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SOUND PICTURE RECORDING SYSTEM

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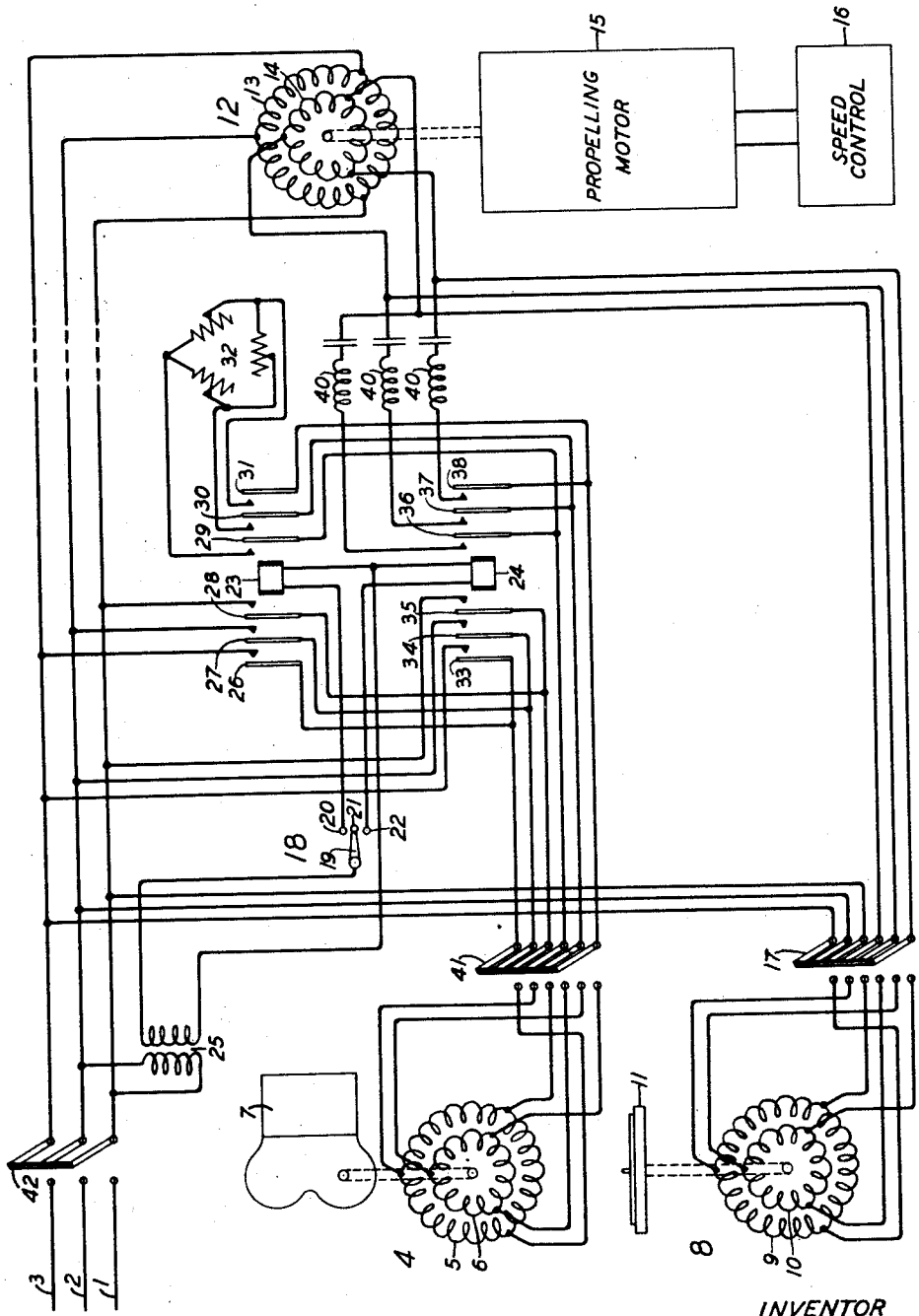

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SOUND PICTURE RECORDING SYSTEM

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This invention relates to sound picture recording systems and particularly to synchronizing circuits for sound picture recording systems.

One object of the invention is to provide a sound picture recording system having a plurality of electrically interlocked motors with a portable switch that shall control the operation at will of an interlocked motor independently of the other interlocked motors.

Another object of the invention is to provide an electrically interlocked motor system for sound picture recording that shall permit a motor to be connected to and disconnected from the interlocked motors during operation of the system without interfering with the operation of the interlocked motors.

A further object of the invention is to provide an electrically interlocked motor system with a portable switch located adjacent to one of the motors that shall connect and disconnect the motor to and from the other interlocked motors and that shall control the operation of said motor independently of the other interlocked motors.

In the recording of sound pictures the service motors which drive the cameras and the sound recording machines are operated synchronously and are preferably electrically interlocked. Before and after a sound picture has been taken, it is often desirable to make a test run of a camera and to take a slate giving the data of a picture which has been taken. After a cameraman has threaded up his camera, a test run should be made. In an interlocked system it would ordinarily be necessary to operate the complete interlocked system in order to permit the making of a test run by one cameraman. Not only would the complete interlocked system be tied up during the test run by one cameraman but an additional man would be required at a remote control station to stop and start the system.

In a system constructed in accordance with the invention, means are provided for disconnecting a service motor from the other interlocked service motors at any time and for operating the disconnected service motor independently of the other service motors. Furthermore, a service motor may be disconnected from or connected to the other interlocked motors without interfering with the operation of the interlocked motors.

The invention is illustrated by means of a sound picture recording system of the type shown in the patent to E. R. Morton No. 1,867,373, dated July 12, 1932. The interlocked system is of the type shown in the patent to C. J. A. Michalke, No. 684,579, dated October 15, 1901. In the system disclosed in the E. R. Morton patent, a plurality of service motors having stator and rotor windings are provided for operating cameras and sound recording apparatus. The rotor windings of the motors are connected in parallel circuit relation and the stator windings are connected in parallel circuit relation to a polyphase supply circuit. A distributor motor similar in construction to the service motors operating the cameras and sound recording apparatus is provided with a rotor winding connected in parallel with the rotor windings of the service motor and a stator winding connected in parallel with the stator windings of the service motors. The distributor motor is operated at constant speed and effects synchronous operation of all the service motors at constant speed.

In a system constructed in accordance with the present invention, means are provided for disconnecting any service motor from the other interlocked motors and for operating the disconnected motor at will. A three-position portable switch is provided adjacent to the service motor which is to be controlled. In one position of the portable switch the rotor windings and the stator windings of the service motor are disconnected from the rotor and stator windings of the other interlocked motors. In a second position of the portable switch the rotor windings of the disconnected motor are connected to a polyphase resistance element and the stator windings are connected to polyphase supply source so that the disconnected motor may be operated as an induction motor. In the third position of the portable switch the rotor windings of the disconnected motor are connected in parallel with the rotor windings of the other interlocked motors and the stator windings of the motor are connected in parallel with the stator windings of the interlocked motors.

If the interlocked system is in operation at the time a motor is disconnected from or connected thereto, interference may be caused in the operation of the motors. In order to prevent such interference in the operation of the interlocked motors tuned impedance means is provided in the rotor winding circuit of the motor which is being disconnected from or connected to the interlocked system. The impedance is tuned substantially to the frequency of the current in the rotor winding of the motor when the motor is operating at normal speed. If the service motors are operated from a 60-cycle source of current,

the impedance means should be tuned to a current having a frequency of about 20 cycles.

The single figure in the accompanying drawing is a diagrammatic view of a sound picture recording system constructed in accordance with the invention.

Referring to the drawing a sound picture recording system is shown connected to a three-phase supply circuit comprising conductors 1, 2 and 3. A motor 4 comprising a stator winding 5 and a rotor winding 6 is shown connected to a camera 7. A similar motor 8 having a stator winding 9 and a rotor winding 10 is shown connected to a sound recording machine 11. Although only two service motors 4 and 8 are shown on the drawing for operating one camera and one sound recording machine, it is to be understood that any desired number of such service motors for operating cameras and sound recording machines may be connected to the system. A distributor motor 12 comprising a stator winding 13 and a rotor winding 14 is provided for operating the service motors 4 and 8 synchronously and at constant speed. A propelling motor 15 is provided for operating the distributor motor 12 and a speed control 16 is provided for so controlling the propelling motor 15 as to maintain the speed of the distributor motor substantially constant. The propelling motor 15 and the speed control 16 therefore are preferably of the type shown and disclosed in the patent to H. M. Stoller, 1,662,085, dated March 13, 1928.

A switch 17 is provided for connecting the stator winding of the service motor 8 to the three-phase supply circuit comprising conductors 1, 2 and 3 and for connecting the rotor winding 10 in parallel with the rotor winding 14 of the distributor motor 12. When the stator winding 9 of the service motor 8 is connected to the three-phase supply circuit and the stator winding 13 of the distributor motor 12 is connected to the three-phase supply circuit with the rotor windings of the two motors connected in parallel, then the two motors are interlocked to operate in a manner disclosed in the patent to E. R. Morton, 1,867,373, dated July 12, 1932.

A portable switch 18 comprising a switch arm 19 and three contacts 20, 21 and 22 is provided for controlling the operation of the service motor 4. The portable switch 18 in one position controls apparatus for connecting the service motor 4 to the interlocked system with the stator winding 5 in parallel with the stator winding of the distributor motor and the rotor winding 6 in parallel with the rotor winding 14 of the distributor motor. In a second position of the portable switch 18, the service motor 4 is disconnected from the interlocked system. In a third position of the portable switch 18, the service motor is operated independently of the interlocked system. Although only one portable switch 18 is shown on the drawing, it is apparent that other portable switches may be connected to other service motors. Moreover, it is also apparent that one portable switch may serve to control a number of service motors which are connected to one channel.

The portable switch 18 controls the service motor 4 by means of two relays 23 and 24. Power for operating the relays is obtained by transformer 25 connected across one phase of the three-phase supply circuit. The relay 23 is provided with three switch members 26, 27 and 28 for connecting the stator winding 5 of the service motor 4 to the three-phase supply circuit and three switch members 29, 30 and 31 for connecting the rotor winding 6 of the service motor 4 to an adjustable three-phase rheostat 32. The relay 24 is provided with three switch members 33, 34 and 35 for connecting the stator winding 5 of the service motor 4 to the three-phase supply circuit and three switch members 36, 37 and 38 for connecting the rotor winding 6 of the service motor 4 through tuned circuits 40 to the rotor winding 14 of the distributor motor 12. A switch 41 is provided for connecting the stator and rotor windings 5 and 6 of the service motor 4 to the switch members of the relays 23 and 24. A switch 42 is provided in the three-phase supply circuit.

Assuming the switches 41, 42 and 17 to be closed and the distributor motor 12 to be operated at constant speed, then the service motor 8 will be operated synchronously with the distributor motor 12 at constant speed. When the portable switch 18 is in the position shown on the drawing the relays 23 and 24 will both be deenergized and no operation of the service motor 4 will take place. At this time the switch member 19 is in engagement with the contact 21. If it is desired to effect operation of the service motor 4 independently of the interlock system, the switch arm 19 of the portable switch 18 is moved into engagement with the contact member 20. The relay 23 is then operated to connect the stator winding 5 of the service motor 4 to the three-phase supply circuit and to connect the rotor winding 6 of the service motor to the three-phase rheostat 32. The service motor 4 is then operated as a straight induction motor. The speed of the motor may be controlled by adjusting the rheostat 32.

In case it is desired to connect the service motor 4 to the interlock system, the switch member 19 is moved into engagement with the contact member 22. The relay 24 is then operated for connecting the stator winding 5 of the service motor 4 to the three-phase supply circuit and for connecting the rotor winding 6 in parallel with the rotor winding 14 of the distributor motor 12. At this time it will be noted the rotor winding 6 of the service motor 4 is connected in parallel with the other rotor windings of the interlock system through tuned circuits 40. The tuned circuits 40 are preferably tuned to the frequency of the current flowing through the rotor winding of the motor when the motor is operating at normal speed. If the circuits 40 are tuned to the frequency of the current flowing through the rotor winding when the motor is operating at normal speed, then such circuits will offer considerable impedance to the flow of current through the rotor winding of the motor when the motor is started from rest. If the motor 4 were thrown from rest directly on the interlock system without the provision of the tuned circuits 40, the rotor winding 6 would draw sufficient current to interfere with the operation of the interlock system. It is, of course, apparent that if so desired inductance elements alone may be provided for preventing a rush of current through the rotor winding of the service motor when connected to the interlock system or in some systems condensers alone may be added which cooperate the inductance in the interlock system. It is preferable for smooth operation of the system to have tuned circuits 40 which are tuned to the frequency of the current in the rotor circuit when the service motor is operating at normal speed.

If so desired it is possible, by means of the

portable switch, to first operate the service motor 4 as an induction motor and then while operating the motor close to the synchronous speed of the interlock system 2 connect the service motor to the interlock system. However, when tuned circuits 40 are provided as shown in the drawing, it is unnecessary to operate the service motor 4 to synchronous speed before connection to the interlock system.

Modifications in the system and in the arrangement and location of parts may be made within the spirit and scope of the invention, and such modifications are intended to be covered by the appended claims.

What is claimed is:

1. In a sound picture recording system, a plurality of service motors for operating cameras and sound recording machines at separated places, means for interlocking said motors and for connecting the motors to a source of alternating current to effect synchronous operation thereof at constant speed, a three-position portable switch, and means for disconnecting one of said motors from interlocked relation with the other motors in operation upon movement of said switch to one position, for operating said motor independently of the other operating interlocked motors from said source of alternating current upon movement of said switch to a second position and for connecting said motor in interlocked relation with the other operating motors upon movement of said switch to a third position.

2. In a sound picture recording system, a plurality of service motors having rotor and stator windings for operating cameras and sound recording machines at separated places, means for electrically interlocking said motors to effect synchronous operation thereof, means comprising a switch for connecting and disconnecting one of said motors to and from the other interlocked motors and for operating the motor independently of the other interlocked motors, and impedance means in the circuit of the rotor winding of said motor tuned to the frequency of the current in the rotor winding when the motor is operating at normal speed for preventing interference with the operation of the other interlocked motors when said motor is connected to the other interlocked motors.

3. In a sound picture recording system, a plurality of service motors for operating cameras and sound recording machines at separated places, said motors having rotor windings connected in parallel and stator windings connected in parallel, means for operating the motors synchronously from a source of polyphase power, a switch for connecting and disconnecting one of said motors to and from the other interlocked motors and for operating said motor independently of the other interlocked motors from said source of power, and frequency selective impedance means in the circuit of the rotor winding of said motor for preventing interference with the operation of the other interlocked motors when the motor is connected to the other interlocked motors.

4. In a sound picture recording system, a plurality of service motors for operating cameras and sound recording machines synchronously at separated places, said motors having rotor windings and stator windings, a three-position portable switch, and means for connecting the stator winding and the rotor winding of one of said motors respectively in parallel with the stator windings and the rotor windings of the other motors upon movement of said switch to one position, for disconnecting the stator and rotor windings of said motor from the stator and rotor windings of the other motors upon movement of said switch to a second position and for operating said motor as an induction motor from a polyphase source of power independently of the other motors upon movement of said switch to a third position.

5. In combination, a plurality of motors interlocked to run synchronously and having stator and rotor windings, means comprising a switch for connecting and disconnecting one of said motors to and from the other interlocked motors and for operating the motor independently of the other interlocked motors, and frequency selective impedance means in the circuit of the rotor winding of said motor for preventing interference with the operation of the other interlocked motors when the motor is connected to the other interlocked motors.

6. In an interlock system, a plurality of motors having rotor windings connected in parallel and stator windings connected in parallel, means for operating the motors synchronously from a source of power, means comprising a switch for connecting and disconnecting one of said motors to and from the other interlocked motors and for operating the motor independently of the other interlocked motors, and impedance means in the circuit of the rotor winding of said motor tuned to the frequency of the current in the rotor winding when the motor is operating at normal speed for preventing interference with the operation of the other interlocked motors when said motor is connected to the other interlocked motors.

7. In a sound picture interlock system, a plurality of service motors and a distributor having stator windings and rotor windings respectively connected in parallel circuit relation, a polyphase source of current connected to one set of said windings, means for operating said distributor at constant speed to effect synchronous operation of all the motors at constant speed, a portable switch, and means controlled by said switch for connecting and disconnecting one of said motors to and from the other interlocked motors without interfering with the operation of the interlocked motors and for operating the motor independently of the interlocked motors.

8. In a sound picture interlock system, a plurality of motors having rotor windings and stator windings respectively connected in parallel, means for operating the motors synchronously from a source of power, means comprising a switch for connecting and disconnecting one of said motors to and from the other interlocked motors and for operating the motor independently of the other interlocked motors, and tuned impedance means in the circuit of the rotor winding of said motor for preventing interference with the operation of the other interlocked motors when the motor is connected to the other interlocked motors.

9. In a sound picture interlock system, a plurality of service motors having rotor windings connected in parallel and stator windings connected in parallel, one set of said windings being adapted to be connected to a polyphase source of current, and means comprising a portable switch for disconnecting the windings of one of said motors from the windings of the other motor when in one position, for connecting the

stator winding of said motor to said source and the rotor winding of said motor to a polyphase resistance when in a second position and for connecting the rotor winding and the stator winding of the motor in parallel with the rotor windings and the stator windings of the other motors when in a third position.

10. In a sound picture interlock system, a plurality of service motors having rotor windings and stator windings, a portable switch, means for connecting the stator winding and the rotor winding of one of said motors respectively in parallel with the stator windings and rotor windings of the other motors and for synchronously operating the motors from a source of alternating current upon movement of said switch to one position, means for disconnecting the stator and rotor windings of said motor from the stator and rotor windings of the other motors upon movement of said switch to a second position and means for operating the motor as an induction motor from said source of alternating current independently of the other motors in operation upon movement of the switch to a third position.

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