June 4, 1940. H. L. VAN VALKENBURG 2,203,585

TIMING RELAY

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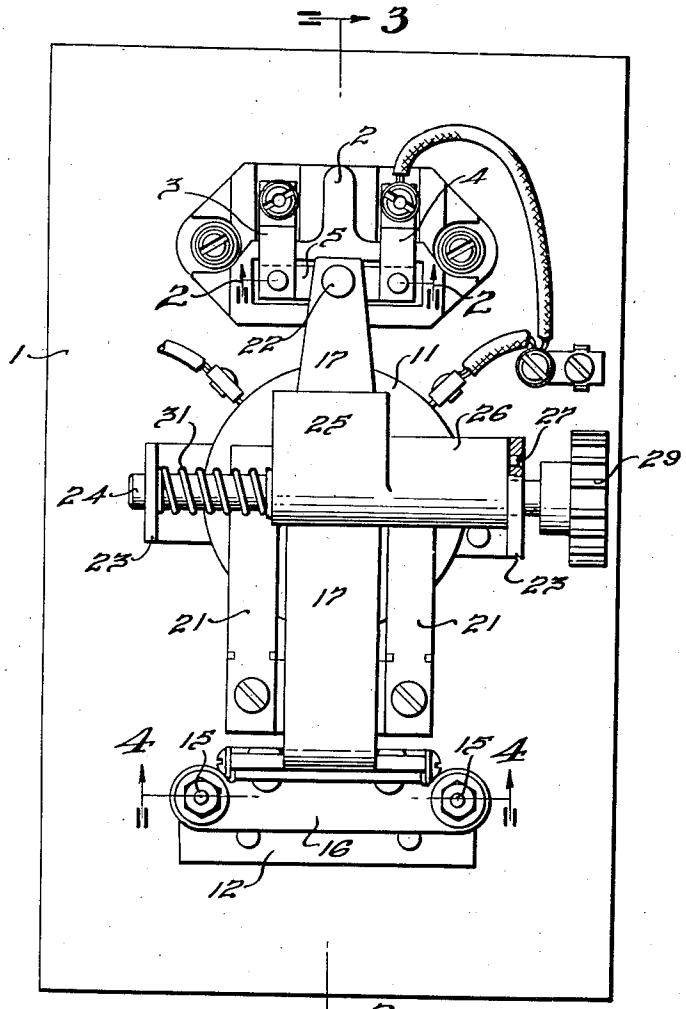


FIG. 1.

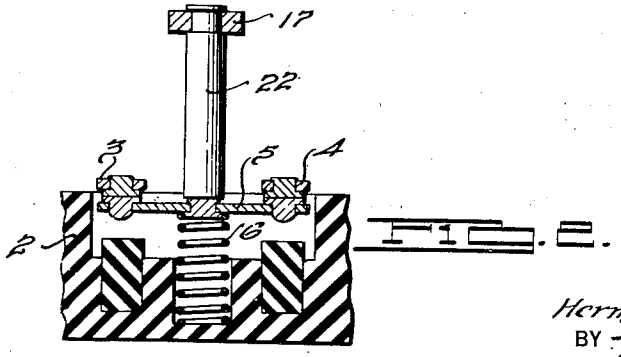


FIG. 2.

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FIG. 3.

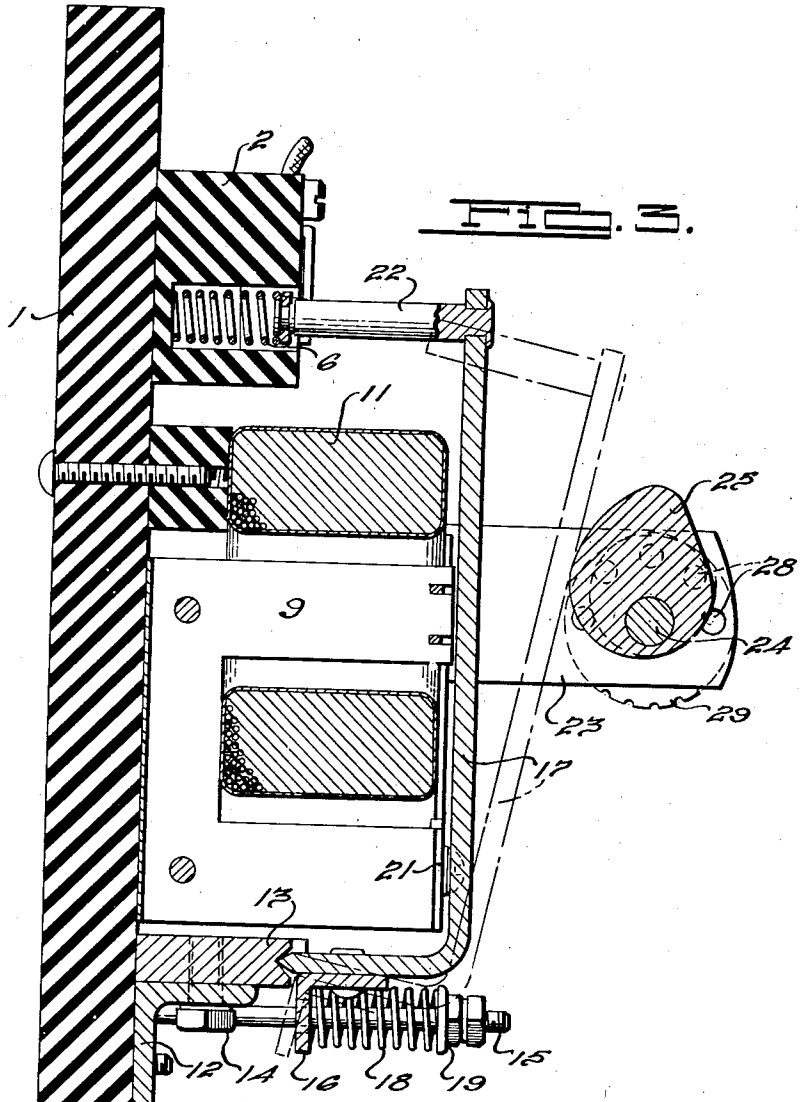
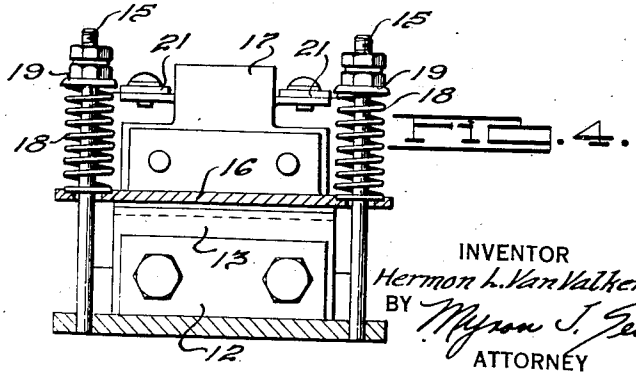


FIG. 4.



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TIMING RELAY

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Application November 11, 1936, Serial No. 110,271

4 Claims. (Cl. 175—336)

This invention relates to automatic timing relays having provision for varying the time of operation of the relay.

One object of the present invention is to provide an automatic relay including a stationary core and a movable armature adapted to actuate the relay contacts with means for varying the air gap between the armature and the core to vary the time of operation of the relay.

Another object of the invention is to provide an automatic timing relay having an armature movable to operate the relay contacts with means for varying the stroke of the armature to adjust the timing period.

Another object of the invention is to provide an automatic timing relay having a movable armature for actuating the relay contacts with an adjustable stop for the de-energized position of the armature to provide for variation in the timing period.

Another object of the invention is to provide an automatic timing relay having an armature of the clapper type for actuating the relay contacts with a rotatable cam surface providing an adjustable stop for the armature in its de-energized position.

Further objects and features of this invention will be readily apparent to those skilled in the art from the following specification and the appended drawings illustrating certain preferred embodiments of this invention in which:

Figure 1 is a front elevational view of a timing relay according to the present invention.

Figure 2 is a detailed sectional view on the line II—II of Figure 1.

Figure 3 is a vertical sectional view on the line III—III of Figure 1.

Figure 4 is a detailed sectional view on the line IV—IV of Figure 1.

The relay according to the present invention comprises a supporting panel 1 having mounted on the upper portion of its front face an insulating block 2 on which are mounted stationary contact elements 3 and 4 and in a recess of which is disposed a bridging contact plate 5 biased to contacts engaged position by a compression spring 6. Mounted below the block 2 as by means of rigid supporting brackets is a U-shaped stationary magnet core 9 about one leg of which is wrapped the actuating coil 11. Rigidly secured below the stationary core 9 is a bracket 12 having adjustably mounted thereon a knife-edge seat 13 as by means of studs 14. Rigid with the support 12 are a pair of pins 15 which loosely receive openings through a plate 16 attached to the bottom leg of an angle-shaped armature member 17. Compression springs 18 are disposed about the pins 15 between the plate 16 and adjustable stops 19 and serve to bias the armature member 17 to its disengaged position remote from the core 9. The lower leg of the armature member 17 is provided with a knife-edge as shown received within the knife-edge seat 13 and biased therein by the springs 18 thus providing a pivotal mounting for the armature. Plates 21 may be secured to the front portion of the core supporting brackets to secure the coil 11 in place. A striker pin 22 is mounted rigid with the upper end of the armature member 17 and is adapted to engage the bridging contact plate 5 and move it to separated position when the armature member 17 is in its energized position.

Rigidly mounted at either side of the coil 11 are supporting brackets 23 having journaled therein a shaft 24 serving to support a cam element 25. This cam element has a cylindrical portion 26 rigid therewith carrying a pin 27 adapted to be received within suitable openings 28 in the right hand bracket 23. A knob 29 is rigidly secured to the right hand end of shaft 24 and a compression spring 31 is wrapped around the shaft and biases the pin 27 on the cylindrical portion 26 within the openings of the bracket 23. To rotate the cam member 25 and hence to adjust the de-energized position of the armature the handle 29 is pushed to the left to disengage the pin 27 from a hole 28 and is then rotated into the desired position where the pin 27 again engages in a hole 28 and prevents further rotation of the cam member. This provides a very simple and quickly adjusted means for varying the de-energized position of the armature 17 and hence for varying its angular movement upon energization of the coil 11 before pin 22 engages the bridging contact 5 to move it into disengaged position. This provides a limited but quite accurate adjustment of the operating time for the relay. With this method of delay, depending on the stroke of the armature, the delay period is quite limited with the maximum delay usually less than a dozen cycles, at 60 cycle frequency, depending upon the size and inertia of the relay parts. Where slightly longer periods of delay are desired, two of these relays may be connected for consecutive operation to give the desired time interval. The relay of the present invention is not adapted for long time intervals and, in fact, finds its greatest application where the timing operation is on the order of a few cycles of current at 60 cycle frequency. While

the relay contacts as shown are of the normally closed type it is obvious that the invention is equally applicable where the contacts are normally open and are closed by the armature striker.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest interpretation within the terms of the following claims.

What is claimed is:

1. An electromagnetic operator for an electric relay comprising a stationary magnet core, an energizing coil therefor, an armature member, a rotary cam having a surface adjustably limiting the de-energized position of said armature and serving as a stop for the armature in said position, means adjustably locking said cam in a plurality of positions, biasing means for maintaining said locking means in operation, and manual means for moving said cam against said biasing means to permit rotation of said cam to vary the de-energized position of the armature.

2. An electromagnetic operator for an electric relay comprising a stationary magnet core, an energizing coil for said core, a pivoted armature adapted to be attracted by said core to move the movable contact, a pair of spaced supporting brackets, a shaft journaled therein and having a limited longitudinal movement, a cam surface mounted on said shaft in a position to adjustably limit the de-energized position of the armature, a pin rigid with said cam surface and a plurality of holes in one of said brackets adapted to receive said pin to lock said cam surface in adjusted position, means biasing said cam surface and shaft toward said one bracket, and manual means for moving said shaft and cam surface away from said one bracket to disengage said pin from said openings and permit said cam to be moved into another adjusted position.

3. An electromagnetic operator for an electric relay comprising a stationary magnet core, an energizing coil therefor, an armature member adapted to be attracted to said core upon energization of said coil, a movable cam having a surface adjustably limiting the deenergized position of said armature and serving as a stop for the armature in said position, interengaging elements on said cam and on a stationary part, means normally biasing said elements into engagement to maintain the cam in an adjusted position, and manual means for moving said cam bodily against said biasing means to disengage said elements and thereafter move said cam into another adjusted position providing a different deenergized position for the armature.

4. An electromagnetic operator for an electric relay comprising a stationary magnet core, an energizing coil therefor, an armature member, a rotary cam having a surface adjustably limiting the deenergized position of said armature and serving as a stop for the armature in said position, position-determining, interengaging elements on said cam and on a stationary part, means normally biasing said elements into engagement to lock the cam in position, and manual means for moving said cam bodily against said biasing means to disengage said elements and permit rotation of the cam to another limiting position for the armature.

HERMON L. VAN VALKENBURG.