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Blouin

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[54] **REMOTE CONTROL RECEIVER**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **178/88**

[51] **Int. Cl.** **H04l 15/24**

[58] **Field of Search** ..... 179/2 A, 4; 178/2 B, 178/26 R, 4.1, 33 A, 47, 88, 95

[56] **References Cited**

UNITED STATES PATENTS

2,095,144 10/1937 Masson 178/88

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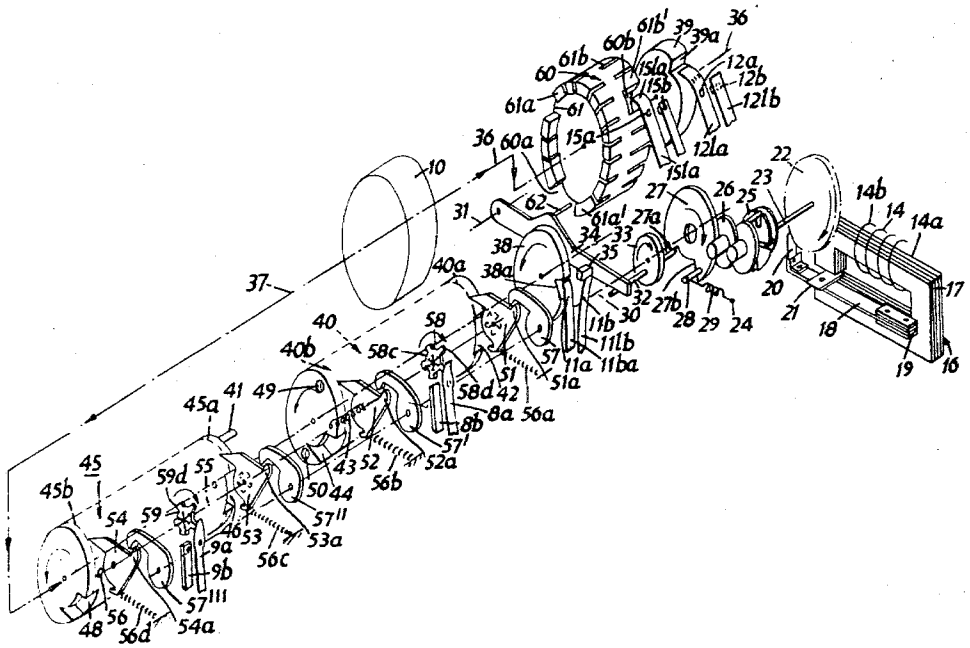
Attorney—**William R. Sherman, Jerry M. Presson et al.**

[57] **ABSTRACT**

Receiving relay of the type used in centralised remote control systems in which a single emitter, without any pilot wires, sends telegrams of orders over the electrical energy mains distribution network. These telegrams of orders are received in synchronisation by one or several receiving relays having a vibrating reed and connected in parallel on the mains network. The pulses are formed by modulating a carrier and are superimposed on the mains. The relays are able to decode optionally at least two sorts of telegrams distinguished by a starting pulse which may be short or long. The receiving relay comprises a vibrating reed frequency selector for detecting the first pulse of the telegram of orders to as to actuate a trip lever closing an energisation circuit passing through a starting cam for controlling contacts for supplying a motor with power.

8 Claims, 10 Drawing Figures



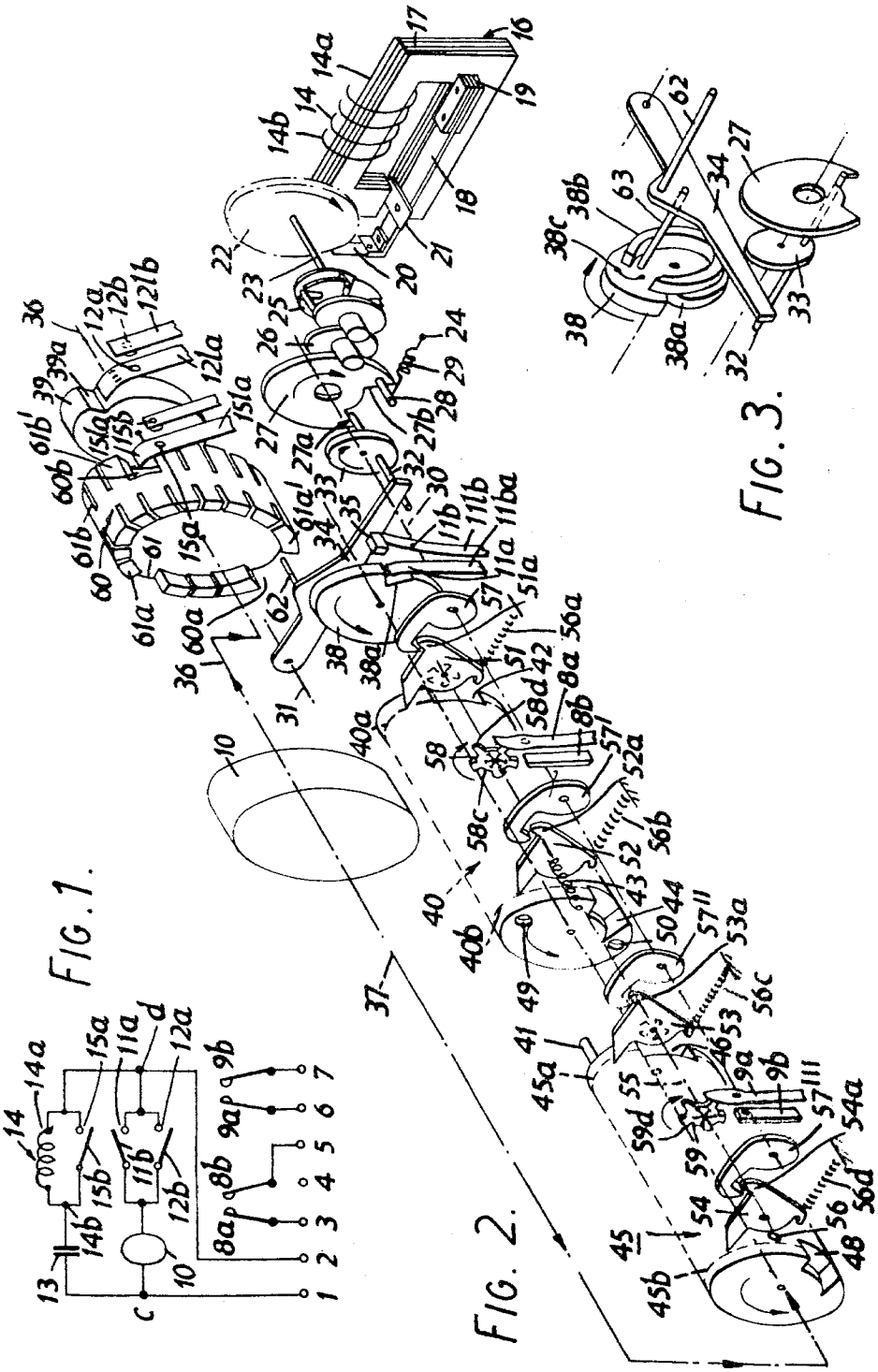


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

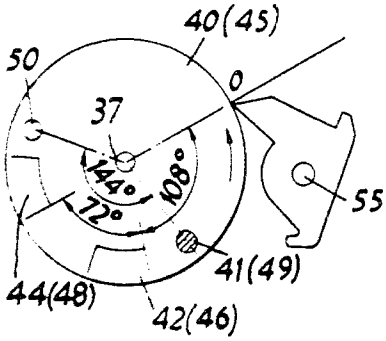


FIG. 5.

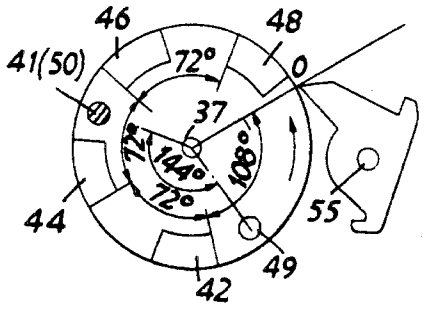


FIG. 10.

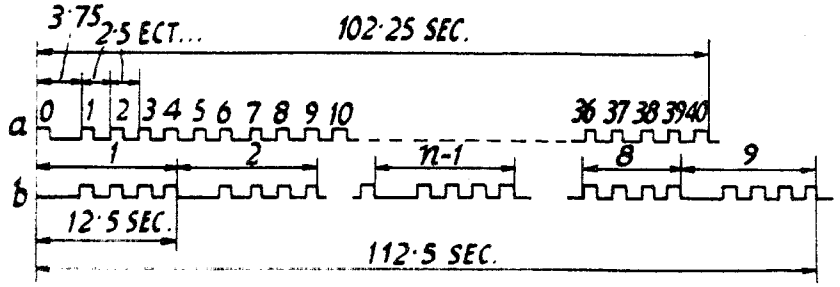


FIG. 6.

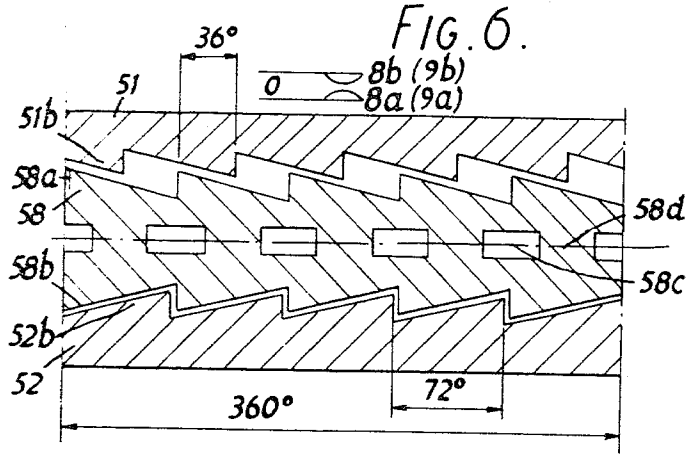


FIG. 7.

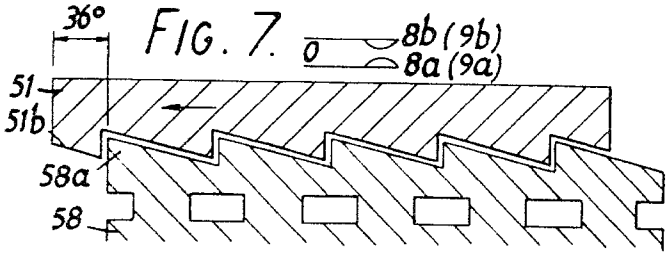


FIG. 8.

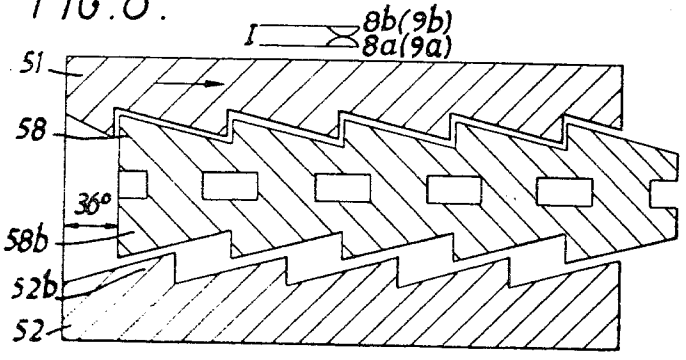
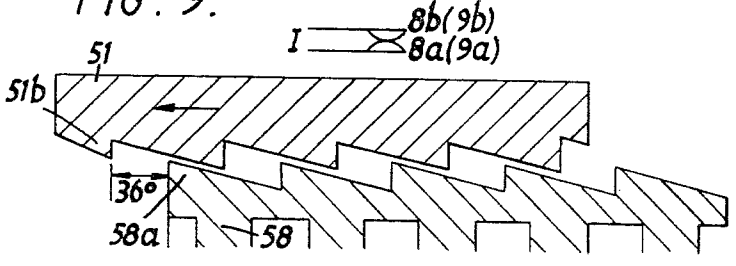


FIG. 9.



REMOTE CONTROL RECEIVER

This motor drives a primary decoding cam which is cut out in the image of the telegram and at least two secondary decoding cams coupled to each other. The primary cam rotates in synchronisation with the transmission of the telegram; the secondary cams rotate at a speed which is a multiple of the speed of the primary cam. Two recesses formed on each secondary cam are spaced apart by an angle proportional to the time separating two order pulses after the interval of time reserved for the first pulse. First and second feeler levers controlled by the recesses execute via the intermediary of bossed cams "close" and "open" orders corresponding respectively to odd and even pulses decoded by the frequency selector. A common catch locks said feeler levers in the absence of pulses. An odd or even order pulse removes the catch and actuates at least one of the feeler levers via the intermediary of the recess presenting itself in synchronisation with said order pulse, such that the bossed cam closes electrical contacts during an odd pulse and opens said contacts for an even pulse.

The "Pulsadis" centralised remote control system is known in which a single emitter, without any pilot wires, sends telegrams of orders over the electrical energy mains distribution network; these telegrams of orders are received synchronously by one or several receiving relays connected in parallel on the mains network. The pulses are formed by modulating a carrier and are superimposed on the mains. The carrier frequency used may be, for example, 175 Hz for a 50 Hz mains frequency. A telegram of orders is formed by a cycle of pulses whose total duration is 102.25 seconds.

The first interval separating two pulses is fixed at 3.75 seconds and the other intervals are fixed at 2.5 seconds. The order pulses have a duration of 1 second.

In order to execute an order, each receiving relay responds to a code contained in the telegram. There are receiving relays which are sensitive to a telegram A comprising a long starting pulse of 2.5 seconds located at the beginning of the first interval of 3.75 seconds, an order pulse being sent at the beginning of one of the n following intervals.

Other relays are decoded by a telegram B comprising a short starting pulse of 1 second, an order pulse being sent in the same manner as in the case of the telegram A. There are also receiving relays which are decoded by a telegram C comprising a short starting pulse of 1 second, followed by a preselection pulse (1 second) preceding an order pulse of rank n.

A receiving relay which normally responds to code B is also sensitive to code A. With conventional receiving relays, it is not possible to perform a selective decoding and without particular precautions these relays are not compatable within the same remote control network.

The object of the present invention is to remedy these disadvantages and to provide, to this end, remote control receiving relays of identical construction capable of decoding one telegram from two by differentiating them both by the duration of the control pulse and by the rank of the order pulse.

The receiving relay according to the invention, of the type used in centralised remote control systems, comprises:

a vibrating reed frequency selector for detecting the first pulse of a telegram of orders so as to actuate a trip lever for closing an energisation circuit passing through

contacts controlled by a starting cam for supplying power to a motor driving a primary decoding cam having a portion cut out in the image of the telegram and at least two secondary decoding cams coupled together, the primary cam turning in synchronisation with the transmission of the telegram, the secondary cams turning at a speed which is a multiple of the speed of the primary cam; two recesses formed on each secondary cam being offset by an angle proportional to the time separating two order pulses after the interval of time reserved for the first pulse; first and second feeler levers controlled by the recesses for executing, via the intermediary of bossed cams, "close" and "open" orders corresponding respectively to the odd and even pulses decoded by the frequency selector, a common catch for locking said feeler levers in the absence of pulses; an odd or even order pulse removing the catch and actuating at least one of the feeler levers via the intermediary of the recess presenting itself in synchronisation with said order pulse, such that the bossed cam closes electrical contacts during an odd pulse and opens said contacts for an even pulse.

According to a preferred feature of the invention the cut out portion of the primary cam has a first row of breakable crenelles for forming recesses corresponding to the starting and order pulses of the telegram to be decoded, a first peg rigid with the trip lever engages in a starting recess and at the interior of the hollow profile of said cam during the first pulse, said peg disengages itself when an order recess presents itself such that between said recesses the trip lever maintains closed the motor energisation circuit passing through the contacts of the starting cam.

According to another preferred feature of the invention, the trip lever is equipped with an optional supplementary peg blocked by the rotation of a hollow profile of the contact controlling cam when the first pulse is short, such that said lever mechanically blocks the frequency selector which becomes insensitive to order pulses transmitted after a first short pulse and for the entire duration of the telegram.

According to another subsidiary feature of the invention, the cut out portion of the primary cam has a second row of breakable crenelles for forming recesses corresponding to the starting and order pulses of the telgram to be decoded, the electrical contacts being opened at the passage of the recesses for unshort-circuiting the winding of the frequency selector and these same contacts being closed outside the recesses for short-circuiting said winding.

According to another subsidiary feature of the invention, a feeler lever executes an order by two successive movements, the first is a rocking of the end of the lever into the recess of the secondary rotating cam, the rocking having the effect of putting into engagement axial teeth provided on the adjacent lateral faces of the feeler lever and of the bossed cam, the second movement is a reverse rocking consecutive to the return of said end onto the exterior profile of the secondary rotating cam, the reverse rocking having the effect of making said teeth advance such that the bossed cam rotates through an angle corresponding to the closing or the opening of the associated electrical contacts.

According to another subsidiary feature of the invention, the bossed cam comprises two sets of axial ratchet teeth disposed symmetrically on its two faces, the feeler levers have a set of axial ratchet teeth bearing elasti-

cally against the corresponding teeth of the bossed cam, the teeth of a feeler lever are shifted through half of said proportional angle with respect to the teeth of the other feeler lever, such that the teeth of a feeler lever which has executed an opening order are in direct engagement at the end of the rotation with the corresponding teeth of the bossed cam whereas the teeth of the other feeler lever are shifted by half a tooth forward with respect to the other teeth of the bossed cam while waiting for the execution of a closing order, such that furthermore said teeth in engagement at the end of the rotation cannot repeat a previously executed order.

According to another subsidiary feature of the invention, the secondary cams are coupled with their respective recesses in phase two by two such that one revolution of each secondary cam executes one order chosen among two possible successive orders.

According to another subsidiary feature of the invention, the secondary cams are coupled with an offset between their respective recesses such that one revolution of each secondary cam executes one order chosen among four possible successive orders.

The invention will be better understood with the aid of the following description and of the accompanying drawings which are given merely by way of example without any limiting character.

FIG. 1 shows an electrical schematic diagram of the principle of the receiving relay forming the subject of the invention;

FIG. 2 is an exploded view in perspective of an embodiment of the mechanism of the receiving relay according to FIG. 1;

FIG. 3 is a detail of construction of FIG. 2;

FIGS. 4 to 9 are other details of FIG. 2;

FIG. 10 illustrates a diagram of the mode of operation of the receiving relay according to the invention.

In FIG. 1, the receiving relay is connected in parallel on the mains network by terminals 1 and 2. The terminal 2 is connected to the common point *d* and to a terminal 14*a* of the winding 14. The terminal 1 is connected to the common point *c* and to a capacitor 13 connected in series at the point 14*b* with the winding 14 which can be shunted by contacts 15*a* and 156. The capacitor 13 and the winding 14 constitute a tuned circuit tuned to the frequency of the carrier forming the pulses; this circuit 13, 14 is thus used in a known manner for obtaining a frequency selection electrically. A motor 10 connected to the common point *c* is also connected to the common point *d* through parallel contacts 11*a*, 11*b* and 12*a*, 12*b*. The contacts 8*a*, 8*b* and 9*a*, 9*b* connected respectively to the terminals 3, 5 and 6, 7 are operated by the relay in response to the orders that it receives; the manner of this operation will be explained in the course of the present description.

In FIG. 2, a mechanical frequency selector 16 of a known type comprises a magnetic circuit 17, a vibrating reed 18 held at one end by an embedding 19 and provided with a pawl 20 at its other end. A lateral extension 21 of the reed 18 is disposed in the air gap of the magnetic circuit 17. The pawl 20 engages with the periphery of a ratchet wheel or friction wheel 22 mounted on a shaft 23 which drives successively an Oldam coupling 25, a gear train 26 and a cam 27. The assembly of rotating pieces 22 to 27 is returned to a rest position by a spring 29 attached to the point 28 of the cam 27 on the one hand and to a fixed point 24 on the other hand.

In the position shown by FIG. 2, the rest stop 27a of the cam 27 maintains the crank 32 of the disc 33 in a position which corresponds to the rest position of the trip lever 34. The disc 33 is rigid with a shaft 30 securely fastened to a catch 57. For clarity in the drawing, the catch 57 is represented by four pieces 57, 57', 57'' and 57''' which, in practice, form just a single piece of sufficient width to cover the lugs 51*a*, 52*a* and 53*a*, 54*a*.

The motor 10 drives, through a reducing gear, on the one hand a shaft 36 rigid with a primary decoding cam 60 and with a primary cycle cam 39, and on the other hand a shaft 37 rigid with a starting cam 38 and with secondary decoding cams 40 and 45 respectively. The shaft 36 and consequently the cams 39, 60 make one revolution per cycle of a duration fixed at 102.5 seconds. The shaft 37 and consequently the cams 38, 40 and 45 make nine revolutions per cycle (1 to 9, FIG. 10b), namely one revolution in 12.5 seconds. The gear ratios and the times are given merely by way of example.

The contacts 11*a*, 11*b* are placed under the dependency of the cam 38 and of the boss 35 of the lever 34 and control the energisation circuit of the motor 10 (see FIG. 1). The contacts 11*a* and 11*b* close when the blade of the contact 11*a* disengages from the recess 38*a* in order to maintain the energisation circuit of the motor 10 for one revolution (12.5 seconds) of the cam 38 after the motor has started. The contacts 12*a*, 12*b* are closed as soon as the blade 121*a* disengages from the recess 39*a* in order to maintain the energisation circuit of the motor 10 for one revolution (102.5 seconds) of the cam 39.

The cam 60 with its crenelles (i.e. the upstanding portions between the recesses) performs mechanical and electrical blocking functions. Its periphery comprises two similar tracks each presenting a fixed recess 60*a* and 60*b* respectively, 18 crenelles such as 61*a* and 61*b*, plus a compensation crenelle such as 61*a'* and 61*b'*.

By comparison with the telegram of FIG. 10*a*; the times represented by the cut-out portions of the primary cam 60 are the following: 3.75 seconds for a fixed recess 60*a* or 60*b*; 2.5 seconds for a decoding recess 61 (equivalent to a crenelle 61*a* or 61*b*); 8.75 seconds for a compensation crenelle 61*a' or 61b'*, with a total of 102.5 seconds for a complete revolution of the cam 60.

The mechanical authorisation for actuating the trip lever 34 is subordinated first to the passage of its pin 62 into the fixed recess such as 60*a*, and then to the passage of this pin 62 into a coding recess such as 61 obtained by breaking off a crenelle 61*a*. FIG. 3 shows a supplementary, optional locking arrangement for the lever 34 which can be used for rendering the receiving relay according to the invention insensitive to starting orders of short duration (1 second). In this case, a peg 63 placed on the lever 34 engages inside a cup-shaped cam 38*b* rigid with the cam 38. The lifting of the lever 34 is only possible by the simultaneous release of the peg 63 passing outwardly into the opening 38*c* and of the peg 62 engaging inwardly into the fixed recess 60*a*.

The electrical authorisation for actuating the receiving relay is obtained by the opening of the contacts 15*a*, 15*b* which short circuit the winding 14 (FIG. 1). The opening of these contacts is obtained by the engagement of the blade 151*a* into a coding recess similar to 61 obtained by prior rupturing of a crenelle 61*b*.

The secondary decoding cam **40** comprises two tracks, one of which, **40***a*, has a recess **42**, and the other of which, **40***b*, has a recess **44**. The secondary decoding cam **45**, coupled to the cam **40**, also comprises two tracks, one of which, **45***a*, has a recess **46**, and the other of which, **45***b*, has a recess **48**. It should be recalled that in this embodiment, the cam **40** makes one revolution in 12.5 seconds, so that taking into account the spacing of the pulses of the telegram, the recess **42** is located at 108° from the position of the origin O of the cam **40** (FIGS. **4** and **10***b*). This arrangement respects the time of 3.75 seconds corresponding to the first pulse, namely the starting pulse, taken together with the interval that separates it from the first order pulse. The possible positions of the recess **42** are located at 72° from each other after the angle of 108° from the origin position O of the cam **40**, in order to respect the time of 2.5 seconds which elapses between two order pulses (FIGS. **4** and **10**).

The recesses **42, 46** can be put in phase (FIG. **4**) by aligning the cams **40** and **45** identically with each other on the shaft **37**. For this purpose, a stud **41** of the cam **45** engages in a hole **49** of the cam **40**. A phase shift between the recesses is obtained by shifting the stud **41** into the hole **50**, that is to say 144° in the present example.

The tracks **40***a*, **40***b* and **45***a*, **45***b* are followed by corresponding levers **51, 52** and **53, 54** articulated on a shaft **55** and returned individually by springs **56***a*, **56***b*, **56***c* and **56***d*. These levers each comprise a lug, **51***a*, **52***a* and **53***a*, **54***a* respectively, which can be retained by the common catch **57** rigid with the shaft **30**.

The internal faces of the levers **51** to **54** have ratchet teeth such as **51***b*, **52***b* (visible in the developments of FIGS. **6** to **9**) oriented in the direction of the shaft **55**. The bossed cam **58** turning on the shaft **55** is disposed between the internal faces of the levers **51, 52**. Another bossed cam **55** is disposed in the same manner between the levers **53, 54**, the bossed cams **58** and **59** comprising on their two faces ratchet teeth such as **58***a*, **58***b* equal in number to the teeth of the levers.

In order to obtain relative motion, which will be explained in the course of the present description, it should be noted that the axial teeth **51***b* and **52***b*, corresponding respectively to the levers **51** and **52**, are shifted with respect to each other by 36° when these levers are at rest whereas the teeth **58***a* and **58***b* of the bossed cam **58** are symmetrical (FIG. **6**).

The arrangement of the teeth could be reversed without changing the scope of the invention. The same types of teeth are adopted for the levers **53**, and **54**, as well as for the bossed cam **59** actuating the contacts **9***a*, **9***b*.

The freely turning stack constituted by the levers **51** to **54** and the cams **58, 59** have some axial play obtained by a spring **43** mounted on the shaft **55** between the levers **52, 53** such that the teeth **58***a*, **58***b* and the similar teeth of the cam **59** can engage or disengage freely with the corresponding teeth such as **51***b*, **52***b*. The stack is retained by a pin **56** fixed on the shaft **55**. The contacts **8***a*, **8***b*, and **9***a*, **9***b* of FIG. **1** are visible in FIG. **2**, facing the bossed cams **58, 59**. The blade of the movable contact **8***a* is actuated by the bosses such as **58***d* (cam **58**) and the blade of the movable contact **9***a* is actuated by the bosses such as **59***d* (cam **59**).

The operation of the receiving relay is the following. When a telegram is sent along the mains network (FIG. **10**), the carrier frequency of its first pulse 0 is applied to the winding **14** as shown in the diagram of FIG. **1**. The reed **18**, urged by the attraction of its extension **21**, begins to resonate and makes the wheel **22** turn via the intermediary of the pawl **20**. The motion is transmitted to the shaft **23**, the Oldam coupling **25**, the gear train **26** and the cam **27**, which stretches the spring **29** by the movable point of attachment **28**. The position of the working abutment **27***b* on the cam **27** is arranged to decode the telegrams first pulse 0, which may be short or long. As soon as the abutment **27***b* encounters the crank **32**, and before the duration of the first pulse has elapsed, the disc **33** rotates with its shaft **30**. At the end of the first pulse, the crank **32** has rotated sufficiently to lift the trip lever **34**, whose pin **62** passes into the recess **60***a*. The boss **35**, in its displacement with the lever **34**, releases the blade **111***b* which closes the contacts **11***a*, **11***b* thereby making the starting circuit of the motor **10** (FIGS. **1** and **2**). The motor **10** starts and drives the cams **38, 40** and **45** via the intermediary of the shaft **37** on the one hand, and the cams **39, 40** via the shaft **36** on the other hand. The cam **38** displaces the closed contacts **11***a* and **11***b* (by means of the blade **111***a*) so as to replace the blade **111***b* under the dependancy of the boss **35** and thereby to prepare for the next start. The cam **39** closes the contacts **12***a*, **12***b* so as to authorise the permanent operation of the motor **10** during a complete revolution (102.5 seconds) of the cam **60**. Simultaneously, the shaft **30** trips the catch **57** in order to release the feeler levers **51** to **54**, which remain in their initial position due to the fact that they bear against the non-recessed parts of the tracks **40***a*, **40***b* and **45***a*, **45***b*.

After a maximum time of 2.5 seconds, when the first starting pulse ceases, the lever **34** falls back and with it the catch **57**. At 3.75 seconds, the blade **111***a* falls back into the recess **38***a* and opens the motor starting circuit that passes through the contacts **11***a*, **11***b*. The motor **10** remains supplied with power by the permanent circuit passing through the contacts **12***a*, **12***b* controlled by the cam **39**. The winding **14** is short circuited by the contacts **15***a*, **15***b* closed by the displacement of the blade **151**a coming out of the recess **60***b*. Simultaneously, the pin **62** comes out of the recess **60***a* and passes to the exterior of the cam **60**. The relay according to the invention is ready to receive order pulses.

In order to meet the operating needs of certain networks that require at least two types of receiving relays to co-exist, for example, one for long starting pulses and the other for short starting pulses followed by a preselection pulse, it becomes imperative to discriminate the length of the starting pulse. Thus, a receiving relay arranged to operate with a long pulse must remain insensitive to a short starting pulse and for this purpose it will be equipped with a supplementary peg **63** (FIG. **3**). In this case, the operation is the following: when a short starting pulse (1 second) is received by the frequency selector **16**, the trip lever **34** is lifted as has been described above. At the end of this pulse, the pin **62** falls back out of the recess **60***a* whereas the pin **63** falls back into the recess **38***c* and engages at the interior of the cup-shaped cam **38***b*, so that the lever **34** is blocked in its low position by the pin **63** during a complete revolution of the cam **38***b* whose rotation is linked with that of the cam **38**. When the order pulses are received by the frequency selector **16**, even if there were

some decoding coincidences with the recesses **60***b* of the cam **60** which would eliminate the short circuit of the winding **14** by opening the contacts **15***a* and **15***b*, the lever **34** will not be lifted by the crank **32**, which will be blocked reciprocally by the lever **34**. The receiving relay according to the invention will thus be insensitive to order pulses which follow.

By contrast, if the receiving relay receives a long starting pulse, the lever **34** maintains the pin **63** for 2.5 seconds, which is a sufficient time to make it clear the recess **38***c* and to maintain it at the exterior of the cup-shaped cam **38***b*. Thus the lever **34** is placed in its high position for the entire duration of the rotation of the cam **60**. The result is that all the order pulses which follow will be received in synchronisation with the opening of the contacts **15***a*, **15***b* and will act on the crank **32** as well as on the catch **57**. The receiving relay will thus be sensitive to the order pulses which follow the long starting pulse.

According to the operating conditions of the receiving relays co-existing on a network, the decoding of the order pulses must be able to be performed with different mechanical couplings between the cams **40** and **45** so as to permit, according to the case, the execution of 8 or 16 pairs of orders. These couplings are obtained as has been explained above by the engagement of the stud **41** into the hole **49** if the cams **40, 45** are to be in phase and in the hole **50** if they are to be out of phase.

Whatever be the coupling imposed, the decoding of a pair of order pulses of the telegram by the cams **40** and **45** takes place in the following manner: when a "close" order pulse is sent in synchronisation, on the one hand, with the decoding conditions imposed by the cam **60** and, on the other hand, with the passage of one of the recesses such as **42, 44, 46,** or **48,** the crank **32** trips the catch **57** which releases the lug of the corresponding lever, for example **51***a* for the lever **51**. The end of the lever **51** engages in the recess **42** under the action of the return spring **56***a*. The teeth 51b of the lever **51** (see FIGS. **2, 6** and **7**) slide (towards the left in FIG. **6**) along the corresponding teeth **58***a* of the bossed cam **58** due to the axial play permitted by the spring **43**, from the position of FIG. **6** to that of FIG. **7**. The teeth **51***b* thus shift through 36° and come into engagement with the teeth **58***a* (FIG. **7**).

At the end of the "close" order pulse, the end of the lever **51** is lifted back onto the track **40***a* and the teeth **51***b*, which are in engagement with the teeth **58***a* move towards the right in FIG. **7** to make the bossed cam **58** pivot and to bring it into the position of FIG. **8** which corresponds to the closing of the contacts **8***a*, **8***b*.

When an "open" order pulse is sent in the conditions of synchronisation and of decoding indicated above, the crank **32** trips the catch **57** which releases the lug of the corresponding lever, for example **52***a* for the lever **52**. The end of the lever **52** engages in the recess **44** under the action of the return spring **56***b*. The teeth **52***b* of the lever **52** (see FIGS. **2** and **8**) slide towards the left in FIG. **8** along the corresponding teeth **58***b* of the bossed cam **58**, due to the axial play permitted by the spring **43**. The teeth 52b thus shift through 36° and come into engagement with the teeth **58***b*. At the end of an "open" order pulse the end of the lever **52** is lifted back onto the track **40***b* and the teeth **52***b* in engagement with the teeth **58***b*, more toward the right to make the bossed cam **58** pivot and to bring it back into the position of FIG. **6** which corresponds to the opening of the contacts **8***a*, **8***b* (or **9***a*, **9***b* for the other cam **45**).

In the case of a confirmation of a "close" order when the contacts **8***a* and **8***b* (or **9***a* and **9***b*) are already closed (FIG. **8**) the teeth **51***b* recoil by 35° (FIG. **9**) without being able to come back into engagement with the teeth **58***a* of the bossed cam **58**. The contacts **8***a*, **8***b* or **9***a*, **9***b* remain closed. Similarly, in the case of a confirmation of an "open" order when the contacts are already open (FIG. **6**), the teeth **52***b* recoil by 35° without being able to come back into engagement with the teeth **58***b* (not shown).

I claim:

1. A receiving relay of the type used in centralised remote control systems for receiving in synchronisation a telegram of orders sent by a single emitter, without any pilot wires, over an electrical energy mains distribution network, the telegram being formed by pulses produced by modulating a carrier and superimposed on the mains network, said receiving relay comprising:

a vibrating reed frequency selector tuned to the frequency of the carrier for detecting the pulses of the telegram ;

a trip lever actuated by said frequency selector in response to pulses received thereby, said trip lever, when actuated by the first pulse, of the telegram, closing a set of starting contacts for starting a motor;

a primary decoding cam having a track shaped in the image of the telegram driven by the motor so that its track rotates in synchronisation with the telegram ;

at least two secondary decoding cams coupled to each other and driven by the motor at a speed which is a multiple of the speed of the primary cam, each secondary cam having two tripping portions spaced apart by an angle corresponding to the time separating two order pulses after the interval of time reserved for the first pulse;

first and second feeler levers controlled by said tripping portions for executing, by means of respective bossed cams, "close" and "open" orders corresponding respectively to order pulses decoded by the frequency selector;

a common catch for locking said feeler levers in the absence of pulses and for unlocking them in the presence of order pulses, whereby when one of said tripping portions of a secondary decoding cam presents itself to its corresponding feeler lever in synchronisation with an order pulse, that feeler lever is actuated by said tripping portion and actuates in turn its corresponding bossed cam so as to make that bossed cam actuate its contacts.

2. A receiving relay according to claim **1**, in which the shaped track of the primary cam has a first row of breakable crenelles for forming recesses corresponding to the starting and order pulses of the telegram to be decoded; and in which a principal peg is provided rigid with the trip lever for engaging in a starting recess and at the interior of a hollow profile provided on said primary cam, during the first pulse; said peg disengaging itself when an order recess presents itself such that between said recesses the trip lever maintains said motor starting contacts closed.

3. A receiving relay according to claim **2** adapted to decode two sorts of telegrams distinguished from each other in that one sort has a short first pulse and the

other sort has a long first pulse, in which the trip lever is equipped with a supplementary peg blocked by the rotation of a hollow profile of the starting contact controlling cam when the first pulse is short, such that said lever mechanically blocks the frequency selector which becomes insensitive to order pulses transmitted after a first short pulse and for the entire duration of the telegram.

4. A receiving relay according to claim 2, in which the primary cam has a second track shaped in the image of the telegram, this second shaped track being in the form of a second row of breakable crenelles for forming recesses corresponding to the starting and order pulses of the telegram to be decoded; electrical contacts being provided which are opened at the passage of the recesses to unshort-circuit a winding of the frequency selector and these same contacts being closed outside the recesses in order to short-circuit said winding.

5. A receiving relay according to claim 2, in which axial teeth are provided on adjacent lateral faces of a feeler lever and its corresponding bossed cam, and in which the feeler lever executes an order by two successive movements, the first is a rocking of the end of said lever into the recess of the secondary rotating cam, for putting the axial teeth on the lever into engagement with the axial teeth on the bossed cam, and the second movement is a reverse rocking consecutive to the return of said end onto the exterior profile of the secondary rotating cam, for advancing said teeth such that the bossed cam rotates through an angle corresponding to the closing or the opening of the associated electrical contacts.

6. Receiving relay according to claim 5, in which the bossed cam comprises two axial sets of ratchet teeth disposed symmetrically on the two faces of said bossed cam, the feeler levers have a set of axial ratchet teeth bearing elastically against the corresponding set of teeth of the bossed cam, the teeth of one feeler lever being shifted by half of said angle corresponding to the time separation between two order pulses, with respect to the teeth of the other feeler lever, such that the teeth of a feeler lever which has executed an "open" order are in direct engagement at the end of the rotation with the corresponding teeth of the bossed cam whereas the teeth of the other feeler lever are shifted by half a tooth forward with respect to the other teeth of the bossed cam while waiting for the execution of a "close" order such that furthermore said teeth in engagement at the end of the rotation cannot repeat a previously executed order.

7. Receiving relay according to claim 2, in which the secondary cams are coupled with their respective recesses in phase two by two such that one revolution of each secondary cam executes one order chosen out of two possible successive orders.

8. Receiving relay according to claim 2, in which the secondary cams are coupled with a shift between their respective recesses such that one revolution of each secondary cam executes one order chosen among four possible successive orders.

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