

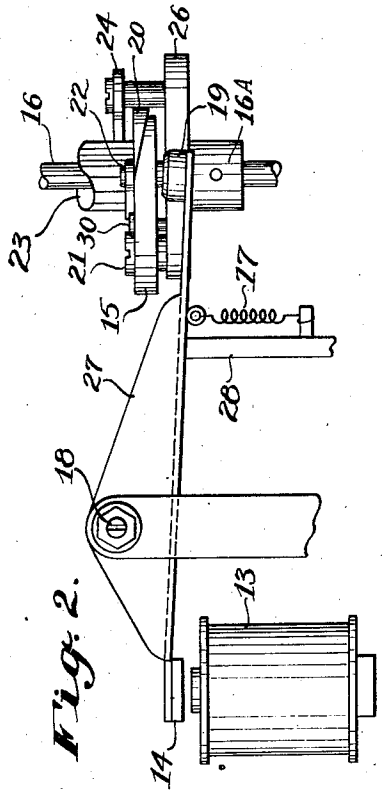
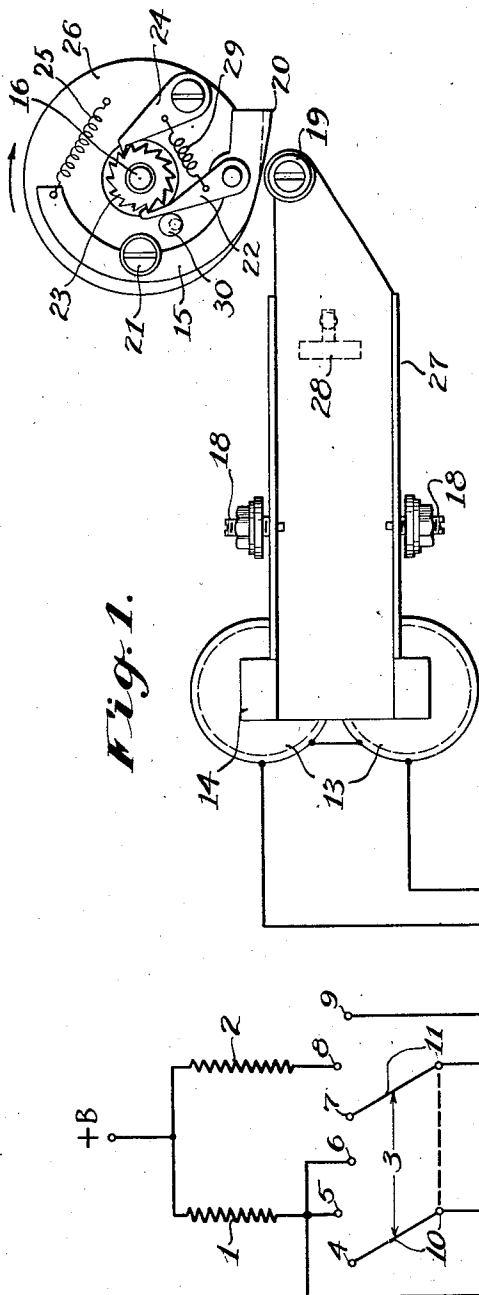
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ELECTROMECHANICAL PHASING DEVICE

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ELECTROMECHANICAL PHASING DEVICE

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This invention relates to a manually controlled electro-mechanical phasing device for use primarily with receiving distributors of the type employed in multiplex telegraph systems.

Phase correctors as used heretofore provide continuous correction of the distributor brushes either in response to synchronizing signals or under control of the code signals themselves. At the outset of transmission, however, it is essential that signal element #1 be received on distributor segment #1, element #2 on segment #2, etc., in order that the correct signal combination may be set up for operation of the printer.

When a synchronous printing telegraph circuit is started in operation, the signal elements will not necessarily be applied to the proper segments of the distributor. It is the purpose of this invention therefore, to provide means including a manual switch operable after baud phasing has been established for controlling an electromechanical device so that the brushes associated with the receiving distributor shall be moved in steps of whole elements until the signalling code elements are correctly applied.

It is an object of our invention to provide means for orienting the brushes of a distributor in a step-by-step manner where each step represents the angular spacing between centers of adjacent active segments of the face-plate.

It is a further object of our invention to render the stepwise setting of the distributor brushes more rapid than could be accomplished by the conventional phase corrector means of a synchronizing system.

Our invention will now be described in more detail, reference being made to the accompanying drawings in which

Fig. 1 shows a circuit diagram and certain mechanical structure which has been found advantageous and useful for carrying out the invention, and

Fig. 2 shows a different view of the electromagnetic device for actuating a cam mechanism which is also shown as part of Fig. 1.

Referring to Fig. 1, we show therein a double-pole-triple-throw switch 3 having switch arms 10 and 11 and switch points 4 to 9 inclusive. Switch points 4 and 7 are for the "off" position of the switch, points 5 and 6 are fed with potential from a direct current source indicated by the +B terminal. A resistor 1 is included in the circuit. Resistor 2 connects the +B source terminal to switch point 8. Switch point 9 is connected to switch blade 10 and also to one terminal of a winding for a magnet 13. The other

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terminal of this magnet winding is connected to the minus terminal of the direct current source (-B), which terminal may be grounded if desired.

The switch 3 is manually controlled. Another double-pole-triple-throw switch 3' is also shown for purposes of indicating that control may be had from a remote point. The components of the switch 3' include two switch blades 10' and 11' and switch points 4', 5', 6', 7', 8' and 9'. Switch points 4' and 7' are for the "off" position. Switch points 5' and 6' are interconnected with points 5 and 6 in the switch 3. Switch points 9 and 9' are interconnected and both are connected to switch blade 10'. Switch point 8' is connected to the +B source through a resistor 2', but may, if desired, be connected to switch point 8 so as to eliminate the extra resistor 2'.

Switch blade 11 is connected to one terminal of a capacitor 12, the other terminal of this capacitor being grounded. Similarly, switch blade 11' is connected to one terminal of a capacitor 12' the other terminal of which is grounded.

The magnet 13 has an armature 14 which is mounted on a lever arm 27 pivoted at 18. The lever arm 27 is normally held against a stop 28 by means of a spring 17. At the end of the lever arm 27 is a roller 19 so positioned that it will rise up into the path of a cam member 15 when the magnet 13 fully attracts the armature 14. Cam member 15 is pivotally mounted on the top surface of a disc 26. A shaft 16 and a collar 16A support disc 26 in its operative position. Shaft 16 also carries a brush arm associated with a distributor face-plate (not shown).

Loosely mounted on the shaft 16 is a ratchet wheel 23 which is fastened to the hub of a driving gear (not shown). Normally the brush arm shaft 16, the disc 26 and the driving gear hub with its ratchet wheel 23 are rotated in a locked up condition by virtue of the engagement of a holding pawl 24 in one of the teeth of the ratchet wheel 23. Pawl 24 is pivotally mounted on the disc 26.

As previously mentioned, cam member 15 is pivotally mounted on a disc 26, the pivot stud being shown at 21. This cam member is arranged and adapted to be rocked through a small angle against the tension of a spring 29 when the cam periphery is engaged by the roller 19.

At one place on the cam member 15 is a pivot support for a retracting pawl 22. This pawl and pawl 24 are resiliently interlinked by means of a spring 29. The two pawls are, therefore, urged against the teeth of the ratchet wheel 23 by vir-

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tue of the tension of spring 29. In place of a single spring 29, however, each pawl may, if desired, be independently held against the ratchet wheel by a separate spring.

The shaft 16 as viewed in Fig. 1 rotates clockwise, as indicated by the arrow. The trailing end of the cam member 15 when acted upon by the roller 19 produces the aforementioned rocking action about the pivot 21 and thereby causes the pawl 22 to ride over a tooth of the ratchet wheel 23. As the trailing end of the cam 15 passes under the roller 19 the latter is "de-railed" by a wedge shaped boss 20 which is integral with the cam member 15. The roller 19 after performing its function of rocking the cam member 15 is then forced down out of the path of the cam member 15, thus permitting the cam 15 to be restored by its spring 25 to the normal position. This operation produces a retrograde movement of the ratchet wheel 23 to the limited extent of one tooth space. The pawl 24 rides over a single tooth of the ratchet wheel. By this time the magnet 13 no longer attracts its armature 14.

An eccentric stud 30 is mounted on the disc 25 in a suitable position to act as a back-stop for the pawl 22. By turning and then fastening this stud so as to provide just the right amount of clearance for the pawl 22 the latter can be prevented from improperly disengaging itself from the ratchet wheel 23.

The operation of our invention will now be more fully described. When the switch 3 and the switch 3' are both set in the positions shown, that is, on contracts 4 and 7, also 4' and 7', then all circuits are open and the device is not in use. Since the control may be had from either of two points it will be sufficient to describe the operation of the switch 3 only, the operation of switch 3' being exactly the same.

When the switch blades 10 and 11 are advanced to contacts 5 and 8 respectively, two circuits are established. Switch blade 10 connects the power source to the winding of magnet 13, thus energizing the same. Switch blade 11 establishes a connection across the terminals of the power source through the capacitor 12.

The impedance of the resistor 1 in series with the coil of magnet 13 does not allow the flow of sufficient current to develop an attractive magnetic force for moving the armature 14 against the retractile force of the spring 17. However, the circuit through the capacitor 12 causes this capacitor to be charged to the voltage of the direct current source in a time t of very short duration, resistor 2 being small and included only to prevent line surges.

When switch 3 is further advanced so that blades 10 and 11 rest on points 6 and 9 respectively, then, while the basic circuit is maintained through switch blade 10, the potential applied to the coil of magnet 13 is augmented by the charge on capacitor 12. Capacitor 12, therefore, discharges through the magnet coil until its charge equals the difference between the full voltage of the source and the potential drop across resistor 1.

During the discharge of the capacitor 12 sufficient current flows through the coil of magnet 13 to overcome the retractile force of the spring 17 and to cause the attraction of the armature 14. The lever arm 27 is now rocked about its pivot center 18 so as to bring the roller 19 into the path of the cam member 15.

At a certain point in the cycle of the cam member 15, which rotates continuously, the roller 19

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presses against this cam and causes it to pivot about the point 21 against the tension of spring 25. This motion causes pawl 22 to advance over one tooth of the driver ratchet 23, but no change of relation between this ratchet and the driven shaft 16 takes place until the roller 19 becomes "de-railed." Then, however, the spring 29 is free to act and the pawl 22 is retracted.

Coincident with this stepping action of pawl 22 the roller 19 is forced down the inclined plane of the wedge 20 at the trailing end of the cam 15. This forces the armature out of the strong magnetic field of magnet 13, permitting the spring 17 to take control and to pull the roller down out of the path of the cam 15.

When the roller 19 drops out of contact with cam 15 the spring 25 takes control of the cam 15 and restores the latter to its normal position in relation to the disc 26. Since the driving ratchet 23 rotates continuously the new hold which the pawl 22 has now taken enables the spring 25 to accelerate the disc 26 momentarily, thus causing the detent 24 to ride over a tooth of the ratchet wheel.

The number of teeth in the ratchet wheel 23 is the same as of the number of active segments in the face-plate. Accordingly the ratchet and pawl control as above described is such as to advance the brush arm through the angular distance between centers of two adjacent face-plate segments.

By successively charging and discharging the condenser 12 any required number of steps may be taken to bring the brushes into proper phase with the incoming signals. All that is necessary in this case is to move the switch 3 back to its central position momentarily and then to advance it again so that switch blades 10 and 11 rest upon points 6 and 9 respectively.

The advantages to be gained by manual control of the brush phasing in the manner above described will be apparent when it is considered that on starting up the distributor the brush may be so far out of phase that much time would be lost in attempt to accomplish the orientation by means of the conventional continuously variable corrector system. It will, of course, be appreciated, however, that once the manual stepwise correction has been accomplished the automatically operable phase corrector will be put in service for maintaining synchronism.

What is claimed is:

1. In a device for actuating a ratchet-and-pawl mechanism, a cam member for supporting the pawl, said cam member being rotatable about the axis of the ratchet and oscillatable on a pivot center eccentric to said axis, a cam follower movable into and out of engagement with said cam member, an electromagnetic actuator for said cam follower, a control switching circuit arranged and adapted upon manipulation to energize the magnet of said actuator, thereby to cause displacement of said cam member and to advance the pawl over a tooth of the ratchet, and means for causing the "derailment" of said cam follower and the subsequent retraction of said pawl.

2. A device according to claim 1 and including a capacitor in said control switching circuit, the charging of said capacitor and release of energy therefrom under manipulative control being effective to limit the operating period of said cam follower actuator.

3. In a device of the class described, an electromagnet having an armature to be attracted in opposition to spring tension; a control circuit in-

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cluding a three-position switch, a direct current source and a capacitor, said three-position switch having an "off"-position, an "intermediate"-position for partially energizing said electro-magnet while charging the capacitor, and an "operate"-position arranged to dissipate the capacitor charge through the coil of said magnet; and cyclically motivated mechanism under control of said armature, said mechanism being arranged and adapted to remove the armature from the strong field of the magnet after the discharge of said capacitor.

4. A device according to claim 3 in which said cyclically motivated mechanism is constituted as a driving ratchet and a pawl normally rotatable in locked engagement therewith, the pawl being supported by an oscillatable cam pivoted on a rotatable driven member, and the cam being cooperatively disposed with respect to a lever system carrying said armature and a cam follower at its respective ends.

5. An electromagnetic control mechanism operable upon a continuously revolving cam member which supports a driven pawl normally engaged with a ratchet wheel tooth, said cam member being pivotally mounted on a disc which rotates coaxially with said ratchet, said control mechanism having a lever system pivotally mounted intermediate its ends, one end carrying an armature, the other end pivotally supporting a cam follower roller, an electromagnet for attracting said armature against spring tension, thereby to bring said roller into the orbit of said cam member, an energizing source switchable into circuit with said electromagnet and switching means in cooperation with a capacitor for momentarily augmenting the current flow through the winding of said electromagnet, whereby the cam member upon being engaged by said roller is caused to advance the pawl over a tooth of said ratchet.

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6. A mechanism according to claim 5 and including a boss formed on said cam member whereby said roller is pushed to one side of the orbital plane of said cam member after the latter has actuated said pawl.

7. In combination, a double-pole-triple-throw switch, an electromagnetic actuator for a continuously rotatable ratchet-and-pawl mechanism of the type which is capable of shifting the phase relation between two coaxial shafts, one a drive shaft which carries the ratchet, the other a driven shaft which carries a disc for providing pivotal support to a cam member, where this cam member offers pivotal support to the pawl of said mechanism, an armature lever system constituting part of said electromagnetic actuator and arranged to cooperate with said cam member for reciprocally actuating said pawl to produce a desired phase shift between said shafts, a capacitor chargeable when said switch is thrown from an "off"-position to an intermediate position, and a circuit closeable by said switch when thrown to its third position for discharging said capacitor through the magnet of said actuator, whereby the armature lever system is kicked into operation and quickly restored to normal.

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