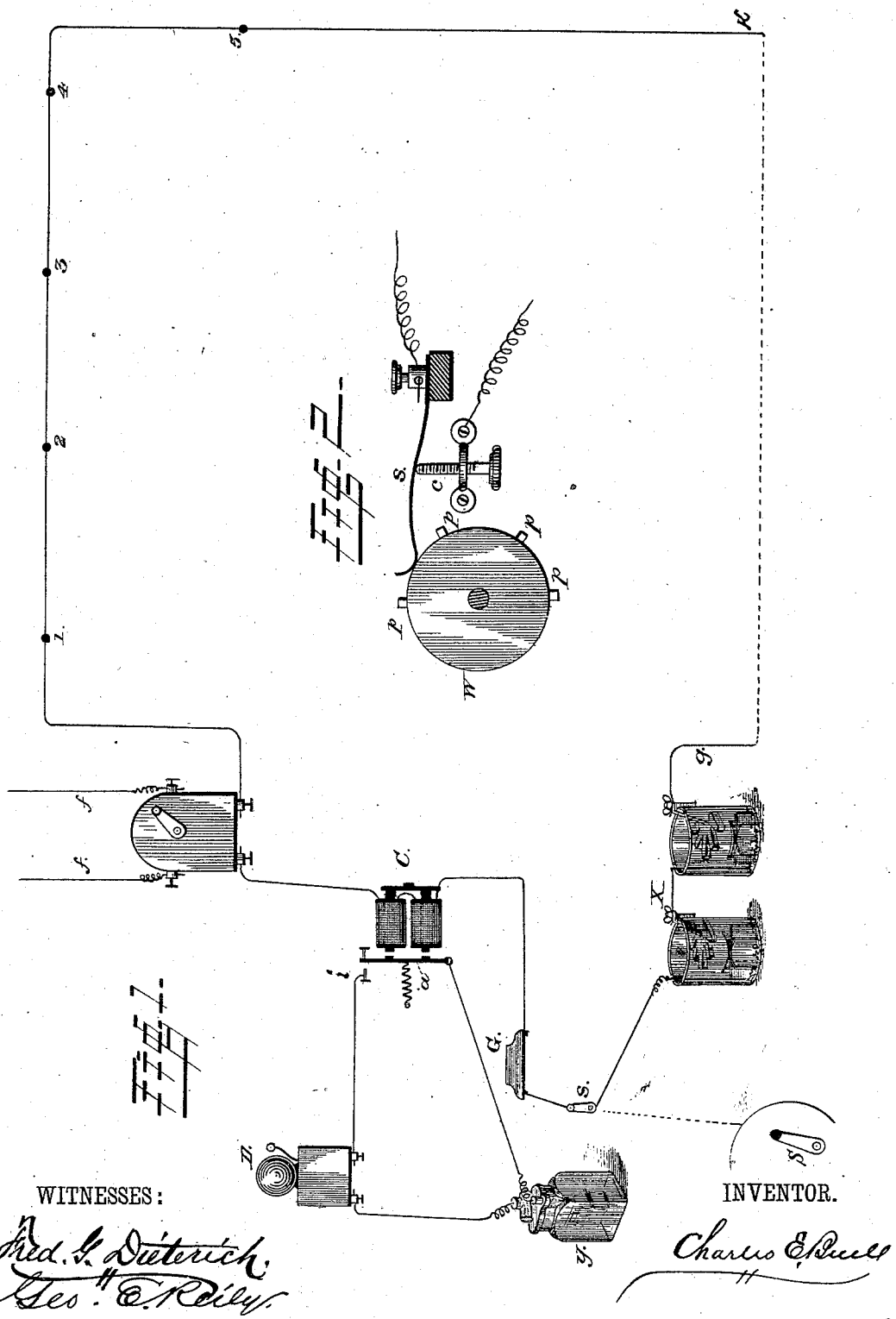
(No Model.) 6 Sheets—Sheet 1.

C. E. BUELL.

ELECTRIC FIRE ALARM AND FIRE EXTINGUISHER SYSTEM.

No. 294,008. Patented Feb. 26, 1884.



(No Model.) 6 Sheets—Sheet 2.

C. E. BUELL.

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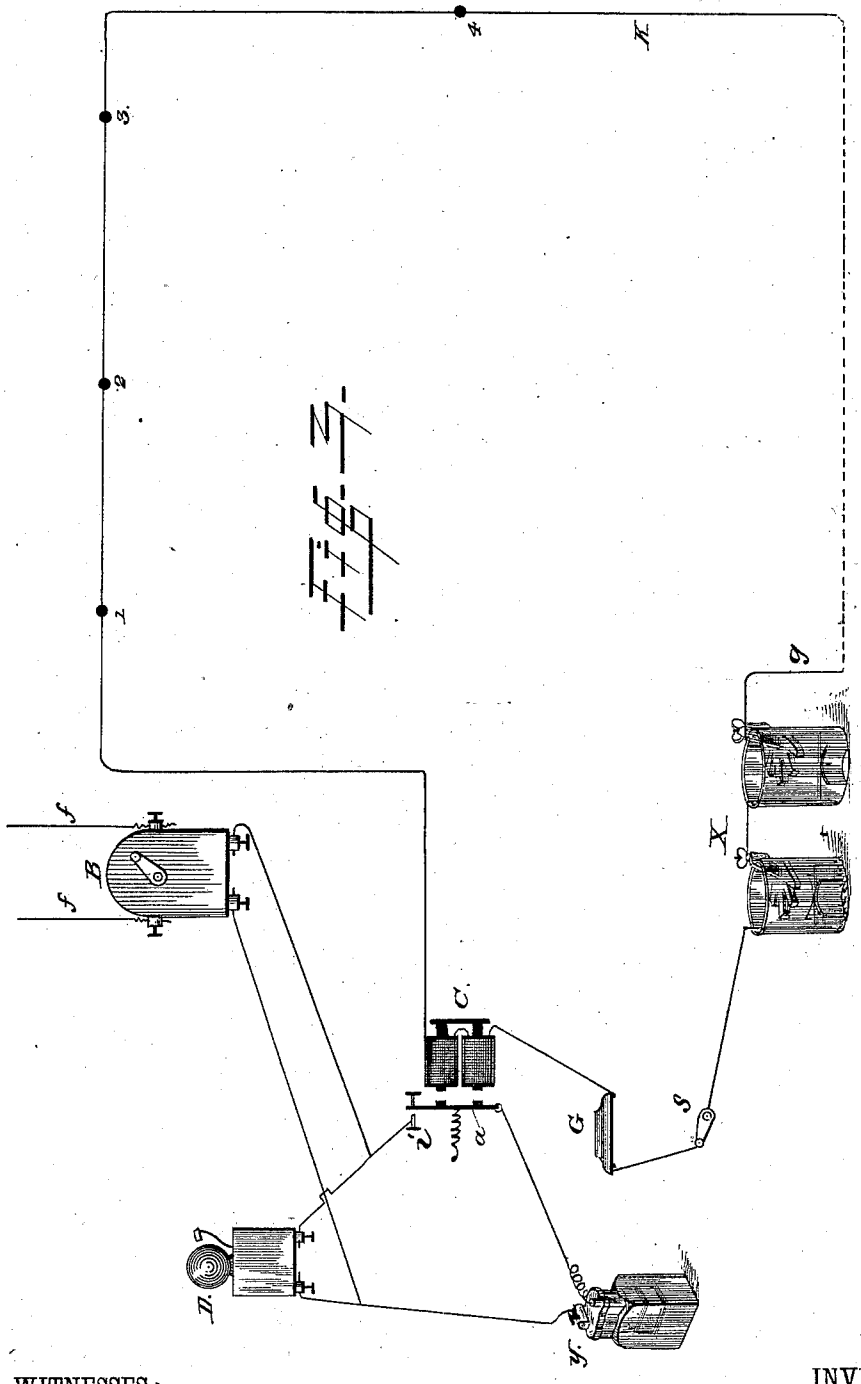

WITNESSES:

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(No Model.) 6 Sheets—Sheet 3.

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ELECTRIC FIRE ALARM AND FIRE EXTINGUISHER SYSTEM.

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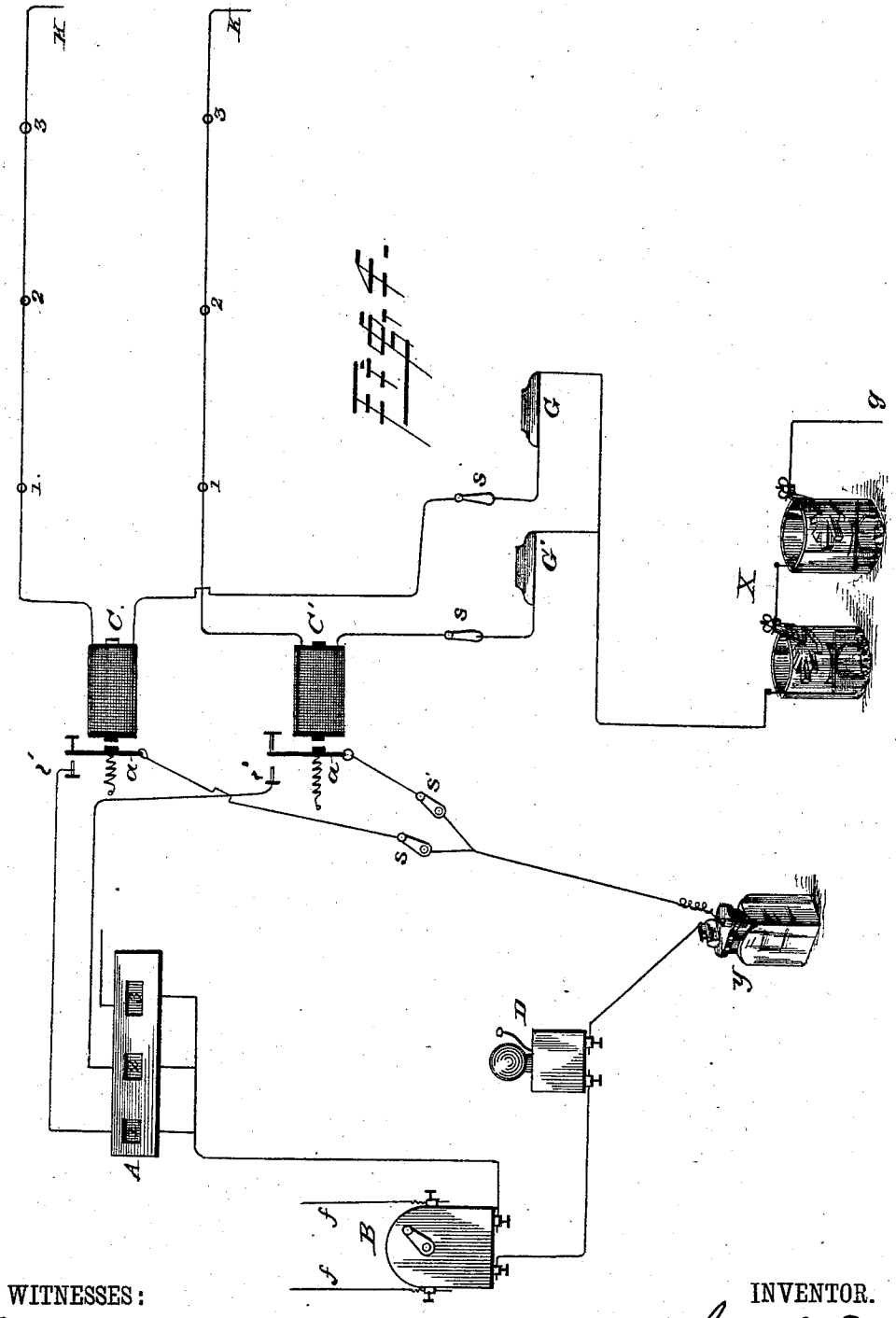

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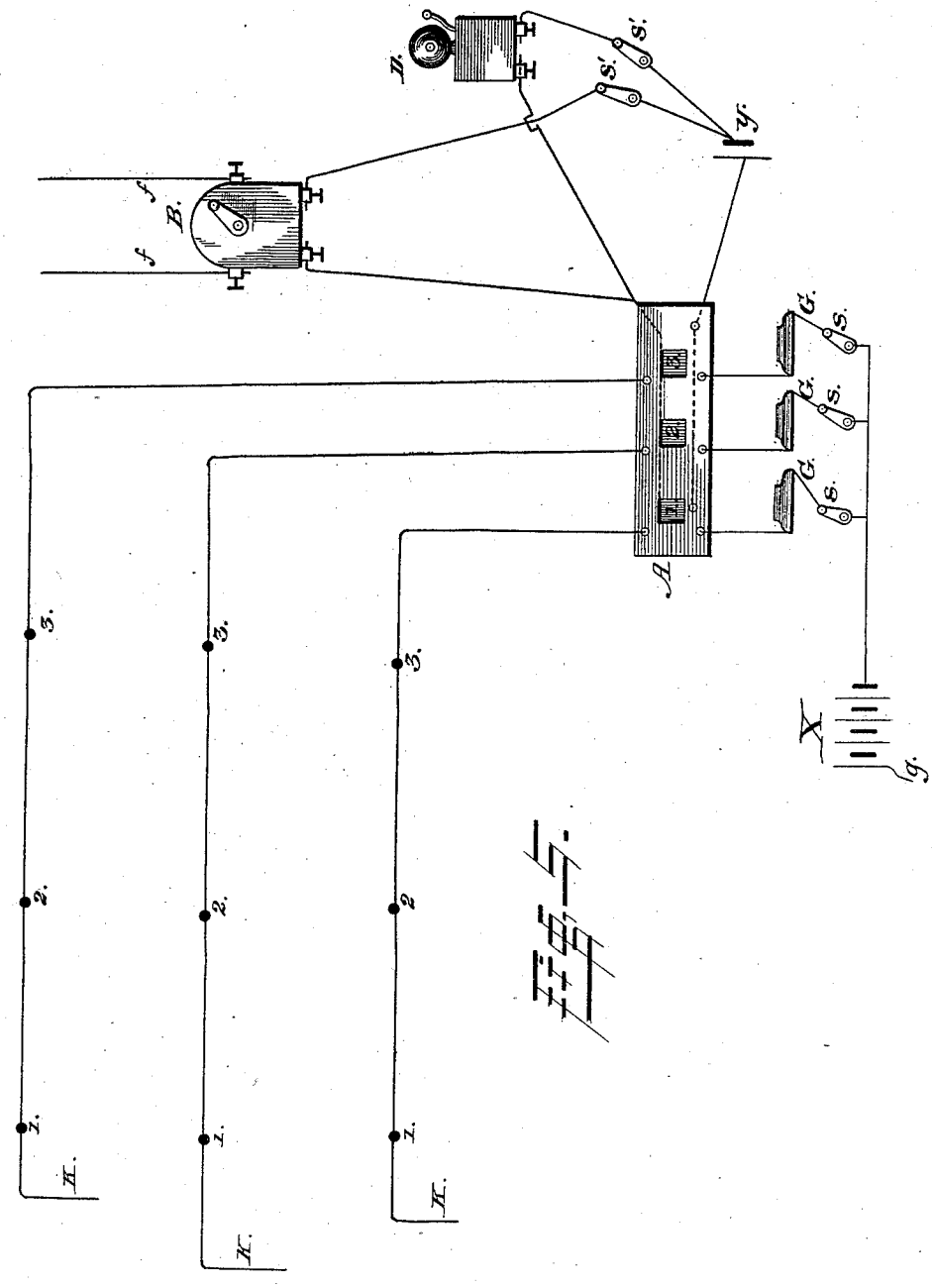
(No Model.) 6 Sheets—Sheet 4.

C. E. BUELL.

ELECTRIC FIRE ALARM AND FIRE EXTINGUISHER SYSTEM.

No. 294,008. Patented Feb. 26, 1884.



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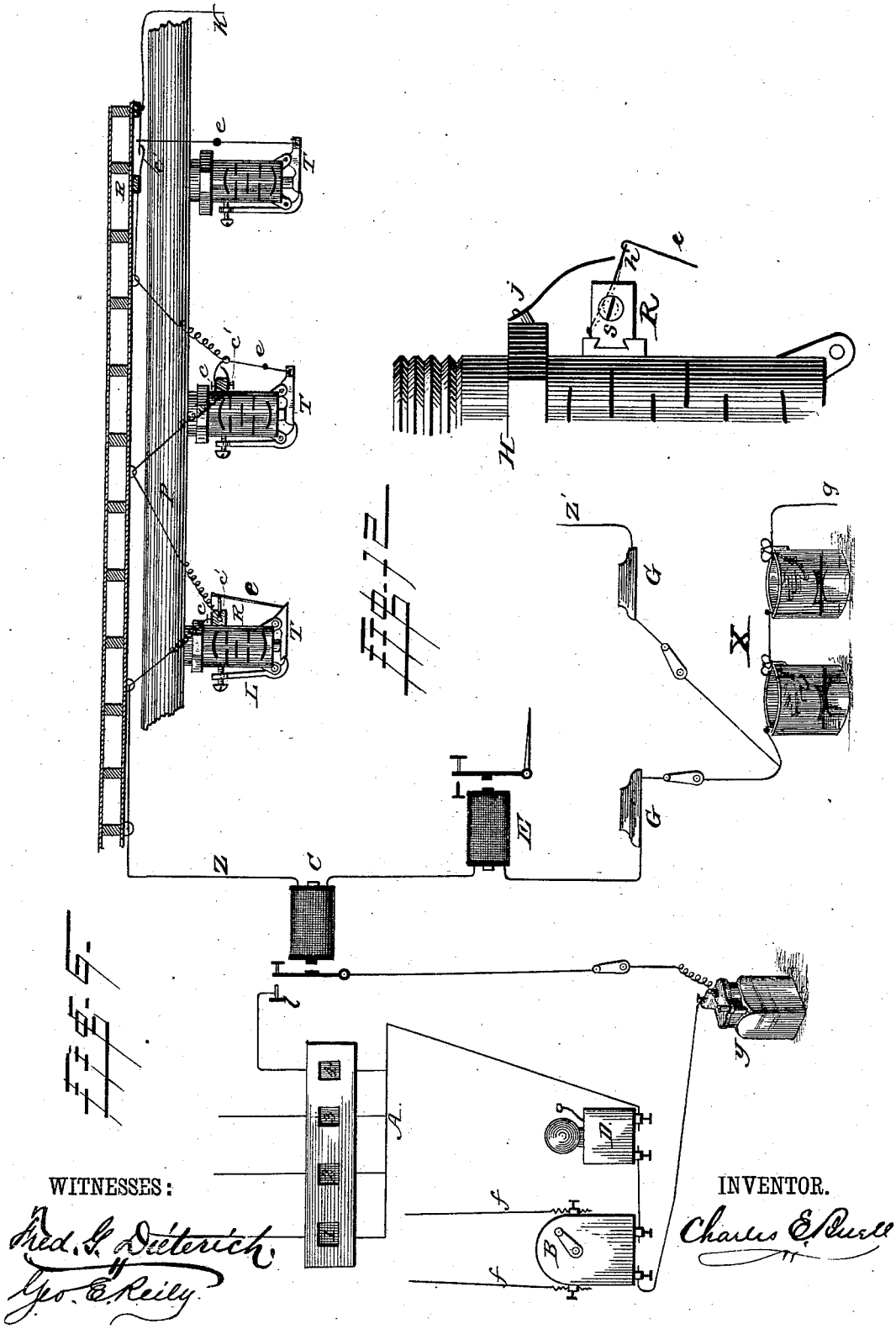
(No Model.) 6 Sheets—Sheet 5.

C. E. BUELL.

ELECTRIC FIRE ALARM AND FIRE EXTINGUISHER SYSTEM.

No. 294,008. Patented Feb. 26, 1884.



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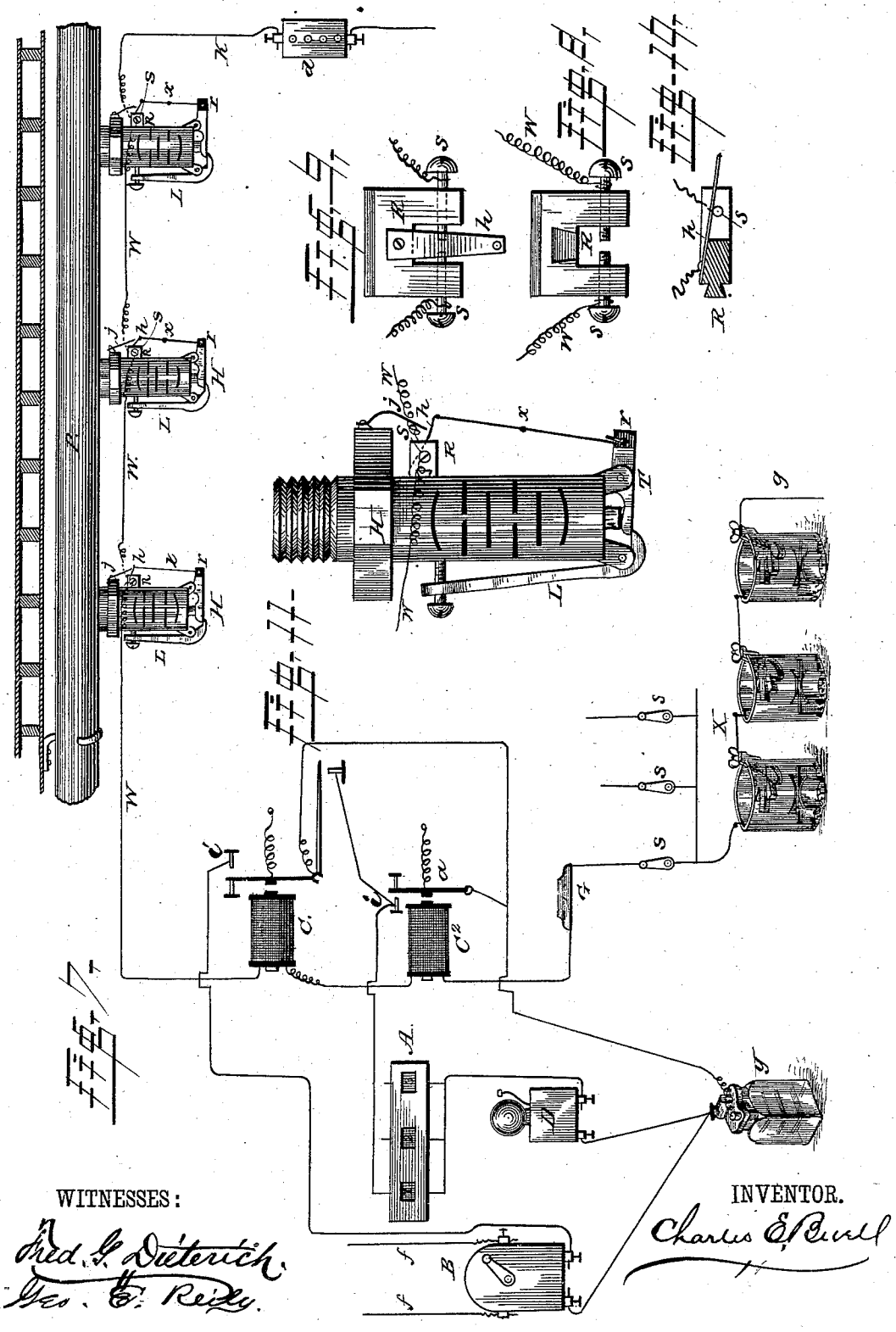
(No Model.) 6 Sheets—Sheet 6.

C. E. BUELL.

ELECTRIC FIRE ALARM AND FIRE EXTINGUISHER SYSTEM.

No. 294,008. Patented Feb. 26, 1884.



WITNESSES:

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INVENTOR.

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UNITED STATES PATENT OFFICE.

CHARLES E. BUELL, OF NEW HAVEN, CONNECTICUT.

ELECTRIC FIRE-ALARM AND FIRE-EXTINGUISHER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 294,008, dated February 26, 1884.

Application filed December 22, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUELL, of the city and county of New Haven, State of Connecticut, have invented Improvements in Electrical Fire-Alarms and their Combined Use with Fire-Extinguishers, of which the following is a specification.

My invention consists, primarily, in the combination, with one or more alarm-circuits adapted to open by heat, of alarm apparatus adapted to be made operative when said circuit or circuits open, and an independent circuit and means adapted to transmit a definite signal thereon to a remote station when said alarm circuit or circuits open, as hereinafter described.

My invention further consists in certain combinations and sub-combinations, which will be hereinafter described.

Figure 1 represents my invention. Fig. 2 represents a detailed view of one of the elements of my invention. Figs. 3, 4, 5, 6, and 7 show my invention. Figs. 8, 9, 10, 11, and 12 show detailed parts of my invention.

Referring to Fig. 1, C is a relay electro-magnet; G, a galvanometer, and B is a signaling-box of well-known construction included in the alarm-circuit of battery X, said circuit consisting of a wire that includes soldered joints 1 2 3 4 5, and connects to earth or other return-circuit at *g* and *k*. A switch, *s*, is also included in the circuit, for opening said circuit when making tests to ascertain the condition of the circuit in connection with the use of the galvanometer G. D is a call-bell in the normally-open circuit of battery Y, and is controlled by armature *a* of relay C, said call-bell being made operative to produce an alarm when the armature *a* is retracted to its back contact-stop, *i*. *f f* represent an independent circuit leading to a remote station, and adapted to be made operative by the signaling mechanism B when said signaling mechanism is set in motion by the opening of one of the soldered joints before mentioned.

Fig. 2 represents the circuit-breaking mechanism of the signaling-box B. W is a wheel adapted to be revolved by clock-work in a well-known manner, said clock-work being normally wound up, or partly so, and held from running down by the armature of an electro-magnet interlocking with its parts in a well-known way. The wheel W is provided with projections *p p*, adapted to lift the spring S^2 from the contact C as it revolves, thus breaking the circuit *f f*. By arranging the projections at longer or shorter intervals on the periphery of the wheel W, a definite number-signal will be produced as the wheel rotates.

Fig. 3 represents a circuit, as shown in Fig. 1 and described, with the difference, however, that the signaling mechanism B is included in the normally-open circuit of the battery *y*, thereby gaining some advantages which are obvious.

Fig. 4 represents two alarm-circuits charged from battery X, said circuits being, like that shown in Fig. 1, composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, and included therein, respectively, are the relay electro-magnets C and C′, galvanometer G and G′, and switches *s* and *s′*. The signaling mechanism B is placed in the normally-open circuit of battery *y*, together with the call-bell D and an annunciator, A, of a well-known construction. The circuit of battery *y* being divided through the annunciator A, in a well-known manner, when either of said alarm-circuits becomes open by the action of the heat its respective drop in annunciator A is made operative through the intermediate action of its relay electro-magnet, closing the circuit of battery *y* through a branch controlled by said relay electro-magnet, the call-bell D and signaling-box B being arranged, however, to respond to the opening of either of the relays. Switches *s″* and *s″* are shown for opening the circuits of battery *y*, when necessary, to inspect and repair the alarm apparatus actuated by battery Y.

Fig. 5 represents three alarm-circuits charged by battery X, the annunciator A having its electro-magnets included in the circuits of battery X, and the drops of the annunciator being so arranged, constructed, and connected as to serve both as an annunciator and relay, so that when one of the three alarm-circuits becomes open by heat its respective annunciator-magnet becomes demagnetized, its respective drop falls, displaying a number corresponding to the circuit, and closing the circuit of battery *y*, making operative the

bell D and signal-box B. Galvanometer G G′ and switches *s s′* are used in connection with this modified form of circuit.

Fig. 6 represents battery X charging circuits Z Z′, said circuits being held in electrical continuity by contact-springs *c* and *c′*, said contact-springs being held normally closed for the passage of the current by attachments therefrom to the moving parts of a sprinkler used for fire-extinguishing purposes, and so arranged, in connection with the sprinklers to which they are connected, that by the opening of the sprinklers, or either of them, whether by heat, by accident, or by design, the circuit connected to said contacts will be ruptured and an alarm be sounded. These contacts may be insulated upon the sprinkler itself, or upon the ceiling of the building that is to be protected, or in any desirable manner. There is shown the fine wire *e*, connected from contact *c* to lever T of the sprinkler, and insulated from said lever, and provided with a joint of solder which will become melted slightly in advance of the opening of the sprinkler, which is also adapted to open by heat. In the circuit Z Z′, I have shown the relay electro-magnet C and an independent electro-magnet, E, adapted to control a mechanism for turning on a water-supply to the pipe P, which supplies the sprinklers H H H. One electro-magnet may be arranged to act to close the circuit of battery *y* and control mechanism for turning on a water-supply; but the use of separate magnets, as shown, is preferred. The annunciator A, call-bell D, signaling mechanism B, and independent circuit *f f* are shown in connection with the circuit Z Z′, as in previous figures that have been described.

Fig. 7 shows the conducting-pipe P, sprinklers H H H, circuit W W W, electro-magnets C and C², galvanometer G, switches *s s′*, and a resistance, *d*, at the point *k* of the circuit. The electrical connections of the circuit W are controlled by the sprinklers H H H, in a similar manner to that already described. The electrical connections of the circuit are preferably constructed, as shown in Figs. 8, 9, 10, of a block, R, of hard rubber, having the binding-screws *s s* running therein, to which the wire W W is attached, the block R and screws *s s* being arranged in relation to each other, so that the screws do not come in contact with each other. The spring *h* is secured to the block R, and is normally held depressed by the lever T of the sprinkler, in such a manner as to make contact with the screws *s s* and complete the circuit. When the lever T is released by the opening of the sprinkler, or when the wire *e* is ruptured by heat, the spring *h* retracts and opens the circuit, sounding an alarm. A piece of metal, *j*, is shown soldered to the six-square of the sprinkler, and is in such relation to the spring *h* that if the sprinkler becomes open without the action of heat the spring *h* will come in contact with the piece *j* before opening the circuit, thus short-circuiting the battery X over the pipe P, the spring *h* and sprinkler serving for a shunt and sounding an alarm, and dropping the number of the annunciator by the attraction of armature *a* of relay C, which in this case is adjusted to be normally retracted, the force upon the circuit through the relay C being increased, when the spring *h* comes in contact with the piece *j*, by the cutting out of the resistance *d*, the terminal *k* and the terminal *g* of circuit from battery X being connected to the pipe P as a return-circuit, or by a wire from its return-circuit to the pipe P, between the resistances *d* and *g*, in an obvious manner. The piece of rubber R, as shown, is attached to the sprinkler H by means of a dovetailed part upon both the sprinkler and the hard-rubber block. The electro-magnet C is shown as having its armature A, adjusted to be attracted with the resistance *d*, included in the circuit, and its armature adapted to control a water-supply mechanism, and also to act as a relay for making operative the call-box B when the circuit has become ruptured. By this arrangement of electro-magnets, resistance, and short-circuiting devices, an alarm will be given when the circuit becomes out of order without the action of heat, while an alarm will be given and a signal sent to a remote station and the water-supply turned on to supply the sprinklers if the circuit becomes open by the action of heat.

Instead of accomplishing the giving of an alarm by short-circuiting battery X when the sprinkler becomes open without heat, I may close a reverse battery through circuit W for producing such an alarm by substituting electro-magnets with polarized armatures for the neutral electro-magnets shown.

What I claim is—

1. The combination, with two or more alarm-circuits that are adapted to open by heat, of alarm apparatus adapted to be made operative when either of said circuits opens, and an independent circuit and means common to the several alarm-circuits adapted to transmit a definite alarm-signal thereon to a remote station when either of said alarm-circuits opens.

2. The combination, with two or more alarm-circuits that are adapted to open by heat, of alarm apparatus adapted to be made operative when either of said circuits opens, and a galvanometer in each circuit for determining the cause of accidental alarms and for showing the condition of the circuits.

3. The combination, with two or more normally-closed alarm-circuits adapted to open by heat, of an alarm apparatus common to the several circuits and adapted to sound an alarm by the opening of either, and an annunciator controlled by said circuits to indicate the opening of the several circuits, or either of them, and means common to the several circuits for transmitting a definite alarm-signal to a remote station.

4. The combination, with two or more alarm-

circuits adapted to open by heat, of an alarm apparatus adapted to sound an alarm when either circuit opens, an annunciator controlled by said circuits to indicate the opening of said circuits, or either of them, and a galvanometer in each circuit to indicate the condition of said circuits, substantially as described.

5. The combination, with two or more alarm-circuits adapted to open by heat, of alarm apparatus adapted to sound an alarm when either of said circuits opens, an annunciator adapted to indicate the opening of said circuits, or either of them, and an independent circuit, and means common to the several circuits adapted to transmit a definite number-signal thereon to a remote station when either of said circuits open.

6. The combination, with two or more alarm-circuits adapted to open by heat, of an alarm apparatus adapted to be made operative by the opening of either of said circuits, and an annunciator adapted to indicate the opening of either of said circuits, a galvanometer in each of said circuits for denoting the condition of said circuits, and a normally-closed independent circuit, and mechanism common to the several circuits adapted to transmit a definite number-signal over said independent circuit when either of said alarm-circuits opens.

7. The combination, with a series of alarm-circuits adapted to open by heat, of the alarm apparatus D, the annunciator A, the circuit *f f*, signaling mechanism B, the galvanometers G G, and switches *s s'*, the whole arranged and operating substantially as set forth.

8. The combination, with the sprinkler H, of a spring insulated thereon and held to close an electric circuit by the parts T and L of said sprinkler when those parts are in the position of normally closed, and in a manner to allow said spring to retract and make operative said circuit when the said parts T and L, or either, become displaced from the position of closed.

9. The combination, with the distributing part of a sprinkler, of a circuit-closing key insulated thereon and held to close an electric circuit by the interlocking parts T and L, or either of them, in a manner to allow said spring to retract when said parts, or either, become displaced from their normally-closed position, to make operative said electric circuit.

10. A series of sprinklers, each provided with a circuit-closing spring that is insulated therefrom and adapted to close a circuit common to the series when the moving parts of the sprinkler are in their normal position, for excluding water, and the said spring in such relation to the fusible devices of the sprinkler as to accelerate their movement when released by heat.

11. The combination, with a sprinkler that is adapted to be made operative by the action of heat upon a fusible substance, of electrical circuit-connections insulated thereon and portable therewith, and adapted to make operative an electric circuit when said sprinkler becomes open by heat or its moving parts displaced by accident.

12. The combination, with a sprinkler that is adapted to be made operative by the action of heat upon a fusible substance, of circuit-connections insulated thereon and held to close an electric circuit when the said sprinkler is closed to exclude water, and said circuit-connections adapted to become operative when said sprinkler is in a position the reverse from pendent and its moving parts become released.

13. The combination, with an alarm-circuit composed in part of a water-conducting pipe, of means for short-circuiting the battery charging said circuit by the opening or partial opening of a sprinkler.

14. The combination, with battery X, of the pipe P, sprinklers H H H, with W W, resistance, and means for shunting said resistance by the partial opening or opening of the sprinklers, or either of them, to produce an alarm.

15. The combination, with a series of alarm-circuits that are normally charged, and composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, of an alarm apparatus common to the series of circuits, adapted to sound an alarm when either of said circuits opens, and means to indicate which of the several circuits has opened.

16. The combination, with a series of alarm-circuits that are normally charged, and are composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, and provided with alarm apparatus common to the several circuits, adapted to sound an alarm when either of said circuits opens, of a normally-closed independent circuit and a call mechanism adapted to transmit a definite call-signal to a remote station when either of said alarm-circuits opens, substantially as described.

17. The combination, with a series of alarm-circuits that are normally charged, and are composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, and provided with alarm apparatus adapted to sound an alarm when either of said circuits opens, and to indicate which of the several circuits has opened, of a normally-closed independent circuit and mechanism common to the series of circuits adapted to transmit a definite call-signal to a remote station when either of said alarm-circuits becomes open.

18. The combination, with a series of alarm-circuits that are normally charged, and are composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, and provided with alarm apparatus common to the several circuits, adapted to give an alarm when either of said circuits opens, of a normally-closed independent circuit and devices adapted to produce an alarm at a remote station when either of said alarm-circuits becomes open.

19. The combination, with a series of alarm-circuits that are normally charged, and are composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, and provided with alarm apparatus common to the several circuits, adapted to give an alarm when either of said circuits opens, of independent devices in each of said circuits adapted to indicate the condition of said circuits, substantially as described.

20. The combination, with a series of alarm-circuits that are normally charged, and are composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, of alarm apparatus in a local or sub circuit adapted to be made operative to give an alarm when either of the said normally-closed alarm-circuits becomes open, whereby said normally-closed circuits may be short-circuited or the force charging said circuits be augmented without making operative said alarm.

21. The combination, with a series of alarm-circuits that are normally charged, and are composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, and provided with alarm apparatus adapted to give an alarm when either of said circuits becomes open, of a local circuit that is normally open, and a call mechanism, and means controlled by said local circuit and adapted to transmit a signal to a remote station when the said local circuit is closed by the opening of either of said alarm-circuits, and devices in the said alarm-circuits for closing the said local circuit when either of said alarm-circuits opens.

22. The combination, with a series of alarm-circuits that are normally charged, and are composed of lengths of wire not easily fused, held in electrical continuity by easily-fused joints, of an alarm apparatus adapted to sound an alarm when either of said circuits opens, and an annunciator adapted to be made operative by the closing of a local circuit when either of said alarm-circuits opens, to indicate which of said alarm-circuits has opened, with devices for each alarm-circuit adapted to close said open circuit through its respective drop of said annunciator when it becomes opened, the whole arranged and operating substantially as set forth.

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C. E. DIEHL.