

Feb. 18, 1947.

J. J. SHIVELY

2,416,070

SELECTIVE RELAY

Filed Aug. 26, 1942

3 Sheets-Sheet 1

FIG. 1

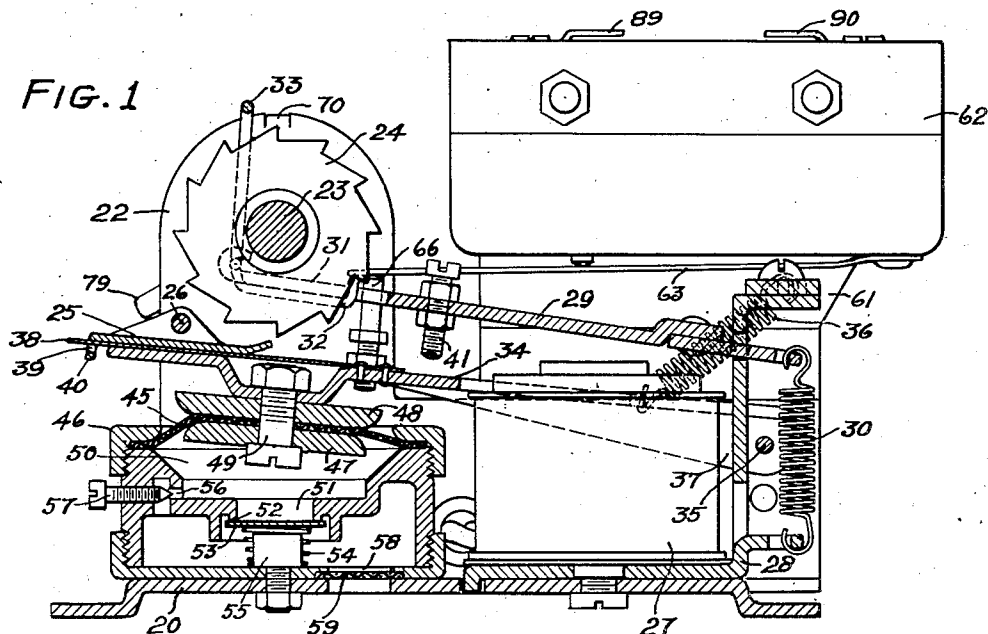


FIG. 2

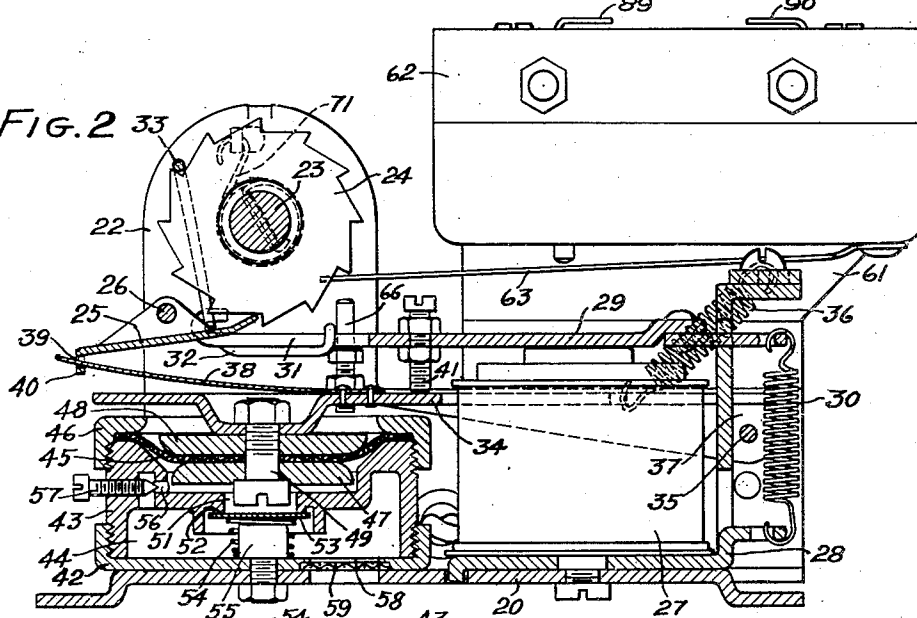
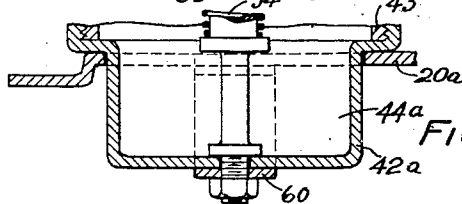


FIG. 3



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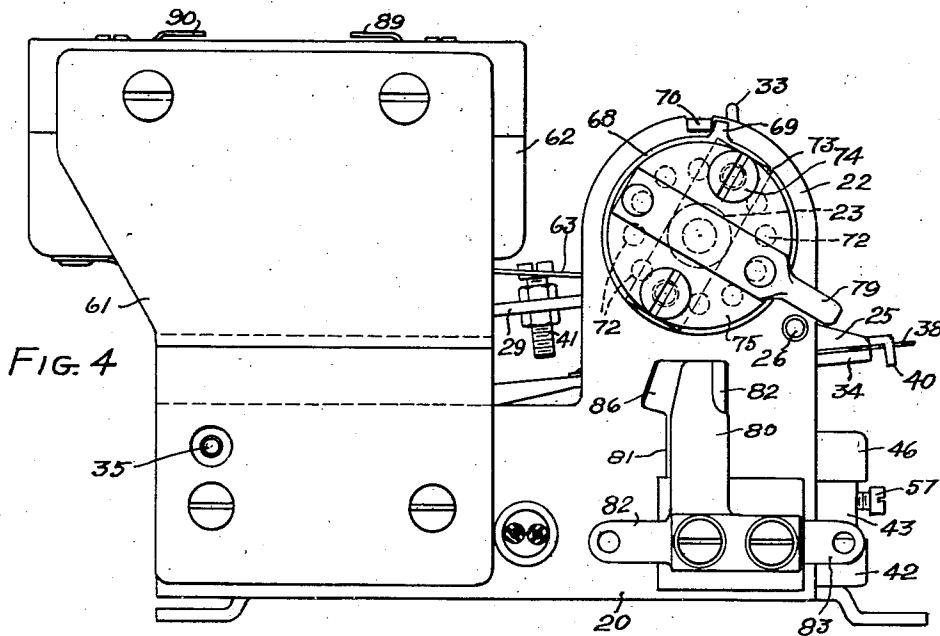
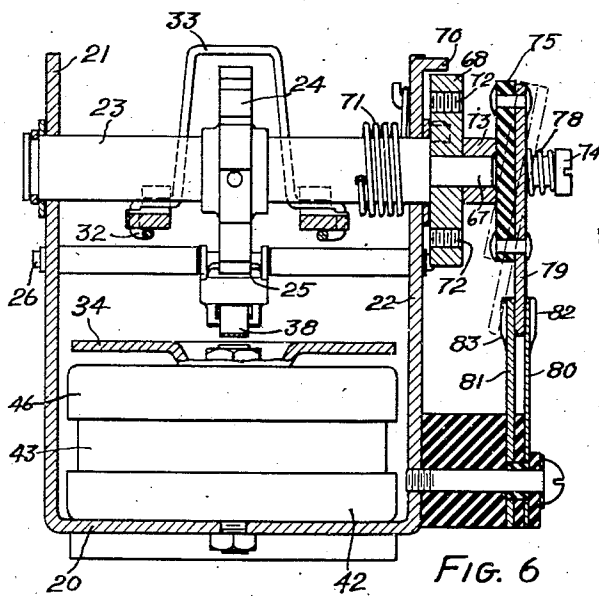
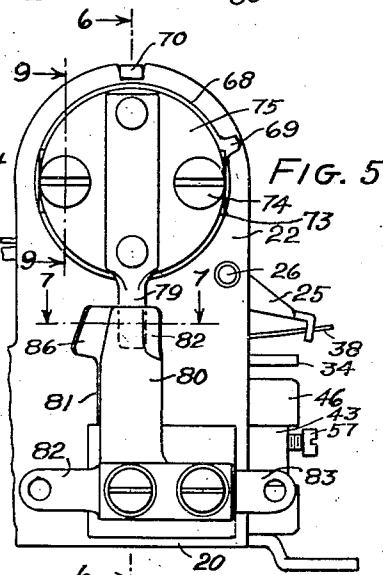
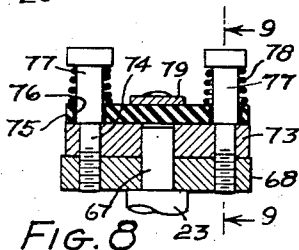
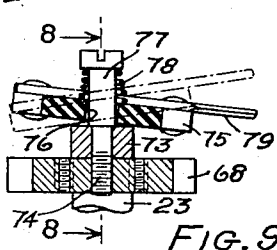
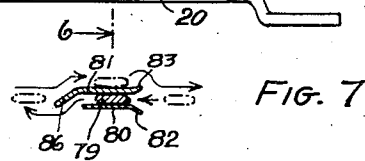
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SELECTIVE RELAY

Filed Aug. 26, 1942

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SELECTIVE RELAY

Filed Aug. 26, 1942

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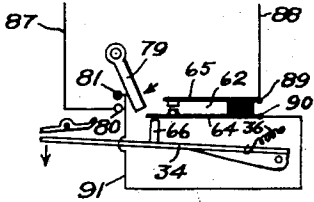


FIG. 10

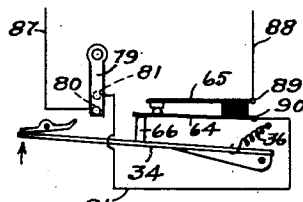


FIG. 11

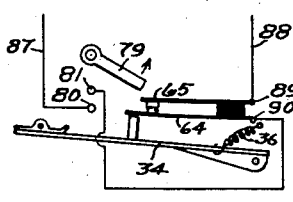


FIG. 12

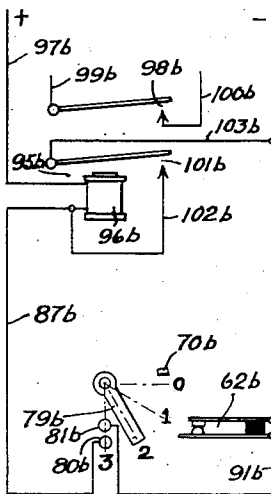
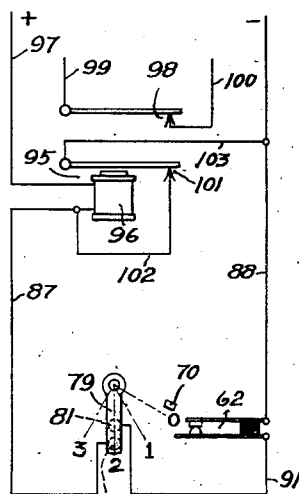
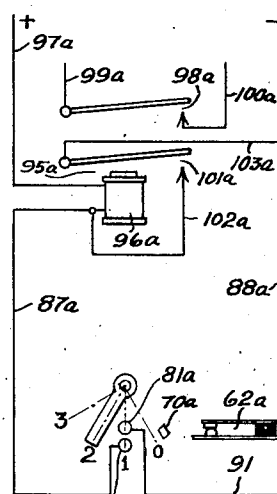


FIG. 13

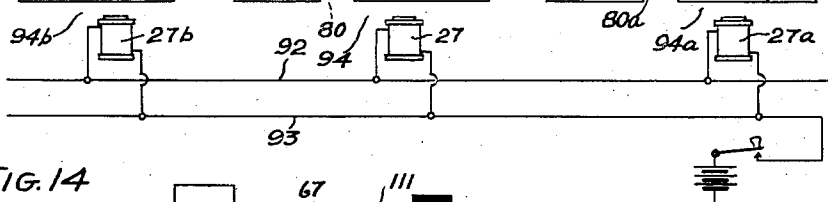
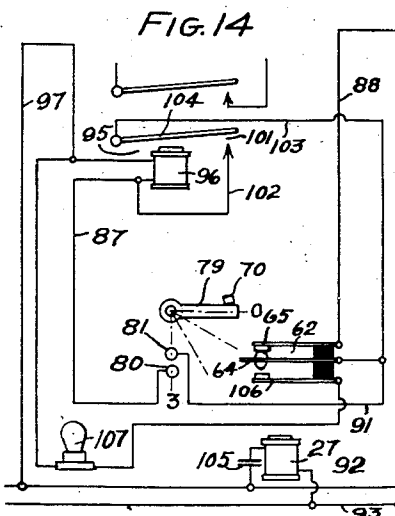
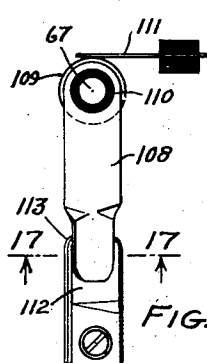


FIG. 16

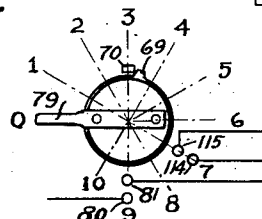


FIG. 15

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2,416,070

SELECTIVE RELAY

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Application August 26, 1942, Serial No. 456,157

3 Claims. (Cl. 74-142)

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The present invention pertains to improvements in selective relays and circuits therefor.

An object of the invention is to provide an improved relay adapted to control a circuit or circuits in response to a pre-determined number of electrical impulses.

Another object is to provide a device of the above nature including means to prevent actuation of the circuit controls when the number of impressed electrical impulses exceeds the said pre-determined number.

A further object is to provide apparatus of the above nature including means adapted to actuate switching contacts upon entering a given station from one direction but to avoid actuating said contacts upon entering said station from the opposite direction.

Another object is to provide a relay of the above nature including automatic means to reset the switching means to initial position.

Another object is to provide time-delay means to control the automatic resetting apparatus.

Another object is to provide suitable circuit arrangements by which the invention may be applied to a variety of control purposes.

A further object is to provide apparatus of the above nature which is simple, compact, and which may be easily and cheaply manufactured.

Other objects and advantages of the invention will become evident in the course of the following description in connection with the accompanying drawings, in which—

Figure 1 is a longitudinal view of a preferred form of the device in normal position, the view being taken in partial vertical central section;

Figure 2 is a similar view illustrating the position of the parts when the relay magnet is energized;

Figure 3 is a fragmental view showing an alternative detail form of the time delay mechanism;

Figure 4 is a rear elevation of the device, showing the selective switching means in normal position;

Figure 5 is a partial similar view showing the selective switching means in engaged position;

Figure 6 is a cross sectional view partially in the plane 6-6, Figure 5;

Figure 7 is a diagrammatic sectional view of the selector contacts, referring to the plane 7-7, Figure 5;

Figure 8 is a detail cross sectional view of the switching head on the lines 8-8, Figure 9;

Figure 9 is a detail sectional view of the switching head on the lines 9-9, Figures 5 and 8;

Figure 10 is a diagrammatic illustration of the

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switching relationship during operation of the relay magnet;

Figure 11 is a similar diagram illustrating the apparatus at the instant of completing the selected circuit;

Figure 12 is a similar view showing the parts at the time of automatic reset;

Figure 13 is a diagram illustrating a typical application of the device to multiple circuit control;

Figure 14 illustrates alternative switching and circuit connections;

Figure 15 illustrates the provision of a plurality of selector switching stations to the device;

Figure 16 shows an alternative form of the selector switching parts; and

Figure 17 is a sectional view of the contact members in the plane 17-17, Figure 16.

Referring to Figures 1, 2, 4 and 6, the numeral 20 denotes a channel-shaped frame having upwardly extending bearing portions 21 and 22 (Figure 6) in which is journaled a cross-shaft 23. A ratchet 24 is secured centrally on the shaft 23. A pawl 25, pivoted on a cross rod 26, is adapted to engage the ratchet 24.

An electro-magnet 27, mounted on an angular frame 28, is secured in the channel frame 20. An armature 29 is movably held in knife-edge relationship in the magnet frame 28 and is normally held retracted from the magnet 27 by a spring 30, as shown in Figure 1.

The armature 29 has a forked extension 31 into which is secured in snap relation a spring clip or yoke 32. The upper or cross bar portion 33 of the yoke 32 overlies the ratchet 24, and in normal position as shown in Figures 1 and 6, the bar stands clear of the ratchet teeth. When the magnet 27 is energized, as in Figure 2, thereby drawing the armature 29 and yoke 32 downward, the bar 33 engages the ratchet 24 and revolves the latter through substantially the arc of one tooth. During this action the spring construction of the yoke 32 permits the bar 33 to follow the circular motion of the ratchet.

A forked lever 34 is pivoted on a cross-rod 35 in the frame 20 below the armature 29, and is urged upward by diagonal springs 36. Due to the sectional showing in Figures 1 and 2, only one leg 37 of the forked lever 34 and one spring 36 appear therein, but it will be understood that the second leg and spring are similar to those shown, the legs spanning the magnet 27 and magnet frame 28.

A light leaf spring 38 is secured to the lever 34, and the free end of the spring 38 extends through

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a slot 39 in the downwardly bent rear end 40 of the pawl 25. When the lever is in upper or normal position, as shown in Figure 1, it presses the leaf spring 33 flat against the bottom of the pawl 25 and holds the latter clear of the ratchet 24. However, when the lever 34 is depressed as in Figure 2, the spring 33 is flexed and urges the pawl 25 resiliently into engagement with the ratchet 24.

An adjustable screw 41 in the armature 29 is adapted to engage the top of the forked lever 34 and depress the latter, as shown in Fig. 2, when the armature is drawn down by the magnet 27.

After depression of the lever 34 and after the armature 29 has been released by the magnet 27, the upward return of the lever 34 is controlled by time delay means of any suitable type, herein illustrated as a pneumatic device constructed as follows:

A bottom cap 42 secured to the frame 20, has screwed therein a body member or casing 43, forming a lower chamber 44. A flexible diaphragm 45, of a suitable air-tight material such as flexible fabric impregnated with synthetic rubber, is peripherally sealed to the top of the casing 43 by means of a screw ring 46. Pressure disks 47 and 48 are pressed against the central portion of the diaphragm 45, a screw 49 securing the disks and diaphragm together and also to the bottom of the lever 34.

When the lever 34 is in normal position, Figure 1, the elevation of the diaphragm 45 provides an upper chamber 50 between the latter and the casing 43. A central passage 51 in the casing 43 terminates in a downwardly directed valve seat 52. A thin valve disk 53 is normally pressed upward against the seat 52 by a light spring 54, a stud 55 serving to guide the spring and also to act as a limit stop for the disk 53.

A small orifice 56, leading from the upper chamber 50 onto the lower chamber 44, is co-operative with a cone-pointed screw 57 to form an adjustable needle-valve passage between the chambers.

The lower chamber 44 may have a breather opening 58 provided with a screen 59 to prevent entry of dust. Where the device is to be used in locations involving very fine dust, undue moisture, fumes, or the like, breather 58 may be omitted, and if it is desired to minimize compression in the lower chamber, an alternative construction such as that shown in Figure 3 may be used. In the latter construction, the bottom cap 42^a is deepened and is secured in a suitable opening in the main frame 20^a by any convenient means, such as a strap 60. This structure provides large volume in the lower chamber 44^a, preventing undue rise in pressure during operation as hereafter set forth, but at the same time remaining sealed against the exterior atmosphere.

An offset bracket 61, Figures 1, 2, and 6, is secured to the side of the frame 20 and carries switching means 62 of any suitable type herein illustrated as a well-known commercial switch having an actuating leaf 63 and normally open contacts 64 and 65. As the internal structures of such switches are well-known in the art and form per se no part of the present invention, no detailed description thereof is required, the contacts 64 and 65 and their operation being shown diagrammatically in Figures 10 to 16, inclusive.

An adjustable pin 66, secured in the forked lever 34, is adapted to engage the leaf 63 and

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actuate the switch 62 in the usual manner during upward movement of the lever 34.

Referring to Figures 4, 5, and 6, it will be seen that the rear end 67 of the shaft 23 carries a disk 68 tightly secured thereon, as by pressing or the like.

The disk 68 has a radially extending lug 69 adapted to engage a stationary stop 70 provided on the frame side member 22. A torsional reset spring 71 coiled around the shaft 23, Figures 2 and 6, normally holds the lug 69 retracted against the stop 70 as shown in Figure 4.

The disk 68 has therein an even number of equally spaced tapped holes 72, the holes corresponding in number and angular spacing to the number and spacing of the teeth of the ratchet 24. A transverse block 73 is secured to the disk by means of two shoulder screws 74. An insulating disk 75 has two oppositely disposed holes 76 engaging the shanks 77 of the screws 74.

Light compression springs 78 on the shanks 77 normally hold the insulating disk 75 flat against the block 73, but the holes 76 have sufficient clearance about the shanks 77 to allow the disk to be rocked inwardly and outwardly against the spring pressure as illustrated in Figures 6 and 9. An outwardly extending metallic switch arm 79 is secured to the insulating disk 75.

Two parallel contact leaves 80 and 81 are mounted on the frame member 22, being electrically insulated from the frame and from each other as shown in Figure 6, and provided with terminal lugs 82 and 83 respectively, Figures 4 and 5.

The leading edges 84 and 85 of the contact leaves 80 and 81 are flared outwardly as shown sectionally in Figure 7, the flared opening between the leaves being in the normal path of circular travel of the switch arm 79 and normally adapted to receive the latter in the manner of a knife-switch. The outer leaf 80 is resilient, while the inner leaf 81 is substantially rigid and has an outwardly inclined deflector tab 86 extending from its rear edge.

When the arm 79 is swung in its forward direction by the ratchet mechanism, that is clockwise in Figures 4 and 5, as the arm enters the switching position from the right, it moves between the leaves 80 and 81 to engage both of them and establish a conducting bridge between them as shown in full lines in Figures 7 and 6. If the arm 79 receives further forward motion it moves out of contact position toward the left, the disk 75 rocking to allow the arm 79 to over-ride the deflector tab 86. Thereafter, upon return or reset motion of the arm 79 toward the right (Figure 7) the arm engages the inner side of the deflector tab 86 and is rocked inwardly to ride behind the leaf 81, thus avoiding contact with the outer leaf 80.

From the foregoing description, illustrated clearly by the arrow paths in Figure 7, it is evident that the arm 79 can establish electrical connection between leaves 80 and 81 only when it engages the switching station in a forward direction, such connection being prevented when the arm enters and passes the station in the reverse or reset direction.

Referring again to Figures 1, 2 and 3, the general operation of the device is as follows:

The device being initially in normal or re-set position, when the magnet 27 receives an energizing impulse, the armature 29 is drawn downward to revolve the ratchet 24 and to depress the lever 34 as previously described. As the lever

34 is depressed, the depression of the attached diaphragm 45 suddenly forces air out of the chamber 53 past the check valve 53. When the magnet 27 is de-energized the armature 29 immediately snaps up to normal position, but rise of the lever 34 is restrained by the resistance to upward motion of the diaphragm 45 due to atmospheric pressure above it, the check valve 53 being closed against re-entry of air below the diaphragm. The pawl 25 consequently remains in engagement with the ratchet 24, holding the latter against rearward rotation by the torsion spring 71.

Under the upward urge of the diagonal springs 36, a partial vacuum is created below the diaphragm 45, and air moves in through the restricted needle valve orifice 56 to gradually relieve the vacuum and allow the diaphragm to rise throughout a period of time dependent on the strength of springs 36 and the adjustment of the needle screw 57 in the orifice 56.

If the magnet 27 receives no further impulse until the diaphragm 45 has allowed the lever 34 to engage and rock the pawl 25 as shown in Figure 1, the pawl releases the ratchet 24 and the shaft 23 is rotated rearwardly by the spring 71 to reset position, the lug 69 encountering the stop 70 as shown in Figure 4. However, if a second impulse is received by the magnet 27 before the lever 34 has had time to release the pawl 25 as described, the lever 34 is again driven downward and the above action repeated, the ratchet being advanced a second step.

From the foregoing it is evident that a series of impulses to the magnet 27 causes the ratchet 24 and attached parts to be rotated by successive steps without reset until, following an impulse, a sufficient pause occurs to permit the lever 34 to rise without interruption. It is further evident that the duration of the time required for reset to be effected may be set by adjustment of the needle valve screw 57.

As the shaft 23 is advanced by rotative steps, the switch arm 79 (Figures 4 and 5), is moved by corresponding steps, and when the requisite number of impulses has been applied, the arm closes the connection between members 80 and 81 as previously described. The shoulder screws 77 may be placed interchangeably in any selected pair of holes 72 in the disk 68, allowing the arm 79 to be set at various angular normal positions with respect to the contacts 80 and 81 to cause closure of the latter after any desired number of impulses within the range of the device. Thus in Figure 4 the arm is set to close contact on the second impulse for purposes of illustration.

During upward movement of the forked lever 34, near the upper limit of its travel, the pin 66, Figure 1, engages the leaf 63 to actuate the switch 62.

When the device is to be applied to circuits such as those illustrated herein, the relationship between the actions of the switch arm 79, lever 34, and switch 62 are set as shown in Figures 10, 11 and 12.

Figure 10 illustrates that the switch 62 has been released by the pin 66 and thereby allowed to open early in the downward motion of the lever 34, that is, before the switch arm 79 can have connected the contacts 80 and 81.

Figure 11 illustrates the instant of closure of the switch 62, when the lever 34 is engaging the pawl 25 but before rocking the latter to disengage it from the ratchet.

Figure 12 illustrates the device during re-set

with the arm 79 revolving rearwardly, the pawl 25 released and the switch 62 remaining closed.

In the diagrams, Figures 10, 11 and 12, wires 87 and 88 may represent leads forming part of a circuit to be closed by the device, wire 87 being connected to the contact leaf member 80 and wire 88 to one terminal 83 of switch 62, while contact leaf 81 and the second terminal 80 of switch 62 are connected by a short lead 81.

Figure 10 shows that no circuit is established between leads 87 and 88 during the motion of switch arm 79, since switch 62 has opened before the arm 79 can bridge contacts 80 and 81, as set forth above. In Figure 10, however, contacts 80 and 81 are already bridged, so that closure of switch 62 completes the connection between leads 87 and 88, and this connection persists during the time required for the lever 34 to rock the pawl 25 to disengaged position, whereupon re-set occurs and the circuit is broken by arm 79 as shown in Figure 12. However, it is evident also that if the selector arm 79 is in any other than contact position when the rise of arm 34 is being completed as set forth, no circuit is closed.

To summarize the above described action briefly, it will be seen that if at the completion of a series of energizing impulses, the selector arm 79 is on contact station, the device will first close a control circuit, then automatically re-set. If at the completion of the series the arm 79 is in any other than contact position, no control circuit is closed, and the device simply re-sets.

Figure 13 illustrates the application of the device to selective remote control of a plurality of devices by means of a single pair of wires. The magnets 27, 27^a and 27^b of three of the devices hereinafter generally designated as selective relays 94, 94^a and 94^b are connected in parallel across common wires 92 and 93 over which the selector impulses are to be sent. The selector arm 79 is arranged to engage contacts 80 and 81 on the second impulse, while arms 79^a and 79^b are respectively set to engage their contact stations on the first and third impulses. For purposes of clarity and to avoid undue structural showing and complication of the diagrams, the stops 70, 70^a and 70^b are shown diagrammatically as engageable directly by the arms 79, 79^a and 79^b, it being understood that mechanically the various arm settings may be made as explained in connection with Figures 4, 6, and 8.

As previously stated, the invention is adapted to selectively control the operation of any desired types of electrical devices, and for purposes of illustration such devices are shown as power relays 95, 95^a and 95^b. The magnet 96 of relay 95 is connected on one side to the wire 87 and on the other to a conductor 97 connected to one side of a suitable source of local current. The wire 88, connected to the switch terminal 83 as described in connection with Figures 10, 11 and 12, comprises the second side of the local current supply.

The power relay 95 may have any desired secondary switching arrangement suitable for the particular circuit or circuits it is to control, such as normally open contacts 98 adapted to control a circuit through leads 99 and 100. Relay 95 may also include a pair of normally open contacts 101 connected via leads 102 and 103 with conductors 87 and 88 respectively, and adapted to provide a holding circuit for the relay 95 as hereinafter described.

The connections of power relays 95^a and 95^b

and their relationships with their selective relays 79^a and 79^b are the same as those relating to relay 95, the corresponding parts throughout being designated by the same numerals with suffixes *a* and *b* respectively.

To operate the system, a series of impulses is sent over the control conductors 92 and 93, the time intervals between impulses being less than that necessary to allow re-closure of the switches 62, 62^a and 62^b in the manner previously set forth. For example, let it be assumed that it is desired to actuate power relay 95 by remote control over wires 92 and 93, without closing either power relays 95^a or 95^b.

Since selective relay 94 is set to close contacts 80 and 81 in the second step position of arm 79, two impulses are sent over the lines 92 and 93. These impulses are received by all three magnets 27, 27^a and 27^b, causing the arms 79, 79^a and 79^b to be advanced two angular step positions as shown. Since the second impulse is the last of the series, as soon as the predetermined time-delay period of the selective relays permits, the switches 62, 62^a and 62^b are closed as described in Figure 11.

Figure 13 shows the condition of the three sets of apparatus at the instant of these closures. Since arm 79 is bridging contacts 80 and 81, a circuit is established from supply conductor 88 via switch 62, wire 91, contact member 81, arm 79, contact member 80, and wire 87 to power relay magnet 96, thence to supply line 97. Power relay 95 is thereby closed as shown. No such circuits are established through selective relays 94^a or 94^b, however, since arm 79^a has over-ridden its switching position and arm 79^b has not reached its switching position. As a consequence, only relay 95 is actuated following the series of two impulses.

Subsequent to closure of switches 62, 62^a and 62^b, that is upon completion of the predetermined time-delay period of the three selective relays 94, 94^a and 94^b, all three reset to zero position by release of their pawls in the manner previously explained. Upon reset, arm 79 breaks its connection between contacts 80 and 81, and if power relay 95 is equipped with the holding contacts 101 which close as it is energized, its magnet 96 continues to receive current via branch 103, contacts 101 and branch 102 until its main current supply is subsequently broken either manually or automatically, depending on the type of apparatus controlled by it.

During reset the arm 79^a of relay 94^a, in passing through its switching station, is prevented from bridging its contacts 80^a and 81^a in the manner set forth in connection with Figures 6 and 7, so that no circuit can be established there-through. Similarly, arm 79^b can establish no circuit, as it engages no contacts whatever.

While the operation has been illustrated by a system employing three selective relays, it will be evident that as many such relays and sets of connected apparatus may be similarly employed as there are possible effective switching station positions on each relay. It is also obvious that the relays may be constructed with as many possible switching positions as desired by providing the ratchet 24 with the proper number of teeth and proportioning the related parts accordingly. The typical operation described makes clear that no matter what the number of selective relays connected to a common pair of control conductors, the only relay which will close its desired circuit in response to a series of im-

pulses is the one resting in its particular switching station at the conclusion of the last impulse. Thus any relay of the series may be selectively actuated by sending the corresponding number of impulses over the common control lines.

By means of the needle valve adjustments between orifices 56 and screws 57, as illustrated in Figures 1 and 2, the time delay intervals of all the selective relays of a series may be pre-determined for equal duration, but any exact equality of time lag normally is not required, it only being essential that none of the relays shall have a time-lag to switch-closing position shorter than the normal interval between impulses of a series.

The diaphragm delay means operates as a type of dash-pot, but lacks the disadvantages of the usual type of dash-pot such as close-fitting rubbing parts subject to sticking, requiring lubrication, liable to varied action due to temperature changes, etc. Lack of these inherent faults, plus the effective protection of the orifice 56 against dust and the like, adapts the device to operation over long periods without substantial variation and to accuracy of setting without unduly precise and expensive manufacture.

As previously stated, the invention is adapted to incorporation in a wide variety of circuit arrangements and combinations, Figure 13 being one typical illustration.

Figure 14 illustrates several variations in circuit arrangement as follows, the relay 94 being set to respond to three successive impulses from the lines 92 and 93. In this variation the second wire 103 from the movable holding contact member 104 of power relay 95, instead of being connected directly to supply line 88, is normally connected thereto through the switch 62. By this arrangement, supposing the relay 95 to have been locked in upon actuation of the selective relay 94, the first subsequent impulse received by magnet 27 will cause the switch contacts 64 and 65 to open as in Figure 10, thereby breaking the described holding circuit of relay 95 and allowing the latter to open. In multiple station systems using this device, the setting of the various selective relays would preferably be made from the number two impulse stations upward, no relay being set to actuate its connected device (for instance relay 95) on one impulse, leaving the single impulse operation available for remotely controlled release. With such a system, the operator, after throwing and locking in any desired connected device by the proper series of impulses, can then release the remote connection at any time by sending a single impulse over the control lines 92 and 93.

Figure 14 also illustrates means by which the relay 95 or similar device may be furnished with current over the same common wires 92 and 93 which carry the selecting impulses. In this case wires 88 and 97 are connected to lines 93 and 92, respectively, and a suitable condenser 105 is connected between the magnet 27 and line 92. The condenser 105 is impervious to direct current, but is adapted to pass alternating current for which the magnet 27 is wound, as for example telephone ringing current. A steady source of direct current is provided in lines 92 and 93, which current has no effect on magnet 27, due to the condenser.

When alternating current impulses are impressed on the lines 92 and 93 they energize the magnet 27, and if the series has the proper number of impulses (three in Figure 14) the selective

relay connects the power relay 95 to the direct current supply in lines 92 and 93 in the manner previously pointed out.

Figure 14 further illustrates that the switch 22, Figures 1, 2, and 4, may be provided with additional contacts for any desired purpose. For example, the movable contact 64 may be made to engage a lower contact 106 when the magnet 27 is energized, completing a circuit through a device such as a signal lamp 107.

Figures 16 and 17 show an alternative construction of the selective switching arm and contact mechanism. In this form the arm 108 comprises a resilient leaf provided with a conducting hub 109, both hub and arm being insulated from the rotary shaft end 67 by a bushing 110 of fiber or the like.

A stationary brush 111 is adapted to convey current to the hub 109 and arm 108. A stationary contact member 112 is laterally inclined as shown on Figure 17, and has on its underside a flat insulating member 113. The end of the arm 108 is also laterally inclined. When the arm 108 is rotated in its forward direction—that is from the right in Figure 17—it encounters the outer face of the contact member 112 to establish electrical contact therewith.

Further forward movement of arm 108 causes the latter to flex outward, over-ride the contact member 112, then snap inward again. Upon reset, when the arm moves backward or toward the right in Figure 17, it engages the insulating member 113, flexes inwardly to under-ride the latter, and thus passes the switching station without having engaged the contact member 112.

In the previously described examples the selective relays have been described as each having a single switching station, but it will be obvious that the device may be constructed to provide a plurality of switching stations on the same relay, as illustrated diagrammatically in Figure 15. In this example, in addition to contact members 80 and 81, adapted to be engaged by the arm 79 at the ninth impulse, a second pair of similar contacts 114 and 115 may be provided for engagement in station 7. An example of the use of such plural switching stations would be in the case of a multiple device system wherein it may be desired to control two or more devices individually or in combination. Thus one selective relay may be controllable either by seven or by nine impulses as shown, while another selective relay of the same system may be similarly arranged for response either to three or to nine impulses. By this arrangement, a series of three impulses will actuate only one of the relays, a series of seven will actuate only the other, while a series of nine will actuate both at once.

While the invention has been set forth in preferred form, it is not limited to the precise structures illustrated, as various modifications may be made without departing from the scope of the appended claims.

What is claimed is:

1. In a device of the character described, in combination, a support, a shaft journaled in said support, a ratchet on said shaft, resilient means

urging said shaft and ratchet in one rotary direction, a stop on said support, a member on said shaft adapted to engage said stop in said direction, means including an electro-magnet responsive to successive electrical impulses to revolve said ratchet step by step in the other direction, a pawl, means operable by said advancing means to move said pawl into holding engagement with said ratchet, means to release said pawl from said ratchet, and a time-delay device adapted to delay the operation of said releasing means.

2. In a device of the character described, in combination, a support, an electro-magnet on said support, an armature cooperative with said magnet, said armature being normally retracted from said magnet, a ratchet mechanism on said support and operable by said armature, said mechanism including a holding pawl, a member movably attached to said support adjacent said armature, resilient means normally urging said member against said pawl to hold said pawl out of holding engagement, said armature when attracted by said magnet being adapted to move said member out of engagement with said pawl, resilient means attached to said member and adapted to move said pawl into engagement with said member when said pawl is disengaged by said member, and means connected between said member and said support and adapted to retard return movement of said member toward said pawl when said member has been released by said armature.

3. In a device of the character described including a ratchet and electromagnetic means to move said ratchet, a holding pawl adapted to engage said ratchet, a member normally engaging said pawl to hold the same out of engagement with said ratchet, said member being movable away from said pawl by said electromagnetic means, and means operable by said member upon withdrawal thereof from said pawl to press said pawl into engagement with said ratchet.

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