

1,004,321.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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COMBINATION SAFE AND VAULT PROTECTOR.

1,004,321.

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To all whom it may concern:

Be it known that I, EDWIN W. WEST, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Combination Safe and Vault Protector, of which the following is a specification.

An object of this invention is to provide means whereby a person possessed of a combination of numbers or letters may, by operating mechanism according to said combination at one station, cause apparatus at another station to operate or cease operating. The invention may be carried out in various forms.

One purpose to which the invention may be applied, is the opening and closing of an electric circuit which may be employed at a near or distant point to perform a desired service; as to operate an alarm or to shift a bolt; the closing of the circuit being effected by the operation of one device and the opening of the circuit being effected by the use of the combination, or vice versa.

It is understood that the invention may be employed for various uses and I regard it as being pioneer and broadly new.

The invention in its various forms is applicable to mechanism adapted to protect any form of structure or inclosure.

An object is to provide means whereby an automatic alarm that may be set into operation by trespass on a protected area, can only be brought to inactivity through operation of permutation mechanism.

The accompanying drawings illustrate the invention in two forms of its embodiment.

Figure 1 is a view partly in elevation and partly diagrammatic, of an electrically-operated safe and vault protector embodying the invention. Portions are shown in section. Fig. 2 is a detail elevation viewed from the right side of line x^2 , Fig. 1. Fig. 3 is a fragmental sectional view on an enlarged scale to illustrate the wedging action of the dog when the same is actuated by its electro-magnet. Fig. 4 is a fragmentary side elevation of another form of the invention in which the alarm may be subject to automatically operate by mechanical means held out of operation by a closed circuit.

The safe and vault protector in the form illustrated comprises an adjustable element

in the form of a rod or bolt 1 having a normal tendency, by the force of gravity, to move in one direction, viz., downward; mechanism, as a dog 2, operatable by impulses to move said element 1, step by step, in another direction, viz., upward; means, as the armature 3, electro-magnet 4, and electrical circuit including the battery 5 and conductors 6, 7, with key 8 to cause such impulses; retaining means, as the detent 9 to hold said adjustable element against return movement; and releasing means, as the arm 10, pivoted at 11 and actuated by the armature 12, to release the retaining means thereby to allow the element 1 to return to normal position. A plurality of adjustable elements such as 1, 13, 14 and 15 may be provided. Said elements are duplicates, and are conducting rods mounted respectively in tubular guides 16 and arranged to slide up and down therein and each carries an insulator 17 at some point along its length and is provided with downwardly and outwardly sloping teeth 18 with which dogs 2 and detents 9 engage. Each of the elements is provided with teeth and with a dog and a detent; and the dogs are similarly operatable by armatures and electro-magnets and each electro-magnet is subject to be energized by operation of a key. In the drawings the correlation of the several keys and their magnets is indicated by the characters a, b, c, d and o , the characters on the magnets being distinguished by indices. The electro-magnets are connected in parallel with the battery 5, through keys a, b, c, d .

The dog 2 is pivoted by a pivot 19 to the armature 3, and said armature is pivoted by pivot 20 to a support 21 and is arranged beneath the pole-piece 22 of the electro-magnet 4 so that when the key 8 is operated to close the circuit, the magnet will be energized and the armature operated, thus to move the pivot 19 upward. The dog 2 is overbalanced and its center of gravity is between its pivot and the adjustable toothed element it is to engage, so that upward movement of the pivot 19 will move the point of the dog upward in engagement with the element 1 to move the element upward one step at a time just far enough to allow the detent 9 to engage one of the teeth 18 to prevent return of the element downward.

In order to prevent the dog from tossing the element 1 in case the impulse from the magnet is excessively forcible, an inclined stop 23 is arranged in the path of the dog, and the tip of the dog is aslant; the inclination of the stop and the slant of the dog being downward away from the adjustable element and of such an angle that when the dog the length of a single tooth or notch that the dog becomes wedged between the inclined stop and the inclined face of the tooth, thus preventing further upward movement either of the dog or the adjustable element. Said adjustable elements form switch members connected with one side of an electrical circuit. Other switch members 24 are adjustably mounted by slides 25 having set-screws 26 and arranged to be fixed at different heights on rods 27 which are insulated by a non-conducting support 28 at one end and are connected by electrical conductors 29 at the other end with one side of a battery 30, the other side of which is connected by a conductor 31, the conducting frame 31' and tubular guide 16, with the element 1 which is an electrical conductor and completes the circuit by contact with the switch member 24, through rod 27 and conductors 29 and 32, at all times except when the switch member 24 is in contact with the insulator 17. The conducting portions of the adjustable elements extend above and below the insulators 17 so that the adjustable element 1 and its mates 13, 14 and 15 may be stepped up to move the insulators 17 past the contact points 33 of the switches.

A support 34 is provided for the adjustable elements to sustain said elements when they are released by the dogs and detents; and rests 35 are provided for the free ends of the dogs 2, so that when the armatures are not attracted by the pole pieces 22, the weight of the armatures will bend the knuckle joints at 19, thus moving the tips of the dogs away from the toothed adjustable elements, 1, 13, 14, and 15, as the case may be. The parts are so constructed and arranged that when any dog is approximately withdrawn as shown in Fig. 2, the bending of the joint at 19 will cease and the dog will remain in position to be moved into engagement again as soon as the armature is again moved up by its pole piece.

While any magnet is inactive the dog operatable thereby is free from its adjustable element so that it can fall in case the detent is withdrawn from such element.

The releasing electro-magnet *o'* is connected in parallel in the circuit 5, 6, 7 and is controlled by the key *o* so that when said key is closed the magnet *o'* attracts the releasing armature 12 thus to move the arms 10 outward. All of said arms are fixed to a common shaft 36 to which the releasing

armature 12 is fixed, and said shaft is journaled in the bearings 37 so that when the armature 12 is drawn against the pole piece *o''* of magnet *o'*, all the detents are released and all the shifting elements fall to rest on the support 34.

The circuit including battery 30 and conductors 31, 31', 16, 24 and 32 may operate or start into operation an automatic signal mechanism 39 which may be an alarm mechanism as an automatic gong or bell inside a case 40 that may also contain the battery 30 of the circuit.

Any current through the signal circuit will cause the signal to be continuously given and the only way to stop the signal without destruction is to stop the current. This cannot be done except by adjusting all the shifting elements to cause all the insulators 17 to engage the contact points 33. To do this the person in possession of the secret combination will first close the key *o*, thus energizing the magnet *o'* and drawing up the releasing armature 12, thereby withdrawing all the detents from all the shifting elements, which being otherwise unsupported will move to rest on the support 34. This is the position shown in Fig. 1, and does not interfere with the current through circuit 29, 30, 31, 32 since the switch members 24 of said circuit are in contact with the conducting portions of the shifting elements.

To cut off the current, the operator may now release key *o* thus releasing the detents 9 and will then appropriately operate the keys *a*, *b*, *c* and *d*. With the combination shown he will operate key *a* once, *b* three times, *c* seven times and *d* four times. Then the current through 29, 30, 31 and 32 is cut off by the insulators 17, and the signal mechanism 39 ceases to operate.

Any tampering with any of the keys to close a circuit will again sound the alarm which may be a gong and this can only be silenced by one in possession of the combination because the current through any of the adjustable elements can only be cut off by first dropping such element, and consequently all the elements, thus throwing on the entire combination.

It is understood that any number of adjustable elements and the parts that go with the same can be employed so as to increase the complication of the combination and that in practice one portion of the combination may be in the possession of only one person and another portion in possession only of another and so on, thus to require the coöperation of two or more persons to stop the alarm, thereby to guard against dishonesty of those in possession of trust funds guarded by means capable of starting the alarm.

Means for starting the alarm independently of the keys are not shown as the

principle of this invention may be applied in many ways that may suggest themselves to those skilled in the art.

It is thus seen that I have produced a protective system in which an automatic signal mechanism is associated with permutation means to control the signal mechanism and thus make provision for unavoidable detection in case of any invasion of the protected area.

For the purpose of illustration the keys 8 may be looked upon as the guards for a protected area and it is readily seen that if the operation of one of such keys is caused by attempted trespass, the signal will operate until the proper readjustment of the permutation means is effected and that no clue to such readjustment can be gotten through operation of any of the devices involved.

In the form shown in Fig. 4 the adjustable element 1 is provided with an adjustable switch 18'' that will engage the switch element 24'' at only one of the various positions to which the adjustable element may be adjusted; and with such construction the alarm may be subject to automatically operate by mechanical means held out of operation by a closed circuit.

I claim:—

1. The combination of an adjustable element provided with teeth, a pivoted dog to engage the teeth to move the element, means to operate the dog, a stop to engage the dog on its return movement to withdraw the same from said element, a detent to support the element, and means to intermittently operate the dog-carrying means thereby to move the element step by step.

2. The combination of an adjustable element provided with teeth, a pivoted dog to engage the teeth to move the element, means to operate the dog, an adjustable stop to engage the dog on its return move-

ment to withdraw the same from said element, a detent to support the element, and means to intermittently operate the dog-carrying means thereby to move the element step by step.

3. In a protector comprising a tubular guide, an adjustable element inside said guide, an insulator on said element, a switch member to contact with said element and with the insulator, an alarm and electrical circuit for controlling said alarm, said circuit being completed through the guide, the adjustable element and the switch element when the switch element is in contact with the adjustable element, and being broken when the switch element is in contact with the insulator, and means to move the adjustable element in the guide.

4. The combination of a plurality of adjustable elements having a normal tendency to move in one direction, each of said elements comprising a conducting rod provided with teeth, guides for said conducting rods, insulators carried by said conducting rods, dogs and detents to engage teeth of said conducting rods and to lift said element, armatures and electro-magnets to operate said dogs to lift said elements, an electric circuit and keys therefor, said electro-magnets being subject to be separately energized by the operation of the keys respectively, an armature and electro-magnet operably connected to withdraw the detents, and an electric circuit including a key to energize the magnet and operate the armature for withdrawing the detents to release the adjustable elements.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 2nd day of November, 1909.

EDWIN W. WEST.

In presence of—

JAMES R. TOWNSEND,
L. BELLE RICE.