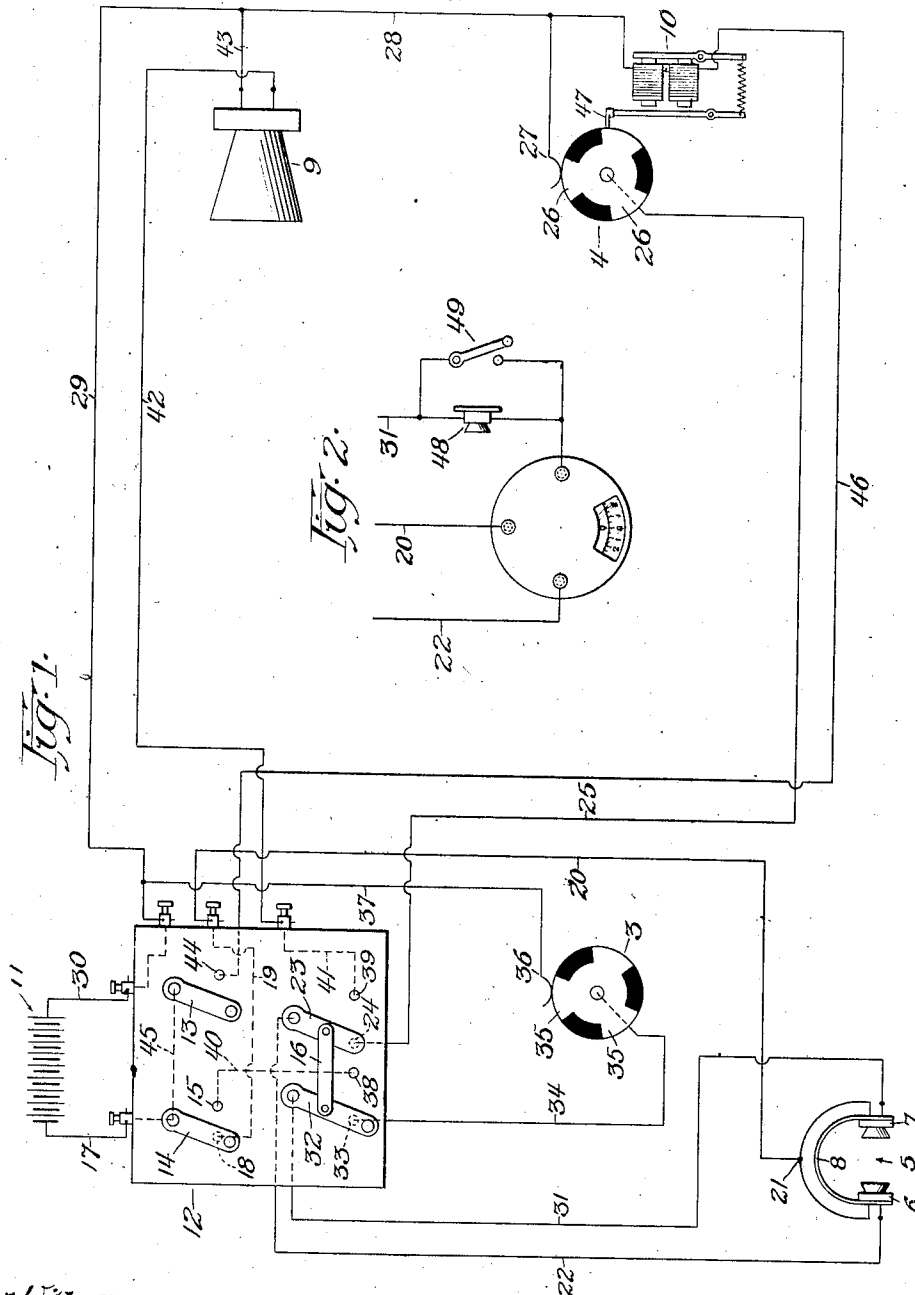


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 COMBINED SYNCHRONIZING AND TELEPHONE SYSTEM.
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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GUSTAV E. HOGGLUND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Combined Synchronizing and Telephone System, of which the following is a specification.

This device is especially intended to provide accurate and delicate means for synchronizing two machines, and for permitting telephone messages to be transmitted over the same circuits which are used for the synchronizing process. It may further enable the use of the same listening apparatus during synchronizing which is used for receiving the telephone messages, but separate apparatus may be provided for synchronizing and for receiving the telephone messages, if desired.

At the present time, it is customary, in many moving picture theatres, to make use of a phonograph or other sound producing mechanism, for supplying music or conversation during the appearance of the scenes on the screen. Evidently, where such a combination is used, it is desirable, if not necessary, that the phonograph should be run in synchronism with the moving picture machine. Also, where such a combination is used, it is customary to place the moving picture machine in the rear of the hall and the phonograph in the front of the hall, so that the sounds will seem to come from the screen or stage on which scenes are thrown. In such cases, it is desirable also that there should be provided easy means for sending messages from the stage operator or manager to the operator of the moving picture machine. At the present time such communication is usually afforded by means of a series of buzzers or by a telephone system, the latter being entirely separate from and independent of the synchronizing circuits. This necessitates a multiplicity of wires and other connections and apparatus, so that the combination is not satisfactory and has not been extensively used.

Various methods are employed for synchronizing machines. In my device I prefer to use a method wherein a series of electrical impulses are delivered to the line in any suitable manner, as, for example, by placing a commutator on a rotating shaft on each machine. The instant of synchro-

nism may then be detected as the instant when these impulses are delivered by the two commutators at equal or proportionate speeds. The detecting device may be in the form of a telephone receiver, differential galvanometer, or other suitable mechanism.

The invention further consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawing, Figure 1 shows in outline, by common electrical symbols, the preferred arrangement of parts and circuits for accomplishing the purposes of this invention; and Fig. 2 shows a modified arrangement of mechanism for detecting the times of synchronism, and for enabling a telephone message to be received by the operator.

In the drawing, commutators 3 and 4 are so connected to the machines as to be rotated at speeds proportionate to the speeds of rotation of the moving picture machine and the phonograph, respectively. Such rotations may be accomplished by placing the commutators on shafts of the machines, so that they will be positively driven. However, the relation between the synchronous speeds of rotation of the shafts and the number of electrical segments on each commutator 3 and 4 should be such that, when the machines are running in synchronism, electrical impulses will be sent out on the line at equal speeds by the commutators 3 and 4. In the preferred arrangement, a double telephone receiver 5 is provided, for detecting the time of synchronism of the machines. This double telephone receiver comprises ear pieces 6 and 7, properly connected by a spring band 8 so as to hold them against the ears. A mouth piece 9 is provided to enable the stage operator or manager to talk to the moving picture machine operator, when desired. An electrical brake 10 is under the control of the moving picture machine operator, so that he can start and stop the phonograph from his location at will. A storage battery 11 provides current for carrying on all of the different operations associated with my device. A switch board 12, carrying all of the switches necessary for forming the different electrical connections, is intended to be conveniently located near the moving picture machine operator, so that he can form the proper connections at will. This switch board carries a starting

switch 13, which is adapted to energize the brake mechanism 10, thereby allowing the phonograph to start at the proper time. A two-point switch 14 is provided for the purpose of enabling both of the telephone receivers to be used for receiving communication from the transmitter 9, or for enabling both of the receivers to be used during the synchronizing process, depending upon its position. In the position shown, it forms the proper connection for the synchronizing process, but when thrown to the point 15 it will be properly connected for receiving the telephone message. A double-pole two-point switch 16 is also provided for changing over from synchronizing to telephoning connections, it being shown in position for synchronizing purposes.

I will now describe the manner in which the machines are intended to be synchronized: With the switches thrown into the position shown, current will flow down from the battery 11, through the wire 17 into the switch 14, thence into the point 18, thence across through the wire 19 down through the wire 20, and into the common connection of the double receiver 5 at 21. Here the current will split, a portion of it passing through the receiver 6 up through the connection 22 and down through the arm 23 of the switch 16 to the point 24. From there it will pass out over the connection 25 into the body of the commutator 4, so that, as this commutator rotates, its contacts 26 will successively come into contact with a brush 27, thence the current will pass up through the connections 28, 29 and 30 into the other pole of the battery 11. From this it will be seen that, as the commutator 4 rotates, a series of electrical impulses will be delivered to the receiver 6. The other portion of the current delivered to the common point 21 will pass through the receiver 7 and up through the connector 31 to the arm 32 of the switch 16. Thence it will flow down through the point 33 and the connection 34 to the body of the commutator 3. As the contacts 35 successively come into contact with the brush 36, the current will flow up through the connections 37 and 38 into the battery 11. Thus it is seen that as the commutator 3 rotates a series of electrical impulses will be delivered to the receiver 7.

Inasmuch as the receivers 6 and 7 are adapted to be held conveniently to the ears, any difference in the periodicity of the impulses from the commutators 3 and 4 will be detected as a difference in the frequency of the impulses heard in the receivers 7 and 6, respectively. The operator of the moving picture machine may then adjust the speed of his machine until the impulses are heard to come at equal speeds in both of the receivers, when he will know that the two machines are running in synchronism.

To enable the stage operator or manager to telephone to the moving picture machine operator, the switch 14 should be thrown to the point 15, and the switch 16 should be thrown so that the arm 32 will come into contact with the point 38, and the arm 23 will come into contact with the point 39. In this case, current will flow down through the connection 17 and the switch 14 into the point 15, then through the connection 40 to the point 38, up through the arm 32, down through the connection 31, across the common connection from the receiver 7 to the receiver 6, up through the connection 22, and down through the arm 23 to the point 39, thence out through the connection 41 and the line 42 to the transmitter 9. After passing through the transmitter, it will pass out over the connection 43 to the line 29, and thence through the connection 39 into the battery 11. In this case it is seen that neither of the commutators is in circuit with the receivers, but that both of the receivers are in circuit with the transmitter 9. This being the case, the only sounds which will be heard in the receivers 6 and 7 will be those thrown into the transmitter 9, and these sounds will be heard with double strength, owing to the fact that they will be heard in both of the receivers.

When it is desired to start the phonograph, the switch 13 may be thrown over to the point 44. When this is done, current will flow down through the connection 17 and the connection 45, through the arm 13, into the point 44, and over the line 46, to the brake 10, whence the current will flow back over the lines 28, 29, and 30, to the battery 11. Thereupon the magnets of the brake will be energized and the brake 47 will be drawn away from the moving portion of the phonograph, which will then start.

From the above it will be seen that after the moving picture machine operator has started the phonograph by releasing the brake 47, he may adjust the speed of his machine so that it will always run in synchronism with the phonograph, and in case he desires from time to time to receive communication either from the stage operator or manager or to hear more strongly the sounds given out from the phonograph, he may throw the switches 14 and 16 in such a manner that the phonograph sounds will be heard in the receivers 6 and 7.

In case it is desired to make use of other means for detecting the synchronism of the machines, use may be made of any device which will detect the impulses from the commutators 3 and 4, and indicate a difference between their frequency. This may be in the form of a differential galvanometer, as is shown in the modification of Fig. 2. In this case the connections 20, 22, and 31 may be made as shown. A single or double receiver

48, as desired, may be placed in the line 31, so that when the switch 49 is opened the current will flow through such receiver. Thereupon a message thrown into the transmitter 5 9 will be heard at the receiver 48. Normally, for synchronizing purposes, the switch 49 should be closed, so as to reduce resistance of the synchronizing circuits to the lowest possible value.

10 It is seen that my system provides a simple means for enabling the synchronizing lines to be used for telephoning purposes, and that, therefore, the total cost of such system may be reduced and the danger of interruption to its service may be largely eliminated.

I claim:

1. In a system of the class described, two machines, electrical circuits adapted to detect synchronism of the machines, a telephone transmitter and a telephone receiver, and means adapted to enable the use of a synchronizing line for connecting the telephone transmitter to the telephone receiver, substantially as described.

25 2. In a system of the class described, two machines, a source of current, a circuit adapted to detect synchronism of the machines, a telephone transmitter and a telephone receiver, and connections adapted to enable the use of a synchronizing line for connecting the telephone transmitter to the telephone receiver, substantially as described.

30 3. In a system of the class described, two machines, an electrical circuit adapted to detect synchronism of the machines, a telephone transmitter and a telephone receiver, and switches adapted to enable the use of a synchronizing line for connecting the telephone transmitter to the telephone receiver, substantially as described.

40 4. In a system of the class described, two machines, a commutator adapted to be driven by each machine, an electrical circuit adapted to receive electrical impulses from the commutators, means for detecting the relative frequency of the electrical impulses from the two commutators, a telephone transmitter and a telephone receiver, and means adapted to enable the use of a synchronizing line for connecting the telephone transmitter and the telephone receiver, substantially as described.

50 5. In a system of the class described, two

machines, a commutator adapted to be driven by each machine, electrical circuits 55 adapted to receive electrical impulses from the commutators, a telephone receiver in each of said electrical circuits, a telephone transmitter, and means adapted to enable the use of a synchronizing line for connecting the telephone transmitter to the telephone receivers, substantially as described.

6. In a system of the class described, two machines, means adapted to be driven by each machine for delivering a series of electrical impulses to an electrical circuit, a telephone receiver in each of said electrical circuits, adapted to detect electrical impulses in said circuit, a telephone transmitter, and switches adapted to enable the use of a synchronizing line for connecting the telephone transmitter to a telephone receiver, substantially as described.

7. In a system of the class described, two machines, means adapted to be driven by each machine for delivering a series of electrical impulses to an electrical circuit, a telephone receiver adapted to be connected to each of said circuits for detecting the frequency of the electrical impulses therein, a telephone transmitter, and switches adapted to connect the telephone transmitter to a telephone receiver, substantially as described.

8. In a system of the class described, two machines, means adapted to be driven by each machine for delivering a series of electrical impulses to an electrical circuit, a telephone receiver adapted to be connected to each of said circuits for detecting the frequency of the electrical impulses therein, a telephone transmitter, and switches adapted to connect the telephone transmitter to the telephone receivers in series, substantially as described.

9. In a system of the class described, a plurality of machines, electrical circuits adapted to detect synchronism of the machines, a telephone transmitter and a telephone receiver, and means adapted to enable the use of a synchronizing line for connecting the telephone transmitter to the telephone receiver, substantially as described.

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