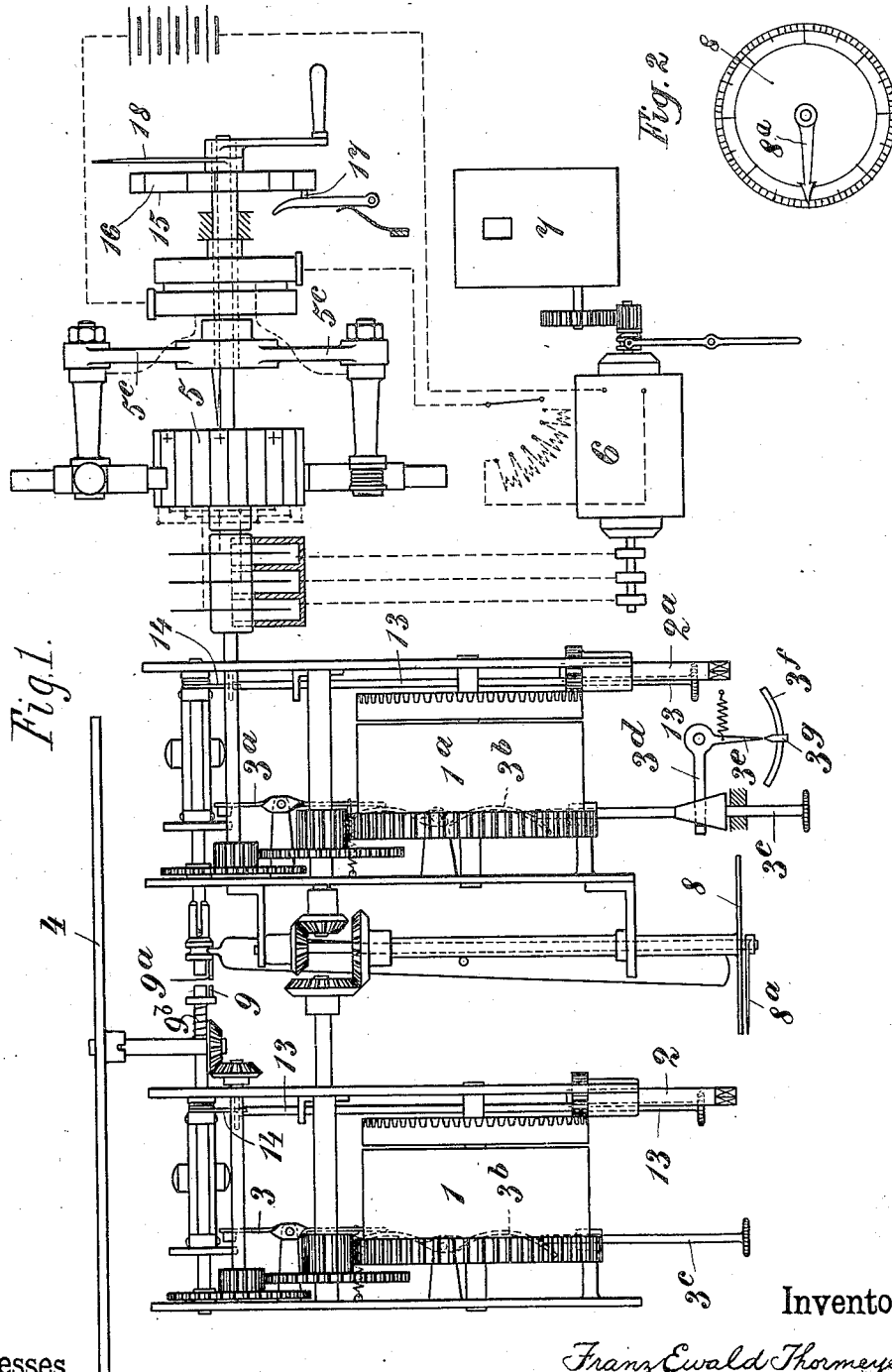


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 APPARATUS FOR PRODUCING AUDIBLE MOVING PICTURES, PIECES OF MUSIC, AND
 OTHER PERFORMANCES.

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To all whom it may concern:

Be it known that I, FRANZ EWALD THORMEYER, a citizen and resident of Hamburg, in the German Empire, have invented a new and useful apparatus for producing audible moving pictures, pieces of music, and other performances by the aid of two or more devices, such as moving-picture apparatus, phonographic apparatus, and the like, of which the following is a specification.

In exhibiting audible moving pictures it has been the custom to employ apparatus, which have been arranged side by side and coupled together, so that they both can be driven together by a motor or by hand. Now since the kinematograph is generally placed at a considerable distance away from the screen it has been found that, when the screen has been lighted up from behind, so that it stands between the audience and the talking machine or phonographic apparatus and the pictures shine through the screen, the words of the speaking machine are heard indistinctly, because the screen acts as a muffler, while the voice is heard from behind the audience if the pictures are thrown on the screen from in front, and this also impairs the effect of the performance.

A natural reproduction of scenes requires that the voice, speaking, singing or the like be heard as though coming from the picture. For this reason the machines are placed at a distance from one another say about 15 to 60 meters apart. When the separately arranged machines are driven by two motors which run synchronously and are electrically connected and therefore are dependent one upon the other, it is true differences in the running of the two cannot occur, however differences which arise from constant displacement of phases, for instance when the needle jumps into a wrong spiral line or convolution, are very difficult to remove or equalize. It has been suggested in apparatus, in which one controls the distribution of the current of the other, to make use of special devices for adjusting the phases of the controller.

Not until the apparatus have been driven separately and the distance has been bridged by aid of electrical signals or distant indicators, which allowed audible signals to be given, so that the running of the talking machine could be followed, was it possible, to watch and regulate the running of the

kinematograph or its driving motor with regard to the incorrectness of the phases as well as of the running. However it is not feasible to drive the kinematograph directly, though a direct actuation is well adapted for the talking machine.

If the kinematograph is driven by an electromotor, the difficulty arises that, on account of unavoidable fluctuations of the tension in the supply circuit, the motor now and then runs faster and slower and therefore either is ahead of the talking machine or behind it, so that disturbances in the coincidence of sound and pictures are the result. In removing these irregularities it frequently happens that during the regulation of the amount of current by aid of resistances new fluctuations of tension arise, which again destroy the regulation and therefore the regulating manipulations themselves cause faulty reproductions or the disturbances are still increased. Attempts have been made to do away with the detrimental effects of the fluctuations of tension by the use of a periodically acting braking-apparatus but in vain.

The reason that it is not practical to drive the kinematograph directly by a mechanical motor (such as a spring-motor or weight-motor) is, that to attain the necessary power the motor must be constructed of such large dimensions and heavy parts, that considerable difficulty is met with to arrange such a motor in connection with a kinematograph. The costs of construction of a plant of this description would be unduly high. Moreover the duration of the working of such a motor is very limited since large mechanical motors cannot for technical reasons be so constructed that they can be wound up when running. Therefore for instance the weight, when run down, must be wound up again, thus bringing the motor to a standstill. Even should it be possible to wind up the motor when going, it would be impossible to watch the signal with sufficient attention, to avoid disturbances between sound and picture or the winding up would have to be carried out by a separate person and the costs would be augmented by his wages. For this and other reasons, particularly for the reason, that even the actuation by a motor requires constant attention and watching of the signal, it has been customary, to regulate the working at the kinematograph accord-

ing to the working of the talking machine, by driving it by hand, in spite of the frequent suggestions with regard to the best way of mechanical driving. The conformity between sound and picture depends on the intelligence and skill of the person attending the apparatus.

According to the present invention the actuation of the two machines (whether it be to register performances or to reproduce performances) by separate or combined driving means is made possible by a third driving-device, which preferably is placed between the two driving devices of the performing apparatus and which actuates together with the driving means of one apparatus an indicating device for controlling the working, while on the other hand the driving device of the second apparatus is controlled by this third driving device in the same manner as otherwise is done by the driving-means of the first apparatus. In this case a coupling such as has been used heretofore between driving motors may be arranged between the first and third driving means and devices such as has been used for adjusting the phases of controllers may be arranged between the second and third driving device.

If the motors working independently of one another are placed side by side, they can be provided with couplings that can be thrown out of gear, which allows of a reciprocal acting of one motor on the other, when the couplings are thrown in gear. When the couplings are constructed as a driver or rotating driving peg the action of one motor on the other will not take place, until a relative rotation of a certain angle has been carried out. It is advantageous to construct the coupling with elastic members, to allow the action of one motor on the other to take place by degrees. By making use of a coupling it is not necessary to constantly watch the running of the motors or the apparatus.

The indicating device may be driven mechanically by the motors placed side by side, so that the complicated electrical devices or the electrical connection with the latter can be done away with. Thus for instance the running of the motors can be made perceptible by an index-finger. Beside this indicating-device a supplemental adjusting index finger may be made use of, which is acted upon by any suitable part of the motor or the apparatus, for instance in such manner, that its position is determined by a slanting surface on the device for regulating the speed of the motor and thus indicates the synchronism of the motors, for the purpose of quickly securing synchronism of the motors after regulating the performance, as will be clearly explained hereafter.

In the accompanying drawings Figure 1

is an elevation of a plant for producing audible moving pictures the electrical parts being shown diagrammatically and Fig. 2 is a detail front view of the indicating device.

In the plant shown the motors 1 and 1^a are similar spring motors which are controlled by brake-action. They are arranged side by side and can be wound up by keys or handles to be placed in usual manner on the ends of the shafts 2 and 2^a. The motion can be regulated by known brake levers 3 and 3^a. The motor 1 serves for rotating the carrier for the record disk and the motor 1^a for operating the controller, which in the plant shown, is a commutator 5 for distributing electric current for the motor 6 of the kinematograph 7.

The gearing of each motor 1 and 1^a is connected with indicating devices such as a disk and index-hand 8 and 8^a respectively. These two indicators are so arranged that they can rotate side by side. In the construction shown the indicating device is operated mechanically. The shaft of the disk 8 is tubular and serves as a bearing for the shaft of the hand 8^a. The indicating devices are adjustably fixed to their shafts preferably by friction. The disk 8 is provided with a single or double scale and a special index-line is shown. One series of divisions corresponds to the number of revolutions of the speaking plate on one complete rotation of the index-disk and the other series of divisions corresponds to the number of pictures thrown on the screen during one complete rotation of the record carrier. The movement of the motors 1 and 1^a now is so regulated that the hand 8^a constantly coincides with the index-line on the disk 8. For regulating the speed of the motors as shown the tensile strength of the spring is regulated permanently by the aid of the brake-regulators by the brake levers 3 and 3^a respectively, the position and effect of which can be changed by a second double armed lever 3^b and a rod 3^c provided with an external thread, and projecting with its threaded part through a fixed bracket. The rod 3^c is provided with a conical part, against which an arm 3^d of a spring actuated bell-crank lever bears, the other arm 3^e of which is formed to act as an index finger. Opposite or next to this index finger a segment 3^f is fastened to the frame or wall of the machine not shown and provided with division lines on its outer surface and on this segment a pointer or marking hand 3^g is adjustably fastened. The lines of division correspond to the angular speed of the record carrier 4, necessary for the normal pitch of tune of the phonic performance.

When the motor 1 of the talking machine is running at a speed necessary for the normal pitch of tune of a certain performance

say 80 revolutions per minute of the record-carrier 4, according to its speed, the speed of the other motor 1^a is adjusted by turning the screw-rod 3^c until by the position of the hand 8^a opposite the index line of disk 8 it can be seen that both motors run uniformly. When turning the rod 3^c the index finger moves to a certain position by the action of the slanting surface of the conical part of the said rod and this position corresponds to a speed of 80 revolutions per minute of the speaking machine, which will be marked on the segment 3^c. In a similar way the positions of the index finger 3^c may be determined for other speeds of the motors 1 and 1^a. At the commencement of a performance the marking pointer may be placed on the division line corresponding to a certain speed, to allow for a quick regulation during the working of the apparatus, when an irregularity in the course of performance takes place.

Now, when it happens, that the needle on the phonographic plate jumps into a wrong convolution of the phonic line, whereby the coincidence of sound and picture is lost, it will be the task of the operator to change the speed of the motor 1^a and therefore also the speed of the kinematograph to such an extent that the right sounds again come together with the proper pictures. As soon as this is attained it is his second task, to make the motor 1^a to run with its former speed, so as to again secure uniformity of speed between the two motors. This regulation is carried out by watching the two indexes 3^c and 3^a. When first the speed of the motor 1^a is changed by turning the rod 3^c, naturally also the index finger 3^c has moved away from the marking point 3^a. The synchronism, which then is again desired, the operator attains by turning the rod 3^c quickly back, so as to bring the index finger 3^c opposite the marking point 3^a again. By these means a rough adjustment is quickly obtained. The exact adjustment will then be brought about by watching the index-finger 8^a and the index line on the disk 8 or the line of division on this disk then now might come in question until it is covered by the index-finger 8^a.

As long as disturbances above-mentioned do not arise, it is only necessary that the two motors run synchronously. During this time a device may be made to act, which prevents one motor from running faster or slower than the other on account of its spring unwinding irregularly and thus the said device avoids the constant regulation of the motor 1^a. This device consists of a coupling or clutch for instance of a pair of drivers or driving pegs 9 and 9^a, of which one is fixed to a driving member of one motor and the other to a driving member of the other motor running normally at the same speed

as the first named driving member. These driving pegs 9 and 9^a are adjustable in such a way, that either can be brought out of the working path of the other, thus allowing both machines to run at a different speed. When the pegs are made to approach one another, so that one is running in the same path as the other, it is impossible for the shaft carrying one peg to run quicker than the shaft carrying the other peg for more than one revolution. If desired one of the driving pegs as 9 may be made to yield for instance by connecting it with the shaft by means of a spring 9^b, so that, when for a short time a motor spring unwinds irregularly, only a soft touch between the two driving pegs takes place. By these means an absolute even and uniform working of the motors is secured and therefore fluctuations in the pitch of the notes are avoided.

As to the current distribution device, which may be of any known description, it is to be remarked that the segments of the commutator are electrically connected in known manner with the coils of the driving motor 6 of the kinematograph 7, which motor acts as a synchronous-motor, and thus this motor is free from the action of the fluctuations of tension. Between the two a certain electric ratio may exist, that is to say the number of conductors may correspond to a multiple of the number of segments or coils, so that with regard to the speed of the current distributing device the speed of the synchronous-motor driving one of the apparatus may be accelerated or slackened down. The novelty in this plant is that for the current distributing device a special motor 1^a is provided for.

Instead of the motor 1^a and the current distributing device shown, other driving means and other independent means to control the operation of the driving mechanism of the kinematograph or the like, according to the operation of the said driving means, may be used. The independent special driving means may itself be operated by any source of power, even by hand.

On the frame of each machine a locking bar 13 is slidably positioned opposite arms 14 on the shafts of the motors.

The operation of the plant described above is as follows: The uniform motion of the two spring motors 1 and 1^a depends on the position of the brake levers 3 and 3^a and in order to find the line of division of the scale 3^c which corresponds to the angular speed of the record carrier the motors are allowed to run with full load and then the rod 3^c is adjusted, until by the position of the index-disk and hand 8 and 8^a respectively it is seen, that a uniform running is obtained for the desired pitch of tone. Hereby the finger 8^a must move opposite the index line on the disk 8 synchronously. The

position of the finger 3^e is noted on the scale 3^r and over this position the marking pointer 3^s is brought. By pushing the locking bars 13 inwardly, they catch hold of the arms 14 and thereby stop the motors. In this manner the divisions of the scale 3^r is found, corresponding to the speeds of the record carrier 4. In the adjustment described above the brake levers 3 and 3^a will be in such position that, when the motors are again started they attain the desired speed synchronously. It is advisable to have the couplings 9 and 9^a thrown in gear, so that small irregularities, which may arise on starting the apparatus or even during the working of the same by the fluctuating power of the spring motors 1 and 1^a, may be equalized or reduced to the limit of one single revolution of the motor-shaft. Now and also for every repetition of the performance all that need be done, is, to bring the first picture on the film opposite the window of the kinematograph and to place the needle on the starting end of the phonic line on the record, and then the plant is ready for the performance. The performance is then started by closing the circuit and withdrawing the bars 13. When the operator makes the observation, that a disturbance of importance happens, for instance such, which arises, when the needle leaps into a wrong convolution of the phonic line the couplings are immediately thrown out of gear and by regulating the brake levers 3^a by aid of the rods 3^c the speed of the kinematograph is raised or lowered until both sound and picture come in correctly. When this is attained or nearly attained the rod 3^c turned in one direction before is now turned backward until the index finger 3^e is standing again opposite the pointer 3^s. The hand 8^a has moved away from the index-line on the disk 8 a distance corresponding to one or more revolutions of the record carrier, so that in the further progress of the performance the angle between the hand 8^a and the index line on the disk 8 must remain unchanged. The simplest way of bringing this about is, to throw the coupling into gear. The disturbance could also be equalized in the known manner by adjusting the rotatable brush bridge 5^e relatively to the segments of the current distributing-device 5.

In plants, in which the talking machine controls the distribution of current for the kinematograph or in which a common driving means for the current distributing device and the talking machine is provided for, very disagreeable fluctuations of the pitch of tune of the talking machine and a troublesome flickering of the projected pictures takes place and even sometimes the electromotor stops altogether and together with it the film of the kinematograph. Hereby the film fre-

quently is destroyed or set on fire by the heat of the lamp. In the new apparatus a shifting of the brushes can have no influence on the pitch of the talking machine, because its driving-device 1 moves independently of the working or regulation of the current distributing device 5. Moreover the electric motor is constantly kept going, even when the shifting of the brushes takes place in the direction of rotation of the current distributor.

In order to carry out the shifting of the brushes corresponding to a certain number of pictures in the kinematograph exactly and with decision, it is necessary to be able to read off the angle of this angular shifting on the apparatus. This object can be attained by fastening a disk 15 firmly to the shaft of the bridge 5^e provided with a rotatable ring 16 having division lines on its outer surface. The division lines correspond with the number of pictures, which should pass the window of the kinematograph on one revolution of the current distributor. By aid of a spring pressed locking pin 17 carried on an arm which is pivotally attached to the frame of the apparatus, not shown in the drawing, and which pin is adapted to engage openings on the disk 15, the latter and therefore also the brush carrier 5^e is held from rotation when adjusted. On the shaft of the bridge 5^e an index-finger 18 may be arranged next to the disk 15. The pin 17 also may be made the shape of an index-finger, opposite which the ring 16 is adjusted with its zero-line. If for instance a shifting of the brushes is necessary for two pictures, the finger 18 is moved on for two division lines, whereupon after withdrawing the pin 17 the finger 18 is rotated together with the disk 15 and the brush carrier 5^e to such an angle, that it stands opposite the pin or finger 17, in which position the latter again may drop into an opening. This device has the advantage, that the shifting of the brushes, which has been carried out heretofore only according to the operator's own discretion, now can be effected with certainty and quickly and repeatedly, without disturbing the synchronous movement of the motors 1 and 1^a.

In place of a talking machine and a kinematograph any other machines used for carrying out performances can be made use of, for instance musical instruments, apparatus for allowing figures to dance and the like. Moreover instead of spring motors as shown any other motors that can be regulated by hand or automatically may be used to operate the said apparatus or machines. The plant may also be constructed in this way, that the motor 1^a or the electromotor 6 respectively operates the talking machine and the motor 1 the kinematograph.

I claim:

1. Apparatus for securing synchronous

working of two apparatus for producing performances, comprising a driving means for each apparatus, a special independent driving device adapted to control the working of one apparatus and also adapted to be brought into connection with the driving members of the other apparatus.

2. Apparatus for securing synchronous working of two or more apparatus for producing performances, comprising a driving means for each apparatus, a special driving device adapted to control the driving means of one apparatus and also adapted to be brought in connection with the driving member of another apparatus and to be released therefrom, and indicating means in connection with said driving means to enable the running of the apparatus to be watched.

3. Apparatus for securing synchronous working of two or more apparatus for producing performances, comprising a driving means for each apparatus, a special driving device and an indicating device actuated by the driving device of one apparatus and by the said special driving device, the latter adapted to run synchronously with said driving means of one apparatus, and moreover adapted to control the driving device of another apparatus of performance.

4. Apparatus for securing synchronous working of two or more apparatus for producing performances, comprising a driving means for each apparatus, a special driving device adapted to control the working of the driving means of said apparatus, and a coupling between said special driving device and the driving device for another apparatus of performance, the coupling adapted to be thrown into and out of gear.

5. Apparatus for securing synchronous working of two or more apparatus for producing performances, comprising a driving means for each apparatus, a special driving device adapted to control the working of the driving means of one of said apparatus, a coupling between the special driving device and the driving device for another apparatus of performance, the coupling adapted to be thrown out of gear and into gear, and a yielding member in the coupling.

6. Apparatus for securing synchronous working of two or more apparatus for producing performances, comprising driving means for each apparatus, a special independent driving means adapted to control the driving means of one of said apparatus, and means to quickly regulate rough defects in the working.

7. Apparatus for securing synchronous working of two or more apparatus for producing performances, comprising driving means for each apparatus, a special driving means adapted to control the driving means of one of the apparatus of performances and means for shifting phases of the controller.

8. Apparatus for securing synchronous working of two or more apparatus for producing performances, comprising driving means for each apparatus, a special driving means adapted to control the driving means of one of said apparatus, means for shifting the phases in the controller, and an indicator in connection with said means for shifting the phases.

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