(No Model.) 2 Sheets—Sheet 1.

T. R. BARNEY.

MULTIPLE CIRCUIT CLOSER FOR ELECTRIC TRAP PULLING DEVICES.

No. 568,013. Patented Sept. 22, 1896.

FIG. 1.

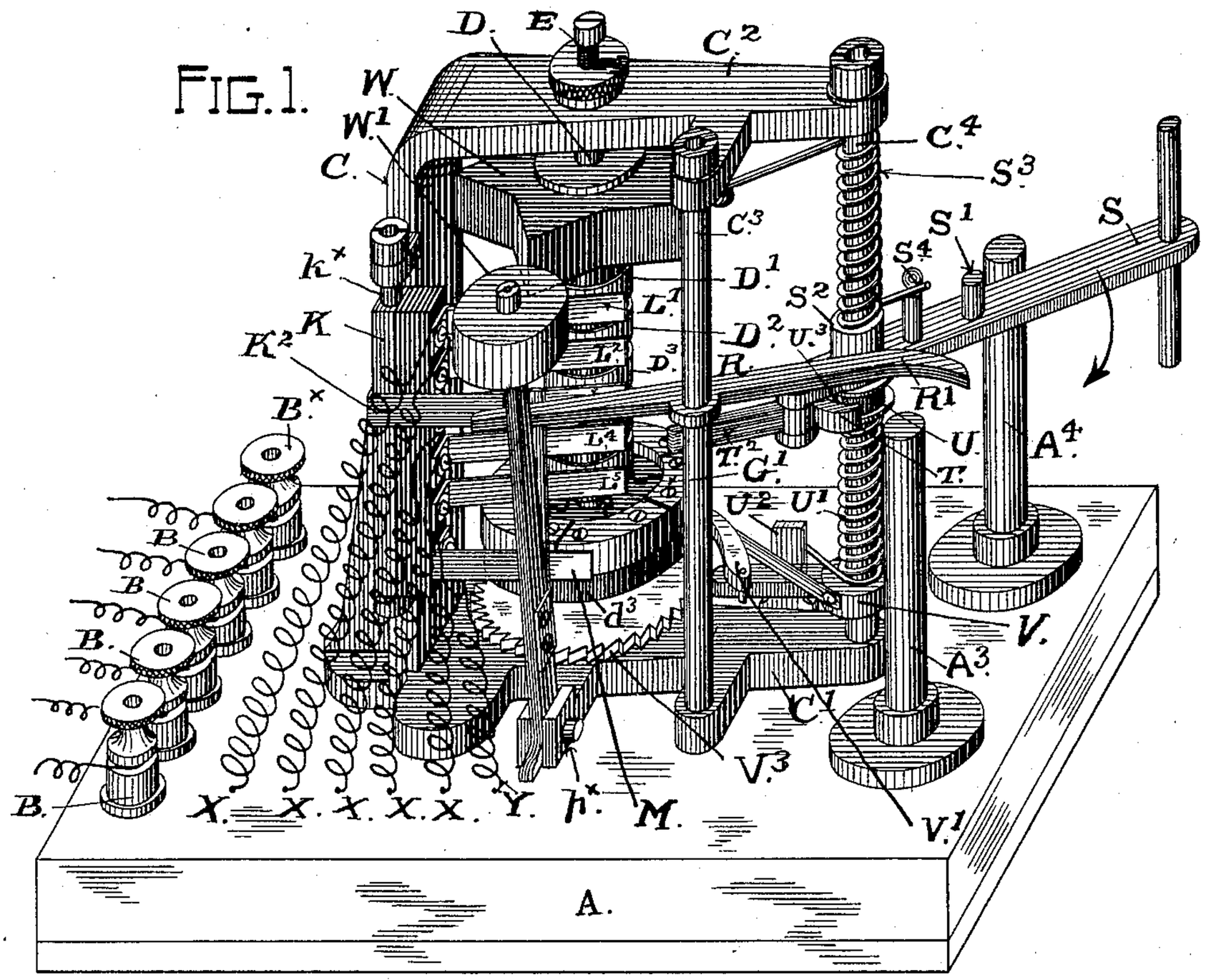
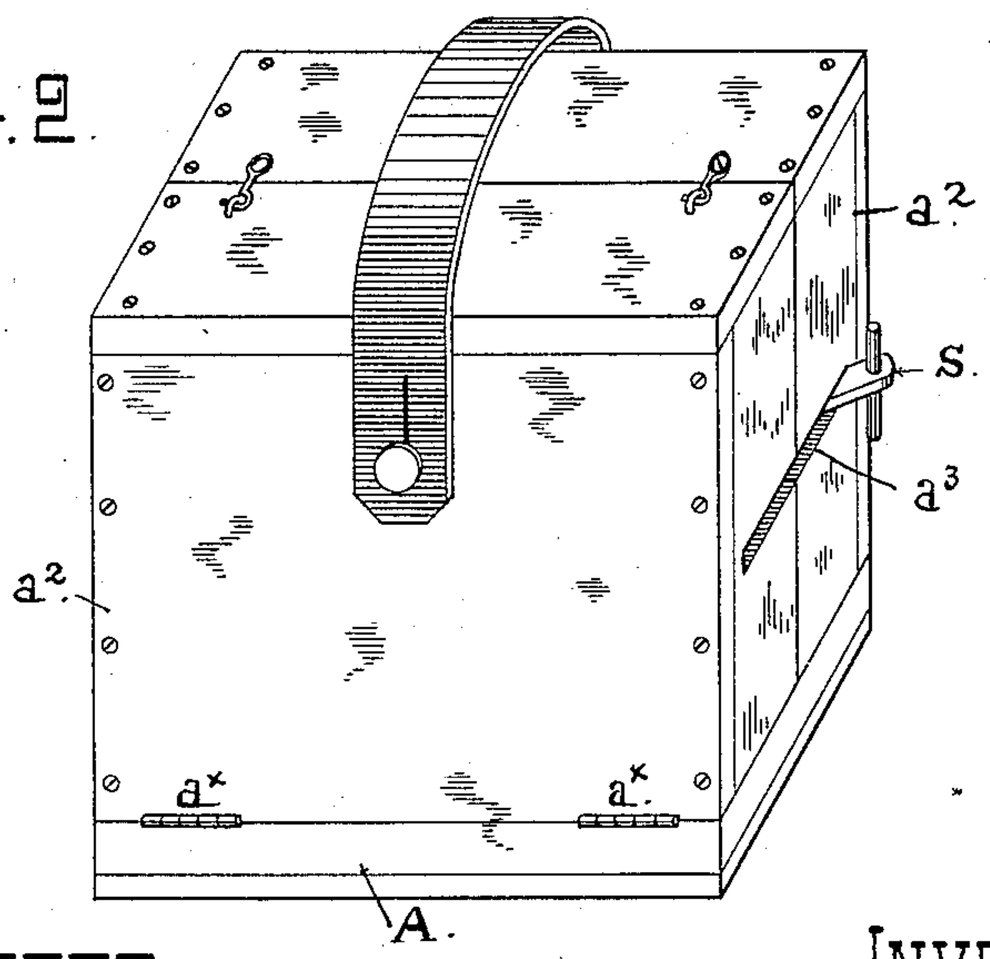


FIG. 2.



WITNESSES

E. Salomon.

M. Regner

INVENTOR

Thomas R. Barney

By Wright Osborn
his attys.

(No Model.) 2 Sheets—Sheet 2.

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FIG. 3

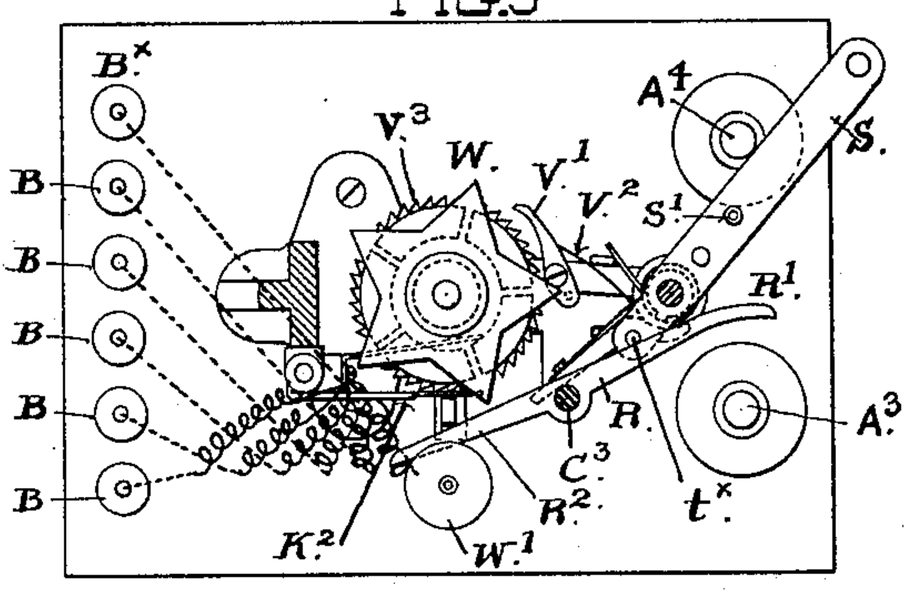


FIG. 4

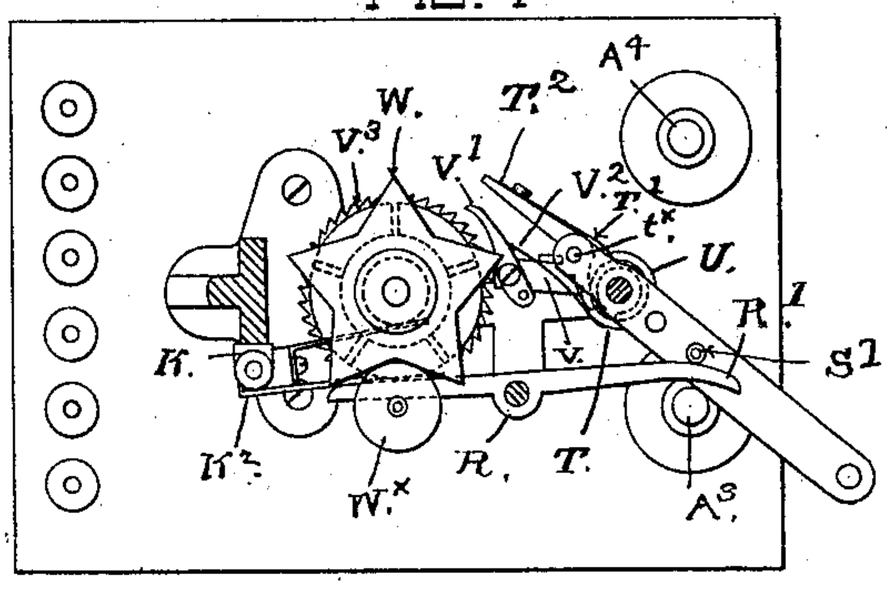


FIG. 5.

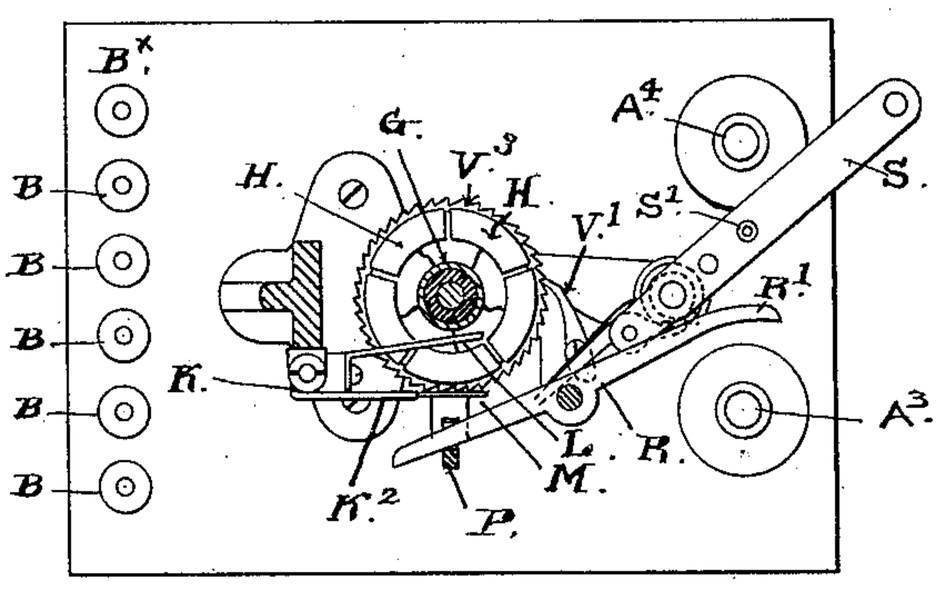


FIG. 7.

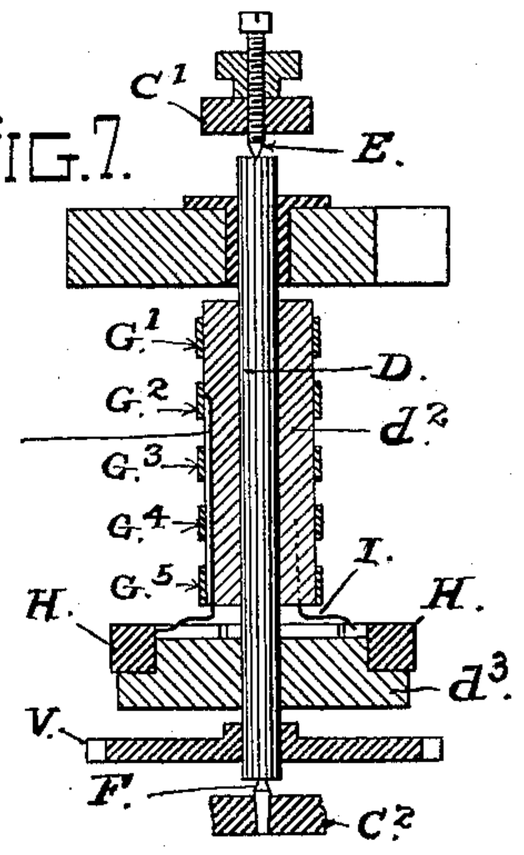


FIG. 6.

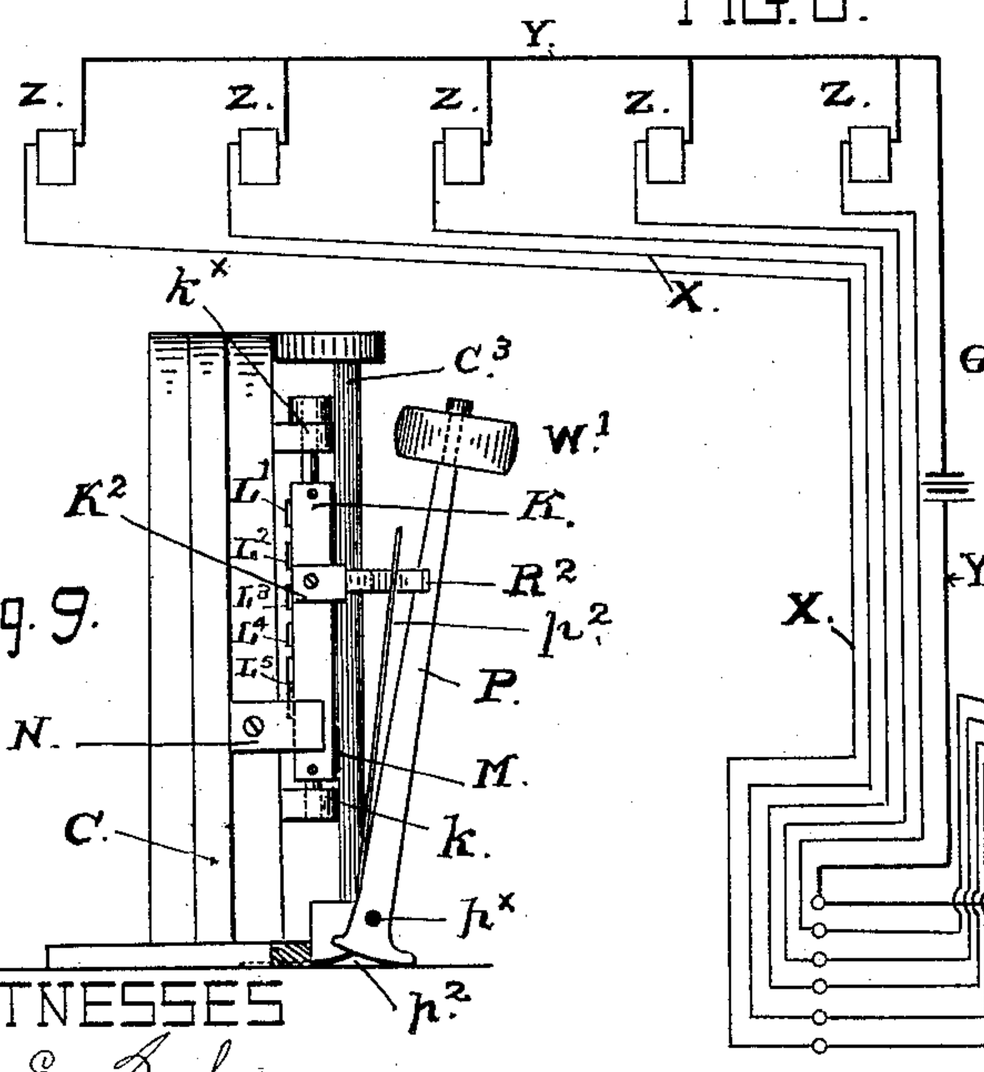


FIG. 8.

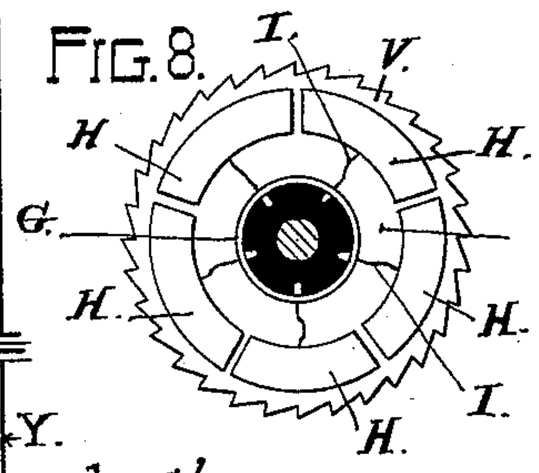
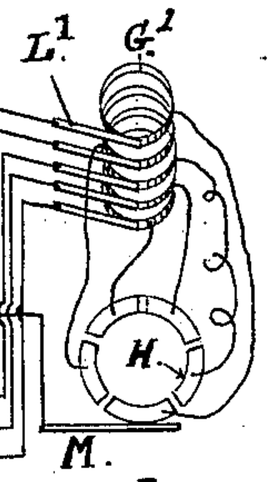


Fig. 9.



WITNESSES

E. Salomon.

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UNITED STATES PATENT OFFICE.

THOMAS R. BARNEY, OF SAN FRANCISCO, CALIFORNIA.

MULTIPLE CIRCUIT-CLOSER FOR ELECTRIC TRAP-PULLING DEVICES.

SPECIFICATION forming part of Letters Patent No. 568,013, dated September 22, 1896.

Application filed April 21, 1896. Serial No. 588,485. (No model.)

To all whom it may concern:

Be it known that I, THOMAS R. BARNEY, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Multiple Circuit-Closers for Electric Trap-Pulling Devices, of which the following is a specification.

My invention has for its object, mainly, to produce a mechanical means or device or apparatus for closing the circuits of a number of electrically-operated trap-pulling devices in single order and irregular or arbitrary succession at intervals of time apart and to so conceal the order in which the circuits are operated that the same is not indicated or disclosed beforehand and cannot be ascertained or controlled either by the shooter or by the person operating the traps.

To such end and object my said invention consists in certain novel parts and combination of parts and mechanism producing a device or apparatus to operate a number of traps on a shooting-range by electrical means and to select and determine entirely by mechanical means the order or succession in which the traps are sprung or set off and without disclosing the same to the shooter or the attendant who works the traps, all as hereinafter fully set forth.

The following description explains the nature of the said invention and the manner in which I proceed to construct and produce the same, reference being had to the drawings that accompany and form part of this specification.

Figure 1 is a perspective view of an apparatus embodying my invention and constructed to operate five traps. Fig. 2 represents in perspective a case with hinged sides in which the mechanism is inclosed for convenience in handling and transporting the apparatus as well as to protect the parts from injury and from being tampered with. Fig. 3 is a top view of the mechanism with the top of the frame removed and showing the positions assumed by the parts when at rest and the point at which they start at the beginning of each operative movement. Fig. 4 is a top view of the same, showing the position in which the parts are thrown by the movement of the operating-lever to close the circuit of one of the traps. Fig. 5 is a top view showing the position to which the parts return when the hand-lever is released. In this figure the section is taken below the star-wheel on the top of the commutator-shaft to expose the parts below it. Fig. 6 is a diagram showing the arrangement of the traps, the battery, and the circuits through the apparatus. Fig. 7 is a vertical section, on an enlarged scale, taken through the center of the commutator. Fig. 8 is a horizontal section taken through the commutator at a line, as *x x*, Fig. 7. Fig. 9 is an elevation taken from the back of the apparatus, looking at the standard C of the frame.

The principal parts of this apparatus consist of a rotatable spindle or shaft carrying contact-rings insulated from one another and contact-segments also insulated from one another and from the contact-rings, both individually connected with said rings, both the rings and segments corresponding in number with the circuits to be controlled or operated; a spring-actuating hand-lever adapted to coil up or compress coil-springs and mechanism actuated by the recoil of said springs when released to spin or rotate rapidly the said spindle or shaft on its centers; a circuit-closing spring for each circuit having electrical contact with one of the contact-rings on the shaft and to which one wire of the circuit is connected; a circuit-closing spring having electrical contact with the contact-segments and a ground or return wire and battery common to all the circuits connected to the last-named circuit-closer. With these parts are combined and arranged mechanism through the medium of which, as the same is acted on by a movement of the hand-lever in one direction from a state of rest, all the circuit-closers of the line-wires are brought in contact with the contact-rings, but the circuit-closer of the return-wire is brought in contact with only one of the contact-segments at such time of contact, whereby one circuit is closed upon the battery at every movement and contact of the circuit-closers against the rings and segments, and the particular circuit so closed is determined and governed by the position of the contact-segments with reference to the circuit-closer of the return-wire. By such mechanism also the movement of

the hand-lever in the opposite direction to its position of rest causes the contact rings and segments to make a number of rapid turns or revolutions on its centers before coming to rest, this motion being imparted by the recoil of a spring that is compressed or wound up by the movement of the hand-lever and is released and thrown upon the ring and segment carrying the shaft in the return movement of the lever. The result of this rotation is to change the position of the contact-segments with respect to the return-wire contact-spring and to set one out of the whole number of such segments arbitrarily into operative position in front of that spring ready for the next operation when the contact-springs are moved against the rings and segments, whereby the circuits are closed in irregular order and beyond the knowledge and control of the person who operates the hand-lever.

A indicates a suitable base on which the parts are mounted.

B B B$^{\times}$ are binding-posts for connecting the conducting-wires from the traps T T and the battery.

C is a frame composed of a post or standard, a horizontal foot C′, and a horizontal arm C^2 at the top parallel with the foot. Between these two horizontal supports the spindle or shaft D, carrying the contact rings and segments before mentioned, which I have termed the "commutator," is mounted to rotate freely by centering its top ends on a pointed screw E and its lower end on a center screw F. This part D is composed of a number of rings G′ G^2, &c., of conducting metal, equal in number to the number of circuits to be operated, secured on a sleeve d^2, of insulating substance, at proper distance apart to isolate electrically one ring from the others.

H H are contact-segments of conducting material secured on an insulating-block d^3 in a circle concentric with the axis of rotation of the commutator and separated electrically one from the other. These segments correspond in number with the contact-rings, and each one is connected with a ring by a covered wire I.

K is an upright bar attached to the standard of the frame by hinges $k^{\times}$ $k^{\times}$, and L′ L^2 are circuit-closing springs secured by one end to the side of such bar in the same plane, parallel with the axis of the commutator and spaced at proper distance apart to correspond with the spacing of the rings, so that they come opposite to such rings and will make individual contact therewith when the bar is turned.

X X are conducting-wires connecting each circuit-closer of the set L′ L^2, &c., with a separate binding-post B, and Y is a wire connecting the spring M with a binding-post B$^{\times}$.

N is a spring bearing upon the bar K to hold it normally away from the commutator and all the springs L M out of contact.

P is an arm hinged at $p^{\times}$ on the foot C^2 of the frame in position directly behind and in close relation to the backs of the circuit-closing springs, and R is a lever having a center or fulcrum on an upright rod C^3 on the frame and two arms or members R′ R^2 of about equal length, one of which is attached by a spring-tongue p^2 to the hinged arm P.

S is a hand-lever having movement in a horizontal arc between two stops A^3 A^4 on the base, and S′ is a short post on the lever, in the path of which the end R′ of the lever R is set to be struck and moved outward by the throw of the lever. Such movement has the effect to throw the opposite member R^2 inward and thus move the arm P toward the commutator, and by contact of that arm with a short projecting arm K^2 on the side of the bar K sufficient movement of the bar K toward the commutator is produced to bring all the contact-springs on that bar against the contact-rings and one of the contact-segments.

S^2 is a hub on the lever S, fitted to turn smoothly on the rod C^4 of the frame, and S^3 is a helical spring having one end connected to the lever at S^4 and the other end bearing against a fixed point on the frame. The office of this spring is to throw the hand-lever back to position against the stop A^4 when it is released by the operator. The rod C^4 is fitted in bearings in the arms C′ C^2 of the frame to turn smoothly.

U is a flanged collar or clutch keyed on the rod C^4 and setting closely in contact with the under side of the hand-lever, so that a variable amount of friction is produced between the lever and the top face of the collar, the amount or degree of which depends on the pressure given by the hand of the operator upon the hand-lever in moving it. The collar U is not directly or positively attached to the hand-lever, however, and the frictional contact between the lever and the collar is intended to produce a constantly-varying amount of resistance or retarding force that will make the rotative movements of the collar irregular or variable in the continued operation of the apparatus.

U′ is a helical spring surrounding the rod C^4 below the flanged collar and connected at one end directly to that collar and at the other end to a fixed point U^2 on the frame.

V is an arm fast on the rod C^4 and projecting at right angles toward the commutator D just below the plane of a ratchet-wheel V^3, that is fixed on the commutator-shaft below the segments H G, to which arm is pivoted a pawl V′ to engage the teeth of that wheel, and V^2 is a flat spring holding the pawl into engagement with the teeth of that wheel.

T is a pawl pivoted at $t^{\times}$ on the inner end of the hand-lever, and T′ is a spring holding the pawl against the periphery of the collar U to engage a tooth or projection U^3 on its face between the flanges. T^2 is an arm integral with such pawl or rigidly secured to it and extending from the pivot $t^{\times}$ outward to the fixed rod C^3 in such manner that the

outer end of the pawl-carrying arm striking the said rod has a fixed stop which acts to throw out and hold the point of the pawl clear of the collar. The position of this stop C^3 is such that the pawl is thrown away from the collar first before this hand-lever comes to rest at the end of its return movement. The function of this collar and pawl is to compress or coil up the spring U′ in the return movement of the lever produced by the upper spring N, and toward the end of this return movement to apply the power thus stored up to produce a number of rapid revolutions of the commutator. This last-named operation is produced by the rotative movement of the rod C^4 acting upon the ratchet-wheel V^3 through the medium of the pawl T on the arm V′ already described.

These parts and mechanism as thus constructed and combined operate as follows: By the movement of the hand-lever S in the direction indicated by the curved arrow in Fig. 1 the two operations are performed of first locking the flanged collar to the lever, whereby the coil-spring U′ is wound up, and afterward of moving the hinged bar K, that brings the circuit-closing springs against the contact-pieces of the commutator. This movement of the hinged bar is effected by the rocking lever R first pressing against the arm P and bringing that part in turn against the finger K^2. In this first movement of the hand-lever the upper coil-spring is wound up and sufficient power is obtained therefrom to restore the hand-lever to its position of rest against the stop A^4 and to compress the lower coil-spring U′. Near the end of the return movement of the lever the pawl T is thrown clear of the flanged collar U, and that part being fast on the shaft C^4 is turned with a short and quick movement, the effect of which is to rotate the commutator D by the connecting parts, consisting of the arm V and pawl V′ and the ratchet-wheel V^3. As the outer end of that arm V travels in an arc of relatively short radius, the pawl V′ is disengaged from the teeth of the ratchet-wheel at the end of its throw, and by that means the commutator is left free to revolve under the impulse given to it until the motion dies and the part comes to rest. The result of this motion is to change the positions of the contact-segments and set the same with respect to the contact-spring M in an arbitrary manner without any control on the part of the person who works the hand-lever and without indicating or making known the order in which such segments are set. In this operation of the mechanism upon the commutator the varying frictional contact between the flanged collar and the hand-lever when the lever is making its return movement and is retained in the hand of the operator forms an unknown and constantly-varying factor that prevents the spring U′ from acting always with the same degree of force, and consequently of imparting the same length of rotative movement always to the commutator, thus avoiding any possibility of a particular order or succession in the position of the different contact-segments with respect to the contact-spring M being calculated and ascertained from operating the apparatus a number of times.

For the purpose of bringing the segments H into working position with reference to the contact-spring M at or before the circuit-closing springs are set forward against the commutator the star-wheel W is fixed on the shaft D in position with the angle between every two points directly over the vertical middle line of a segment, and a roller W′, mounted on the end of the arm P to turn freely, is set to strike the wheel in the movement of the arm that throws the hinged bar K forward, and by lodging in the angle between the two nearest points the roller acts to turn the commutator into position just as the contact-springs are brought against the contact-rings and contact-segments. These parts thus prevent the contact-spring M from straddling or coming in contact with two segments at the same time. The base A, on which these parts are mounted, may form the bottom of a case of which the ends, sides, and top, being attached to the base by hinges $a^\times$ $a^\times$, can be made to open and uncover the mechanism or to close and conceal them, a slot a^3 being provided for the hand-lever to project through that it may be operated from the outside without opening the case. A case of this character is illustrated in Fig. 2 of the drawings.

In the sections, Figs. 3, 4, and 5, are represented the different positions assumed by the hand-lever and the other operative parts at the beginning and the end of the operation of setting off a trap. Fig. 3 illustrates the positions with the hand-lever at rest at the beginning of the operation. Fig. 4 represents the extreme position of the hand-lever at the end of its first movement, at which time the contact-springs L M are brought against the commutator, and that one of the circuits in which is included the segment H in front of the contact-spring is closed by the battery. Fig. 5 shows the position of the parts on the release of the hand-lever and when it is returning to its first position against the back-stop C^4. At such time the pawl V is set into the ratchet-wheel and the lower coil-spring is wound up and ready to act on the pawl as soon as the flanged collar is released from the hand-lever.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A circuit-closing device for operating mechanically a number of electric circuits in irregular order or succession consisting of a contact-spring for each circuit forming the terminal of one wire of the circuit; a common "ground" or return wire to which all the cir-

cuits are connected on one side of the battery, a contact-spring forming the terminal of said circuit on the other side of the battery; the revoluble commutator carrying a set of separate insulated contact-rings and a set of insulated contact-segments, each contact-ring being electrically connected to a contact-segment, the said rings and segments being arranged with relation to the contact springs or terminals to make individual contact therewith; means for moving said springs into contact and out of contact with said rings; and means for imparting rotation to the said commutator after the contact-springs are thrown out of contact therewith, for the purpose of changing the positions of the said segments with respect to the contact-spring making contact therewith, after each time of contact.

2. In combination with a number of electric circuits in which are included a battery and operative devices such as described; a rotatable commutator having a separate contact-ring for each circuit and separate contact-segments corresponding in number with the contact-rings and each of which is in permanent electrical connection with one of such rings, circuit-closing springs normally out of contact, but adapted by contact with said rings and with one of said segments to close the battery through such segment and that one of the rings connected to it, means for bringing said contact-springs into contact with the commutator, and means for imparting rotating motion to the commutator when the said springs are moved away from the contact rings and segments, substantially as described for operation as set forth.

3. The combination, with a number of electric circuits including a separate operative device in each circuit and a battery common to all the circuits; of mechanism operating to close the battery upon the said circuits one after another at intervals and in irregular order or succession, comprising a revoluble commutator having an individual contact-ring for each circuit, an individual contact-segment in permanent connection with each ring, separate circuit-closing springs connected permanently to each circuit and each adapted to connect one wire of the circuit with a ring of the commutator, a circuit-closing spring and a return-wire common to all the circuits, and adapted to make contact with one of the commutator-segments at a time and not more than one at the same time, a battery included in said return-wire, means for throwing said circuit-closers into contact with the rings and with one segment of the commutator at the same time, and means for spinning said commutator on its axis after the circuit-closing springs are moved away from electrical contact with the commutator.

4. In combination with the commutators comprising a number of separate insulated contact-rings, and a corresponding number of separate contact-segments, each of which is in electrical connection with a contact-ring; of the circuit-closing springs normally out of contact with said rings, a contact-spring normally out of contact with the said segments and adapted to make contact with only one of said segments at the same time, an operating-lever and means connecting the same with the said circuit-closing springs to throw them simultaneously into electrical contact with the commutator, a binding-post to each circuit-closing spring, and means actuated by said lever to impart a revolving motion to said commutator to set the segments thereof in a new position for operation with respect to the circuit-closing springs after said springs are thrown out of electrical contact with the commutator.

5. The combination, with a revoluble commutator comprising separate contact-rings one for each circuit to be controlled, and a contact-segment for each contact-ring electrically connected thereto and electrically isolated from all the other rings and segments; of a set of contact-springs corresponding in number to the contact-rings and normally out of contact therewith and to which the wires of said circuits to be controlled are individually connected, a contact-spring normally out of contact with the contact-segments and forming one terminal of a ground or return wire common to all the circuits, means for throwing all the said contact-springs simultaneously into contact with the commutator and means for imparting a revolving motion to the commutator when said contact-springs are set clear of the commutator.

6. The combination, with the revolving armature; of the ratchet-wheel on the commutator-shaft, the shaft C^4, a fixed arm on the shaft, a pivoted pawl on said arm adapted to engage the ratchet-wheel, the flanged collar secured on the shaft, the hand-lever loose on the same shaft, the coil-springs, the pawl and arm mounted on the said lever and locking the flanged collar to the lever, and stops arranged with respect to said lever and the pawl-controlling arms, substantially as described, for operation as set forth.

7. The combination with the revoluble commutator, of the shaft C^4, loosely-mounted lever S, flanged clutch U fixed on said shaft and having contact with said lever, a pawl on the lever engaging the clutch in the throw of the lever and means for throwing the pawl out of the clutch in the return movement of the lever, the arm V and pawl V′ and the ratchet-wheel on the commutator, substantially as described to operate as set forth.

8. The combination, with the revoluble commutator having separate contact-rings and an individual contact-segment electrically connected to each contact-ring; of the movable bar K, contact-springs mounted on said bar and adapted by the movement of the bar to make and break electric contact with the said contact-rings and with one of the contact-

segments at the same time, circuit-wires connected to the contact-springs of the said rings on the commutator, and a ground or return wire common to all the said circuits and electrically connected to the contact-spring that is brought into contact with the segment of the commutator, to operate as set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

THOMAS R. BARNEY. [L. S.]

Witnesses:
EDWARD E. OSBORN,
WM. O. QUINBY.