

No. 786,912.

PATENTED APR. 11, 1905.

C. O. MILLER.
BURGLAR ALARM.
APPLICATION FILED APR. 9, 1903.

4 SHEETS—SHEET 1.

Fig. 1.

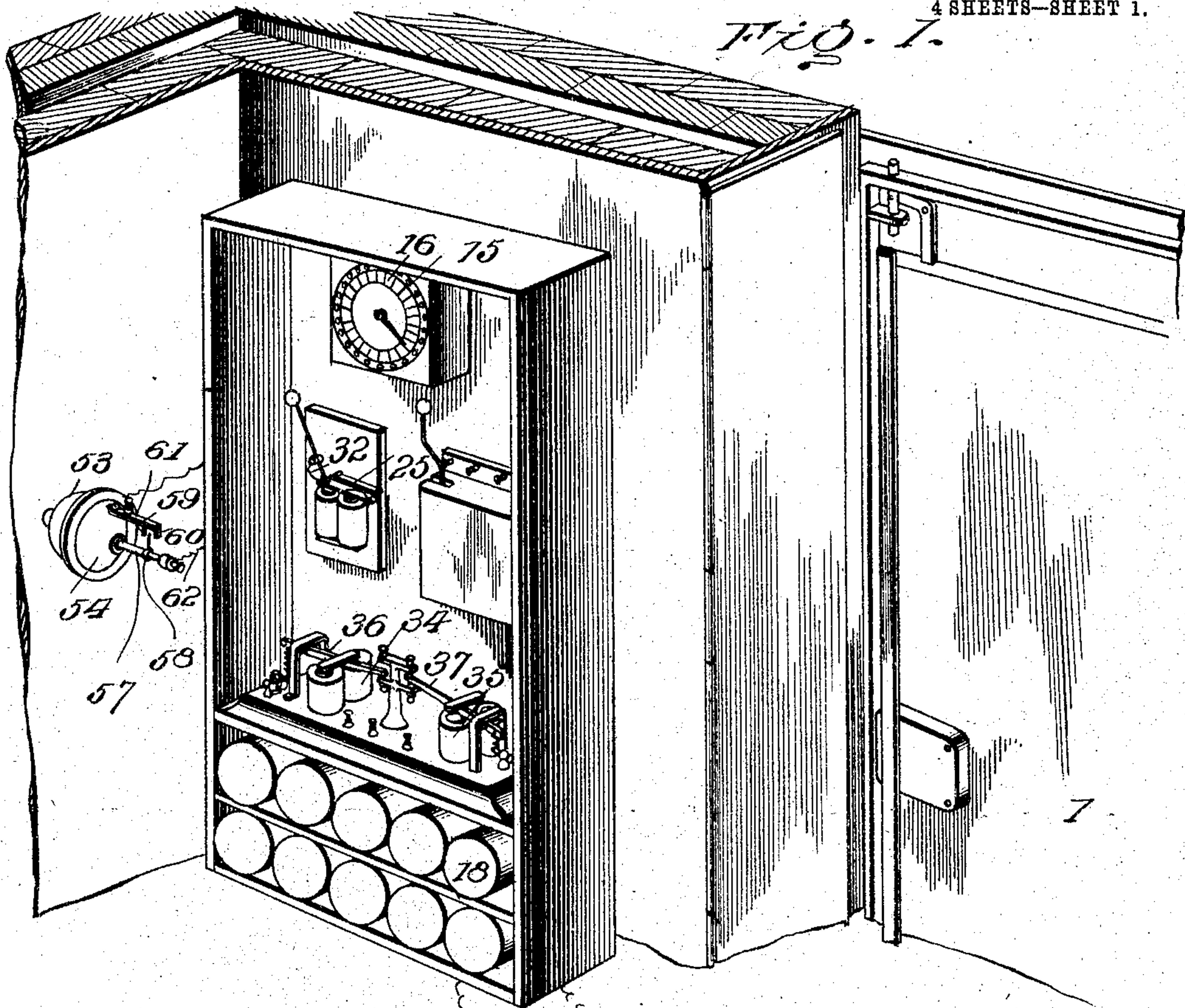
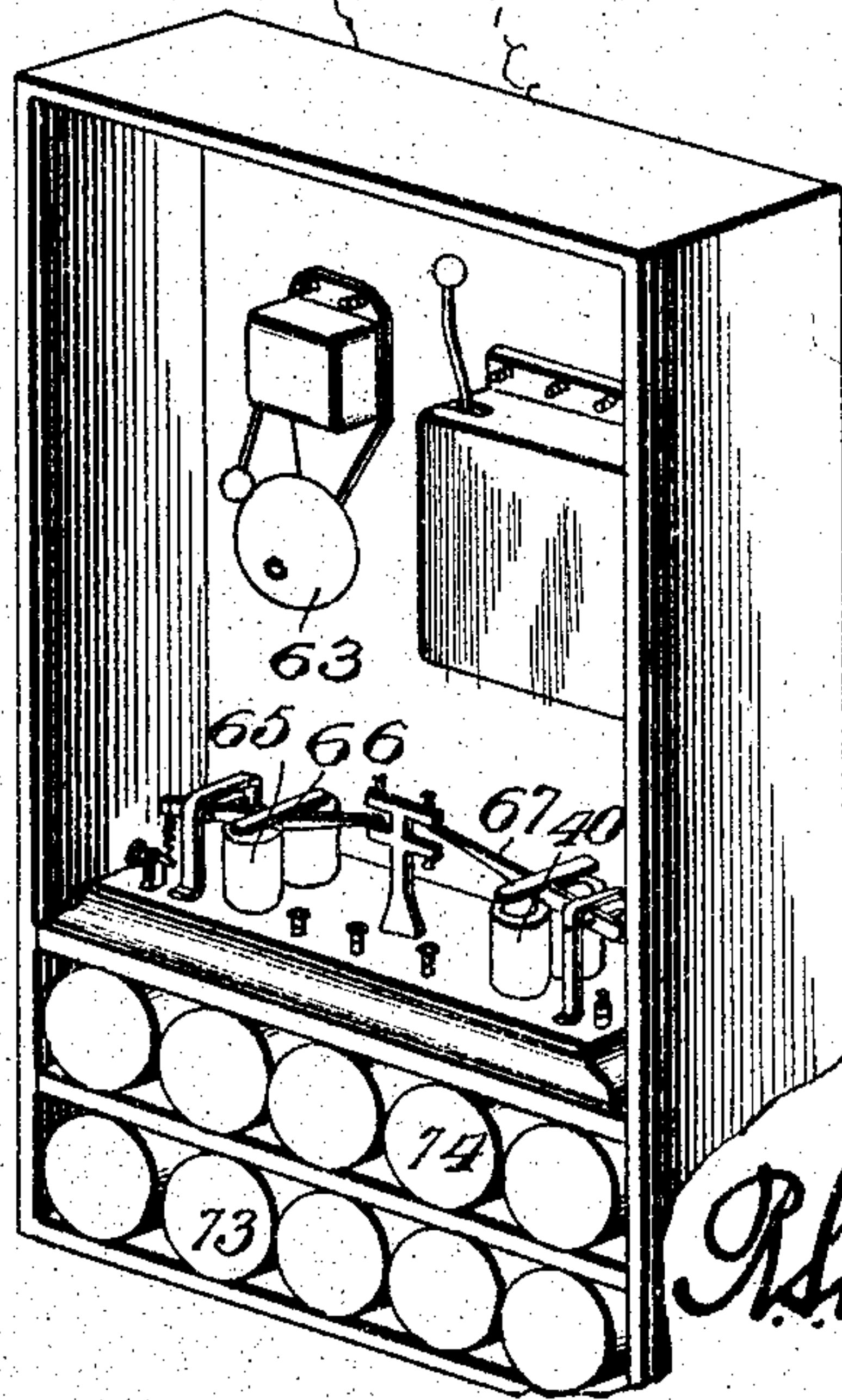


Fig. 2.



Witnesses

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By

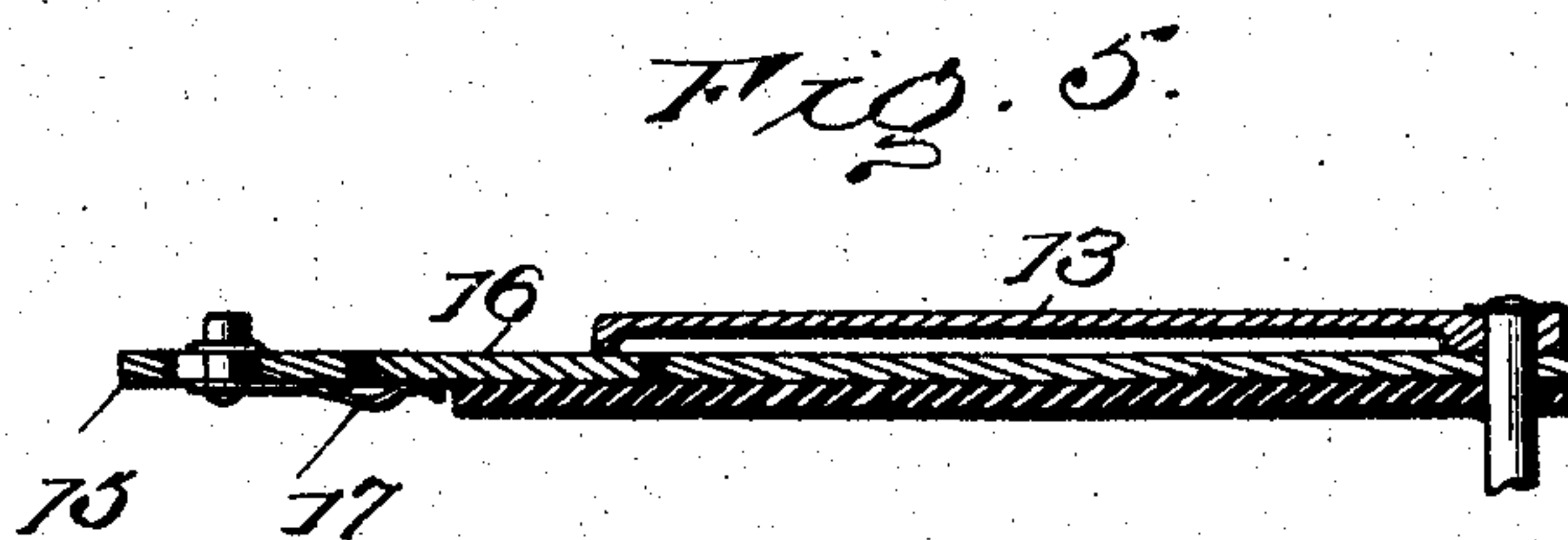
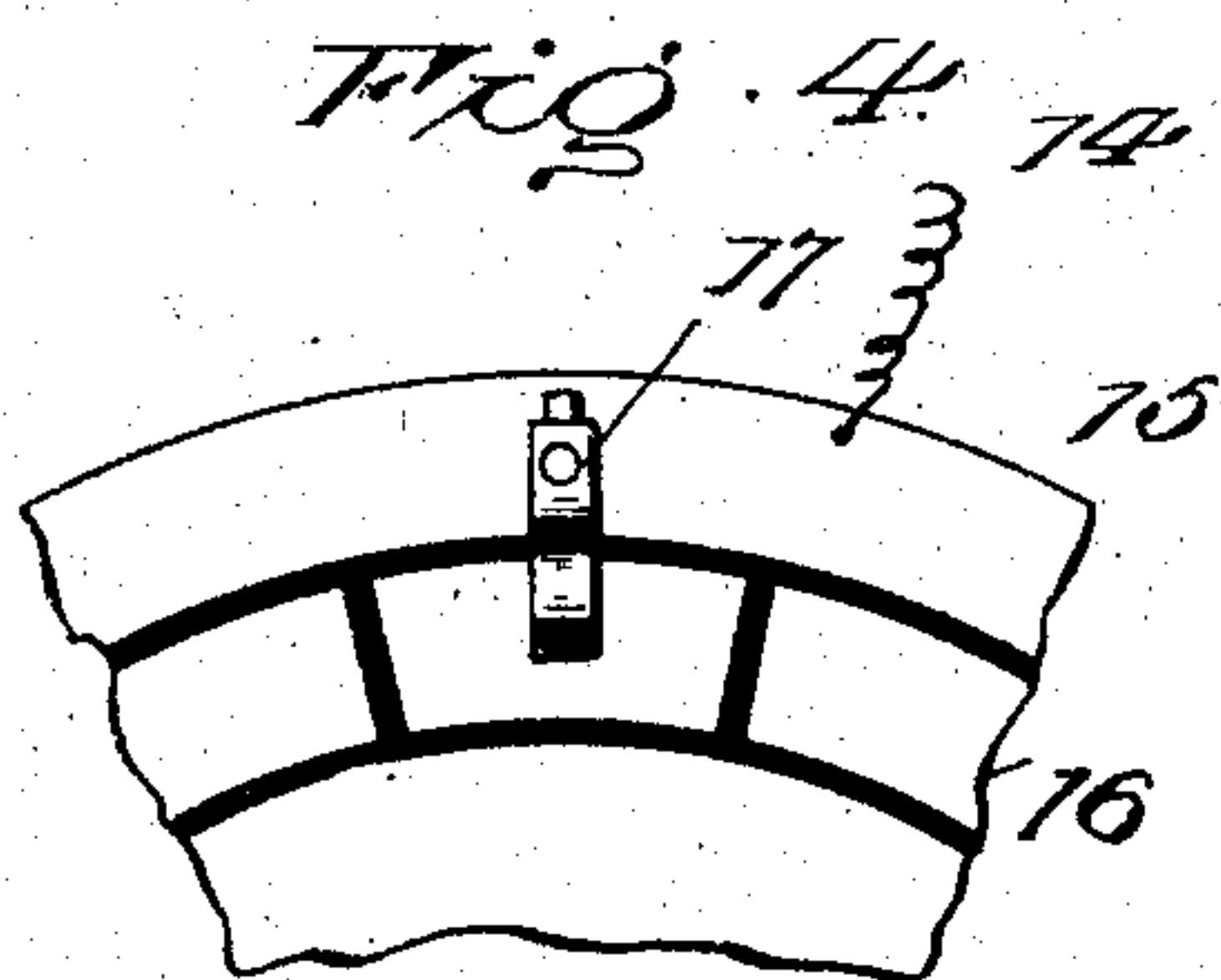
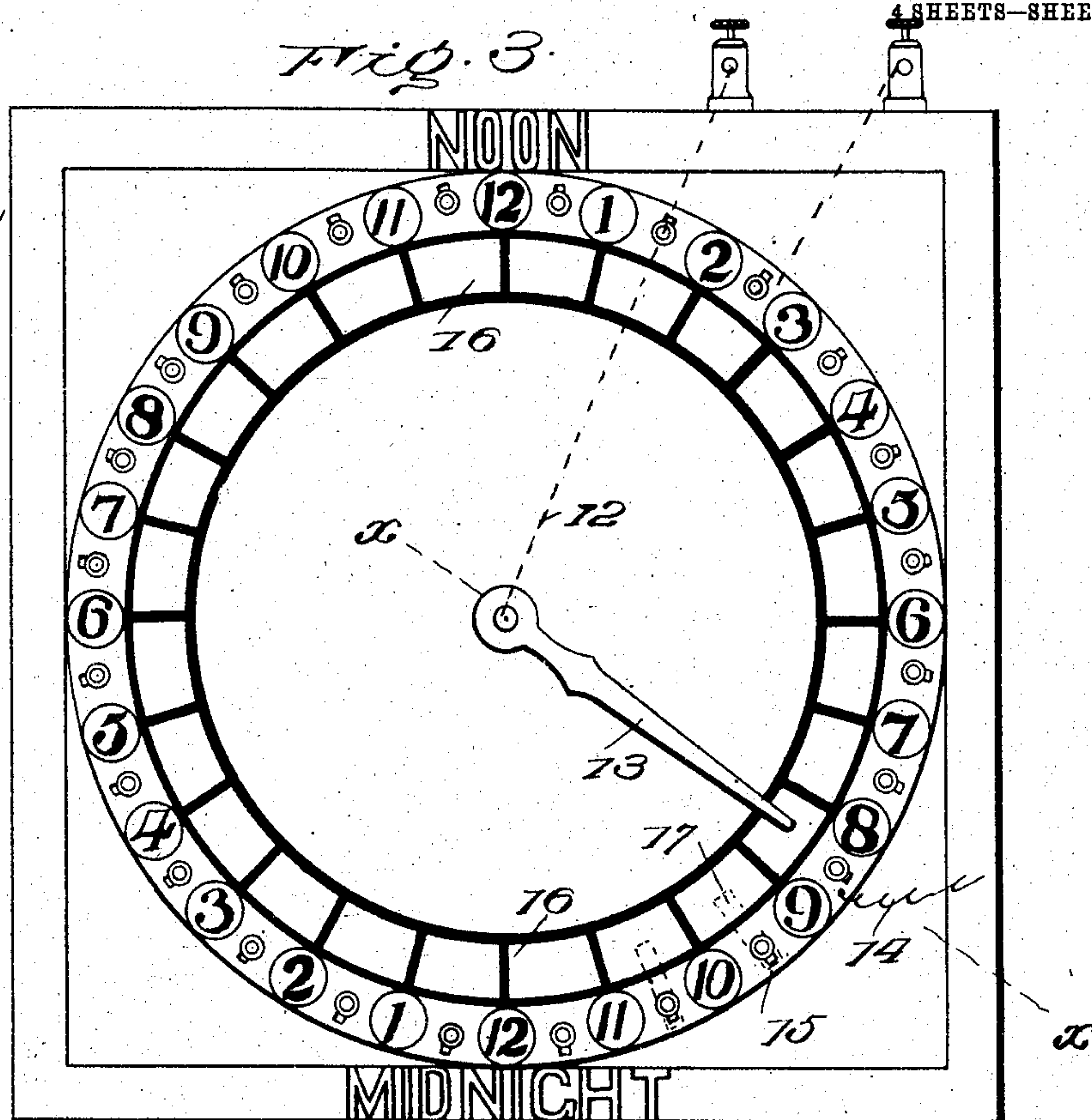
R. H. A. Racy, Attorneys

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4 SHEETS—SHEET 2.



Witnesses

Witnesses

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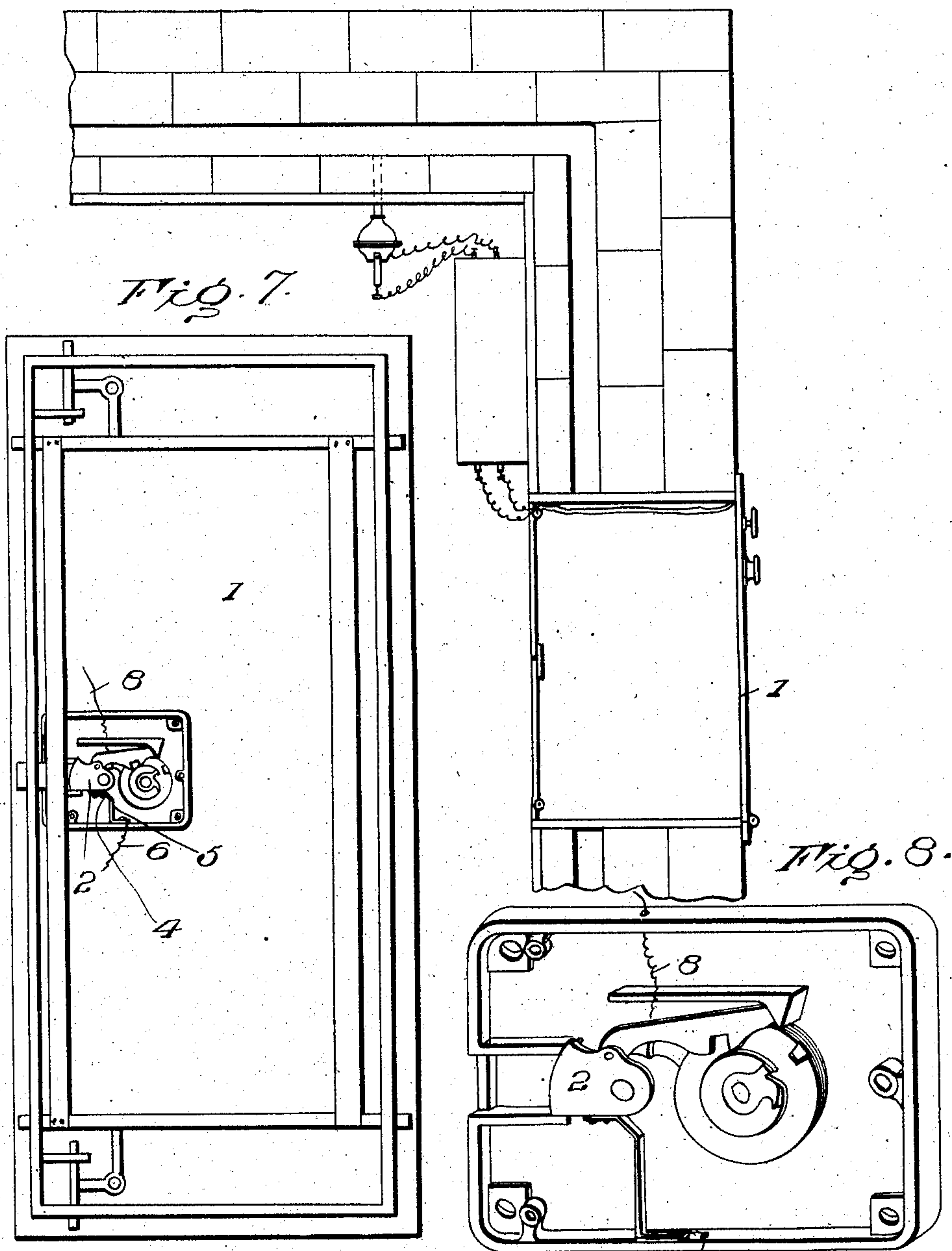
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4 SHEETS—SHEET 3.

Fig. 6.



Witnesses

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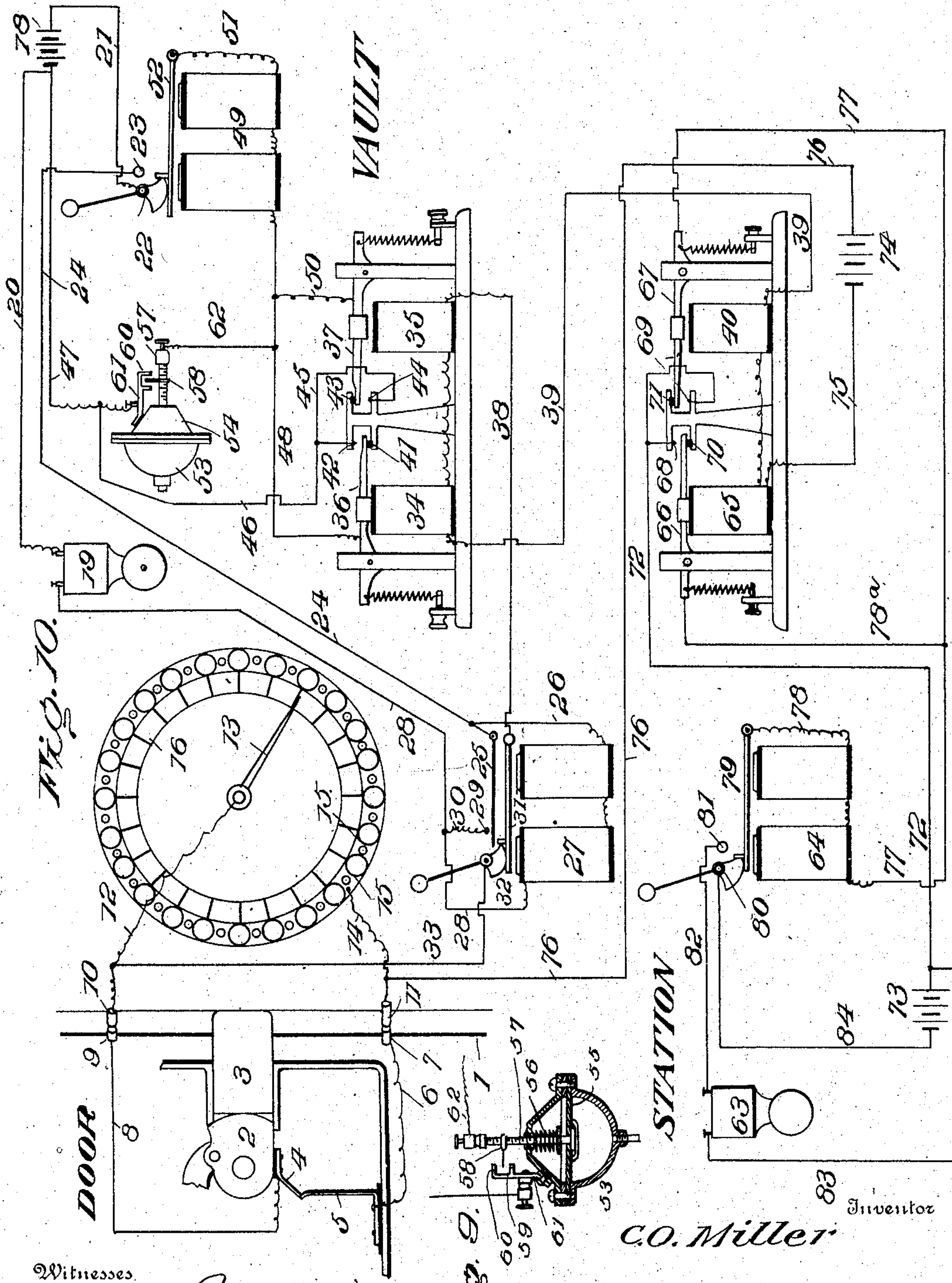
W. H. Lacey, Attorney

No. 786,912.

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4 SHEETS—SHEET 4.



Witnesses.

W. N. Woodson

Fig. 9.

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UNITED STATES PATENT OFFICE.

CHARLES O. MILLER, OF ESTHERVILLE, IOWA, ASSIGNOR TO MILLERS
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BURGLAR-ALARM.

SPECIFICATION forming part of Letters Patent No. 786,912, dated April 11, 1905.

Application filed April 9, 1903. Serial No. 151,934.

To all whom it may concern:

Be it known that I, CHARLES O. MILLER, a citizen of the United States, residing at Estherville, in the county of Emmet and State of Iowa, have invented a new Burglar-Alarm, of which the following is a specification.

This invention relates to systems and means for preventing surreptitious and unlawful entry into bank vaults, safes, and other repositories for valuables desired to be protected against unauthorized and unwarranted entrance being effected without giving warning at predetermined points.

The protective or alarm system contemplates, in combination with the locking means, alarm mechanism to indicate at the time of closing the safe, vault, or other storage-place whether the locking has been properly effected or not; to include in the circuit a pneumatic closer adapted to be actuated upon any unusual atmospheric disturbance, such as resulting from forcing the door either inward or outward, to insure warning being given; to interpose in the circuit a double-balance circuit-closing instrument to prevent tampering with the line either to increase or to diminish the resistance in an attempt to cut the vault, safe, or the like out of circuit, and to provide local alarm-circuits, the one at the vault or other place to be safeguarded to be closed by either the pneumatic circuit-closer or the breaking or disturbance of the main circuit and the other at police headquarters or like station to be closed upon the breaking or tampering with the main line.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and drawings hereto attached.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a fragmentary view in perspective of a bank safe or vault having the invention installed therein, the cabinet containing the instruments having the cover removed.

Fig. 2 is a detail perspective view of the cabinet containing the instruments located at police headquarters or the station in electrical connection with the bank vault, safe, or other repository to be safeguarded. Fig. 3 is a front view of the clock on a larger scale. Fig. 4 is a fragmentary view of the rear side of the dial, switch, and electric contacts forming a part of the clock for closing the main circuit at the predetermined time, so as to cut the vault, safe, or like place out of circuit. Fig. 5 is a detail section of the clock on the line X X of Fig. 3. Fig. 6 is a sectional detail of the bank vault or safe, showing the alarm mechanism in position. Fig. 7 is a detail view in elevation of the door provided with a lock mechanism equipped with circuit-closing contacts. Fig. 8 is a detail view in perspective of the lock mechanism, showing more clearly the relation of the electric contacts. Fig. 9 is a sectional view of the pneumatic circuit-closer on a larger scale. Fig. 10 is a diagrammatic view of the system.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The invention is designed for protecting repositories for valuables, but may be adapted for rooms, buildings, and structures intended to be entered at predetermined times and by authorized parties and which will give warning of any attempt to gain entrance between the periods of closing and opening.

The invention is shown applied to a bank vault or safe to which access is had by means of the outer door 1, which is provided with the accustomed lock-bolts and lock mechanisms, the latter being of any type. The tumbler 2 for throwing the lock-bolts is adapted to shoulder or abut against a block or stop 3 when the bolts are properly thrown and the lock made secure. The tumbler 2 is provided with an electric contact 4 to make electrical connection with a corresponding contact 5, secured to the frame of the lock and insulated therefrom. The electric contact 5 is resilient to admit of proper and free operation of the tumbler when throwing the same. The wire 6 connects the contact 5 with the contact 7 at

or near the edge of the door, and the wire 8 connects the contact 4 with the contact 9, arranged at or near the edge of the door. Electric contacts 10 and 11 are provided upon the door-frame and make electrical connection with, respectively, the contacts 9 and 7 when the door is properly closed. A wire 12 connects the contact 10 with the post or arbor of the clock provided with the hand 13, and the wire 14 connects contact 11 with the dial 15 of said clock.

The clock may be actuated by any type of movement, and the dial is provided with twenty-four numerals or characters corresponding to the hours of a calendar day, and a corresponding electric contact 16 is provided for each of said numerals or characters, said electric contacts being insulated from one another and from the dial 15. Switches 17 coöperate with the contacts 16 and dial 15 to electrically connect any selected contact with the dial, whereby the main circuit may be closed by means of the clock, so as to admit of opening the safe, vault, or other repository without turning in an alarm. The hand 13 is constructed at its outer end to travel over the contacts 16 and make electrical connection therewith in successive order. When the hand makes electrical connection with the contact 16, connected by the switch 17 with the dial 15, the mechanism applied to the vault or safe is shunted or cut out of circuit and the safe may be opened without sounding an alarm. The clock may be located at any convenient point so as to prevent access being had thereto, and it is preferably arranged within the bank or repository having the protective system installed.

The local alarm-circuit applied to the bank comprises the battery 18 and bell 19, one pole of the battery being connected to the bell by the wire 20 and the other pole being connected by the wire 21 with the movable contact 22, which is pivoted and weighted. A fixed contact 23 is arranged in the path of the movable contact 22 and is connected by the wire 24 with the spring 25. A wire 26 connects the wire 24 with the helix of the electromagnet 27, and said helix is connected by the wire 28 with the bell 19. A fixed contact 29 is connected by the wire 30 with the wire 28 and coöperates with the spring or movable contact 25 to cut the electromagnet 27 out of circuit the instant its armature 31 has been attracted and the movable or pivoted contact 32 has been released and press the free end of the contact 25 against the contact 29. The movable or pivoted contact 32 is weighted or counterbalanced, so as to operate automatically when released from the restraining influence of the armature 31, by means of which it is normally held out of contact with the part 25. The wire 33 connects the contact 32 with the wire 12.

The double-balance relay or circuit-closer

comprises the electromagnets 34 and 35, with their respective armatures 36 and 37, the helices of the electromagnets being in electrical connection, and the wire 38 connecting the helix of the electromagnet 35 with the armature 31, and the helix of the electromagnet 34 being connected by the wire 39 with the helix of the electromagnet 40 of a companion double-balance relay or circuit-closer located at police headquarters or like station. The double-balance relays are included in the main circuit, which is normally closed, and one or the other is affected by increasing either the resistance or the current of the main line. The armature 36 is normally attracted by the force of the electromagnet 34, and in the event of said force being diminished the slightest degree the armature 36 is released and leaves the insulated point 41 and makes connection with the electric contact 42. The armature 37 normally stands away from the electromagnet 35 and bears against the insulated point 43 and the slightest augmentation of the force of the electromagnet 35 attracts the armature 37 and brings it in engagement with the electrical connection 44. The electric points 42 and 44 are connected by the wire 45, which wire is connected by the wire 46 with the wire 47, connected to the opposite pole of the battery 18. The wire 48 connects the armature 36 with the helix of the electromagnet 49, and a wire 50 connects the wire 48 with the armature 37. The helix of the electromagnet 49 is connected by wire 51 with the armature 52, which normally holds the movable contact 22 away from the fixed contact 23.

The pneumatic circuit-closer comprises a casing composed of the parts 53 and 54, secured in any substantial manner, preferably by having each part formed with an outer flange apertured to receive fastenings. A rubber or other flexible diaphragm 55 is clamped between the meeting parts of the sections 53 and 54 and is acted upon by a spring 56 on one side and compressed air or other fluid on the other side, the two forces neutralizing each other under normal conditions. A post or stem 57 is connected with the diaphragm 55, so as to move therewith, and is provided with an adjustable contact 58, arranged to operate between the two contacts 59 and 60, forming parts of or applied to the arm or bracket 61, connected at its inner end with the casing of the pneumatic closer. A wire 62 connects the post 57 with the wire 48, and the wire 47 is connected with the arm or bracket 61.

At police headquarters or like station is located a double-balance relay or circuit-closer similar to that arranged at the bank or other repository, together with a local circuit including the bell 63 and electromagnet 64. The double-balance relay at the station comprises the electromagnet 40, the electromagnet 65, the armatures 66 and 67, the electric contacts 68 and

69, and the insulating-points 70 and 71, against which the armatures 66 and 67, respectively, bear under normal conditions. When the force of the electromagnet 65 is diminished, its armature 66 is released and makes electrical connection with the contact 68. When the force of the electromagnet 40 is augmented, its armature 67 is attracted and makes electrical connection with the contact 69. The contacts 68 and 69 are electrically connected by the wire 72, which is connected with one pole of the battery 73. The battery of the main line is indicated at 74, and one pole thereof is connected by the wire 75 with the helix of the electromagnet 65, and the opposite pole is connected by the wire 76 with the wire 14. The armature 67 is connected, by means of the wire 77, with the helix of the electromagnet 64, and the wire 78 connects the armature 66 with the wire 77. The helix of the electromagnet 64 is connected by the wire 78^a with the armature 79, which normally engages with the movable contact 80 to hold the same out of engagement with the fixed contact 81, which is connected by the wire 82 with the bell 63, the wire 83 connecting the bell with one pole of the battery 73, the opposite pole of said battery being connected by the wire 84 with the movable or pivoted contact 80.

The movable contacts 22, 32, and 80 may be of any construction so long as they cooperate with their respective armatures and are held in restraint thereby and when released serve to close the alarm-circuits in the manner stated. The main circuit is normally closed and the local alarm-circuits open and adapted to be automatically closed when the main circuit is tampered with in any manner, either by forcing an entrance into the vault or safe or by attempting to cut said vault or safe out of circuit. Any attempt to force an entrance into the safe either by means of an explosive, pry, or like tool will disturb the atmosphere and affect the pneumatic circuit-closer and cause the diaphragm 55 either to move inward or outward, according to the nature of the disturbance. The movement of the diaphragm in either direction causes the post or stem 57 to correspondingly move and bring the contact 58 into electrical connection with either one or the other of the contacts 59 or 60, thereby closing the circuit including the electromagnet 49 and the battery 18, said circuit being as follows: starting from the battery 18, through the wire 21, contact 22, armature 52, wire 51, helix of the electromagnet 49, wires 48 and 62, post 57, contact 58, arm 61, and wire 47, back to the battery 18. The electromagnet 49 is energized upon passage of the current, and the armature 52 is attracted and releases the contact 22, which makes electrical connection with the contact 23, thereby cutting the electromagnet 49 out of circuit and closing the circuit including the

electromagnet 27, whereby the main circuit is broken and the alarm-circuits at the bank and station closed to apprise those on guard that the system has been tampered with. When the armature 52 is attracted and the contact 22 released and permitted to make electrical connection with the contact 23, the circuit from the battery 18 is as follows: from battery 18, through wire 21, contacts 22 and 23, wires 24 and 26, the helix of the electromagnet 27, wire 28, bell 19, and wire 20, back to the battery 18. When the electromagnet 27 is energized, its armature 31 is attracted and releases contact 32, which presses the contact 25 into engagement with the contact 29, thereby breaking the main circuit and permitting the electromagnets 34 and 65 of the respective double-balance relays to close the respective local alarm-circuits at the bank and station. When the contact 25 is in electrical connection with contact 29, the electromagnet 27 is cut out of the local alarm-circuit, which is as follows: starting from the battery 18, through wire 21, contacts 22 and 23, wire 24, contacts 25 and 29, wires 30 and 28, bell 19, and wire 20, back to battery 18. The circuit at police headquarters or other station when closed by the double-balance relay is as follows: starting from the battery 73, through wire 72, through the relay or circuit-closer, wire 77, helix of electromagnet 64, wire 78, armature 79, contact 80, and wire 84, back to battery 73. The current passing through the electromagnet 64 attracts the armature 79 and releases the contact 80, which makes electrical connection with the contact 81, thereby cutting the electromagnet 64 out of circuit and cutting the bell 63 into circuit, the direction of the current being as follows: starting from battery 73, through wire 84, contacts 80 and 81, wire 82, bell 63, and wire 83, back to battery 73.

Should the main line be tampered with in an attempt to cut the vault, safe, or other repository out of circuit, the double-balance relays at the station and at the place safeguarded will be affected and the local alarm-circuits closed whether the resistance or the current-power of the main line is augmented to the slightest degree, thereby closing the local circuits and giving an alarm. When the safe, vault, or other place equipped with the system is properly closed and locked, the main circuit is closed and the double-balance relays and pneumatic circuit-closer in prime condition for breaking the circuit under abnormal conditions, such as herein stated. On the other hand, should the bank, safe, or the like be improperly closed or locked the main circuit will remain open and an alarm will be sounded at the bank and station, apprising those on guard of the fact. When the system is in prime working condition and the safe, vault, or the like is properly closed and locked, any attempt to force an entrance into

the safe or to tamper with the line will turn in an alarm. When the hour for opening the safe or vault has arrived, the main circuit will be closed through the clock by the hand 13 engaging with the contact 16, connected by the switch 17 with the dial 15, thereby cutting the vault or safe out of circuit and permitting the same to be opened without giving an alarm.

The closed circuit that passes through the clock and through the lock is shunted by the clock and gives the banker permission to open the vault-door when the hand 13 moves over hour-plates 16, where switches 15 have been closed. It carries the closed circuit through the clock and shunts it from the door; but the door must be closed and properly locked when the hand 13 moves off from the hour-plates 16, where the switches 15 have been closed, or it will turn in the alarm. This circuit must be closed either in the clock or in the lock, and the door must be closed to complete the circuit at 9 10 and 7 11, which leads to the lock. The draw-bolts must be thrown out to bolt the door before it can be locked, and when locked the tumbler 2 drops down in place and closes the circuit by bringing contacts 4 5 together, thus completing the circuit in the lock. After this circuit is completed in the lock the clock-hand 13 can pass off from plate 16 where the switches have been closed onto plate 16 where the switches have not been closed without turning in the alarm. For example, suppose the banking-hours are from nine a. m. to three p. m. The switches will be closed onto all the hour-plates between nine a. m. and three p. m. just as long as the banking-hours remain the same. If the banker does not want to close at three p. m., he must close a switch for every hour he wishes to remain.

With reference to the electromagnet 27 and its adjunctive parts it may be well to state that it prevents taking a measurement of the line between the bank and the distant station. As soon as the current flowing in the line is increased or decreased by applying a meter to take the measurement of the circuit it makes variation enough to operate the relays and act on element 27 and throws the drop 32, and this element 27 operates so quick and breaks the closed circuit, leaving the line dead, which makes it impossible to take a measurement.

The movable contact 25 serves to shunt the local circuit from element 27 as soon as drop 32 is released, and the point or drop 32 striking element 25 holds it up to contact 29. In doing this it shunts circuit from coils 27 and stops armature 31 from vibrating; otherwise about two-thirds of the electricity in this local circuit would be lost. The element 27 operates always in sympathy with the relay at the vault and throws the current off from the line between the bank and distant station and leaves this line dead and prevents any measurement from being taken.

Having thus described the invention, what is claimed as new is—

1. In an alarm system for safes, vaults, repositories and the like, the combination of a closed circuit including an automatic circuit-closer, a lock mechanism applied to the door of the safe, vault or the like, contacts connected with the lock mechanism and actuated thereby for closing the main circuit, corresponding sets of contacts applied to the door and frame of the vault, safe or the like for completing the main circuit when said door is properly closed, and an alarm-circuit controlled by the aforesaid circuit-closing device included in the main circuit for giving warning when the main circuit is not completed or is tampered with, substantially as set forth.

2. In an alarm system for safes, vaults, repositories and the like, the combination of a closed circuit including an automatic circuit-closer, a lock mechanism applied to the door of the safe, vault or the like, contacts connected with the lock mechanism and actuated thereby for closing the main circuit, corresponding sets of contacts applied to the door and frame of the vault, safe or the like for completing the main circuit when said door is properly closed, a time mechanism included in the main circuit for cutting the vault, safe or the like out of circuit at the predetermined time to permit opening of the same without giving an alarm, and an alarm-circuit controlled by the aforementioned circuit-closing device located in the main circuit when the latter is broken or tampered with, substantially as specified.

3. In an alarm system for safes, vaults, repositories and the like, the combination of a closed circuit including an automatic circuit-closer, a lock mechanism applied to the door of the safe, vault or the like, and included in the closed circuit when said door is properly closed, a time mechanism included in the main circuit for cutting the vault, safe or the like out of circuit at the predetermined time to permit opening of the same without giving an alarm, said time mechanism comprising a dial, a series of electrically-insulated contacts concentric with the dial, means for electrically connecting any one of the contacts with the dial, and a hand to make electrical connection with said contacts, and an alarm-circuit controlled by the aforementioned circuit-closing device located in the main circuit when the latter is broken or tampered with, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES O. MILLER.

Witnesses:

W. H. FOOTE,
FRANK P. WOODS.