T. P. SHEAN.

DOOR LOCKING MECHANISM.

APPLICATION FILED NOV. 29, 1909.

998,642. Patented July 25, 1911.

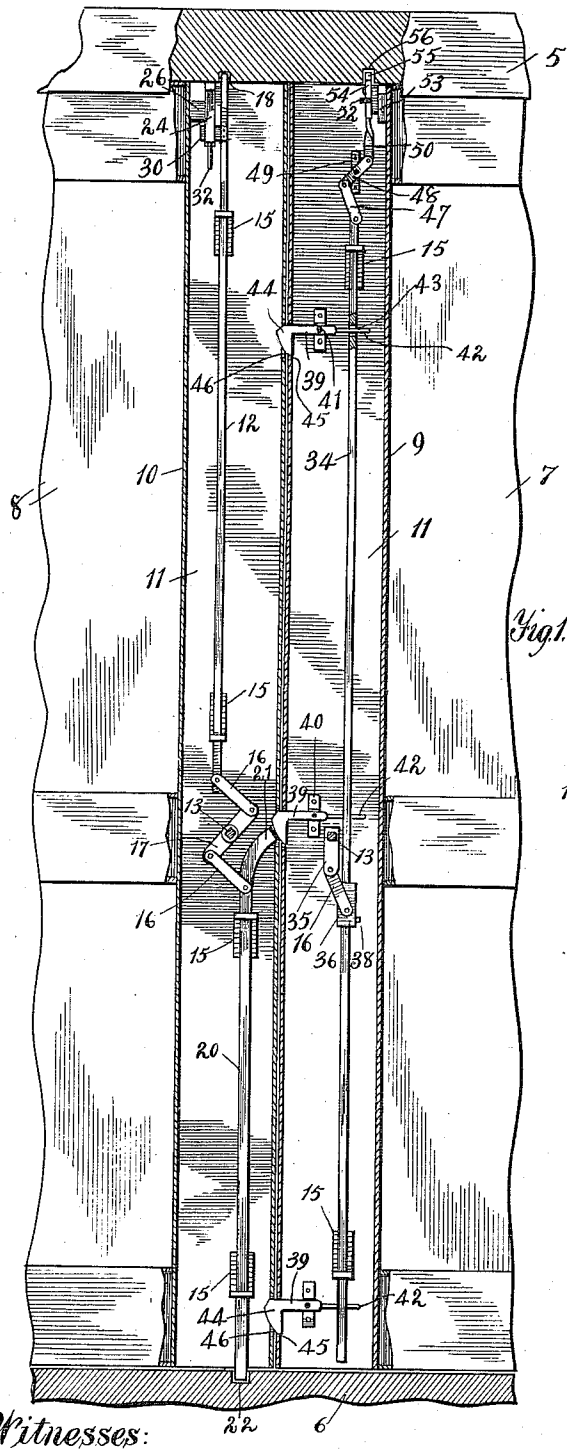

Fig. 1.

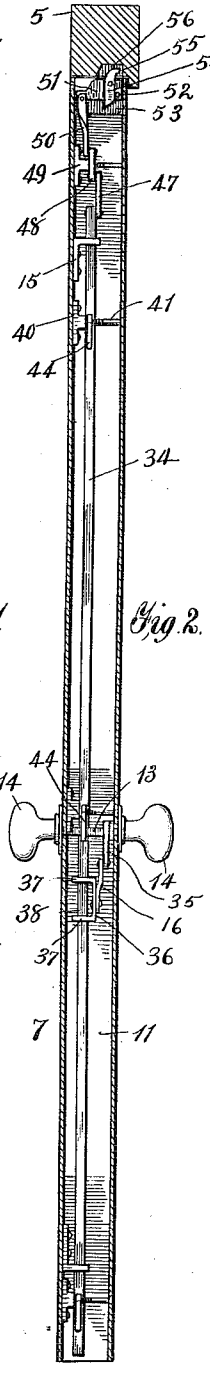

Fig. 2.

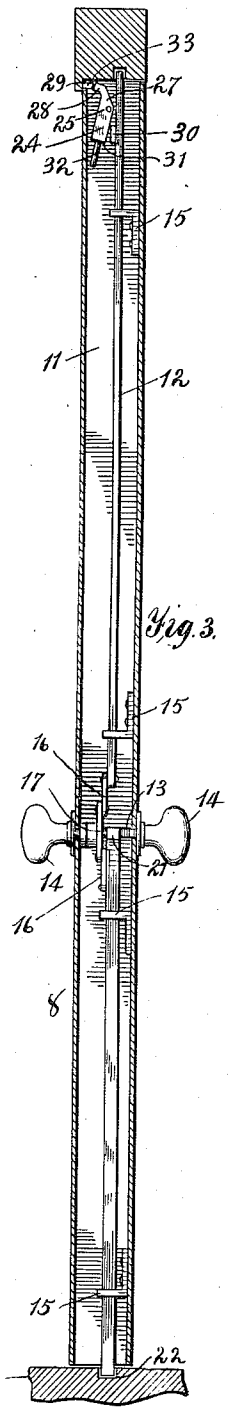

Fig. 3.

Witnesses:

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DOOR-LOCKING MECHANISM.

998,642. Specification of Letters Patent. Patented July 25, 1911.

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To all whom it may concern:

Be it known that I, THOMAS P. SHEAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door-Locking Mechanism, of which the following is a specification.

My invention relates to door fasteners and refers more particularly to locking or latching mechanism especially adapted for securing closures commonly designated as fire doors.

The chief objects of the improvements which constitute the subject matter of this application for patent are:—to provide fastening means for hinged doors that will hold the latter securely at both top, bottom and middle, in order to prevent any tendency to warp and thereby leave cracks or openings through which the flames might pass in case of fire; to permit the doors to be automatically latched by the act of closing; and to accomplish the latching and unlatching of the doors by means of an ordinary latch spindle having knobs of usual appearance, the necessary mechanical movements being accomplished by turning the knobs in the usual manner, so that a person unfamiliar with the doors and their latching mechanism will be able to operate them without special introduction or skill.

Other features of importance are the automatic devices for holding the locking bolts in retracted position while the doors are open, thus preventing the lower bolt from dragging upon the floor or striking the sill when the doors are moved to closed position.

I accomplish the desired results by means of the devices illustrated in a preferred form in the accompanying drawing which forms a part of this application, the important details of construction being shown in the following views:—

Figure 1 is a front elevation of portions of a pair of coöperating doors forming a closure for a single opening the lock stiles being in section to disclose the mechanism, and Figs. 2 and 3 are vertical transverse sectional views taken through the stiles of the right and left hand doors, respectively shown in Fig. 1.

Referring to the details of the drawings, the numeral 5 indicates a lintel and 6 the sill of a doorway closed by right and left hand hinged doors designated 7 and 8, respectively. These doors are preferably made of sheet metal, all the parts being formed with double walls so that the door is hollow throughout, and particularly the lock stiles 9, 10, which abut and are interlocked when the doors are in closed position shown in Fig. 1. Within the cavities 11 of said stiles is arranged the locking mechanism. The mechanism of the left-hand door will be first described, since this door must be closed and bolted before the coöperating door is shut. This door 8 is secured by bolts which enter suitable sockets in adjacent portions of the sill and lintel. The upper bolt is a square rod or bar 12, long enough to extend from the top of the door to the vicinity of the knob spindle 13, which latter passes entirely through the stile and is furnished with knobs 14 on the projecting ends of the spindle in the usual manner. This bolt is slidably supported and guided in angle bracket-plates 15 secured to one of the inner side walls of the stile, and the lower end of the bolt is attached by a link 16 to one end of a rock-arm 17 fixedly mounted upon the knob spindle 13. When the bolt is projected upward by the suitable turning of the spindle its upper end enters a recess or socket 18 in the lintel 5, and thus holds the door securely locked at this point. The lower bolt 20 is a bar square in cross-section but designedly heavier than the bolt 12, is slidably mounted and guided in bracket plates 15 in the same way as the member 12, and connected near its upper end by a link 16 to the lower end of said rock-arm 17. The upper end 21 of the said bolt is curved toward the front edge of the door as shown in Fig. 1 for a purpose hereinafter explained. It will be evident that the said locking bolts 12 and 20 may be slid in their bearings 15 by turning the spindle 13 to which the double rock-arm 17 is secured. This is done only to retract the bolts for, when the knob 14 is released the weight of the lower bolt 20 is sufficient to cause it to fall into a socket 22 in the sill 6, while at the same time, through the action of the links 16 and the arm 17 it will project the upper bolt 12 to the locking position shown in Fig. 1.

As the gravity of the bolt 20 tends to normally project both bolts, it will be evident that some provision must be made to prevent the projecting ends of the bolts from interfering with the lintel and threshold respectively, and thus requiring the manipulation

of the knob 14 to retract them before the door could be completely closed. To overcome this condition I provide a bolt-retracting device constructed and arranged as follows:—At the top of the stile of door 8 is a swinging gravity-acting dog 24, pivoted at 25 to a bracket 26 secured to the stile wall. The upper end of the dog is lightened by cutting away one corner, as indicated at 27, and is furnished at the extremity with a tooth or projection 28 which is in alinement with a notch 29 in the upper edge of the opposite wall of the stile (Fig. 3). The bolt 12 is provided with a lug 30 adapted to engage the shoulder 31 near the lower end of the dog 24 when the said bolt is retracted, a stop pin 32 on the dog holding the bolt and dog so that they may be readily disengaged which is accomplished by a pin or lug 33 attached to the lintel and adapted to project through the notch 29 to engage the tooth 28 and swing the dog to the position shown in Fig. 3. The movement just described will disengage the lug 30 and dog 24 and allow the connected bolts 12 and 20 to be automatically projected by the action of gravity so that their outer ends will engage their respective recesses as previously explained.

The coöperating door 7 is provided within its stile with a vertically latch-operating rod 34, slidably mounted in bracket-plates 15. The said rod is operated from a spindle 13 by an arm 35, pivotally connected by a link 16 to a slide plate 36, having right-angled flanges 37, through openings in which the said rod passes. This slide plate is loosely mounted so that the rod 34 may have a limited movement independently thereof. When the slide is moved upward by turning the spindle 13 it will engage a stop-pin 38, fixed in and projecting from the rod, and carry the latter with it, the return movement being accomplished by gravity. When in its lowest position, the rod is supported by the spindle 13 through the engagement of the slide 36 by the stop pin 38. The reciprocation of the rod 34 operates latches or bolts 39, arranged near the top, middle and bottom of the stile. Each latch 39 consists of a body pivoted to a support or bracket 40 by a bolt or screw 41. The rear end of the body is furnished with a pin 42 which passes through a slot 43 (see upper latch Fig. 1) in the rod 34. The front ends are shaped into hooks 44 which are adapted to project through slots 45 in the stile edge when the latches are in their operative positions, shown in Fig. 1, and when so extended the hooks will engage corresponding slots 46 in the margin of the stile of the cooperating door 8. By this arrangement the latch hooks will be swung downward by the upward movement of the said rod 34, thus releasing the door 8, and when the rod descends by gravity the latches will be restored to their operative extended positions shown in Fig. 1. During the act of closing the door 7 the latches must be retracted to avoid striking the stile of the opposite door which should be shut first, and while this retraction of the latches may be done by turning the spindle 13, it is desirable to accomplish this automatically, and for this purpose mechanism is arranged as follows:—The upper end of the rod 34 is connected by a link 47 with the lower end of a rock-arm 48, mounted on a block 49, the opposite end of the arm being connected by another link 50 with a plate 51, pivoted at 52 to a support 53 in the stile. Upon the side of the said plate 51 is pivotally mounted a gravity dog 54. The lower portion of said dog engages the pivot 52, which projects to form a stop when the dog is swung to that side, as shown in Fig. 1, and the upper end of the dog is provided with a curved end 55 which normally projects above the upper edge of the door, and is received in a recess 56, formed in the lower face of the lintel 5 when the door is closed. It will be understood that when the door is swung shut, the lug 55 will strike against the downwardly projecting outer face of the lintel, depress the free end of the plate 51 because of the stop 52, and as the plate is depressed it will elevate the rod 34 through the action of the links 50, 47, and the arm 48, and thus retract the latches 39, which will remain retracted until the dog 54 enters the recess 56, when the dog and all other connected members will be restored to normal positions by gravity. As the door is swung open, the dog 54 will be depressed by being turned upon its pivot by engagement of the curved upper end with the face of the lintel.

In operating the fastening devices hereinbefore described, it is to be noted that when the doors are both open, the left hand door 8 should be closed before the door 7 is shut, and when opening the doors, the said right hand door is operated first. The proper sequence in opening the doors is secured by means of the deviation of the upper end 21 of the lower bolt 20, which end is so located that the middle latch 39, when extended, will project into its path, and thus prevent the door spindle 13 of door 8 from being turned until the said latch is withdrawn by depressing its outer end as described.

Having thus described my invention what I claim as new is:—

1. In door-locking mechanism, the combination with a swinging door, of a knob-spindle extending through the door lock-stile, of a rod slidably mounted in said stile, means operatively connecting said rod and spindle, latches pivoted in said stile and operated by said rod, means engaging the latches when in operative position, and

means independent of the spindle for automatically moving said rod into unlocking position, said means operated by the closing of the door.

2. In door-locking mechanism, the combination with a swinging door, of a rod slidably mounted on said door and adapted to be moved by gravity into locking position, hook-shaped latches pivoted on the door and having extensions operatively engaged by said rod, manually operated means for moving said rod into unlocking position, and means on the door frame for automatically moving said rod into unlocking position, said means operated by the closing of the door, and means engaging said latches when projected.

3. In door-locking mechanism, the combination with coöperating swinging doors, of a gravity acting rod slidably mounted on one of said doors, pivoted latches engaged and operated by said rod and adapted to engage the other door, manually operated means for moving said rod to unlocking position, and means on said rod and the door frame for automatically moving said rod to unlocking position by the closing of the door.

4. In door-locking mechanism, the combination with companion doors having hollow lock stiles with registering openings in their meeting edges and one of said stiles having openings in both ends of rods arranged in one of said stiles and adapted to be projected by gravity through the end openings of said stile means for manually operating said rods, means for holding said rods from projection when the door is open, means for releasing said holding means through the closing of the door, a rod slidably mounted in the stile of the other door, latches operatively connected with said rod and adapted to project through the openings in the edge of said stile into the openings in the edge of the companion stile, and one of said latches adapted to engage one of the rods in the other stile and thereby hold said rods in their projected position, means for manually operating the latch connected rod, and means for automatically operating said latch connected rod.

5. In door-locking mechanism, the combination with a pair of coöperating doors, and knob spindles for the doors, of a rod slidably mounted upon one of said doors, connection between said rod and the corresponding spindle, a plurality of latches operatively connected with said rod and adapted to engage the adjacent door, means for automatically operating said rod independently of the spindle by the closing of the door, a plurality of bolt rods in the said adjacent door, operative connection between said bolt rods and their knob spindle, one of said bolt-rods coöperating with one of said latches for preventing the movement of said bolts until said latch is withdrawn.

6. In door-locking mechanism, the combination with a pair of coöperating doors, and knob-spindles therefor, of bolts operatively connected with the spindle of one of said doors and adapted to be respectively extended beyond the top and bottom of the door, means for retaining said bolts in inoperative position, means for automatically releasing said bolts, a plurality of latches mounted upon the opposite door and adapted to be extended to engage the first mentioned door, one of said latches when so extended being within the path of one of the said bolts, operative means connecting said latches with the corresponding spindle, and means for automatically retracting said latches independently of the action of said spindle.

In testimony whereof I affix my signature in the presence of two witnesses.

THOMAS P. SHEAN.

Witnesses:
M. A. MILORD,
H. DE LOS HIGHMAN.