3 Sheets--Sheet 1.

J. WALK.

Improvement in Motors for Signal-Alarms.

No. 128,683 Patented July 2, 1872.

Fig. 1.

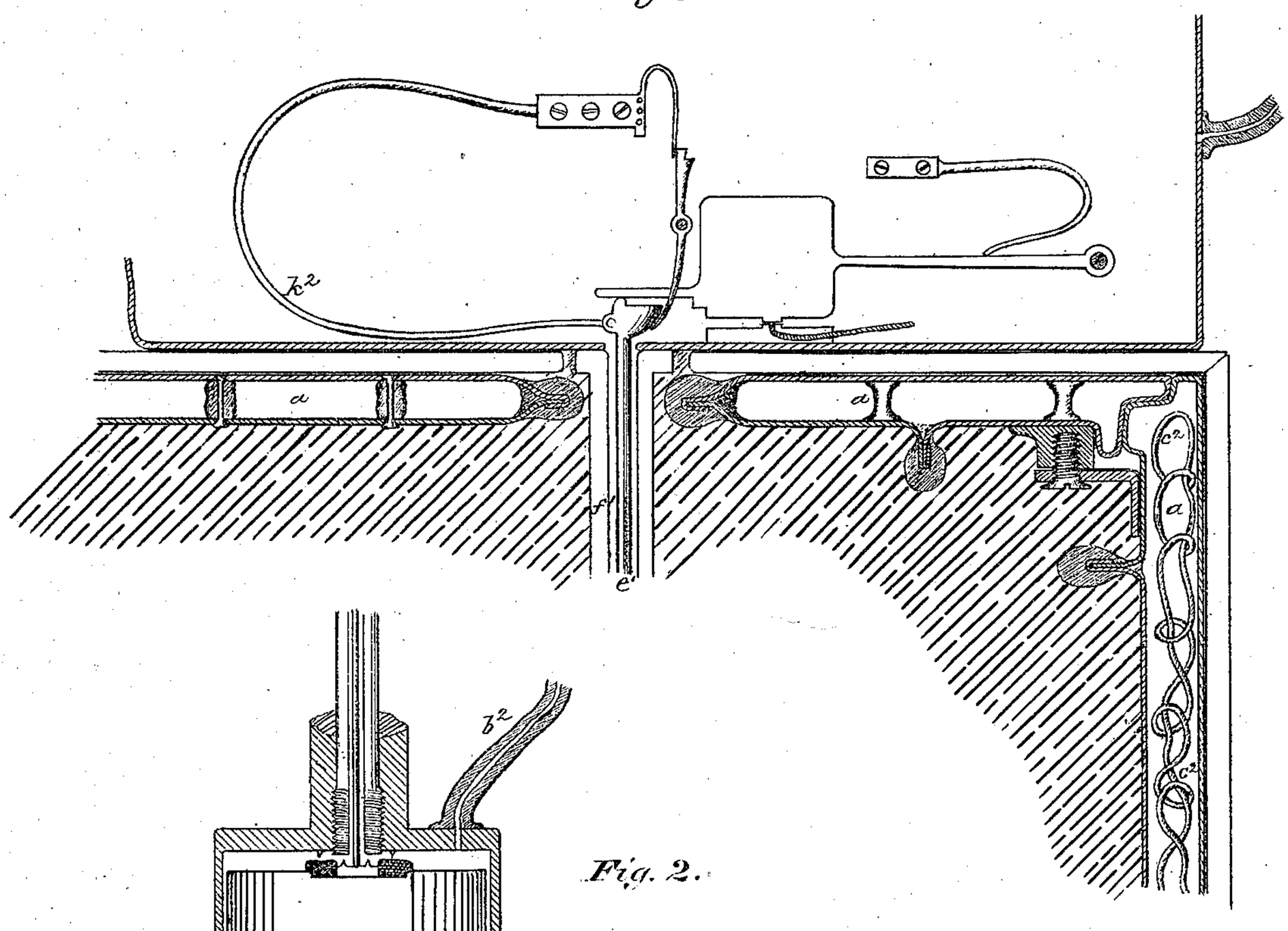
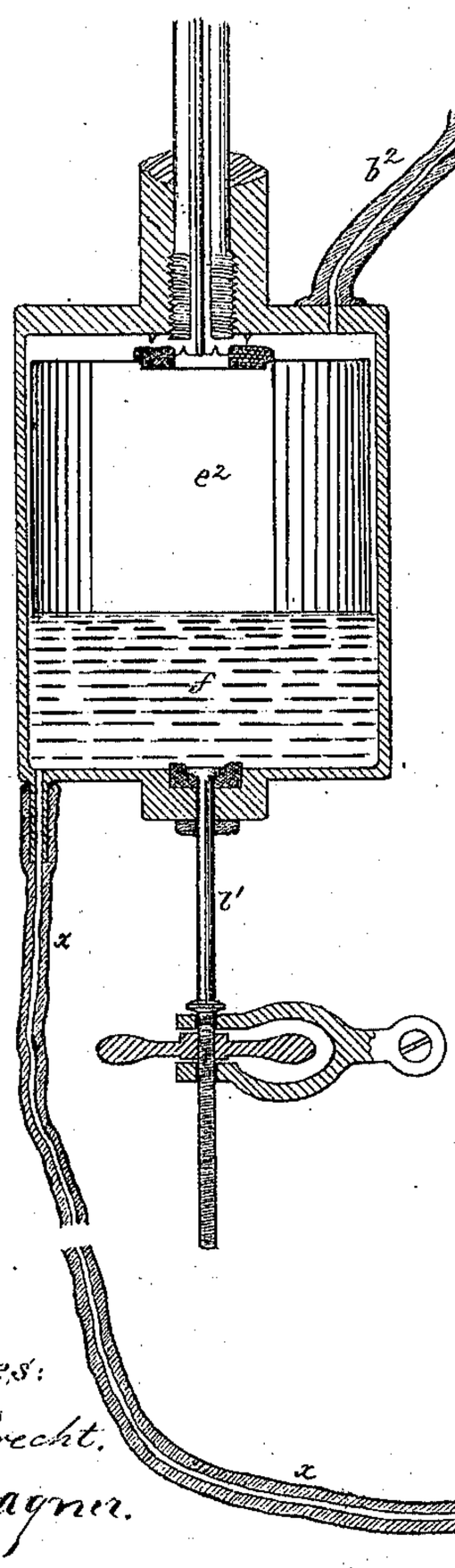
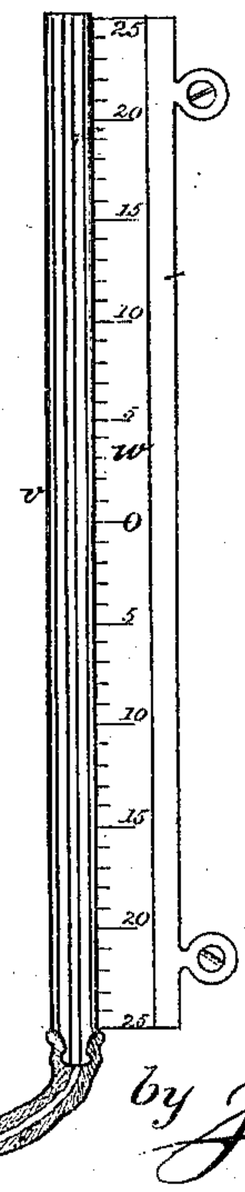


Fig. 2.





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3 Sheets--Sheet 2.

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Fig. III.

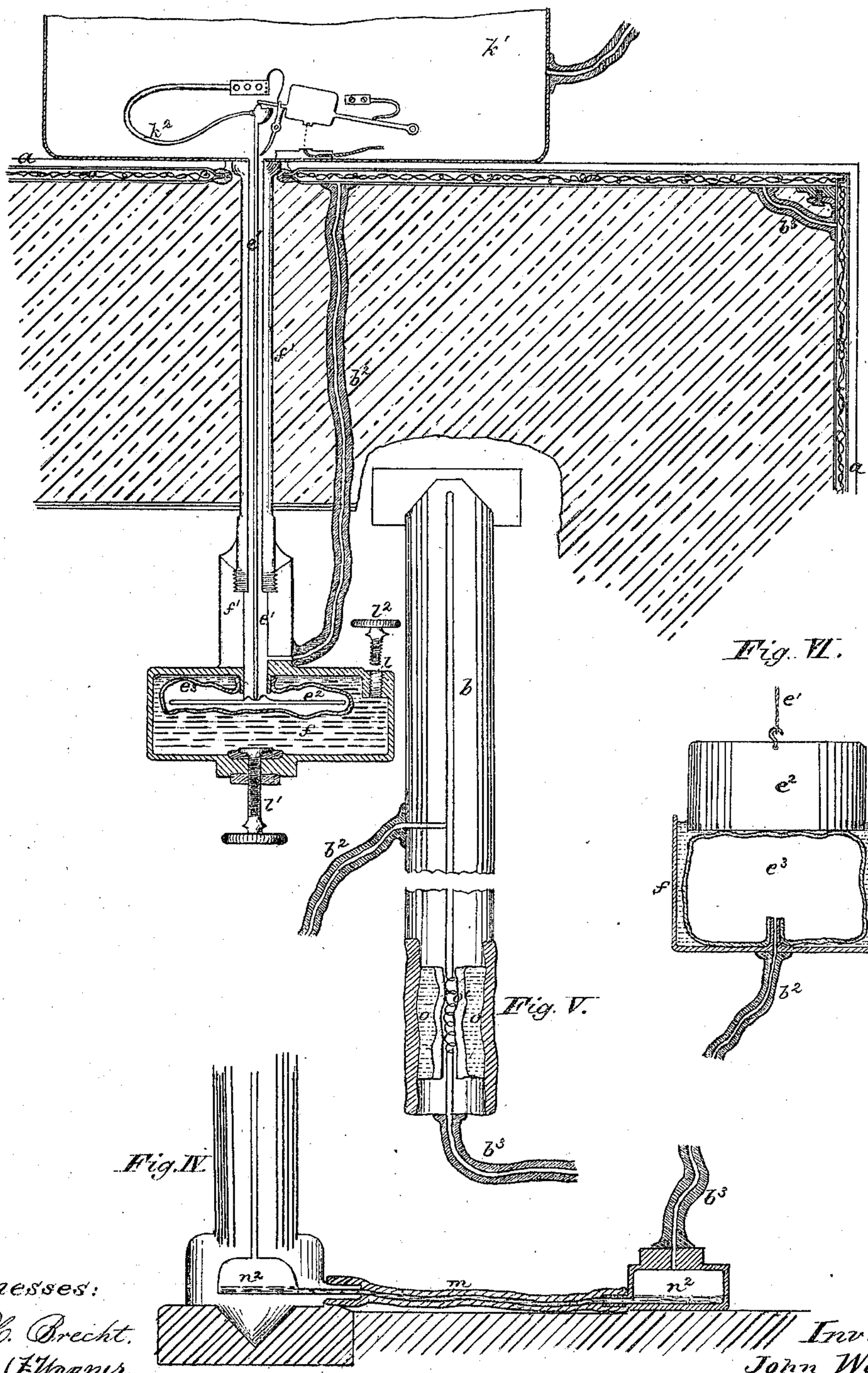

Fig. VI.

Fig. V.

Fig. IV.

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3 Sheets--Sheet 3.

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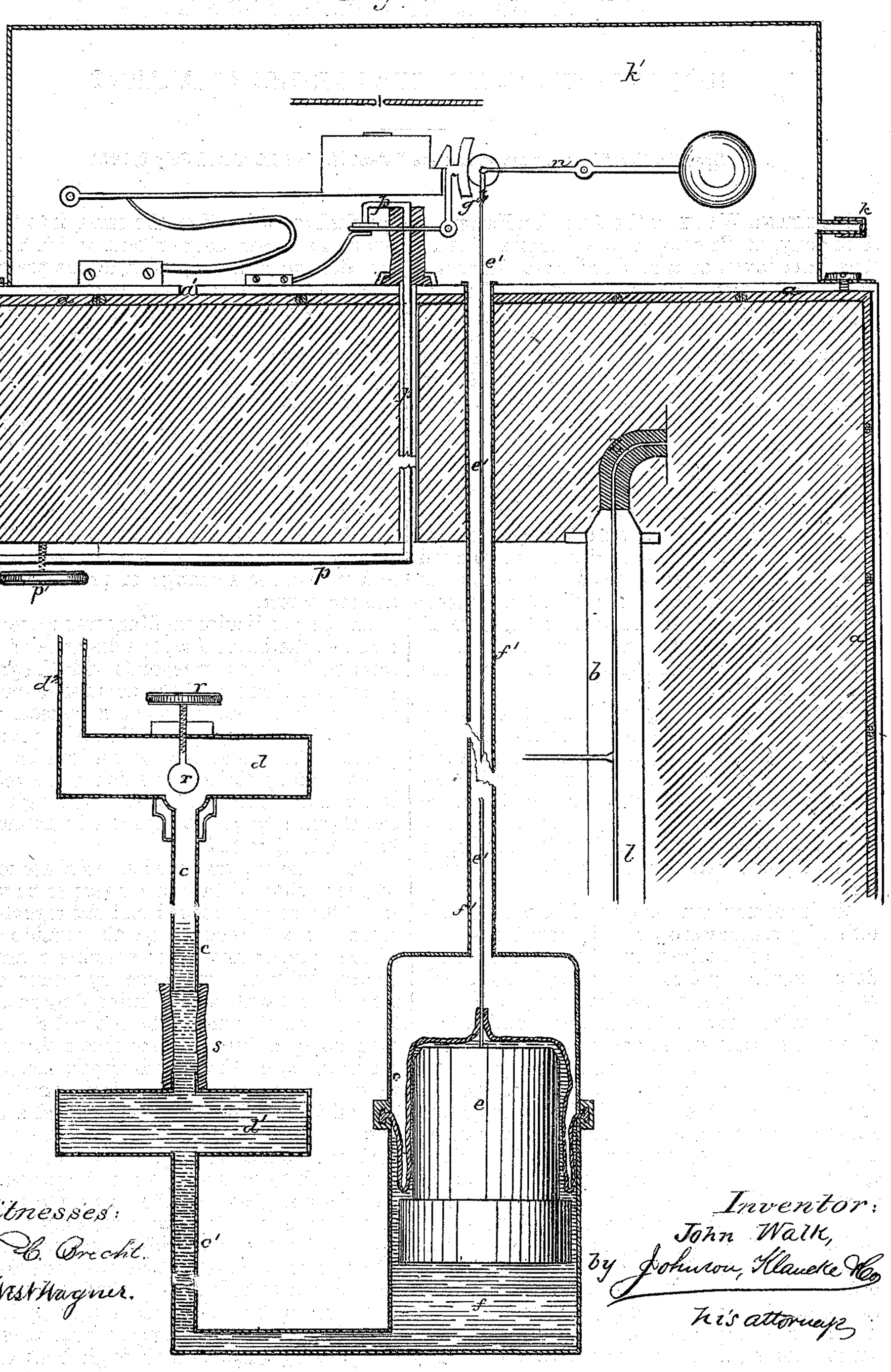
Fig. VII.



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UNITED STATES PATENT OFFICE.

JOHANN WALK, OF VIENNA, AUSTRIA.

IMPROVEMENT IN MOTORS FOR SIGNAL-ALARMS.

Specification forming part of Letters Patent No. 128,683, dated July 2, 1872.

I, JOHANN WALK, of the Austrian Escompte Company, of Vienna, in the Empire of Austria, have invented a new and useful Improvement in Motors for Signal-Alarms, of which the following is a specification:

My invention relates to that class of signal-alarms operated by aerostatic means; and my said invention consists, first, in a novel arrangement and combination of devices to effect the operation of the alarm through the medium of compressed air, and to interrupt such effect at pleasure. Second, in means for preventing the collapse of the air-chambers when rarefied air is used. Third, the combination of devices to prevent the operation of the alarm when used with either compressed or rarefied air, when desired, for legitimate operation or removal of the object protected. Fourth, in the combination of devices to effect a connection between the air-chambers of the body and those of the door or doors of the safe or object protected.

In the drawing, Figures 1 and 3 show my improved motor as applied to a safe and used with rarefied air. Fig. 2 shows an indicating attachment to the same. Figs. 4 and 5 are modifications of air-tight flexible connections between the air-chambers. Fig. 6 is a modification of the device shown in Fig. 3; and Fig. 7 shows my apparatus as used with compressed air.

My invention can be applied in two ways—either by compressed air or by rarefied air.

I will first illustrate the former method by describing its application to a safe, as shown on Sheet 3, Fig. 7, of the drawing.

The safe is fitted on its inside with additional walls, so that an air-space, *a*, is around its entire interior. The outside door is provided with a similar air-space, which is connected to the air-space of the safe-body by means of an India-rubber pipe, *m*, and the hollow axis *b*, as shown in Fig. 4, where n^3 is the door, having a hollow axis, *b*, and turning upon its pivot n^4, and is connected to the air-space in the side walls of the safe by a flexible tube, *m*, which unites recesses n^2, so arranged that a column or mass of quicksilver standing level in these recesses will also fill the tube and thus shut off air connection; but if the equilibrium of this quicksilver is disturbed by any cause from either recess, the pressure on the quicksilver will drive the same into that air-space in either door or safe which has been meddled with, and so change the pressure in the sound air-space, thereby operating the alarm, as will be hereinafter more fully described. In Fig. 5 this connection is shown continuous, the air-spaces in the door and safe not being shut off from each other, the quicksilver being situated around the tube in a space formed by a larger surrounding-tube, *o*, the inner tube being kept expanded by means of a wire coil, *o'*. In this case unauthorized meddling with the safe will cause the quicksilver to flow into the inner tube by overflowing the space around the same, and thus interrupt communication between the air-spaces, and thus cause a change of pressure to operate the alarm.

The perpendicular capillary transparent tube *c* carries the bulbs *d* d^1, the distance of which from each other corresponds with the greatest possible difference of the amount of pressure on the air in the air-space *a*, caused by the change in the temperature in the outer atmosphere. On the surface of the quicksilver in the cylinder *f* the piston *e* floats, the rod e^1 of which acts upon the lever *n*, through which the signal apparatus, inclosed in an air-tight box, k^1, is operated.

The cylinder *f* and the bulbs *d* d^1 are secured on the inside of the safe so as to be visible when the door is opened and the signal-apparatus box k^1 is secured on the outside or top of the safe, or any other suitable place connecting with the air-space by means of the tube a^1, and with the cylinder *f* by means of tube f^1, which surrounds the rod e^1. Air is then pumped into the air-space *a* through an opening, *k*, in the signal-apparatus box k^1, which forces the piston *e* downwardly until the quicksilver in tube *c* has reached a height corresponding with the outside temperature, the upper bulb *d* communicating with the air in the safe by means of a small open tube, d^2. The distance between the bulbs *d* d^1 and the sensitiveness of the apparatus depends upon the height of the column of quicksilver in tube *c*.

If, by any damage that may be done to either the inner or outer wall of the safe, the pressure of the air in the air-space, either by having formed an opening through which to escape or by being expanded through heat of fire,

is changed beyond the limits which could be produced by a natural change of the outer atmosphere, the equilibrium of the quicksilver is destroyed, and it will, if the compressed air is released, rise in cylinder *f;* or, if the air is forcibly compressed the piston *e* will press the quicksilver down in the cylinder and cause it to rise through tube c^1 into bulb d^1, in either case affecting the rod e^1, through which the signal apparatus is operated. A like result is effected by the unauthorized removal of a safe; for if the same be tipped over so much as to cause the quicksilver to rise in tube *c*, the pressure of the air in air-space *a* will force the piston *e* down, thus operating the signal through rod e^1. If it is desired to move a safe without setting off the alarm, a thumb-screw, *r*, in bulb *d*, may be turned down so as to close the tube *c* and shut it off from the atmosphere, when the safe can be moved and tipped without disturbing the equilibrium of the quicksilver; or, the quicksilver may be entirely removed from the cylinder *f*, after securing the bell-crank lever *g*, which holds the hammer through which the alarm is set off, by means of turning the lever *p* so as to seize over and hold the lever *g*, and securing the lever *p* by means of a thumb-screw, *p'*—all these parts being on the inside of the safe and signal-apparatus box, so that they can be operated only from the inside of the safe. The removal of the quicksilver from the cylinder *f* is effected by removing the bulb *d* from the wall and bending it downward, which may be done by forming a part, *s*, of it of India rubber, so that all the quicksilver is by the pressure of the air forced and runs into bulb *d*, which is sufficiently large for that purpose, and by then closing the opening of said bulb by thumb-screw *r*, the tube d^2 having, of course, been suitably closed before. It will be readily understood that any kind of alarm apparatus may be used, and arranged to be operated by the rising and falling of rod e^1. On Sheets 1 and 2 I have shown the construction of the apparatus when used with rarefied air. In this case the air-spaces *a* are filled with bent wires c^2 to prevent the collapse of the walls. In this case, also, the rod e^1, Figs. 1 and 3, carries at its lower end merely a plate, e^2, surrounded by a flexible air-tight bag, e^3, and the cylinder *f* is not connected to or provided with bulbs. The surrounding tube f^1 is connected with the air-space *a* by means of a flexible tube, b^2, while the walls, to strengthen them, may form separate air-chambers *a*, connected to each other by suitable air-tight flexible tubes b^3, Figs. 3 and 4. In this case the air is pumped out from the air-chambers, so as to collapse the flexible bag e^3. If any of the walls are injured and air admitted, its rush will expand this bag, forcing the quicksilver out of the cylinder through opening *l*, and allowing the spring k^2 to depress rod e^1, thus setting free the alarm. The power of spring k^2 must be, of course, less than the weight of the atmosphere, exerted through the opening *l* upon the quicksilver and under side of bag e^3 and plate e^2, else the spring would operate the rod. In Fig. 6 is shown a method of operating the alarm by raising the rod e^1 or its equivalent. In this case the bag e^3 is under the piston, which latter sinks when the bag is collapsed by pumping out of the air, while, when air is admitted, the bag expands and raises the piston or float e^2. In Figs. 2 and 3 is a screw, l^1, passing through air-tight bearings in the under side of the cylinder *f*, and which, when the apparatus is put into operation, is screwed out, so that its upper and inner end is flush with the bottom of cylinder *f*, as shown, and the screw l^2, Fig. 3, which fits into opening *l*, is removed to allow the exertion of the weight of the atmosphere. In moving the safe the screw l^2 is made to close the opening *l* to prevent the overflow of the quicksilver, and the screw l^1 is screwed up until its upper and inner end touches the bag e^3 and plate e^2, thus firmly holding the latter and preventing the spring k^2 from forcing the rod e^1 downwardly.

Fig. 2 shows the attachment of indicator to illustrate the pressure of the atmosphere on the quicksilver. A glass tube, *v*, on a metal scale, *w*, connects with the cylinder *f* by means of a tube, *x*, and as the top of the tube *v* must be arranged in the safe or other article to which this invention is applied in such a manner that only an unauthorized pressure will drive the quicksilver out of the tube *v*, thus a glance at the tube *v* will indicate the natural change of the atmosphere and the amount of its pressure.

In Figs. 1 and 3 the alarm is shown as produced by means of the descent of the hammer when released by the rod e^1; in Fig. 7 the hammer is elevated for that purpose. In each case the hammer is operated by means of a spring, the rod e^1, by its upward or downward movement, releasing it. The hammer, on being released, comes into forcible contact with a detonating mass suitably arranged in the box k^1, and connecting with an explosive alarm mass.

I am well aware that signal-alarms have been operated by means of aerostatic changes, and this I do not claim; but in all the devices heretofore used the protection afforded has been but partial, and a legitimate approach to or entrance into the object thus protected could be effected only by disconnecting by suitable means the alarm from said object to prevent the alarm from being set off; or the alarm is operated, whether the approach is legitimate or otherwise, which, for signaling at a distance, would not secure the object sought to be attained. In my invention only illegitimate approach to or entrance into the object protected will be indicated, as by means of improved flexible connections the doors of a safe or the doors and windows of a house may be opened at any time without operating the alarm; while, if they are properly locked and entrance is tried to be effected by working through them, the alarm is instantly set off by the change in the density of the air in the different chambers.

Having described my invention, I claim—

1. The bulbs d d^1, in combination with the air-spaces a, tubes c, c^1, and f^1, the cylinder f, piston e, and connecting-rod e^1, as a means for operating the alarm through the medium of compressed air, substantially as described.

2. The wire bracing c^2 in the air-chambers, as a means of preventing collapse of the walls of said air-chambers when used with rarefied air, substantially as described, and as shown in Figs. 1 and 3 of the drawing.

3. The combination of the lever p, thumb-screw p', valve r in bulb d, and flexible connecting-tubes, as a means of preventing the operation of the alarm when desired, and when used with compressed air, substantially as described, and shown in Fig. 7 of the drawing.

4. In combination with the connecting-rod e^1, plate e^2, flexible bag e^3, cylinder f, and inclosing-tube f^1, I claim the thumb-screws l^1 and l^2 as a means of preventing the operation of the alarm when desired, and when used with rarefied air, substantially as described, and shown in Fig. 8 of the drawing.

5. The combination of the air-spaces a, hollow axle b of door n^3, recesses n^2, and tube m filled with quicksilver, as a connection between the door and the body of the safe, substantially as described, and shown in Fig. 4 of the drawing.

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