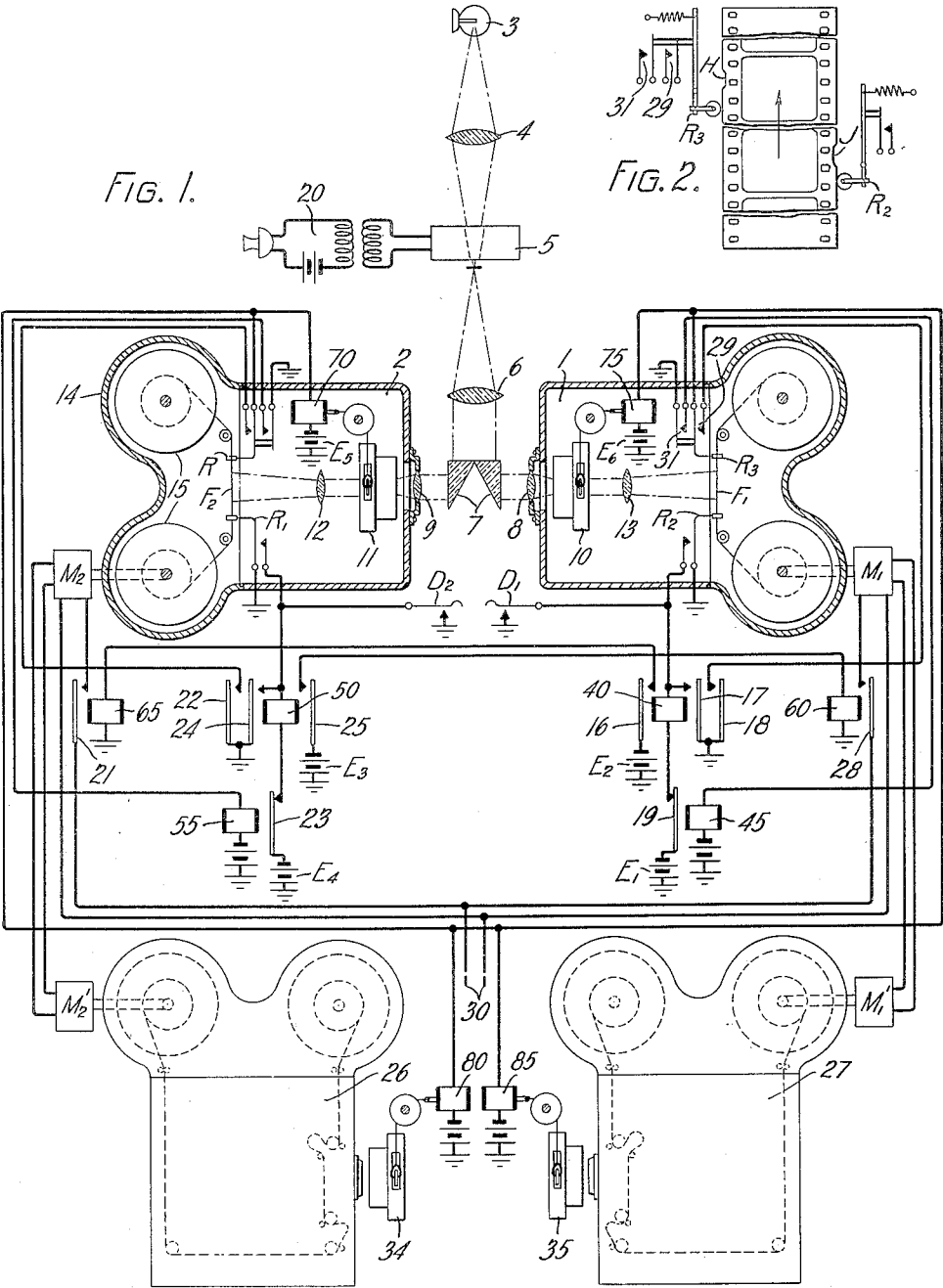


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SOUND RECORDING SYSTEM

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SOUND-RECORDING SYSTEM.

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This invention relates to optical speech recording mechanisms and particularly to automatic film changing devices associated with such recording mechanisms.

5 In recording acoustically modulated light waves on photographically sensitive film it is desirable to record the light waves regardless of the duration of the speech or musical number without losing any of the record. 10 The time required to record the average speech or musical number is sometimes longer than the time required for the running of a film of standard length. This results in a loss of part of the record unless means are 15 provided to instantaneously shift the recording operation to a new film.

An object of the invention is to accurately transfer to photographically sensitive film a record corresponding to a series of success- 20 sively occurring sound or picture variations.

A further object is to accurately record on several lengths of motion picture film a continuous record of successively occurring acoustically modulated light waves or picture 25 variations without losing any part of these records in transferring the recording operations from one length of film to another.

In accordance with the invention the above objects are accomplished by the use of an 30 electric circuit comprising a plurality of relays to control the operation of the motors which drive the film and to control the shutters of the recording mechanism to admit or reject the light waves projected to the recording films. More specifically the inven- 35 tion employs two recording systems each comprising a film magazine with its associated lens, shutter, and a motor to drive the film. A single source of modulated light 40 common to both systems is used and consists of a light source, a light valve and spherical lenses to project the image of the light valve on to the recording films. The light is directed to each of the recording films by two 45 silvered reflecting prisms which divide the light and reflect it to each of the films. An electric circuit comprising a plurality of relays interconnects the driving motors and the shutters. When the run of one standard 50 length film is nearly completed a notch in the edge of the film engages a roller which

closes circuits to operate the relays so as to close the driving motor circuit for the second film. When this motor attains the proper speed a notch in the edge of the second film 55 engages another roller which closes an electric circuit to stop the motor of the first film and open the shutter of the second film. With a mechanism of this kind there is no loss of time in transferring from one film to 60 another which therefore gives a complete record of the picture variations and their accompanying musical number.

Fig. 1 is a diagrammatic view of the apparatus and circuit connections. 65

Fig. 2 is a detail of the film and its associated tripper contacts.

Referring to Fig. 1, a light source 3 projects light rays to a spherical lens 4, then to light valve 5. Voice modulated currents 70 from microphone circuit 20 are supplied to said light valve, thus varying the amount of light transmitted in accordance with the speech currents.

A preferred form of light valve is disclosed in Patent 1,638,555, August 9, 1927, to E. C. Wentz. These acoustically modulated light waves pass through lens 6 and are then divided and reflected, by silvered reflecting 80 prisms 7, toward each of the sound recording cameras 1 and 2.

The two cameras being alike, it will simplify the description to consider only camera 2 for the present. This sound recording camera consists of casing 14, spherical lenses 9 85 and 12, film F_2 , film winding reels 15 and the film driving motor M_2 . Included in casing 14 are magnet 70 for controlling the shutter 11, and contacts R and R_1 associated with the film for controlling the various switching 90 operations.

Scenic cameras 26 and 27 record the action accompanying the speech or musical number and although necessary for a complete description they form no part of this inven- 95 tion.

The operation of the device is as follows:

Let it be assumed that both the sound recording mechanisms are at a standstill. If the operator wishes to start camera 2 he de- 100 presses key D_1 which energizes relay 40 through contact 19 of relay 45, battery E_1

and ground. Relay 40 attracts armature 16 which closes the circuit to heavy duty relay 65, through battery E_2 and ground, which in turn attracts armature 21, thereby closing the circuit of motor M_2 to power supply line 30. It will be seen that motor M'_2 is started simultaneously with motor M_2 . As the depression of the key D_1 is only momentary, a locking means is provided for relay 40, the circuit comprising armature 17, relay 40, armature 19, battery E_1 and ground.

The shutters 11, 34, 10 and 35 are all connected in parallel circuit and each pair is so mechanically adjusted that when 11 and 34 are open 10 and 35 are shut and vice versa. Any switching operation affecting one set will affect the other set. The shutters operate on the well known principle of the ordinary camera shutter set on time exposure wherein two operations of the shutter lever are necessary to open and close the shutter.

The film F_2 is now recording the acoustically modulated light waves. When film F_2 nears the end of its run, an indentation in film by engaging tripper R_1 (equivalent to R_2 shown in Fig. 2) closes contacts to energize relay 50 through battery E_4 , armature 23, relay 50 and ground. Armature 25 attracted by relay 50 closes the circuit to heavy duty relay 60, which attracts armature 28 closing the circuit to film driving motor M_1 and power supply lines 30. The film F_1 has an indentation H about four feet from the starting end of the film adapted to receive tripper R_3 (Fig. 2). This tripper R_3 falling into indentation H makes a double contact. Contact 29 closes the circuit to magnets 70, 75, 80, 85 through battery, windings of the magnets, contact 29, armature 18 and ground, which opens shutters 10 and 35 and closes the shutters 11 and 34 of the first machine. Contact 31 closes circuit to relay 45 which attracts armature 19, thus breaking the locking circuit of relay 40. Armatures 16, 17 and 18 are released. The release of armature 16 breaks the circuit of motor M_2 , thereby causing the film F_2 to stop. The double contact controlled by R_3 , is so adjusted that the contact 29 closes slightly before contact 31 because contact 29 closes the circuit to the magnet 75 through armature 18, to trip the shutters, and contact 31 closes the circuit to relay 45 which attracts armature 19 to break the locking circuit of relay 40, thereby releasing armature 18 from its contact. Therefore, it is necessary that the circuit through armature 18 be made before the second contact 31 opens the circuit.

It is obvious from the above description of the operation that either machine may be started first and the transfer from one machine to the other may be effected without loss of any of the record, thereby eliminating the objections heretofore experienced in

recording a musical or speech program on photographically sensitive film.

What is claimed is:

1. In a recording system, a source of acoustically modulated light waves, a photographically sensitive film, a second photographically sensitive film, means for driving each of the films, means to project light waves from said source toward each of said films to produce a photographic sound record, and means controlled by said films to shut off said light waves from the first mentioned film and to project said light waves upon said second film.

2. In a recording system, a source of acoustically modulated light waves, a photographically sensitive film, a second photographically sensitive film, driving means for each of said films, means to project light waves from said source toward each of said films to produce a photographic sound record, and automatic means controlled by said films for alternately starting and stopping each of said film driving means.

3. In a recording system, a source of acoustically modulated light waves, a photographically sensitive film, a second photographically sensitive film, driving means for each of said films, reflecting prisms for projecting light waves from said source toward each of said films to produce a photographic sound record, and film controlled electromagnetic means for starting one of said film driving means and stopping the other of said film driving means.

4. In a recording system, a source of acoustically modulated light waves, a photographically sensitive film, a second photographically sensitive film, driving means for each of said films, means to project light waves from said source upon each of said films to produce a photographic sound record, means to control the admission or rejection of said light waves to each of said films, and film controlled means to simultaneously actuate said light controlling means with said driving means.

5. In a recording system, a photographically sensitive film, a second photographically sensitive film, film controlled shutters associated with each of said films, a source of acoustically modulated light waves common to both of said films, means to project light waves from said source upon each of said films to produce a photographic sound record, said light waves being admitted to either of said films under the control of said film controlled shutters.

6. In a recording system, a photographically sensitive film, a second photographically sensitive film, a source of acoustically modulated light waves common to both of said films, separate driving means for each of said films, shutters associated with each of said films, said driving means and said shutters

being simultaneously controlled by said films.

7. In a recording system, a source of acoustically modulated light waves, a photographically sensitive film, a second photographically sensitive film, driving means for each of said films, means to project light waves from said source toward each of said films to produce

a photographic sound record, shutters associated with said films and means controlled by said film to alternately open and close each of said shutters. 10

In witness whereof, I hereunto subscribe my name this 28th day of January, 1928.

THEODORE J. ENGEL.