T. P. SHEAN.

DOOR LOCKING MECHANISM.

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980,131. Patented Dec. 27, 1910.

Fig. 1.

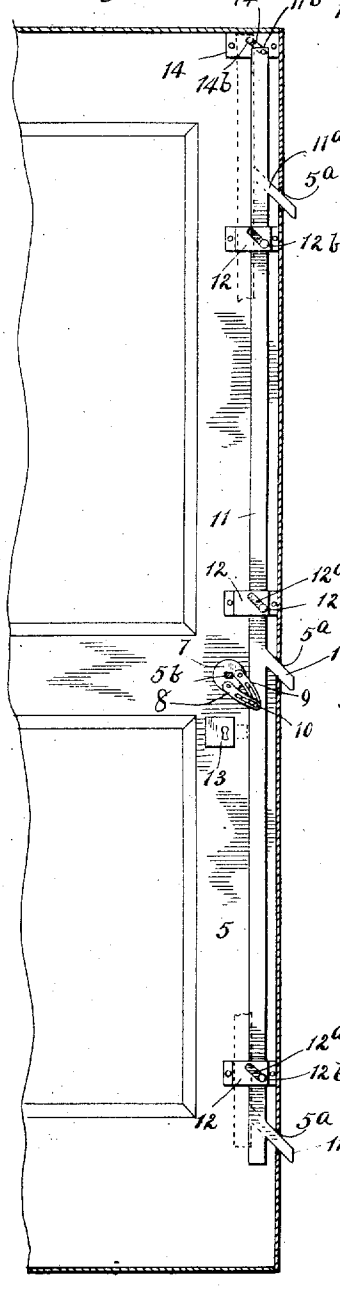


Fig. 2.

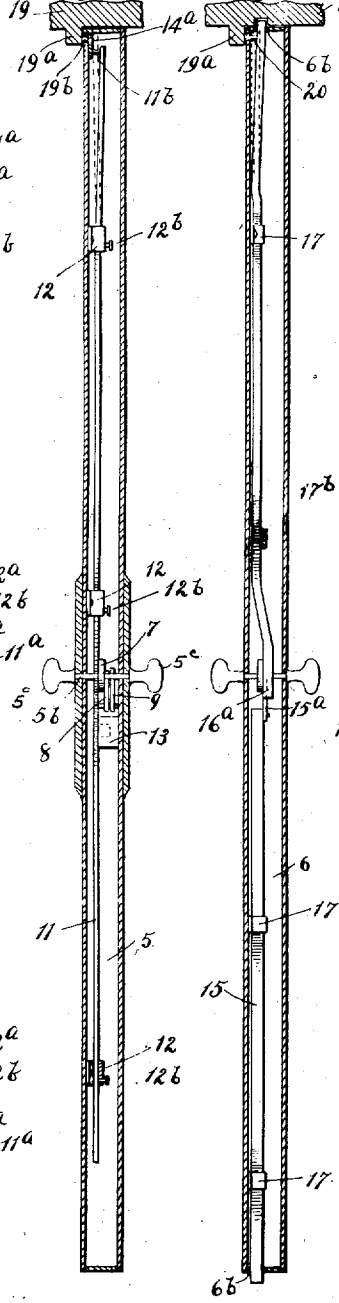
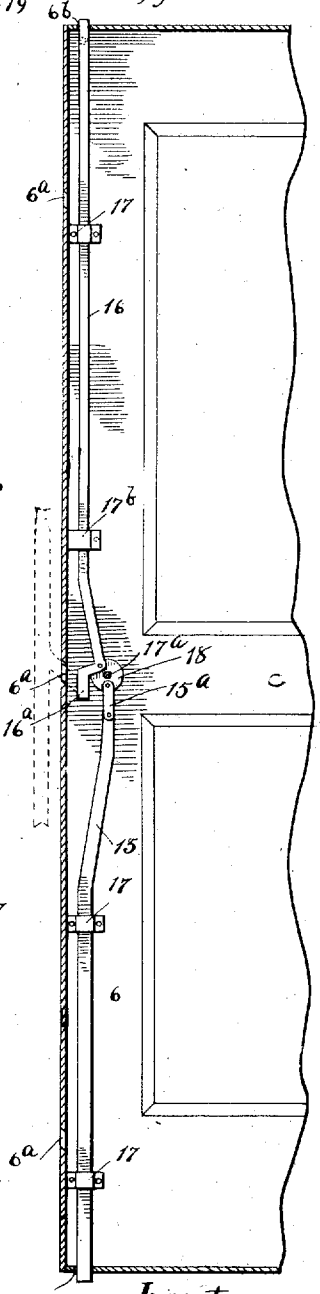


Fig. 3.

Fig. 4.



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DOOR-LOCKING MECHANISM.

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Application filed February 11, 1910. Serial No. 543,336.

To all whom it may concern:

Be it known that I, THOMAS P. SHEAN, 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.

This invention relates to improvements in locking means for fireproof swinging doors upon the general construction and arrangement disclosed in my co-pending application, Serial Number 530,287, and the especial object of the improvements forming the subject matter of this application is to provide locking bars that will lock two hinged doors together and to the frame in which they are hung without the aid of springs, and in which the action of gravity is utilized in the locking operations.

A further object of my improvements is to provide locking means having as few parts as possible, and to so combine and arrange these that they will operate effectively, and easily under all the conditions affecting devices of this character.

An additional object is to provide means whereby the door arranged to be closed in advance of the other must always be closed in that order.

Various other special objects and advantages are obtained by my improvements as will readily appear to those skilled in the art to which this invention relates.

In the accompanying drawing which forms a part of this application, I have shown my improvements in a preferred form in the following views:—

Figure 1 is a vertical sectional view of a portion of a hollow metal door to which my locking mechanism is applied, the latter being shown in elevation; Fig. 2 is a vertical cross-section of the lock-stile of the door shown in Fig. 1, with an edge-view of the locking parts; Fig. 3 is a vertical cross-section of the lock-stile of the companion door to the one shown in Figs. 1 and 2, and Fig. 4 is a vertical section of a portion of the companion door with its locking bars shown in elevation.

Referring to the details of the drawing, 5 represents the hollow lock-stile of a swinging sheet metal door hereinafter called for convenience, the left-hand door and 6, correspondingly illustrates the lock-stile of the companion door, hereinafter called the right-hand door. The meeting edge of the stile of the left-hand door is provided at equidistant points with openings 5^a, and the corresponding edge of the right-hand door is provided with openings 6^a which register with the openings 5^a when the doors are closed. A knob-spindle 5^b extends through the stile 5 and is provided with knobs 5^c on its ends in the usual manner. Mounted on the spindle within the stile, is a circular plate 7, on which are pivoted two curved links 8 and 9, near the outer ends of which are slots which effect a limited sliding engagement of the links with a pin 10 projecting from the adjacent side of the latch-bar 11.

The latch-bar 11 extends nearly the entire length or height of the door. It is a flat metal bar provided along one edge with inclined tumblers or bolts 11^a which are adapted to slide easily through the openings 5^a, the walls of the latter being inclined to correspond with the edges of the bolts. The latch-bar 11 is slidingly mounted in three metal straps or keepers 12 which are riveted to one side of the door stile and have slideways adapted to permit lateral as well as vertical movement to said bar. Each of the straps 12 has a slot 12^a cut diagonally therein, the inclination of which corresponds to that of the bolts 11^a. Slidingly fitted in each slot is a pin or bolt 12^b which is fixed in and projects from the bar 11.

At the upper end of the bar 11 a pin 11^b is fixed so as to project outwardly toward the contiguous face of the door, and extends through the inclined slot 14^a of the plate 14 which is riveted to said face. Opposite the upper end of the slot a hole 14^b extends through the sheet metal side of the door and the pin 11^b will spring into this hole owing to the deflection of the bar in that direction when the bar is raised its full limit. A pin 19^b projects a short distance from the door-strap 19^a of the lintel 19 of the door-frame. This pin is so positioned that when the door is closed against the door stop 19^a said pin will pass through the hole 14^b and strike against the pin 11^b (the bar 11 being raised) and push the latter with the bar inwardly.

As soon as the pin 11[b] is pushed through the hole in the door it will be free to slide in the slot 14[a] and gravity will cause the bar 11 to drop and thereby project the bolts through the openings 5[a]. The deflection of the bar 11 resulting from the action of the pin 19[b] is indicated by full lines, Fig. 2.

In the lock-stile of the right-hand door are slidingly mounted locking-bars 15 and 16, both of which are preferably square in cross-section, but bar 15 is somewhat heavier than bar 16. Bar 15 is pivotally connected with a circular plate 18 on the knob spindle 17[a] by a short link 15[a]. Bar 16 is directly pivoted on said plate at a point nearly diametrically opposite the pivotal connection of the link 15[a]. The lower end of the bar 16 terminates in an outward and downward hook-shaped extension 16[a], which occupies a position opposite the central opening 6[a]. The bars 15 and 16 are vertically slidable in keepers 17 riveted to one side of the stile, and their ends are adapted to be projected through openings 6[b], in the top and bottom rails of the door in which they are mounted, and when projected will enter suitable recesses in the frame lintel and sill, the latter opening not being illustrated. The bar 16 is deflected at a point above the upper keeper 17 so as to normally lie close to the adjacent wall of the door stile from the point of deflection to its upper end. Through the stile wall against which the bar 16 lies, and near the upper end of the latter a hole is provided which is arranged to receive, when the door is closed, a pin 20 which projects from the door stop 19[a] so that its end will strike against the bar 16 and push it from the contiguous wall of the stile. It will be noted that the hole 6[b] in the top of the door is out of alinement with the bar 16 when the latter is in its unlocked or unprojected position, so that the end of said bar unless pressed by the pin 20, will lie under the portion of the top rail wall adjacent to said hole, and that when in such position it will be prevented from passing through said hole. So that, when the right-hand door is free from contact with the pin 20, which it will always be when the door is open, and the bars 15 and 16 are retracted, gravity cannot act to project the bars, for, though the heavier bar 15 in its downward movement would push upward the bar 16 if the latter were not held against such action, it would be impossible for such action to take place so long as the upper end of the bar 16 abuts against the top wall of the top rail of the door, as indicated by dotted lines, Fig. 3.

It will be understood, that a very slight deviation of the bars 11 and 16 only is required to effect the operations above described, and this will be permitted by the nature of the material from which said bars are made, the location of the keepers 12 and 17 respectively and the slight deflection effected by bending the bars as indicated in Figs. 2 and 3.

When the latch-bar 11 is projected, its middle bolt 11[a] will lie in close proximity to the outer edge of the hook 16[a] as indicated by dotted lines, Fig. 4, and it will be obvious that when in such position, the bar 16 cannot be moved, its pivotal connection with the plate 18 being such that when projected or in locked position, it can only be moved downwardly and its shape being such that when moved downwardly, the hook 16[a] will move outwardly or toward the bolt 11[a]. Hence it will be necessary, to effect the opening of the right-hand door, that the latch on the left-hand door be first operated to disengage it from the right-hand door. The slight lateral movement of the lower portion of the bar 16 is provided for by leaving the strap 17[b] open at the side toward which such movement takes place.

The unlatching of the bar 11, may be prevented by a lock 13 secured within the stile 5 and so arranged that its bolt, when projected, will impinge against the rear or inner edge of said bar, as indicated in Fig. 1.

It will be noted that the relative arrangement of the slotted curved links 8 and 9 and disk-plate 7, is such that said links will lift the bar irrespective of the direction in which the knob-spindle is turned.

In opening the left hand door the knob-spindle 5[b] is turned, thus raising the bar 11 and freeing the bolts 11[a] from the openings 6[a] in the companion door or in whatever openings may be provided therefor. As the door is swung on its hinges the pressure of the pin 19[b] will be released from the pin 11[b] so that the latter will be forced into the hole 14[b] in the door opposite the upper end of the slot 14[a], and as soon as the pin enters said hole the pin will be held therein and thus the bar 11 will be held in its inoperative position until the left-hand door is again closed. If the left-hand door should by inadvertence be closed in advance of the right-hand door, the bolts 11[a] would project and thus the right-hand door would strike against them and closing be made impossible, hence it will be seen the locking mechanism is so constructed and arranged that the doors must always be closed and opened in the predetermined order.

I claim:—

1. In door-locking mechanism, the combination with a door and door-frame, of a gravity acting bar mounted on the lock stile of said door to slide vertically and laterally, bolts connected with said bar and adapted to be projected from the lock-stile of the door, means for manually lifting said bar, means

coöperating with said bar for automatically locking it in its raised position, and means on the door-frame for automatically releasing said bar operative upon the closing of the door against the frame.

2. In a door-locking mechanism, the combination with a door and door-frame, of a gravity-acting bar mounted on the lock-stile of said door to slide vertically and laterally, bolts connected with said bar and adapted to be projected from the lock-stile in an oblique direction, a knob-spindle, means connected with the knob-spindle for lifting said bar, means for locking said bar in its raised position and means on the door-frame adapted upon the closing of the door, to push against said bar whereby said bar will be released from said locking means.

3. In door-locking mechanism, the combination with a door and door-frame, of a gravity-acting latch bar mounted on the lock stile of said door to slide obliquely, bolts connected with said bar and extending in the direction of the movement of said bar, means for lifting said bar, means for automatically locking said bar in its lifted position, and means for automatically releasing said bar, operative upon the closing of the door against its frame.

4. In door-locking mechanism, the combination with a hollow metal door-stile having inclined openings in its edge, of a latch-bar arranged within said stile, bolts connected with said bar and adapted to slide in said openings, means mounted in said stile to guide said bar in an oblique direction, and means for operating said bar.

5. In door-locking mechanism, the combination with a door, a latch-bar mounted to slide obliquely on said door, a knob-spindle mounted transversely to said bar, a plate on said spindle, and slotted links pivotally connected with said plate and bar and adapted to lift said bar when the spindle is turned in either direction.

6. In door-locking mechanism, the combination with a door having an opening in its upper edge and a hole in its side near upper edge, a door-frame having means pin adapted to project through said opening when the door is closed, a locking-bar slidably mounted in said door and adapted to be deflected by said pin and to extend through said opening when deflected, and means for operating said bar.

7. In door-locking mechanism, the combination with a door having an opening in its upper edge and a hole in its side near its upper edge, a door-frame having means adapted to extend through said hole when the door is closed, a locking-bar slidably mounted in said door and adapted to be deflected by said means and to extend through said opening when deflected, manually operable means for depressing said bar and gravity operating means for raising said bar.

8. In door-locking mechanism, the combination with a door-frame, of two complementary doors, a latch-bar mounted on one door and adapted to engage the companion door, a locking-bar mounted on the companion door and adapted to engage the door-frame, means on their respective doors for holding the latch-bar and the locking bar in inoperative positions, means on the latch-bar for preventing the operation of the locking bar and means on the door-frame for automatically releasing both latch-bar and locking-bar from their inoperative positions when said doors are closed.

9. In door-locking mechanism, the combination with a door-frame, of two complementary doors, a gravity acting latch-bar mounted on one door and adapted to engage the companion door, means for automatically locking said latch-bar in inoperative position, a gravity-acting locking-bar mounted on the companion door and adapted to engage the door-frame, to be engaged by the latch bar, and to be automatically held in inoperative position, and independent means on the door-frame for automatically releasing both latch-bar and locking-bar from their locked positions.

10. In door-locking mechanism, a door-frame, a door having a hollow metal stile, a locking-bar slidably mounted in said stile, said bar having a hook-extension at its lower end and having its upper end held within said stile in inoperative position when the door is open, means adapted to engage said hook extension to prevent the sliding of said bar, means on the door-frame for deflecting the upper end of the bar, said means operative upon the closing of the door, and gravity operated means for sliding said bar to locking position after said upper end has been deflected.

11. In door-locking mechanism, the combination of a door-frame, a pair of doors hinged on said frame, a latch-bar on one door held in inoperative position when the door is open, a locking-bar on the other door held in inoperative position when the door is open, means on the latch-bar and means on the locking-bar adapted to coöperate when the doors are closed and the latch-bar and locking-bar are in operative positions whereby the locking-bar cannot be moved to its unlocked position until the latch-bar has been moved to its unlatched position, and independent means on the frame for releasing said latch-bar and locking-bar from inoperative positions when said doors are closed.

12. In door-locking mechanism, in combi-

nation with a hollow metal door stile having openings in its meeting edge, a gravity acting latch-bar arranged within said stile and having inclined bolts rigidly connected therewith and extending through the openings in said stile, means for guiding and supporting said bar within the stile, means for normally operating said bar, and means for receiving said bolts when in projected position.

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

THOMAS P. SHEAN.

Witnesses:
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M. A. MILORD.