

Oct. 9, 1956

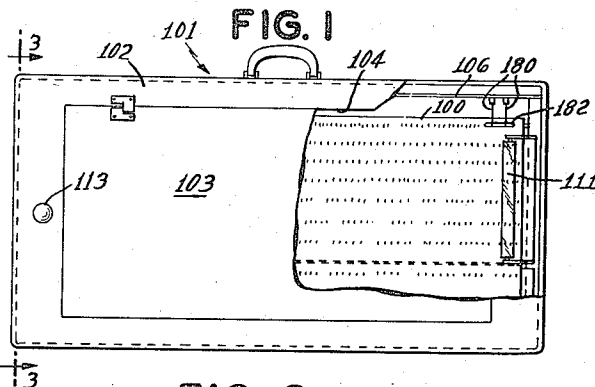
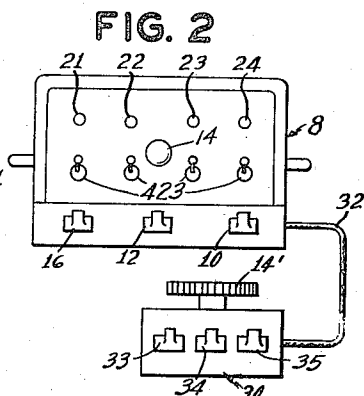
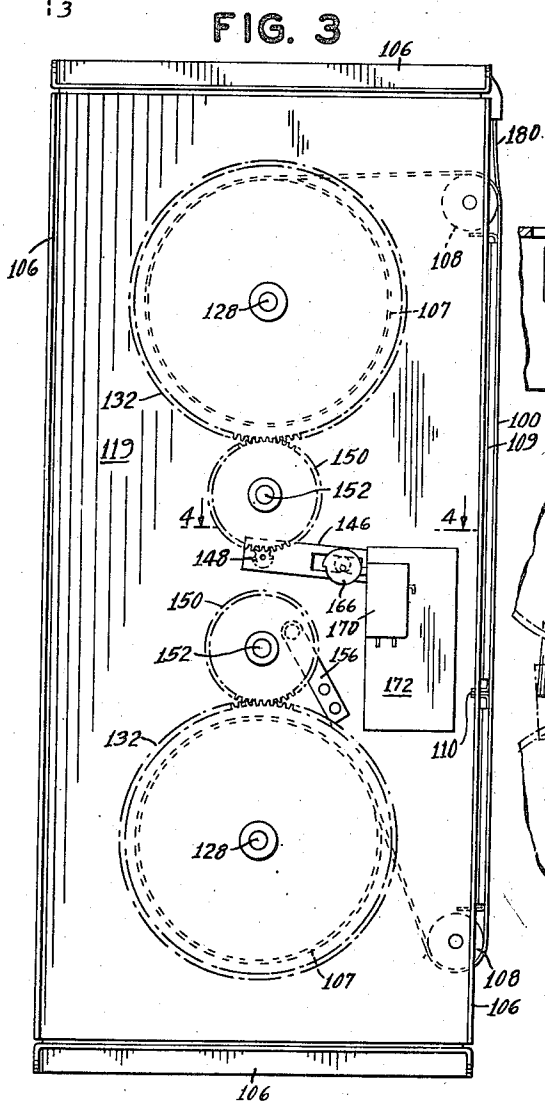
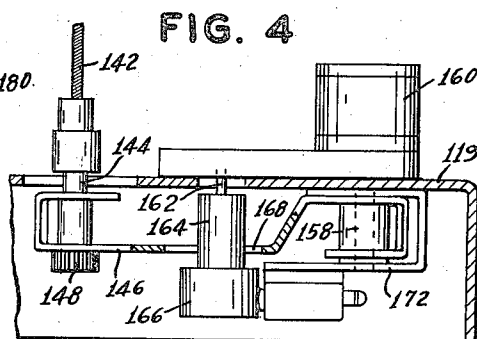
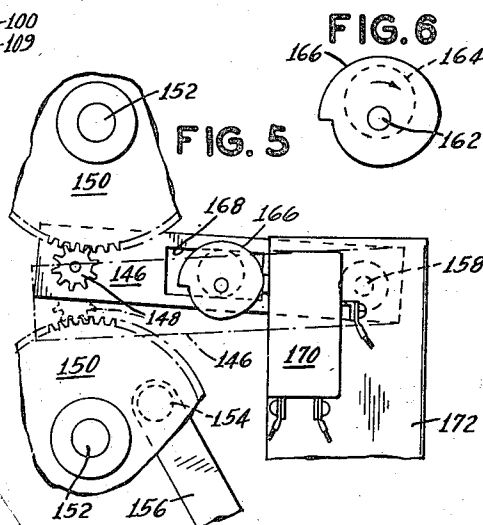
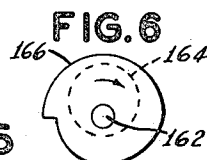
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2,765,552

CUING SYSTEM

Filed April 6, 1951

4 Sheets-Sheet 1



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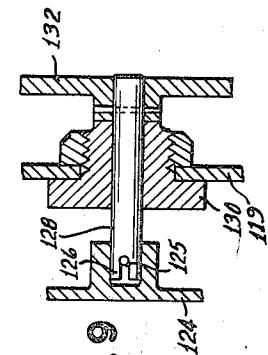
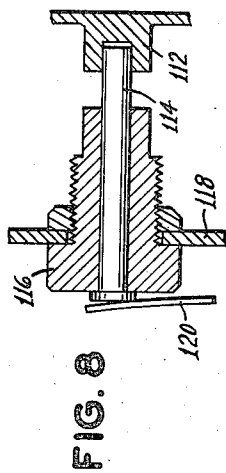
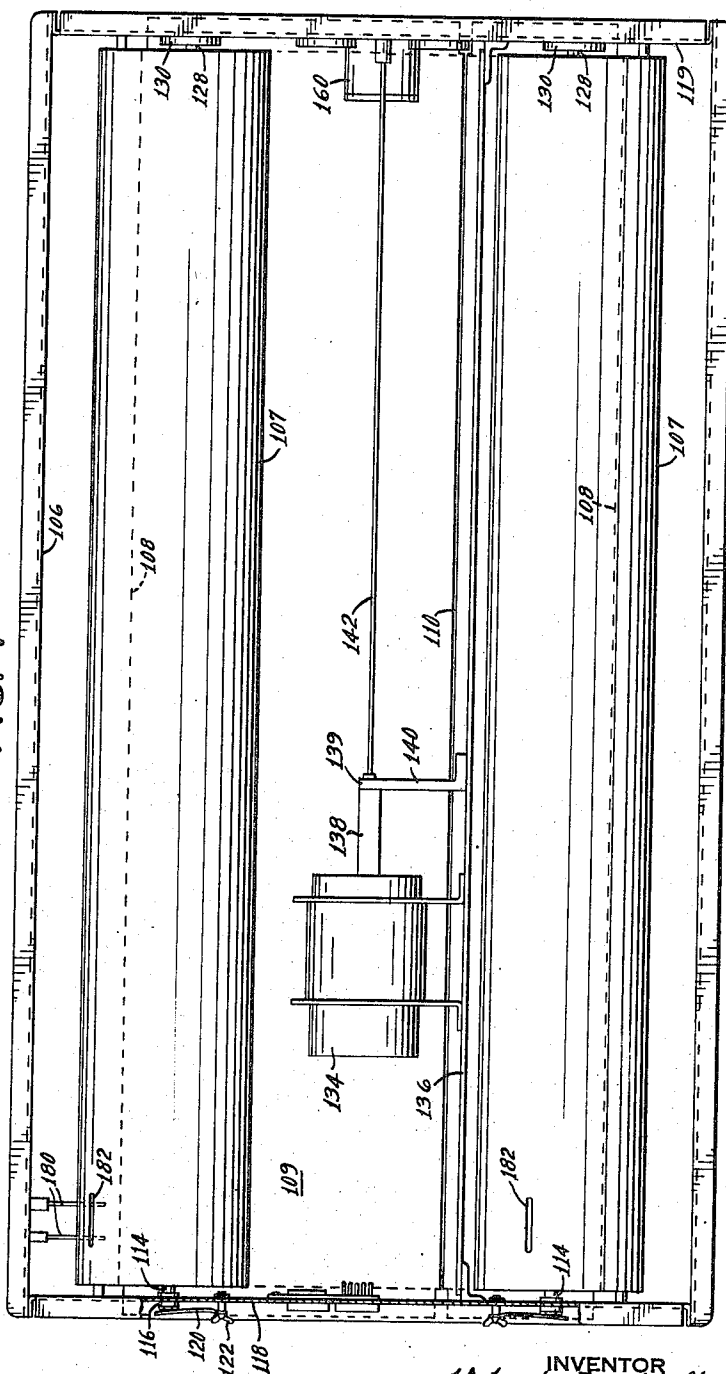
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2,765,552

CUING SYSTEM

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4 Sheets-Sheet 2



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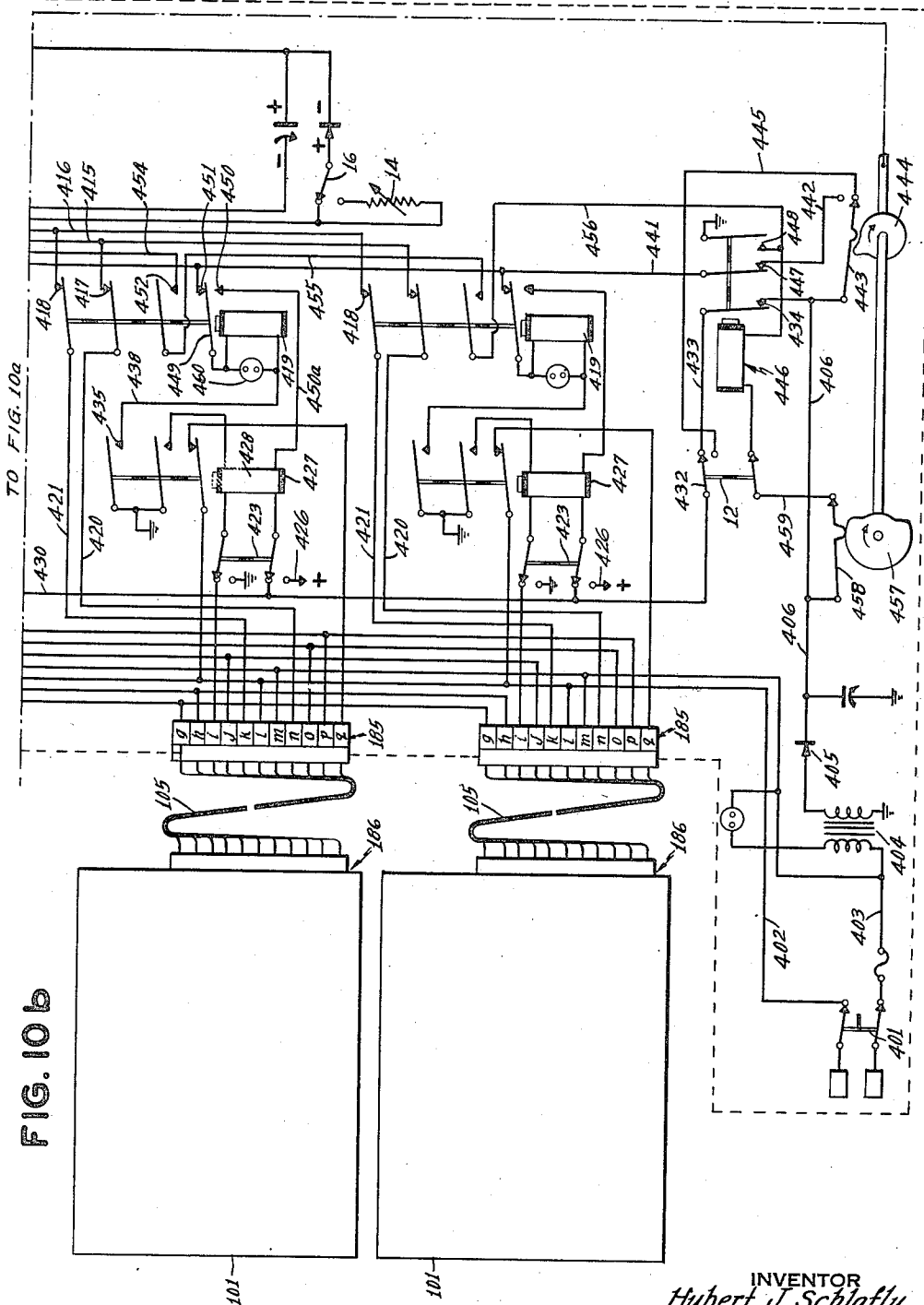
H. J. SCHLAFLY

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CUING SYSTEM

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4 Sheets-Sheet 3



Oct. 9, 1956

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2,765,552

CUING SYSTEM

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4 Sheets-Sheet 4

FIG. 10a

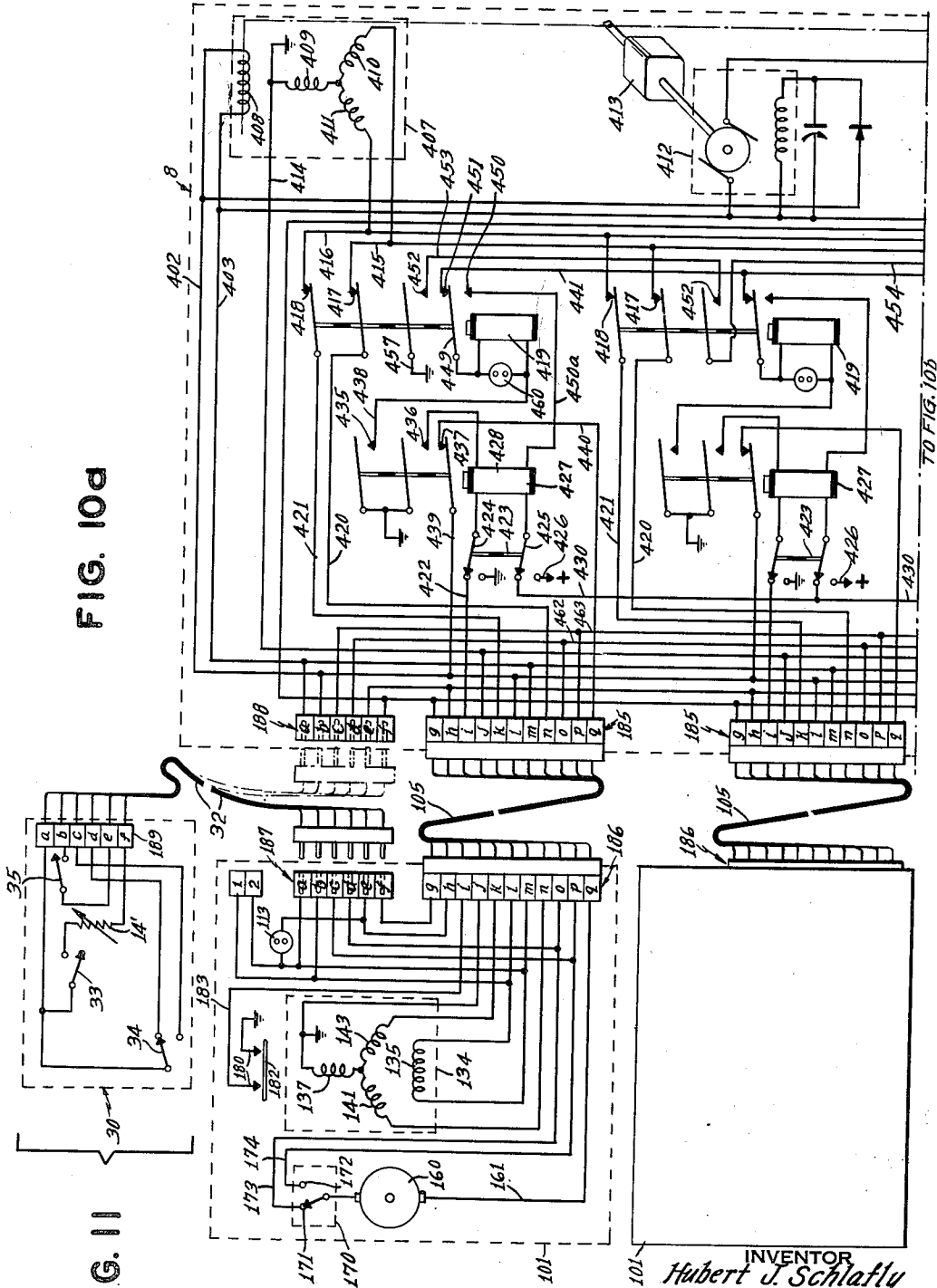
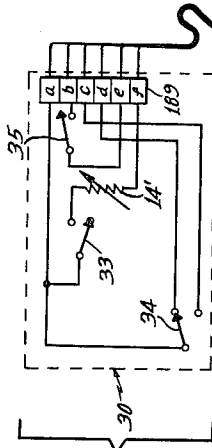


FIG. 11



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2,765,552

CUING SYSTEM

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Application April 6, 1951, Serial No. 220,506

11 Claims. (Cl. 40—53)

The present invention relates to cuing devices and systems for use during the presentation of dramatic productions and more particularly to a system of interconnected cuing devices which permit the display at widely separated points of copies of a single script, the separate copies of the script being advanced in synchronism under a centralized control to display at all times the same lines to all participants.

In the dramatic production for motion pictures and television which are given in "live form" once or at most a few times, it is desirable in the interests of economy to reduce as much as possible the necessity for rehearsal and particularly the requirement that the players learn their lines. This can be achieved by continuously presenting to them the dialogue or script of the production. Since the ultimate audience sees only that portion of the scene selected by a strategically located camera or cameras, apparatus for presenting such scripts can readily be located in positions where they are visible to the performers, without falling within the field of view of the camera or cameras.

In such a system it is important to be able to control all script repeating units from a central point, to be able to advance all the units together at any desired rate of speed, and to reverse the progress of the scripts if desired.

A device for the display of motion picture or television scripts at separated points has been proposed heretofore in the copending application Serial No. 88,860, filed April 21, 1949, by Fred H. Barkau, now Patent Number 2,635,373. In this device, as in the script repeating units according to the present invention, the script or dialogue to be presented is written, typed or printed on a strip of paper or the equivalent which is passed from a supply to a take up roll between which it may be read by the performers. This prior art device however suffers from complexity in the mechanical and electrical arrangements provided for advancing together in synchronism the scripts in a plurality of interconnected prompting units, and from lack of any satisfactory means for preventing the various units from getting gradually out of step with each other.

In the copending application of Fred H. Barkau above identified means are disclosed whereby each unit may be driven separately from the others, and in this way a correction of an "out of phase" condition is perhaps possible. In the device there shown however correction of the "out-of-phase" relation among the various script repeating units of the system requires that that condition be first detected visually and then corrected by manual control. The present invention provides instead means whereby once the copies of the script for the separate repeating units are properly made up, they will be automatically kept in phase in spite of divergences in operation which may develop among the various units.

The present invention further provides convenient means whereby the direction of travel of the scripts at all units may be simultaneously reversed from a central

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point, where the performance of the separate units may be continuously observed.

The invention will now be further described in terms of a preferred embodiment as shown in the accompanying drawings in which

Fig. 1 is a view in front elevation of a script repeating unit according to the invention, the protective casing being broken away to illustrate certain features of construction;

Fig. 2 is a front elevation of the master control unit of the script repeating system, the control unit of Fig. 2 being adapted to control simultaneously a plurality of script repeating units as shown in Fig. 1. Fig. 2 also shows a remote control unit by means of which the essential control functions may be performed at a position remote from the master control unit;

Fig. 3 is a sectional view of the script repeating unit of Fig. 1 taken on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3, illustrating certain elements of the means employed for reversing the direction of travel of the script;

Fig. 5 is a detailed view in elevation of the reversing gear shown in Fig. 3;

Fig. 6 is a view in elevation showing the cams of the reversing gear of Fig. 5;

Fig. 7 is a view in rear elevation of the script repeating unit of Fig. 1, the protective casing being removed;

Fig. 8 is an enlarged sectional view of one of the idler bearings for the script rolls of the unit of Fig. 1;

Fig. 9 is a view similar to that of Fig. 8 but showing the bearing which supports the script rolls at the driving end;

Figs. 10a and 10b constitute a schematic wiring diagram showing the electrical components and interconnections of a cuing system according to the invention, including a master control unit as shown in Fig. 2, and a plurality of script repeating units as shown in Fig. 1; and

Fig. 11 is a schematic wiring diagram of a remote control unit as shown in Fig. 2.

The cuing system of the invention comprises a master control unit and one or more script repeating units interconnected therewith by cables. Actual control may be effected if desired through a remote control unit connecting with the master control unit either directly or via one of the script repeating units.

Each of the script repeating units accommodates a supply and a take up roll for the accommodation of a strip-like script sheet, means to drive the sheet from one to the other of the supply and take up rolls, and means to reverse its direction of travel. Additional means are provided which operate in conjunction with the master control unit to maintain a line for line synchronism of the dialogue as shown on the script sheets of all repeating units. This synchronizing function is performed by providing on the script sheet in each repeating unit periodic discontinuities which operate via a switch or switches to interrupt the application of power to repeating units which reach these discontinuities ahead of others, until the last repeating unit catches up with those in advance of it. These discontinuities, most simply small electrically conducting areas, may be called "synchronizing marks" and are applied to the script sheets at identical lines of the dialogue, regardless of geometrical differences which may occur in the spacing of the dialogue along the length of the separate script sheets.

The master control unit 8 of Fig. 2, whose components will be further described in connection with Fig. 10, includes on its front panel an on-off switch 10 controlling the application of power to the entire system, an "automatic-manual" switch 12, a speed control 14 regulating the rate of progress of the script through the script repeat-

ing units, a "remote-local" switch 16 for shifting control to a remote control unit 30, and indicator lights 21, 22, 23, 24, etc., one for each associated script repeating unit. The master control unit also includes a plurality of switches 423, one for each script repeating unit. These switches are operable individually to remove their respective repeating units from operation. Any number of script repeating units can be employed with the master control unit to form the prompting system, four having been found a convenient and sufficient number in practice.

The remote control unit 30, shown connected to the master control unit by a multiconductor cable 32, may be provided with controls duplicating certain controls of the master control unit as follows: on-off switch 33, speed control 14' and a reversing switch 34 for reversing the direction of travel of the scripts through the repeating units. It may also include a switch 35 for operation of cuing lights in the script repeating units. As will be explained in connection with Fig. 10 the script repeating units and the master control unit are so wired and cabled together that the remote control unit may be connected to the master control unit either directly or through any one of the script repeating units. The program director controls the progress of the script by observing one of the script repeating units. Thus in practice the master control unit is located in a position from which observation of one of the script repeating units may be made, or else the system is controlled from the remote control unit 30 connected to one of the script repeating units.

The construction of one of the script repeating units will now be described. Such a unit is generally indicated at 101 in Fig. 1. It includes a casing 102 with a removable front cover 103. Removal of the cover 103 displays at an opening 104 the script sheet 109 on which the dialogue is carried.

One or more lights 111 may be disposed about the opening 104 for illumination of the script. In addition a light 113 may be provided to be controlled from the remote control unit to serve a cuing function.

The operative elements of the unit 101 are supported on a frame 105 seen in Figs. 3 and 7. The frame includes end plates 118 and 119 which support two script rolls 107 serving as supply and take up rolls for the script sheet. The sheet passes from one to the other of the rolls 107 over two idler rolls 108 mounted in the frame at the front of the unit as illustrated in Figs. 1 and 3. The rollers 108 present the script in a flat condition across the opening 104, where it is backed by a backing board 109 against which any desired corrections can be readily made. The backing board is equipped with a transverse slit 110 which facilitates the cutting out or splicing in of portions of the script.

The idler rollers 108 are permanently journaled in the frame whereas the script rolls are removably insertable. As illustrated in Figs. 7 and 8 the script rolls are borne at one end on pin type bearings which support the rolls for rotation with respect to the frame. Each roll contains a bushing 112 (Fig. 8) which fits over a pin 114 slidably arranged in a collar 116 fixed in the frame. The pin 114 may be removably braced against the collar 116 by means of bars 120 which may be tightened down by wing nuts 122.

As illustrated in Fig. 9 the other end of each roll is provided with a bushing 124 containing a cross pin 125 which engages with a fork 126 formed on the end of a stub driving shaft 128. The shaft 128 is journaled in a bearing 130 fixed in the end plate 119. Each of the stub shafts has pinned thereto a spur gear 132.

The script sheet 109 is initially wound on a script roll 107 which is inserted in the lower position in the frame between one of the pin bearings 114 and stub shafts 128. The sheet is then led from the top of this roll 107 over the idler rollers 108 to an empty script roll 107 mounted in the upper position of the frame. The end of the sheet may be attached to the upper roll 107 by any suitable

means. In the course of a performance the sheet is driven from the lower script roll 107, which may be termed the supply roll, to the upper roll which serves as a take up roll. Power to rotate the upper roll for advance of the sheet or to the lower roll to reverse its direction of travel is supplied from a driving mechanism presently to be described.

Each script repeating unit contains a driving motor 134, seen in Fig. 7. The motor 134 is supported on a transverse plate 136 extending between the end plates 118 and 119 of the frame. The motor 134 may be of any suitable type although in a preferred embodiment of our invention described in detail in connection with Figs. 10 and 11 it is a motor of the self-synchronous type rotating revolution for revolution with a self-synchronous generator in the master control unit of Fig. 2.

The motor 134 drives a shaft 138 which turns in a bearing 139 at the end of a strut 140 affixed to the supporting plate 136. The shaft 138 connects at the bearing 139 with a flexible driving shaft 142 which in turn connects with a stub shaft 144 journaled in a pivoted lever 146 (Fig. 4) forming part of the reversing gear which permits transverse of the script sheet in either direction. The stub shaft carries a driving pinion 148 through which the rotation of the motor 134 is communicated to one or the other of the spur gears 132 via idler gears 150.

The idler gears 150 are journaled on stub shafts 152 (Fig. 3) affixed to the end plate 119 in position to effect mesh between the idler gears 150 and the spur gears 132. To prevent overrunning of the script roll from which the script sheet is drawn, a friction brake is applied to each of the driving trains (each comprising one of the gears 132 and one of the gears 150) which intervene between the rolls 107 and the driving pinion 148. In the embodiment shown the brakes take the form of pads 154 on the ends of spring arms 156 which are affixed to the end plate 119 in position to bring the pads to bear upon the idler gears 150.

In order to permit review or rereading of portions of the script, for example during such rehearsing as may be necessary, it is important to be able to reverse its direction of travel in all of the script repeating units. This is accomplished by providing means whereby the driving pinion 148 is engaged alternately with one or the other of the idler gears 150. To this end the driving pinion is mounted on a stub shaft 144 journaled in a reversing lever 146 which is pivoted on a shaft 158 in the end plate 119 (Fig. 4). With the reversing gear lever 146 in the position shown in Fig. 3 and in full lines in Fig. 5 the driving pinion makes contact with the upper idler gear to advance the script sheet from the lower to the upper of the script rolls 107, corresponding to "forward" motion of the script sheet. Fig. 5 also shows in dotted lines the position of the reversing gear lever which engages the driving pinion with the lower script roll to draw the script sheet in the "reverse" direction from the upper to the lower of the script rolls. In the embodiment shown, the reversing gear lever is shifted from one to the other of its positions by means of a reversing motor 160 affixed to the inside face of the end plate 119 as shown in Figs. 4 and 7. The reversing motor 160 drives a shaft 162 which carries a reversing gear cam 164 and a switching cam 166. The reversing cam engages a cut-out slot 168 (Fig. 5) formed in the reversing gear lever 146 so that a half revolution of the shaft 162 shifts the reversing gear lever 146 from the "forward" position of the full lines in Fig. 5 to the "reverse" position of the dotted lines. The reversing motor is under the control of a reversing switch in the remote control unit of the system. As will be described in connection with Figs. 10 and 11, the reversing switch in the remote control unit cooperates electrically with a reversing circuit switch 170 of the microswitch type which is mounted on a bracket 172 in position to be engaged by the switching cam 166. The profiles and phasing of the cams 164 and 166 are

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shown in Fig. 6 from which it appears that the switch 170 is operated from one to the other of its positions just as the reversing cam 164 brings the reversing gear lever to the limit of its travel. Shaft 162 turns clockwise as seen in Figs. 5 and 6. As will be explained in connection with Fig. 10 this operation of the switch 170 breaks the circuit to the reversing motor so that the reversing gear lever remains in this limiting position until the reversing switch in the master control unit is again thrown to the opposite position, whereupon a circuit is made to the reversing motor through the newly adopted contacts of the switch 170. When the reversing motor 160 again rotates in response to such actuation of the reversing switch in the remote control unit, the profile of the switching cam keeps the reversing circuit switch 170 in the same position until the reversing gear lever has reached the opposite end of its travel, whereupon the switch 170 assumes its opposite position, breaking the then established circuit for the reversing motor.

The script repeating unit of Fig. 1 as thus far described includes supply and take up rolls for a script sheet and means for driving the sheet from one to the other of these rolls in either direction by means of a remotely controlled reversing gear. As will be subsequently described the invention provides centralized control of the driving motors 134 in each of the script repeating units of a cuing system so that to a first approximation the script sheets of all repeating units move through the same intervals and display at all times the same portions of the dialogue. Moreover in a preferred embodiment the driving motors 134 are of the self-synchronous type which keep step with each other revolution for revolution. Even this however is not sufficient to insure that all units will in fact display the same lines of dialogue. For example the lines of dialogue may not be equally spaced apart on all of the script sheets. A small difference in the spacing of successive lines of dialogue can quickly accumulate into a difference such that even though the same length of script sheet has been passed through all repeating units, different units may be displaying different lines of the dialogue. In view of this possibility and in view of the unequal tightness with which the script sheets may be wound on the take up rolls in the separate repeating units, and in order moreover to make possible the use of driving motors of other than the self-synchronous type, the invention provides means to remove the power from repeating units of the system which get in advance of others until the later ones have caught up. For this purpose there is provided in each script repeating unit a switch which is actuated by the arrival at the edge of the opening 104 of discontinuities applied to the script sheet at a chosen point in the dialogue. In the embodiment shown in Fig. 1 the switch consists of two brushes 180 affixed to frame 106 in position to bear against the paper as it passes over one of the idler rollers 108. To cooperate with the brushes 180 there are applied to the script sheet at suitable intervals strips of conducting material 182 in position to complete an electrically conducting path between the brushes 180 each time such a conducting strip 182 passes under the brushes. This results in the completion of a circuit which operates a control element in the master control unit to disable the drive motor 134, unless each of the other repeating units of the system has, within a period of time short compared to the interval between the passage of two successive strips 182 through a repeating unit, already stopped and actuated its associated control element in the master control unit, in which case the stopping of the last unit may be instantaneous only, and followed by restarting of all units.

In practice two brushes 180 cooperating with a conducting strip 182 wide enough to contact both have proven most satisfactory. Other devices of course may be employed to complete an electric circuit each time a chosen point in the dialogue on a script sheet passes the

opening 104 in its repeating unit. For example a single brush may be employed cooperating with periodic holes in the paper permitting contact between such a single brush and the idler roller 108 which is electrically continuous with the frame. In place of the hole there may be applied to the paper a conducting element continuous on both sides of the paper, the conducting element taking the form of a conducting sheet of paper or of a liquid or paste applied to the paper. Similarly tabs may be applied to the edge of the paper to actuate a switch having a movable contact.

The operation of a prompting system according to the invention will now be described by reference to Figs. 10a, 10b and 11. In Figs. 10a and 10b the electrical components of a master control unit are shown within a dashed line box 8, and four identical script repeating units are shown at the dashed line boxes 101. The remote control unit 30 of Fig. 2 is shown schematically in Fig. 11. Since the script repeating units are identical, Figs. 10a and 10b show the components of one such unit only.

The master control unit connects to each of the script repeating units 101 by a multiconductor cable 105. The cables are detachably fitted into plugs 185 on the master control unit and 186 on the script repeating units. A cable 32, fitted to the remote control unit at a plug 189, is adapted to connect either with the master control unit at a plug 188 or with any one of the script repeating units at a plug 187. On these plugs terminals which are electrically connected by the cables 105 and 32 are identified by the same lettered symbols.

Power is supplied to the entire system from a single phase A. C. line not shown through a main power switch 401 in the master control unit. Switch 401 feeds wires 402 and 403. A transformer 404 having one side of its secondary grounded in the master control unit frame steps the line voltage down to a level suitable for the production of D. C. power for the operation of certain relays hereinafter to be described. The rectifier 405 in series with the secondary of the transformer applies a positive voltage to the wire 406 for this purpose.

In the embodiment shown the motors 134 of the script repeating units are of the self-synchronous type, driven by a self-synchronous generator 407 in the master control unit. Rotation is imparted to the generator 407 by any convenient source of power such as a D. C. motor 412, whose armature is linked through a suitable speed changing device 413 with the rotor 408 of the generator 407. The winding of rotor 408 is connected across the wires 402 and 403 of the A. C. line.

The generator 407 has three stator windings 409, 410 and 411. The free terminal of winding 409 is connected to a wire 414 grounded in the master control unit frame, and the wire 414 connects via the cables 105 to the free terminal of a corresponding winding 137 in the stator of the motor 134 in each of the script repeating units. The free end of the winding 137 is similarly grounded to the frame of each of the script repeating units. The free ends of the other stator windings in generator 407 are connected to a pair of wires 415 and 416 which lead respectively to normally closed contacts 417 and 418 of each of a plurality of control relays 419, one relay 419 being provided for each script repeating unit.

In its normal, i. e. de-energized, position, each of the relays 419 connects wires 415 and 416 with a pair of wires 420 and 421, one such pair 420 and 421 being provided for each script repeating unit. Each pair 420 and 421 connects through a cable 105 to the stator windings 141 and 143 in the driving motor 134 of the script repeating unit associated with the relay 419 to which the pair 420 and 421 connects. In addition the cables 105 connect the ends of the rotor winding 135 in each of the motors 134 with wires 402 and 403 of the A. C. power line. Accordingly with the relays 419 de-

energized the motors 134 follow the generator 407 rotation for rotation, advancing the script rolls in the script repeating units together.

As previously stated in connection with the description of Figs. 1-9, the invention provides means to correct for inequality in the winding of the script sheets on the rolls 107 and for inequality in the spacing of lines of dialogue along the script sheets in the various script repeating units. The operation of the "synchronizing marks" 182 and brushes will now be described. One of the brushes 180 in each script repeating unit is grounded to the script repeating unit frame and is hence at the same potential as the frame of the master control unit via the wire connecting stator winding 137 in motor 134 with stator winding 409 in the self-synchronous generator 407.

When in one of the script repeating units a "synchronizing mark" in the form of a conducting discontinuity or strip 182 on the script sheet passes under the brushes 180 the second of these brushes will be brought to ground potential also. This second brush is connected via a wire 183 and cable 105 to a wire 422 in the master control unit, one wire 422 being provided for each script repeating unit. Each wire 422 terminates at a contact of a double pole double throw switch 423 arranged for manual operation. One such switch 423 is provided for each script repeating unit. With the switch 423 in the normal or "on" position shown in the drawings the grounding of a wire 422 by operation of a conducting area 182 in the associated script repeating units brings about the stopping of the motor 134 of that unit as will now be described.

The blade 424 of switch 423 connecting with wire 422 in the on position of the switch leads to one end of the coil 428 of a relay 427. The other end of coil 428 is connected via the blade 425 of switch 423 to a wire 430. Wire 430 connects via blade 432 of a manually operated "automatic-manual" switch 12 yet to be described with a wire 433. Wire 433 connects via normally closed contact 434 of a "reset" relay 446 with wire 406, held at a positive "B+" D. C. voltage by rectifier 405.

Accordingly the grounding of wire 183 in a script repeating unit by the arrival of the conducting strip or area 182 under the brushes 180 of that unit energizes the relay 427 in the master control unit which is associated with that script repeating unit. Energization of the relay 427 grounds switch blade 424 at a contact 436 and grounds a wire 438 at contact 435. It also breaks contact between wires 439 and 440 whose function is yet to be described. The grounding of contact 436 provides a holding circuit for relay 427.

Grounding of wire 438 results in energizing the control relay 419 connected thereto when next wire 441 is brought to a positive voltage by a cam operated switch 443 (Fig. 10b). The blade of switch 443 is connected to wire 406. A cam 444, coupled to the shaft of generator 407 which carries its rotor winding 408 to rotate revolution for revolution with such shaft cooperates with the blade of switch 443 to disconnect it from the wire 445 and to connect it with the wire 442 for a short time interval once for each revolution of generator 407. Wire 442 connects with wire 441 via a normally closed contact 447 on reset relay 446. As will subsequently appear relay 446 is not energized until the motors 134 of all script repeating units have been stopped.

As a result of the energization of a relay 427 as previously described the (subsequent) instantaneous shifting of switch 443 energizes the relay 419 associated with that relay 427. Contact blade 449 of relay 419 is of the "make before break" type so that it makes with the normally open contact 450 before relinquishing contact 451 on wire 441. Contact 450 connecting via wire 450a and switch 423 with wire 430 provides a holding circuit for the relay 419. Energization of the relay 419 opens the normally closed contacts 417 and 418, breaking the

connection between stator windings 410 and 411 of generator 407 and the corresponding windings 141 and 143 in the script repeating unit under consideration. The motor 134 therefore stops, substantially instantaneously in view of the braking applied to the gear train which connects it with the script roll being driven. Rotor 135 therefore remains in the orientation held by the rotor 408 at the energization of the relay 419. Energization of relay 419 also grounds a wire 453 at contact 452 by means of the grounded point 457', for a purpose presently to be described.

The result of the operations just described is that the script repeating unit 101 first reaching a conducting strip or discontinuity 182 corresponding to a given point in the dialogue on the script sheet of that unit is brought to a stop within the next revolution of the generator 407. This corresponds to a fraction of the interval between two successive lines of dialogue on the script sheet. The stopping of the unit 101 is signaled by the lighting of a lamp 460 across the coil of relay 419.

The next script repeating unit to reach a conducting strip 182 is similarly stopped, and the energization of its associated relay 419 closes the normally open contact 452 of that relay. This establishes a further link in the chain which begins with ground at 457' in the master control unit and which goes through wires 453, 454 and 455 to 456, wire 456 connecting with the coil of reset relay 446. Moreover the rotors of all motors 134 are brought to a stop in the same position of alignment in view of the fact that switch 443 energizes wire 441 always at the same angular position of the rotor 408 in generator 407.

At each revolution of the generator 407, a reset cam 457 coupled to turn revolution for revolution with the impulse cam 444 closes a switch 458 for an interval of the order of half a revolution. The cam 457 is phased to close the switch 458 some 60° or 90° before cam 444 actuates switch 443 to connect wire 406 with wire 442. Cam 457 is further shaped to maintain switch 458 closed for a substantial fraction of a turn after actuation of switch 443.

Accordingly, when all but one of the relays 419 have been energized, the next succeeding closing of switch 458 by the reset cam prepares the circuit for operation of the reset relay and the reenergization of all of the motors 134, whereupon the script repeating units will start off together again. This occurs as follows: When the last script repeating unit to bring a conducting strip 182 under its brushes 180 energizes its associated relay 427 in the master control unit, the next succeeding operation of switch 443 causes energization of the associated relay 419 to open the circuits to the stator windings 141 and 143 of this last script repeating unit. At the same time however by virtue of the closed condition of switch 458, upon such actuation of switch 443 and the energization of the last relay 419, a circuit is completed between wire 406 and wire 459, coil of relay 446, wires 456, 455, 454, 453 and ground at 457'. Relay 446 is accordingly energized. This breaks the supply of B+ voltage to wire 430 at contact 434, deenergizing all relays 427 and 419. It also opens the normally closed contact 447 preventing the further energization of wire 441 even during the short instant of time in which cam 444 connects wire 406 to wire 442. At the same time a holding circuit for the relay 446 is established at its contact 448. The power is therefore withheld from all of the relays 427 and 419 until the cam 457 again permits switch 458 to open, to insure that all script repeating units clear the conducting strip 182 from under their brushes 180 and to insure that all relays 427 and 419 return to their deenergized positions.

Reference has been made to a plurality of switches 423, one for each script repeating unit, and to a single switch 12, called the "automatic-manual" switch of the system. The switches 423 permit individual disconnection of their respective script repeating units from the system and the switch 12 controls whether after stopping the script re-

peating units will be reenergized through the reset relay 446 or manually.

Each switch 423 when in the "on" position as shown in the drawings connects its relay 427 to ground through the brushes of its script repeating unit and to B⁺ through the wire 430 and the reset relay. Accordingly the relay 427 is energized only by operation of the "synchronizing marks" in its script repeating unit, and the motor 134 of that unit is permitted otherwise to rotate. In the "off" position, each switch 423 energizes its relay 427 continuously by grounding one side of the coil thereof and connecting the other side directly to B⁺ at a contact 426, by-passing the reset relay. With a relay 427 so energized by actuation of the switch 423 to the off position the associated control relay 419 will promptly be energized and will remove power from the motor 134 in the associated script repeating unit. These relays 427 and 419 will remain energized regardless of subsequent operation of the reset relay. The remaining script repeating units however may continue to function as before inasmuch as the contact 452 of the permanently energized relay 419 is closed. The switches 423 thus provide means for removing disabled or unwanted script repeating units from operation.

In "automatic" position shown in the drawings switch 12 allows the driving motors 134 of the script repeating units to be reconnected through action of the reset relay. In "manual" position this switch 12 requires manual operation of the switches 423 in order to start and stop the script repeating units. When in "automatic" position switch 12 connects wire 430 to wire 406 via the reset relay and permits energization of the reset relay by switch 458. In "manual" position switch 12 disables the reset relay and connects wire 430 to wire 406 via wire 445 and switch 443, insuring that even with manual control of the script repeating units by their switches 423, the drive motors 134 can be reenergized only when their rotors are aligned with that of the generator 407.

The remote control unit 30 of Fig. 11 includes an on-off switch 33, a reversing switch 34, a speed control 14' and a cue light switch 35. The on-off switch 33 is connected via cable 32 in the armature circuit of the motor 412 which drives the generator 407, and the speed control 14' is in series with switch 33. If it is desired to operate the system from the master control unit itself, a variable resistance 14 functioning as a speed control can be inserted into the field circuit of motor 412 by means of the "remote-local" switch 16 to perform the function of the speed control 14' of the remote control unit. The switch 35 in the remote control is wired to control a series of cuing lights 113, one provided in each script repeating unit.

The direction of motion of the script sheets through the script repeating units is changed at a reversing switch 34. Each script repeating unit contains a reversing motor 160, which may be of the synchronous type. Each motor 160 is connected via a wire 161 in the script repeating unit and via a cable 105 to a wire 440 in the master control unit and thence through a normally closed contact 437 on the relay 427 associated with its script repeating unit to a wire 439 and thence to one side of the A. C. line at 402. The other terminal of the motor 160 connects with the blade of a single pole double throw microswitch 170. The contacts 171 and 172 of this switch connect to wires 173 and 174 and thence via the cable 105 to wires 462 and 463 in the master control unit. Wires 462 and 463, are common to all script repeating units and are led to terminals c and d in the plug 188. Similarly in each script repeating unit the wires 173 and 174 connect with terminals c and d in plug 187. Thus cable 32, whether connected to the master control unit at plug 188 or to one of the script repeating units at a plug 187, brings the contacts 171 and 172 of all the switches 170 to the two contacts of switch 34 in the remote control unit. The pole of switch 34, with the pole

of the on-off switch 33, is then led back through cable 32 to wire 403 on the other side of the A. C. power line in the master control unit.

For either position of switch 34 the reversing motors 160 will be energized until their cams 166 (Figs. 4 and 5) shift the switches 170 to the position cutting the circuit established by the given position of the switch 34. Switch 34 thus provides means for reversing the direction of travel of the script sheets in all script repeating units simultaneously.

The embodiment described has included for the script repeating units a particular type of motor which is well adapted to the production of uniform motion of the script sheets throughout all script repeating units. Substantially equivalent results may however be achieved with drive motors of other types not requiring a generator in the master control unit. Variable or constant speed motors may be substituted for the self-synchronous motors which have been described, and the generator 407 together with its source of driving power 412 may be eliminated. In such an alternative embodiment the driving motors in the script repeating units are energized and deenergized from a centralized control in the master control unit, subject as in the embodiment shown in the drawings to relays of the type of relays 419.

I claim:

1. A cuing system comprising a control unit and a plurality of script repeating units electrically interconnected therewith; each of said script repeating units including a frame, supply and take up rolls arranged in the frame, a script sheet wound on said rolls, a plurality of discontinuities disposed lengthwise of the script sheet, driving trains arranged in the frame and coupled to said rolls, a driving motor, means to couple the driving motor selectively with said driving trains, and a switch arranged on the frame in position to be closed by the passage of each of the discontinuities on the script sheet; said control unit including a plurality of control relays, one for each of said plurality of script repeating units, a reset relay, a plurality of means associated one with each of said control relays and adapted upon the operation respectively of said switches to energize said control relays individually, a normally closed contact on each of the control relays connected in the power circuit of the driving motor of the script repeating unit associated therewith, the coils of all said control relays being connected in parallel through a normally closed contact of the reset relay, the coil of the reset relay being wired in series with a normally open contact of each of said control relays, and means to maintain the reset relay energized for a time sufficient to permit the script sheets in all of the script repeating units to advance their discontinuities past said switches.

2. A cuing system comprising a control unit and a plurality of script repeating units electrically interconnected therewith; each of said script repeating units including supply and take up rolls, a script sheet wound on said rolls, a plurality of discontinuities disposed lengthwise of the script sheet, driving trains coupled to said rolls, a driving motor, means to couple the driving motor selectively with said driving trains, and a switch positioned to be closed by the passage of each of the discontinuities on the script sheet; said control unit including a plurality of control relays, one for each of said plurality of script repeating unit, a reset relay, a normally closed contact on each of the control relays connected in the power circuit of the driving motor of the script repeating unit associated therewith, separate means associated with each of said control relays adapted to energize its associated control relay upon the closing of the switch in the script repeating unit associated with such control relay, the coils of all said control relays being connected in parallel through a normally closed contact of the reset relay, the coil of the reset relay being wired in series with a normally open contact of each of said control re-

lays, and means to maintain the reset relay energized for a time sufficient to permit the script sheets in all of the script repeating units to advance their discontinuities past said switches.

3. A cuing system comprising a control unit and a plurality of script repeating units electrically interconnected therewith; each of such script repeating units including a frame, supply and take up rolls for a script sheet, a script sheet wound on said rolls, driving trains arranged in the frame and coupled to said rolls, a driving motor, means to couple the driving motor selectively with said driving trains, an electrical contact brush arranged on the frame in position to bear on the script sheet during its passage between the supply and take up rolls, and means including electrically conducting material arranged on the script sheet at a plurality of locations lengthwise thereof in position to ground the brush to the frame upon passage of such conductive material beneath the brush; said control unit including a plurality of control relays, one for each of said plurality of script repeating units, separate means associated with each of said relays each responsive to the grounding of the brush in its associated script repeating unit and adapted thereupon to energize its associated control relay, a normally closed contact on each of said control relays connected in the circuit of the driving motor of the script repeating unit associated therewith, a reset relay, a normally open contact on each of said control relays connected in series with the coil of the reset relay, a normally closed contact on the reset relay connected in the common supply circuit of the control relays, whereby upon energization of all of said control relays said reset relay is energized to remove power from said control relays, and means to maintain said reset relay energized for a time sufficient to permit all of said script repeating units to advance their script sheets sufficiently to clear the conducting areas from under their brushes.

4. A cuing system comprising a control unit and a plurality of script repeating units; each of said script repeating units including a frame, supply and take up rolls for a script sheet, driving trains coupled to each of the rolls arranged in the frame, a self-synchronous driving motor, a flexible shaft coupled to the driving motor, a reversing lever pivoted in the frame, a driving pinion journaled in the reversing lever and coupled to the flexible shaft, the reversing lever being positioned to engage the pinion with either of the driving trains, a reversing motor, a reversing cam affixed to the shaft of the reversing motor in position to shift the driving pinion from engagement with one to engagement with the other of the driving trains, a switching cam affixed to the reversing motor shaft, a single pole double throw switch in series with the reversing motor arranged on the frame in position to be thrown by the switching cam upon engagement of the driving pinion with either of the driving trains, two electrical contact brushes arranged on the frame in position to bear upon the script sheet during its passage between the supply and take up rolls, one of said brushes being short circuited to the frame, the script sheet having conducting areas thereon arranged to short circuit the brushes upon passage therebeneath; said control unit including a frame, a self-synchronous generator, means to rotate the generator, a plurality of pairs of relays, one pair being associated with each of said plurality of script repeating units, a reset relay, a source of potential difference, a connection from one end of the coil of a first relay of each pair to the nongrounded brush of its associated script repeating unit, a common connection from the other end of the coils of all said first relays to the source of potential difference through a normally closed contact of the reset relay, a normally open contact on each of said first relays adapted when closed to ground one end of the coil of the second relay of its pair, a normally open impulse cam operated switch coupled at

unity drive ratio to the generator and wired to energize when closed a normally closed contact of each of said second relays to which the other end of the coil of said second relay is connected, two normally closed contacts on each of said second relays connected in the stator circuits of the driving motor of its associated script repeating unit, the reset relay being connected to said source of potential difference through a normally open contact of each of said second relays in series, and a reset cam coupled at unity drive ratio with the generator and adapted when closed to apply power to one terminal of the reset relay coil, whereby the driving motors in all of the script repeating units will stop with their rotors in the same position, and whereby upon the stopping of the script repeating unit last to bring a conducting area under its brushes the reset relay will be energized.

5. A script repeating unit comprising supply and take up rolls, means to support said rolls for independent rotations, a script sheet wound on said rolls, a plurality of electrically conducting areas disposed lengthwise of the script sheet, an electrical contact brush arranged on said support means in position to engage said areas successively as the script sheet passes from one to the other of said rolls, a driving motor, and means to couple the driving motor selectively with said rolls.

6. A script repeating unit comprising a frame, a pair of driving shafts journaled in the frame, bearings coaxial with the driving shafts adapted to support therewith supply and take up rolls for a script sheet, a script sheet wound on the supply and take up rolls, a plurality of electrically conducting areas disposed lengthwise of the script sheet, an electrical contact brush insulatedly supported on the frame in position to bear on the script sheet, a driving train coupled to each of said shafts, a brake engaging each driving train, two idler rolls arranged in the frame, a slotted backing board arranged between the idler rolls, a reversing lever pivoted in the frame between the driving trains, a driving pinion journaled on the lever in position alternately to engage the driving trains, a self-synchronous driving motor arranged in the frame, a flexible coupling between the driving motor and the driving pinion, a reversing motor arranged in the frame, a reversing cam arranged on the reversing motor shaft in position to engage the reversing lever, a switching cam arranged on the reversing motor shaft, and a single pole double throw switch arranged in position to be actuated by the switching cam, the pole of said switch being connected in series with the reversing motor.

7. A cuing system comprising a control unit and a plurality of script repeating units electrically interconnected therewith; each of said script repeating units including supply and take up rolls, a script sheet wound on said rolls, a plurality of discontinuities disposed lengthwise of the script sheet, driving trains coupled to said rolls, a driving motor, means to couple the driving motor selectively with said driving trains, and a switch positioned to be closed by the passage of each of the discontinuities on the script sheet; said control unit including a plurality of control relays, one for each of said plurality of script repeating units, a reset relay, each of said control relays having its coil wired in series with the switch of its associated script repeating unit and having a normally closed contact connected in the power circuit of the driving motor thereof; the coils of all said control relays being connected in parallel through a normally closed contact of the reset relay, the coil of the reset relay being wired in series with a normally open contact of each of said control relays, and means to maintain the reset relay energized for a time sufficient to permit the script sheets in all of the script repeating units to advance their discontinuities past said switches.

8. A cuing system comprising a control unit and a plurality of script repeating units electrically connected

thereto; each of said script repeating units including a script sheet, a plurality of discontinuities disposed lengthwise of the sheet, a driving motor coupled to the sheet, and a switch positioned to be actuated by said discontinuities successively, said control unit including a plurality of relays each connected to control according to its state of energization the state of energization of the driving motor in one of said script repeating units, and an equal plurality of electromagnetic means each responsive to the actuation of the switch in one of said script repeating units controlling the state of energization of one of said relays.

9. A cuing system comprising a control unit and a plurality of script repeating units electrically connected thereto; each of said script repeating units including a script sheet, a plurality of discontinuities disposed lengthwise of the sheet, a driving motor coupled to the sheet, and a switch positioned to be actuated by said discontinuities successively, said control unit including a plurality of switches each connected in the circuit of the driving motor of one of said script repeating units and a plurality of relays each responsive to actuation of the switch in one of said repeating units to operate the switch in said control unit connected in the circuit of the driving motor of the said one repeating unit.

10. A cuing system comprising a control unit and a plurality of script repeating units electrically connected thereto; each of said script repeating units including a script sheet, a plurality of discontinuities disposed lengthwise of the sheet, a driving motor coupled to the sheet, and a switch positioned to be actuated by said discontinuities successively, said control unit including a plurality of relays each connected to control according to its state of energization the state of energization of one of said driving motors, and an equal plurality of electromagnetic devices each responsive to the actuation of one of said switches to control one of said relays to its state of energization corresponding to the non-energized state of one of said driving motors.

11. A cuing system comprising a control unit and a

plurality of script repeating units electrically connected thereto; each of said script repeating units including a script sheet, a plurality of discontinuities disposed lengthwise of the sheet, a driving motor coupled to the sheet, and a switch positioned to be actuated by said discontinuities successively, said control unit including a plurality of relays each connected to control according to its state of energization the state of energization of one of said driving motors, an equal plurality of electromagnetic devices each responsive to the actuation of one of said switches to control one of said relays to its state of energization corresponding to the non-energized state of one of said driving motors, and a reset relay responsive to the shift of all of said motor controlling relays to their state of energization corresponding to de-energization of said driving motors to restore all of said motor controlling relays to their state of energization corresponding to energization of said driving motors.

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