Nov. 28, 1939. A. N. GOLDSMITH 2,181,564

SIGNALING SYSTEM

Filed Oct. 29, 1936 5 Sheets-Sheet 1

Fig. 1

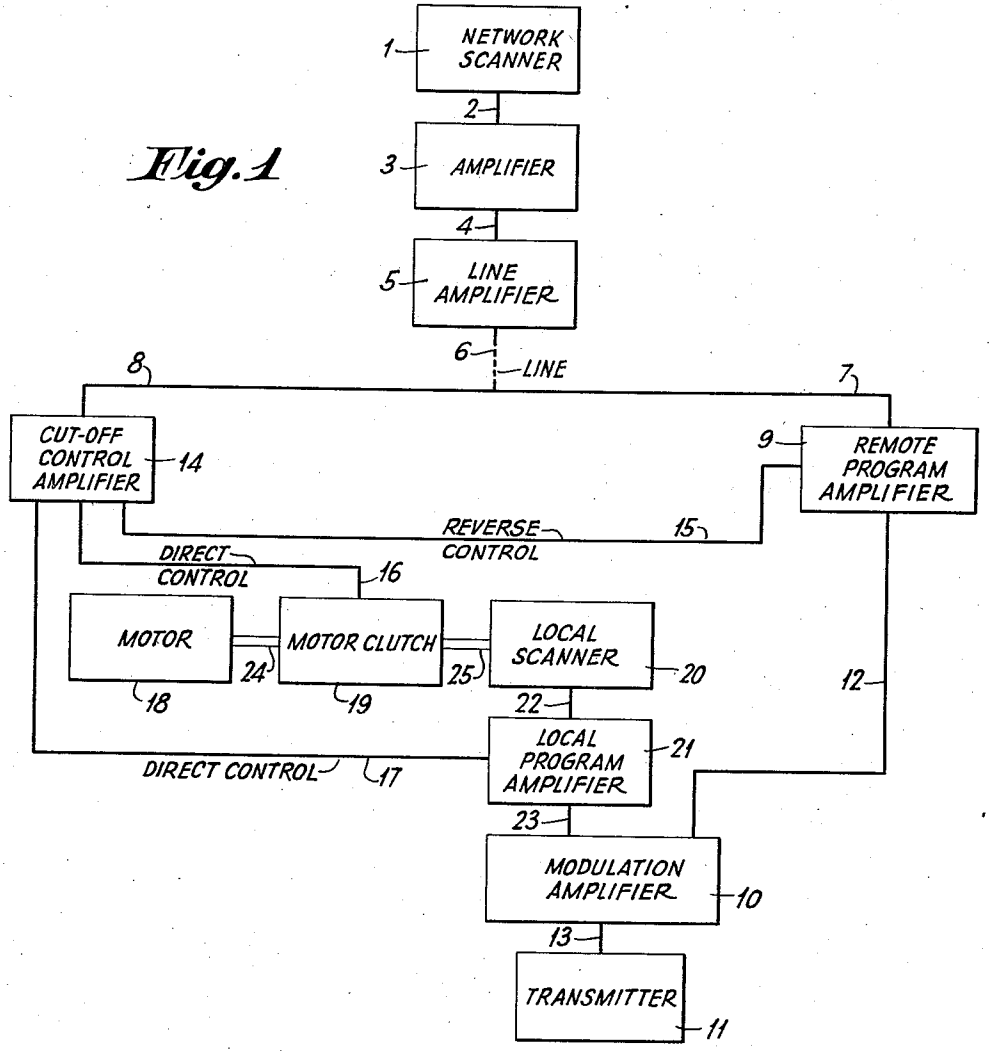
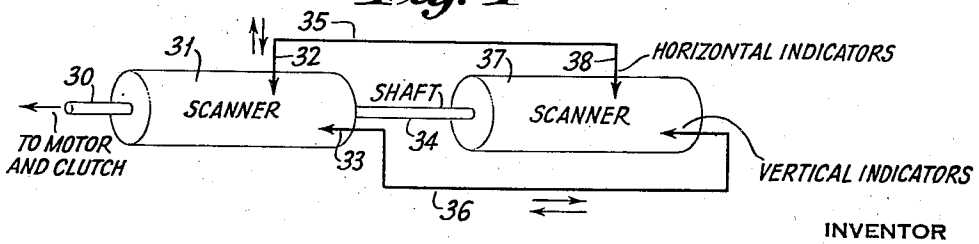


Fig. 4



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SIGNALING SYSTEM

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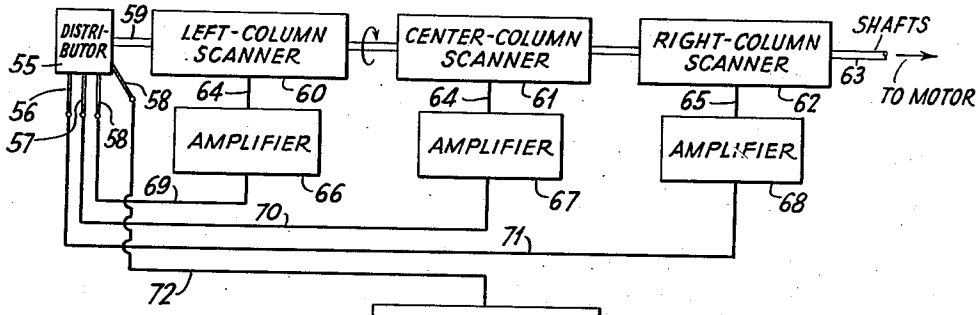


Fig. 2

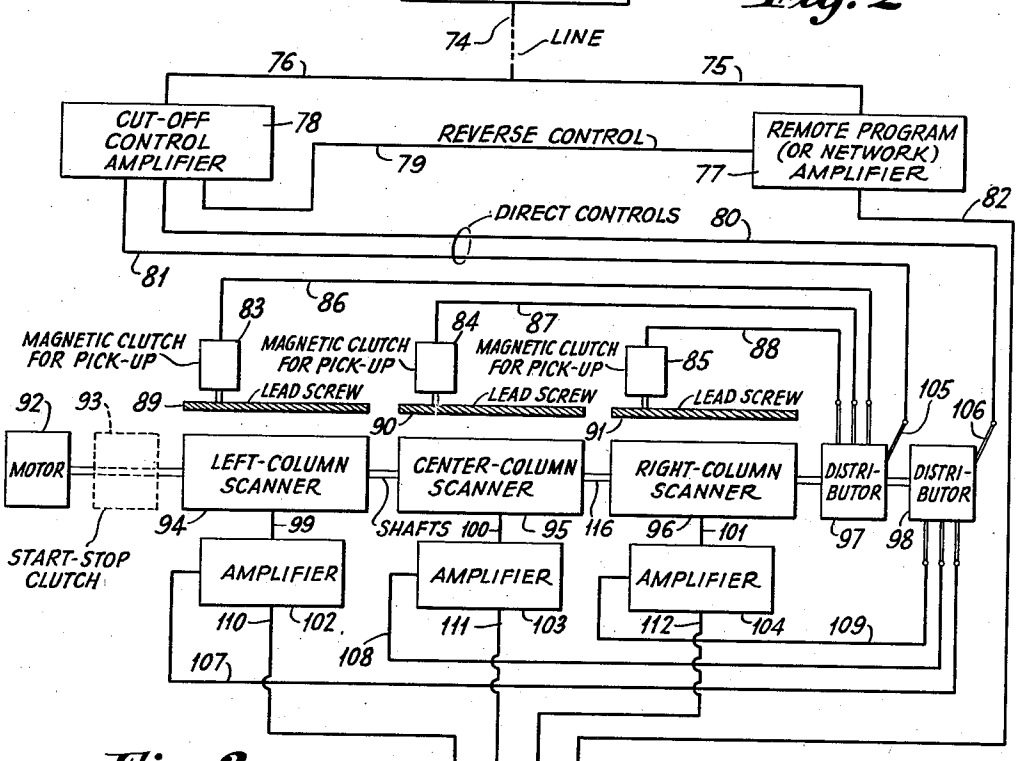
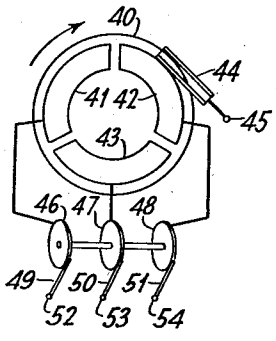


Fig. 3



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SIGNALING SYSTEM

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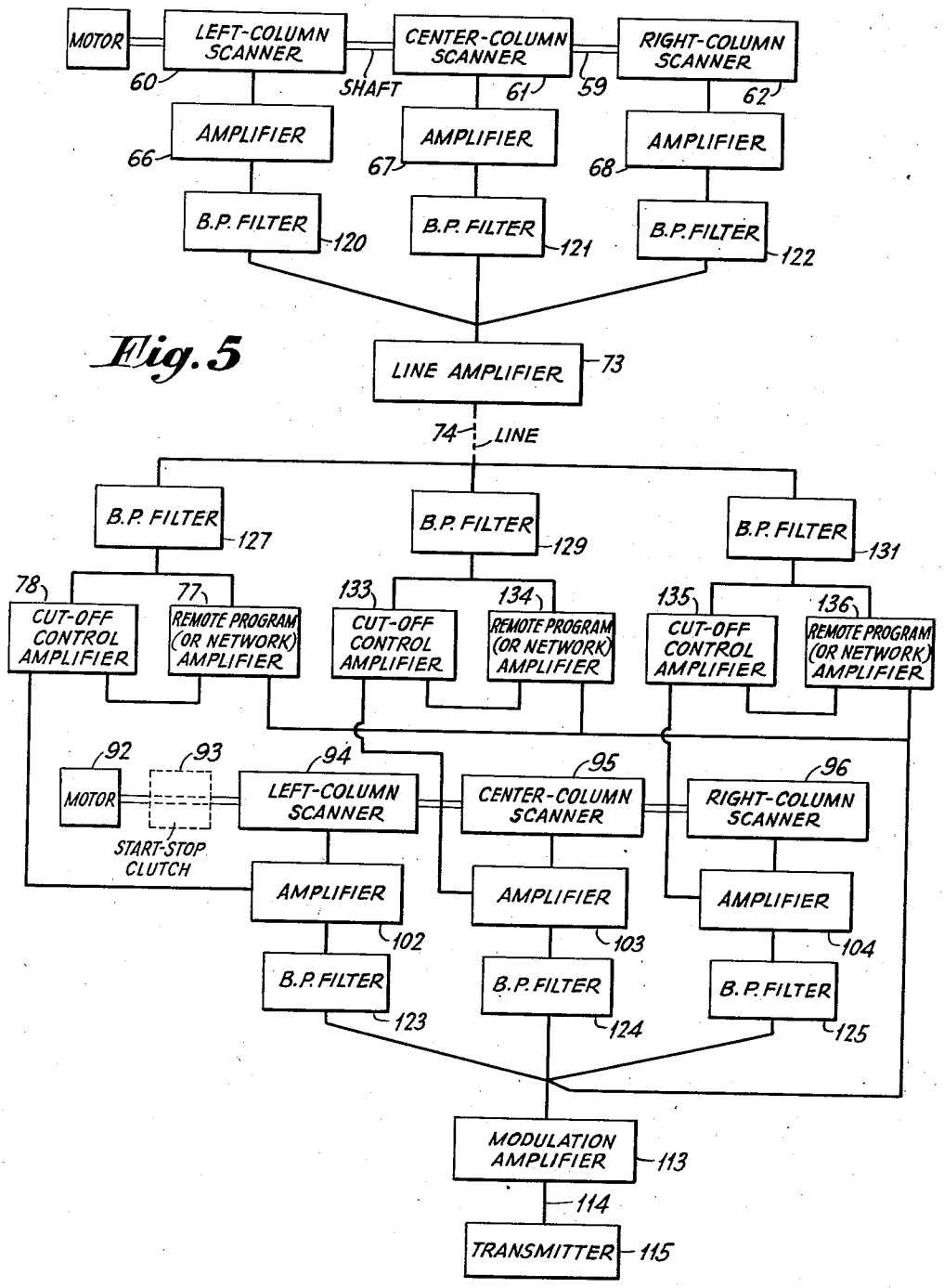


Fig. 5

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SIGNALING SYSTEM

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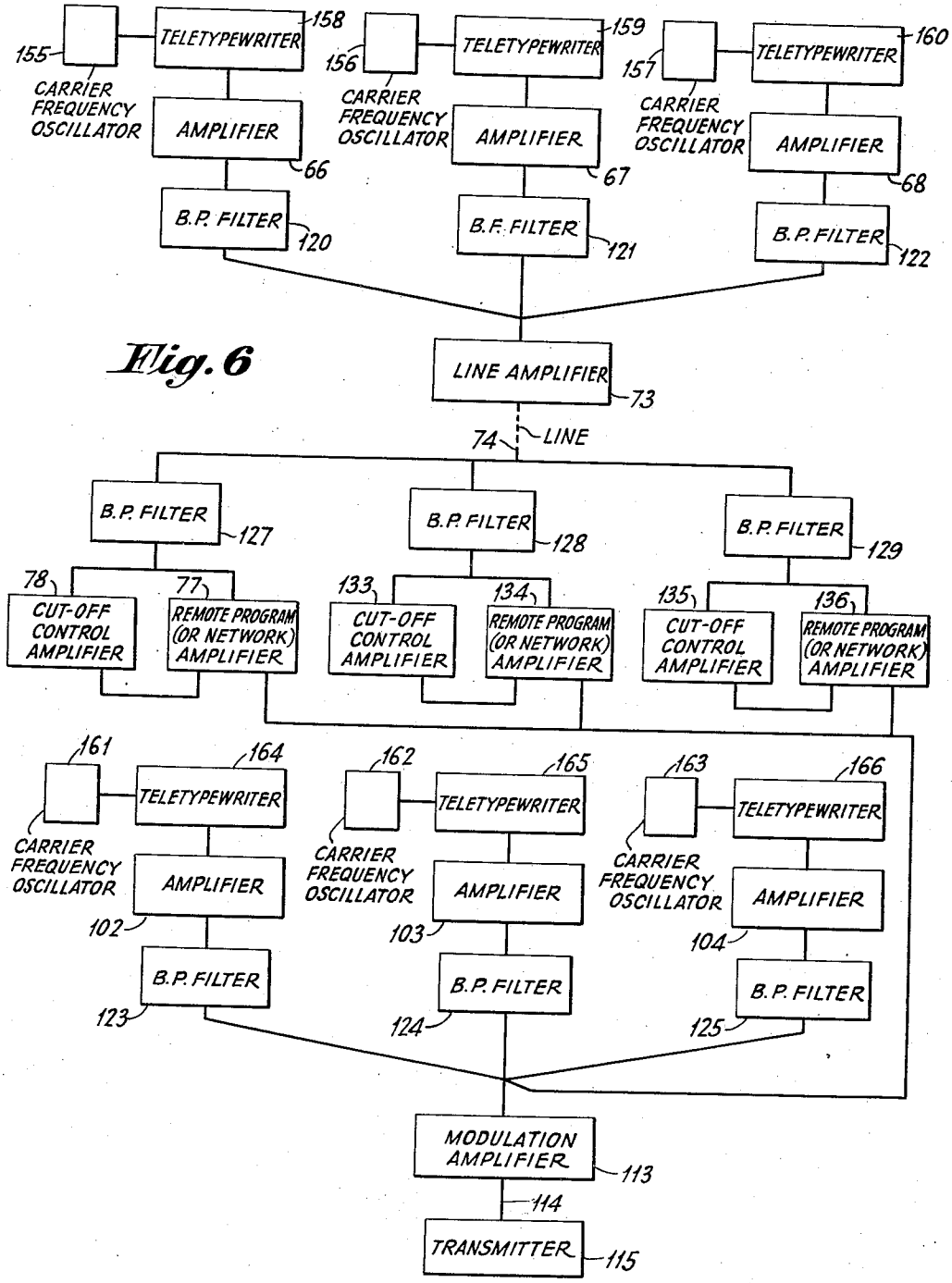


Fig. 6

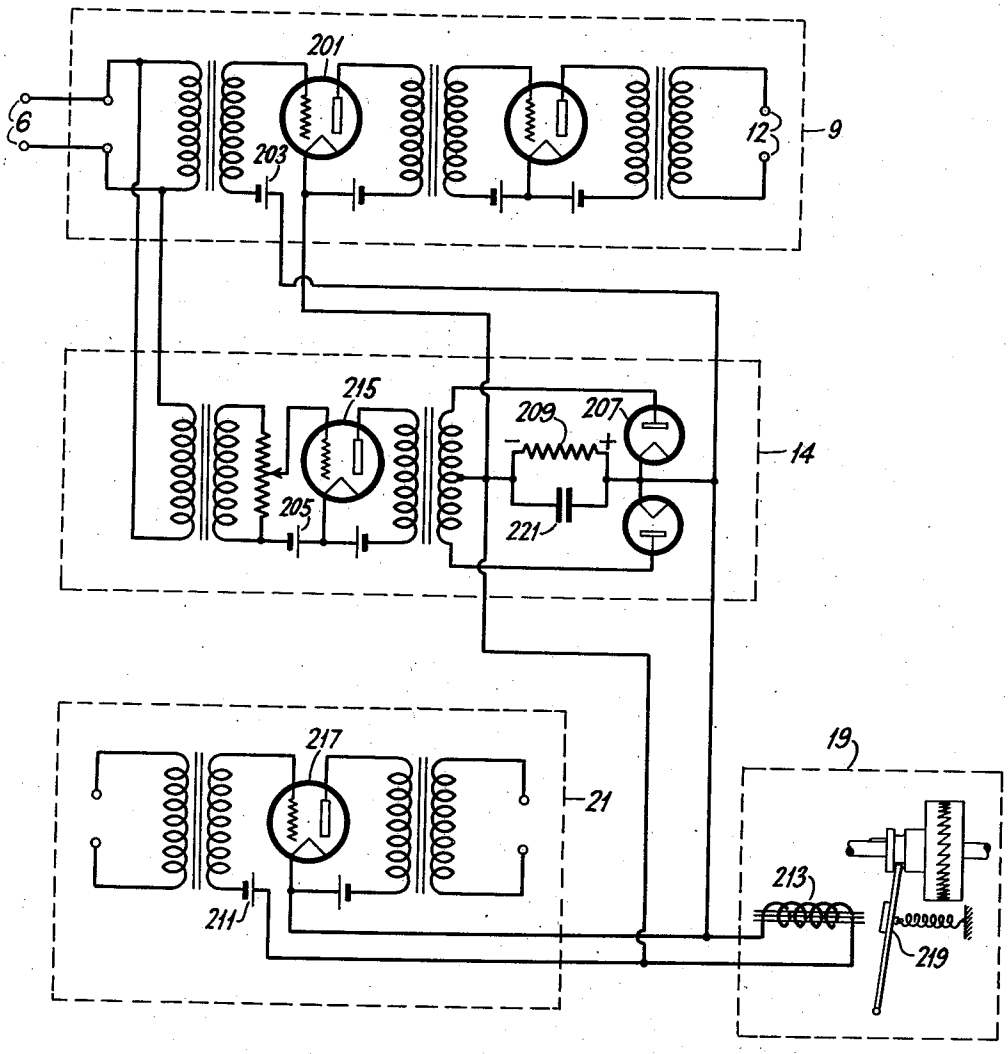
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SIGNALING SYSTEM

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Fig. 7



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Patented Nov. 28, 1939 2,181,564

UNITED STATES PATENT OFFICE

2,181,564

SIGNALING SYSTEM

Alfred N. Goldsmith, New York, N. Y.

Application October 29, 1936, Serial No. 108,132

20 Claims. (Cl. 178—5)

This invention relates to signaling systems, and in particular, relates to facsimile and teletypewriter syndication systems, and is applicable as well to telephone and television systems.

It has been proposed to organize a general news syndication system for the purpose of broadcasting both general news items and advertising, the general news items consisting of events occurring in foreign nations as well as those in this country, sports, politics, and the like, market reports of various kinds and general business information. In further pursuit of such a system, it has been proposed that there would be several central points for collecting the material to be transmitted, which material would be transmitted either by facsimile or teletypewriters to secondary distributing stations, these distributing stations being generally of lower power and serving well defined areas of population, while the central points or stations would simply serve to communicate the intelligence to be transmitted to the various outlying or secondary stations.

To devise such a system, it will be readily apparent that the efficient operation will require automatic means of not only transmitting the material, but also automatic means for setting into motion the transmitting apparatus at the remote stations. Since the material consists broadly of two classes, i. e., general news and advertising, it may be desirable that separate transmitters be provided for the general news service, and for the advertising service. While the receiver comprising one machine would have individual recorders arranged to reproduce the received material in columnar form, one or more of the columns being given over to news, while the third column would carry the advertising, for example. The desirability of this arrangement will become clearer upon further consideration of the remarks to follow.

In any syndicated news system employing facsimile or teletypewriter apparatus, it is extremely desirable to transmit advertising material as well as general news, since the revenue to be obtained from advertising will help support the organization syndicating the news, and thereby reduce the cost of the service to the consumer. For national coverage within such a large country, as, for example, the United States of America, an analysis of the material transmitted by an outlet station will disclose that there are four general classes of material. There is the nationally syndicated news or other material, nationally syndicated advertisements, news or other material which is of local origin, and advertisements originating locally. To successfully accomplish the combination of nationally syndicated news and that of local origin, it becomes necessary to organize the equipment of an outlying outlet station for the system so that there shall be a steady smooth flow of material to be transmitted without loss of time interruptions or confusion between these various classes of material.

It will be obvious that nationally syndicated material must take precedence over local material and at the same time the transmission of advertisements must not be interrupted by the insertion of news items or other material, for to do this would destroy the continuity and thought of the advertisement, and accordingly would not serve as a satisfactory medium to those people who would support the syndication by paying advertising fees.

It thus becomes clear that the broad object of this invention is the orderly and automatic physical coordination of the apparatus control at the local outlet station, and while the term "facsimile" will be used in describing the further objects to be attained and the system, it should be noted that fairly obvious modifications may be made to adapt it to the transmission of television programs or to the use of teletypewriters. Further than this, as was pointed out above, there are two series of transmissions to be effected, one being of local origin at the local output station, and the other originating from some remote control point.

Accordingly, the main object of my invention is the automatic transmission by a local station of two series of signaling energy, one originating remotely and the other originating locally, and the further syndication of the signaling energies.

Another one of the aims of this invention is the automatic transmission by a local station of two series of facsimile scanned programs, one originating remotely and the other originating locally.

Again, it is desirable that the remotely originated program should have priority over the local programs in order that such programs may be transmitted simultaneously to all of the local stations, and thus another object of my invention is the automatic transmission by a local station of either a remotely originated facsimile program or a locally originated program, the remotely originated program having priority or dominance over the locally originated program in access to the transmitter; and the consequent transmission of the locally originated program

only when no remotely originated program is received.

Since there will be a plurality of columnar incoming and remotely originated portions of the programs at the local station, it is desirable that the remotely controlled programs shall not affect all of the locally transmitting equipment, but shall only affect those columnar scanners which are assigned for the transmission of the remote programs. Thus, another object of my invention is the automatic transmission by a local station of two series of facsimile scanned programs, one originating remotely, and the other originating locally to cover a multiplicity of columnar incoming and remotely originated portions of the programs and a multiplicity of columnar locally originated portions of the program, the priority of access to the local transmitter for the remotely originated material holding within or for each column respectively but without interaction between or interference with the other columns.

Other objects of my invention are to provide a system where teletypewriters may be used for distributing news from a central station to a local retransmission point which is equipped with local teletypewriters as well, and to control the time periods during which the local teletypewriters may be used.

A further object of my invention is to provide ways and means of transmitting a series of intelligence signals which series may be coordinated with respect to time so as to share the time of transmission.

A further object of my invention is to transmit simultaneously a series of intelligence signals which signals may be differentiated at a receiving point by frequency discrimination networks.

A further object of my invention is the joint control of multiplex transmitting equipment from a local and a remote point.

Other and ancillary objects will at once become apparent upon a consideration of the description of my invention when taken together with the drawings.

In the drawings,

Fig. 1 shows schematically one form of a syndication system;

Fig. 2 shows another form of a facsimile syndication system using time-division multiplex methods;

Fig. 3 shows one type of commutator suitable for use with my invention;

Fig. 4 shows a mechanical indicator suitable for use with my invention;

Fig. 5 shows another modification of my invention using frequency-identified multiplex methods;

Fig. 6 shows one form of my invention in which teletypewriters replace facsimile scanners, and

Fig. 7 illustrates one form of an amplifier used which may be used in my invention.

Referring now to Fig. 1, 1 is a facsimile scanner for transmission of material over a network, and presumably located at or near the key station of the network or at least near the control room of such key station. It is connected by wires 2 and 4 to amplifier 3 and line amplifier 5, the functions of which are obvious. 5 may include as well volume controls, equalizers, and such other adjuncts as are used for network input or testing equipment. 6 is a wire line or radio link such as a multiple-relay system connecting the network scanner location with the distant control room of one of the outlet stations on the network. As usual, such a conection actually passes through or is connected to each outlet station control room of the network system. The remainder of the equipment between 6 and down to modulation amplifier 10 is understood to be located in the outlet station control room. Considering this equipment in further detail, the line 6 is connected through 7 to remote program amplifier 9, and also through 8 to cut-off control amplifier 14. The latter has the single function of producing output voltages when a line signal is being received, which output voltages in turn fulfill the following functions:

(*a*) through the "reverse control" connection 15, the remote program amplifier 9 is made inoperative and "cut off" whenever no program is received over line 6, but is in normal and operative condition whenever a program is received over line 6. The methods of making amplifier 9 inoperative are well known in the art, and may be, for example, through a negative bias on the tube grids to the plate cut-off point.

(*b*) through the "direct control" connection 17, the local program amplifier 21 is made inoperative and "cut off" whenever any program is received over line 6, but is in normal and operative condition whenever no program is being received over line 6. The methods of making such an amplifier inoperative are, as previously stated, well known in the art.

(*c*) through the "direct control" connection 16, the motor clutch, of an electromagnetic type for example, is made inoperative or released whenever any program is being received over line 6. However, when no program is being received over line 6, the motor clutch is engaged and the motor drives the local facsimile scanner 20 in the usual way.

As an alternative arrangement under this function (*c*), the direct control connection 16 can electromagnetically control a clutch between the scanner pick up, which may be, for example, of the usual optical type including a scanning point or element and a photocell, and its lead screen or drive. Thus, when no program is being received over line 6, the pick-up drive engages the lead screw, and the pick-up is fed uniformly down the page over the material mounted on the cylinder of the facsimile scanner. When a program is being received over line 6, the pick-up remains at rest and scans only a single line, assuming the motor 18 drives the scanner continuously, but the signal corresponding to this line does not reach the input of modulation amplifier 10 because the local program amplifier 21 is in this case biased to cut-off by direct control connection 17. 24 and 25 are portions of the shaft connecting the motor to the local scanner 20.

Remote program amplifier 9 has its output connected through 12 to modulation amplifier 10 input, and thus either the output of remote program amplifier 9 or of local program amplifier 21 can be fed into the modulation amplifier depending on which amplifier is in an operative condition. The output of modulation amplifier 10 is fed to the outlet station transmitter 11 through 13. In practice, modulation amplifier 10 may consist of a line amplifier, feeding into a line between the control room of the station and the actual transmitter, and also a line amplifier and modulation amplifier located at the outlet station transmitter.

Some additional practical features of the new system may be here considered. The cut-off control amplifier 14 may be arranged through a tuned audio-frequency input circuit to be especially responsive to the particular audio-frequency "car-

rier" which is modulated by the facsimile signals. Thus, at the key station or network control room, the amplifier 3 may actually consist of a 2000-cycle oscillator, for example, modulated by the facsimile scanner output. Indeed this is a preferred arrangement for reasons connected with the difficulty of transmitting extremely low-frequency currents over a wire-line repeater system. If, then, the 2000-cycle carrier at the network control is shut off whenever no network program is being transmitted or is at least substantially reduced in amplitude, its complete or partial absence will readily and reliably enable the cut-off control amplifier 14 to function as above described.

Another practical feature is the introduction of sufficient time delay into the operation of the direct and reverse controls emanating from cut-off control amplifier 14 to prevent the jumbling or overlapping of remotely originated and locally originated material. It may be desirable, for example, to scan several lines in blank at the outlet stations, after the remotely-originating program has been suspended, before the motor clutch 19 or alternatively the pick-up lead-screw feed clutch mentioned above become operative. This can be accomplished by dash pots or other well known devices which are set into operation by the absence of a remotely-originated signal and which need not be here described in detail. Similarly, time delay in operation can be introduced into the connections 15, 16, and 17 by means of well known types of electrical delay circuits consisting, for example, of suitably connected resistors and condensers. By these means, the rates of the sequence of operation of the system can be adjusted controllably to whatever standards are found necessary or desirable in practical operation.

To more fully understand my invention as applied to the automatic transmission by a local station of two series of facsimile scanned programs to cover a multiplicity of columnar incoming and remotely originated portions of the programs and a multiplicity of the columnar locally originated portions of the program, the priority of access to the local transmitter for the remotely originated material holding within or for each column respectively, but without interaction between or interference with the other columns, attention is now directed to Fig. 2. Herein a 3-column arrangement of the page in vertical columns, similar to that in newspapers, has been selected illustratively, though any other number of columns could have been selected. As a matter of convenience, the division of operating time between the network programs and the locally originated programs will in general be predetermined by agreement between the operating authorities of the network and of the outlet station. As a result, the network control room will have material available for its portions of the operating schedule, and the local station will similarly have program material available for its portion of the schedule. It is to be noted, however, that this pre-arrangement is for purposes of convenience only, but that the actual automatic placement of network or local program material in each definite column of the locally-radiated program, with priority of transmission for the network program, is accomplished automatically by the arrangement shown in Fig. 2.

Examination of Figure 2 will readily disclose that it consists of three assemblies at the network control room, and three assemblies at the local outlet station control room, entirely similar to the individual assembly in each of these respective control rooms shown in Figure 1, except that the magnetic clutches for the local station scanner pick-up feeds, as described above, are shown in place of the magnetic motor clutch 19 shown in Figure 1, and that distributors and concentrators have been added. One of the assemblies scans the left-hand column only, the second assembly handles the middle column only, and the third assembly functions only with reference to the right-hand column. Naturally, the material placed on the "left-column scanner 60" or the "scanner, left column 94" need consist only of the left column in question, the other two columns being blank. However, as will be seen from the later description, it will do no harm if the entire page, that is, all three columns are placed on each of the scanners in the three assemblies because arrangements are provided whereby the output of a given scanner and amplifier reaches the remainder of the system only when the column which it is planned to scan thereby is actually passing under the pick-up of the said scanner.

To accomplish this last mentioned result, there are provided a number of distributors which are additional novel elements not previously shown in Figure 1. Consider, for example, distributor 55. It has three input terminals, 56, 57, and 58 which are connected respectively through conductor 71, 70, and 69 to the outputs of amplifiers 68, 67, and 66. The output of the distributor, which is really a "concentrator" in this case, is withdrawn by brush connection to terminal 58 and then passes to line amplifier 73.

In Fig. 3 is shown scehmatically the arrangement of this distributor. Brush terminals 52, 53 and 54 are the same as brush terminals 56, 57 and 58. The thereto-connected brushes 49, 50 and 51 rest on slip rings, 46, 47, and 48 respectively, and said slip rings are respectively connected to commutator segments 41, 43 and 42 through suitable connections. Brush 44 rests on each of the commutator segments in turn as such segments pass beneath the brush which, in turn is connected to terminal 45, which is the same as terminal 58. Each of the segments covers an arc of approximately 120 degrees and is therefore under the brush for one-third of a revolution corresponding to the scanning of one column, provided the segments are correctly aligned relative to the shaft 59 with reference to the angular position of the related scanned material. This alignment may be made adjustable, if desired. The scanners and distributor are driven by a motor coupled to shaft 63. Obviously each scanner has one-third of the time of the line amplifier 73 and of the line 74 connecting the network control room and the outlet station control room. During its one-third of the time, each scanner and its amplifier scan or cover the corresponding column of text, a line at a time, in the usual way. Needless to say, the text must be mounted on the scanners in suitable alignment, and a simple mechanical adjunct for accomplishing will later be described under Figure 4.

It remains only to describe the functioning of distributors 97 and 98 at the control room of the outlet station. Through the direct-control connection 81 from the cut-off control amplifier 78, the brush connected to terminal 105 energizes and makes operative at suitable portions of each scanner revolution the magnetic clutches 83, 84, and 85 respectively (through their connections 86, 87, and 88 to the distributor 97) providing

no network program in the corresponding column is passing over line 74 to amplifier 78. Distributor 98, through the direct-control connection 80 connected to its brush terminal 106, places a biasing or cut-off voltage on individual scanner amplifiers 102, 103, and 104 respectively (through the connection of their respective input circuits to the terminals of distributor 98 through 107, 108, and 109 respectively) but only when a network program in the corresponding column is passing over line 74 to amplifier 78.

The mechanical and rotary form of distributor shown in Figure 2 can, of course, be replaced by a stationary and electronic form of distributor. For example, a low-frequency three-phase oscillator can be arranged to cut-off the output of three tube amplifiers, each cut-off lasting for two-thirds of a revolution of the scanners and suitably phased for each tube, by providing an oscillator period equal to the time of revolution of the scanner drums and the oscillator wave form and the biasing cut-off voltage are correctly chosen. Conically-travelling electron beams describing their circular terminal path at a suitable frequency, and impinging on segmental collectors of proper arcuate length, 120 degrees in the particular case shown, can also be arranged to carry as shown in U. S. Patent No. 1,977,398 to Morrison, or alternatively to control the transmission of the facsimile signals, acting somewhat in the same way as the distributor or concentrator brushes. Thus the particular form of the distributors and concentrators is not essential to this invention.

It will readily be seen that the incoming network program has definite priority, in reaching modulation amplifier 113, over the local program, and that this priority holds for each column independently but without interaction or interference between individual columns. All the expedients mentioned and explanations relative to Figure 1 hold for Figure 2 as well, and are accordingly not repeated here.

Alignment indicators for horizontal and vertical "lining-up" of columnar material are shown in a simple form in Figure 4 though only for two scanners, it being obvious that the arrangement could be extended easily to any desired number of scanners. For horizontal indication, pointers 32 and 38 are rigidly connected by bar 35. The ends of 32 and 38 rest extremely close to the material being scanned to avoid parallax errors in observation, and the whole assembly is arranged to rotate around the shaft 30, 34 as an axis so that the ends of 32 and 38 will describe paths corresponding to a horizontal line on the scanned material. If desired, the entire assembly can also be moved longitudinally parallel to the shaft 30, 34, in which case it would act also as a pair of vertical indicators of position or alignment. Alternatively, a separate pair of vertical indicators, one of which is indicated by 33 can be provided, these being connected by bar 36, the entire assembly moving parallel to shaft 30, 34.

In Fig. 5 is shown a modification of my invention where frequency selective multiplex operation is used. In adapting frequency selective multiplex to my system, each of the scanners 60, 61, 62 serves to modulate locally generated carrier tone frequencies of different frequencies, each of the frequencies being so selected, that their harmonics will not produce interference with each other. For example, a frequency of 935 cycles per second might be assigned to the scanner 60, while 1445 cycles per second would be assigned to scanner 61, and 1955 cycles per second would be assigned to scanner 62. Amplifiers 66, 67, and 68 are used for further amplifying the modulated carrier signals. Band-pass filters 120, 121 and 122 are provided in order to furnish a smooth impedance output and to prevent interaction of one channel upon another and the outputs of these filters are then combined at the line amplifier 73.

At the receiving station essentially similar types of cut-off control amplifiers 78, 133 and 135 and the remote control amplifiers 77, 134 and 136 are furnished. In addition, the output of the amplifiers 77, 134 and 136 feed the modulation amplifier 113. The cut-off control amplifiers 78, 133 and 135 furnish cut-off biases to the three scanners 94, 95, and 96, respectively, which scanners are also fed with a carrier tone frequency, each scanner having its own carrier tone assignments similar to that described above. The outputs of the local scanners 94, 95 and 96 are amplified by the amplifiers 102, 103, and 104, respectively, and each of these amplifiers after feeding through its associated and appropriate band-pass filter 123, 124 and 125, feeds to the modulation amplifier 113. At the receiving point where the transmitted signals are to be utilized for recording, similar band-pass filters are accordingly utilized to segregate each of the transmitted modulated carrier waves, and the segregated signals are thus caused each to operate a recorder as is well known in the art.

This modification of my invention has certain advantages not to be found in the previously described modifications, in that a saving in operating and line time is obtained and continuous transmission of material is readily effected. However, it will be well appreciated that the frequency requirements for transmission are apt to be more rigorous since in general, a wider band must be provided in order to guard against interaction between channels, since perfect filters are impossible to be obtained; while even filters having a sharp cut-off characteristic are difficult and expensive to build. It will also be appreciated that the cost of the receiver is somewhat increased due to the necessity of providing the filters. On the other hand, somewhat greater flexibility can be obtained since, by merely changing the carrier frequencies at the transmitting station, the material to be transmitted may be recorded in any one of the three channels. For example, if, as was pointed out above, the three frequencies utilized for carrier tones were 935, 1445, and 1955, band-pass filters having their mid-pass frequency set at these points at the receivers, would record the columns consecutively, column 1 being associated with frequency 935, etc. If, now, however, the third scanner, instead of being supplied with a frequency of 1955 cycles energy were provided with 935-cycle energy, the material transmitted would appear in the third column instead of the first column and accordingly, therefore, this method provides for an easy means of positioning the transmitted material and keeping this means under the control of the transmitting operator. It will be appreciated, of course, that the transmitting band pass filters must be changed simultaneously with changes in the supplied frequency of the oscillators. Another advantageous feature of this method is the greater freedom from moving parts in the transmitter and receiver, which reduces maintenance problems. It will

thus be apparent that the association of the transmitting columnar scanners and receiving columnar scanners may be obtainable, by either of the two general methods above discussed, namely (1) by a division of operating time, embodied in mechanical or electronic distributors at both the transmitting and receiving ends, an electronic distributor being essentially a group of biased line amplifiers rendered active by a multi-phase voltage which for the embodiment shown, would be a three phase voltage, and with such time division in regular sequence and for equal lengths of time; or (2) by the division of the frequency band transmissible by the networks line, such that each scanner output at the transmitter is carried on a different carrier frequency within the band transmissible by the line and each receiving scanner is selectively actuated only by a corresponding modulated carrier.

To utilize my invention with teletypewriters, teletypewriters may be substituted for the scanners **60**, **61** and **62** in Fig. 6, in which case, each of the teletypewriters actuates or controls the carrier tone. A similar substitution for the scanners **94**, **95** and **96** by teletypewriters may be made at the local transmitting station. At the receiving end, of course, the facsimile recorders would be replaced by receiving teletypewriters associated with filters for frequency discrimination in order that each of the teletypewriters may receive the signals with which it is associated. Where time-division multiplexing is desired for use with teletypewriters, the distributors **106**, **105** and **55** may be replaced by any time division multiplex system known to the art. As one example of such a system which is readily applicable to my invention, that shown in Patent No. 2,010,505 issued August 6, 1935, to J. L. Callahan et al., entitled "Time division multiplex system" is readily adaptable. It will be understood in this case that the automatic transmitters operating from perforated tape in conjunction with the teletypewriter, may have teletypewriters substituted for the automatic tape transmitter.

It will thus be appreciated that my invention and the various modifications, provide a large number of means for effecting the broad objects of my invention, and that the choice of any one of the particular embodiments to incorporate in such a system will be determined by a consideration and the weight of the various factors as initial cost, frequency band available, type of material to be transmitted, maintenance considerations, and the time available for transmission. The choice of any particular embodiment must, therefore, rest upon the weights of these various factors and their influence upon arriving at a solution which gives the best solution in the light of these considerations.

Since each one of the embodiments possesses certain advantages over the other embodiments, the choice must necessarily rest upon the preference of those people, upon whom the decision of a particular system to be used rests. It will be appreciated, of course, further, that it is not necessary to use three scanners or three teletypewriters, but that a combination of scanners and teletypewriters may be used. This, for example, may be desirable where the cost of the initial equipment is a considerable item. For example, general news and straight reportorial communications may be carried on teletypewriters, while special news requiring the use of photographs may be carried on one scanner, and advertising which generally combines half-tone circuits with printed matter, may likewise be placed on a scanner, so that where this seems to be desirable, a transmitting station would embody two scanners and one teletypewriter. No difficulty will be encountered where the frequency-selective multiplex system is used, since the filters supplied for selecting the various signals may operate continuously without any regard to time division. On the other hand, where time division is required, it may be desirable to use the time-division multiplex system described in the above mentioned patent, since this particular system affords an effective solution for the problems of synchronizing.

On the other hand, no difficulty would be involved in applying such a combination of scanners and teletypewriters to the embodiment of my invention shown in Fig. 2.

Whereas all the foregoing descriptions have been referred particularly to facsimile operation of a network control room and one or more local outlet station control rooms, yet the invention applies also to the following: (*a*) to telephonic operation where the network program is at all times to have priority of access to the local station transmitter; (*b*) to television operation where the network program is at all times to have priority of access to the local station transmitter, either for the entire picture width or for columnar portions thereof without interaction between the columnar controls. In this case, the television scanner, e. g., iconoscope or mechanical type, is substituted for the facsimile scanner, and the distributors become either electronic distributors, for example, multi-phase tube arrangements, or alternatively a conically sweeping electron beam impinging on a multiplicity of segmental collectors of suitable arcuate angle or mechanical commutator distributors operating at necessarily high speeds; (*c*) to purely local operation either at a network control room, or in a local outlet station control room respectively, where one type of material is to be given priority locally over another type of material either as a whole, or in columnar and mutually non-interacting portions. Such types of material might be, for example: "flash" news versus ordinary text, or ordinary text versus advertisements, the former-mentioned of each pair having, for example, priority; and (*d*) to operation wherein a number of types of material are to have priority in any desired sequence or order, thus "flash" news versus ordinary text versus advertisements. In this case, the arrangements shown in Figure 1 or Figure 2 respectively, as required, are cascaded, each arrangement in the cascade having priority over the next in the cascade.

In Fig. 7 is shown in more detail the cut-off control amplifier **14**, the remote program amplifier **9** and the local program amplifier **21**, as well as the interconnections therebetween. In Fig. 7 the dotted boxes are numbered the same as their respective boxes in Fig. 1. The cut-off control amplifier **14** embodies a conventional one stage transformer coupled amplifier whose input is fed from the line **6** and whose output is coupled to a full wave rectifier **207**. The rectified current is fed to resistor **209** and the time delay and filter condenser **221**. The voltage drop from the resistor **209** is then utilized to perform the functions of the cut-off amplifiers described above in conenction with Fig. 1. The remote program amplifier **9** has the grid of the tube **201** biased to cut-off by the bias voltage **203**, so that in the absence of any signal coming over the line **6**,

no output is available to be fed over the line 12 to the modulation amplifier 10. When a signal is placed on the line 6, voltage appears across the resistor 209 after being amplified by the tube 215 and rectified by the full wave rectifier 207. Across the resistor are connections so that this voltage is fed to the tube 201 in series with its cathode and the bias voltage 203. The polarity is so arranged that the voltage which appears across the resistor 209 is opposite to the bias battery 203 and accordingly, the bias voltage on the tube 201 is reduced by suitable selection of constants. By controlling the gain of the tube 215 the rectified voltage which appears across the resistor 209 may be sufficient to produce the grid potential of the tube 201 to such a value so as to make the bias voltage of the tube 201 of such a value as to give linear amplification. The incoming signalling from the line 6 is fed in parallel to this stage and accordingly, in the presence of any signalling voltages coming over the line 6, the tube 201 will amplify the signal, which signal may then be passed on from the output terminal through the line 12 to the modulation amplifier. Simultaneously with this the voltage across the resistor 209 is fed to the local program amplifier 21 whose bias voltage 211 is such as to give in the absence of any voltage across 209 a linear amplifying characteristic to the amplifier 21. The voltage from the resistor 209 is fed in series with the cathode and the grid of the tube 217 and is of such polarity as to increase the negative bias on the grid of the tube 217. Accordingly, therefore, when signals appear on the line 6, the tube 217 is biased past cut-off so that the local program signal is not passed onto the modulation amplifier 10. At the same time the voltage appearing across the resistor 209 is also fed to the motor clutch 19. The voltage drop acting on the magnetic coil 213 pulls the armature 219 toward it. This armature is coupled by any one of the conventional means to the clutch arrangement to disengage the clutch between the motor 18 and the local scanner 20 so that in the presence of the signal on the line 6, the local scanner is stopped.

It will be appreciated that Fig. 7 is merely one scheme for accomplishing the results which the cut-off control amplifier 14 is designed for. Methods and apparatus other than that shown in Fig. 7 may be used so long as the results of having a received signal actuate the remote program amplifier cut-off, the local program amplifier and the local scanner, are obtained.

Having described my invention, what I claim is:

1. In a transmission system, a transmitter, means for producing locally a sequence of intelligence signals, means for receiving at the transmitter a series of intelligence signals remotely initiated, means for normally controlling the transmitter by the locally developed intelligence signals, and means responsive to the received remotely initiated signals for completely interrupting the transmission of the locally produced signals for the full period of remotely originated signal transmission and means for transmitting the remotely initiated signals from the first named transmitter.

2. In a program distribution system, the method of transmission which comprises the steps of developing at and transmitting from a local transmitting point a sequence of intelligence signals, developing a second sequence of intelligence signals at a control point remote from said local transmitting point, transmitting the signals originating at the control point from that point to the local point, receiving the remotely developed signals at said local transmitting point, and controlling the local transmitter to transmit only the sequence of remotely developed signals to the complete exclusion from transmission of the local origin signals during periods of operation of the remote transmission.

3. An intelligence transmitting station comprising a local transmitter, means to control the local transmitter, means for producing at the local transmitter a sequence of intelligence signals, means for producing remotely from the local transmitter a second sequence of intelligence signals, means to convey the remotely produced signals to the transmitter, means at the local transmitter to energize simultaneously the control means by the conveyed signals to render inoperative for transmission purposes the local signal producing means in the presence of and for at least the duration of the conveyed signals, and means to energize the control means for the local transmitter by the locally produced signals only in the absence of conveyed signals.

4. An intelligence transmitting station comprising a transmitter, means to actuate the transmitter, electro-optical means at the transmitter for producing signals representative of an object of which an image is to be transmitted, electro-optical means remote from the transmitter for producing signals representative of a second object of which an image is to be transmitted, means to convey the remotely produced signals to the transmitter, means at the transmitter to select one of the two produced signals, means to control the selecting means in accordance with the conveyed signals, and means to energize the actuating means by the selected sequence of signals.

5. An intelligence transmitting station comprising a transmitter, means to actuate the transmitter, electro-optical means at the transmitter for producing signals representative of an object of which an image is to be transmitted, electro-optical means remote from the transmitter for producing signals representative of a second object of which an image is to be transmitted, means to convey the remotely produced signals to the transmitter, means at the transmitter to simultaneously energize the actuating means by the conveyed signals, and to render inactive the first electro-optical means in the presence of conveyed signals, and means to energize the actuating means by the signals produced at the transmitter in the absence of conveyed signals.

6. An intelligence transmitting station comprising a transmitter, means to actuate the transmitter, a facsimile scanner at the transmitter for producing electro-optical signals representative of an object, a facsimile scanner remote from the transmitter for producing electro-optical signals representative of a second object, means to convey the remotely produced signals to the transmitter, means at the transmitter to select one of the two produced signals, means to control the selecting means in accordance with the conveyed signals, and means to energize the actuating means by the selected sequence of signals.

7. An intelligence transmitting station comprising a transmitter, means to actuate the transmitter, a facsimile scanner at the transmitter for producing signals representative of an object, a facsimile scanner remote from the trans-

mitter for producing signals representative of a second object, means to convey the remotely produced signals to the transmitter, means at the transmitter to energize simultaneously the actuating means by the conveyed signals and inactuate the first facsimile scanner in the presence of conveyed signals, and means to energize the actuating means by the signals produced at the transmitter in the absence of conveyed signals.

8. A transmitting station as claimed in claim 1 and comprising in addition means for delaying the action of the control means.

9. A transmitting station as claimed in claim 6 and comprising in addition means for delaying the action of the control means.

10. A transmitting station as claimed in claim 1 and comprising in addition means for delaying the action of the local transmitter control means for a predetermined duration of time.

11. A transmitting station as claimed in claim 6 and comprising in addition means for delaying the action of the control apparatus for a predetermined duration of time.

12. In a transmitting system, a local transmitter, means for producing locally a sequence of intelligence signals, means for receiving at the local transmitter a series of intelligence signals remotely initiated, means for normally controlling and transmitting from the local transmitter the locally developed intelligence signals, means at the local transmitter responsive to the received remotely initiated signals for completely interrupting the control and transmission of the locally produced signals and transmitting completely the remotely initiated signals from the local transmitter to the exclusion of the locally developed signals, and means to introduce a delay of predetermined time interval between the termination of a sequence of intelligence signals from one point of origin and the commencement of the control action by a sequence of intelligence signals from the second point of origin.

13. In a program distribution system, the method of transmission which comprises the steps of producing at a local transmitting point a sequence of intelligence signals, developing a second sequence of intelligence signals at a point remote from the local transmitting point, receiving the remotely developed signals at the local transmitting point, controlling a local transmitter to transmit only one sequence of said sequences of signals to the complete exclusion of the other sequence during periods of development of the remote sequence of signals, and delaying the control action upon the local transmitter by each sequence of signals for a predetermined time interval subsequent to a cessation of each sequence.

14. A transmission system comprising a local transmitter, a plurality of local signal generating devices, a plurality of remote signal generating devices, means for normally controlling the local transmitter by the local signal generating devices, means to receive at the local transmitter the remotely generated signals, and automatic means to select in accordance with the received signals a predetermined plurality of said remote signal generating devices for controlling the local transmitter so that during period of receipt of remote generated signals the local transmitter repeats the complete remotely generated signal with at least one of the locally generated signals completely excluded.

15. In a transmission system, a plurality of local transmitter stations, means for producing at each of the plurality of local transmitter station separate sequences of intelligence signals, means for receiving at each of the plurality of local transmitter stations a sequence of intelligence signals distributed from a remote source, means for normally controlling each said local transmitter by the locally developed intelligence signals, means at each of the plurality of local stations responsive to the signals received from the remote source for completely interrupting and excluding the transmission from each of the local transmitters of the there produced locally initiated signals and means for repeating, at such time periods of local transmission interruption, the signals originating at the remote source of transmissions from each local transmitter.

16. In a transmission system, a plurality of local transmitter stations, means for producing and then transmitting at each of the plurality of local transmitter stations a plurality of intelligence signal sequences, means for receiving at each of the plurality of local transmitter stations at least one sequence of intelligence signals transmitted in similar fashion and distributed from a remote source, means for normally controlling each said local transmitter by the thereat locally developed intelligence signal sequences, means responsive to the signals received from the remote source for completely interrupting the transmission of at least one of the locally produced sequences from each of the local transmitters, and means for controlling each local transmitter at such time periods of local interrupter transmission by the signals originating at the remote source to transmit from each local transmitter at such time periods intelligence signal sequences of which at least one of the sequences have originated at the controlling point.

17. In a program distribution system, a plurality of local transmitter stations, means for producing at each of the plurality of local transmitter stations a locally determined sequence of intelligence signals, means for transmitting to each of the local stations from a controlling point signals having their effective origin at the controlling point, means for receiving at each local transmitter the signals distributed from the controlling point, and means at each local transmitter station automatically operating under control of the signals transmitted from the controlling point to limit the transmission of signals from each local point to a single series of signals only with the remotely developed signals controlling the selection for transmission from each local station between locally and remotely developed signals to the complete interruption and exclusion of locally developed signals during periods of receipt of remotely developed signals.

18. A transmission system comprising a local transmitter, means for producing locally a plurality of independent sequences of signals, means for producing remotely a plurality of independent sequences of signals related to the locally produced sequences, means to receive locally the remotely produced signals, means for normally controlling the local transmitter by the locally produced signals, means to interrupt completely the control of the local transmitter by at least one of the plurality of the locally produced signals at time periods of receipt of remotely produced signals, and means for controlling the local transmitter by the received remotely produced signals subsequent to the interruption of

the control by the interrupted locally produced signals.

19. A transmission system comprising a local transmitter, means for producing locally a plurality of independent sequences of signals, means for producing remotely a plurality of independent sequences of signals, means to receive locally the remotely produced signals, means to energize the said transmitter under the control of one only of the produced sequences of signals, means for selecting the controlling sequence of signals, means for controlling the selecting means by the received signals so that received remotely developed signals only are repeated during periods of receipt thereof and a number of locally produced independent sequences coinciding with the number of remotely developed signals received are completely interrupted, and means to delay the control selection of the energizing means subsequent to the controlled selection of signals for a predetermined time period.

20. A transmission system comprising a local transmitter, means to produce locally a plurality of independent sequences of signals, means for sequentially and cyclically selecting each of the sequences of signals and then energizing the local transmitter thereby, means to produce remotely a plurality of independent sequences of signals related to the locally produced signals, means to receive locally the remotely produced signals, means for sequentially and cyclically selecting each of the remotely produced sequences of signals, means for normally energizing the transmitter by the sequentially selected locally produced signals, means for completely interrupting the energization of the local transmitter by a number of locally developed signals coinciding with the number of received remotely developed signals related thereto and for time interruption periods substantially coinciding with the duration of receipt of remotely developed signals, means for maintaining the interruption of transmission control by the local signals for a predetermined time interval, and means for subsequently re-energizing the transmitter by the locally produced signals only after a predetermined time interval following a cessation of received related signals.

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