I. KITSEE.

SYNCHRONIZING PICTURE EXHIBITING AND SOUND RECORD MACHINE.

APPLICATION FILED AUG. 5, 1911.

1,083,498.

Patented Jan. 6, 1914.

2 SHEETS—SHEET 1.

Fig. 2.

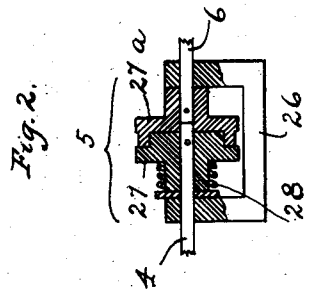


Fig. 1.

WITNESSES:

Edith R. Stiller

Mary E. Smith

INVENTOR.

Josiah Kitsee

I. KITSEE.

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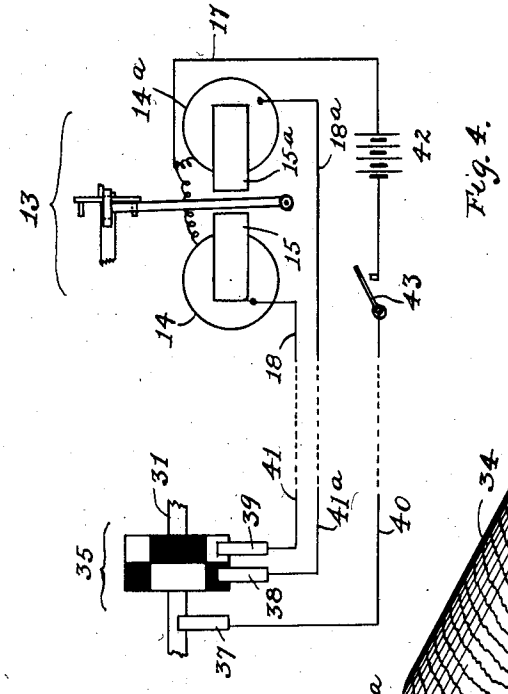


Fig. 4.

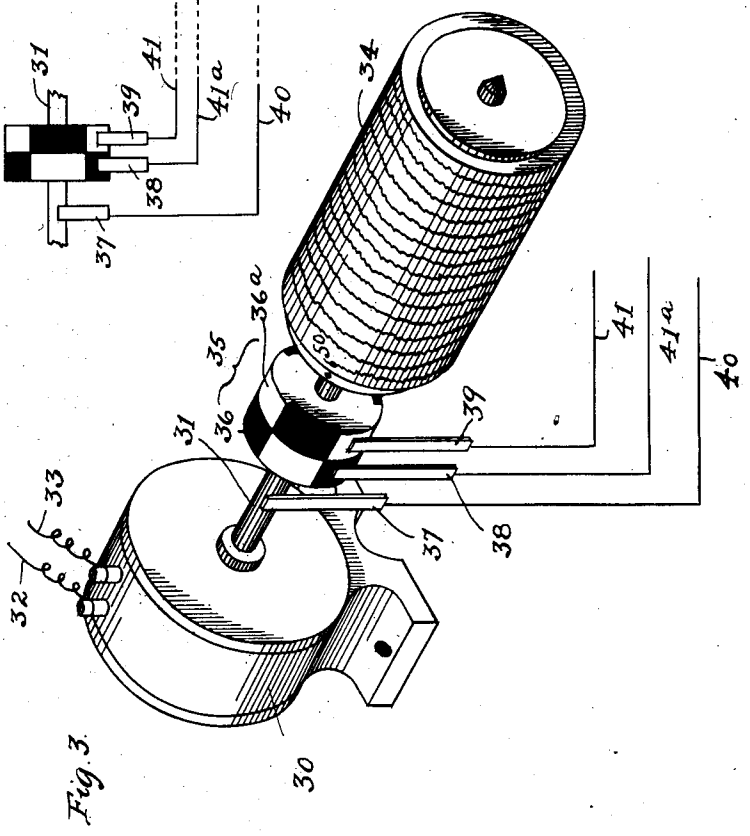


Fig. 3.

WITNESSES:

Edith P. Stiles

Mary E. Smith

INVENTOR.

Isaac Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE CORT-KITSEE CO., A CORPORATION OF NEW YORK.

SYNCHRONIZING PICTURE-EXHIBITING AND SOUND-RECORD MACHINE.

1,083,498 Specification of Letters Patent. Patented Jan. 6, 1914.

Application filed August 5, 1911. Serial No. 642,453.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Synchronizing Picture-Exhibiting and Sound-Record Machines, of which the following is a specification.

My invention relates to an improvement in synchronizing moving picture machines and machines adapted to produce sounds.

It is unnecessary here to enumerate all the attempts made in this direction, but so far, none of the devices placed on the market proved a commercial success. In such systems which were brought before the public, the aim of the designer or inventor was to allow the picture film to run at its required speed and to produce means whereby the speed of the talking machine should accommodate itself to the speed of the picture film.

In contradistinction to the attempts made so far, I accommodate the speed of the picture film to the speed of the sound machine and produce means whereby for each predetermined length of a sound record a predetermined number of pictures are exhibited and exhibited simultaneously with the production of the sound through that part of the record line. When, either through design or accident, the sound machine either retards or accelerates, the exhibition of the pictures on the picture film will also retard or accelerate in the same proportion; and if, by design or accident, the sound machine entirely ceases its movement, then the picture machine will cease its movement simultaneously.

For the purpose of illustrating my invention, I have reference to the accompanying drawing, in which—

Figure 1 is a perspective view illustrating in conventional sign part of a moving film, the means to move the same, and the means to synchronize the same with a sound machine. Fig. 2 is a cross section in detail of the frictional drive device employed in my synchronizing system. Fig. 3 is a perspective view illustrating here the sound record as of cylindrical form, the means to move said sound record and the means to synchronize the same with a picture exhibiting machine. Fig. 4 is a diagrammatic view showing the electrical connections for synchronizing.

In Fig. 1; 1 are the means to operate the picture machine, here shown as an electric motor, of which 2 and 3 are the wires adapted to be connected to a current carrying circuit. For the purpose of my invention, it is immaterial if the speed and force of this motor are above the normal and to actuate this motor, it is only necessary to connect the same to one of the well known light circuits. A motor, which takes one-half an ampere at one hundred and ten volts, suffices for all practical purposes. 4 is the shaft revolved by this motor. 5 is a frictional drive device as an entirety. The different parts of said device are illustrated in detail in Fig. 2. The function of this frictional device is, to allow the motor to normally rotate at a desired speed, even if the mechanism, with the aid of which the film is operated, is kept stationary by suitable devices. 6 is an additional shaft on which are positioned the sprocket wheels 9, 9, for driving the picture and part of the means for retarding the movement of said shaft. As clearly illustrated, part of the frictional device is mounted on the shaft 4 and part thereof mounted on shaft 6. 7 is the light aperture through which the light rays project and across which the picture film 8 passes. This being common to all of the picture film apparatus, it is not necessary to go into detail of the operation of same. The portion of the interrupting means positioned on shaft 6 are designated as an entirety by the numeral 10. These means consist here of the stop wheel 11 provided with the four stops 12, 12^a, 12^b and 12^c. The relation of these stops as to the sprocket wheels 9, 9, is such that for each movement from one stop to the succeeding stop, one picture is brought to view for the purpose of being exhibited on a suitable screen. 13 is the part of the interrupting device placed in juxtaposition and in operative relation to the coöperating part carried by the shaft 6. This part 13 comprises here two electromagnets designated by the numerals 14 and 14^a, respectively, and provided with the two cores 15 and 15^a, respectively. The coils 16 and 16^a are connected together at one terminal and to this termi-

nal is connected the wire 17 adapted to be connected to an outside circuit. The other terminal of coil 16 is connected to wire 18 and the coil 16^a to wire 18^a, also for the purpose of connecting the same to an outside circuit. 19 is the armature as an entirety comprising the soft iron part 20 journaled at 21, and positioned between the pole faces. This armature part is provided with the projection or lever 22 and the end of this lever carries a forked head 23 comprising the prongs 24 and 25. That part of the armature which is positioned between the two poles is adapted to be moved to the right or left in accordance with the energizing of the magnets 16 or 16^a.

The operation of the device as an entirety is as follows: Normally, the armature of the motor 1 is rotating. Normally, also, one of the prongs 24 or 25 will engage with one of the stops of the stop wheel 11. The picture moving mechanism will, therefore, be held in check and the shaft 6 will remain stationary. The frictional device being so adjusted the part stationed on shaft 4 or motor shaft will not exert sufficient pressure on that part stationed at shaft 6, so as to revolve the same as long as one of the prongs of the fork is in engagement with one of the stops of the wheel 11, but as soon as the stop is free from the prong, the friction between the different parts of the device 5 is sufficient to revolve the shaft 6 at the desired speed. It is now supposed that the electromagnet 16 is energized. The armature, therefore, will be tilted to the left and the fork will come in a position whereby the prong 25 will engage the stop 12, as illustrated. As long as the fork remains there, no movement of the shaft 6 will take place and, therefore, the film 8 will remain stationary. It is now supposed that the electromagnet 16 is de-energized, but the electromagnet 16^a is energized. The part of the armature stationed between the poles of the electromagnets will be drawn to the right. The fork, therefore, will also be drawn to the right and the prong 25 will be drawn out of contact with 12, but the prong 24 will be positioned so as to engage the stop 12^c as soon as the same comes in alinement with the prong 24, it being understood that the arrow indicates the direction of rotation of wheel 11. The moving of the wheel positioning stop 12^c, so as to come in alinement with prong 24, operates the film in the same manner as the well known "Geneva" movement of today, that is, it moves the picture formerly in view out of view and substitutes therefor a succeeding picture. It will therefore be seen that the organism just described does not only perform the function of the synchronizing part, but also performs the function of the well known "Geneva" or "star wheel" movement, as employed today in moving picture machines, and this mechanism is, therefore, eliminated from the machines provided with my invention.

In Fig. 2; 5 is the frictional device as an entirety, comprising the two disks 27 and 27^a, the spring 28 and the frame 26. These two disks 27 and 27^a are pressed together by the spring, re-acting against the frame 26. The disks are here pinned to their respective shafts 4 and 6.

In Fig. 3: 30 are the means to operate the sound record. These means are here shown as an electric motor provided with the wires 32 and 33 adapted to be connected to a current carrying circuit. Whereas, the speed of the motor 1 of the picture exhibiting machine may differ during its operation, the speed of the motor 30 actuating the sound record has to be a predetermined one and should not differ during its operation. 31 is the shaft with the aid of which the sound record 34 is operated. This sound record is here shown as of cylindrical form, but it is obvious that any other sound record may be substituted therefor. The means to produce the sound are not illustrated, as these means may vary in accordance with requirements. 35 is a commutator mounted on the shaft 31 and adapted to revolve with the same. This commutator consists here of the two parts 36 and 36^a. Each of these parts is provided with three conducting and three nonconducting segments, disposed so that each conducting segment of the part 36 of the commutator is opposite a nonconducting segment of the part 36^a of the commutator, or vice versa. All the conducting segments of both parts of the commutator are here shown as in electrical connection with the shaft 31. 37, 38 and 39 are contacting brushes; 37 always in electrical contact with the conducting shaft 31; 38 adapted to connect with the conducting segments of 36 as soon as a conducting segment is brought in alinement with same; and 39 adapted to connect with the conducting segments of 36^a as soon as a conducting segment is brought in alinement with the brush. The brush 37 is provided with the wire 40; the brush 39 with wire 41 and the brush 38 with wire 41^a.

In Fig. 4 which, as said above, illustrates the electrical connection of the two circuits, one illustrated in connection with the picture machine and the second illustrated in connection with the sound machine; 35 is the commutator, as illustrated in Fig. 3; 31 its shaft; 37, 38 and 39 the connecting brushes; 40, 41^a and 41 the wires connected to these brushes. 13 is the interrupting device as illustrated in Fig. 1, as an entirety. 14 and 14^a are the two electromagnets. 17 is the wire connected to the joined terminals of both electromagnets. This wire is here shown as provided with the source of current 42 and is connected with the interpo

sition of the switch 43 to the wire 40. The wire 18^a of the electromagnet 14^a is here shown as connected to the wire 41^a of the brush 38 and the wire 18 of electromagnet 14 is here shown as connected to wire 41 of brush 39. For the convenience of the operator, I have provided the sound record with the mark 50 and the picture film with the mark 51, so that at the commencement of the operation, the required parts may be placed in the required positions.

I will now describe the operation of my device as an entirety, it being understood that in practice, the sound producing device may be positioned at a place more or less remote from the place where the picture exhibiting device is positioned. At the start, the operator positions his film and the sound record at the required points, the switch 43 remaining open. The motor actuating the sound record is also idle. The switch 43 is then closed and the motor of the record machine started. Through the closing of the switch 43, the armature of the electromagnet of the interrupting device 13 will be actuated so as to be placed in a position to engage with one of the stopping points 12, 12^a, 12^b and 12^c as soon as the same comes in alinement and it is supposed that the operator in placing his film moves the shaft in a manner so that said alinement shall take place. As long as the motor 30 of the sounding device remains idle, no change will take place in the position of the film. It is supposed that the brush 39 touches, before the motor 30 starts, one of the conducting segments of the commutating part 36^a, as is illustrated in Fig. 3, and it is supposed that through the connection of this part of the circuit, the armature of the device 13 is thrown to the left and in alinement with the stop 12, as clearly illustrated in Fig. 1, and that a blank space of the film is brought to view. As stated above, as long as the motor 30 remains idle, the picture film will remain in this position. It has to be stated, that in the operation of my device, the motor 1 of the picture machine is connected to its source of current and, therefore, revolves before the operator commences the operation of the sound producing machine and revolves continuously no matter if the mechanism moving the picture is locked against revolving or not; thus for the reason that the speed of the motor should always be normal at the moment when the locking means are removed, otherwise, it would take a unit of time before the motor has attained full speed. It is now supposed that the motor 30 is brought into service and is revolved at the required and predetermined speed. It is also supposed that the unit of time for each revolution of the motor and the commutator is equal to the unit of time during which six pictures should be exhibited. During one full revolution of this commutator, the electromagnet 14 will be three times energized and deënergized, so also will be, during this revolution, the electromagnet 14^a energized and deënergized three times, and the energization of these two electromagnets will be alternate. Through this alternate energization, the armature will be drawn back and forth, that is, to the right and left and the prongs 24 and 25 will alternately engage with and disengage from one of the stops 12, 12^a, 12^b and 12^c. During the time that they are engaged with these stops, the moving picture mechanism will be at rest, but during the time of the movement of the prongs from right to left, or vice versa, the friction of the device 5 suffices to move the shaft 6 through the power of the motor 1. It will, therefore, be seen that the movements of the sprocket wheels 9, 9, will be an interrupted one, in the same manner as the movements are today, if controlled through the Geneva device; and it will also be seen that for each conducting segment of the commutator 35, one movement will take place in the moving picture device and each of these movements will bring to view a new picture.

Through experiments, I have ascertained that if the sound and picture should be simultaneously and correctly exhibited, it is best to accompany each picture, during the time of its exhibition, with a sound produced by one inch of sound record. When, therefore, the sound record is of greater or lesser diameter, then it is obvious that the number of segments of the commutator should also be increased or decreased to suit conditions.

I have discarded all ratchet mechanism having a zero position through the control of a spring, for the reason that with such mechanism, the ratchet arm has to make two movements for the engagement of each of the stops and such is detrimental, since, first, the spring control may vary and, second, that one of the time units is lost and for these reasons and others not necessary to enumerate, I have selected the type as illustrated.

The elements grouped under the numerals 10 and 13 constitute an interrupting device for the movement of the film 3 and these elements are substituted in the present invention for the ordinary Geneva movement which is commonly employed in motion picture apparatus at the present time.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In mechanism for synchronizing the movement of sound reproducing and motion picture machines, operating means for the picture-carrier, a source of power tending to constantly actuate said operating

means, and means controlled by the sound reproducing machine for intermittently interrupting the movement of the picture-carrier-operating means.

2. In mechanism for synchronizing the movement of sound reproducing and motion picture machines, the combination with the sound record of a sound reproducing machine, and means for imparting thereto a continuous movement, of a picture-carrier, means tending to constantly operate the latter, a device for intermittently interrupting the movement of said picture-carrier-operating means, and means associated with the sound record for actuating said interrupting device.

3. In mechanism for synchronizing sound reproducing and motion picture machines, the combination with a sound record, and means for operating the same, of a picture-carrier, means tending to constantly operate the latter, a device for intermittently interrupting the movement of the picture-carrier-operating means, electro-responsive means for actuating said interrupting device, and means associated with the sound record for controlling said electro-responsive means.

4. In mechanism for synchronizing sound reproducing and motion picture machines, the combination with a sound record, and means for actuating the same, of a picture-carrier, means for actuating the latter, a source of power tending to constantly operate the picture-carrier-actuating means, a frictional device interposed between said source of power and said actuating means, means for interrupting movement of the picture-carrier-actuating means, and means associated with the sound record for controlling said interrupting means.

5. In mechanism of the class described, a machine for the exhibition of pictures having an operating shaft, a sound machine, a frictional device, a motor tending to constantly operate the picture machine, said frictional device being arranged in part on the shaft of said motor and in part on the shaft of the picture machine, a device for interrupting movement of the picture-machine shaft, and means associated with the sound machine for controlling said interrupting device, whereby to control the movement of the movable part of the picture machine independently of the operation of said motor.

6. In mechanism of the class described, a sound record, a shaft upon which said record is mounted, means for rotating said shaft, a plurality of commutators associated with said shaft and each including a plurality of conducting and non-conducting segments, a brush for each of said commutators, electrical circuits in which said brushes are included the energization of which is controlled by said commutators, a source of current included in said circuits, a picture exhibiting machine, picture-carrier-actuating means included in the latter, means tending to constantly operate said picture-carrier-actuating means, means for interrupting the movement of said picture-carrier-actuating means, and electro-magnets arranged in said circuits and controlling the movement of said interrupting means.

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

ISIDOR KITSEE.

Witnesses:
EDITH R. STILLEY,
MARY C. SMITH.