

H. KNAPP.
DOOR CHECK AND CLOSER.
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966,926.

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Fig. 1.

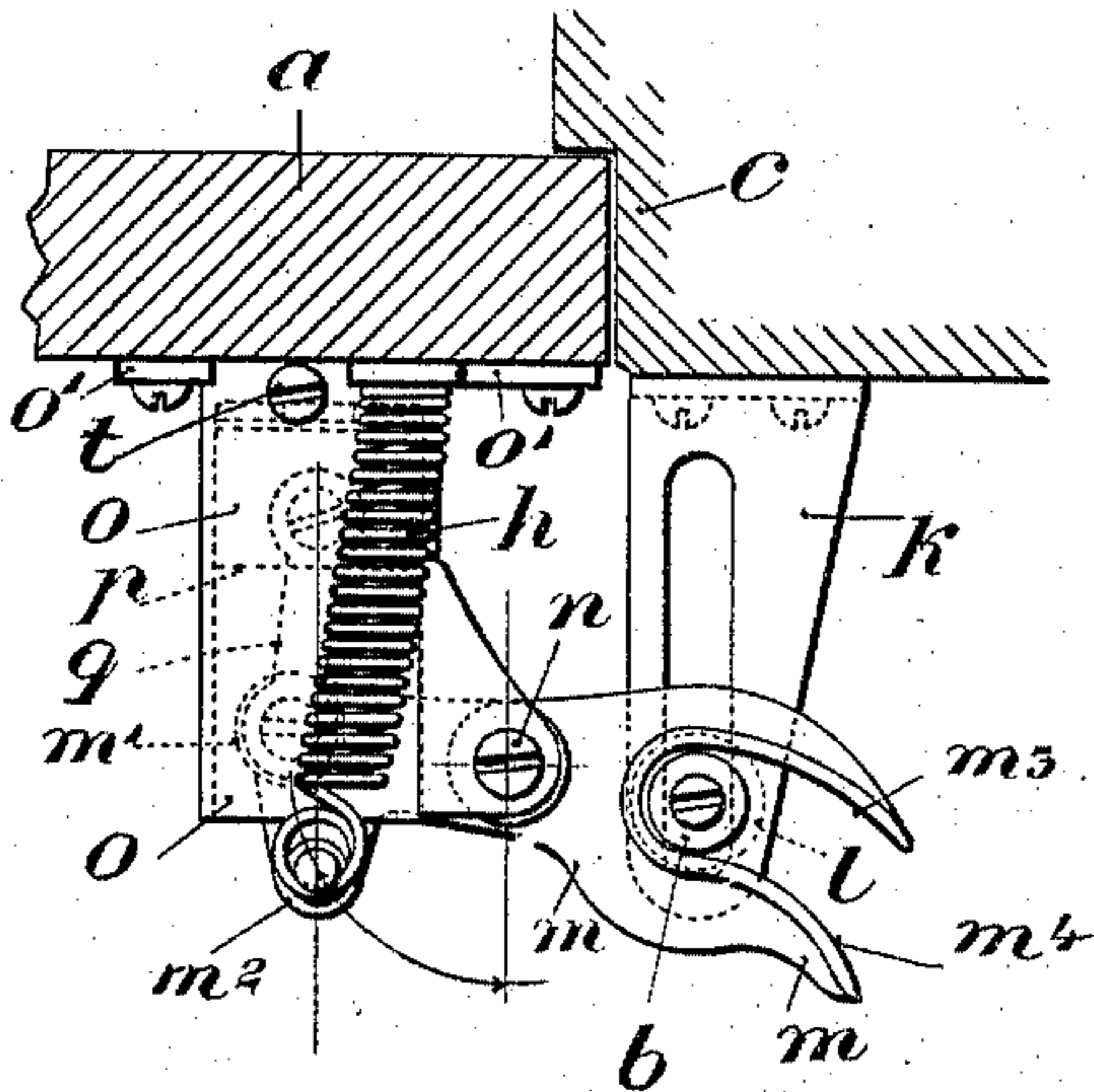


Fig. 2.

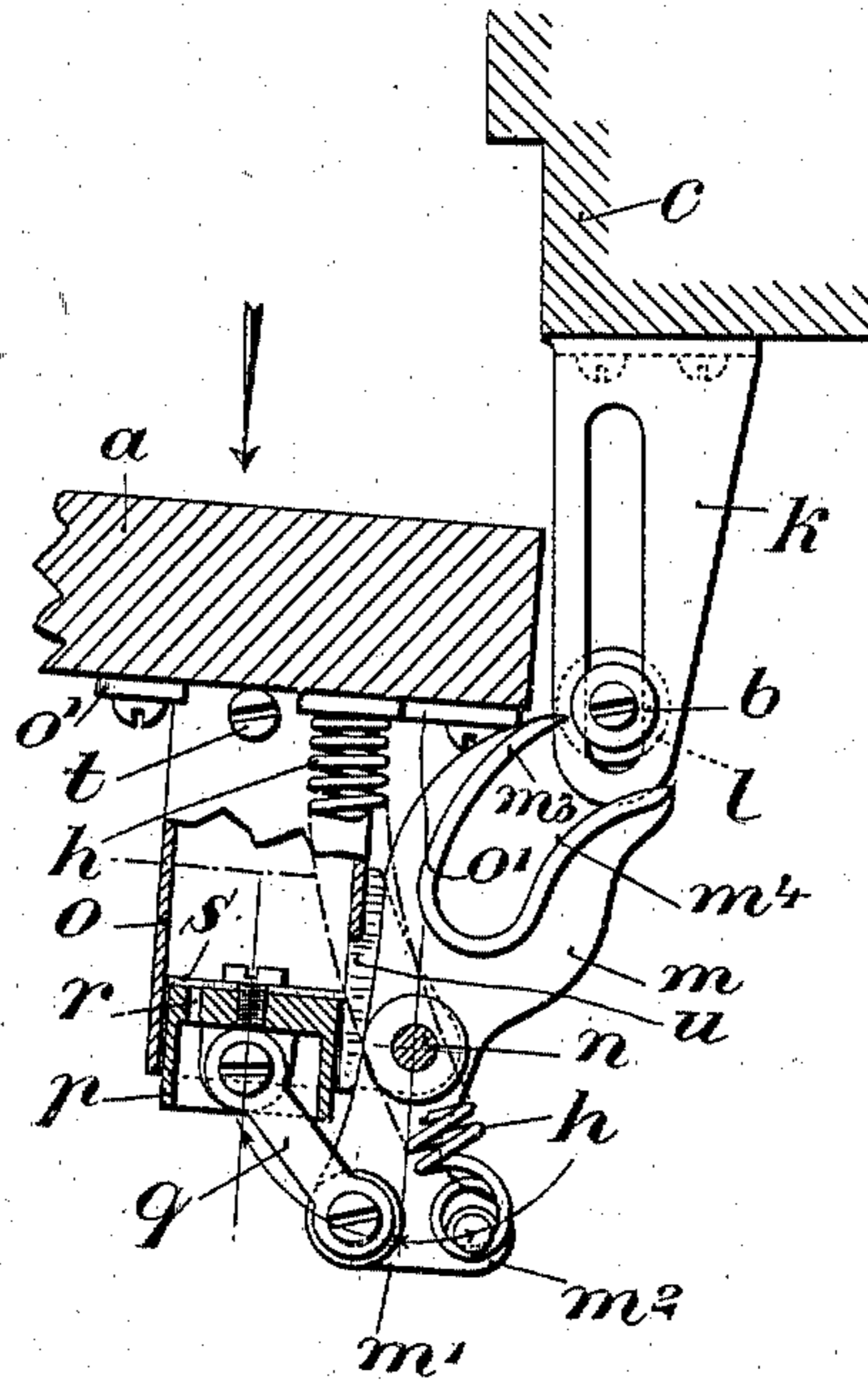


Fig. 3.

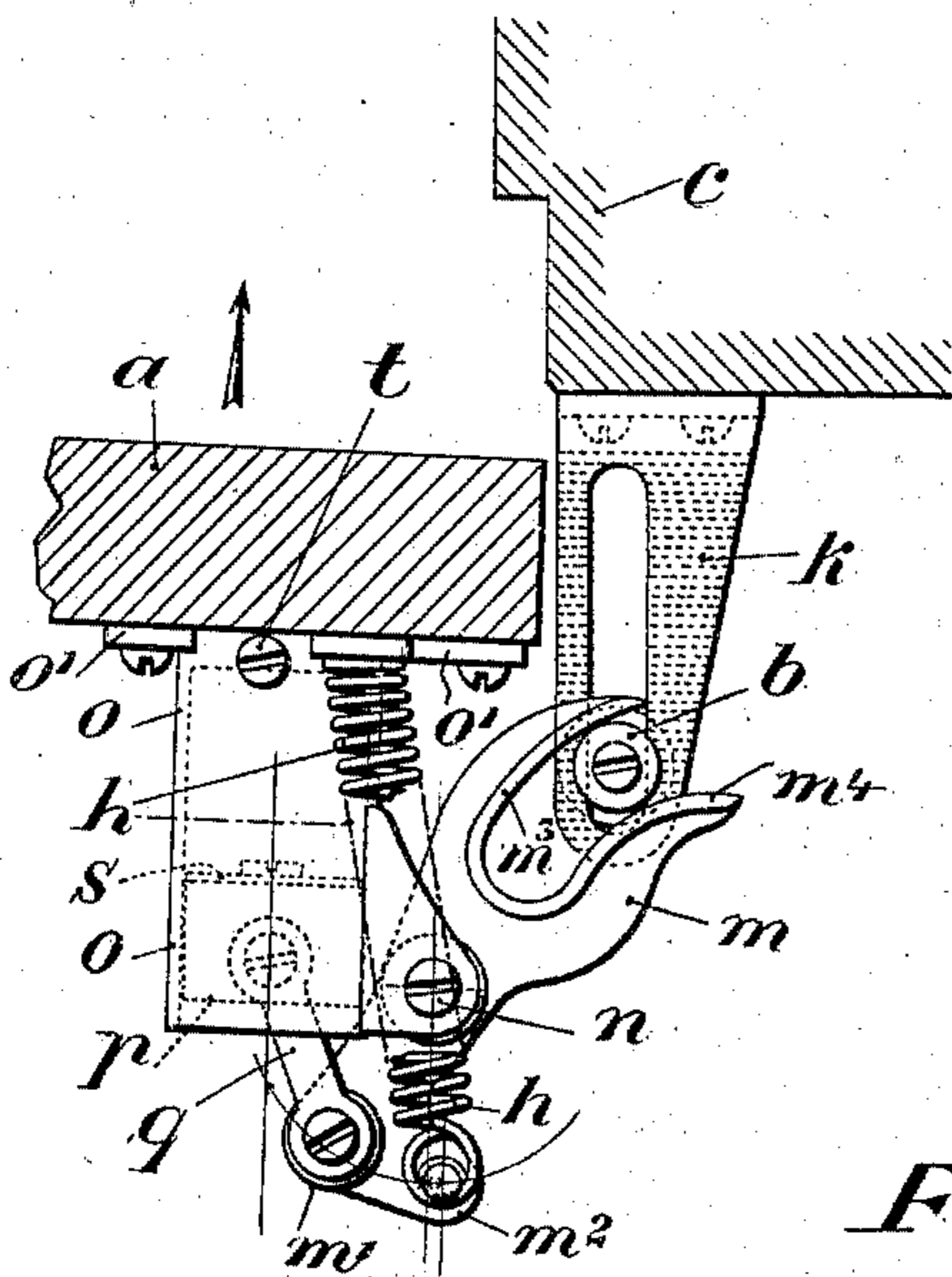


Fig. 4.

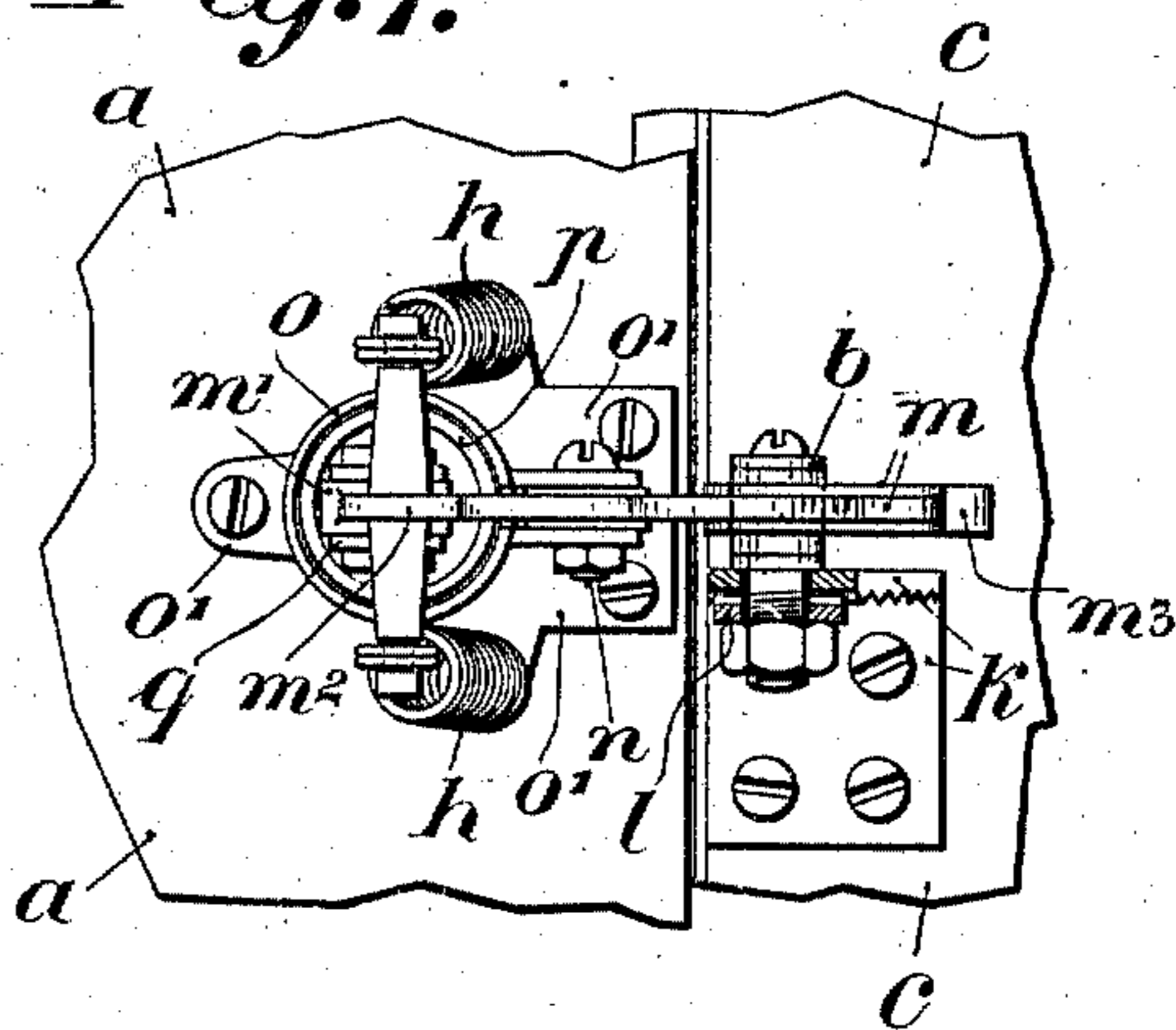


Fig. 5.



Witnesses

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DOOR CHECK AND CLOSER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HEINRICH KNAPP, engineer, a subject of the German Emperor, residing at Weimar, Grand Duchy of Saxe-Weimar-Eisenach, Germany, have invented certain new and useful Improvements in Door Checks and Closers, of which the following is a specification.

This invention relates to improvements in door checks and closers and has for its object to provide a device which embodies means for efficiently producing the closing of a door and which is in coaction with a means for braking the last stage of the closing movement of the door, in order that the latter may assume its closed position with a certain and yet retarded action.

An embodiment of the invention is illustrated in the accompanying drawings wherein—

Figure 1 is a plan view showing the door in closed position and the relation of the parts subsequent to their operation; Fig. 2 is a sectional plan view showing the door ajar and the relation of the parts prior to their operation; Fig. 3 is a plan view showing the relation of the parts at the inception of their operation and during the last stage of the closing movement of the door; Fig. 4 is an end elevation, the parts being shown as in the relation of Fig. 1; and Fig. 5 is a sectional detail.

Similar characters of reference designate corresponding parts throughout the several views.

The door as *a* has its closed position with relation to a jamb or frame, as *c*, and the arrangement which forms the subject matter of the present invention is active only during the final stage of the closing movement of the door. Said arrangement embodies, *inter alia*, a bracket, as *k*, which, as shown, is attached to the jamb or frame *c*, an arm, as *m*, which, as shown, is carried by the door, and a pair of springs, as *h*, which govern the action of the arm *m*. It may be stated that while the bracket *k*, as shown, is attached to the jamb or frame *c*, and the arm *m*, as shown, is carried by the door *a*, the positions of these parts and the adjuncts associated with each, may be interchanged, when demanded by convenience; that is to say, the bracket *k* may be carried by the door *a* and the arm *m*, and its adjuncts may be carried by the jamb *c*.

The bracket *k* is formed with a longitudi-

nal slot, in which is mounted for adjustment a pin carrying at its upper end a roller *b* and carrying at its lower end a suitable fixing device which includes a nut and a washer, as *l*, which is held by the nut in engagement with the milled or otherwise roughened under face of the bracket *k*, as shown in Fig. 4.

The arm *m* is pivoted between its ends, as at *n*, to a part of a bracket *o*, which is provided with attachment flanges *o'*, through which fastening screws pass to secure said bracket to the door. The outer end portion of the arm *m* is formed with an arcuate recess, the curved faces of which are indicated by the characters *m*³ and *m*⁴ and have coaction with the roller *b* in a manner to be hereinafter set forth. The springs *h* aforesaid are connected to an extension *m*² provided at the rear end of the arm *m* and to the adjacent attachment flanges *o'* aforesaid. The action of this part of the apparatus is as follows: When the door is in its closed position, as shown in Fig. 1, the springs *h*, which are preferably of the retractile coil type, hold the arm *m* in a position wherein its recessed end portion projects laterally from the bracket *o*, in which position the roller *b* is at the inner end of the recess. When the door is opened, the roller *b* acts on the curved face *m*³ aforesaid and thus produces the movement of the arm *m* continuously with the movement of the door through an initial stage, to a position almost parallel to the bracket *o*, abutting the edge of the door and wherein the springs *h* are just beyond their lines of dead center, as shown in Fig. 2. When the arm *m* has been moved into this position its recessed end clears the roller *b* and allows of the further unretarded opening movement of the door, during which further movement the device is "cocked" or set by reason of the preliminary action just described. When, however, the door is closed, the greater portion of its closing movement is unretarded, the device being inactive except during the last stage of the closing movement. At this time the curved face *m*⁴ comes into engagement with the roller *b*, as shown in Fig. 3, and as a consequence of such engagement, the arm *m* is moved from the position of Fig. 3, back to the position of Fig. 1. The roller *b* is efficient in effecting such movement of the arm *m* as will throw the springs *h* beyond their lines of dead center and thereafter the springs, acting on the arm *m*

and through the intermediary of said arm and the roller *b*, complete the movement of the door to the closed position, as will be obvious.

5 The bracket *o* to which reference has been made, is in the form of a cylinder which projects horizontally from the door and in which a piston *p* is slidable, this piston being connected by a link, as *q*, with the inner
10 end of the arm *m*, as at *m'*, and having a vent opening *r* which, during the inward movement of the piston, is closed by the flap valve *s*, the latter incidentally serving as a packing. To prevent the trapping of air at
15 the inner end of the cylinder *o*, the latter is formed with an air escape opening, the efficient size of which may be regulated by a screw *t*.

The cylinder *o* is formed at one side thereof with a longitudinal slot, as *u* which serves
20 the two-fold purpose of providing for the admission of air and of receiving the inner end portion of the arm *m* when the latter occupies the position of Fig. 1. The action
25 of this part of the apparatus is as follows: When the arm *m* is moved from the position of Fig. 1 to the position of Fig. 2, in the manner explained, the piston *p* is consequently moved to the outer end of the cylinder
30 *o* and during such outward movement of the piston *p*, air is admitted into the cylinder in the rear of said piston through the opening *r* as well as through the slot *u*. When, however, the arm *m* is moved from
35 the position of Fig. 3 to the position of Fig. 1, the piston *p* will be forced inwardly as is obvious. The slot *u* is of such a length that during the initial stage of the inward movement of the piston *p* and while the springs *h*
40 are being shifted to a position at one side of their dead centers, air may be vented from the cylinder through said slot and consequently no cushion will be formed at this time which will resist the initial action of
45 the parts or will interfere with or retard the movement of the springs beyond their lines of dead center. When, however, the springs are shifted beyond their lines of dead center so that they can automatically act to complete the closing of the door, in the manner
50 above explained, and to consequently complete the inward movement of the piston *p* a cushion is formed which efficiently retards

the action of the parts and which consequently retards the last stage of the closing
55 movement of the door without interfering with the certainty of such closing movement. This effect of the cushion in retarding the closing movement of the door is had by reason of the fact that the pressure of air in
60 the rear of the piston and which provides for the cushion aforesaid, is being constantly and gradually diminished by the escape of the air through the vent opening at the rear end of the piston and which is
65 regulated by the screw *t*.

Having fully described my invention, I claim:

1. In a door closer and check, a projection carried by the door frame, a bracket carried
70 by the door and formed with a cylinder, an arm pivoted between its ends to the bracket and having its outer end portion formed with an arcuate recess for coöperation with the projection, a spring having an
75 end connected to the inner end of the arm and having an end connected to the door, a piston movable axially of the cylinder, a link connecting the piston and the inner end of the arm, and means for venting air from
80 the cylinder during the inward movement of the piston.

2. In a door closer and check, a projection carried by the door frame, a bracket carried
85 by the door and formed with a cylinder, the latter having a vent opening at its inner end and having a longitudinal slot adjacent its outer end, an arm pivoted between its ends to the bracket, and having its outer end portion formed with an arcuate recess for co-
90 operation with the projection, the inner end portion of the arm working through the slot, a retractile coil spring having an end connected to the door and an end connected to the inner end of the arm, a piston movable
95 axially of the cylinder and having an air admission opening and a flap valve closure therefor, and a link connecting the piston and the inner end of the arm.

In testimony whereof I have hereunto set
100 my hand in presence of two subscribing witnesses.

HEINRICH KNAPP.

Witnesses:

ERNST EBERHARDT,
BERTICE B. BUSSE.