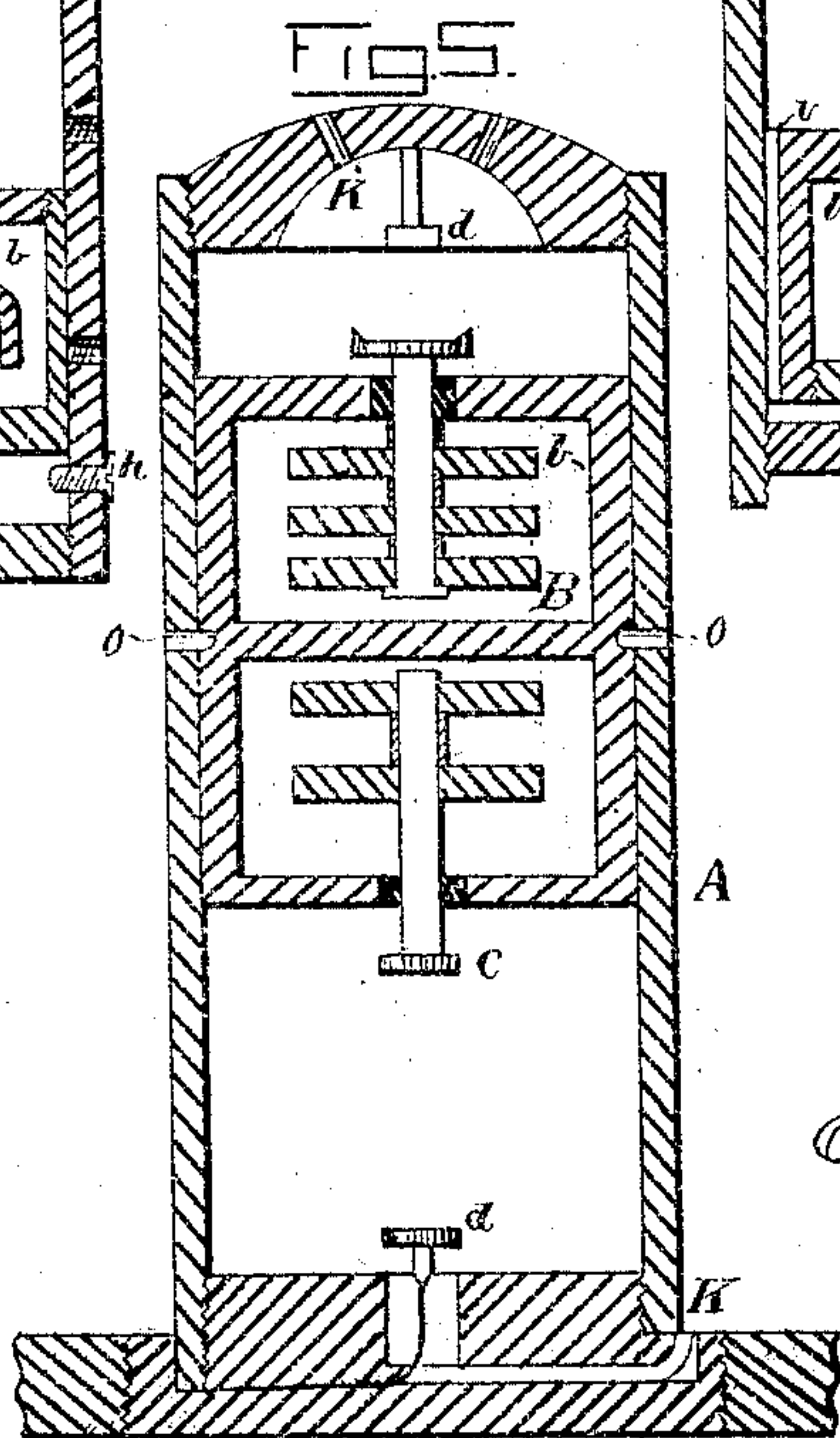
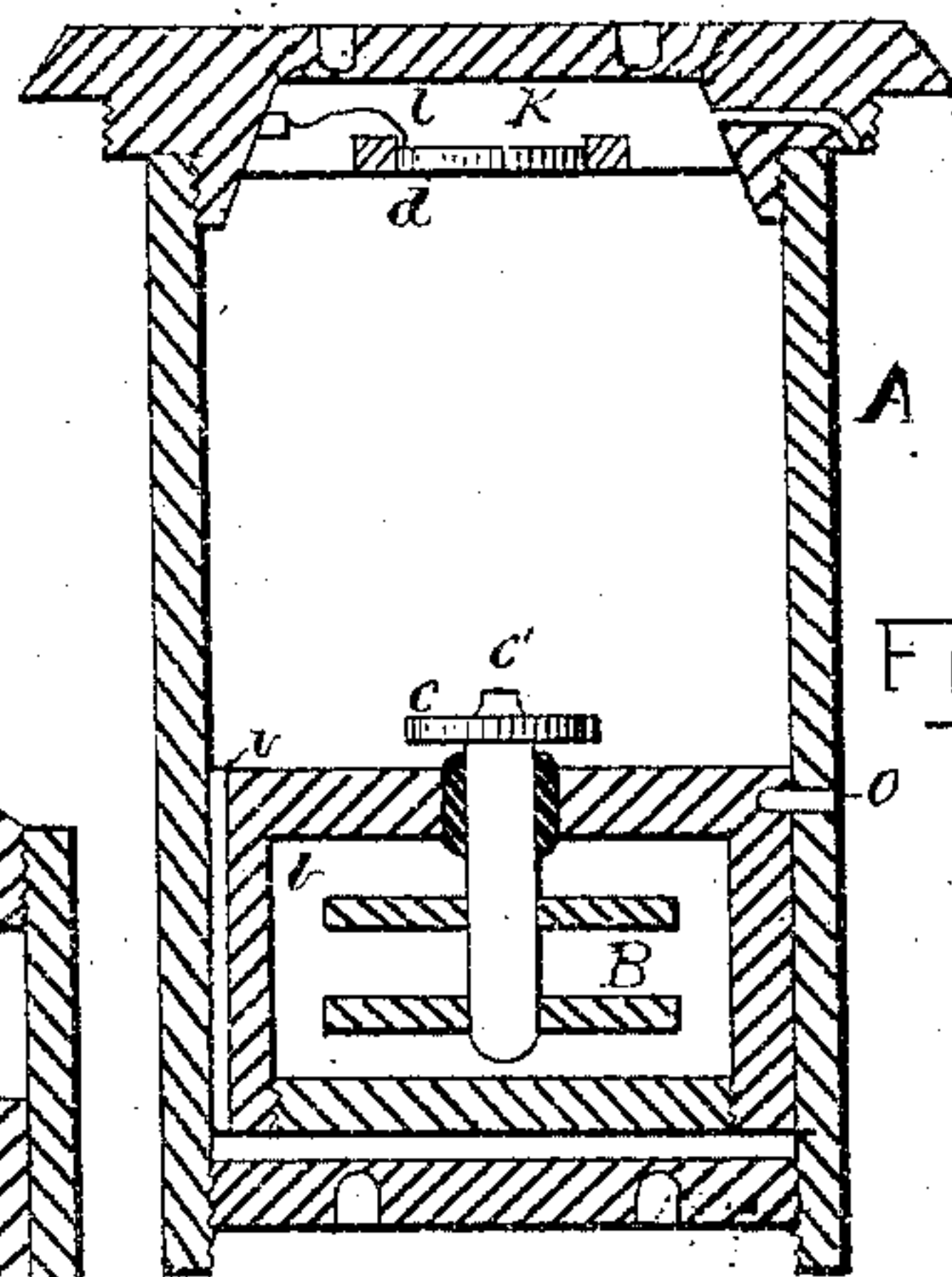
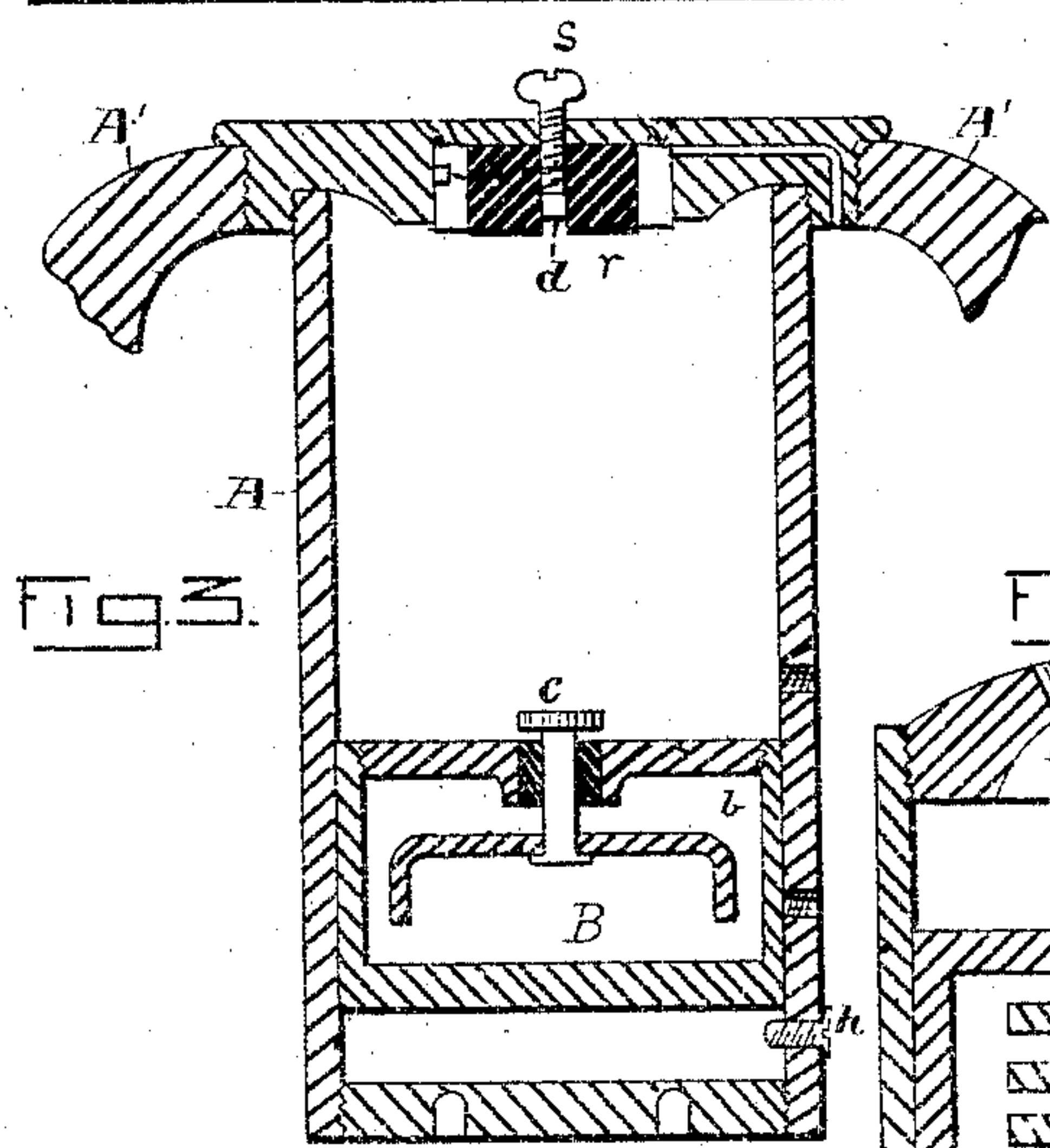
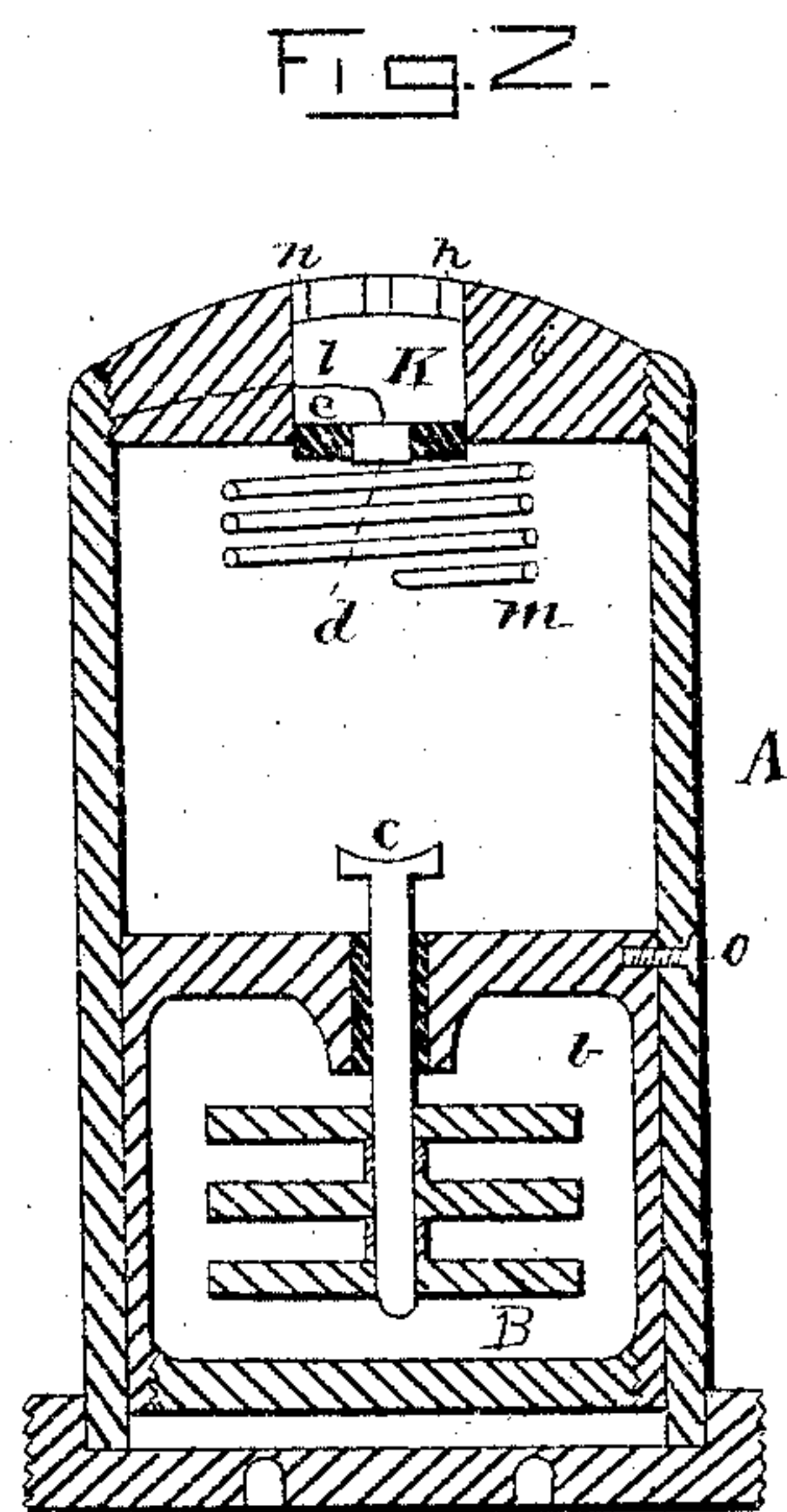
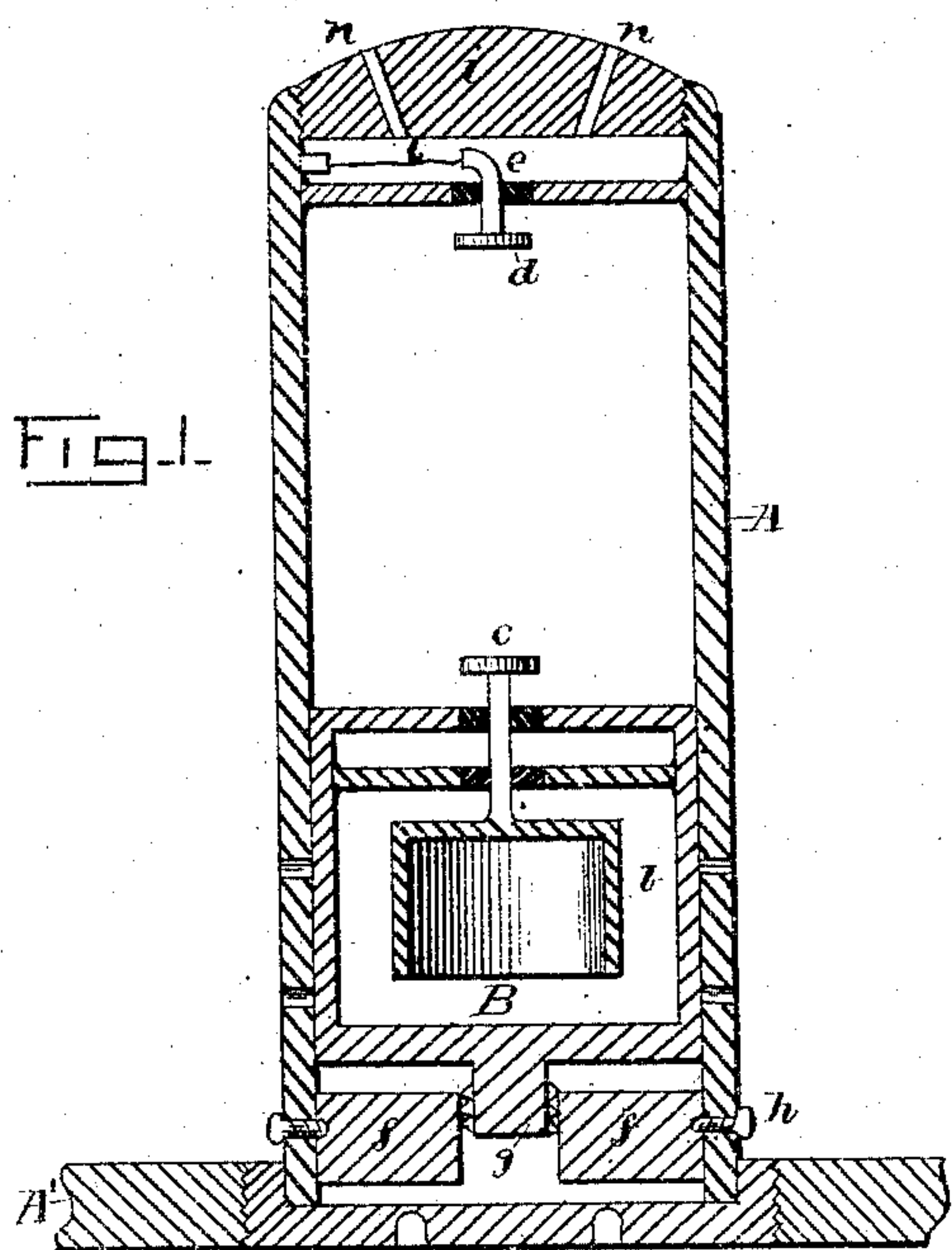


(No Model.)

E. L. ZALINSKI.
ELECTRIC SHELL FUSE.

No. 313,150.

Patented Mar. 3, 1885.



WITNESSES:

Storrs A. Clark,
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UNITED STATES PATENT OFFICE.

EDMUND L. ZALINSKI, OF UNITED STATES ARMY.

ELECTRIC SHELL-FUSE.

SPECIFICATION forming part of Letters Patent No. 313,150, dated March 3, 1885.

Application filed December 16, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDMUND L. ZALINSKI, of the United States Army, now on duty at Fort Hamilton, State of New York, have invented certain new and useful Improvements in Shell-Fuses, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to shell-fuses; and it consists in certain improvements whereby the fuse may be fired and the shell exploded by the closing of circuit of a contained electrical firing-battery, or by a simultaneous action of closing-circuit and a percussive action, thus increasing chances of successful ignition of the bursting charge.

The object of my invention is to make a fuse which may be attached to a shell, either in front or rear, or embedded in the explosive charge, which will act with certainty to fire the charge on contact with the target or at the expiration of any desired time after leaving the gun.

In the drawings, Figure 1 is a central longitudinal section of one form of shell-fuse and contained battery. Figs. 2, 3, and 4 are similar views showing modifications of certain details, as will be hereinafter explained. Fig. 5 represents an electrical time and percussion fuse.

A indicates the fuse tube or casing, of metal, any usual fuse-tube being adopted, and A' a portion of an explosive shell. Inclosed in the tube is a battery, B, the zinc element *b* forming the cell and being in contact with tube A, the other element being insulated therefrom, and having a projecting pole, *c*, with a suitable contact-plate. By the use of proper chemicals and materials well known in the electrician's art a small battery of great intensity may be thus made. The battery B, when permitted, slides easily in tube A, a groove, *v*, being made in one or the other to permit the passage of air, if found necessary, and thus avoid the retardation of movement by the intervening air-cushion. A contact-piece, *d*, which may be of platinum or other metal, is placed near the front end of tube A, and in the line of movement of the pole *c*. The piece *d* may be on the end of an insulated wire, *e*, which is electrically connected to the

casing through the fuse-wire bridge *l*, or may be otherwise connected by a metallic circuit with said casing. The sliding battery-cell B has a rearward extension, *g*, in Fig. 1, which has slight projections or serrations. These projections engage small teeth in the aperture in a leaden disk, *f*, which disk is secured, as by set-screws *h*, at such distance from the rear of the fuse-tube as will regulate the distance of travel of the sliding casing, and so in a measure determine the time of explosion (which occurs when plates *c* and *d* come together) after the contact of the shell with its target. While this difference in time of explosion after contact is very minute, it is yet sufficient to permit a penetration of several inches when a projectile is moving at a high velocity. This is to secure a degree of penetration into the latter before the explosion takes place. The impulse of firing the gun tears the projections *g* free from those in disk *f*, and carries the battery B as far as possible to the rear of the fuse-tube. On striking the target the battery B is thrown violently forward and circuit closed through *c d*, causing an incandescence or heating of the platinum, or a spark, according to the materials used, and thus igniting the fuse composition surrounding or in contact with the bridge-wire, and the flash passes through apertures *n*, as usual.

In Fig. 2 I have shown the contact-piece *d* in circuit with the metallic plug *i*, forming the front of the fuse-tube. The fulminate in this case may be in recess K, and a spiral spring, *m*, prevents closing of circuit on slight contact, as by dropping the fuse. The battery is held in place by a small lead wire or wooden pin, *o*, which breaks on firing the gun.

In Fig. 3 a rubber washer, *r*, surrounds the contact-piece *d*, and the piece *c* must compress this washer before it can close circuit with *d*. The piece *d* can be moved out or in by screw *s*, to prevent closing of circuit altogether, or to determine the contact force necessary to bring the parts *c d* into engagement. The screw *h* may be moved to determine length of movement of slide B, or to retain it in position of safety.

In Fig. 4 the part *c* is made with a point, *c'*, and the fulminate in aperture K will be ig-

nited by the percussive action of the battery B as a plunger, or by the electric circuit through the contact of parts *c d*. Of course it is immaterial whether the part *d* is an annulus or a plate, the location of point *c'* being varied according to circumstances.

To combine an electrical time-fuse with the percussion or contact fuse, the battery B may be a double cell made so that it will have a complete and distinct battery at each end. The tube A has at one end what is known as a "time-fuse," which may be set to explode the shell at any desired time. This contains also an electrical wire bridge similar to the one previously described. The battery B is forced backward, the circuit is closed, and the time-fuse is ignited when the gun is fired. Meanwhile, if the projectile strikes the target sooner than allowed for in the time-fuse, the battery B flies forward owing to its inertia, and thus the fuse is ignited and the shell is exploded, as previously explained. The same results for firing the time-fuse may be obtained by a single battery-cell and a suitable arrangement of wire, but the double form is preferred. The details of the arrangement of the time-fuse may be the same as ordinarily used.

Instead of the battery described, the plunger B' may be a form of battery known as a "secondary battery," with essentially the same device for causing the current to pass through the bridge-wire of the fuse.

It will be understood that the battery may be fixed and the contact-plate movable, thus reversing the position of the parts, without departing from the spirit of my invention.

I claim—

1. In combination with an explosive shell, a contained electric battery therein, and electrical connections from the same in contact with the fuse-charge.

2. In combination with the casing of a shell-tube, a contained electric battery therein, an electric circuit in contact with the fuse-charge, and a movable contact-piece which closes circuit when the projectile strikes the target, as set forth.

3. In a shell-fuse, the combination of percussion-striker and an electric battery, both contained in the shell, and arranged to explode the fuse-charge when the projectile strikes its target.

4. In a shell-fuse, a time-charge, and an electric battery contained in the shell, and arranged to close circuit and ignite the time-charge on the firing of the gun.

5. In a shell-fuse, the combination of a time-charge, a percussion-charge, and an electric battery contained in the shell, and arranged to close circuit through and ignite the exploding charges.

6. In an electrical shell-fuse wherein an electric battery is contained within the shell, the combination, with the movable pole of the battery, of adjustable mechanism, substantially as described, whereby the movement may be made greater or less, and the time of explosion after contact thus regulated.

7. In a shell-fuse, a contained battery therein, and an electric circuit some portion of which is in contact with the fuse-charge, and a safety device which holds the poles of the battery apart against slight shocks, as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDMUND L. ZALINSKI.

Witnesses:

S. D. SCHUYLER,
GEO. F. RILEY.