March 17, 1936. C. S. WHITNEY ET AL 2,034,364

PHASING SYSTEM

Filed Feb. 20, 1932 2 Sheets-Sheet 1

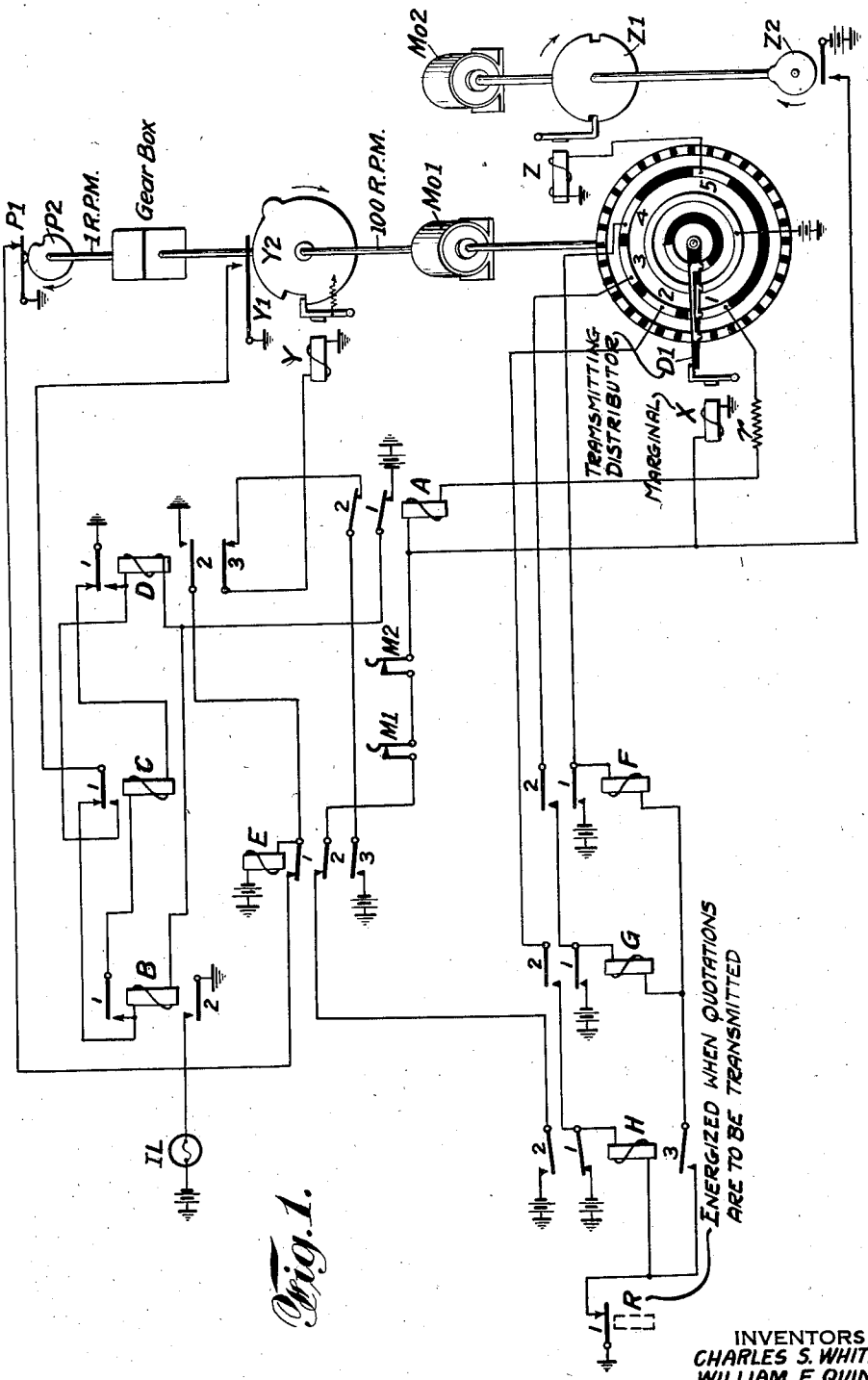


Fig. 1.

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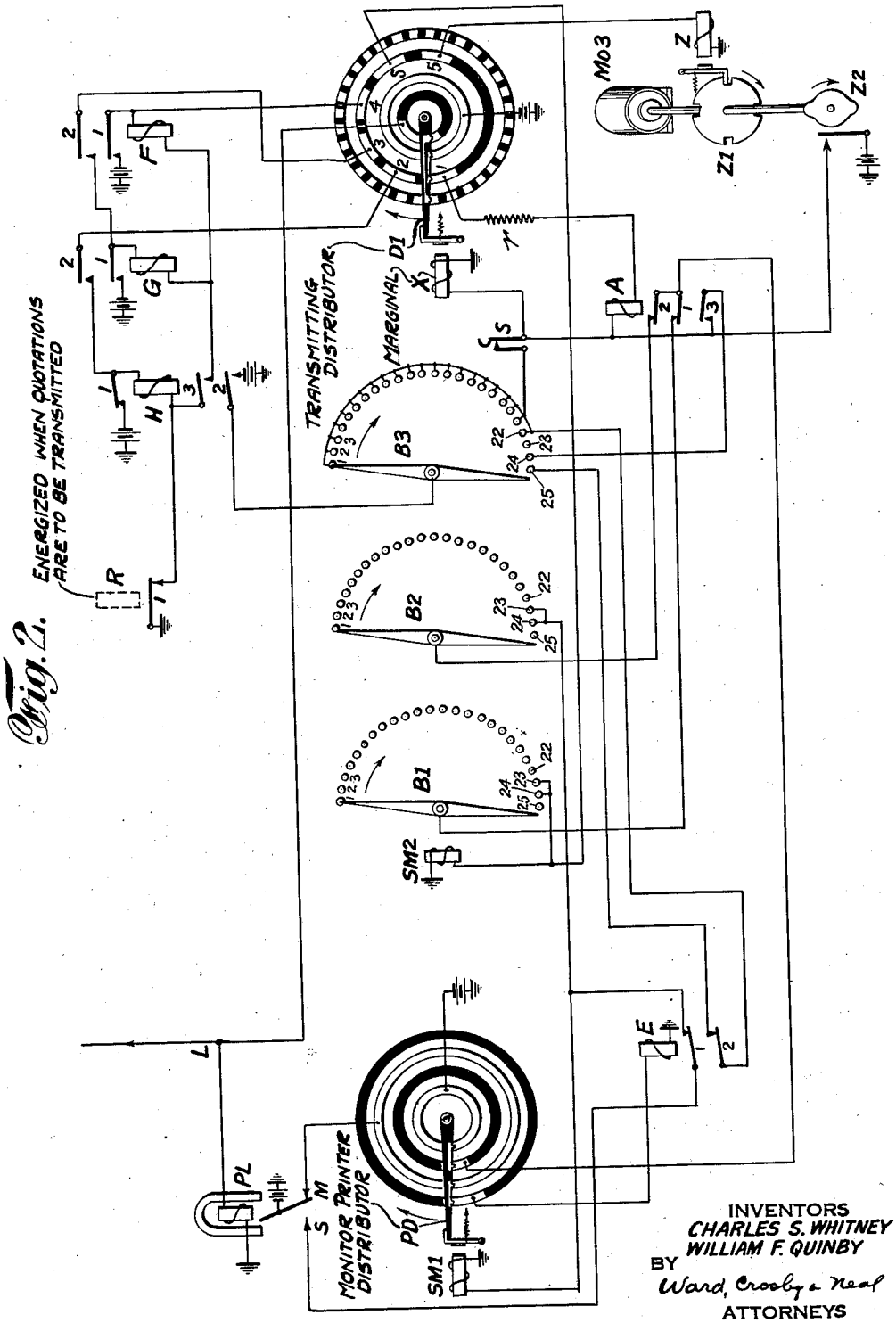


Fig. 2.

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# UNITED STATES PATENT OFFICE

2,034,364

## PHASING SYSTEM

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Application February 20, 1932, Serial No. 594,174

9 Claims. (Cl. 177—353)

This invention relates to phasing equipment.

The transmitter (not shown) with which this invention is used, comprises four overlap and storage devices, known as mechanical overlap units, each of which has associated with it a sending keyboard arranged for stock quotation transmission. An operator writes up a quotation on one of the keyboards by pressing successively stock letter keys, price keys, and lastly a range key. As each key is depressed, corresponding signal impulses are sent from the keyboard and stored in an associated mechanical overlap unit to await transmission to the line. Quotations may be written on any or all of the four keyboards simultaneously as the keyboard operation and the function of the associated mechanical overlap units are independent of one another. Whenever a complete quotation has been written on any keyboard which is being indicated to the equipment by the depression of a range key, a relay associated with the corresponding keyboard and mechanical overlap unit is released thereby permitting the equipment comprising the phasing device to start functioning and initiate the transmission of the stored quotation to the outgoing line. Since, as described, there are four independent keyboards there are four of the associated relays which are used to initiate the functioning of the phasing equipment. These relays correspond to the relay R, shown in the drawings.

In order to simplify the description and the drawings of the present application, and avoid complicating them unnecessarily by including too much of the equipment of the transmitter not forming any part of this invention, the functions performed by the four R relays of the actual transmitter were replaced, for purposes of describing the invention, by a single relay designated R.

In the general system in which this phasing equipment is employed, the transmitter, as stated before, includes four keyboards on which a complete quotation may be set up, and an arrangement whereby when the range key in any keyboard is depressed an R relay will be pulled up to function, as shown in the drawings of this application. This sets the transmitter in operation to transmit a quotation set-up. Two of the keyboards are used for setting up stock information which is to go out as channel-one information which, in the receiver, will control stocks on one-half of the stock quotation board. The other two keyboards are employed for setting up channel-two information which will control indicators in the other half of the board in the receiver. All this information is transmitted over a single line between the transmitter and the receiver. The arrangement is such that from a position of rest channel-one information will be transmitted first followed by channel-two information, and the transmission of channel-one and channel-two information will continue alternately as long as calls are waiting.

The construction of the receiver with which this mechanism is used is such that a multicontact gang relay, which completes the circuits to the selected indicators, will remain operated until another transmission is made. For this reason the transmitting distributor is controlled to make one or more revolutions after the last call of the series of calls has been transmitted. A single idle revolution may be deemed sufficient for this purpose, but the design of the equipment causes the distributor to make several revolutions and a different number depending upon whether the last quotation transmitted was a channel-one or channel-two quotation.

It has also been found desirable to arrest the distributor after a certain number of revolutions in order to bring the receiver in phase with the transmitter. This may be done manually by a key as indicated, or its may be done automatically after a certain desired number of revolutions, for example, after a hundred revolutions as indicated, by the equipment shown in Fig. 1, or after a smaller number of revolutions, that is, after a series of forty-eight quotations has been transmitted as indicated, by the system shown in Fig. 2. Each of these systems may be changed to control automatic phasing after any desired number of revolutions, this number to be determined by the operation of the equipment.

Among the objects of this invention is the provision of mechanism for automatically stopping the transmission of information for a predetermined time after a given number of transmissions have been made, for the purpose of permitting the receiving mechanisms to become synchronized with the transmitter in the event that one or more have become out of phase.

Another object of the invention is the provision of mechanism which permits the transmitter to operate for a given number of turns before stopping, after actual quotation transmission has ceased so as to release any relays that may be locked up at the receiving end.

Other objects of this invention will appear from the following description taken in connection with the drawings, in which

Fig. 1 shows one embodiment of the invention in connection with a transmitter; and

Fig. 2 shows another embodiment of the invention in connection with a monitor printing apparatus and a transmitter.

The phasing circuit shown in Fig. 1 is employed for the purpose of controlling a transmitter of any suitable character such as indicated diagrammatically, to operate a number of times after actual quotation transmission has ceased; and for causing the brush arm of the transmitter to stop only after an even number of rotations; and also for the purpose of stopping the transmitter for a predetermined time, after a predetermined number of rotations of the distributor brush arm, although other quotations may be awaiting transmission, for the purpose of permitting any receiving distributors that may be out of synchronism to become in phase.

The distributor indicated diagrammatically in Fig. 1 includes a rotatable brush arm D1 which is frictionally driven from a shaft driven by the motor Mo1. The motor Mo1 also drives a cam disk Y2 through any suitable friction mechanism and a cam disk P2 through a reduction gear box, and for the purpose of description it may be assumed that the disk Y2 is driven at a hundred rotations per minute and the disk P2 at one rotation per minute.

A second motor Mo2 may be provided to frictionally drive a locking disk Z1 and a cam disk Z2 at a speed such that the cam disk Z2, when permitted to rotate, may turn from one of its stop positions to its next stop position in a time slightly less than the time of one rotation of the brush arm D1.

The apparatus in Fig. 1 is shown in its normal condition. Although current is flowing through the coil of relay X, it is held to a sufficiently low value, because of the series resistance *r* and the resistance of the coil of relay A, to prevent the armature of X from moving from its normal (released) position.

When quotations are to be transmitted the relay R is energized causing its contact 1 to remove ground from the winding of the relay H of the counting chain, which comprises the relays F, G, H. This causes the relay H to release which opens its contact 1 and closes its contacts 2 and 3. This connects battery through contact 2 of relay H, operated make contact 2 of relay E, switches M1 and M2 to one side of the winding of relay A and one side of the winding of relay X. The relay A now releases as it has battery of the same polarity applied to each side of its winding, that is, battery from contact 2 of relay H to one side of the winding of relay A, and battery from the inner ring and across the brush D1 and segment 1 of the outer ring of the distributor to the other side of the winding of relay A. The relay X picks up and operates its latch which permits the friction driven brush D1 to rotate. The rotation of the brush D1 now transmits quotations, the presence of which was indicated by the opening of the contact 1 of the relay R.

As long as contact 1 of the relay R is open, as an indication that quotations are awaiting transmission, the relay X remains energized thus permitting the brush arm D1 to continue to send out quotations.

When no other quotations are awaiting transmission contact 1 of relay R closes applying ground to contact 3 and to one side of the winding of relay H. As the arm D1 rotates it connects battery over segment 4, over the winding of the relay F and to ground, over closed contact 3 of relay H and normal contact 1 of relay R, operating relay F which from battery on its make contact 1 locks to ground over contact 3 of relay H and contact 1 of relay R.

On the next rotation of the brush arm D1, battery is connected to segment 3, and over operated contact 2 of relay F and the winding of relay G, to ground over contact 3 of relay H, and contact 1 of the relay R. This causes the relay G to operate which locks from battery on its make contact 1, to ground over contact 3 of relay H and contact 1 of relay R.

On the next rotation of the brush arm D1, battery is connected to segment 2 and over contact 2 of relay G and the winding of relay H, to ground, over the contact 1 of relay R. This causes the relay H to operate which locks from battery over its own make contact 1 to ground over contact 1 of relay R. As contact 3 of relay H opens, it opens the locking circuit of the relays F and G causing these relays to release. As contact 2 of relay H opens it removes battery from one side of the winding of the relay X causing this relay to deenergize which permits its latch to move into position to stop the brush arm D1, provided the contact controlled by the cam Z2 is open.

The contact controlled by the cam Z2 is provided for the purpose of closing a circuit which will permit the brush arm D1 to be stopped only after an even number of rotations has been made. During each rotation of the brush arm D1, it passes over a segment 5 which closes a circuit from battery across the winding of relay Z to ground. As Z is energized it withdraws its locking pawl from the disk Z1 which advances a half rotation. Every second time that the disk Z1 advances a half rotation the high spot on the cam Z2 closes its contact thereby closing the circuit over the winding of the relay X. Relay X becoming energized withdraws its locking pawl from the brush D1 causing the brush arm D1 to rotate which, during its rotation, energizes the relay Z which permits the cam Z2 to advance half a rotation opening the contact controlled by the cam Z2. As this contact opens it removes battery from the winding of the relay X and causes the latch on relay X to move into position, to stop the brush arm D1, provided the relay R is not operated as an indication that quotations are awaiting transmission.

When the brush arm D1 comes to rest, battery is applied through segment 1 over the winding of relay A and the winding of relay X to ground. Relay A operates, closing its contacts 1 and 2 which perform no function during this operation, but function during the phasing period to be explained later. Due to the resistance in the circuit the relay X will not be energized sufficiently to withdraw its latch from the distributor brush arm D1; therefore transmission over the distributor will be discontinued.

*Automatic phasing*

It is assumed that the contact R1 is open, the relay H is unenergized, and the relay X is energized and the brush arm D1 is rotating continuously.

After a predetermined time or number of rotations of the brush D1, depending upon the gearing connecting the cam disk P2 to the motor shaft, the lug on the contact P1 falls into the depression of the cam P2 opening the contact P1. This

removes ground from the contact 1 of relay E causing the relay E to release which opens its contact 2 and closes its contact 3. The opening of the contact 2 of relay E removes battery from the winding of the relay X which causes its latch to stop the brush arm D1, provided the contact controlled by the cam disk Z2 is open.

When the brush arm D1 comes to rest, the relay A operates, as explained before. Contact 3 of relay E, which is now closed, connects battery through contact 2 of relay A, contact 3 of relay D, to one side of the winding of relay Y which operates. As the relay Y operates it withdraws its latch from the cam Y2 which permits the cam Y2 to rotate. As the high spot on the cam closes the contact Y1, battery is extended over the contact 1 of relay A, winding of relay B, the break contact 1 of relay C, and the contact Y1 to ground. This operates the relay B which closes its contact 1 which causes ground from the contact Y1 of the cam Y2 to be extended to one side of the winding of relay C which, however, does not operate as ground through the break contact 1 of relay D is connected to the other side of the winding of relay C.

As the cam Y2 continues to rotate the contact Y1 opens, removing ground from this source to one side of the windings of relays B and C. The relay B remains operated from ground which is received through its contact 1 and over the winding of relay C and the break contact 1 on relay D. The relay C now operates in series with the relay B.

As the high spot of the rotating cam Y2 again closes the contact Y1, ground from this contact is passed through make contact 1 of the operated relay C to one side of the winding of relay D, the other side of which is connected to battery, over the contact 1 of relay A. Relay D operates and locks to ground over its own make contact 1 and at its break contact 1 removes ground from the series circuit of the relays B and C, causing these relays to release.

The opening of contact 3 of relay D removes battery from the winding of the relay Y causing the relay Y to release and permit its latch to stop the rotation of the cam Y2.

The closing of the contact 2 of relay D connects ground over the winding of relay E to battery causing the relay E to operate and lock over its contact 1, to ground, over the contact P1 of the cam disk P2, which is again closed due to the advancing of the cam disk P2.

The closing of contact 2 of relay E closes battery from the contact 2 of relay H, if a quotation is waiting, to one side of the winding of relay A and the winding of relay X. The relay A releases as battery is applied to each side of its winding. The relay X becomes energized and withdraws its latch permitting the distributor arm D1 to rotate and resume transmission.

Contact 1 of relay A, upon opening, removes battery from the winding of the relay D causing this relay to release. This completes the phasing period and all equipment involved is restored to the condition assumed above.

A lamp IL is provided to be energized over a contact 2 of relay B each time the relay operates as a visual indication of the phasing period.

In order to provide for phasing at times other than that provided by the rotation of the cam disk P2, break contact switches M1 and M2, heretofore referred to, may be connected in the circuit of the relay X. Any number of keys or switches may be provided and located at different positions so that manual phasing may be accomplished from the desired location. When the switch M1 or M2 is opened, battery is removed from the winding of relay X which permits the latch to fall in the path of the brush arm D1 stopping transmission, provided contact 2 controlled by the cam Z2 is open. The brush arm D1 remains at rest as long as the key controlling the contacts M1 or M2 is depressed. When the manual phasing key is released the circuit through contacts M1 and M2 to the relay X is again closed and operation is resumed, if a quotation is waiting.

By means of the mechanism described the transmitter is brought to rest after it has made a certain predetermined number of rotations following the last actual quotation transmission, and if there is a continuous series of transmissions so that the contact 1 of the relay R will remain open for an indeterminate number of transmissions, the distributor will be brought to rest at intervals of one hundred transmissions, as indicated by the fact that cam disk P2 makes one rotation per minute while the distributor brush arm D1 makes one hundred rotations per minute. The number of transmissions between phasing operations may be varied to suit conditions, and instead of transmitting one hundred quotations between successive phasing operations the mechanism may be geared so that a smaller or greater number of quotations may be transmitted between phasing operations.

The phasing equipment shown in Fig. 2 includes the same counting relay equipment as that in Fig. 1 but, instead of a cam P2 for interrupting the transmission after a certain number of transmissions have been made, this mechanism includes a three bank rotary switch which operates in connection with the receiving distributor of a monitor printing device for arresting the transmission after a series of forty-eight quotations has been transmitted. The monitor printing device is employed to make a record of all of the information transmitted over the transmitting distributor for the purpose of checking the information transmitted.

Systems to which this mechanism has been applied, include a plurality of transmission controlling mechanisms, on each of which information is set up as to certain stocks. These mechanisms are alternately brought in operation to control the transmission of impulses over the distributor to the outgoing line L, which goes to receiving mechanisms where in turn the information is received alternately on different receiving mechanisms. The mechanism is so designed that after the transmission has been terminated, and the mechanism is again in condition to transmit, it will first transmit a channel-one information, and the construction is especially designed for the alternate transmission of channel-one and channel-two information, for which purpose the phasing cam Z2 is made to close a circuit for the start magnet X for the distributor during the transmission of the uneven number in the series.

Incorporated in the outgoing line is the polarized relay PL which controls the monitor printing distributor and printer, the brush of which is indicated at PD, the brush for the transmitting distributor being indicated at D1.

After a series of transmissions has been made the mechanism will be in the condition shown in the drawings with the relays H, A and E energized.

When a quotation is awaiting transmission the relay R will be energized and this relay will remain energized as long as quotations are waiting. As this relay is energized it opens the circuit at its contact 1 for the relay H, causing this relay to deenergize, opening its own locking circuit at its contact 1, preparing a circuit at its contact 3 for relays F and G, and applying battery at its contact 2 to the brush B3 of the third bank of the rotary switch. All of the contacts 1 to 22 on this bank are connected together and through a manual phasing key S to one side of the winding of relay A which releases and to one side of the winding of the start magnet X which, upon energization, will attract its latch and withdraw it from the distributor arm D1 permitting this arm to be rotated, as is well known, through a friction drive with a motor shaft which may be a separate motor or may be the motor Mo3 which also frictionally drives the stopping disk Z1 and the phasing cam Z2.

As the distributor arm makes its first rotation, channel-one information is transmitted over the line L and is recorded by the monitor printing mechanism, as is well understood. As the brush arm contacts with segment S it connects battery to one side of the winding of the stepping magnet SM2, which steps the arms B1, B2 and B3 of the rotary switch on to contacts 2. The magnet X is energized over contact 2 of the third bank so that the distributor arm will continue to rotate, and as it makes its second rotation it will transmit channel-two information. This alternate transmission of channel-one and channel-two information continues if there are quotations waiting, and as the twenty-second transmission is made, which is a channel-two transmission, the brush B3 moves over free contact 23 thus removing battery from this branch of the circuit to the winding of relay X.

Immediately after the brush B3 has been stepped ahead the magnet Z is energized, withdrawing its latching pawl from the disk Z1, which operation it also performs during each transmission, permitting the cam Z2 to be rotated to open its contact, thereby opening also the circuit from battery at this point for the starting magnet X. As the distributor arm D1 completes its twenty-second rotation it connects battery across its brush and a resistance, across the winding of the relay A, and across the winding of relay X, to ground, but relay X does not pick up at this time on account of the resistance in the circuit.

The relay A at its contact 1 connects battery extended across the brush PD of the monitor printer distributor to the rotary switch arm B1, and across the contact 23, to one side of the winding of the stepping magnet SM2, causing the arms B1, B2 and B3 to step ahead to the twenty-fourth contact. Battery across the brush PD of the monitor printer distributor is also extended across the contact 2 of relay A to the rotary switch arm B2, and across contact 23, to the winding of the start magnet SM1 which energizes and withdraws its latch from the arm PD, permitting this arm to make a rotation, the arm being driven from any suitable motor approximately synchronized with the motor Mo3 or driven by said motor through a friction clutch mechanism, as is well understood.

As the distributor arm PD of the monitor printer distributor completes its rotation it again connects battery over the contact 1 on relay A, rotary switch arm B1, and across contact 24, to one side of the winding of the stepping magnet SM2, causing the rotary switch arms B1, B2 and B3 to be stepped ahead to a twenty-fifth contact. Battery across the distributor arm PD, and contact 2 of relay A, rotary switch arm B2 and contact 24, bank 2, again operates the start magnet SM1 of the monitor printing device, and permits the monitor distributor arm to make another rotation. As the rotary switch arm B3 contacts with the twenty-fifth stationary contact, it connects battery from the normal contact 2 of relay H, if quotations are waiting, across the operated contact 2 of relay E, to one side of the starting magnet X of the transmitting distributor, causing this distributor to make a rotation. A spacing signal on line L will apply battery across the contact 1 of relay E to energize the starting magnet SM1. As the arm D1 passes over the segment S it energizes the stepping magnet SM2 causing the rotary switches B1, B2 and B3 to be moved on to the 1 contact. During this last operation the distributor arm transmitted channel-one information.

If the relay R is still energized the relay H will be deenergized and battery over contact 2 of relay H and the rotary switch B3 and contact 1 of the third bank will energize the starting magnet X, permitting the distributor arm D1 to continue its rotation and transmit a channel-two quotation, and after the transmission of twenty-one additional quotations, the circuit for the starting magnet X will be opened, as before, as the rotary switch arm B3 moves off contact 22, but the magnet X will be held up over the contact controlled by the phasing cam Z2 which is now in a position to close its contact so that the distributor arm will make another rotation.

As the stepping magnet SM2 is again energized and steps the arm B3 on to contact 24, battery from contact 2 of relay H, is extended across the normal contact 3 of relay A to the winding of the start magnet X, causing this magnet to energize, preventing the relay A from being pulled up as the distributor arm D1 reaches its home position. This causes the distributor arm to transmit another channel-two quotation, and to step the switch arm B3 on to the twenty-fifth contact which has, as before, energized the starting magnet X causing the distributor arm to make another rotation and transmit information, which in turn causes the stepping magnet SM2 to step the rotary arm B3 on to contact 1, after which transmission will take place as before until the arm B3 moves on to contact 23 opening one of the circuits to the starting magnet X, the other circuit being opened at the contact controlled by the phasing cam Z2 as a channel-two quotation has just been transmitted. By means of the construction described, the mechanism will come into operation to arrest the transmission of quotations after a series of forty-eight quotations has been transmitted.

If it is assumed that a quotation is set up to be transmitted on channel-one, but that no further information has been set up, then the release of the relay H will energize the distributor magnet X and permit the arm D1 to make one rotation to transmit this information. The relay H was released at the time that the relay R was energized and when the relay R is deenergized a circuit will be prepared for the relays F and G across the contact 1 on relay R, and contact 3 of the relay H. During the second rotation of the distributor arm battery will be connected across the distributor arm and segment 4, across

the relay F, energizing this relay, which will lock over its own contact 1, and over the contact 3 of relay H, and contact 1 of relay R, to ground. During the third rotation of the distributor arm, battery over the arm and segment 3, and operated contact 2 of relay F, will operate relay G which locks over its own contact 1 and contact 3 of relay H, and contact 1 of relay R, to ground. During the next rotation of the arm D1, battery over said arm and segment 2 will operate contact 2 of relay G, will operate the relay H which removes battery from the winding of the relay X, and opens the circuits for the relays G and F, causing these relays to descend. The relay H will lock over its own contact 1 and contact 1 of relay R, to ground. If, during the last rotation of the distributor arm D1, the phasing cam Z2 was caused to close its contact, then the distributor arm will make an additional rotation to bring the parts into the position indicated in the drawings in which the mechanism is conditioned for a channel-one transmission.

While this invention has been described with particularity with reference to the embodiments disclosed, it is obvious that the principle of this invention may be carried out by other means and mechanisms. It is, therefore, not the intention to limit the claims to these embodiments, and it is to be understood that the claims are to be accorded the scope permitted by the prior art.

What we claim is:

1. In an apparatus of the character described, the combination of a transmitting distributor, a relay, means controlled by said relay when energized for setting the distributor in operation, a counting chain of relays, said first mentioned relay when deenergized closing a circuit to the counting chain of relays, means included in said closed circuit for sending a number of impulses to the chain, depending upon the number of rotations of the distributor, and means controlled by said counting chain of relays for stopping the distributor after a predetermined number of idle operations have been made following the deenergization of said relay.

2. In an apparatus of the character described, the combination of a transmitting distributor, a counting chain of relays, one of which is normally energized, a relay for starting said distributor, a circuit for said starting relay adapted to be closed upon deenergization of said normally energized relay of the counting chain of relays, a normally deenergized relay over the contact of which the circuit of said normally energized relay of the counting chain of relays extends, said normally deenergized relay being adapted to be energized to open said circuit to deenergize said normally energized relay of the counting chain of relays to energize said starting relay to set the transmitting distributor in operation, and means included in the distributor for successively operating the other of the relays of the said counting chain of relays after the normally deenergized relay has been released, said counting chain of relays closing a circuit for said normally energized relay from the transmitting distributor after a plurality of operations of the transmitter have been made to cause the deenergization of the starting relay to stop said distributor.

3. In an apparatus of the character described, the combination of a transmitting distributor, a relay, means controlled by said relay when energized for setting the distributor in operation, a counting chain of relays, said first mentioned relay when deenergized establishing an impulsing circuit from the distributor to said counting chain of relays, means controlled by the last operated relay of said counting chain of relays controlling said first mentioned means for stopping said distributor after a predetermined number of idle operations have been made following the release of said first mentioned relay, and means operable during an uneven numbered operation of the distributor for causing said distributor to make an additional operation in case the counting chain functions to stop the distributor at the end of an uneven number of operations.

4. In an apparatus of the character described, the combination of a transmitting distributor over which messages are transmitted, a counting chain of relays one of which is normally energized, a relay for starting said distributor, a circuit for said starting relay adapted to be closed upon deenergization of said relay of the counting chain of relays, a normally deenergized relay over a contact of which the circuit of said normally energized relay of the counting chain of relays extends, said normally deenergized relay being adapted to be energized to cause the deenergization of said normally energized relay of the counting chain of relays to energize the starting relay of the distributor, means included in the distributor for successively operating the relays of the said counting chain of relays after said normally deenergized relay has been deenergized, said normally energized relay of said counting chain of relays being the last to be energized and being adapted after a plurality of operations of the transmitter have been made to be energized to cause the deenergization of the starting relay to stop the distributor, and means operable during an uneven numbered operation of the distributor for causing said distributor to make an additional operation in case the counting chain functions to arrest the distributor at the end of an uneven number of operations.

5. In an apparatus of the character described, the combination of a transmitting distributor, a relay adapted to be operated when messages are to be transmitted, a starting relay controlled by said relay for releasing the distributor to transmit a message and for arresting said distributor after messages have been transmitted, a phasing mechanism, a counting chain of relays, a normally energized control relay for causing said starting relay to arrest said distributor, a contact for momentarily opening a circuit to said normally energized control relay, a cam operable after a predetermined number of continuous cycles of operations of the distributor for opening said contact for controlling said normally energized control relay to cause the arrest of said distributor, a second cam, a circuit adapted to be closed by said normally energized control relay for releasing said second cam, means controlled by said second cam for setting said counting chain of relays in operation, and means controlled by the last operated relay of said counting chain of relays for arresting said second mentioned cam and for causing the reenergization of said normally energized control relay controlling the stopping of said distributor for again releasing said distributor to continue to transmit any waiting messages.

6. In an apparatus of the character described, the combination of a transmitting distributor, a relay for releasing said distributor for operation, means for causing the arrest of said distributor

after the lapse of a predetermined period of time corresponding to a predetermined number of successive transmissions, means for causing said distributor to remain at rest for a predetermined time, means controlled by said distributor for continuing the operation of said distributor for an additional rotation when said arresting means operates after an odd number of transmissions, and means for causing said distributor to resume operations if said relay is operated.

7. In an apparatus of the character described, the combination of a transmitting distributor, a cam, a common shaft for driving said distributor and cam, means normally holding said distributor and cam against rotation, a second cam adapted to be driven through a reduction gear from said shaft, a relay, means operated by said relay for releasing said distributor, means operated by said second mentioned cam for arresting said distributor after a period of time corresponding to a predetermined number of transmissions and for releasing said first mentioned cam, and means set in operation by said first mentioned cam and operable after a predetermined interval of time for arresting said first mentioned cam and also for starting said distributor under control of an operated condition of said relay.

8. In an apparatus of the character described, the combination of a transmitting distributor, a monitor printer distributor, a relay, means operated by said relay to release said transmitting distributor to transmit a message and to control the monitor printer, a stepping switch mechanism including a plurality of banks, a magnet for stepping said switch mechanism, a circuit for releasing said transmitting distributor made across one of said banks when said relay is operated, said circuit being made across said bank in a plurality of positions of said one bank to control a definite number of operations of the transmitting distributor while said relay is operated and adapted to be opened after a certain number of operations of the transmitting distributor, means for automatically closing a circuit across the monitor printer distributor and a pair of banks of said switch for releasing said monitor printer distributor and for operating said stepping magnet to step said switch ahead to again close the circuit for releasing said transmitting distributor across the first bank of said switch, said transmitting distributor remaining released for another series of operations, means operated after said series of operations have been made for releasing said transmitting distributor and for causing said transmitting distributor to make one operation for each step of the switch, said operation of the transmitting distributor and the switch being continued through another series of operations after which the transmitting distributor will be arrested as the switch is stepped ahead a plurality of steps under control of the monitor printer distributor.

9. In an apparatus of the character described, the combination of a transmitting distributor, a monitor printer distributor operated under the control of said transmitting distributor, means for releasing said transmitting distributor, and means under control of said transmitting distributor for arresting said transmitting distributor, said last mentioned means operating after a plurality of operations of said transmitting distributor, and means under control of said second mentioned means and said monitor printer distributor for releasing said transmitting distributor after a predetermined number of operations of the monitor distributor have been made.

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