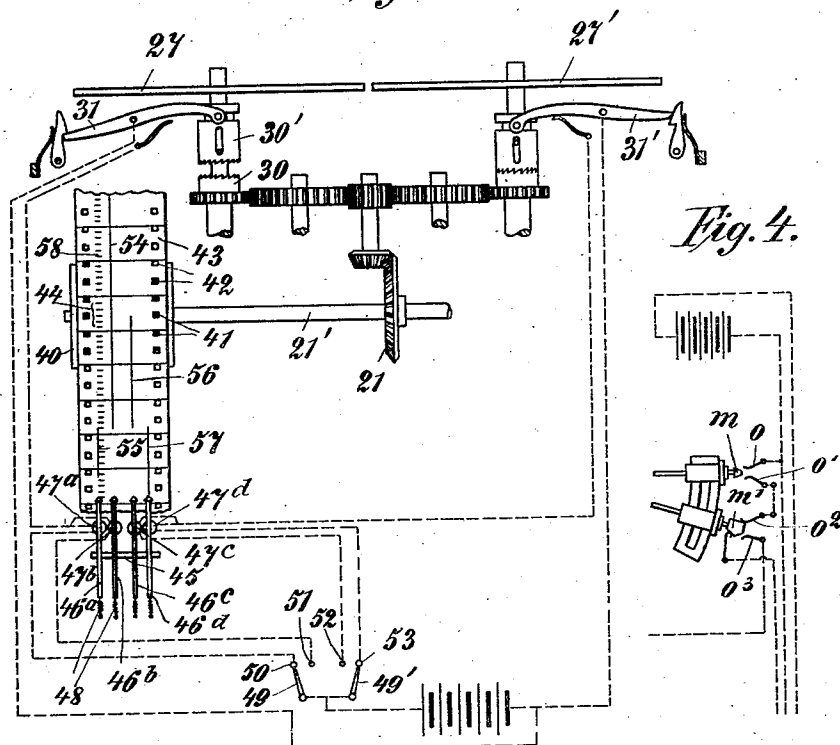
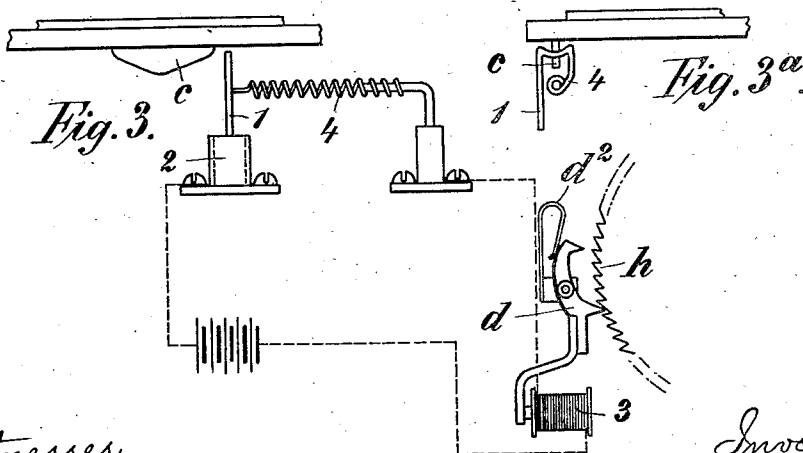
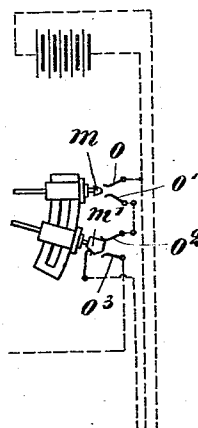


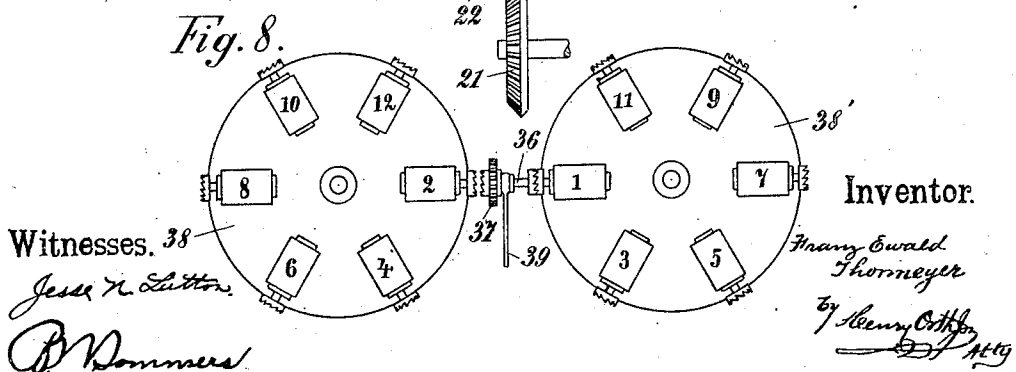
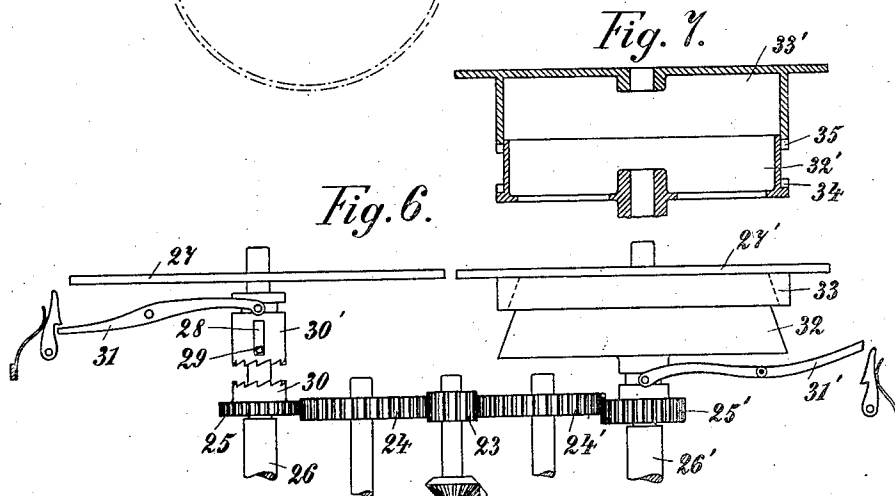
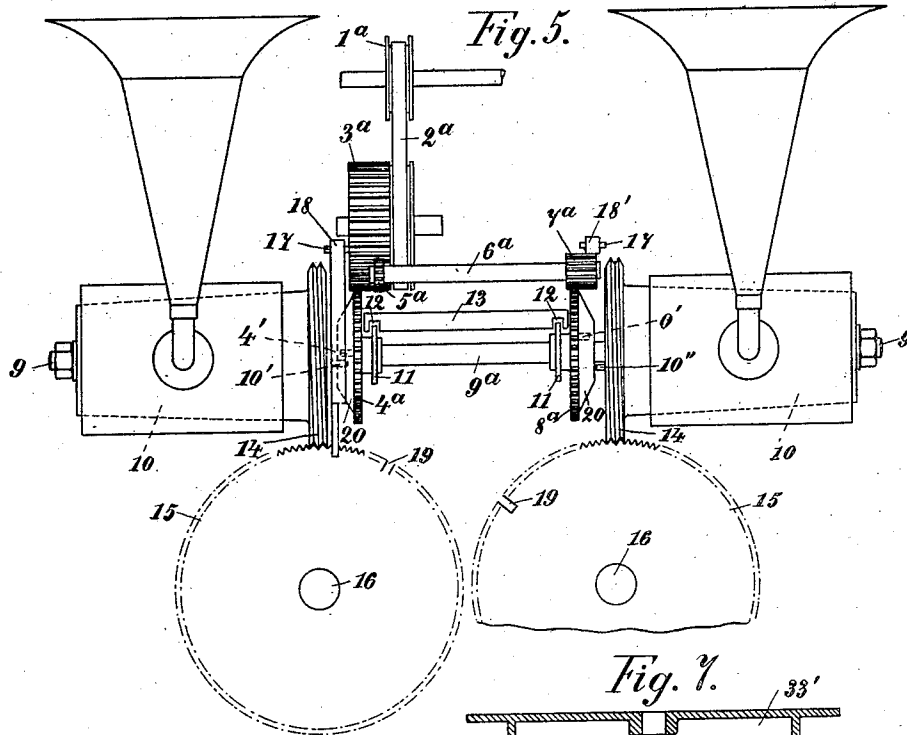
Fig. 4.



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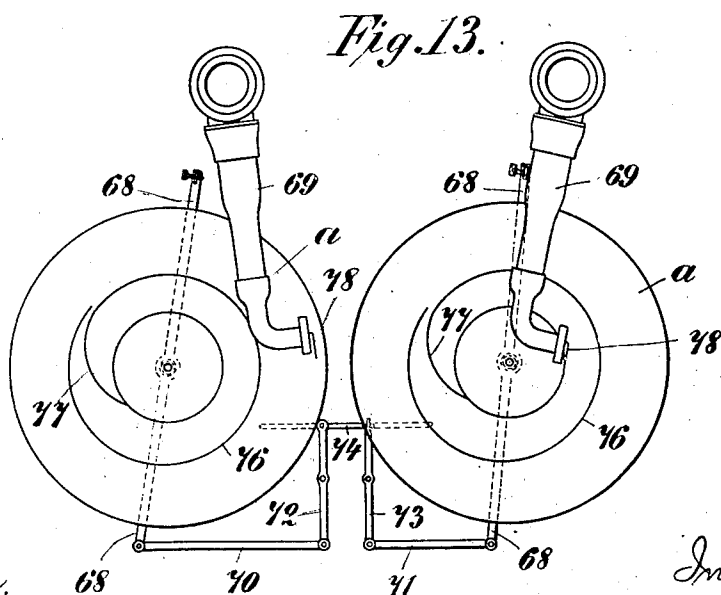
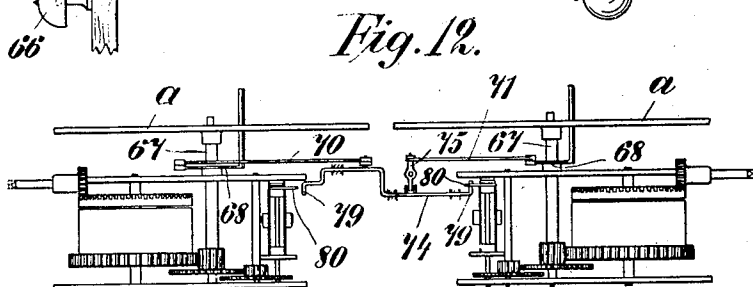
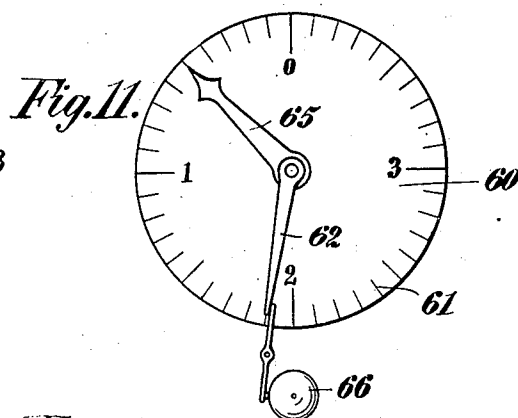
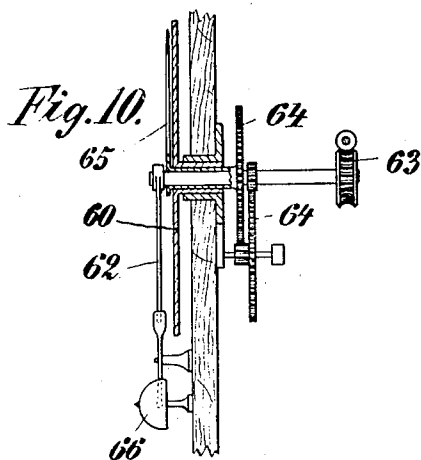


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UNITED STATES PATENT OFFICE.

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MEANS FOR RECORDING AND REPRODUCING LENGTHY SPEECHES, COMPOSITIONS, AND THE LIKE.

1,063,085.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed October 22, 1906. Serial No. 340,067.

To all whom it may concern:

Be it known that I, FRANZ EWALD THORMEYER, a citizen of Hamburg, in the German Empire, have invented a new and useful
5 Means for Recording and Reproducing Lengthy Speeches, Compositions, and the Like, of which the following is a specification.

This invention relates to means for recording and reproducing lengthy speeches, music and the like by the aid of two or more sound reproducing machines.

The object of the invention is to provide means for starting the several instruments one after the other, the measure of motion of the apparatus working being transferred to a regulating device, which is set in motion together with the working apparatus and serves to determine the starting of the
20 second apparatus, when the record on the first or working-apparatus has come to its end.

In the accompanying drawings similar letters refer to similar parts in the various
25 figures.

Figure 1 is an elevation of an apparatus embodying one form of my invention. Fig. 2 is a diagrammatic plan of two instruments in combination with two regulating devices.
30 Figs. 3 and 3^a are modifications in diagrammatic side and end elevation for releasing the regulating device. Fig. 4 is a modification of an electric shunt-system employed in connection with the apparatus illustrated in
35 Figs. 1 and 2. Fig. 5 is a plan view of a modified form of apparatus in which both instruments are driven by the same driving mechanism. Fig. 6 is an elevation of another modification operating in a manner
40 similar to that shown in Fig. 5. Fig. 7 is a vertical section of a modification of the clutch at the right hand side of Fig. 6. Fig. 8 is a diagrammatical plan of an apparatus provided with two series of instru-
45 ments coupled one after the other to a single driving means. Fig. 9 is a diagrammatic view of mechanism for registering the rates of movements of the device shown in Fig. 6. Fig. 10 is a section and Fig. 11, an elevation
50 of a modification of the registering mechanism shown in Fig. 9. Fig. 12 is an elevation and Fig. 13 a plan of means for determining the starting movement of a record section.

55 In the apparatus shown in Figs. 1 and 2,

which may be used for either recording or reproducing speeches, music and the like, two phonic instruments I and II are employed, in combination with two electric tripping devices. Each instrument consists
60 of a bearing plate or mandrel *a* rotated by any known means, on which a disk *b* carrying the record or phonic line is placed, so that this record-carrier rotates with the bearing plate *a*. The latter is provided with
65 a cam *c*, which preferably is made adjustable and in the path of which there is an anchor *d*, which is acted upon by a spring *d*² and which coacts with teeth *f* of a regulating or tripping disk *h*, driven by any suitable
70 means for instance a spiral-spring *g*. At each revolution of the bearing plate *a* the anchor *d* is tripped by the cam *c*, thus allowing the regulating disk *h* to rotate in the direction of the arrow for one tooth *f*.
75 The disk *h*, which is preferably made of non-sounding material, is provided with an annular upright flange *i*, having an opening *k* at one place. An electrical contact *m*, which is acted upon by a spring *l* has a
80 hooked end *n*, hooking over the flange *i*. When the corresponding instrument is working the hooked end *n* bears against the inner surface of the flange *i* until the opening *k* reaches the hook, whereupon the latter is
85 released and the contact *m* is forced forward by the spring *l* to make contact between contact-pieces *o* and *o*¹ of an electric circuit.

Before the instrument I is started the
90 bearing plate *a* is held against rotation by a stud *q*, arranged on the rim of the plate and bearing against an arm *r*, which forms the armature of an electro-magnet *s*.

For placing the stylus at the proper place
95 on the record a special spring pressed hand or pointer *t* is arranged on a bracket *u* next to the bearing plate *a* and adapted to bear against the rim of the disk *b* by a shoulder *v*. The front end of the hand *t* reaches as
100 far as that convolution of the phonic line on which the stylus is to be placed. When this done the hand *t* is withdrawn and held in this position by the spring *u*'. When the instrument is to be set in motion all that
105 is necessary to do is to draw the arm *r* away from the electro-magnet, so as to allow the stud *q* to pass.

In order to ascertain the moment the instrument II is to be started the cam *c* is
110

made adjustable. For this purpose there is a series of holes c^2 arranged in a circle near the rim of the bearing plate a , say 60, into either of which the cam c may be placed. If
 5 for example on the disk record carrier b a section of a speech is to be reproduced that extends over $135\frac{1}{4}$ convolutions of the spiral phonic line and $5\frac{3}{4}$ convolutions are to move idle, the plate a must rotate for 141 revolutions
 10 before the second instrument should allow a sound to be heard. As will be clearly understood, every motor requires some time before it attains its normal speed, therefore the instrument II should be started
 15 before the said 141 revolutions of the instrument I are completed and the phonic line of the instrument II must have a fore-line corresponding to the length of time, which is necessary to attain the normal
 20 speed. If this length of time corresponds say with a movement of $8\frac{1}{4}$ revolutions, the instrument II must be started when the first instrument has made $141 - 8\frac{1}{4} = 132\frac{3}{4}$ revolutions. The setting of the apparatus
 25 is done in the following manner: The cam c is placed on the rim of bearing plate a , the holes c^2 of which are numbered, in the 15th hole from the hole standing opposite the anchor point, in the starting position, while
 30 the regulating-disk h is given such a position, that the opening k is at a distance away from the contact-piece m corresponding with 133 teeth. In this position the cam c will contact with the anchor d , when the bearing
 35 plate has made $\frac{1}{4}$ revolution, so as to release the same and to allow the disk h to rotate the distance of one tooth by aid of the spring q . On each following revolution of the bearing plate a the cam will again trip the
 40 anchor d and allow the disk h to rotate the distance of another tooth until the $132\frac{3}{4}$ revolutions of the bearing plate a are completed and the opening k presents itself to the hook n of the contact piece m . The latter
 45 closes the circuit and an electro-magnet w^1 included in the circuit is energized. The electro-magnet is placed opposite an armature r^1 , which corresponds to the armature of r of the instrument I. Thus the armature r^1
 50 is withdrawn from the stud q^1 of the bearing plate a^1 forming part of the instrument II and allows the latter to be set in motion, which will begin its play after a length of time corresponding to $8\frac{1}{4}$ revolutions, that
 55 is at the same time the first instrument ceases to sound. For stopping the latter, there is provided another pair of contact-pieces o^2 , o^3 , between which the contact-piece m^1 may project to close a circuit in which the electro-magnet s is included. The contact-piece
 60 m^1 is constructed similar to the contact-piece m . Thus when the opening k is moved to the hooked end of the contact m^1 the latter is moved in between the contact-pieces o^2 , o^3
 65 and the circuit is closed, so that the electro-

magnet s is energized and attracts the arm r which acts as a brake on the rim of the bearing plate a and finally stops it when the stud q contacts therewith. The circuit-breaker o^2 , m^1 , o^3 may be made adjustable, so as to make it correspond with the fore-line of the next following record. In setting the instrument II the same rules must be observed as in setting the instrument I, so that the opening k^1 on the flange i^1 of
 75 the instrument II comes opposite the contact-piece m^2 when a third record carrier, in the meanwhile placed on the bearing plate a of the apparatus I, is to be set in motion, and the opening k^1 comes opposite the contact-piece m^3 , when the instrument
 80 II is to be stopped.

Every time the instrument I has come to rest the plates a and h must be set anew while the instrument II is playing and the record-carrier is replaced by one which is to follow that on the bearing plate a^1 at the time being. The same is done with the instrument II when the instrument I is playing.
 85 90

When the instruments are driven by spring-motors or the like it is of advantage to limit the tension of the spring or the like by an abutment, so as to obtain fairly equal motive power.
 95

The record-carriers may be numbered so that the carriers bearing numbers that can be divided by 2 are placed on the bearing plate a^1 and the rest on the plate a .
 100

In order to make the choice of the record-carriers easier, the bearing plates a and a^1 may be provided with means of attachment that differ totally from each other. For instance, in the construction shown the plate a is provided with an arc shaped piece x
 105 while the plate a^1 is merely provided with two pins y and z . The record carriers that are to be placed on the plate a , therefore must be provided with an arc shaped slot and those that are to be placed on the plate
 110 a^1 with two small circular holes.

In order to avoid friction the tripping of the anchor escapement may be effected by electrical means as shown in Figs. 3 and 3^a. A spring-supported pin 1 is arranged to project into the path of the cam c in such a manner, that, when this cam slides over the top of the pin, the latter is pushed downward into a mercury contact-bath 2, thus closing a circuit in which an electro-magnet 3 is placed. The spring pressed anchor
 115 120 d serves as an armature and therefore is attracted when the circuit is closed. When the cam c has passed the pin 1, the latter is drawn away from the contact bath by the spring 4, thus opening the circuit and allowing the spring d^2 to throw the anchor over to the other side again, and the disk has now moved for the distance of one tooth.
 125

In Fig. 4 the electric connection is in
 130

series instead of parallel. This has the advantage of a minor consumption of current and a better operation of the electro-magnet.

In this modification the contact-piece m^1 or m^2 is so constructed that it is included in the circuit closed by the circuit-breaker o , m , o^1 or o^4 , m^2 , o^5 respectively and that this circuit is broken as soon as the contact piece m^1 or m^2 is pushed in between the contact-pieces o^2 o^3 or o^6 , o^7 respectively.

Like the regulating disks h and h^1 the anchor may be made of nonsounding material so as to avoid noise as much as possible.

It is of advantage to provide the phonographic instruments with clutches so as to secure a decided and quick starting of the instrument. When there are only two instruments working alternatively they can be connected by suitable gearings and couplings in such a way that at the same moment one instrument is started the other is stopped. In this instance the best way is to drive both instruments by only one motor, so that there can be no doubt that the instruments are always driven by the same speed or nearly so. Any kind of motor will do for this purpose, preferably a spring-motor or electric-motor. The employment of only one motor has besides the uniform speed also the advantage of the equal pitch of tune of the delivery. It is not necessary to crowd a certain section of the speech, or music into one single record but an interruption may be made at any place, for instance at the end of a sentence, verse or paragraph or at any other suitable moment, to allow a record-section to come to an end and to begin a new one on another carrier. The fore-line may be left out since when one instrument is thrown out of gear and the next one into gear, the latter instrument starts at once with the normal speed and there is no fear that an interruption between the parts of the delivery takes place.

In the apparatus shown in Fig. 5, two conical roll-carriers 10 are connected by gearings and clutches so as to be driven alternatively by the same motor, (not shown) by aid of the pulley 1^a. This pulley 1^a is in operative connection with a broad toothed wheel 3^a by the belt 2^a and two wheels 4^a and 5^a are in mesh with the wheel 3^a. Keyed to the shaft 6^a of the wheel 5^a is a broad pinion 7^a, which gears with a wheel 8^a of the same diameter as the wheel 4^a. These wheels 4^a and 8^a rotate in opposite directions and are adapted to slide on their preferably common shaft 9^a and to be coupled with either of the roll carriers 10 by means of studs 4¹ and 10¹ or o^1 and 10¹¹ respectively. If desired the construction may be changed so as to allow both roll-carriers 10 to be driven in the same direction.

Since the rolls or record carriers are

played one after the other the conical carriers 10 must be brought into operative connection with the wheels 4^a and 8^a alternatively. For this purpose there is attached to the nave of the wheels 4^a and 8^a a collar 11, which collar projects into notches 12 of a sliding rod 13, by means of which the position of the wheels 4^a and 8^a is determined.

Each roll carrier is provided with a worm 14 or the like gearing with the teeth of a regulating disk 15, preferably made of nonsounding material. Each revolution of the worm 14 creates a rotating movement of the disk 15 for the distance of one tooth. The disk is provided with division lines (not shown) corresponding with the revolutions of the roll or record-carrier. By means of a spindle, slides or other devices, (not shown) the disk may be thrown out of gear with the worm, when desired. There is a gap 19 or projection or the like on each disk to create a movement of a lever 18 or 18¹ pivoted on fixed stud 17, when such gap or the like presents itself to the lever, by which means the coupling gear is changed.

In the apparatus shown the disk is brought into gear with the worm in a position, in which the lever 18 or 18¹ respectively, points to a number on the rim of the disk corresponding with the number of revolutions the record-carrier has to make. When the record is played, that is when the roll carrier has run a corresponding number of revolutions, the disk has moved to such position, that the lever 18 or 18¹ falls through the gap 19, in between the roll-carrier 10 and the wheel 4^a or 8^a respectively, the latter, by aid of its conical part 20 and on account of the weight of the lever, being moved so as to be thrown out of gear with its corresponding roll carrier 10. At the same time the opposite wheel is thrown into gear with its corresponding roll carrier, which now rotates at once with its normal speed.

No fore-line or after-line is necessary with this apparatus, when the stylus is placed on the commencement of the line or not far from this end of the line, so that the commencement of the record proper coincides or nearly coincides with that of the phonic-line. This has the advantage that the space on the roll or other record-carrier heretofore used for a fore-line or after-line is gained for a part of the record-line proper, so that a longer section of a speech or music, can be recorded on the carrier and the number of record-carriers will be reduced.

When fore-lines are made use of both record carriers must partly be rotated at the same time. The clutches therefore must be so constructed that when one roll-carrier is thrown into gear the other must still keep on rotating for some time, after which it is also arrested.

When the change of movement is to be carried out by hand, this may be done by aid of the rod 13, which in this instance may be provided with a handle. The parts 14 to 20 will in such case be omitted.

Instruments having plates as record-carriers such as gramophones can be driven by a common motor in similar manner as the instruments with rolls commonly called phonographs.

In this modification shown in Fig. 6 the bevel wheel 21 gearing with the bevel wheel 22 may be driven by any means (not shown) and the rotation of these wheels is transferred through a train of gearings 23, 24, 25 and 24¹, 25¹ to clutch or coupling halves 30 and 32 arranged loosely on the shafts 26 and 26¹, to which are fixed the plate-carriers 27 and 27¹ respectively. The latter partake of the rotation as soon as their corresponding clutches are thrown into gear. On the left hand side of the Fig. 6 the coupling-half 30¹ is connected with the shaft 26 by a pin 29 fixed to the shaft and projecting into a longitudinal slot 28 of the coupling shaft 30¹, which in a known manner can be moved longitudinally by a forked lever 31 or the like by hand or otherwise, to gear with the coupling-half 30 or to be thrown out of gear with the same. On the right hand side of said figure a friction cone-clutch is made use of. The gear 25¹ is made integral with the cone 32 and is slidable on the shaft 26¹. The longitudinal movement can be brought about by the forked lever 31¹ in a well known manner. The second coupling-half 33 consists of a hollow conical member 33 integral with the plate-carrier 27¹. When the coupling-half 32 which may be made of resilient material is moved axially by the lever 31¹ in an upward direction the cone 33 and also the plate-carrier 27¹ will partake of its rotation. This modification has the advantage that the rotation of the plate or record-carrier resting on the carrier 27¹ will not be started suddenly with the full normal speed which sometimes makes the stylus leap out of the phonic line but owing to the friction between the parts 32 and 33 the rotation of the plate-carrier will initially be slow. However the change from the initial slow motion to the normal speed takes place so quick, that there is no perceptive interruption or disturbance in the delivery. Other kinds of clutches may be devised for the same purpose, it being of advantage that the parts are resilient. This last described clutch has the additional advantage that it creates no shaking or trembling of the record carrier when the coupling takes place. When the clutch is of the kind in which coupling teeth of one-half coast with teeth of the second coupling-half it is of advantage to employ a great number of teeth,

so as to avoid jerks and shocks as much as possible.

In the modification shown in Fig. 7 the coupling consists of two cylindrical coupling-boxes 32¹ and 33¹, in which projections 34 on the box 32¹ coast with interdental spaces 35 on the box 33¹. The two boxes serve as a guide for each other, when the coupling is shifted, so that shocks and jerks are avoided.

If desired a greater number of record-carriers may be arranged on rotating-disk, slides or the like, which may be so moved as to successively bring the instrument in position to be coupled with the driving mechanism.

In the modification shown in Fig. 8 two horizontal rotatable disks 38 and 38¹ are employed, each of which is mounted with a series of phonographic rolls or record-carriers. Between the two disks 38 and 38¹ there is a double clutch 36, the shaft of which is continuously driven by the gearing 37 from any desired source. By means of a handle or lever 39 the clutch may be coupled to a roll-carrier of either of the disks 38 or 38¹. When the first roll 1 is playing the disk 38 must be rotated so as to bring the roll 2 opposite the clutch 36 in a position that, as soon as the record on the roll 1 has come to its end, clutch 36 is shifted over to the other side so as to throw the roll 2 into gear and stop the roll 1. The disk 38¹ is then rotated to bring the roll 3 into the position of the roll 1, ready to be coupled with the clutch 36 as soon as the record on roll 2 has been played to its end. During the time the disks are rotated the corresponding reproducer is raised and thereupon it is lowered onto the next roll in proper position.

Instruments having flat record carriers or disks may in a similar manner be arranged on a larger disk, or frame or slide so as to be played one after the other. Thus the record-carriers shown in Fig. 6 may be used in multiple arrangement. Flat record-carriers may also be arranged one over the other, in such a way that their center shafts can be coupled by clutches to the main driving shaft, for allowing the divers records to be reproduced one after the other. The stylus can be taken away from the record-carrier that has been played last, when the next following record is playing. Preferably the record line of the disk has its beginning near the center and finishes off near the rim of the disk, so that the speed of the phonic line at the place where it contacts with the stylus is not so great in starting.

In order to prevent sounds from being heard in reproducing that might be produced by the fore-lines or after-lines, the effect or operation of the stylus, particularly the writing or cutting stylus in recording,

should be destroyed or prevented. This can be done either by preventing the diaphragm or some other part of the writing mechanism from vibrating by holding it fast, or making it soundless or by closing the opening of the horn or the sound-box, by a flap-valve or by a device similar to the photographic shutters, or finally the recorder or reproducer may be lifted up during the time the instrument has to run idle. When the record is completed the writing mechanism can be allowed to drop on the following record-carrier, so that there is no fore-line and the record proper starts at the beginning of the phonic line or near the same.

When recording it is not absolutely necessary to make use of two instruments that are connected so as to work alternatively, but this arrangement is of special advantage in reproducing. The recording of the sections of speeches, music and the like may be carried out on one and the same instrument or on a number of instruments working independent from one another, as long as they are driven at the same speed or nearly so, the number of revolutions being ascertained by any means. Hereby it is of advantage to transfer the rates of movement of the phonic-line sections on a separate surface, which is made to run synchronously to the record carrier or to the instrument. This surface, which may be on a disk, such as shown in Fig. 2, or a band as shown in Fig. 9, or some other mechanism, which may be driven by the recording instrument or by any other means, is provided with divisions for instance a circular row of teeth *f*, Fig. 2, and with an initial sign for instance a gap *h* and which, when at work, will be given a second sign or mark by hand or automatically on the moment the desired part of the phonic line is finished, so that the number of revolutions can be ascertained, for instance, by counting the number of teeth *f* between the two signs.

In the modification shown in Fig. 9 a band 43 of paper, celluloid or other suitable material is used, on which the rates of movement are registered. This band is driven by a drum 40 keyed to the shaft 21' of the bevel-wheel 21 described with reference to Fig. 6, and provided with teeth 41 that engage openings 42 in the band 43, to feed it along. Each rotation of the plate carrier 27 or 27' respectively corresponds to a certain length of movement of the band 43, which preferably is divided into a number of partitions 44.

A number of writing pens or styli, for instance four, viz: 46^a, 46^b, 46^c and 46^d arranged rotatively on shaft 45 are drawn against the band 43 by aid of a corresponding number of electro magnets 47^a, 47^b, 47^c and 47^d, when these are energized, thus drawing lines on the moving band.

Springs 48 are provided to hold the stylus at a distance from the band, when the electro-magnets are not energized. When the lever 31, which is adapted to serve as an electric switch, throws the clutch 30, 30' into gear, said lever at the same time closes a circuit in which the switch 49 contact 50 and the electro-magnet 47^a are included, inducing the stylus 46^a to press against the surface 43 to draw a line representing the fore-line on the record tablet. The line for the fore-line is not shown in the drawing but it would be found in the direction of the line 55. The starting point and the length of such line corresponds with the commencement and length of the fore-movement of the record carrier 27, so that the number of partitions 44 crossed by the line is equal to the number of revolutions.

When the machine has attained its normal speed the switch 49 is moved to make contact with the contact button 51 the moment the performance commences, so that the electro-magnet 47^a is deenergized and the stylus 46^a is raised from off the band, while the electro-magnet 47^b is energized and attracts the stylus 46^b, which records the length of phonic line proper by the line 54 on the band. Before the first part of the performance comes to an end the second machine is thrown into gear by the lever 31', which also is adapted to close a circuit in this case for the electro-magnet 47^c. The stylus 46^c of the latter now records on the band 43 the length of the fore-line on the second record-tablet by the line 56. On a convenient part of the performance for instance at the end of a sentence or the like, the lever 49' is moved from the contact 52 to the contact 53 and at the same time the lever 49 from the contact 51 to the contact 50, whereupon the stylus 46^d registers the length of the second phonic line by the line 57, while the stylus 46^a registers the length of the after-line by the line 55. The latter is cut off as soon as the clutch 30, 30' is thrown out of gear and thereby the circuit is broken by the lever 31, whereupon merely the stylus 46^d records the line 57. This is the position shown in the drawing. When record-tablets are used without fore and after-lines, the lines 55 and 56 will be omitted. In any case the beginning and end of the phonic line proper can be made distinctly visible on the record or record-carrier.

By the aid of the partitions 44, each of which corresponds to the length of a single coil of the phonic line, it will be easy to determine the commencement and the end of a sectional phonic line, particularly when the partitions are subdivided by suitable division-lines 58. According to the drawing the line 56 is found to run over three and two sixth partitions; the fore line of the second phonic line therefore will run over

3½ coils of the spiral line, that is to say, the second machine will make 3½ revolutions before it commences to speak.

The determination of the number of revolutions of the machine when recording by means of only one single machine or by machines working independent from one another is carried out in a similar way.

In the modification shown in Figs. 10 and 11, a disk 60 is provided with a circle of division-line 61 corresponding to the units or measure of movements of the record-carrier and in front of the disk 60 a rotatable hand 62 or pointer points to the numbered division lines.

Every movement of the phonic-line is transferred to the hand 62 by means of a suitable gearing 63 and the amount of the movement of this hand 62 can be read off from the disk at any time. When the hand or pointer 62 makes more than one complete revolution, there may be a train of gearings 64 or the like connected with the same to transfer the movement to a second hand or pointer 65 or the completion of the revolution may be made to be perceived by the sounding of a bell 66 or the like. In order to ascertain the finishing of the fore-line and the record proper only the position of the pointer 62 is to be watched and the number of revolutions to be registered, so as to enable the correct combining of the record sections by aid of the numbers ascertained in the above manner.

The marking of the beginnings and ends of the record-sections can also be carried out after recording by allowing a sign, a pointer, a divided surface or the like to move synchronously with the record carriers in a similar manner as described above with reference to Figs. 2, 9, 10 and 11. The beginning and end of each record-section may be read off from the surface or at the pointer, or the number of revolutions of the record-carrier made visible by a sign or the like counted.

In reproducing the phonic line of the instrument may itself be used for determining the starting moment of the next following record section. In this case all the operator has to do is to watch the playing of the instrument intensively and to set the next instrument in motion by hand as soon as he hears the last sound of the playing instrument. If desired the after line may be so curved that it induces a decided movement of the sound box or horn so as to trip a device which automatically stops or starts the instrument respectively. Means of this description are shown in Figs. 12 and 13.

Loosely pivoted on the shaft 67 of each record carrier plate *a* is a double-armed lever 68, one end of which is bent upward so as to be adapted to be engaged by the sound box carrier 69, while the other end is piv-

otally connected to a rod 70 or 71 respectively. These rods are connected to levers 72 and 73 one of which engages with its other end a slide 74 directly, while the other is also in operative connection with this slide by the intermediary of an upright lever 75, Fig. 12. By these means one sound box carrier 69 is adapted to move the slide 74 to one side, when it approaches the center of its talking machine and the other sound box carrier 69 moves the slide to the other side when it approaches the center of the talking machine. This movement will be a very decided one, when the phonic line 76 in which the needle or stylus 78 is placed is provided with an after line 77 bent to a small circle to run toward the center with a short cut.

The slide 74 is bent at right angles on each end 79, which ends are adapted to enter the path of an arm 80 arranged on any convenient rotating part of the talking machine. Thus when in the operation of one talking machine the phonic line has come to its end, the stylus and also the horn or sound box carrier 69 will be given a quick movement by the after-line 77 thereby operating the levers and rods described above to catch hold of the arm 80 of one machine and to release the arm 80 of the other machine. The result is that the first named machine is stopped and the second is started at the same time.

I claim:—

1. The combination of a plurality of successively operative recording or reproducing machines and means automatically controlled by the operation of one of said machines for starting the operation of another of such machines.

2. The combination of a plurality of successively operative recording or reproducing machines and electro-magnetic means automatically controlled by the operation of one of said machines for starting the operation of another of such machines.

3. The combination with a plurality of successively operative sound recording or reproducing machines each including a record and a stylus, of a regulating means operated by the machine first operated for causing the operation of the after operated machine.

4. The combination with a plurality of successively operative sound recording or reproducing machines each including a record-carrier, of a regulating device actuated by the movement of one record carrier to control the operation of the other record carrier.

5. The combination of a plurality of successively operative sound recording or reproducing machines, means automatically controlled by the operation of one of said machines for starting the operation of another machine and means to stop the movement of the machine first operated.

6. The combination of a plurality of successively operative sound recording or reproducing machines, means automatically controlled by the operation of one of said machines for starting the operation of another machine, means to stop the movement of the machine first operated, and means operated by the machine last put in operation to again start the operation of the machine first put in operation.

7. The combination of a plurality of sound recording or reproducing machines and means automatically controlled by the operation of one of said machines for starting the operation of another machine at any predetermined time of movement of the machine in operation.

8. The combination with a plurality of sound recording or reproducing machines each including a record and a stylus, of a regulating means operated by the machine first operated for causing the operation of the after operated machine, and an adjustable member on the regulating means to determine the time of operation of the after operated machine.

9. The combination with two sound recording or reproducing machines, each including a record, of means including devices adjustable with respect to the records automatically controlled by the said machines to start each other at proper times.

10. In combination, cooperating sound reproducing machines each having a stylus, and regulating mechanism actuated by that machine first set in operation and regulating the time of operation of the succeeding machine with relation to the machine first set in operation, records mounted on the machines and means to position the respective records with respect to their styli to reproduce the phonic lines in succession.

11. In combination, cooperating sound recording or reproducing machines and mechanism to alternately control the operation of said machines, said mechanism actuated by that machine first set in operation and regulating the time of operation of the succeeding machine.

12. The combination of two sound recording or reproducing machines each comprising a motor, a stylus and a record connected up with each machine, a magnet connected with each of said motors, an electric circuit between each machine and the magnet of the other machine, a source of electric current, means to excite the magnet of either one of the machines from said source and thereby operate the same, and automatic means on the machine first operated to excite, with electric current the magnet of the second machine and thereby operate the latter.

13. The combination of a plurality of successively operating sound recording or reproducing machines, each comprising a motor, a reproducer and a record; of electro magnetic means controlled by the operation of the machine first operated for causing the operation of the after operated machine, substantially at the termination of the operation of the machine first operated.

14. The combination of a plurality of successively operative sound reproducing machines, having records and sound boxes, and means adapted to be operatively connected with one of the two machines and to start another machine the moment the first machine ceases to play, the sound boxes of both machines resting on their records during the time this change in the action takes place.

FRANZ EWALD THORMEYER.

Witnesses:

CHARLES HARRY ROELKNER,
OTTO W. HELLMRICH.