W. K. HENRY.

DOOR CHECK.

APPLICATION FILED FEB. 18, 1910.

960,641.

Patented June 7, 1910.

2 SHEETS—SHEET 1.

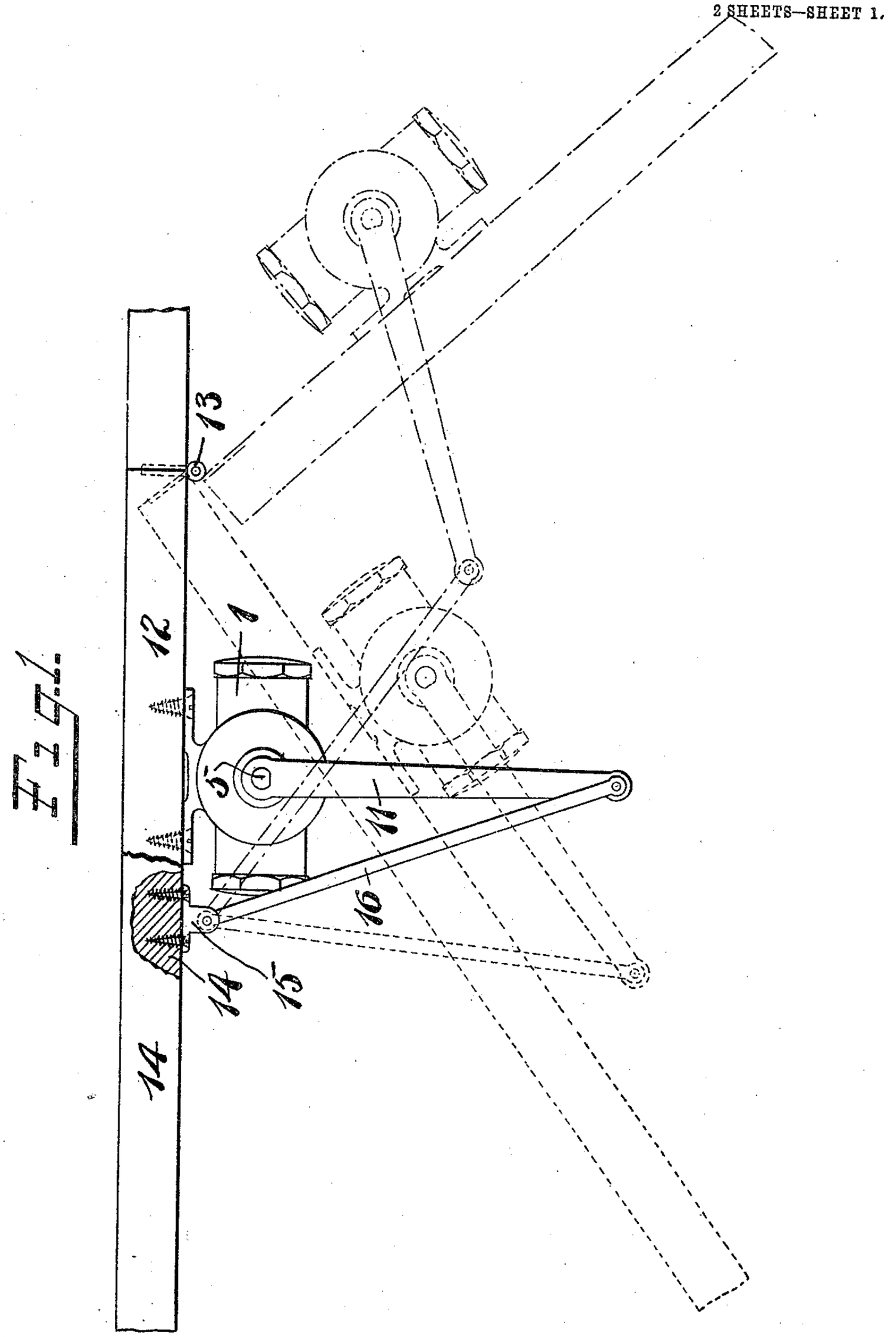

FIG. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

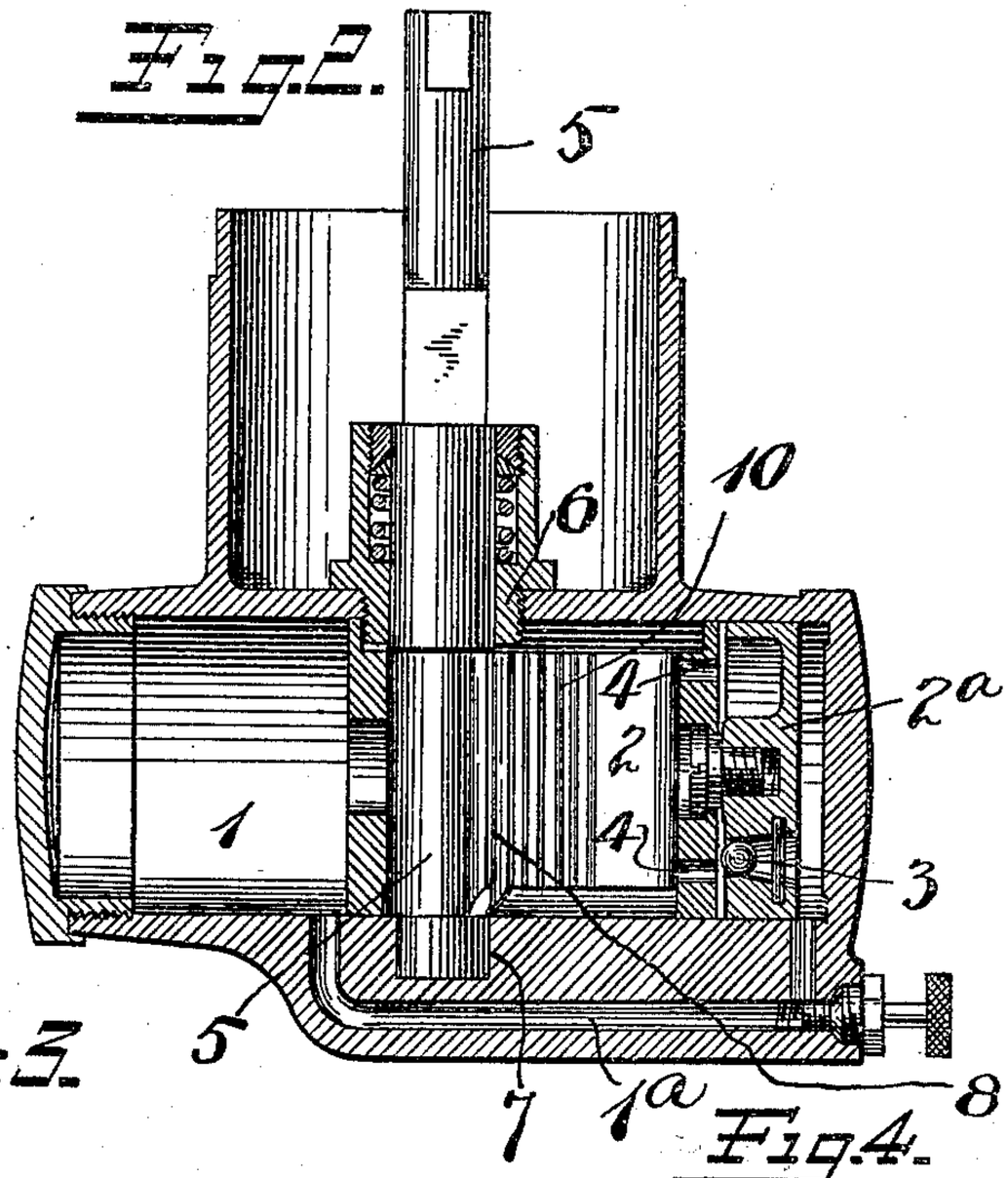
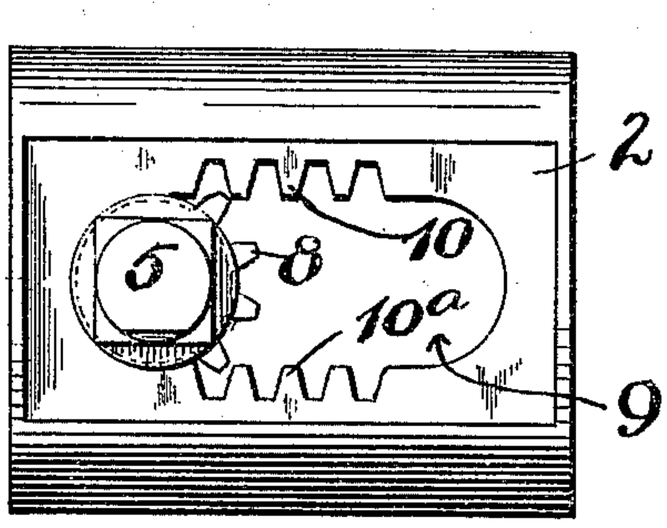


Fig. 3.

Fig. 6.

Fig. 4.



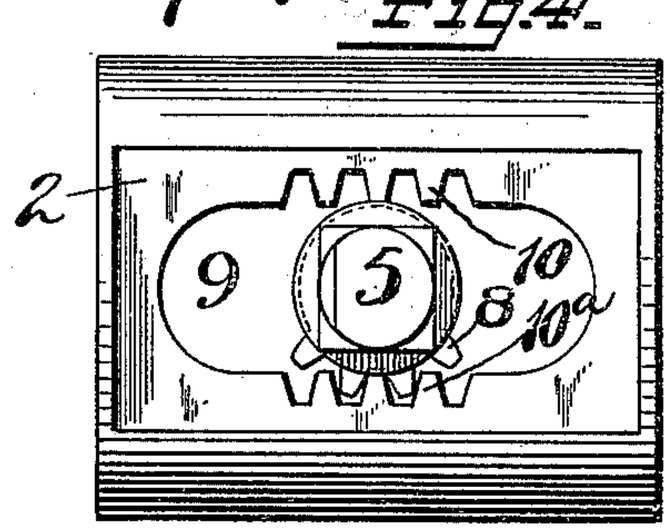
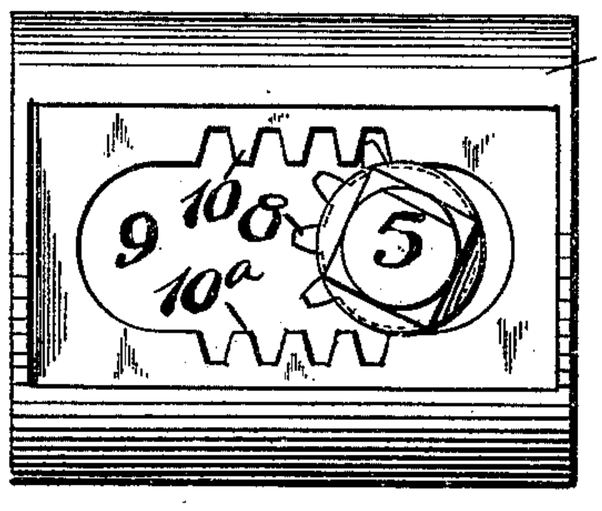
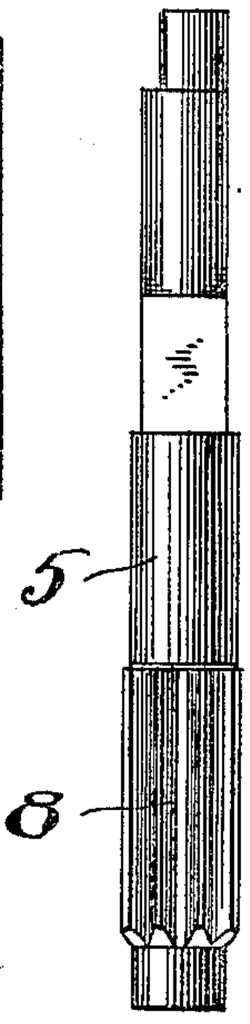


Fig. 5.





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UNITED STATES PATENT OFFICE.

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DOOR-CHECK.

960,641. Specification of Letters Patent. Patented June 7, 1910.

Application filed February 18, 1910. Serial No. 544,585.

To all whom it may concern:

Be it known that I, WILLIAM K. HENRY, a citizen of the United States, residing at New Britain, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Door-Checks, of which the following is a full, clear, and exact description.

My invention relates to an improved door check construction, the object of the invention being simplicity and economy of manufacture and compactness.

The invention is particularly useful when combined as an element of the well-known type of door checks which include door closing mechanism as well and it is in connection with such a structure that I have illustrated my present improvements.

In the accompanying drawing, Figure 1 is a plan view of my invention showing in solid and dotted lines three different positions of the same as it appears in use. Fig. 2 is a longtudinal section of the check. Figs. 3, 4 and 5 show details in different positions. Fig. 6 is a side elevation of another detail.

1 is a cylinder.

2 is a checking piston movable therein which in this particular instance is furnished with a self adjusting piston head 2^a loosely mounted upon the end body 2 of the piston so that any twisting tendency in the former will not be imparted to the head 2^a, thereby unduly wearing the same on one side.

3 is a check valve arranged in a port in the head 2^a, a suitable port or ports 4—4 being provided in the body 2 of the piston to permit the checking fluid to pass from one end of the cylinder to the other when the piston moves back, the check valve 3 preventing said passage excepting as controlled by the usual valved "by-pass" 1^a when the piston moves in an opposite direction. I have not described in detail herein the said by-pass since any well known form customary in this type of check may be employed.

5 is a shaft which preferably passes entirely through the cylinder diametrically and approximately at the center, suitable upper and lower bearing steps being provided. In this instance 6 conventionally represents the upper step and 7 the lower step, the former being removable, the latter being formed in the body of the cylinder 1.

On one side of the shaft 5 and formed on that part of the shaft which is located within the cylinder when the parts are assembled are gear teeth 8—8. These teeth are arranged on one side only of said shaft, occupying approximately one third of the circumference of said shaft. The main body 2 of the piston is provided with an elongated slot 9 having on opposite sides and over a portion of its length gear teeth 10—10^a, said gear teeth being properly designed to co-act with the gear teeth 8 on the shaft 5. By providing the proper clearance, as shown, at both ends of the slot 9 and beyond the gear teeth 10—10^a, the following action takes place, by reason of the rotation of the shaft 5. Starting with the shaft and piston in the position indicated in Fig. 3, partial clockwise rotation will, by reason of the gear teeth arrangement 8 co-acting with the teeth 10^a on the piston, shift the latter from the position shown in Fig. 3 to the position shown in Fig. 4. Continued rotation of the shaft in the same direction will continue to shift the piston in the same direction until the teeth 8 leave the teeth 10^a. When this occurs one of the teeth 8 will engage the teeth 10, as shown in Fig. 5, so that a continued rotation of the shaft in the same direction will reverse the direction of movement of the piston 2. It follows therefore that a continued clockwise rotation of the shaft 5 will move the piston to and fro in a rectilineal path. Not only is this true of a clockwise rotation but in reverse clockwise rotation will produce the same effect in the particular form shown in the drawing as will be readily seen. By reason of this arrangement I am able in a door closer to adapt the invention to either a right or left hand door and to reduce the size of the mechanism very materially. Beyond this I am able to apply it to a door which is capable of being swung to the extent of practically one-half of a circle, at least more than at an angle of 90°. The swinging movement of a door to an extent of more than 90° produces on the operating arm of the closer (when connected up by the preferable lever arm connection) a movement on the part of the lever arm directly connected to the check of

many more degrees. An opening movement of a door, say to approximately 120°, will cause a movement on the part of the lever arm connected to the check of considerably more than 180°. This involves in most checks a very long piston movement whereas by my improvement a relatively short piston movement only is required, thus permitting the length of the cylinder to be materially reduced.

Referring to Fig. 1, 11 is an arm rigidly connected to the upper end of the shaft 5. 12 represents a door hinged at 13 to a door casing 14. The check may be secured to the door 12 in the usual manner while the free end of the arm 11 is connected to a bracket 15 by means of a link 16; the bracket 15 being connected to a part of the door casing above the door 12. I have illustrated in this view, Fig. 1, by dotted lines the position of the parts when the door is open, for example, to approximately 35°. When the door stands open to this extent it will be seen that the arm 11 has turned the shaft 5 substantially 90°. In this same figure I have shown by lines made up of dots and dashes the door open approximately to 120°. In this figure the arm 11 has turned the shaft 5 considerably more than 180°. It is by reason of the fact that the opening movement of the door imparts an angular movement to the arm of the check considerably greater than the angle of opening of the door that my invention is particularly useful as applied to this type of check, for the operation, as will be seen, may be effected successfully on either a right or a left hand door with a piston action and cylinder very materially shorter than in the usual specimen of check found in this class. In the drawings I have shown for convenience of illustration the relative positions of the pistons in Figs. 3, 4 and 5 which correspond to the three positions of the check shown in Fig. 1. When the door is closed, the piston will stand as shown in Fig. 3. When the door is open to the extent indicated by the dotted lines, the piston will stand in the position indicated in Fig. 4 and when the door stands in the position indicated by the line made up of dots and dashes, the piston will stand in the position indicated in Fig. 5. Obviously, when the door is fully open, the checking action is practically negative, and at this point it is immaterial whether the piston moves slightly either forward or back. When, however, the door closes and begins to reach the point where checking action is necessary, the relative position of the piston and shaft will insure said checking action in all instances.

What I claim is:

1. In checking mechanism, a cylinder, a piston therein arranged to move with relative freedom in one direction and against resistance in the opposite direction, a longitudinally arranged slot in said piston, a portion of the opposite side walls of said slot being toothed, a spindle entering said cylinder and standing in said slot, one side of that part of said spindle standing in said slot having teeth arranged to co-act with the teeth on both sides of the slot in said piston, the teeth on said spindle being arranged to leave the teeth on one side of the piston and simultaneously engage the teeth on the opposite side of the piston to reciprocate the latter to and fro by a rotative movement of the spindle in one direction.

2. In a checking apparatus, a cylinder, a piston therein, a longitudinal slot in part of said piston, toothed racks on opposite sides of said slot, clearance spaces at each end of said slot beyond said racks, a rotatable spindle extending into the slotted portion of said piston and between said racks, teeth on one side of said spindle arranged to coöperate with the teeth on opposite walls of the slot, said clearance spaces being sufficiently large to afford room for the spindle at each end of the slotted portion of said piston when the teeth on said spindle shift from engagement with the teeth on one side of the slot in said piston to the teeth on the opposite side thereof.

3. In apparatus of the class described, a rotatable spindle, a mounting therefor, a reciprocating piston coöperating therewith, means to restrain the free movement of the piston in one direction, said piston having a slot into which said spindle extends, toothed racks on opposite sides of said slot, gear teeth on one side of that part of said spindle within said slot arranged for alternate engagement with the racks on opposite sides of said slot, said slotted portion of said piston including spindle clearance spaces at both ends whereby said piston may be moved to and fro in both directions by rotary movement of the spindle in one direction, and a guide for said piston.

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Witnesses:
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