

(No Model.)

2 Sheets—Sheet 1.

C. L. RICE.
DOOR OPERATING DEVICE.

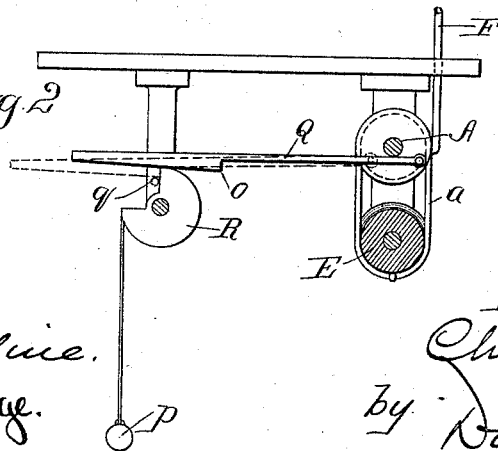
No. 526,636.

Patented Sept. 25, 1894.

Fig. 1.



Fig. 2



Attest:
C. B. Burdine.
Horace A. Dodge.

Inventor,
Charles L. Rice,
by Rodger Lous Att'y's

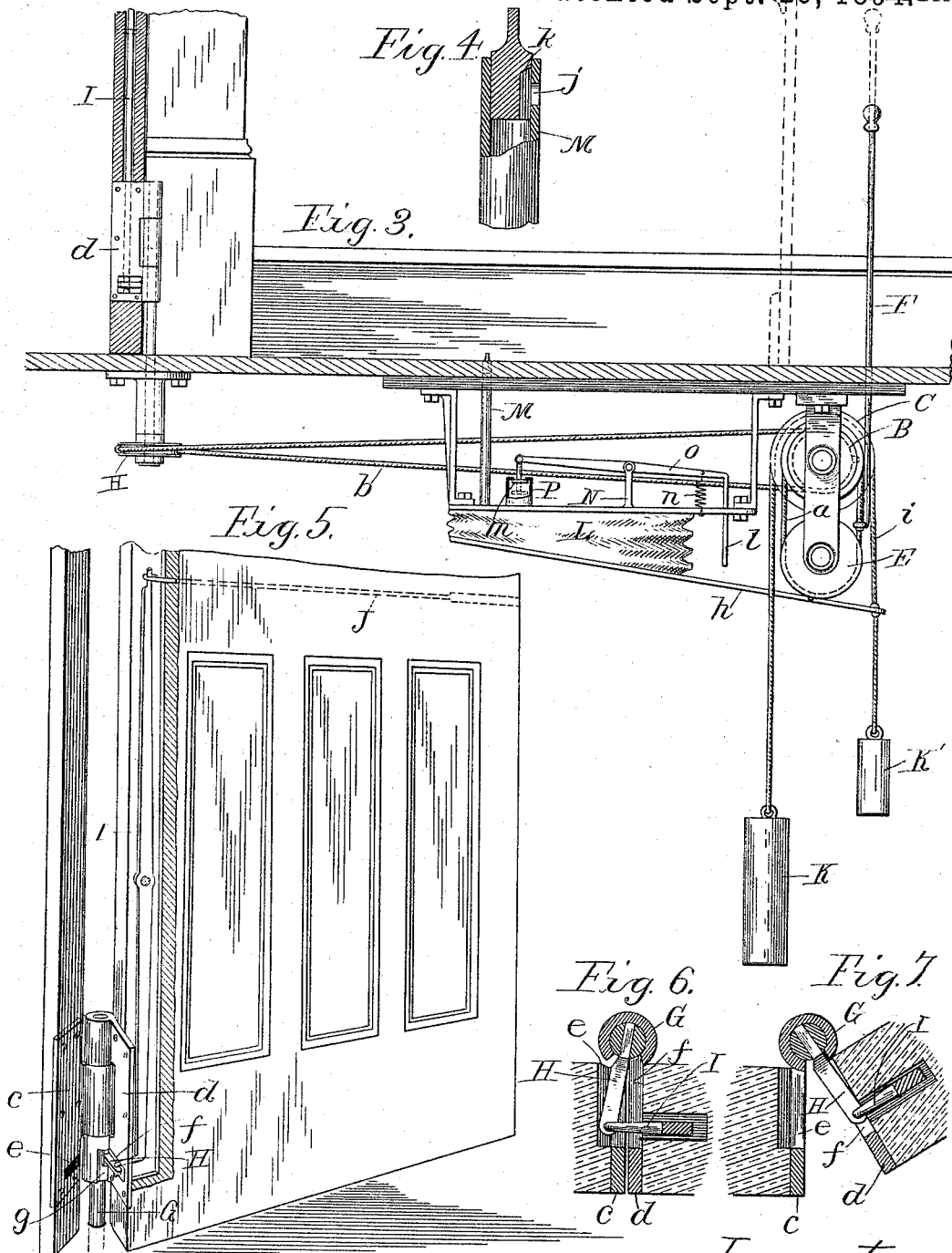
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UNITED STATES PATENT OFFICE.

CHARLES L. RICE, OF GRANITE FALLS, MINNESOTA, ASSIGNOR OF ONE-HALF TO THEODORE G. MAYBOHM, OF SAME PLACE.

DOOR-OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 526,636, dated September 25, 1894.

Application filed November 20, 1893. Serial No. 491,436. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. RICE, a citizen of the United States, residing at Granite Falls, in the county of Yellow Medicine and State of Minnesota, have invented certain new and useful Improvements in Door-Operating Devices, of which the following is a specification.

My invention relates to door operating devices, and consists in the novel construction hereinafter set forth and claimed.

In the drawings,—Figure 1 is a perspective view of my improved device; Fig. 2, a face view of a modified form of check for the door; Fig. 3, a face view, the door being open and shown in section; Fig. 4, a detail view; and Figs. 5, 6 and 7, views showing details of the construction of the door hinge and its connections.

The invention is designed to provide means whereby a door may be opened and closed at will from any desired point, and also to provide means whereby the door will be automatically closed without jar or slamming.

A indicates a shaft suitably suspended beneath the floor at the point whence it is desired to operate the door; and B C and D denote grooved pulleys or wheels rigidly secured to the shaft A. Beneath pulley B, and mounted in the hanger which supports shaft A, is another pulley E, and passing around this pulley and pulley B, is a band or belt *a*. Rigidly connected to this belt *a* is a foot or hand actuating rod F, which extends up through the floor into a convenient position for operation.

G indicates the pintle of the lower door hinge, and is made of such length as to extend down beneath the floor, as clearly shown in Figs. 1 and 3. To the lower end of the pintle is rigidly secured a grooved pulley H, and around this pulley and pulley D, is passed a belt *b*. Each leaf *c*, *d*, of the hinge is cut away as at *e* and *f*, while the lower portion of the knuckle of leaf *d* is provided with a slot or opening *g*.

Extending laterally from the pintle G is an arm H which is so formed or placed on the pintle as to come in line with the openings *e* and *f* of the hinge leaves when the pintle is in place, the arm H passing through the up-

per end of slot *g*. This arm is connected at its outer end to a lever I, which is pivoted in a recess formed in the rear edge of the door, as will be clearly seen upon reference to Fig. 5. To the upper end of lever I is attached (by a hook) a rod or bar J which in turn is connected to the spring bolt of an ordinary lock, or a spring bolt especially adapted to the apparatus.

The belts *a* and *b*, are securely fastened to the pulleys over which they pass by means of pins or the like so as to insure the movement of the parts and yet at the same time allow enough slack to let the parts move freely.

The parts being in the position shown in Fig. 1, the actuating rod F is depressed, motion is given to shaft A, and in turn transmitted through belt *b* to pintle G. The turning of the pintle throws arm H over into the position shown in Fig. 7, lever I being rocked on its pivot, and the bolt withdrawn through rod J. The continued movement of the apparatus will entirely open the door the parts assuming the position shown in Fig. 3. A reverse or upward movement of rod F will cause the door to close, and the bolt to engage its keeper.

I will now describe the operation of the automatic closer and check. Secured to pulley C is a cord or rope to which is attached a weight K sufficiently heavy to normally keep the door closed, the weight of course tending to turn shaft A, and keep the parts in the position shown in Figs. 1 and 6. Suspended beneath the floor in front of shaft A is a bellows L, its upper side being fixed and its lower side free to move under certain conditions. The lower side is extended rearwardly beneath shaft A, and to the arm *h* thus formed are attached a small weight K' and a cord *i* which is fastened to pulley C. Inlet and exit for air to the bellows are furnished through pipe M which extends up through the floor, and is provided at its upper end with an opening *j*, and a turning slotted plug *k*. The exit of air can be readily diminished by simply turning the slot in the plug out of line more or less with the opening *j*.

N indicates an upright secured to the upper side of the bellows, and in which is pivoted a lever O. The rear end of this lever is

provided with a depending arm *l*, while its forward end is formed with a plunger *m* adapted to work freely in a cylinder *P* connected to the bellows.

5 It will be noticed upon reference to Fig. 3 that the plunger *m* is of smaller diameter than the interior of the cylinder, and will only close the same when it is in an elevated position and held against the inwardly projecting rim of cylinder *P*. A spiral spring *n* is
10 attached to the rear of the lever, and tends to keep the plunger *m* in its elevated or closed position.

The door being opened as above described
15 by depressing lever *F*, the weight *K'* will assume the position shown in Fig. 3, and the bellows expanded or inflated. The rod *F* is now released, and the weight *K*, acting through the shaft *A* and its attendant parts
20 as above described, will close the door, the weight *K'* being wound up and the air expelled from the bellows through pipe *M*. This will continue until the lower end of arm *l* comes in contact with the rising arm *h* of
25 the bellows, the arm *l* being made of such length that the contact will not be made until the door is nearly closed. When the contact does take place, the upward movement of arm *h* causes lever *O* to tip or rock, and the plunger
30 *m* to assume the position shown in dotted lines in Fig. 3. It will thus be seen that the bellows has free exhaust through cylinder *P*, and the weight *K* is allowed to exert its full force and close the door. The rapidity with
35 which the door closes may be regulated by increasing or diminishing the exhaust outlet *j* in pipe *M*. So too, the time the full action of the weight *K* takes place is regulated by the length of arm *l* and its consequent time
40 of contact with arm *h* of the bellows. When the door is again opened the weight *K'* will descend, the bellows being inflated, and the plunger *m* rises and closes the mouth of cylinder *P*, the parts being then ready to act as
45 a check against the action of weight *K*.

In Fig. 2 I have shown a modified form of the checking device. To pulley *B* is pivotally attached an arm *Q* provided on its under
50 face with a shoulder *o*. This arm rides over a notched wheel *R*, suspended from the floor, said wheel being provided with a weight *p* which tends to keep it in the position shown, its motion being limited by a stop or pin *q*. When the rod *F* is forced down, and the pulley
55 *B* rotated, the arm *Q* is thrown forward into the position shown in dotted lines, the shoulder *o* engaging the notch in the wheel. When the weight *K* starts to close the door, the arm *Q* is drawn back, the wheel *R* rotated,
60 and the weight *p* raised, and this continues until the arm *Q* assumes such a position that the shoulder *o* will ride out of the notch and the parts assume their normal position. This disengagement is so timed that the door will
65 be nearly closed before it takes place, and the weight *K* allowed to exert its full force; or, this device may be used in connection with

the bellows and the closing weight *K*, when it will be so timed in its operation that it will act only to hold the door open, against the
70 action of the weight *K*, and not as a check,—the slightest upward movement of the rod *F* tending to release it.

The location of the exhaust pipe *M* may be varied as desired. So too, the relative sizes
75 of the pulleys *B*, *C*, *D* and *H* may be varied, so that the apparatus will operate slowly or quickly. Again, the connections between the lever *I* and the door bolt may be other than a direct connection, as in some instances the
80 glass panels would interfere. In this case I simply interpose a series of pivoted levers.

Having thus described my invention, what I claim is—

1. In a door operating device, the combination of a shaft located beneath the floor; an
85 operating lever connected therewith; the door hinge pintle extending downward through the floor; connections between the pintle and the shaft; and connections between the pintle
90 and the door bolt or latch.

2. In a door operating device, the combination of a shaft located beneath the floor; an
95 operating lever connected therewith; the door hinge pintle extending downward through the floor; connections between the pintle and the shaft; connections between the pintle and the door bolt or latch; and a weight or its
100 equivalent tending to keep the door in its closed position.

3. In a door operating device, the combination of a shaft located beneath the floor; an
105 operating lever connected therewith; the pintle of the door hinge extending downward through the floor; connections between the pintle and the shaft; connections between the pintle and the door bolt or latch; a weight tending to keep the door closed; and a check
110 for retarding the action of the weight during all but the last part of its movement.

4. In a door operating device, the combination of a shaft located beneath the floor and provided with three pulleys *B*, *C* and *D*; a pulley located below pulley *B*; a belt passing
115 around these two pulleys; an operating lever connected to said belt; the hinge pintle extending below the floor and provided with a pulley; a band or belt connecting this pulley with pulley *D*; an arm projecting from the
120 pintle; a pivoted lever mounted in the door and having its lower end connected with the arm on the pintle; a rod pivoted to the upper end of said lever and connected with the door bolt or latch; a weight connected to pulley *C*; and a checking device adapted to be operated
125 by the rotation of the shaft for retarding the action of the weight during all but the last portion of its movement.

5. In combination with a door opening and closing device, a weight connected therewith
130 and adapted to keep the door normally closed; a checking device comprising a bellows, said bellows having an adjustable air exit; a pivoted lever mounted on the bellows provided

with a depending arm and a plunger working
in a cylinder connected with the bellows and
adapted to keep the same normally closed, the
movable arm of the bellows connected with
5 the door operating device, and adapted to tip
the pivoted lever and open the cylinder when
the door nears its closed position.

6. The combination with the door opening
10 device, of a weight or its equivalent, for closing
the door, means for holding the door in
its open position, and adapted to be actuated

by the door operating mechanism, and means
for checking or retarding the action of the
weight during all but the last part of its
movement.

In witness whereof I hereunto set my hand
15 in the presence of two witnesses.

CHARLES L. RICE.

Witnesses:

D. A. McLARTY,

C. E. MCGREGOR.