(No Model.) 2 Sheets—Sheet 1.

A. DUDDEN.

PNEUMATIC DOOR CHECK.

No. 456,945. Patented Aug. 4, 1891.

Fig. 1.

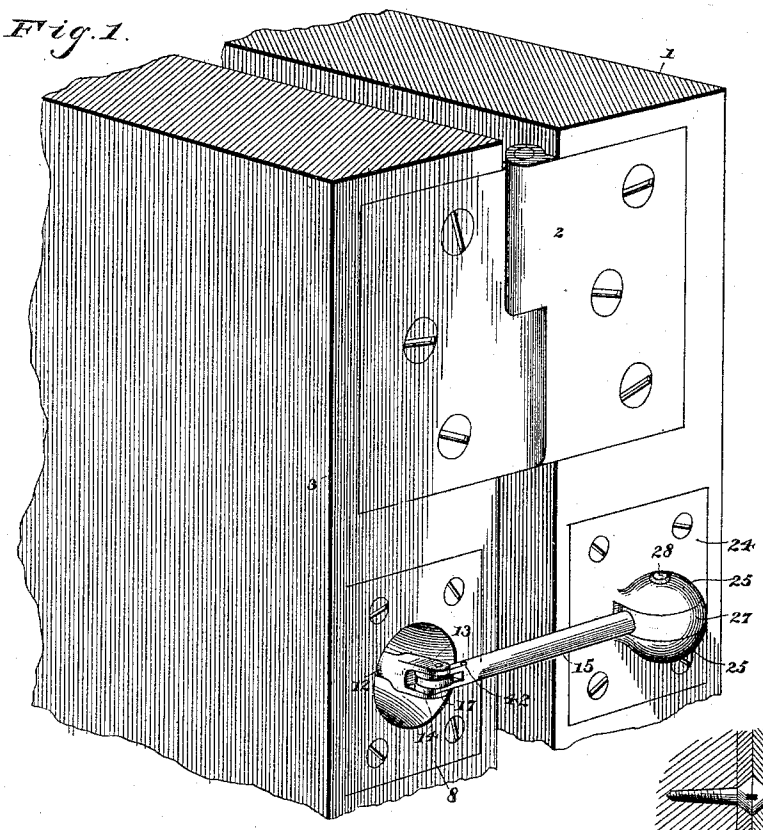
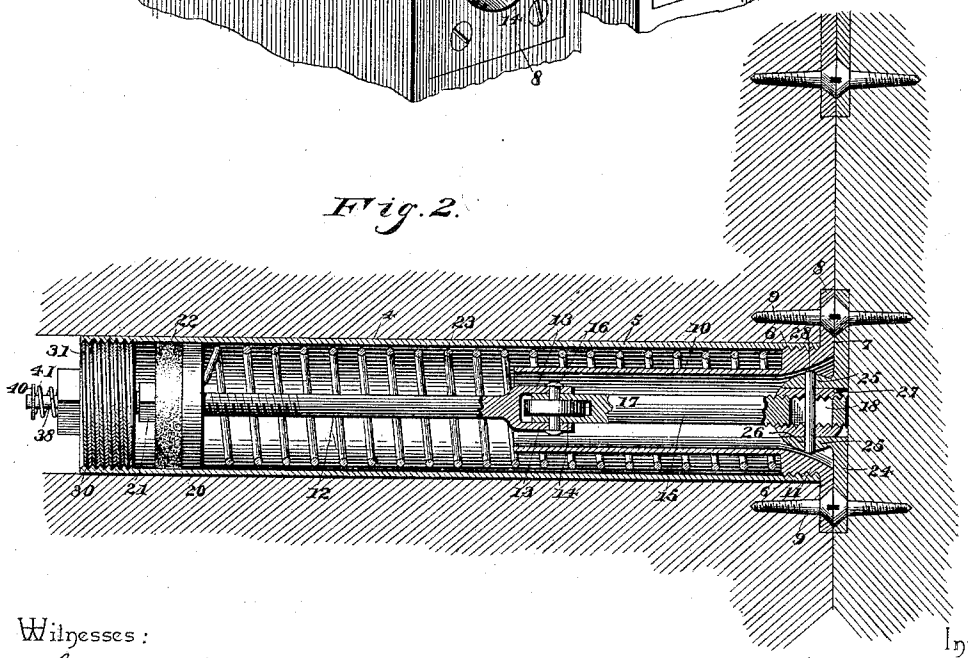


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

A. DUDDEN.

PNEUMATIC DOOR CHECK.

No. 456,945. Patented Aug. 4, 1891.

Fig. 3.

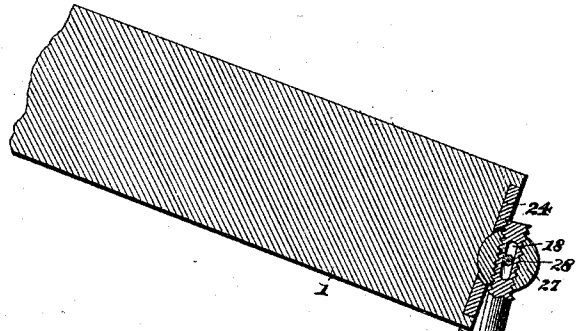


Fig. 4.

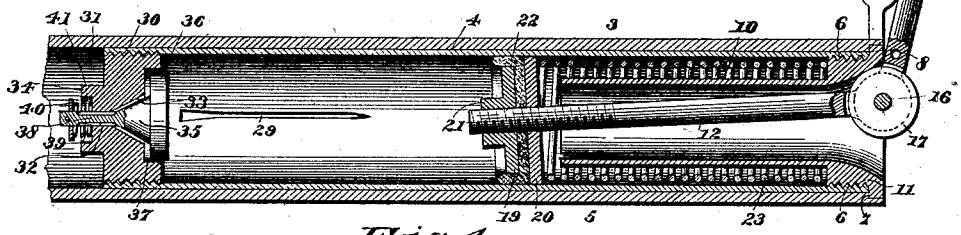
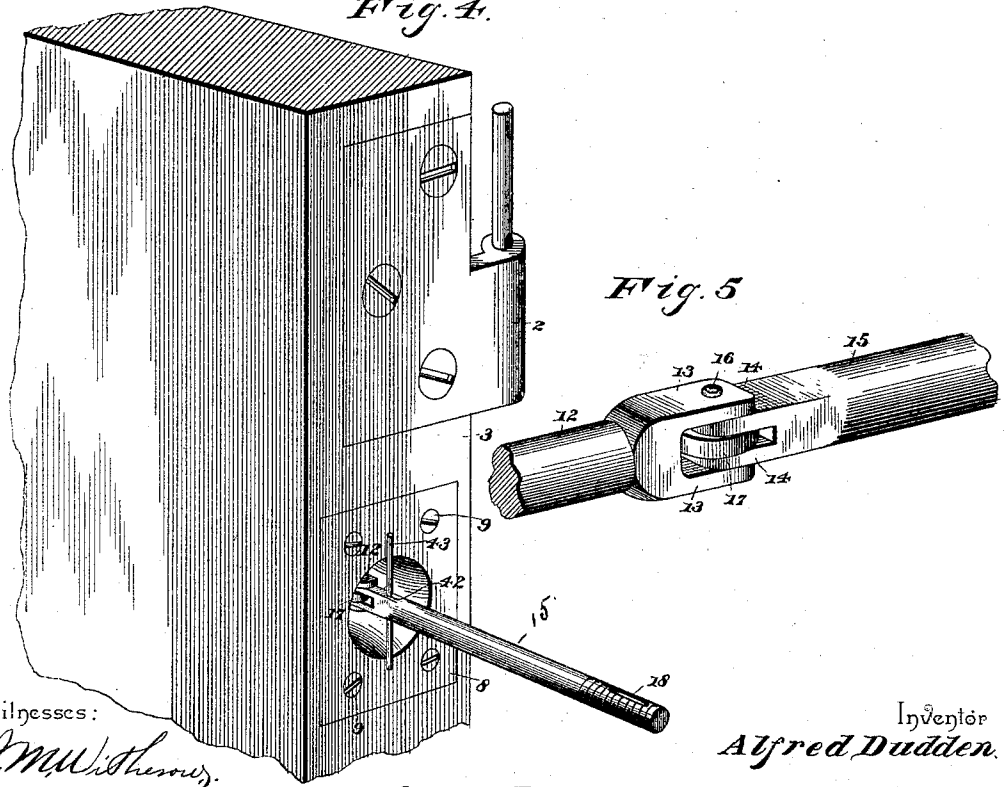


Fig. 5.



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UNITED STATES PATENT OFFICE.

ALFRED DUDDEN, OF SAN FRANCISCO, CALIFORNIA.

PNEUMATIC DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 456,945, dated August 4, 1891.

Application filed May 31, 1890. Serial No. 353,746. (No model.)

To all whom it may concern:

Be it known that I, ALFRED DUDDEN, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented a new and useful Pneumatic Door Check and Closer, of which the following is a specification.

This invention has relation to door-springs, and is designed as an improvement upon Patent No. 414,384, granted me November 5, 1889.

The objects of the invention are to provide for a convenient adjustment of the tension of the spring, to prevent slamming of the door by the expansion of the spring, and to simplify, cheapen, and improve other details of construction, hereinafter apparent.

With the above general objects in view the invention consists in certain features of construction hereinafter specified, and particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a perspective view of the jamb of a door-frame and a portion of a door hinged thereto and connected by a door-spring constructed in accordance with my invention. Fig. 2 is a vertical section through the door and jamb with the door closed. Fig. 3 is a transverse section, the door being open. Fig. 4 is a similar view to Fig. 1, the parts being in position to affect an adjustment of the tension of the spring. Fig. 5 is a detail in perspective of the adjusting-rod, the arm being hinged thereto, portions broken away illustrating the connection.

Like numerals indicate like parts in all the figures of the drawings.

1 designates the door, which is hinged in any suitable manner, as at 2, to the door-jamb 3. The door-jamb 3 has its inner end at any suitable point provided with a cylindrical recess 4, and in the same is fitted a metallic cylinder 5, the outer end of which is internally threaded, as at 6, and terminates flush with a countersunk recess 7, formed in the edge of the door. Seated in the recess 7 is a face-plate 8, provided with screw-holes, through which are passed screws 9 into the door. Extending from the rear face of the plate 8 is a cylinder 10, provided at its juncture with the base with a threaded boss 11. The cylinder 10 is considerably smaller than and is received by the larger cylinder 5, and the circumference of the threaded boss 11 is equal to the internal diameter of the bore of the cylinder 5, and the threads of the boss engage those of the cylinder 5. The outer end of the internal or smaller cylinder 10 is, as shown, flared.

12 designates a combined piston and tension rod of a length sufficient for the purpose in view, and which at its front end is provided with opposite bifurcated and perforated bearing-lugs 13, which receive the inner bifurcated end 14 of an arm 15, and through the bifurcations 13 and 14 is passed a pintle or bearing, pin 16, carrying a roller or wheel 17. The outer end of the arm 15 is threaded exteriorly and is provided with a transverse slot 18.

The rear or inner end of the rod 12 is threaded, as shown, and upon the same is mounted a pair of washers designated as 19 and 20, respectively. The front washer agrees in diameter with the bore of the outer cylinder 5, while the inner washer 19 is somewhat smaller and is provided upon its rear face with an angular boss 21, to which may be applied an ordinary wrench for removing the same. Between the two washers is interposed a packing-disk 22, greater in diameter than either one of the washers, and having its surplus occurring at its periphery rearwardly bent, so as to lie between the periphery of the rear washer and the wall of the cylinder 5.

23 designates a coiled spring, one end of which is secured to the washer 20 and the opposite end to the external boss 11, said spring being located in the larger cylinder 5 and encircling the tension-rod 12 and the smaller or inner cylinder 10.

In the inner edge of the door-jamb there is countersunk transversely opposite the face-plate 8 a face-plate 24, provided with a pair of bearing-ears 25, having central opposite openings 26. The outer end of the arm 15 is, as before stated, exteriorly threaded and provided with a slot 18. This arm has threaded thereon a nut 27, which nut is provided with an opening agreeing with the opening 26 of the ears 25. The nut and ears are connected pivotally by the insertion of the former between the latter and the passing therethrough of the pintle 28. By removing the pintle 28

from the ears, nut, and rod said nut may be rotated in either direction, so as to shorten or lengthen the arm 15, as occasion may require. The exterior conformations of the ears and nut when in position are such that they combine to form a sphere or substantially so, so that the same are adapted when the door is closed to take within the flared mouth of the inner cylinder 10, and thus offer no obstruction to the complete closing of the door and a snug fit of the same within its frame.

In rear of the small cylinder 10 the large cylinder 5 is provided with a narrow elongated air vent or slot. By means of the air slot or vent it will be apparent that the piston or washers 19 and 20, which together with the packing 22 constitute a piston, air will be drawn into the cylinder 5 when the door is opened and will be expelled when the door is closed. The slot or vent 29 is somewhat in rear of the farthest point of advancement of the piston-head, so that during the first movement of the door when in the act of closing said door may move rapidly, but as the piston-head recedes into the cylinder, and in so doing reduces or renders operative only a portion of the slot, as when the door is nearly closed, the air is unable to escape as fast as theretofore, and a cushion is formed between the end of the cylinder and the piston-head, which serves as a check, and the resistance offered by said compressed air is only overcome by the spring after said air has escaped, which it does in a slow manner through the rear end of the slot 29.

The rear end of the outer cylinder 5 is internally threaded, as at 30, and screwed into the same is a plug 31, provided with a central valve-opening 32, the inner end of which is flared to form a conical valve-seat 33. The rear end of the opening is surrounded by an annular flange 34, and mounted in the opening is a valve-body 35, the front portion of which is conical to fit the seat and provided with a head 36 to fit a circular recess 37, surrounding the seat. The valve-body is provided at its rear end with a stem 38, having longitudinal grooves 39 and 40, and between the head and the plug 31 and within the annular flange 34 is located a coiled spring 41, which spring encircles the stem before mentioned.

The object and purpose of the valve is that it may serve as an induction-opening for the admission of air in addition to the slot 29 when the door is being opened and the piston-head advancing. By such an arrangement the opening of the door is not in any way retarded, and only the tension of the spring need be overcome. When the door is being opened, the valve in the rear end of the cylinder opens inwardly, admitting air freely into the cylinder until the door commences to close, when the valve immediately closes and remains closed until the door is again opened, thereby admitting air in the cylinder, the only outlet being the slot through which it slowly escapes, and the piston as slowly moves backward, impelled by the compressed coiled spring 23, and the door closed slowly thereby. Spring 40 insures a perfect closing of the valve. When the door is opened, the piston is drawn forward, tending to form a vacuum, and the spring 23 compressed, thereby opening the valve through which air is supplied to the cylinder. The door being released immediately commences to close. The first effect of this motion is to return the valve 35 to its seat. The air contained in the cylinder is readily compressed to a certain point of compression by the piston, when the force of the spring and the compression of the air in the cylinder just balance each other. At this point the motion of the door to close receives a check, and were there no outlet the door would remain in this position indefinitely; but the piston has reached the commencement of the slot, and so the pressure of the coil-spring 23 forces the air through the slot, which, being very small, the air escapes but slowly, and consequently the door closes but slowly. The edges of the slot are not parallel, but diverge at their rear ends, so that after a certain amount of the air has escaped, and the piston and consequently the door has nearly completed the backward movement, the size of the outlet-slot being enlarged the air escapes quite freely, and so the piston moves more rapidly and the door closes with some force to enable it to overcome the resistance of the latch.

In order to increase or decrease the tension of the spring 23 before closing the door, I provide the arm 15 with a vertical perforation 42 near the rear end of said arm, and in the same insert a cross-bar 43, the same being removable and only used when it is desired to increase or decrease the tension of the spring 23 or to connect the nut 27 with the perforated ears 26. After the bar has been inserted the pintle 28 is withdrawn from the ears and nut and the rod and arm may be turned or rotated, so that the rod may be rotated and will take more or less into the washers 19 and 20.

From the above description it will be apparent that I have provided an improved means of altering the tension of the spring 23 without the necessity of removing the mechanism from the door. Furthermore, I have provided means for adjusting the length of the arm 15 and for preventing the door from slamming. It will also be observed that the parts are of simple construction and adapted for easy assemblage.

Having thus described my invention, what I claim is—

1. The outer cylinder 5, inserted in the door-jamb and provided with internal threads at its front end, and the internal smaller cylinder mounted therein, said smaller cylinder being provided at its front end with a flared mouth terminating in a securing-plate and in rear of the same provided with an external

annular threaded boss or shoulder engaging the threads of the outer cylinder, substantially as specified.

2. The combination, with the cylinder 5, provided at its front or inner end with a stop, the rod 12, mounted therein and terminating in a head, and the spring 23, interposed between the stop and head, of the arm 15 for connecting the front end of the rod to the door, said arm being provided with a transverse perforation, as 42, and the rod or bar 43 in said perforation, substantially as and for the purpose specified.

3. The combination of the face-plate 24, provided with opposite lugs 25, having perforations, the arm 15, longitudinally slotted at 18 and exteriorly threaded at its outer end, the nut 27, transversely perforated to agree with the slot and the perforations of the lugs and threaded upon the rod, and the pintle 28, passing through the perforations of the ears, nut, and rod, substantially as specified.

4. The combination, with the cylinder 5, plugged at its lower end and provided above the same with a narrow slot 29, extending for some distance along the cylinder, of a rod 12, mounted in the cylinder and provided with a piston-head, a spring 23, interposed between the head and the outer end of the cylinder, and an arm 15, pivotally connecting the rod with the door, substantially as specified.

5. The combination, with the cylinder 5, mounted in the recess of the door-frame and provided at its rear end with a plug 31, having a valve-opening provided with an inwardly-opening valve 35, and a tapering slot 29, formed in the wall and extending for a considerable portion of its length at one side of the path traversed by the piston, of a tension-rod 12, having a piston-head mounted for sliding in the cylinder, a spring 23 for retracting the rod, and an arm 15, pivotally connecting the door with the outer end of the rod, substantially as specified.

6. The combination, with the cylinder 5, mounted in the recess of the door-frame and having an internal rear threaded end 30, of a valve-plug 31, threaded in the end of said cylinder and having a central opening 32, provided with a conical seat, and a countersunk recess 37 at the front end of the seat, and an annular flange 34 at the rear end of the opening, a valve 35, having a conical body mounted in the seat, and a circular head 36, fitting the recess and terminating at its rear end in a stem 38, projecting through the opening and the annular flange and provided with a stop or head, a spring 41, mounted between the head and the plug, encircling the stem, and adapted to maintain the valve normally out of its seat, a tension-rod 12, mounted in the cylinder and provided with a piston-head, an arm 15, connecting the rod with a door, and a coiled spring 23, interposed between the head and the front end of the cylinder, substantially as specified.

7. The cylinder 5, having valve-plug 31, provided with a spring-pressed valve, and a narrow tapered slot formed in the wall of the cylinder in front of the plug 31, and having its lower or enlarged end adjacent to said plug, combined with the rod 12, having a piston-head working in the cylinder and pivotally connected at its outer end with the door, as set forth.

8. The combination, with a cylinder provided at its outer end with a stop, of a rod mounted in the cylinder and terminating at its rear end in a piston-head, and near its outer end provided with a transverse perforation, occurring within the cylinder when the rod is in its normal position, and the removable pin adapted for insertion in the perforation and to retain the rod withdrawn from the cylinder against the tension of the spring, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

ALFRED DUDDEN.

Witnesses:
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JOHN R. DUGAN.