

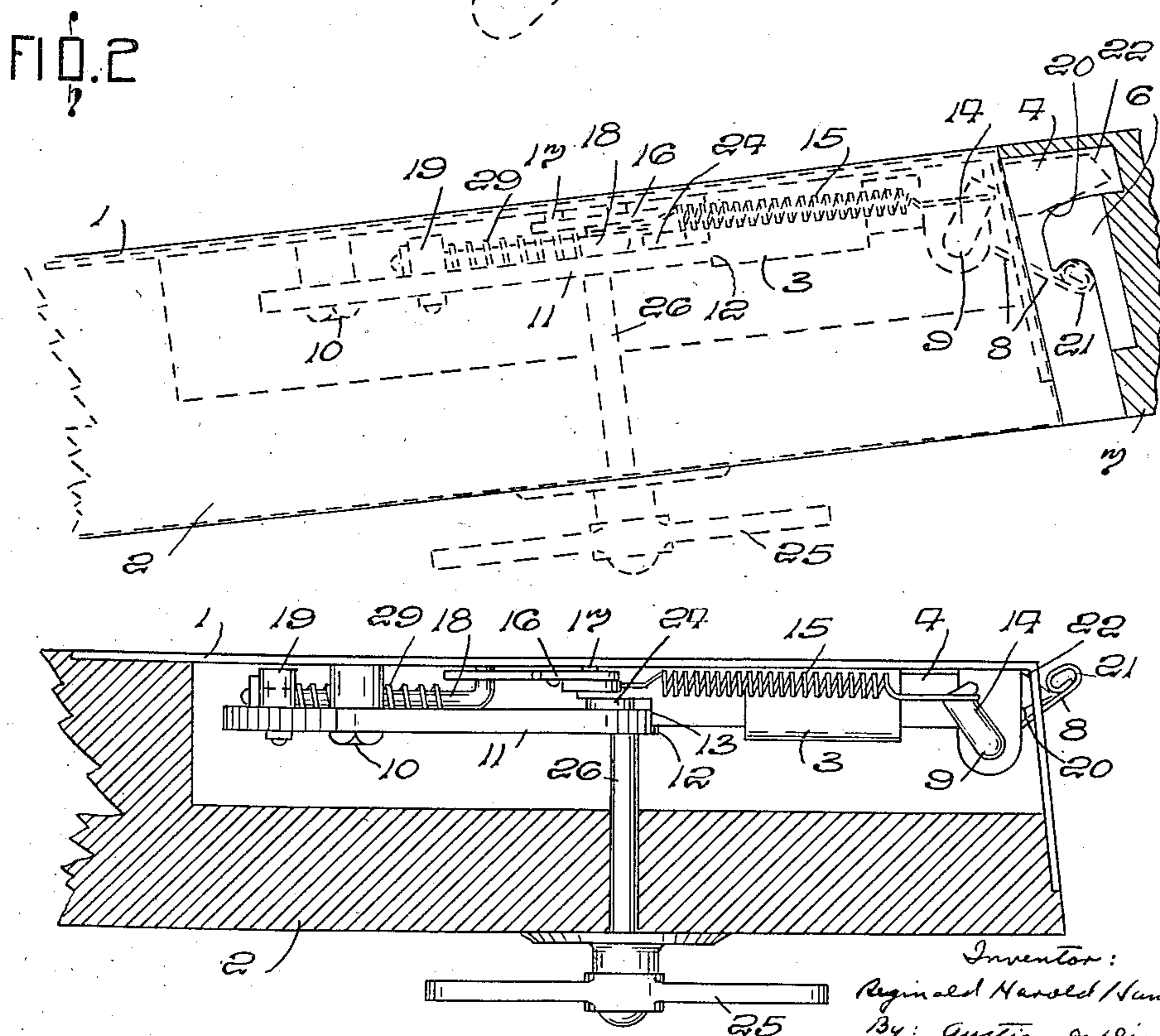
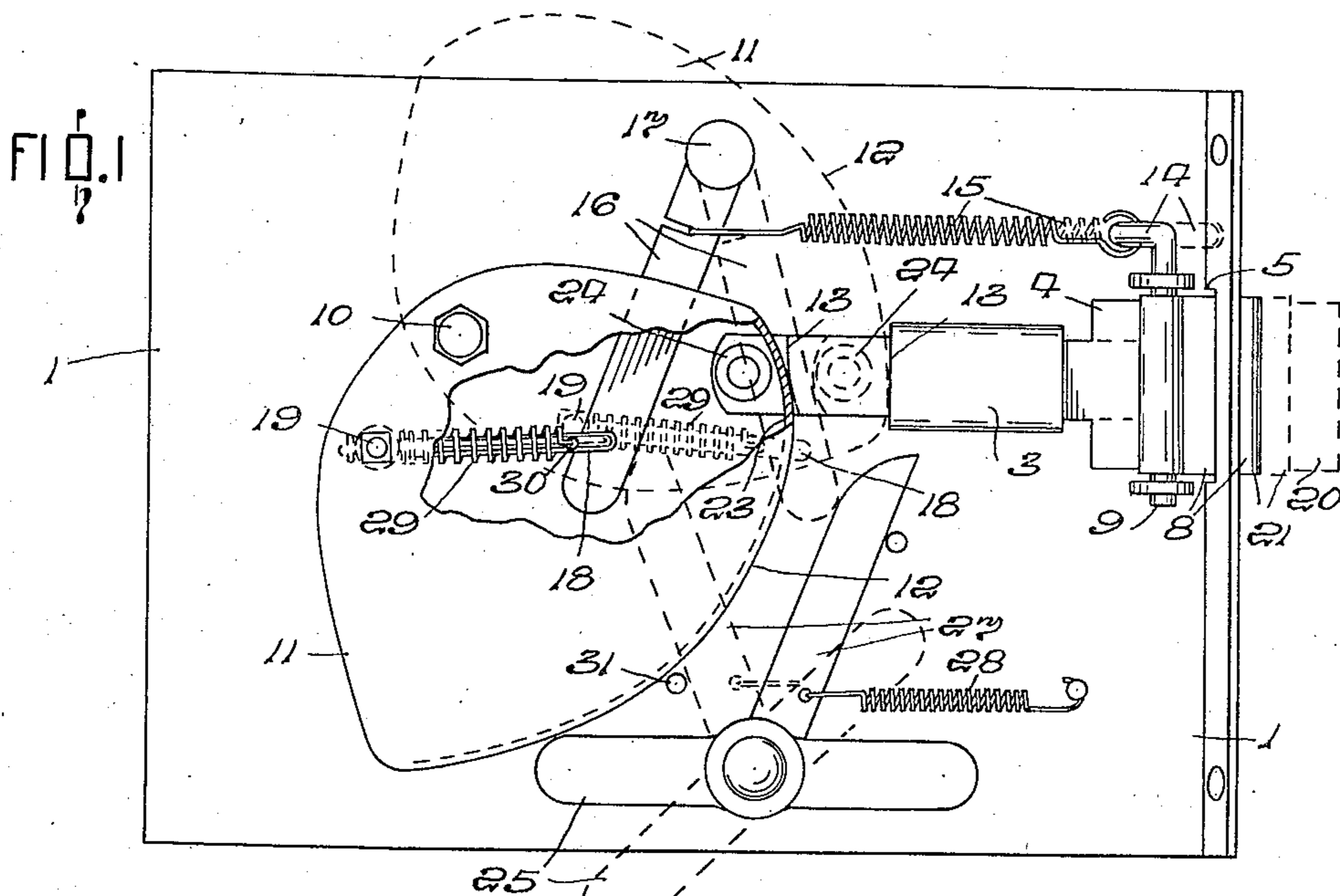
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LATCH

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## LATCH

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This invention relates to latches for use in retaining doors, windows and the like in the closed condition.

In latches for this purpose as hitherto constructed, there has been employed a latch-bolt urged by a spring into a position in which, when the door is closed, it is adapted to engage a catch-plate mounted upon the stationary door-frame and from which position such bolt is retractable manually by means of a suitable handle. The bolt has usually been bevelled at the side at which it first meets the catch-plate, or provided with a roller, in order that when the door is slammed or closed without using the handle, the bolt may be retracted by contact with the catch-plate sufficiently to enter the part of the latter with which it is designed to engage, as above mentioned.

A construction of this kind is open to several serious objections. For example, apart from the ever present possibility of breakage of the spring, the latter, which is necessarily of considerable strength, exerts an increasing force upon the bolt when the latter is being moved in the retracting direction, thereby occasioning considerable effort in operating the handle, or in closing the door without the use of such handle. Again by reason of the fact that the action of the spring is at a minimum when the bolt is in the shot or advanced position in which it is engageable with the catch-plate, it is not practicable to employ the bolt as a means of pressing the door firmly against the jambs of the door-way or to use a latch of this description upon a door in which padding is interposed between the door and the jambs as would be desirable in order to prevent noise through rattling and to effectively exclude draughts.

It is the object of the present invention however to provide a latch of novel and peculiar construction whereby the use of a spring, as the means for actuating the bolt, will be eliminated and whereby the bolt will be operated in a novel and advantageous manner affording an easy and convenient action in opening and closing the door and providing also for the pressing and retaining of the door against the jambs by means of the bolt.

The invention is such also that it may be applied both in the construction of new latches and also in the conversion of latches of the existing type.

With these and other objects the present invention includes briefly a lever or other member movably mounted in the latch-frame and designed normally to occupy a position wherein it

serves to retain the latch-bolt in the retracted condition, said lever or member being adapted as the door is closed, to come in contact with an object mounted upon the stationary door-frame such for instance as a portion of the catch-plate and by which means the said lever or member is displaced from its said normal position to one in which it releases its said retention of the bolt and advances the latter to a position of engagement with the catch-plate.

The arrangement is such also that the said movement of the lever or member by the object upon the door-frame progresses while the closing of the door continues thereby causing the bolt to be advanced to a greater and greater extent as the door is forced home against the jambs.

In a preferred form of the construction also the side of the bolt, which co-operates with the catch-plate in retaining the door closed, is sloped at a suitable angle to present to the catch-plate a wedge-surface adapted as the result of the above mentioned progressive advance of the bolt, to force the door more and more firmly against the jambs.

In order that the nature of the invention and its construction may be clearly understood, it will now be fully described and explained with reference to the accompanying drawing showing, by way of example, a preferred form of such construction and in which:—

Fig. 1 shows the latch in side elevation with the bolt in the retracted position, the corresponding positions assumed by the parts when such bolt is advanced being indicated in dotted lines, and,

Fig. 2 illustrates in sectional plan view, a portion of a door such as that of a motor-vehicle fitted with the latch and occupying a partly open position, while the corresponding closed condition of such door is indicated in dotted lines.

In a preferred form of the construction, as here shown 1 represents a latch-housing of any suitable or appropriate form adapted for mounting upon a door 2 or in a mortice formed in the latter and in which housing is mounted as for instance by means of a guide 3, a sliding bolt 4 which, when advanced, protrudes through an opening 5 in order that such protruding part may engage an abutment such as a catch-plate or keeper 6 mounted upon the frame 7 of the door-way, thereby to retain the door closed as desired.

According to the present invention, the power employed in thus advancing the bolt 3, is provided by means of a lever or member 8 pivoted or fulcrumed upon an axis 9 fixed within the

housing 1, a portion of such lever 8 being arranged to protrude at the exterior of the housing, as through the aforementioned opening 5 and thus come in contact with and be turned by the

catch-plate 6 when the door is being closed. Within the housing 1 and pivoted thereto, as at 10 is a cam 11 which when turned operates upon the bolt 4 to produce the sliding movement of the latter. For this purpose, in a preferred form of the construction as here shown the said cam is formed with an operative surface 12, eccentric to the pivotal centre 1, engageable with a shoulder 13 upon such bolt.

For the purpose of thus turning the cam the aforementioned lever or member 8 is provided with an arm 14 connected, preferably by a spring 15, with a lever 16 fulcrumed as at 17 to the housing 1, while the said lever 16 is in turn connected, by means of a link or connecting-rod 18 with a suitable point 19 upon the cam 11 eccentric to the pivotal axis 10 of the latter.

The arrangement is such that the bolt 4 being in the retracted position and the door open, the closing movement of the door will bring the lever or dog 8 into engagement with the catch-plate 6. Thus as the door-closing movement proceeds the said engagement by the catch-plate will serve to progressively turn the lever 8 which, acting through the intermediate parts represented by the arm 14, spring 15, lever 16 and cam 11 will serve to advance the bolt 4, the protruding end of which in consequence is caused to engage the catch-plate 6 as in dotted lines Fig. 2.

According to the present invention also the said protruding end of the bolt 4 at the side thereof which co-operates with the catch-plate in retaining the door closed, is sloped at a suitable angle, to present to the catch-plate a wedge surface as 20 adapted as the result of the above mentioned progressive advance of the bolt, to force the door more and more firmly against the jambs.

In a preferred form of the construction also resilient means are introduced into the said operative connection between the lever 8 and the bolt 4 in order to provide a slight tolerance in the operation to compensate for any small inaccuracies such as are liable to occur in the manufacture of the latch or in fitting the same to the door.

In the form of the construction here shown this resilience is provided by making the connection 15 in the form of a spring in which, during the movement of the lever 8, power may be stored up to be utilized in advancing the bolt and keeping the same in live engagement with the catch-plate.

This provision also serves to protect the parts from injury in the event of the latch being incorrectly operated or deliberately abused, as for instance in the event of the door being closed while the bolt 4 is held in the retracted position by the manually operable retracting means hereinafter described.

Where resilient means are incorporated, as above mentioned, the latch-bolt will preferably be arranged to continue its advancing movement until arrested by friction occasioned by pressure of its sloping surface 20 with the co-operating surface of the catch-plate 6. This will occur slightly before the lever 8 has completed its operative movement and consequently during the remainder of such movement the lever will store up, in the resilient means, energy tending to urge the bolt still further in the advancing direction.

Such arrangement will be advantageous both in providing a smooth action and also in ensuring at all times a firm and secure retention of the door in the fully closed condition by the bolt.

If desired, a very stiff spring or other member could be used to connect lever 16 to the member 14 so as to act substantially the same as a rigid member.

The said lever 8 is preferably designed also to retain the bolt 4 in its retracted condition. Thus for example in the form here shown this purpose is accomplished by forming the extremity of such lever with a roll or lateral projection 21 adapted to overlies and receive the extremity of the bolt when in this condition.

In practice also the point of the bolt 4 may be bevelled slightly as at 22 at the side at which it first encounters the catch-plate 6 in order to facilitate its engagement with the latter in the event of the door being closed when such bolt is not in its fully retracted position in which it is retained by the formation 21, as above described.

In order that in such cases the bolt may be capable of being retracted slightly in response to such contact of its bevelled surface 22 with the catch-plate, the portion of the cam-surface 12 which produces the initial advancing movement of the bolt is preferably designed to operate upon the bolt with a reversible action in which, under such conditions, an inward thrust applied to the bolt will produce a turning of the cam in the direction in which it permits such retracting movement of the bolt.

From this stage onward however the cam surface is preferably arranged to advance the bolt with an irreversible action thereby positively locking such bolt against retraction and so precluding the possibility of such bolt working back and so relaxing its restraint upon the door.

This irreversible action of the cam, although perhaps not necessary in latches generally, might with advantage be employed in those used for the doors such as those of motor-vehicles and the like where, owing to the strain occasioned to the body structure in turning corners etc., the door openings are apt to momentarily expand and contract, thereby tending to disturb the engagement of the bolt with the catch plate.

The retracting movement of the bolt is performed manually. For this purpose, in the form here shown, the cam 11 is provided with an inner operative surface 23 disposed parallel with the aforementioned surface 12 and engageable with an anti-friction roller 24 or shoulder or other suitable formation upon the portion of the bolt to the inner side of such surface 23. The arrangement is such therefore that the engagement of the roller 24 by the surface 23 will serve to retract the bolt when the cam is turned in the opposite direction to that in which it advances the bolt, as hereinbefore explained.

This manual turning of the cam may be effected in any suitable or convenient manner.

Thus for example, as here shown, there may be provided a handle 25 protruding from the side of the door and fixed upon a stem or spindle 26 pivotally mounted within the housing 1 where such spindle is provided with an arm 27 normally occupying, under the tendency of a spring 28, an inoperative position as here shown and from whence it is adapted to be turned by the handle 25 to engage and turn the aforementioned lever 16 in the opposite direction to that in which such lever is actuated by the connection 15.

This retracting movement entails but little

manual effort in operating the handle 25. Owing to experience in the use of hitherto existing latches, there is however a tendency for the operator to apply undue force to the handle. To guard against possible injury to the parts under such conditions, the link 18, which it will be noted acts in thrust in the bolt retracting movement, is preferably arranged to be slidable through its connecting pivot 19 upon the cam and such link is provided with a cushioning spring 29 interposed in compression between an anchorage point 30 upon such link and the pivot 19. The arrangement is such that while capable of withstanding the pressure necessary to perform the bolt-retracting movement of the cam, the said spring, under an excessive thrust will give, thus permitting the link to slide through the pivot to a slight extent and so cushioning the movement until the control handle strikes its limiting stop 31.

In operation, the door 2 is in the open condition and the latch-bolt 4 in its retracted position with its outer end engaged by the lever 8. The action of closing such door will bring the lever 8 into contact with the outer side of the catch-plate 6 which contact as the closing continues, causes such lever to turn upon its fulcrum 9 and thus through the arm 14, connection 15, lever 16 and link 18, turning the cam 11 in the required direction to cause the face 12 of the latter to act upon the shoulder 13 and so advance the bolt which, at this stage in the movement, has its point or outer end in alignment approximately with the opening or inner side of the catch-plate. Thus during the remainder of the closing operation the consequent continued turning of the lever 8 will serve to further advance the bolt 4, which, on account of the sloping surface 20 which it presents to the inner side of the catch-plate, will produce a wedging effect tending to force the door more and more firmly into the closed condition. This wedging effect of the bolt in forcing the door into a firmly closed condition with the door-frame 7 is accentuated by the power stored up in the resilient means 15 by the lever 8 as hereinbefore explained, while owing to the irreversible action of the cam at this stage, it will be impossible for such bolt to be accidentally retracted.

The positions thus assumed by the lever 8, bolt 4 and the parts co-operating to produce the advancing movement of the latter in response to the turning of such lever will be as here indicated in dotted lines.

When opening of the door is desired, the handle 25, which normally occupies an inoperative position, as here shown, is turned manually, thereby causing its arm 27 to engage and turn the lever 16 which, through the link 18, turns the cam 11 the inner surface 23 of which engages the roller 24 and thus returns the bolt 8 to its retracted position.

In the event of the bolt 4 being in a slightly advanced position when the door is being closed, the bevelled formation 22 of such bolt, on coming in contact with the catch-plate will serve to retract the bolt sufficiently to pass to the required portion of the catch-plate, since, as already explained the bolt at this stage is acted upon by the part of the cam-surface 12 which permits reversible action.

The construction as hereinbefore described, although considered advantageous for the purpose, is to be regarded as a practical example of

carrying the invention into effect and not as necessarily limiting such invention to the specific details of construction described and shown.

Thus for instance the latch bolt instead of being slidable within a guide as 3, may be otherwise movably mounted in the housing by any suitable equivalent means which will permit of its advancing and retracting.

It must therefore be understood that the invention embraces within its scope each and all of these and other modifications as would readily suggest themselves to those skilled in the art for the construction of the member 8 to operate in response to contact with a part upon the fixed door-frame and in the design of intermediate mechanism whereby the operative movement of such member 8 may be applied to perform the advancing movement of the latch-bolt.

A latch in accordance with the present invention may be incorporated in one frame or housing with the mechanism of a key lock, in accordance with the common practice in the construction of the mortice-lock or other types used upon the doors of a building, or such latch may consist of a separate article of any suitable size for use variously upon the doors of rooms, cupboards, windows or the like, or again the construction would be applicable to locks designed for special purposes, such for example as those employed upon the doors of motor vehicles, aeroplanes and the like.

Again in cases where a lock is employed, such lock may, if desired, be of the type adapted to render the handle inoperative for manually retracting the latch-bolt, thereby leaving the latter securely in engagement with the catch-plate until the function of the handle is restored by the use of the requisite key, or locking action.

I claim:

1. In a latch for a door or the like, a latch housing for attachment to the door, a latch bolt slidably mounted in said housing to engage a catch plate upon a stationary door frame, a pair of projections on said latch bolt, a cam member having a flange engageable between said projections, said member being pivoted to said housing, a thrust lever pivoted to said housing, a link pivotally connecting said cam and said thrust lever, a dog pivoted to said housing and adapted to engage the catch plate when closing the door, said dog having an arm, a spring connecting said thrust lever and arm, a handle pivoted to said housing and having a spring normally holding the handle in a given position, said handle having a lever engageable with said thrust lever for manually opening the door.

2. A latch of the type described, adapted to be mounted in a door having a cooperating door jamb with a catch plate, said latch comprising a latch housing, a latch bolt within said housing, a dog operatively mounted within and extending through said latch housing and adapted to contact said catch plate on the door jamb as the door is closed and to be actuated thereby, said dog being operatively connected to the latch bolt and adapted to move said latch bolt forward to engage in said catch plate to retain said door in closed position, said dog adapted, when occupying its normal position, to retain said latch bolt in retracted position.

3. In a latch for a door or the like, a latch housing for attachment to the door, a latch bolt movably mounted in said housing to engage a catch plate upon a cooperating door frame, a cam

member having a flange engageable with said latch bolt and adapted to advance and retract said bolt, said cam member pivoted to said housing and having the face of the flange thereof adapted to resist backward movement of said latch bolt when the same is in its substantially advanced position, a thrust lever pivoted to said housing, a link pivotally connecting said cam and said thrust lever, a dog pivoted to said housing and adapted to engage the catch plate when closing the door, said dog having an arm, a linkage connecting said thrust lever and arm, a handle mounted through said housing for manually operating the latch to open the door.

4. In a latch for a door or the like, a latch housing, a guide in said housing, a latch bolt slidably mounted in said guide and movable through an opening in said housing to engage a catch plate upon a stationary door frame to retain the door in closed position, a cam having engagement with said latch bolt to advance and retract the latter upon rotation of the cam, the face of said cam being so shaped as to permit reversible action of said latch bolt during the early stages of the advancing movement, a latch dog pivoted to said housing and engageable with said catch plate upon closing the door and a linkage connecting said catch dog and said cam for advancing said cam to advance the latch bolt when the door is closed and a handle having means for engaging said cam to withdraw said latch bolt manually to open the door.

5. In a latch for a door or the like having a cooperating door jamb with a latch bolt catch plate thereon, a latch housing adapted to be attached to the door, a latch bolt movably mounted in said housing, a pair of projections on said latch bolt, a member having a cam-shaped flange engageable between said projections, said member being pivoted to said housing, a thrust lever pivoted to said housing, a link pivotally connecting said cam and said thrust lever, a dog pivoted to said housing and adapted to engage the catch plate when said door is in closed position, said dog having an arm, a spring connecting said thrust lever and arm, a handle pivoted to said housing and having a spring normally holding the handle in a given position, said handle having a lever engageable with said thrust lever for manually opening the door.

6. In a latch for a door or the like having a cooperating door jamb with a latch bolt catch plate thereon, a latch housing adapted to be attached to the door, a latch bolt movably mounted in said housing, a member having a cam-shaped flange engageable with said latch bolt and adapted to actuate said latch bolt, said member being pivoted to the latch housing, a thrust lever piv-

oted to said housing, a link pivotally and resiliently connecting said cam and thrust lever, a dog pivoted to said housing and adapted to engage the catch plate when said door is in closed position, said dog having an arm, means for connecting said thrust lever and arm whereby said latch bolt is actuated by said latch dog.

7. In a latch for a door or the like having a cooperating door jamb with a latch bolt abutment, a latch housing having an opening therein, a latch bolt movably mounted in said opening to engage said latch bolt abutment to retain the door in closed position, a cam operatively connected to said latch bolt to hold said latch bolt in closed position, a latch dog mounted on said housing and adapted to hold said latch bolt in withdrawn position when the door is open, said latch dog being engageable with said door jamb upon closing the door, a linkage connecting said latch dog and said latch bolt to advance the latch bolt when the door is closed, and a handle to withdraw said latch bolt manually to open the door.

8. In a latch for a door or the like having a cooperating door jamb and a latch bolt abutment, a latch housing, a latch bolt mounted in said housing to slide horizontally and adapted to engage said abutment to retain the door in closed position, a cam operatively connected to said latch bolt to hold said latch bolt in closed position, a latch dog, a vertical pivot connecting said dog and said housing, said dog having a recessed retaining portion engaging the end of said bolt when the latter is in retracted position, said door jamb having a lug engageable with said dog when the door is closed to disengage said dog from the end of said bolt, linkage including an elastic member between said dog and said bolt, whereby the engagement of said lug and dog during closing movement of said door advances said bolt.

9. In a latch for a door or the like having a cooperating door jamb and a latch bolt abutment, a latch housing, a latch bolt movably mounted in said housing to engage said abutment to retain the door in closed position, a cam operatively connected to said latch bolt to hold said latch bolt in closed position, a latch dog pivoted to said housing and comprising a hook-shaped member engaging the end of said bolt when the latter is in retracted position, said door jamb having a part engageable with said dog when the door is closed to disengage said dog and said bolt, linkage including an elastic member between said dog and said bolt, whereby the engagement of said part and dog during closing movement of said door advances said bolt.

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