(No Model.) 4 Sheets—Sheet 1.

J. P. HARTFUSS & E. HERZ.

ELECTRIC CALL AND ALARM APPARATUS.

No. 555,160. Patented Feb. 25, 1896.

Fig. 1.

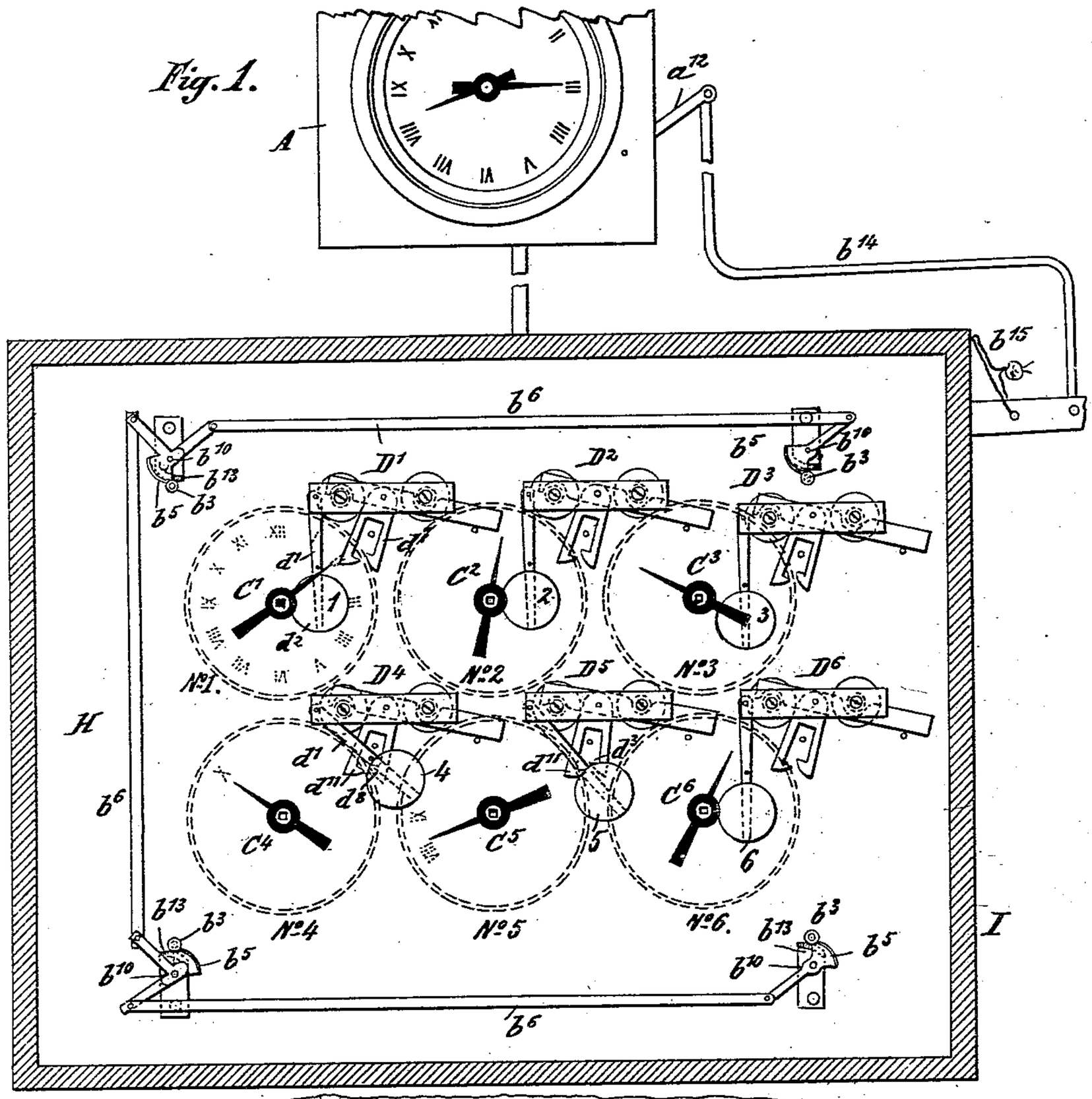
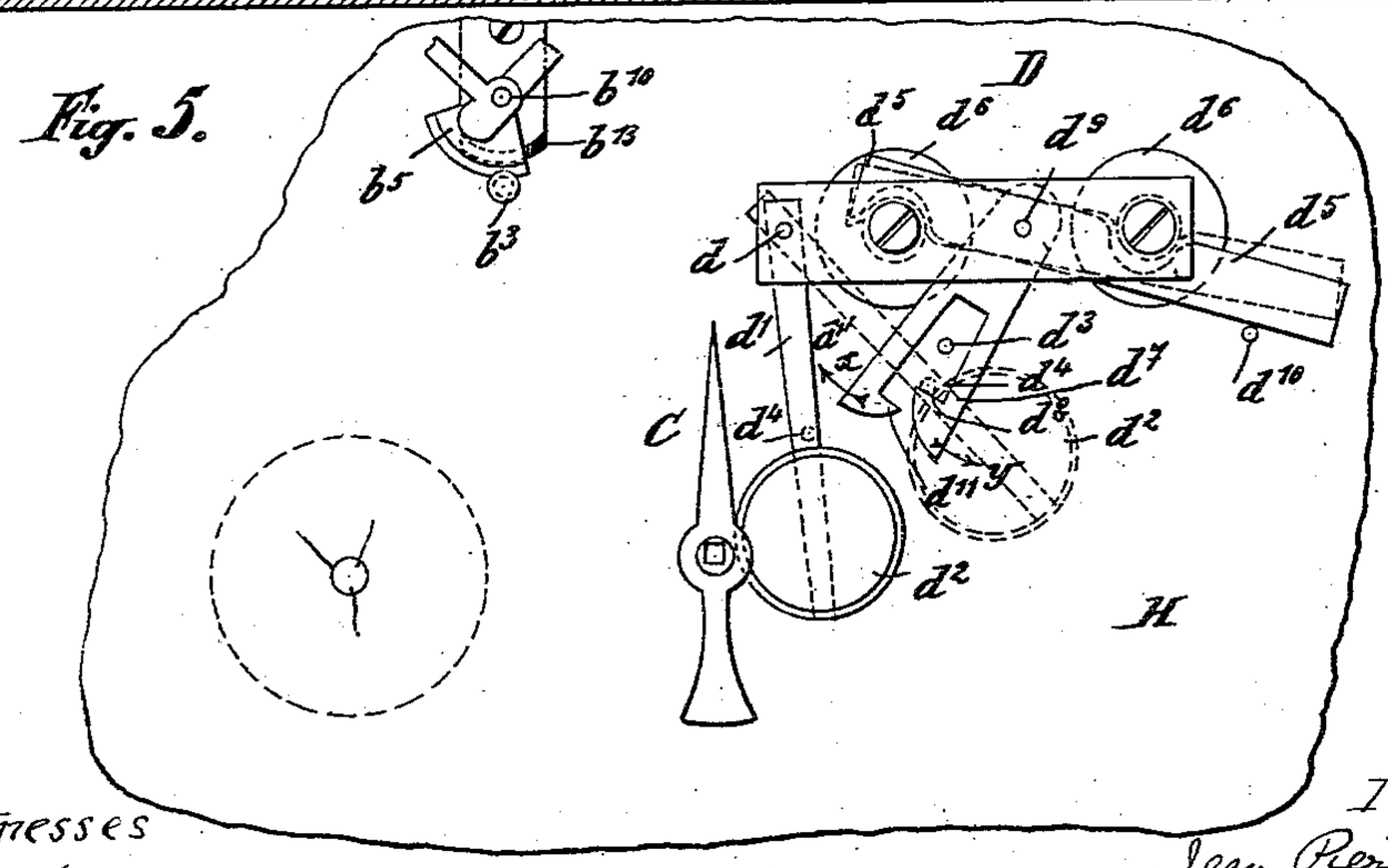


Fig. 5.



Witnesses
A. J. Haddan
A. C. Melhuish

Inventors
Jean Pierre Hartfuss
Ernst Herz
by their Attorney A. J. Haddan

(No Model.) 4 Sheets—Sheet 2.

J. P. HARTFUSS & E. HERZ.

ELECTRIC CALL AND ALARM APPARATUS.

No. 555,160. Patented Feb. 25, 1896.

Fig. 2.

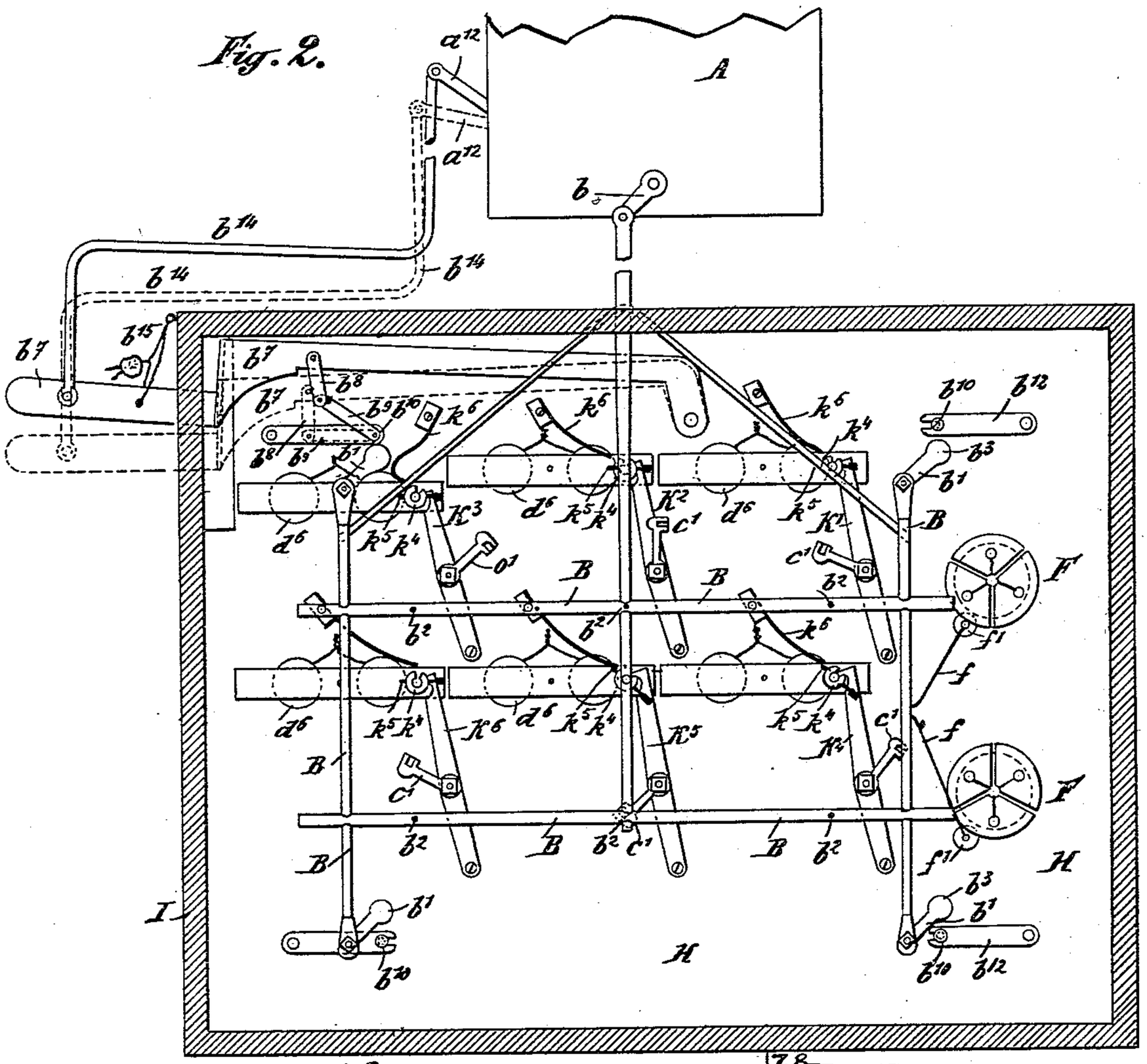


Fig. 3.

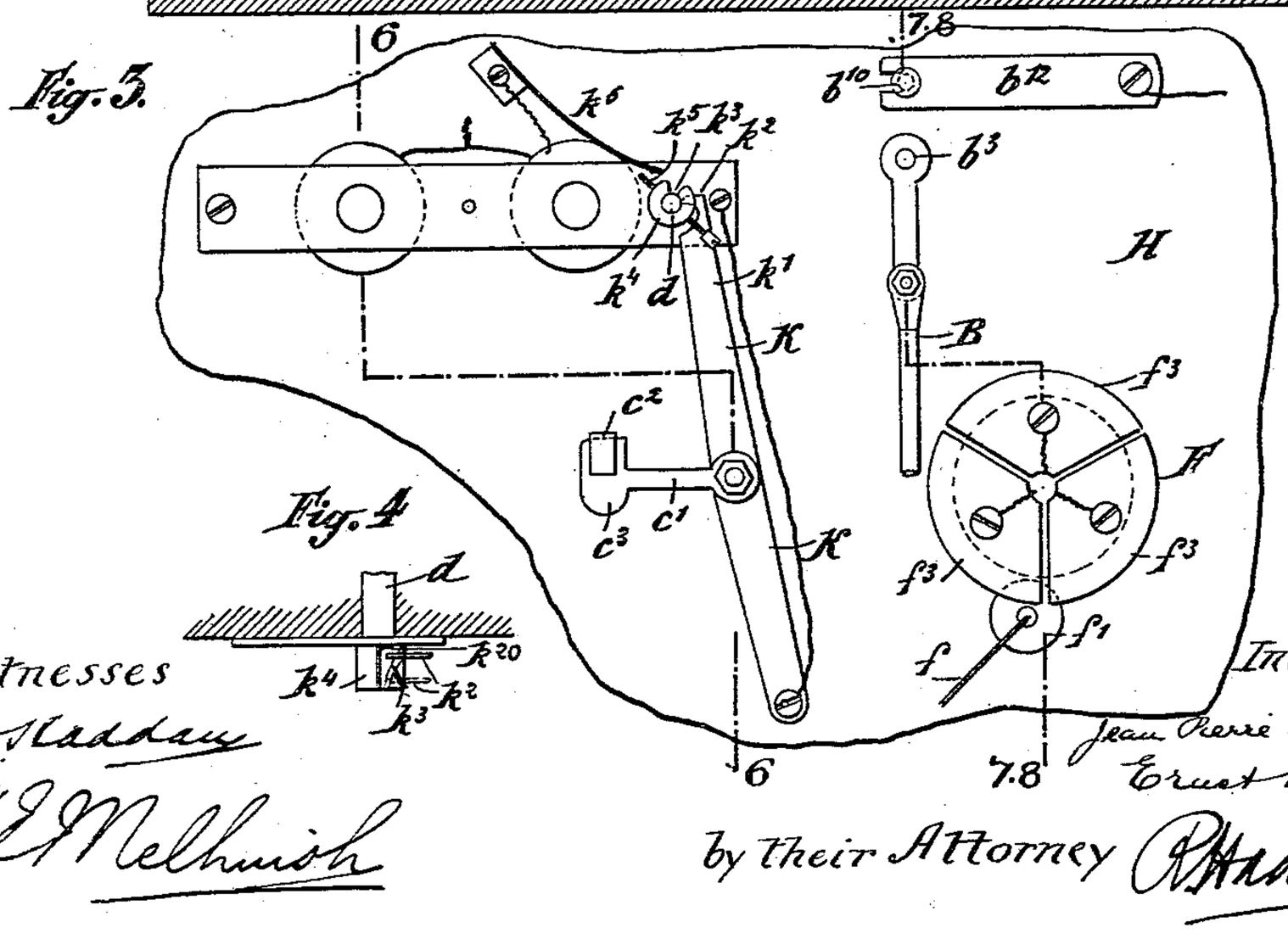


Fig. 4

Witnesses

A. J. Maddox

A. D. Melhuish

Inventors

Jean Pierre Hartfuss

Ernest Herz

by their Attorney R. Maddox

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J. P. HARTFUSS & E. HERZ.

ELECTRIC CALL AND ALARM APPARATUS.

No. 555,160. Patented Feb. 25, 1896.

Fig. 6.

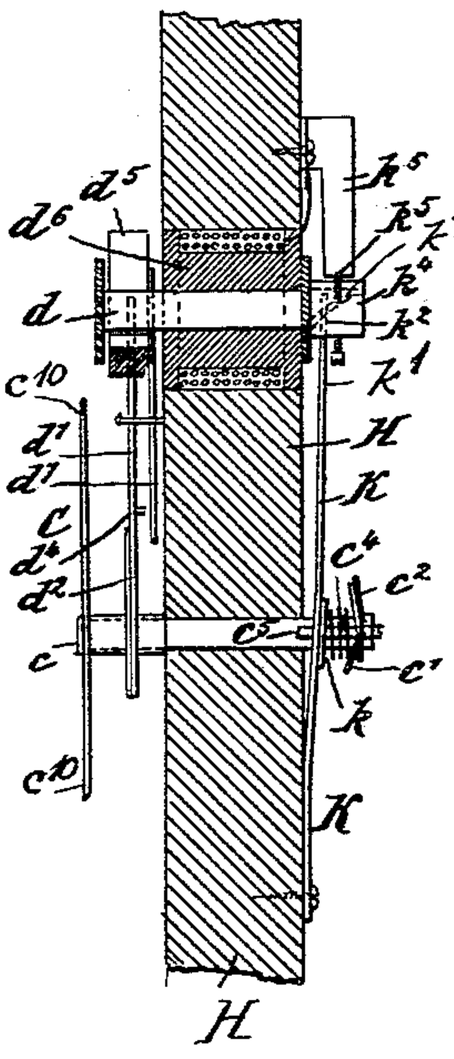


Fig. 7.

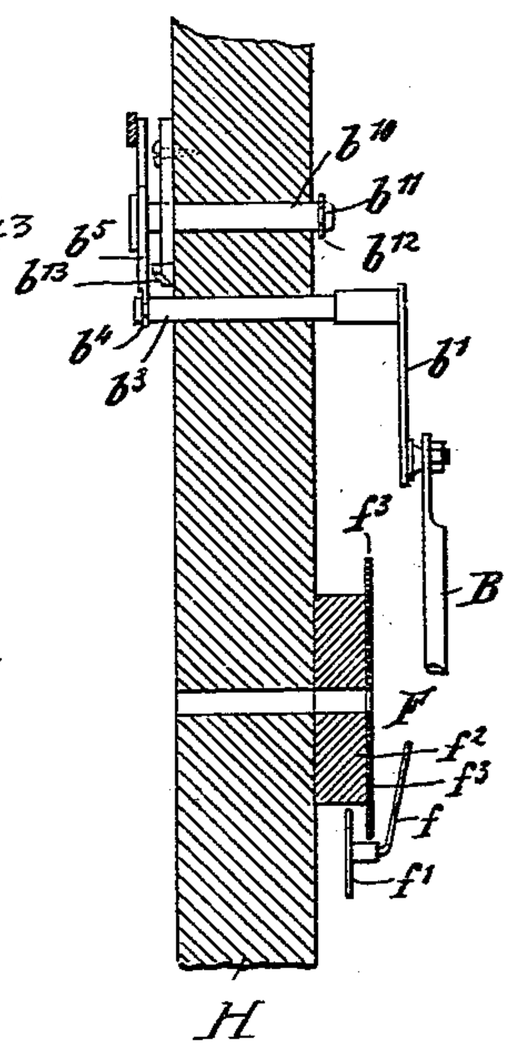


Fig. 8.

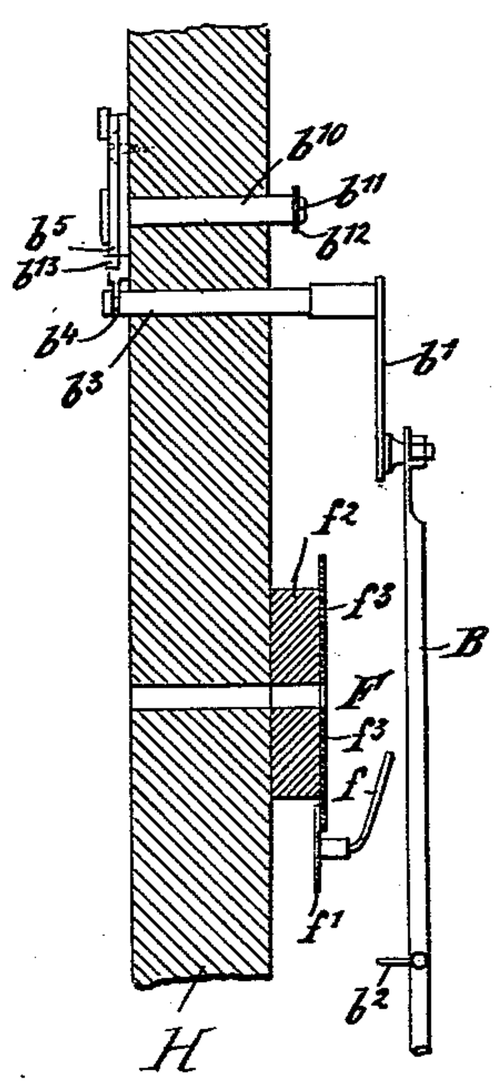


Fig. 9.

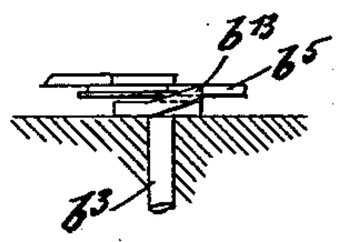
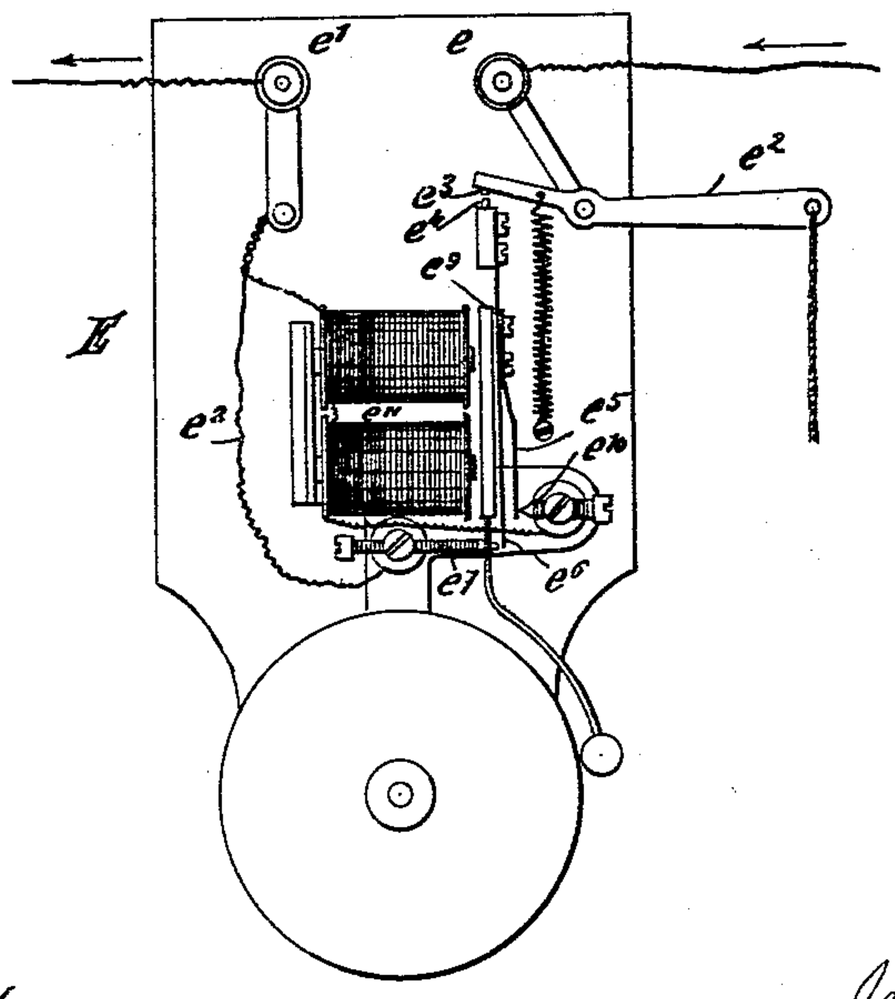


Fig. 10.



Witnesses
A. J. Haddaway
A. D. Melhuish

Inventors
Jean Pierre Hartfuss
Ernst Herz.
by their Attorney R. Haddaway

(No Model.) 4 Sheets—Sheet 4.

J. P. HARTFUSS & E. HERZ.

ELECTRIC CALL AND ALARM APPARATUS.

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Fig. 11.

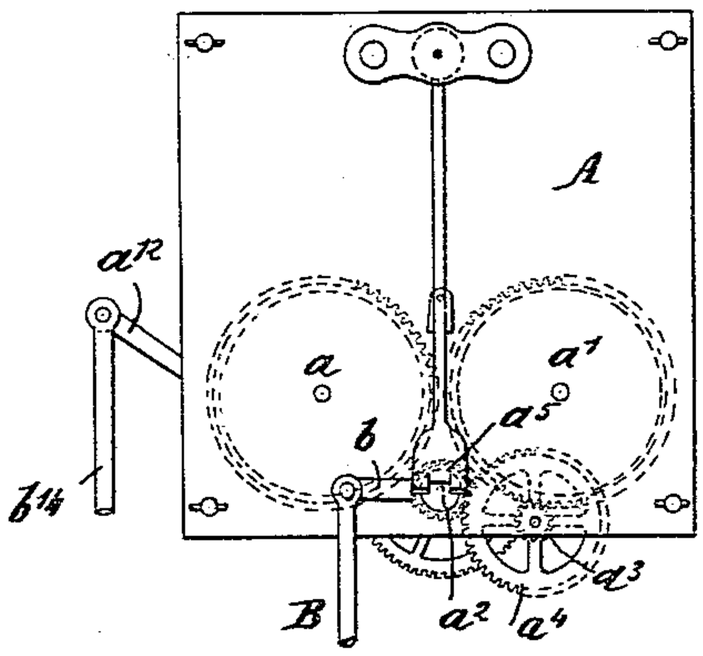


Fig. 12.

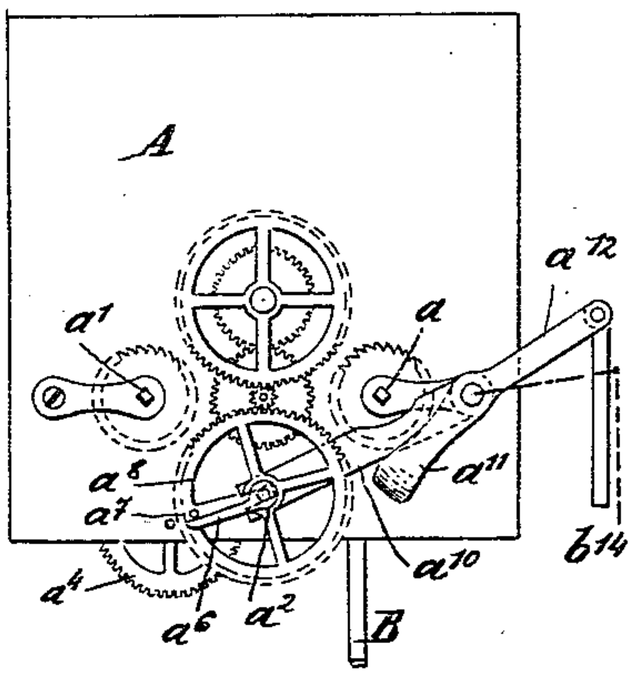


Fig. 14.

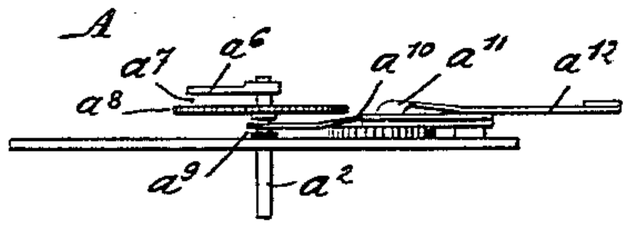


Fig. 13.

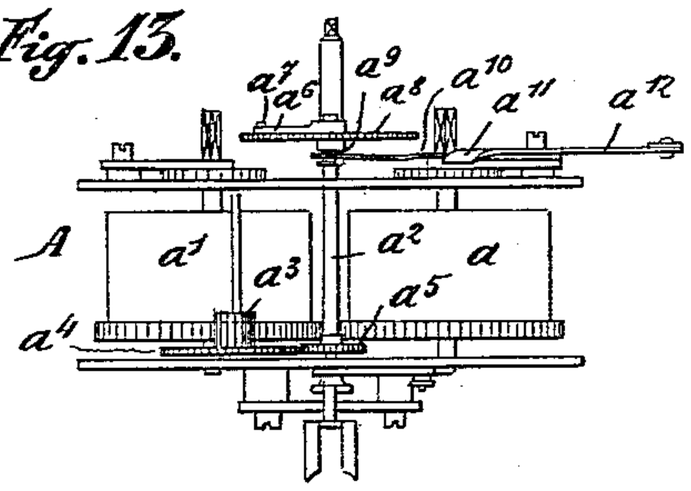
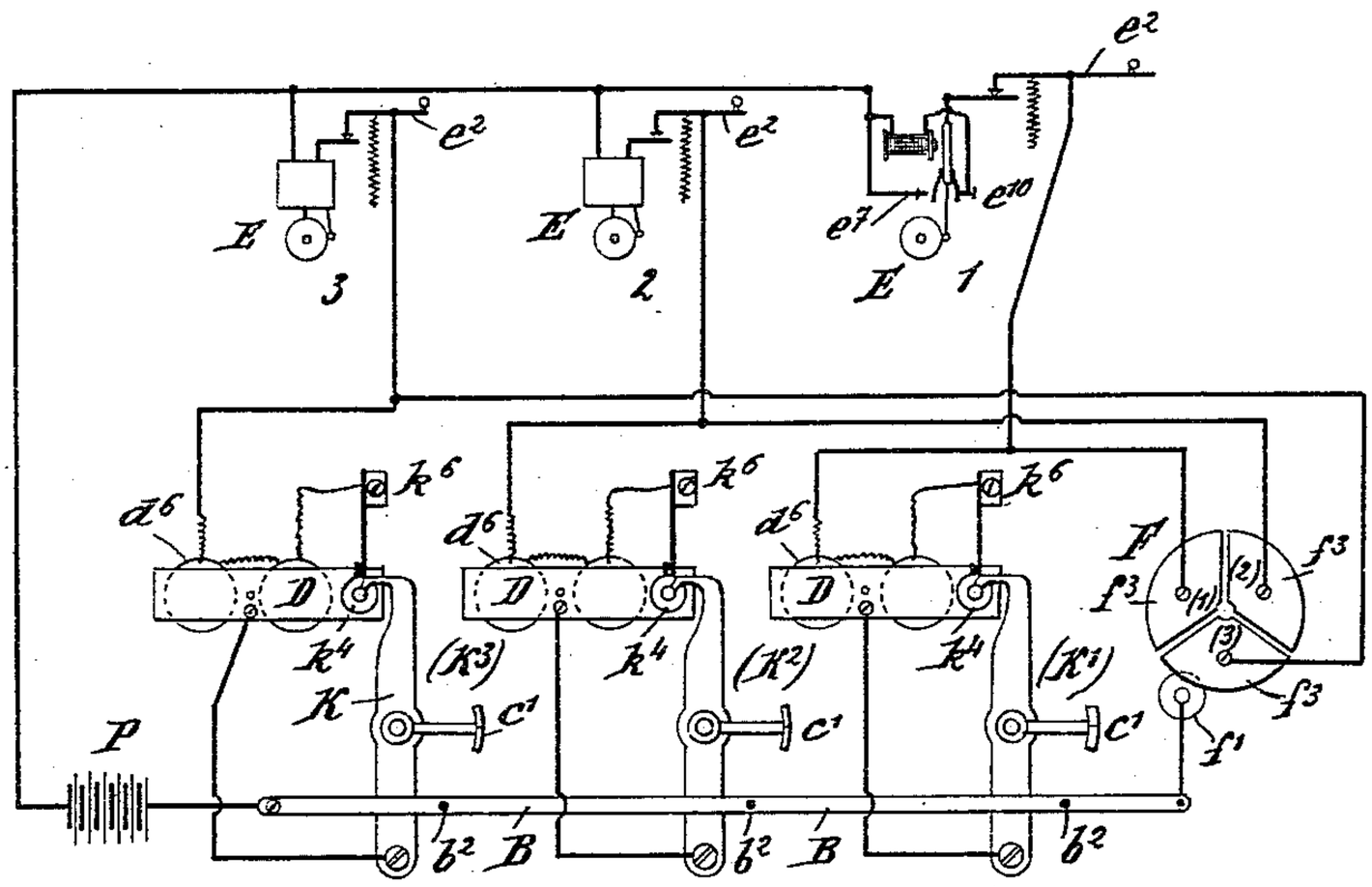


Fig. 15.



Witnesses
A. J. Haddaway
A. McIlwish

Inventors
Jean Pierre Hartfuss.
Ernst Herz
by Their Attorney R. Haddaway

UNITED STATES PATENT OFFICE.

JEAN PIERRE HARTFUSS, OF MERZIG, AND ERNST HERZ, OF SAARBRÜCK, GERMANY.

ELECTRIC CALL AND ALARM APPARATUS.

SPECIFICATION forming part of Letters Patent No. 555,160, dated February 25, 1896.

Application filed February 14, 1895. Serial No. 538,447. (No model.) Patented in Germany February 4, 1893, No. 74,922; in Belgium December 24, 1894, No. 113,349; in France December 24, 1894, No. 243,883; in Austria December 29, 1894, No. 45/2,427; in Italy December 31, 1894, No. 289; in England January 3, 1895, No. 226, and in Switzerland January 18, 1895, No. 10,605.

To all whom it may concern:

Be it known that we, JEAN PIERRE HARTFUSS, residing at Merzig, and ERNST HERZ, residing at St. Johann, Saarbrücken, in the Empire of Germany, subjects of the Emperor of Germany, have invented certain new and useful Improvements in Electric Call and Alarm Apparatus, (for which we have obtained Letters Patent in Germany, No. 74,922, dated February 4, 1893; in Belgium, No. 113,349, dated December 24, 1894; in France, No. 243,883, dated December 24, 1894; in Great Britain, No. 226, dated January 3, 1895; in Italy, No. 289, dated December 31, 1894; in Switzerland, No. 10,605, dated January 18, 1895, and in Austria, No. 45/2,427, dated December 29, 1894,) of which the following is a specification.

This invention relates to the transmission of calls and alarms from a central station or place, either automatically at different predetermined times for each respective individual place at which the call or alarm is to be given or by personal action at any moment to the whole of the places in connection with the central station or place, for instance, upon emergency. The apparatus is also intended to permit the attendant at the said central station or place to receive a signal wherefrom it may be understood that the call or alarm has been noticed at the place called.

The improved apparatus hereinafter described is especially suitable for use in hotels and enables the occupant of any room to arrange beforehand for automatically receiving at any time he may desire a call or signal by setting the mechanism in the hotel-office or other central place, so that the call-transmitting apparatus will be automatically set in action when the predetermined time arrives, and will then continue in action until it is made to cease by a special act of the occupant of the respective room, whereupon the attendant, if any, in the office will be notified automatically by a visible signal that the call has been noticed.

The said apparatus also enables a simultaneous and distinctive alarm to be sounded in every room—for instance, in case of fire.

Reference being made to the annexed drawings, Figure 1 illustrates that portion of the apparatus which is located at the central station or place, such as the hotel-office, the cover-plate of the apparatus with its dials being removed to show part of the interior mechanism. Fig. 2 is an elevation of the same apparatus from the back with the rear inclosing-plate removed. Fig. 3 shows, on a larger scale in rear elevation, part of the mechanism shown in Fig. 2. Fig. 4 is a detail view in plan, partly in section, of part of Fig. 3. Fig. 5 is a front elevation, on the same scale as Fig. 3, of part of the mechanism shown in Fig. 1. Fig. 6 is a vertical section on line 6 6 in Fig. 3. Figs. 7 and 8 are vertical sections on line 7 8 7 8 of Fig. 3, showing the parts in two positions. Fig. 9 is a detail view of parts shown in Fig. 8. Fig. 10 illustrates in elevation the signaling-bell as constructed for fitting in any one of the rooms or places to be called. Fig. 11 is a front elevation, and Fig. 12 a rear elevation, of the operating-clockwork. Fig. 13 is a plan view thereof, and Fig. 14 a detail view of part thereof. Fig. 15 is a diagram illustrating the wiring or electric connections.

The apparatus essentially comprises a parallelogram B, or a similar frame, so guided that it may be given a circular movement while preserving its orientation, this frame carrying a number of contact-pieces which will thus be each moved with a simultaneous and in every respect equal rotary movement; a clockwork A for revolving the said frame; a plurality of devices C adapted to be severally adjusted or set to indicate the desired time at which the call is to be transmitted, at which time contact will take place with the respective contact-piece on the aforesaid frame B, these devices being indicated by C' C^2 C^3 C^4 C^5 C^6 and being equal in number to the number of places to which calls may have to be transmitted; an equal number of indicators (for the return or acknowledging signal)

and commutators D combined with the setting devices; a number of electric signal-bells at the places to be called, and, lastly, a device adapted to cause an intermittent action of all the bells in the system in case of emergency.

The devices B, C, D and F are mounted, by preference, on a tablet or insulating-plate H inclosed in a case A, of which the front cover may be of colored glass or other non-transparent material and provided with a number of dials having also, preferably, in the spaces within the circle of figures on the dials, transparent parts through which the return-signal disk may be rendered visible when this signal is given. The cover is also perforated for the passage of, or to provide access of a key to, the square slotted ends of the shaft of the setting devices. The construction of this cover will be well understood and it is therefore not illustrated, the circumferences of the dials being shown with some of the figures thereon in dotted lines in Fig. 1. The rear of the case I may be closed by a transparent cover and the case may carry in practice a number of terminal binding-posts for the various wires, as will be well understood without illustration, the method of wiring being sufficiently indicated from the diagram in Fig. 15.

The clock A is preferably placed above the case I and the frame B is connected to the rotary crank b, Fig. 2, which is connected in any suitable way to the hour-wheel of the clockwork so as to revolve once, for instance, in each twelve hours. A suitable number of rotary cranks b', having their bearings in the plate H, are connected to the frame B and guide it in its movement of rotation, so that it maintains its orientation and every point of the frame describes an equal circle. The axes of the cranks b' are adapted to be shifted longitudinally in the plate H, so that the frame B may be carried toward or from said plate, for a purpose to be hereinafter described, and the crank-pin of crank b has sufficient length to permit of this play of the frame B without detachment from the clockwork or motor.

The frame B carries as many laterally-projecting contact-pins b^2 as there are setting devices C. The hollow axes c of the setting devices carry indicating-fingers c^{10}, Fig. 6, by which they may be set with regard to the figures on the dial—that is to say, to point to the time when the call is next required—and on said axes are also the spring contact-arms c', the position of which consequently accords with the indicating-finger, so that the pin b^2 on frame B will make contact with the spring contact-arm c' at the time indicated.

To provide for exactitude in contact the end of the arm c' is widened and bent to a curve or an angle, as shown in Fig. 6, and onto one edge of this angularly-bent part is slipped a piece of insulating material c^2, which reaches to the angle or ridge of this bent part. As the pin b^2 in its movement arrives against the insulating-piece c^2 it slips along the latter, at the same time pressing back the spring-arm c' until the pin falls off the end of the insulating-piece c^2 onto the ridge of the part c', thus suddenly making efficient contact where the tension of the spring-arm due to its deflection is the greatest. Thence the pin b^2 slides in contact with the metal part c^3 of arm c', Fig. 3, until it passes off the latter.

The rear end of the hollow shaft c, Fig. 6, is slotted longitudinally to receive a cross-pin c^5, against which a spring-plate K presses, partly by its own resilience, partly assisted by a small coiled spring c^4 between it and the arm c'. One end of spring-plate K is fastened to the plate H, and the effect of the spring-pressure aforesaid is to keep the plate K toward the surface of plate II. Contact is also thus maintained for passage of electric current. The purpose of the spring-plate K is to return the answering-signal disk to its hidden position when the device is being set, and to adjust a commutator to bring the respective place to be called into circuit. For this purpose the free end k' of the plate K forms a tooth k^2, which engages in a helicoidal groove k^3 in a sleeve or drum k^4, keyed on the shaft d of the rocking arm d', which carries the answer-signal disk d^2, Figs. 5 and 6. The interior of the arbor c being squared serves to receive a key, by the rotation of which this arbor may be set as before described, while the insertion of such key causes its inner end to meet and displace the cross-pin c^5, so as to press back the plate K, the tooth k^2 of which thus rotates the sleeve k^4 and with it the shaft d sufficiently to lift the arm d' with it disk d^2 into a position where it is not visible and where it will be then retained, as shown in dotted lines in Fig. 5, by the pin d^4 on arm d' engaging behind the detent d^8. The pin d^3 limits the backward travel of the arm d'. d^6 d^6 are two electromagnets and d^5 is a pivoted armature, the fulcrum of which is at d^9 between the said magnets. The detent-plate d^7 is in one with or fixed to this armature d^5 and is provided with the two detents d^8 and d^{11}. The equilibrium of the armature is such that when no current is passing the detent d^8 is raised and the armature rests against the stop-pin d^{10}.

To provide for bringing the respective place to be called into circuit by the same adjustment the sleeve k^4, Fig. 3, carries a pin k^5, and in proximity thereto a contact-spring k^6 is fixed so that the aforesaid rotation of the sleeve k^4 causes the pin k^5 to come into contact with the spring k^6, deflecting the latter and remaining in contact therewith. The helicoidal recess k^3 in the sleeve k^4 is cut with its one face, k^{20}, parallel with the axis, so as to permit the nose k^2 to return, as shown in Fig. 4, without interference from the sleeve.

The electromagnets d^6 are wired in series with the battery P, Fig. 15, and the signal-bell E. (Shown in detail in Fig. 10.) The

circuit passes on the one hand to the frame B and on the other hand from electromagnets d^6 to spring k^6 through pin k^5 to spring-plate K and to arm c'. The circuit is complete when the pin b^2 in the course of its movement comes into contact with the conductive part of arm c'. The magnets d^6 and e^{11}, Fig. 10, are thus energized. The attraction of the armature d^5 moves the detent d^8 from under the pin d^4, Fig. 5, and brings the detent d^{11} into the path of said pin, so that the arm d' falls slightly until the pin d^4 is arrested by detent d^{11}, this displacement communicated to sleeve k^5 being insufficient to destroy contact between pin k^5 and spring k^6, and this position continues until current ceases to pass through the coils of magnets d^6, when the armature d^5 will return to its first position, freeing the pin d^4 and causing a dissolution of contact between parts k^5 and k^6.

Inasmuch as an ordinary electric bell would produce a cessation of current at the first stroke which would de-energize the magnets d^6 and cause the bell-circuit to be immediately broken, the construction illustrated in Fig. 10 has been adopted to provide for passage of a continuous current until the occupant of the room or place called answers the call by placing the signal-bell out of circuit. e^{11} are electromagnets, and e^9 the vibrating armature carrying the bell-hammer. e^5 is the ordinary armature contact-spring and e^{10} its fixed pillar contact-screw. $e\ e'$ are the two terminals. To these parts the following are added: e^6 is a contact-spring on the armature e^9, and e^7 is its pillar contact-screw. This device is adjusted to make contact at the times when contact is broken between parts e^5 and e^{10} and at such times only, shunting the main circuit through the wire e^8 and cutting out the electromagnets e^{11}, thus again opening the shunt-circuit and reinserting magnets e^{11}.

To permit the person called to open the circuit, a suitable hand-switch is provided in the circuit. For instance, the contact at e^3 e^4 may be broken by pulling down the lever e^2 by means of a cord.

To permit the attendant at the central station to send at any time an alarm to all the stations in the system the following construction is added: As before mentioned, the frame B can be shifted to and from the plate H. When it is shifted away from this plate the pins b^2 will be brought out of the paths of touch with the arms c', but another set of contact devices will be brought into action. b^7 is a hand-lever, which, in ordinary circumstances, may be secured against mischievous interference by a wire with a leaden seal b^{15}. This lever b^7 is connected by link b^8, Fig. 2, to a lever b^9 on a shaft b^{10}, Figs. 7 and 8, carrying a sector b^5, engaging in an annular groove in one of the axles b^3 of the cranks b' of the frame B. Similar sectors b^5, Fig. 1, engage in similar slots in the other axles b^3, and the sectors are connected for simultaneous movement by suitable rod and lever gear b^6. The shafts b^{10} of the sectors b^5 are all adapted to slide in their bearings in plate H, and springs b^{12} engage in circular grooves b^{11} in said shafts b^{10} and tend to push them outward, and with them also the shafts b^3. When the sectors are, however, in their normal position, the lever b^7 being raised, they rest upon the summits of inclined planes b^{13}, Fig. 9, which prevent the parts from giving to the tension of springs b^{12} unless and until the lever b^7 has been turned down and the sectors revolved.

The alteration of the position of the frame B when the lever b^7 is lowered has the effect of bringing the contact wheels or pieces f' on the arms f attached to said frame in lateral contact with the plates F, Figs. 2 and 8. A certain number of these plates F—for instance, three, as shown in the drawings—may be arranged at slight distances apart to form a circular track, about which the contact f' will move as the frame B revolves. Each of these plates F is put in circuit with the signal-bell of one of the places to be called, so that when said circuit is completed by contact of parts f' F each such place will receive a signal of a certain duration, interrupted at periodical intervals of time as the contact f' passes to and from contact with the respective plate F while the frame B pursues its circular course, its movement being for this purpose greatly accelerated by the following means: The clock A is provided with two spring-barrels, $a\ a'$, Figs. 11 to 13, of which the one, a, actuates the clock-movement proper, and a' moves through the gear-train $a^3\ a^4\ a^5$ the crank b of the frame B. On the shaft a^2 of the crank b is a finger a^6, which is arrested by a pin a^7 fixed on a second hour-wheel a^8, so that the rotation of the parallelogram or frame B is restrained thereby to a slow rate synchronizing with the movement of the hour-hand of the clock.

To provide for rapid rotation of the parallelogram or frame B, the wheel a^8 is adapted to slide on the shaft a^2 and is fitted with a sleeve a^9 engaged by the fork of a spring-lever a^{10}, which is adapted to be moved laterally by the curved arm a^{11} of the lever a^{12}, so as to displace the wheel a^2 and disengage the finger a^6 from the pin a^7, Fig. 14, leaving the action of the spring-barrel a' uncontrolled. This movement of the lever a^{12} is produced by the lowering of the lever b^7, to which it is connected by a rod b^{14} or in any other suitable way, so that the release of the finger a^6 occurs simultaneously with the displacement of the plane of the frame B. The alarm-signal transmitted by this mechanism differs from that of the ordinary call owing to the periodical interruptions produced by the arrangement of the plates F, and it is thus more easily distinguished from an ordinary call, while its intermittent nature renders it more effectual in awakening sleepers.

We claim as our invention—

1. The combination of a plurality of open electric circuits, an electric signaling device in each circuit, an adjustable contact-arm adapted to be traversed by the current and forming the one termination of each open electric circuit, a rotary frame common to all the circuits adapted to be traversed by the current and forming the other termination in common of all the open circuits, means for preserving the orientation of said frame, a clock for operating the circular movement of the frame, and a plurality of contact members on said frame adapted severally to have contact with the aforesaid contact-arms and thus complete the respective circuit.

2. The combination in a circuit of a source of electricity, an automatically-disconnected commutator, an electromagnet having an armature carrying a double detent adapted to retain said commutator in position to establish contact, a signal-bell, an adjustable contact-arm and a movable time-controlled contact member adapted to close the circuit by contact with said arm, said armature and detent being adapted to release the commutator after a make and break of the circuit substantially as set forth.

3. The combination in a circuit of a source of electricity, an automatically-disconnected commutator, an electromagnet having an armature carrying a double detent adapted to retain said commutator in position to establish contact, a signal-bell adapted to operate without break of current, a hand-switch, an adjustable contact-arm, and a movable time-controlled contact member adapted to establish the circuit by contact with said arm, said armature and detent being adapted to release the commutator after a make and break of the circuit substantially as set forth.

4. In a circuit a source of electricity, an electromagnet, signal-bell mechanism, an adjustable contact-arm at the calling-station and a movable time-controlled contact member adapted to be traversed by the current and to close the circuit by contact with said arm, in combination with a visible signal-arm adapted to automatically move into view when released an armature adapted to be moved by the aforesaid electromagnet and a double detent on said armature adapted to retain said signal-arm from view and to release the same upon make and break of the circuit for the purpose set forth.

5. In a circuit a source of electricity, a rotary commutator, an electromagnet an adjustable contact-arm and a movable time-controlled contact member adapted to make contact with said arm at the calling-place, together with a signal-bell mechanism in combination with an arm integral with said commutator, a signal-disk on said arm, a movable armature for said electromagnet and a double detent controlled by said armature and adapted to retain said commutator-arm thus closing circuit at the commutator and holding the signal out of sight, and to release the same after make and break of circuit for the purposes set forth.

6. In a circuit a source of electricity, a rotary commutator, an electromagnet an adjustable contact-arm and a movable time-controlled contact member adapted to make contact with said arm, at the calling-place, together with a signal-bell mechanism adapted to operate without break of current and a hand-switch at the place to be called, in combination with an arm integral with said commutator, a signal-disk on said arm, a movable armature for said electromagnet and a double detent controlled by said armature and adapted to retain said commutator-arm thus closing circuit at the commutator and holding the signal out of sight, and to release the same after make and break of circuit for the purposes set forth.

7. The combination with a casing having a window therein, of a signal-arm freely suspended above said window to be visible thereat when free, a pin d^4 on said signal-arm, an electromagnet d^6, a pivoted armature adapted to be laterally attracted by said magnet, a resting abutment d^{10} therefor, a detent d^7 integral with said armature having hooks d^8 d^{11} in different planes, the said hooks being adapted to retain the pin d^4 respectively before and during the passage of a current through said electromagnet, and to release the said pin after the passage of the current has ceased.

8. The combination with the contact-arm c' of a shaft thereto adapted to receive a key for rotary adjustment of said arm, a spring-plate K adapted to be displaced by inthrust of said key, a tooth k^2 on said plate, a sleeve k^4 having a helicoidal groove k^3 receiving said tooth, a shaft d for said sleeve, an arm d' on said shaft and a detent adapted to receive and retain said arm when raised by the inthrust of said key through the aforesaid tooth sleeve and shaft.

9. The combination with the signal-arm d' means for raising the same and a detent for retaining said arm when raised, of shaft d carrying said arm, sleeve k^4 on said shaft, pin k^5 in said sleeve and contact-spring k^6 located to be in contact with said pin when arm d' is raised, and out of contact therewith when said arm has fallen, for the purposes set forth.

10. A rotary contact-arm constructed to be resilient in the plane of its pivotal axis and of its extension from that axis, said arm having its outer end widened and having its lateral edges bent rearward from a central radial line, and having over one of said edges an insulating cover extending from its edge up to said central line, in combination with a contact-pin adapted to be moved to pass into said insulating cover and deflect said arm while sliding on said cover, prior to making sudden contact with the arm on slipping off the cover onto the center of the end of the arm substantially as set forth.

11. The combination of a frame movable in either of two parallel planes and displaceable

from one plane to the other, two series of contact-pieces carried by said frame, means for moving said frame whereby each said contact-piece moves synchronously in an equal and similar path, a third series of independent contact-pieces adapted to be adjustably stationed in those paths respectively of the first series of contact-pieces when the frame is in one of the said planes, a fourth series of contact-pieces respectively stationed in those paths of the second series of contact-pieces when the frame is in the other said plane, and means for shifting the frame from either to the other plane for the co-operation of the first and third, or second and fourth series of contacts respectively.

12. The combination of a series of adjustable contact-pieces, a second series of contact-pieces, a displaceable device adapted to be moved to make contact with the one or other of said series of contact-pieces, a motor for moving said device to make intermittent contact, means for displacing said device to bring same into the field for contact with the one or other of said series of contact devices respectively, and means for accelerating the action of the motor when the device is in the field for contact with the second series of contact-pieces for the purpose set forth.

13. The combination of a rotary contact-making frame, cranks for supporting and maintaining the orientation of said frame, a spring-barrel for revolving one of said cranks, a clockwork having an hour-wheel carrying a detent, a finger in operative connection with said spring-barrel adapted to be restrained by said detent, and means for displacing said hour-wheel and detent from the path of said finger for the purpose set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

JEAN PIERRE HARTFUSS.
ERNST HERZ.

Witnesses:
PERCY BARTHOLOW,
CARL ED. HAHN.