2 Sheets—Sheet 1.

C. E. ZIMDARS.

Pneumatic Annunciator.

No. 222,343. Patented Dec. 2, 1879.

FIG. 1.

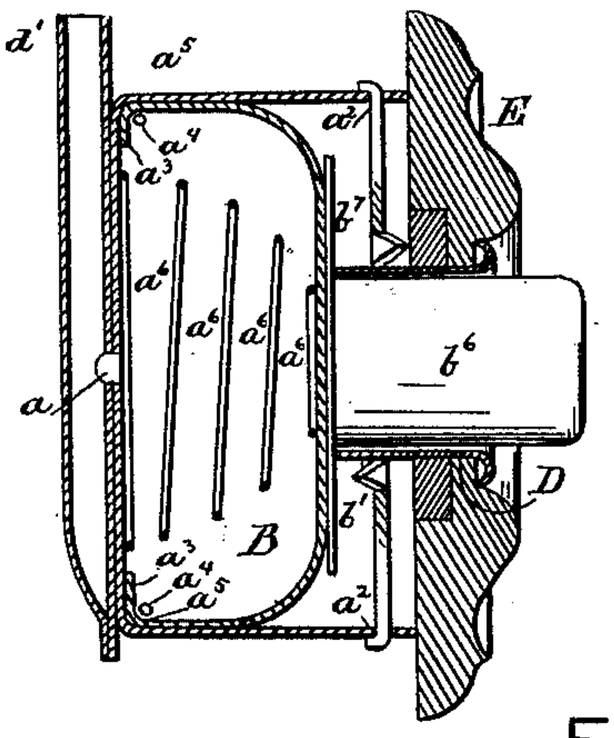


FIG. 2.

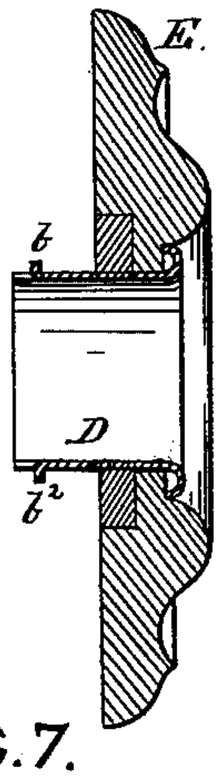


FIG. 3.

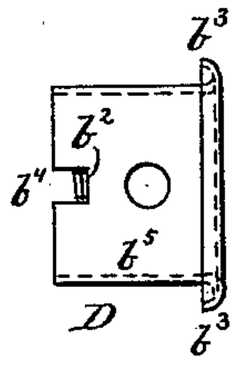


FIG. 4.

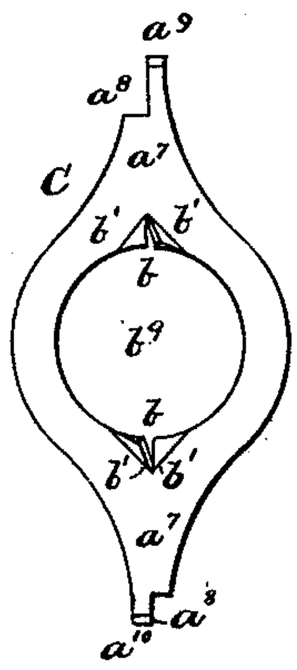


FIG. 5.

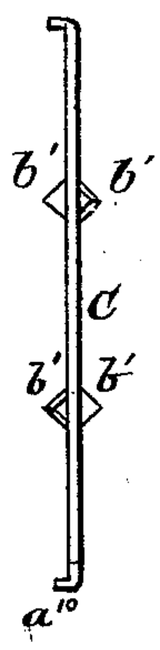


FIG. 6.

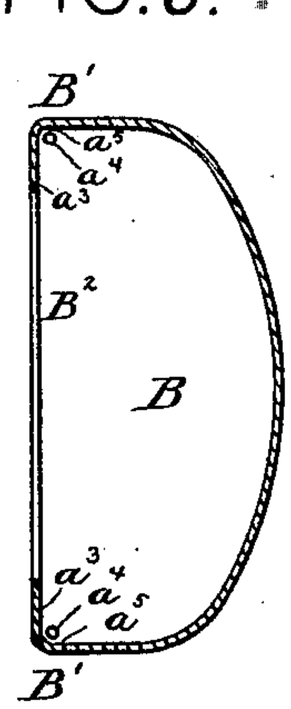


FIG. 7.

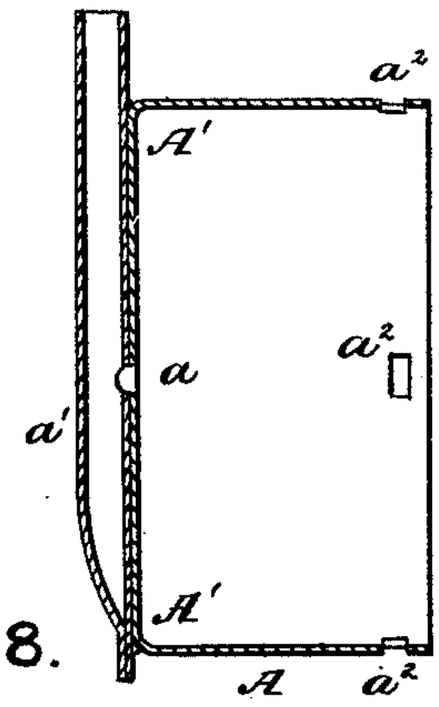


FIG. 8.

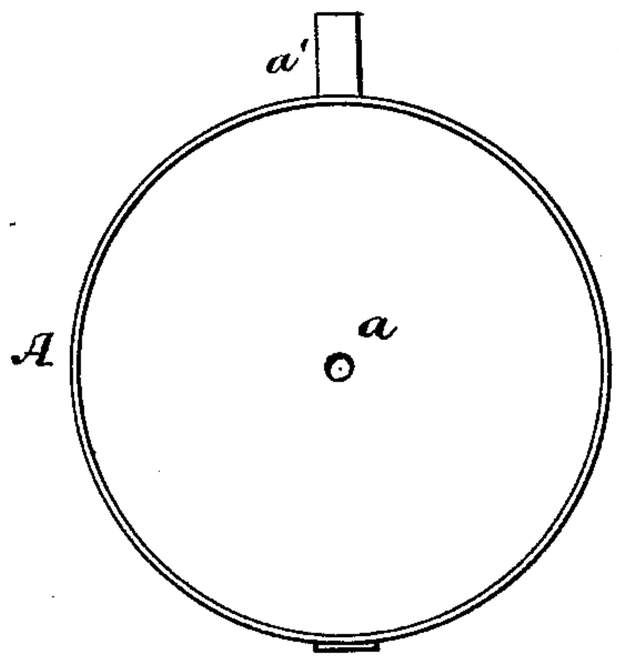
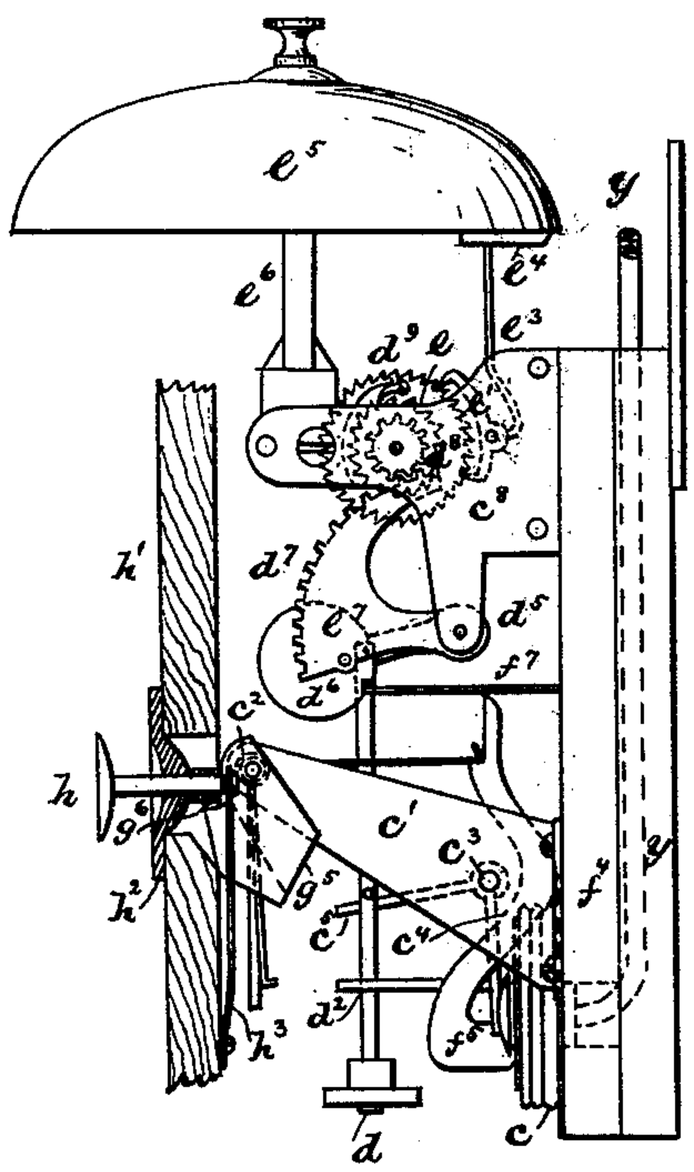


FIG. 9.



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By R. S. & A. P. Lacey Atty's

2 Sheets—Sheet 2.

C. E. ZIMDARS.

Pneumatic Annunciator.

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FIG. 12.

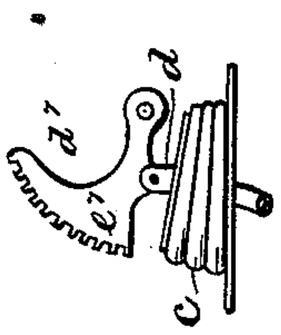


FIG. 11.

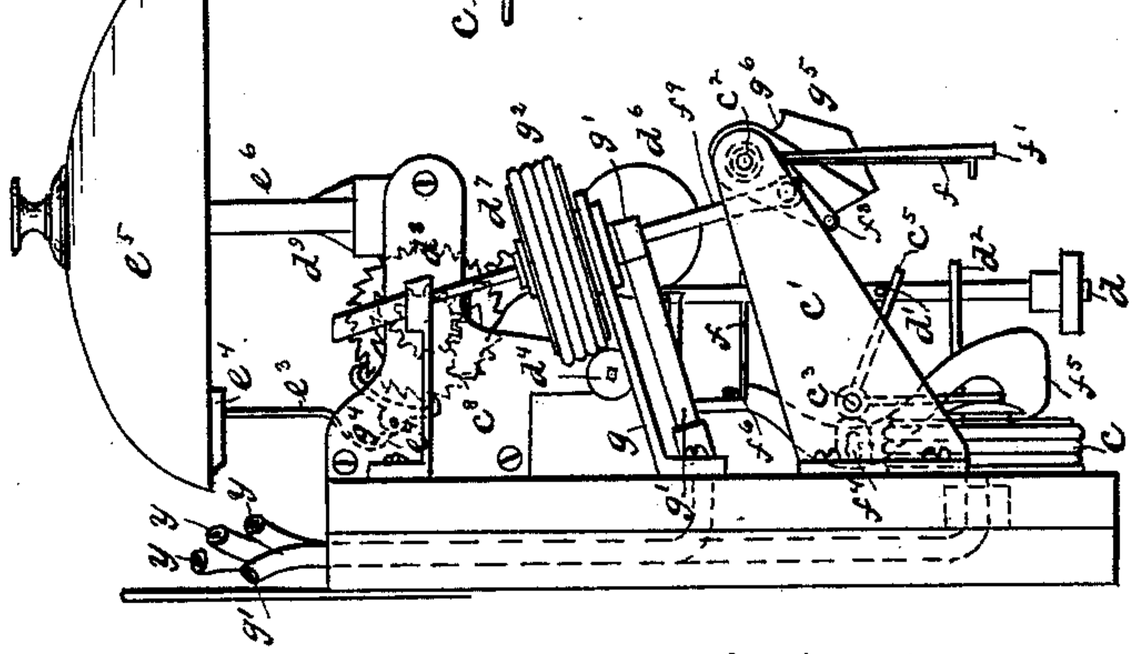
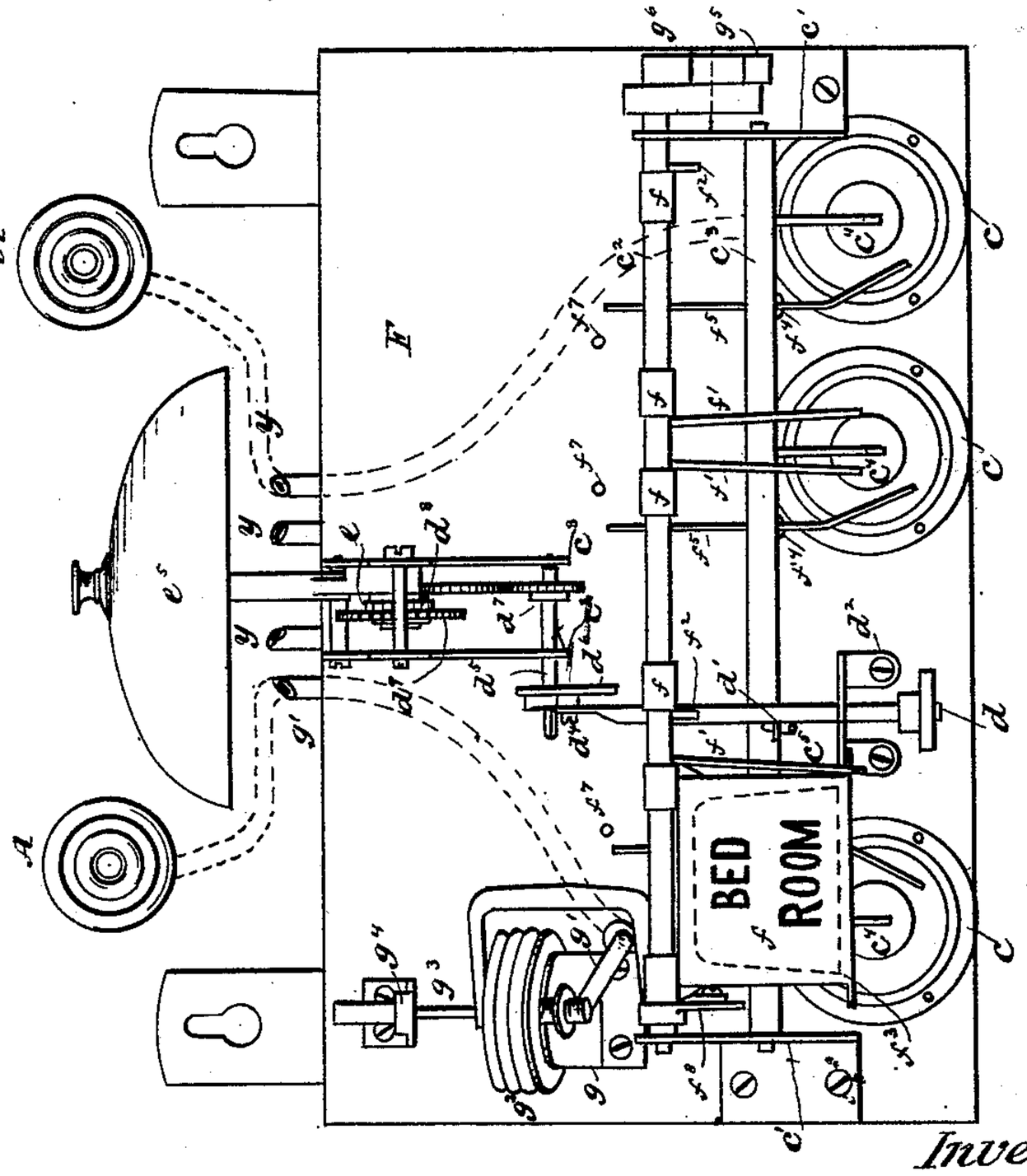


FIG. 10.



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UNITED STATES PATENT OFFICE.

CONRAD E. ZIMDARS, OF LONDON, ENGLAND.

IMPROVEMENT IN PNEUMATIC ANNUNCIATORS.

Specification forming part of Letters Patent No. **222,343**, dated December 2, 1879; application filed September 22, 1879.

To all whom it may concern:

Be it known that I, CONRAD E. ZIMDARS, of London, in the county of Middlesex, England, have invented certain new and useful Improvements in Pneumatic Signaling Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to an improvement in pneumatic signal apparatus for hotels, steamboats, public buildings, private dwellings, elevators, &c.; and it consists of an air compressor or push, bell, and signal-tablets, with a mechanism for operating them by pneumatic pressure, all of which will be more fully hereinafter explained.

In the drawings, Figure 1 is a cross-section of the air-compressor, showing the arrangement of the flexible air-chamber, expanding ring, spring, push, (rose,) and couplings with the air-chamber case. Fig. 2 is a cross-section of the rose, showing its arrangement with the coupling-tube. Fig. 3 is a cross-section of the coupling-tube at right angles to that shown in Fig. 2. Fig. 4 is a front view of the coupling-yoke. Fig. 5 is a side view of the same. Fig. 6 is a cross-section of the flexible air-chamber. Fig. 7 is a cross-section of the air-chamber case. Fig. 8 is a top view of the same. Fig. 9 is a side elevation of the bell and tablets with the mechanism in arrangement for operating them. Fig. 10 is a front elevation of same; and Fig. 11 is a side elevation, the reverse of that shown in Fig. 9.

A is the cylindrical air-chamber case, of suitable size, composing a part of the air-compressor. It has a hole, *a*, in the center of its bottom, and a tube, *a'*, attached to the under side of the bottom, with one end closed, while the other is open, and extends beyond the edge of the case to receive another tube on it, which connects the air-compressor with the signaling apparatus.

The hole *a* communicates with the interior of the tube *a'*, for the purpose of compressing air through it.

The case A also has two holes, a^2, arranged opposite to each other near the top edges of the case, to receive the coupling-yoke. It may have a series of such holes arranged in like manner to accommodate the rose, arranged with coupling-tube, to any desired position.

B is a cylindrical air-chamber, with a dome-top, and made of any suitable flexible material. It is open at its bottom or inner end, B^2, and is so formed that its rim or edge B', surrounding the open inner end, will fit snugly into the angle A' at the inner or closed end of the cylindrical case A, thus securing an air-tight joint between the said casing and air-chamber. It has a flange, a^3, on its bottom edges, of the same material, projecting inward a suitable distance, to the more effectually provide air-tight contact with the case in which it fits. This flange is at right angles to the sides of the air-chamber. The angle so made fits snugly in the right-angle corner of the air-compressor case.

The air-chamber B is provided with an expanding ring, a^4, the ends of which lap each other. It is arranged in the corner a^5, made by the sides of the chamber with the flange, and is designed to keep the chamber sides expanded against the sides of the case. It is further provided with a spiral spring, a^6, having its base larger than the top, so that when pressed together the wire is all on the same horizontal plane, and occupies the least possible vertical space in the chamber. This spring is placed in the air-chamber case with its large side down over the hole *a* when the air-chamber is placed in over it.

The sides of the air-chamber fit snugly against the sides of the air-chamber case, so as to be air-tight when pressed upon. This air-chamber may be made of a flexible material sufficiently heavy and elastic to dispense with the spiral spring a^6, which I preferably use as hereinbefore described.

C is a coupling-yoke, made with a central hole, b^9, and two opposite extending arms, a^7. Each arm is provided on its end with a shoulder, a^8, and fingers a^9 and a^{10}, hooked on their end at right angles with the flat side of the yoke, and in the same direction. One of the fingers, a^9, is longer than the other, so that it may be inserted in one of the holes a^2 and

passed through far enough to admit the other arm on the inside of the case to be put through the other and opposite hole a^2. These hooked fingers are constructed in relation to the holes a^2 so that the yoke must be turned sidewise to be inserted in the said holes, and when through to be turned upright again, the hooks fitting snugly against the outside of the case, so as to prevent coming out.

The yoke is slit at b outward about one-eighth of an inch on opposite sides of the hole b^9, on a line with the arms a^9 a^{10}. The corners b^1 made by one of these slits are bent, one down and the other up, while those made by the opposite slit are bent in the reverse direction, so as to form inclined planes, with shoulders over them, which, on the upper side of the yoke, arrest and turn the coupling-hooks b^2 down the incline planes, while on the lower side they act as stops, preventing the coupling-hooks from turning over. This yoke rests, as described, in the holes a^2 a^2, and couples with the coupling-tube D, which has the rose E attached to it.

D is a coupling-tube, having an outward-extending shoulder, b^3, at its top, and provided with two open slots, b^4, at its bottom edges, arranged opposite to each other, and having at their closed side coupling-hooks b^2 projecting outward at right angles to the tube. It is further provided with holes b^5 in its sides for attaching it to the rose E.

E is a rose of suitable design, having a hole in its center, in which the coupling-tube D is fastened, and so arranged in relation to the air-compressor case and the yoke C that the coupling-hooks b^2, in sliding down the inclines b^1 and turning, spring or draw up the yoke, and produce a tension of the rose against the case.

The button or thumb-piece b^6 has a disk, b^7, attached to its lower end. The button or thumb-piece is placed in the tube D, with the disk b^7 against the air-chamber, which completes the working arrangement of the air-compressor.

When I so desire, I attach the button or thumb-piece b^6 to the air-chamber by means of a second disk on the inside of the said chamber screwed up tight to the outside one. This air-compressor connects by a tube to the signaling apparatus, and produces the signals by pressing on the button or thumb-piece b^6, which compresses the air-chamber and forces air through tubes y into and operates the ringing mechanism.

F is a board, to which is attached the bellows, bell, and tablet mechanism of my invention. It has a series of holes arranged along its lower side, over which a corresponding series of circular bellows, c, of suitable size and construction, are attached, and so arranged that a tube, y, communicating with the interior of each of the said bellows, passes through the said holes and communicates with the air-compressor hereinbefore explained, by means of which the bellows are inflated.

Two arms, c', are attached opposite each other on the sides of the board F, and project forward and obliquely upward. They are each provided with two holes, one at the end and the other near the point of attachment, in which are journaled two shafts, c^2 and c^3. The lower shaft, c^3, is immediately above and in front of the bellows c, so that the said bellows, when inflated, will pass under it. This shaft c^3 is provided with a series of arms, c^4, corresponding to and arranged over the bellows c. Disks are fastened to the free end of said arms, and arranged with their flat side in contact with the bellows, so that they may be carried out by the inflation of the bellows and turn the shaft c^3. To shaft c^3 is attached another arm, c^5, extending forward and at right angles to the bellows-arms c^4. When any one of the bellows is inflated it pushes out the arm c^4, which turns the shaft c^3, as above described, and raises the arm c^5. This in turn raises the vertical rod d by lifting on a pin, d', to ring the bell. The rod d, near its lower end, passes vertically through a guide, d^2, attached to the board F under the shaft c^3. The upper end of rod d is pivoted to a lever, d^4, the inner end of which is rigidly attached to the segment-axle d^5, and operates the ringing mechanism. The outer end of the lever d^4 has a weight, d^6, attached, to aid the segment in dropping back after ringing the bell. The segment-axle d^5 is journaled in a frame, c^8, attached to and near the top of the board F. In this frame is arranged the ringing mechanism, which consists of a gear-segment, lantern-pinion ratchet, escapement-wheel, and escapement with hammer.

d^7 is a circular rack or segment, which gears with the lantern-pinion d^8, which, together with the wheels d^9 and e, forms the escapement or mechanism of ordinary construction immediately connecting with and imparting motion to the hammer e^4.

The circular rack or segment d^7 has its center in the axle d^5, on which it rotates. This axle or center shaft d^5 is journaled in the frame c^8, and is so arranged relatively to the pinion d^8 that the cogs of the segment d^7 will continue meshed with the cogs of the pinion d^8, giving constant motion to the latter as the said segment is rotated upward by the action of the pneumatic bellows on the shaft d. I employ this rotating rack or segment in order to avoid the friction, and consequent binding, which attends the use of straight racks.

The sensitiveness of the pneumatic bellows c is such that it is almost impossible to preserve its action in the given direct line with the shaft which connects it with the ringing mechanism. The force, varying its direction, causes a straight rack to bind in its bearings, thus impairing the action of the signal. To overcome this difficulty I have employed the rotating segment d^7, to which I connect the actuating-shaft d, so that the latter will have a hinge or pivotal movement at the point of

its attachment. When thus arranged, as shown in Fig. 12, any variation in the action of the bellows will not impair the action of the segment.

The arrangement of the shaft d so that its upper end is attached to an arm fixed on the extended end of the shaft d^5 is made where a number of bellows, c, are placed in the same casing, and the place of one of them falls immediately below the segment and ringing apparatus. The shaft d is set off to one side and between two of the bellows, and is connected to the segment, as described and shown.

An escapement, e', attached to a shaft back of the escapement-wheel, and journaled in the frame c^8, is operated by the escapement-wheel. Attached to the escapement-shaft is an upward-projecting arm or handle, e^3, on the upper end of which is a hammer, e^4, which strikes the bell e^5 rapidly, producing a shattering or trembling tone.

The bell e^5 is fastened on the upper end of a staff, e^6, by a set-screw. The lower end is screwed to one of the sides of the frame c^8 immediately over the segment d^7 and front of the lantern-pinion d^8.

When it is preferred to do so, the box or casing containing my invention can be so constructed that the bellows c may be fixed under the end of the shaft d, so that the action of the bellows will be directly on the said shaft, thus obviating the necessity of indirect action through the medium of the shaft c^3 and arms c^4 and c^5.

This construction is more clearly shown in Fig. 12, in which the upper end of the shaft d is attached directly to the segment d^7. When thus arranged, the reacting-weight d^6 can be attached direct to the segment d^7, or may be connected by an arm to the shaft or axle of the segment, as shown in Figs. 9 and 10.

It will be seen that when the parts are arranged as in Fig. 12 the bellows c, when inflated, will adjust itself to the circular movement of the segment d and preserve a uniform upward pressure, insuring a perfect action.

Upon the shaft c^2 is hung a series of indicating-tablets, f, so that they may be raised or lowered at pleasure. They are arranged at stated distances apart, and held in their place by long pins or arms f' and the short pins f^2. These tablets are constructed with a shoulder, f^3, extending laterally from each of the lower ends of its sides, by which they are raised by the pins f' lifting against them when the shaft c^2 turns.

Immediately behind the shaft c^3, and nearly over the bellows c, is fixed in the board F a series of slotted studs, f^4, corresponding in number and position to the series of tablets. In the slots of each of these is hinged a tablet-lever, f^5, the lower end of which is curved and balanced to automatically rest in contact with the bellows c, while the upper end stands out from the board F, and is provided with a shoulder, f^6, on its front side, to receive and hold up the tablets when raised. When the bellows expand, the upper end of these levers is carried back and drops the tablets. Immediately above the upper end of the tablet-levers f^5 a long pin, f^7, is fixed, which prevents the tablets from being thrown over when raised with too much force.

The shaft c^2 is provided at one of its ends with an arm or lever, f^8, rigidly attached. Pivoted to the free end of this lever is a lifting-hook, f^9, which carries the lever f^8 up, turning the shaft c^2, and thereby raising the tablets f to and resting them upon the shoulders f^6 by means of the arms f' lifting against the shoulders f^3.

At a suitable distance above the lever f^8 is a bracket, g, fixed to the board F and extending out nearly as far as the shaft c^2. Its outer end is provided with an open slot, in which is fastened a tube, g', by means of two set-nuts, one above and one below the bracket. The upper end of this tube is attached to the under side of and communicates with the interior of a circular bellows, g^2, close to and resting on the upper nut, fastening it to the bracket. The lower part extends back and through the board F, and continues until connected with an air-compressor, hereinbefore described.

To the upper side of the bellows g^2 is attached a vertical guide-pin, g^3, which passes through and moves in the guide g^4, attached to the board F at a suitable distance above to allow the expansion of the bellows. It also passes through a hole in the upper end of the lifting-hook f^9, and serves as a guide and stay for it while the bellows, in expanding, raises it to operate the tablet mechanism.

The other end of the shaft c^2 extends through the bearing-arm c', and has rigidly attached on its end a lever or arm, g^5, having the concave or cam-shaped recess or bearing g^6 formed in its front edge near its center of motion, to receive the action of the push h, arranged in the frame containing the hereinbefore-described mechanism, for the purpose of raising the signal-tablets when desired, in preference to using the bellows-raising method already described. This lever is made heavy, and arranged parallel with the lifting-arms f', so that its gravity will carry the said arms back and force the push h outward into the position it occupied prior to its use in raising the tablets, as described.

As before stated, I have provided, in addition to the hereinbefore-described pneumatic arrangement for resetting the tablets, another method to be operated by the push h, fixed in the case h', when the said case is located convenient to hand. It consists of the push h operating against the weighted lever g^5. The said push passes through a guide-plate, h^2, set in the end of the case h' adjacent to the lever g^5, and provided on its inner end with a groove running around it. A spring, h^3, slotted in its upper end, engages with the inner end of the push h fitting in the said groove, and is, at its lower end, attached to the inner side of

case h', and arranged to carry the push back after resetting the tablets.

It will be seen the operation of my invention is: By pressing on the button or thumb-piece b^6 of the air-compressor air is forced to the signaling apparatus in a distant apartment, to which it is connected by tubes, and rings the bell, while at the same time it drops a tablet, showing who or what is desired. The tablet is then reset by either of the hereinbefore-described methods, and in readiness for the next signal.

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

1. In a pneumatic signaling apparatus, the combination, with the cylindrical casing A, having the opening a, of the flexible cylindrical air-chamber B, having its inner end, B^2, open, and so formed that the rim or edge B' surrounding the open end B^2 will fit snugly into the angle A' of the casing A, substantially as and for the purpose set forth.

2. In a pneumatic signaling apparatus having a cylindrical casing, A, provided with an opening, a, the cylindrical air-chamber B, open at its inner end, and constructed so that its rim fits snugly into the angle A', and is provided with a flange, a^3, projecting inward from the rim B', and at right angles to its sides, substantially as and for the purpose set forth.

3. The combination, with the flexible air-chamber B, open at its bottom, and the air-chamber case A, having opening a, of the expanding ring a^4, substantially as and for the purposes set forth.

4. The combination, with the air-chamber case A and the rose E, having a coupling-tube, D, provided with hooks b^2, of the yoke c, held by any suitable means to the case A, and having the radial slits b and the points b' b' formed by said slits turned outward in opposite directions, forming inclines and stops, substantially as and for the purposes specified.

5. The combination, with the escapement mechanism for operating the hammer c^4, of the rotating segment or rack d^7, journaled in the frame c^8 and meshing with the escapement-pinion d^8, shaft d, having its upper end hinged or pivoted to the segment d^7, and the bellows c^4, arranged to operate substantially as and for the purpose set forth.

6. The combination, with the tablet-shaft c^2, of the weighted lever g^5, having the concave or cam-shaped recess or bearing g^6 formed in its front edge near its center of motion, and the push-rod h, moving in bearings in the front frame, substantially as and for the purpose set forth.

7. In a pneumatic signaling apparatus, the combination, with the tablet-shaft provided with an arm, f^8, of the connecting link or bar f^9, and bellows g^2, operated by a suitable air-bulb and connecting air-tube, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CONRAD E. ZIMDARS.

Witnesses:

EDWIN BALTZBY,

GEORGE T. GRAHAM.