

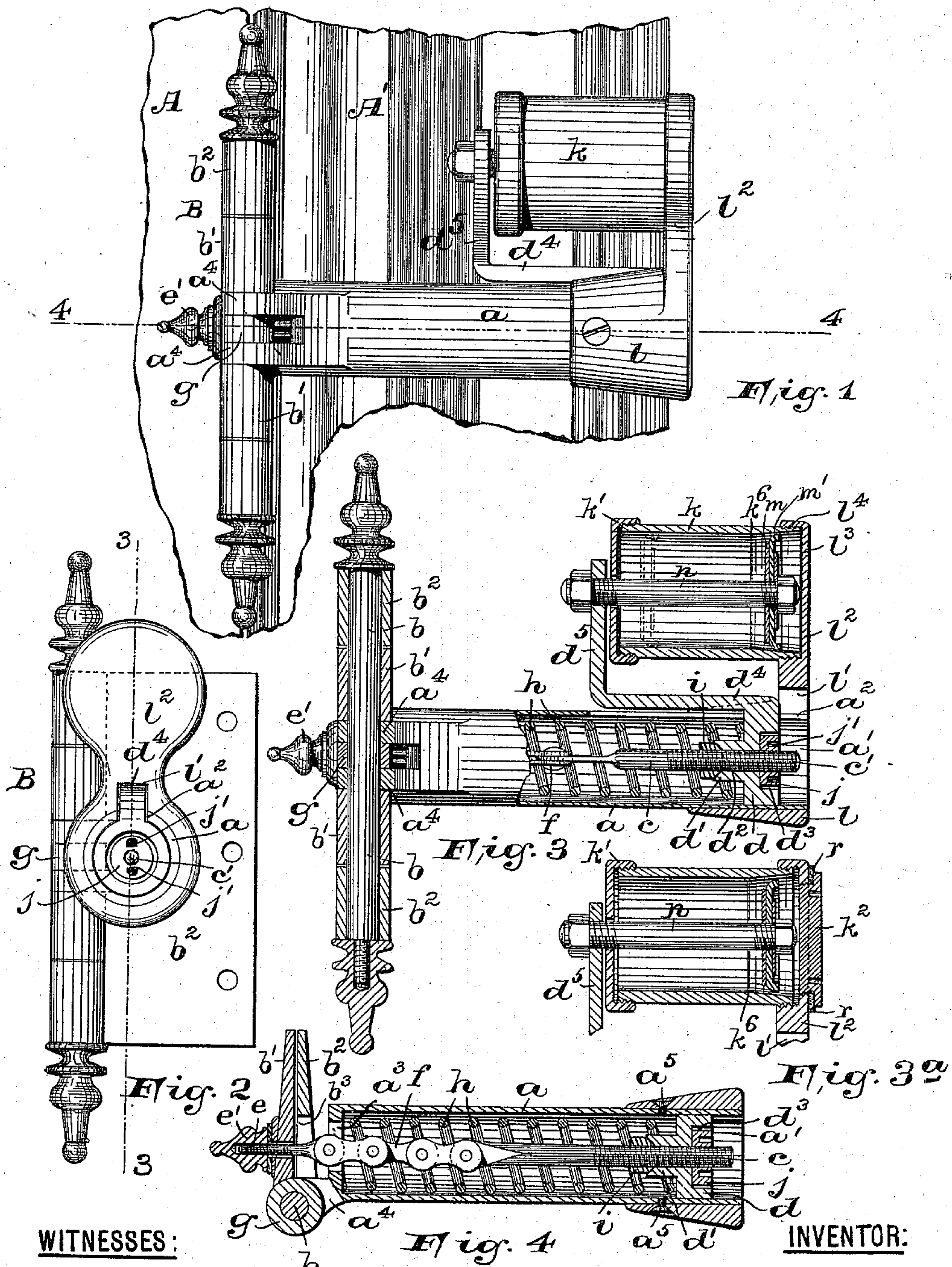
(No Model.)

2 Sheets—Sheet 1.

J. WOLF.  
DOOR CHECK.

No. 527,919.

Patented Oct. 23, 1894.



WITNESSES:

Wm. H. Campfield, Jr.  
G. Basil Hooper.

INVENTOR:

Josef Wolf,  
BY Fred C. Fraentzel, ATT'Y.



(No Model.)

2 Sheets—Sheet 2.

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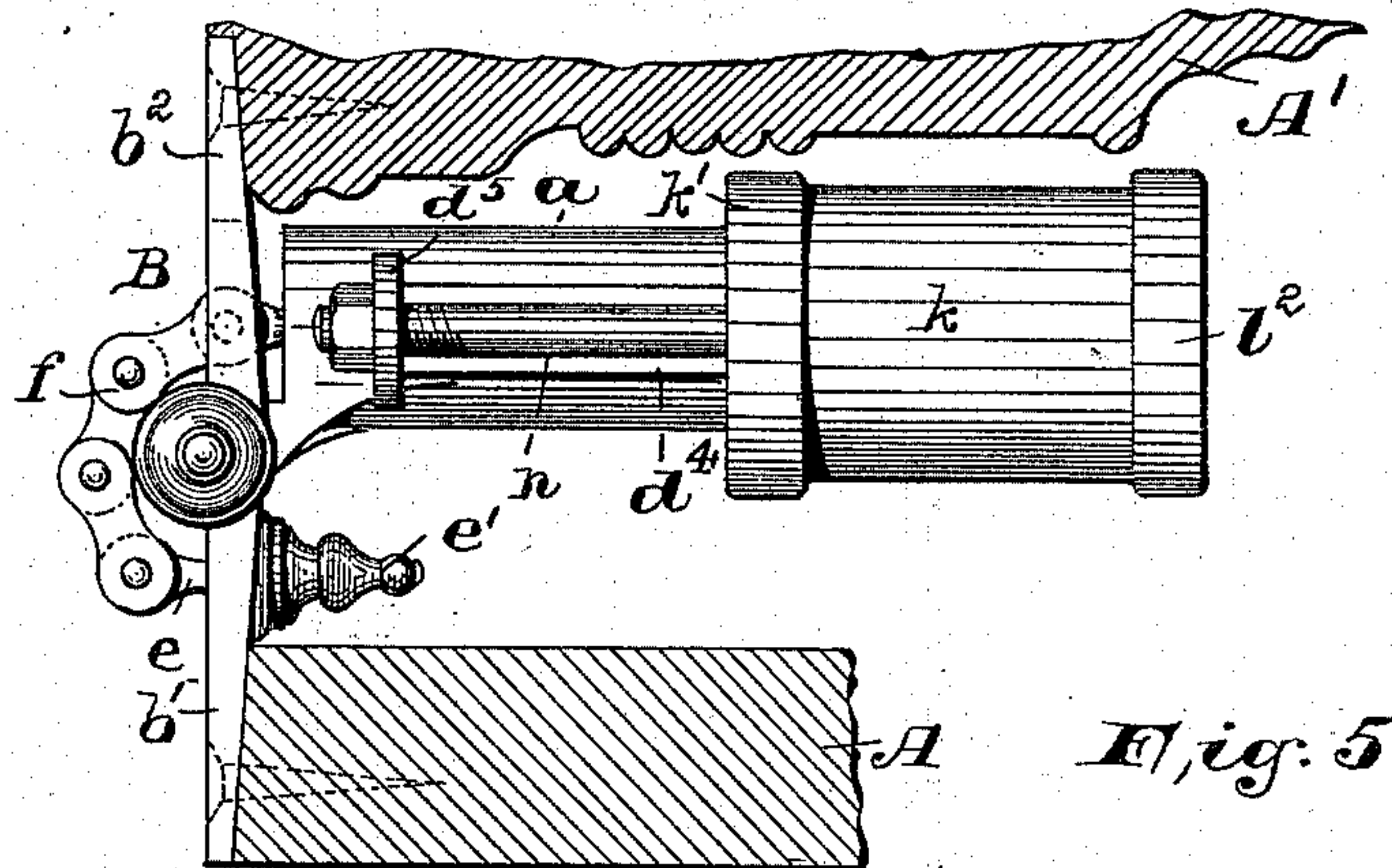


Fig. 5

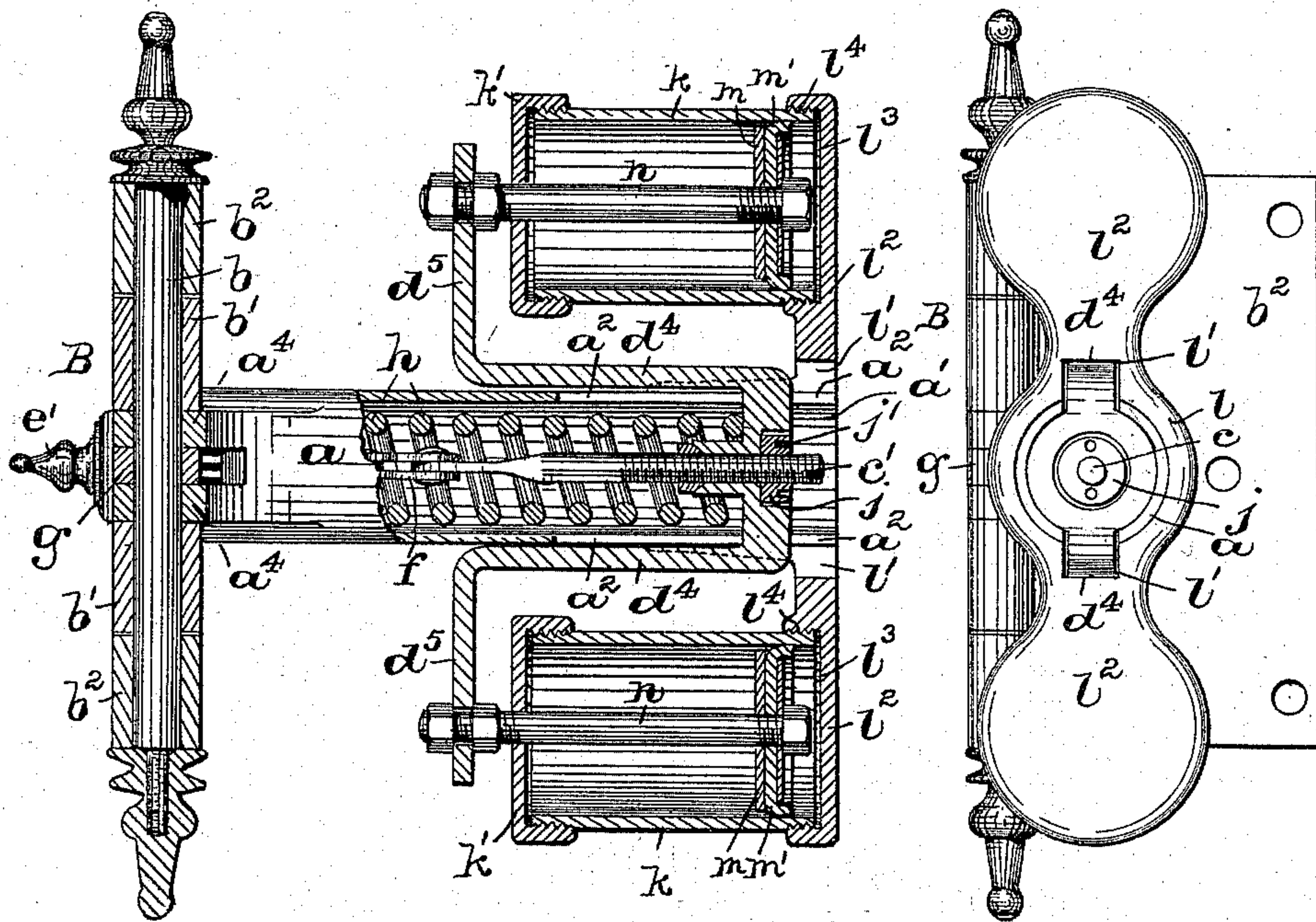


Fig. 6

Fig. 7

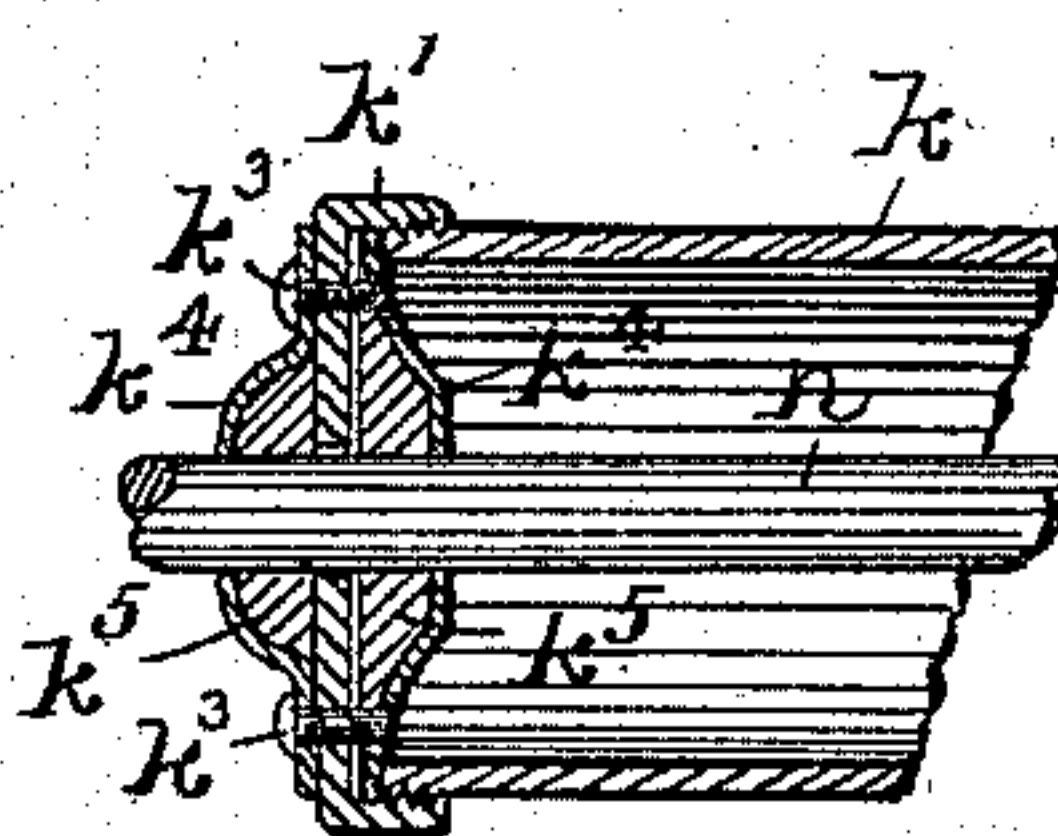


Fig. 8

WITNESSES:

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# UNITED STATES PATENT OFFICE.

JOSEF WOLF, OF NEWARK, NEW JERSEY.

## DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 527,919, dated October 23, 1894.

Application filed September 27, 1893. Serial No. 486,588. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEF WOLF, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Door-Checks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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.

My invention has reference to that class of devices used on doors and known as "door-checks," in which the resistance of a body of compressed air in an air-pump or cylinder is opposed to the tension of a spring arranged in a second cylinder, so that the slamming or noisy closing of the door is prevented; and the invention therefore has for its object to provide means whereby the noiseless closure of the door will be automatically effected.

My improved door-check consists essentially of a cylinder adapted to be secured to the door or door-frame, said cylinder being provided with a spring-actuated piston, operated by the opening of the door, an air-pump or cylinder arranged on said first-mentioned cylinder, and means connecting the plunger in said air-pump with said spring-actuated piston, whereby, when the door has been opened an air cushion is formed in said air-pump, by the interposition of which the slamming of the door is prevented while being closed by the action of the spring.

My invention consists therefore, broadly, in the improvement in the means of compressing the air, and in the means whereby the regulated closure of the door is obtained.

In the drawings herewith accompanying, Figure 1 is a front elevation of my improved form of door-check used in connection with an ordinary door hinge, illustrating broken portions of the door and door frame. Fig. 2 is an end view of the door-check. Fig. 3 is a longitudinal vertical section of the same taken on line 3—3, in Fig. 2. Fig. 3<sup>a</sup> is a detail view of the air pump, provided in the one end with a screw-threaded cylinder head of a slightly modified form of construction, and Fig. 4 is a horizontal section taken on

line 4—4, in Fig. 1. Fig. 5 is a top view of the door-check as connected with a door hinge, said view illustrating the positions of the several operating parts of the hinge when the door has been opened. Fig. 6 is a longitudinal vertical section of a door-check, in which the spring-actuated piston is connected with a pair of air-pumps, whereby the check is adapted for use on heavy doors. Fig. 7 is an end view of the same, and Fig. 8 is a detail view of one end of the pump, illustrating in section one arrangement of packing rings.

Similar letters of reference are used in the above described views to indicate corresponding parts.

In the above described views, *a* denotes a suitable cylinder which is open at the rear end *a'* and is provided in the top with a longitudinally arranged opening or slot *a*<sup>2</sup>, as will be clearly seen from Fig. 3. The opposite end of said cylinder is partially closed, being provided with an opening *a*<sup>3</sup> and the ears *a*<sup>4</sup>, by means of which said cylinder *a* can be pivotally arranged on the pivotal pin *b* of the door-hinge B. Within said cylinder *a* is a suitable piston rod *c* preferably provided with a screw end *c'* on which is screwed a suitable piston *d*. The forward end of said piston rod *d* is connected by means of a flexible connection, such as a suitable link-chain *f*, with a screw-threaded pin *e*, as will be seen from Fig. 4. Said pin *e* is screwed or passed through an opening in the hinge leaf *b'* of the hinge B and is screwed in a nut or acorn *e'* to said leaf, as will be understood. In the opposite hinge leaf *b*<sup>2</sup> is an opening *b*<sup>3</sup> into which said pin *e* extends, and through which said chain *f* passes and rolls itself upon a suitable roller *g* on the pin *b* when the door is opened, as will be understood from an inspection of Fig. 5. The hinge-leaves *b'* and *b*<sup>2</sup> of the hinge B, are secured to the door A and the door frame A' in the usual manner. Thus it will be seen, that the tension of a spring *h* encircling said piston-rod *c* and chain *f* and arranged between the closed end of the cylinder *a* and the inner surface of the piston *d*, will constantly force said cylinder *a* against the door-frame A' whether the door is open or closed.

The piston *d* may be of any suitable form but is preferably of the form illustrated in



the several figures of the drawings, being provided on its inner side with a collar  $d'$  having a centrally arranged hole  $d^2$  through which the screw-threaded end  $c'$  of the piston rod  $c$ , is passed. Said collar  $d'$  of said piston fits against an adjustable nut  $i$  on the screw-threaded portion of said piston rod  $c$ , said piston being firmly forced against said nut  $i$  and held in position on said piston rod  $c$  by means of a suitable nut  $j$ . Said nut may be of the usual form but is preferably a screw-threaded disk provided with suitable recesses  $j'$  for screwing the same upon the screw-threaded end  $c'$  of the piston-rod  $c$ , said disk fitting in a recessed portion  $d^3$ , in the piston, as shown in the several views of the drawings.

It will be evident that by changing the positions of the nuts  $i$  and  $j$  and hence that of the piston  $d$ , the tension of the spring  $h$  can be increased or decreased at will.

In order to prevent the slamming of the door while being closed by the sudden action of the spring  $h$ , I employ in connection with the cylinder  $a$ , an air-pump  $k$ .

Suitably secured to the open end  $a$  of the piston  $a$ , either by means of screws  $a^5$ , or in any other well-known manner, is a sleeve  $l$  having a slotted opening  $l'$  which is provided with an upwardly extending arm  $l^2$ . Said arm  $l^2$  may be provided with a recessed portion  $l^3$  formed by a screw-threaded annular flange  $l^4$ , into which the end of the air-pump or cylinder  $k$ , is screwed, as will be seen from Fig. 3. The end of said cylinder may be secured in said recessed portion  $l^3$  in any other well known manner, or, in a screw-threaded opening in said arm  $l^2$  may be screwed a cylinder head  $k^2$ , a suitable washer or packing ring  $r$  being arranged between the flange on said cylinder head and the edge of said cylinder  $k$ , as will be seen from Fig. 3<sup>a</sup>. Secured to the opposite end of said pump or cylinder  $k$  in any convenient manner is a cylinder head  $k'$ , and within said cylinder is a suitable pump plunger  $m$  having a packing ring  $m'$  made of leather, rubber or any other suitable material. The plunger rod  $n$  is suitably connected with said plunger  $m$ , and projects from an opening in the cylinder head  $k'$ , being connected in any convenient manner, either as in Fig. 3, or as in Fig. 6, to an upright  $d^5$  on an arm  $d^4$  connected with the piston  $d$  in the cylinder  $a$ , as will be clearly seen from Fig. 3.

The operation of the device is as follows:—  
The parts, after having been properly adjusted by the workman, and having been connected with the hinge leaves  $b'$  and  $b^2$ , can then be secured to the door and door-frame. When the door is being opened, the hinge leaf  $b'$  causes the chain  $f$  to adjust itself around the roller  $g$  and by its action upon the piston rod  $c$  draws the piston  $d$  farther into the cylinder  $a$  and compresses the spring  $h$ . At the same time the arm  $d^4$  and its post  $d^5$ , having moved forwardly in the slot  $a^2$  in the cylinder  $a$ , causes the pump plunger  $m$  to move to a position in the forward end of the

pump or cylinder  $k$ . The packing ring  $m'$  of the plunger  $m$  is arranged in such a manner, that the air in the forward end of the cylinder  $k$ , can pass around the circumferential edge of said packing ring, to the other side of the plunger, and when the door is suddenly allowed to close, the spring  $h$  will quickly return the door to its nearly closed position, but by the interposition of the air cushion formed on the one side of the plunger  $m$  and the inner side of the recessed portion  $l^3$  of the arm  $l^2$ , the closing movement of the door is suddenly checked, and while the air slowly escapes between the screw-threaded portions  $l^4$  of the arm  $l^2$  and that of the cylinder  $k$ , the door also slowly closes and without slamming. At the same time, the greater part of the compressed air will also be gradually forced to the opposite side of the piston, which is due to the flexibility of the thin packing ring  $m'$  and to the fact that its surrounding edge does not closely hug the inner surface of the cylinder.

In order to overcome the difficulty of the door closing too slowly, or not entering into its entirely closed position in the door frame, caused by the interposition of the air cushion formed between the returning piston  $m$  and the cylinder head  $k^2$  or arm  $l^2$ , at a point  $k^6$  within the cylinder  $k$ , the bore of said cylinder may be increased, as indicated in Figs. 3 and 3<sup>a</sup>. By this arrangement and construction, as will be evident, the door is caused to return very quickly until the plunger or piston  $m$  has nearly reached said point  $k^6$ , when the air cushion formed in front of the plunger retards the closing action of the door; but as soon as the plunger has passed said point  $k^6$ , then the air in front of the plunger  $m$  immediately rushes to the other side thereof, which allows the spring  $h$  to act with its full force upon the hinge leaf  $b'$ . The door, by this time, has nearly reached its closing position in front of the door frame, and the sudden impact caused upon the door by the free action of the spring  $h$ , closes the door quickly and the parts of the lock on the door and door frame will enter into their holding engagement with but very little noise.

For particularly heavy doors, I may use two pumps  $k$ , as shown in Figs. 6 and 7, the pump plungers of which are connected with the piston  $d$  in the cylinder  $a$ , by a pair of arms  $d^4$  and posts  $d^5$  connected with the plunger rods  $m$  in the upper and lower cylinders  $k$ , as will be understood from Fig. 6. In this form of construction, the cylinder  $a$  is provided with an upper and lower opening or slot  $a^2$  in which said arms  $d^4$  are adapted to move, but otherwise the general construction is the same as that illustrated in connection with Fig. 3.

The cylinder or cylinders  $k$  are usually provided with the form of cylinder-head  $k'$  illustrated in said Figs. 3 and 6, but I may secure to said cylinder head by means of suitable screws or pins  $k^3$ , on the inner or outer surface of said cylinder head, suitably bent



plates  $k^4$ , between which I arrange a packing  $k^5$ , such as leather, rubber or other suitable material, as is clearly illustrated in Fig. 8.

By this form of door-check I have devised a simple and operative device which admirably answers the purposes of closing a door without slamming.

Of course it will be evident that modifications within the limits of the invention may be made without departing from the spirit of the same. I do not therefore wish to be confined to the precise forms of construction herein shown and described.

Another great advantage is, that the form of door-check hereinabove described, answers two purposes; that of a door-check, as well as that of an ordinary door hinge. Owing to the arrangement of the spring-barrel on the pivotal pin  $b$  of the hinge, the spring and checking devices connected therewith can be removed from the pin at any time. All that is necessary is to draw out the pin  $b$ , disconnect the flexible connection from the hinge-leaf  $b'$ , remove the cylinder or spring-barrel, replace the pin  $b$ , and the hinge is complete to serve its ordinary purpose. Furthermore, after such removal of the checking device, there will be no screw holes left to mar the face of the door or door frame.

Having thus described my invention, what I claim is—

1. The door-check, consisting of a cylinder, a spring-actuated piston therein, an air-pump or cylinder arranged on and connected with said cylinder, a plunger and rod in said air-pump, and operative means connecting said plunger rod with said spring-actuated piston, substantially as and for the purposes set forth.

2. The door-check, comprising therein a cylinder having a longitudinal opening or slot in said cylinder, a spring-actuated piston in said cylinder, an air-pump or cylinder arranged on and connected with said cylinder, a plunger and rod in said air-pump, and operative means connecting said plunger rod

with said spring-actuated piston, said means being adapted to slide in said opening or slot in said cylinder, and consisting substantially of an arm  $d^4$  connected with said piston, provided with a post  $d^5$  adapted to be connected with said plunger rod in said air-pump, substantially as and for the purposes set forth.

3. In a door-check, the combination, of a hinge, consisting essentially of two hinge-leaves  $b'$  and  $b^2$  and a removable pin  $b$ , with a spring-barrel and checking devices connected therewith, said spring-barrel being pivotally and removably connected with said hinge, substantially as and for the purposes set forth.

4. A door check, comprising therein, a hinge, consisting essentially of two hinge-leaves  $b'$  and  $b^2$  and a pin  $b$ , a cylinder  $a$  provided with ears  $a^4$  for pivotally arranging said cylinder on said pin  $b$ , a spring-actuated piston and piston rod in said cylinder, and a flexible connection connected with one of said hinge-leaves and with the free end of said piston rod, substantially as and for the purposes set forth.

5. A door check, comprising therein, a hinge, consisting essentially of two hinge-leaves  $b'$  and  $b^2$  and a pin  $b$ , a cylinder  $a$  provided with ears  $a^4$  for pivotally arranging said cylinder on said pin  $b$ , a spring-actuated piston and piston rod in said cylinder, a roller or wheel  $g$  on said pin  $b$  between said ears  $a^4$ , and a flexible connection connected with one of said hinge-leaves and with the free end of said piston rod, and said flexible connection passing over said roller or wheel, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 25th day of September, 1893.

JOSEF WOLF.

Witnesses:

FREDK. C. FRAENTZEL,  
WM. H. CAMFIELD, Jr.