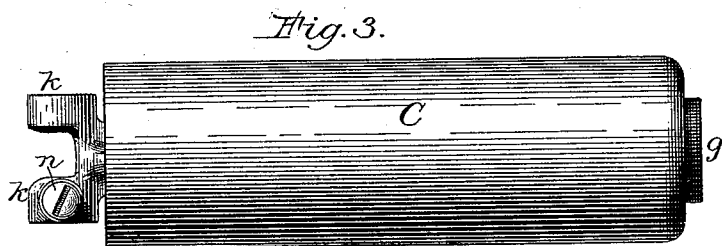
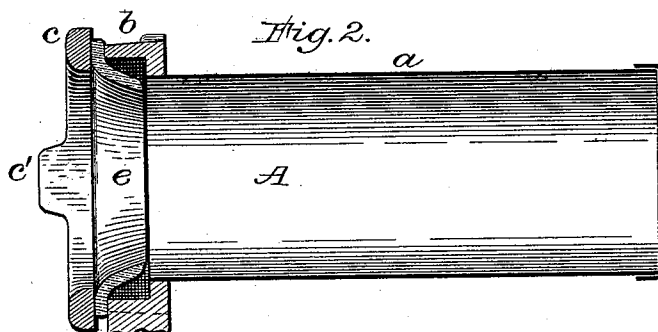
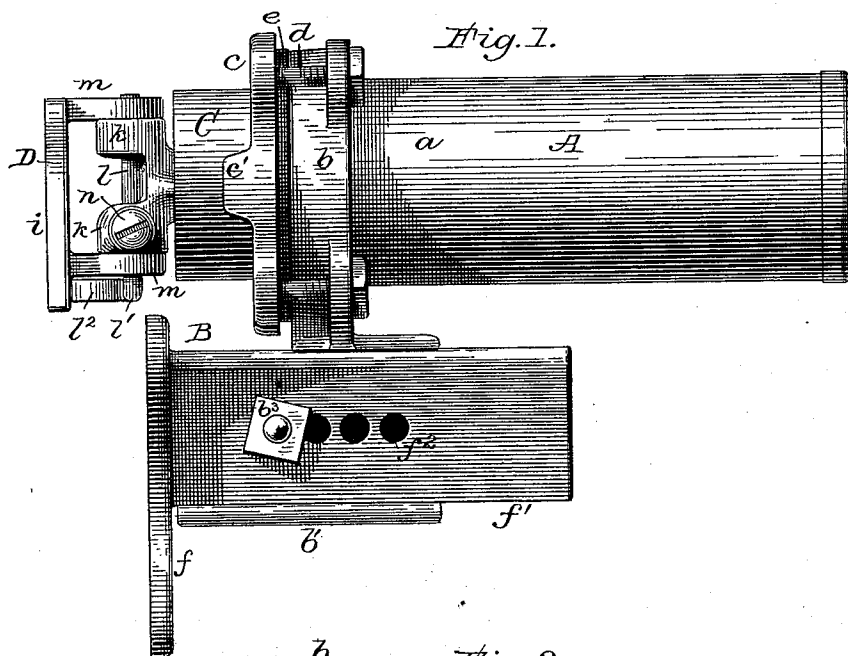


4 Sheets—Sheet 1.

No. 521,182.

Patented June 12, 1894.



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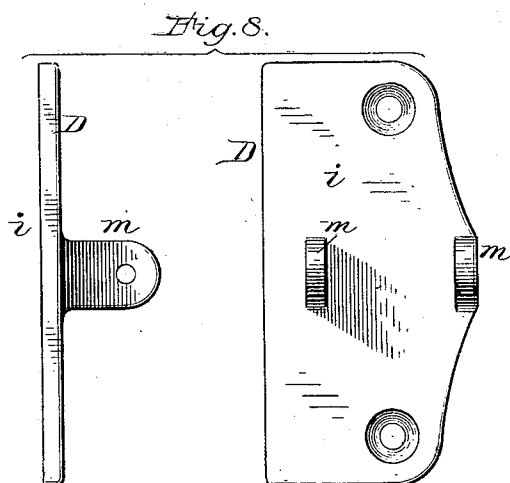
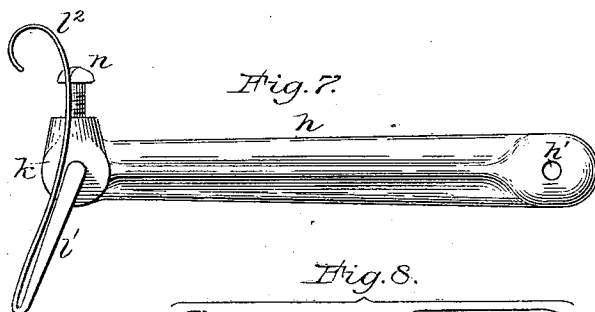
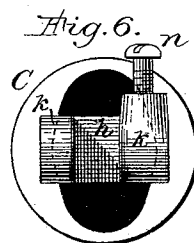
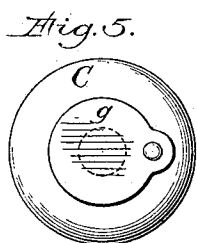
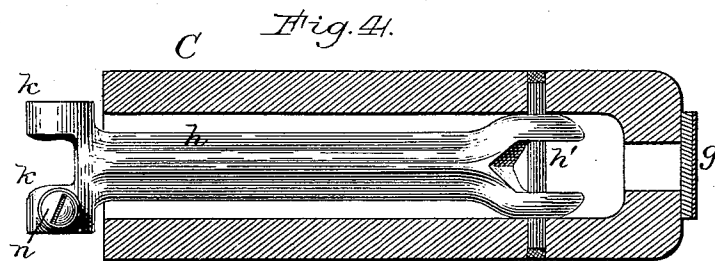
(No Model.)

4 Sheets—Sheet 2.

J. W. RING.
PNEUMATIC DOOR CHECK.

No. 521,182.

Patented June 12, 1894.



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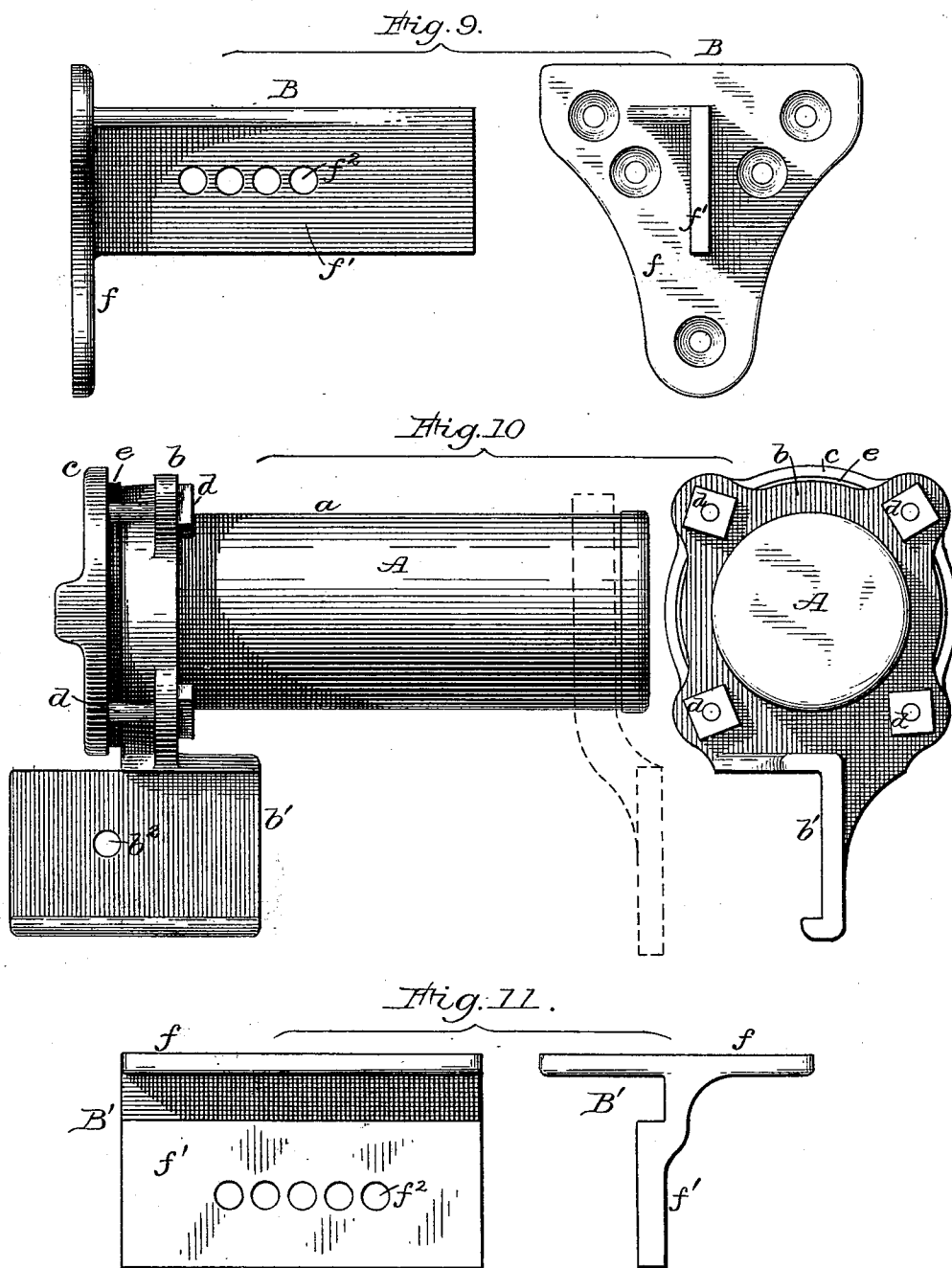
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4 Sheets—Sheet 3.

J. W. RING.
PNEUMATIC DOOR CHECK.

No. 521,182.

Patented June 12, 1894.



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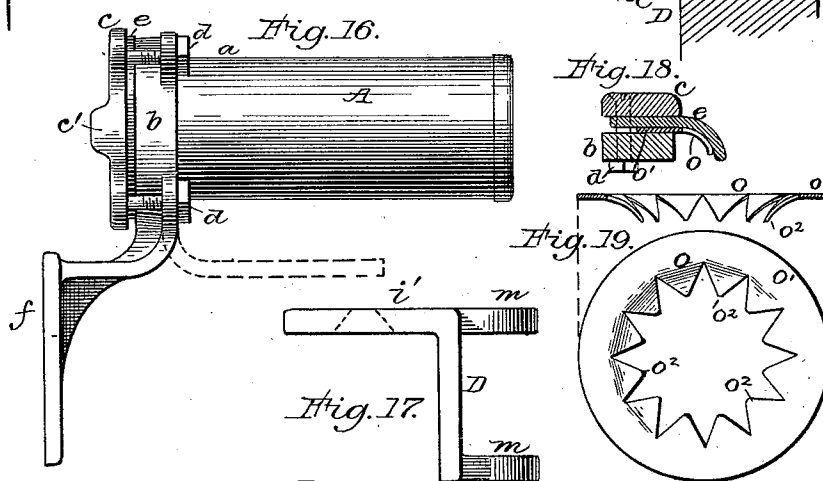
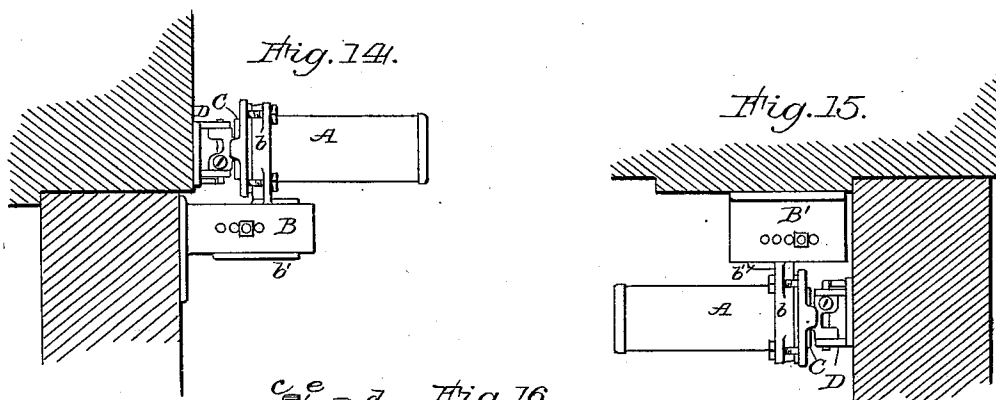
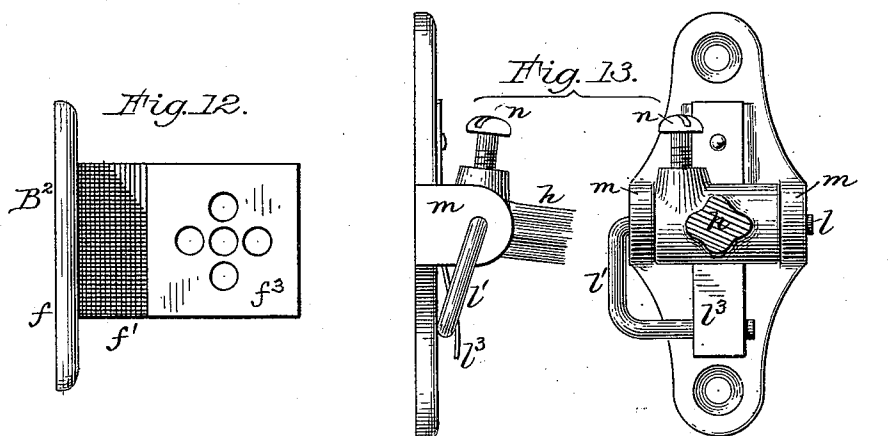
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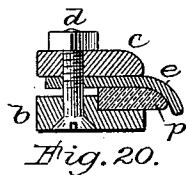
J. W. RING.
PNEUMATIC DOOR CHECK.

No. 521,182.

Patented June 12, 1894.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 521,182, dated June 12, 1894.

Application filed April 23, 1888. Serial No. 271,559. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. RING, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic Door-Checks; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of the several features of my invention.

In my Letters Patent No. 350,560, dated October 12, 1886, I disclosed certain improvements, some of which are applicable only to that variety of complex door checks which involve the use of toggle levers or other forms of pivotal connections; but other portions of my said improvements are equally applicable to that other simple variety of door checks in the operation of which there is a complete separation of the air cushioning devices, as was disclosed in United States Patent to Wetmore, No. 142,540, dated September 2, 1873, and it is to this latter class of door checks that my present improvements pertain. The characteristic feature in a pneumatic door check of either of said classes, embodying the main portion of my said patented invention, is an air tight joint or packing point which is fixed and unvariable during the operation of the door check, and this fixed packing point is obtained by the use of a plunger, which though it serves as a piston has preferably no packing thereon, and needs none, because it co-operates with an air chamber having packing at its open end or mouth for securing air tight relations with the plunger. All air cushioned door checks prior to my said invention involved the use of pistons provided with packing, and hence their air cylinders of necessity were in all cases true cylinders, having an interior surface well finished and concentric throughout for enabling the piston packing to maintain air tight relations therewith while being forced inwardly, but in my door checks, the plunger co-operates with a chamber, which is a mere air chamber, and hence I am enabled to employ a plunger, composed wholly or in part of wood, or other fibrous material capable of absorbing and carrying a lubri-

cant, so that the packing in the mouth of the air chamber may be maintained in good condition for securing desirable air tight relations with the plunger. I have also adjustably mounted the air chamber upon its bracket, so that its position may be varied whenever circumstances render it impracticable or even undesirable to change the position of the air chamber bracket upon a door or door frame on which it may be mounted. I have also mounted the plunger rod on its bracket by means of a spring actuated rock shaft, and a clamp screw is provided by which the rod and shaft may be adjusted with reference to each other and firmly locked together for enabling desirable angular adjustment of the plunger.

To more particularly describe my invention I will refer to the accompanying drawings, in which—

Figure 1 illustrates one of my door checks complete as when on sale. Fig. 2 illustrates the air chamber in longitudinal central section. Figs. 3, 4, 5 and 6 illustrate the plunger with its rod, respectively in side view, longitudinal section, front end and rear end views. Fig. 7 illustrates the plunger rod and its spring rock shaft, detached from the bracket. Fig. 8 in side and top views illustrates the plunger rod bracket. Fig. 9 illustrates one form of bracket by which the air chamber may be mounted on a door. Fig. 10 illustrates the air chamber detached from its bracket. Fig. 11 illustrates the air chamber bracket modified as to shape for enabling it to be mounted on the under side of the lintel of a door frame. Fig. 12 illustrates the air chamber bracket adapted for use either on a door, or on the under side of a door frame lintel. Fig. 13 in two views illustrates the application of a separate spring to the plunger rod rock shaft. Fig. 14 illustrates one of my door checks, as shown in Fig. 1, applied to a door and frame. Fig. 15 illustrates my door check having air chamber bracket as shown in Fig. 11, and applied to a frame lintel, with the plunger mounted on a door. Fig. 16 illustrates an air chamber provided with a bracket which is integral with the head of the chamber. Fig. 17 illustrates a

plunger rod bracket adapted to be mounted on a horizontal surface. Figs. 18, 19 and 20, illustrate the application of springs for supporting the packing in the air chamber head.

5 The air chamber A, is substantially as disclosed in my aforesaid prior patent, and it consists usually of a sheet iron or tin plate shell *a*, a head *b* to which the shell should be tightly attached, and a clamping ring *c*, and
10 screws *d*, by means of which the annular packing ring *e* is secured in proper position in said head at the mouth, or front open end of the air chamber. The diameter of the opening actually guarded by the packing, is
15 slightly less than that of the air chamber, and said packing is flared outwardly, and so is the inner surface of the clamping ring *c*, as clearly indicated, and said flaring feature is supplemented by a pair of oppositely lo-
20 cated projecting lugs *c'* the inner faces of which are curved or inclined to correspond with the flaring annular surface of said clamping ring, said lugs afford deflecting or guiding surfaces for contact with the end of
25 a plunger, on entering the air chamber. In air chambers for use with specially heavy doors, additional packing is however to be employed at the rear of the front packing ring.

30 This air chamber is provided with a bracket which I vary in form and construction according to requirements as to cost, and also to the particular manner in which the door checks are to be applied. As for instance, as
35 shown in Figs. 1, and 9, the bracket B has a vertical face plate *f*, with holes therein for screws, and a horizontal arm *f'*, having therein a line of holes *f''*. The air chamber head *b* has a tail piece *b'*, provided with projecting ribs at top and bottom, and having a
40 bolt hole at *b''*. The tail piece can be moved to and fro on said arm for purposes of adjustment, and the bracket and chamber are then firmly fastened together by means of a
45 bolt and nut *b''*. With this form of bracket the air chamber is mounted upon the outer side of a door, and overhanging the top rail.

In Fig. 11 the bracket B¹ has a face plate *f* parallel with the arm *f'*, and with this form
50 of bracket the air chamber may be mounted on the underside of the lintel of a door frame.

In Fig. 16, the bracket is shown integral with the air chamber head *b*, the face plate *f* being shown in solid lines at right angles to the axis of the air chamber, and in dotted
55 lines parallel with said axis.

In Fig. 12, the air chamber bracket B², is adapted to be mounted in either of the two positions stated, because the arm *f'* has a
60 square block or projection *f''* on one side thereof, which will occupy and fit the space between the ribs of the tail piece *b'*, and said block has two series of holes for receiving the securing bolt *b''*, thus providing for adjust-
65 ment, and enabling the face plate *f* to stand at right angles to the axis of the air chamber, or parallel therewith.

The plunger C in the matter of form is, as was disclosed in my aforesaid Letters Patent, in that it has a rounded end, and is hollow
70 and open at its rear end, and as before, it is provided with a valve *g* at its front or closed end, but it is to be understood that this valve may, if desired, be applied to the interior of the closed end of the air chamber, and in
75 either case provision is made in a well known manner for the gradual escape of air, after such compression as is incident to the forcible entrance of the plunger. This plunger in its best form as now devised by me is composed of, 80
or covered with a material which can absorb and hold such lubricants or moisteners as will enable the packing to maintain a soft pliable condition so that it can at all times properly engage with the surface of the plunger and
85 thereby afford the desired reliable air cushion within the chamber. A metal plunger can be used without departure from certain portions of my present invention, but in its best form it is composed of wood, because it affords light
90 weight and can be cheaply produced, and the wood is a good absorbent or retainer of the lubricating medium. As, for instance, a wooden plunger may be treated first with a solution of glycerine and water, followed by
95 glycerine and oil compounded with plumbago, and excellent results will be produced. A metal shell coated with paper or other sufficiently rigid fibrous absorbent material can also be employed, and so also may cloth be used
100 when properly laid and stuffed with the lubricant and black lead, it being understood that said absorbent material operates in no sense as a packing on the plunger, but merely affords a smooth concentric surface with
105 which the air chamber packing ring may properly engage. The hollow plunger contains a rod *h* which is pivoted thereto at *h'*, the pivotal point being preferably at such a distance from the front end as will afford de-
110 sirable swinging movement of said end, independently of any swinging movement of the rod, thus enabling the plunger to readily enter the air chamber, even if a door and its frame should vary somewhat in their relative
115 positions after the door check has been applied thereto. This pivoting of the rod to the plunger is a novel feature, and it is rendered possible because the packing occupies a fixed position instead of being movable. All prior
120 door check pistons have carried the packing, which necessitates an expensive air cylinder, having a highly finished interior surface.

The plunger is mounted upon a bracket D, which is varied in its form according to
125 whether it is to be mounted upon a surface rectangular to the plunger, or to one parallel therewith. In Figs. 1 and 8, the bracket D affords a face plate *i* having holes for screws, by which the plunger may be mounted upon
130 the vertical face of the top rail of a door, or to the corresponding face of the lintel of a door frame. As shown in Fig. 17 the bracket has a face plate *i'* which enables it to be

mounted on a horizontal surface, but as a rule, when so mounted, the air chamber bracket is located at the closed end of the chamber, as indicated in dotted lines in Fig. 10, so that the chamber may be mounted upon the vertical face of a door, wholly below the top edge thereof, the head *b* of the chamber and its packing being as already described. The plunger rod *h* is provided at its outer end with one or two drilled ears *k*, which afford a bearing for a rock shaft *l*, which is mounted in drilled lugs *m* on the bracket *D*. Said rock shaft loosely fits the holes in said lugs, and semi-rotates therein, the plunger rod ears being provided with one or more clamp screws *n*, by which the rod and rock shaft may be clamped together so that the swinging of the rod will cause a partial rotation of the rock shaft in its bearings. This rock shaft *l* as shown in Figs. 1 and 7, is a piece of steel or hard brass, bent laterally at one end to form an arm *l'*, and then bent upon itself backwardly and formed into a spring *l''*, and so arranged that both the arm and spring bear normally upon the surface of the bracket. This spring rock shaft is passed through the bracket lugs and plunger rod arms, and riveted at its end to secure it in position, and the plunger rod may then be adjusted at any desired angle on said shaft and secured with relation thereto, by the clamp-screws *n*. If a separate spring is desired, the arm *l'* is extended at its end laterally upon the surface of the bracket, and a flat straight spring *l'''* is applied thereto, as indicated in Fig. 13. If a capacity for adjustment be not desired, the plunger may be set in proper position on the rock shaft, and permanently secured thereon, as by means of solder or pins.

In some cases I find it desirable to apply at the rear of the packing, means for forcing it toward the plunger, and I have now devised springs so organized and arranged that they are clamped by the screws in the head, and confined in a position most favorable to their proper action. In Fig. 18 I show in section a sheet metal spring *o* having an annular edge *o'*, which is clamped between the packing *e* and the coincident surface of the head *b* by means of the clamping ring or plate *c* and its screws or bolts *d*. This form of spring as shown in Fig. 19 may be struck up in a die and the several internally projecting arms *o''* so curved as to enable each to operate in forcing the adjacent portion of the packing toward the plunger.

In Fig. 20 an annular spring *p* is shown

of a different form, and this may be composed of rubber, or cork, or other suitable material which will afford the proper resiliency at the rear of the packing. With this form of spring and the head *b* recessed to receive it, the tightening of the bolts will compress the spring, and force its inner edge toward the packing, and thus enable the latter to be nicely adjusted with relation to the surface of the plunger.

Having thus described my invention, I claim as new—

1. In a pneumatic door check, the combination substantially as hereinbefore described, of an air chamber having packing at its front or open end, and also having a bracket by which it may be mounted in position for service, a plunger wholly separable from said chamber as during the movement of a door and having a surface throughout its length with which said packing closely engages, a plunger rod pivoted to said plunger, and a bracket on which said rod is pivoted, and by means of which said plunger may be mounted and supported independently of the air chamber on a door or its frame.

2. In a pneumatic door check, the combination with an air chamber, a plunger separable from said chamber, a plunger rod pivoted to said plunger, a bracket, and a spring rock shaft to which said plunger is secured and by means of which it is pivoted to said bracket, substantially as described, said rock shaft normally maintaining the plunger in an inclined position, but permitting it to vibrate in entering and leaving said air chamber.

3. In a pneumatic door check, the combination of the plunger, its rod, the bracket, the spring rock shaft by which the rod is pivoted to the bracket, and a clamp screw on said rod for engaging with said rock shaft, and causing it to semi rotate in its bearings during the swinging movements of the plunger rod, substantially as described.

4. In a pneumatic door check the combination with a plunger, of the air chamber, the annular, flared packing at its open end or mouth, and an annular spring at the rear of said packing, for reducing the diameter of its annular opening, and causing it to maintain air tight relations with said plunger while entering the chamber, substantially as described.

JAMES W. RING.

Witnesses:

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C. S. VAN WAGONER.