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2,991,643

KEY LOCKING ADAPTER FOR MORTISE EXTENSION BOLTS

Filed May 19, 1959

3 Sheets-Sheet 1

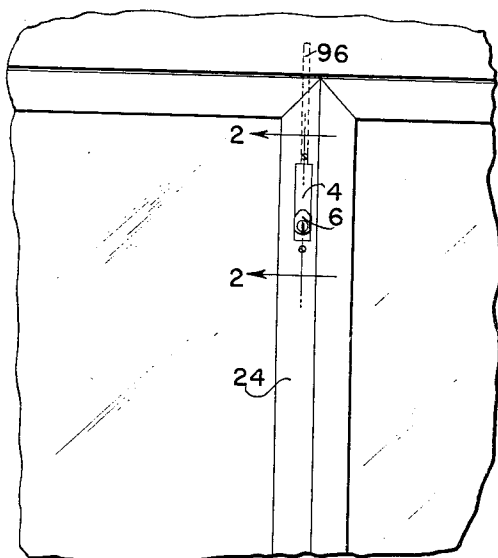


FIG. 1.

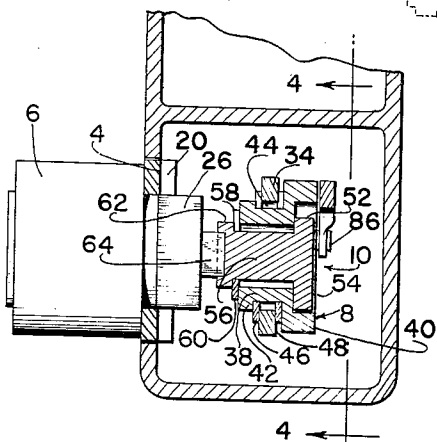


FIG. 2.

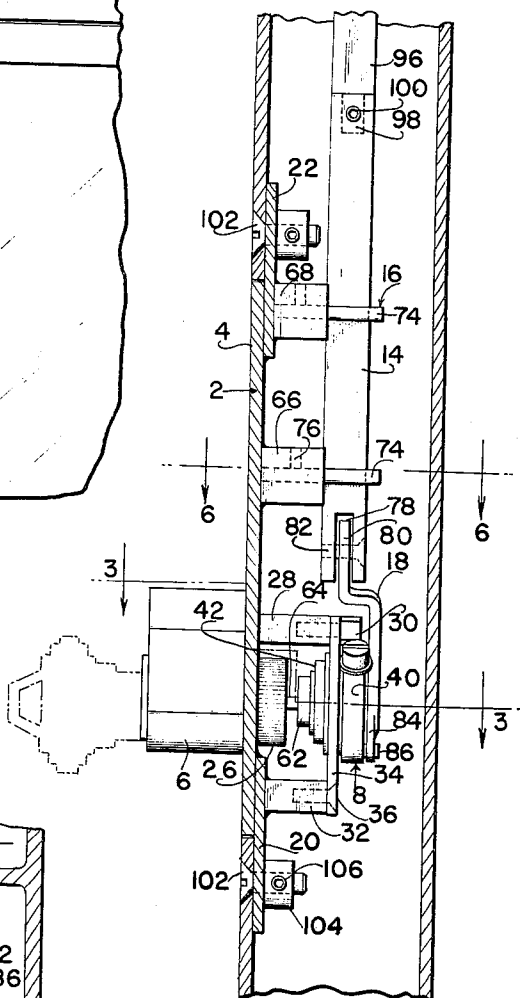


FIG. 3.

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3 Sheets-Sheet 2

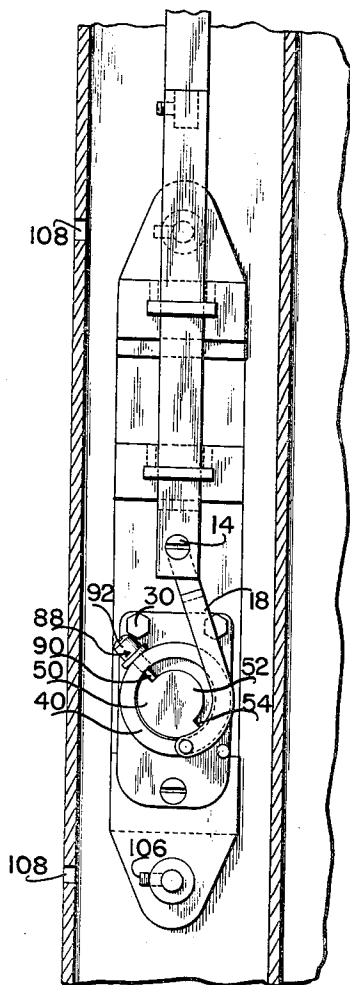


FIG. 4.

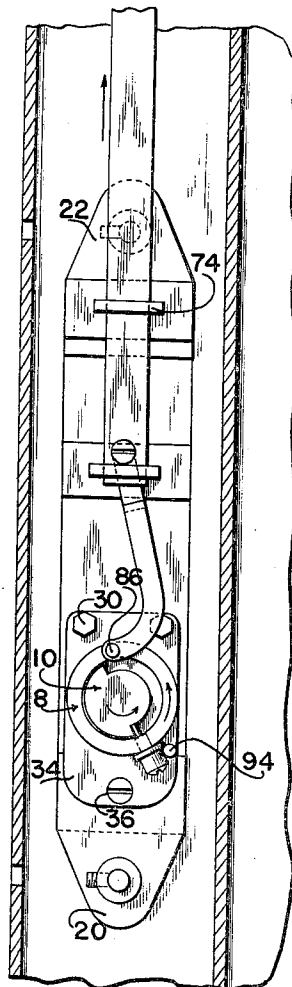


FIG. 5.

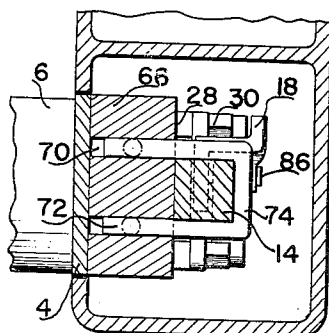


FIG. 6.

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3 Sheets-Sheet 3

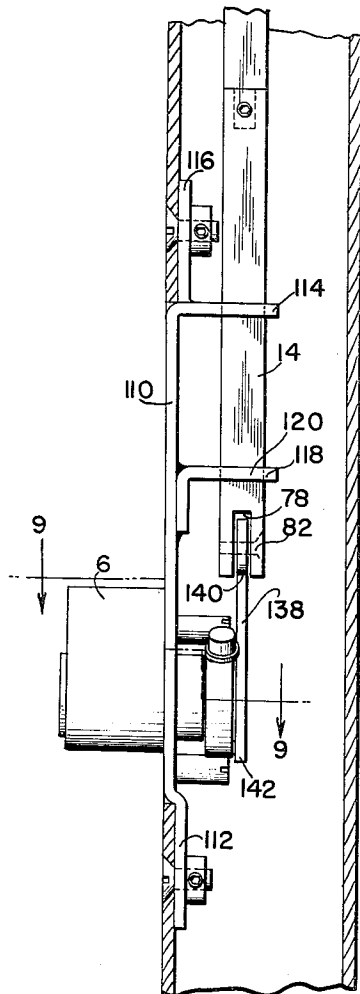


FIG. 7.

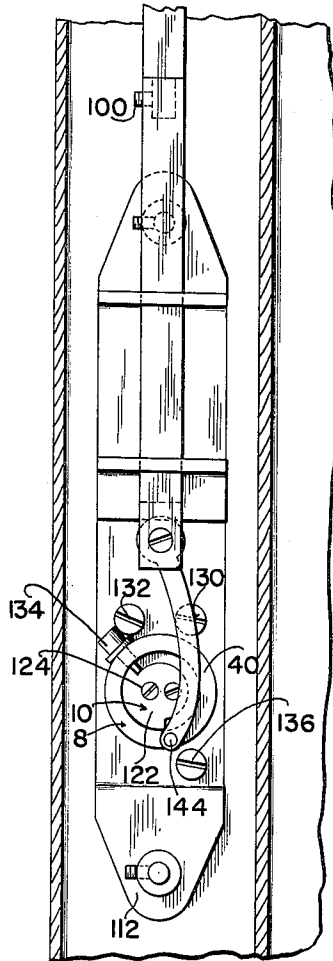


FIG. 8.

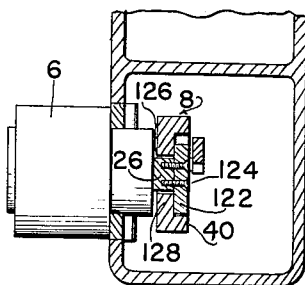


FIG. 9.

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1

2,991,643

KEY LOCKING ADAPTER FOR MORTISE EXTENSION BOLTS

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4 Claims. (Cl. 70—134)

This invention relates to key locking adapter for mortise extension bolts and, more specifically, for mortise bolts used on tubular frame closures, such as doors, windows or the like.

In recent years, there has been a steady increase in the use of doors, windows or other building closures with frames made of tubular metal, e.g., aluminum, stainless steel or other extruded metal. Such frame constructions for building closures not only permit architects to design very attractive and efficient building structures, but also permit substantial space savings to be obtained in the construction of the buildings. For example, in office buildings, stores and other public buildings, usable space is very valuable and every attempt is made in their construction to make their doors perform their intended function with the least possible consumption of space. Since tubular frame doors can be constructed cheaply and attractively with a minimum of actual closure frame, the use of such doors is extremely popular in the present day, so-called "modern," building construction.

In line with the efficient construction of building entranceways or the like, considerable use is being made of so-called butt-mounted doors since this type of construction eliminates the space occupied by door jambs and enables a larger number or larger doors to be installed in a given size building entranceway. In such forms of doors, one side of the door is pivoted at the top and bottom to a building threshold and top frame member, and this pivoted vertical edge of one door becomes, in effect, the jamb for the next door in the row of doors installed in the building entrance.

As above explained, the present use of tubular frame and butt-mounted doors enables substantial efficiencies to be obtained in building construction. Their use, however, is complicated by some practical problems. For example, although the tubular frames for doors and other closures can be made narrow to save space or for the sake of appearance, the more narrow they are made, the more difficult it becomes to install adequate hardware, such as locks, door handles or the like, on the closure. This is particularly true of modern type doors which are all-glass except for the door framing. Moreover, in a series of butt-mounted doors, only the end door has been supplied with a sliding bolt lock which locks into a recess in the vertical door jamb positioned at the side of the building opening, and the remainder of the doors have been equipped with latch-operated extension bolts which are moved into locking position by the building attendant when the building is to be locked up, only the end door being positively locked by means of a key operated lock.

An arrangement of butt-mounted doors with hand operated latch extension bolts on all doors except the end door, as just described, has been found to be unsatisfactory in public buildings, particularly department stores or the like. Thus, thieves have found that these doors can be opened from the inside without any difficulty whatsoever. Hence, a thief or shoplifter merely takes up a place of hiding in the store building just before closing

2

time, and after the store is closed for the evening, the thief merely makes his rounds, picking up the merchandise he wishes to take, and then leaves by one of the butt-mounted doors simply by withdrawing the latch mortise bolt, since no key is required to open any of the doors from the inside except the end door. Several expedients have been tried for disposing of this theft problem connected with butt-mounted tubular frame doors. For example, there have been installed on the doors small key operated bolt locks designed to fit in the bottom edge frame of the door to lock in suitable slot formed in the door threshold. However, such bottom edge locks are generally unsatisfactory because the threshold lock opening continues to become filled with dirt which prevents the lock from operating properly. Another and more drastic solution to this thieving problem has been to completely replace the butt-mounted doors with a series of jamb mounted doors which can be equipped with more conventional type of hardware and whereby each door in the series can be individually locked to the vertical jamb with a key operated lock.

A principal object of this invention is the provision of new forms of key operated locking devices for tubular frame closures. Further objects include:

(1) The provision of key locking adapters for mortise extension bolts in tubular frame doors and other building closures.

(2) The provision of key locking devices which may be used to replace hand latch operators for mortise extension bolts currently used on tubular frame doors and other closures.

(3) The provision of key-operated actuating devices for mortise bolts which may be used to eliminate the thieving problem associated with butt-mounted doors in public buildings, without need to substantially alter or modify the door frames or their method of mounting.

(4) The provision of key locking adapters for mortise bolts which are designed to utilize any standard, available tumbler lock.

(5) The provision of key locking adapters which enable the door bolt to be positively locked in both an open and closed position.

Other objects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description, while indicating preferred embodiments of the invention, is given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

These objects are accomplished according to the present invention by the construction of key-operated actuating devices for extension bolts as illustrated in the accompanying drawings, in which:

FIG. 1 is a reduced fragmentary side view of a pair of butt mounted tubular frame doors, with one of the new key locking adapters of the present invention installed on the upper righthand corner of one of the doors;

FIG. 2 is a fragmentary sectional side view of the key locking adapter taken along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged fragmentary sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary sectional side view taken along the line 4—4 of FIG. 3;

FIG. 5 is a sectional side view corresponding to FIG.

4, with the key-operated locking element having been turned through 360°;

FIG. 6 is an enlarged fragmentary sectional view taken along the line 6—6 of FIG. 2;

FIG. 7 is a fragmentary sectional side view of a modified form of key locking adapter according to the present invention;

FIG. 8 is a fragmentary sectional and view of the key locking adapter of FIG. 7;

FIG. 9 is a fragmentary top sectional view taken along the line 9—9 of FIG. 7.

Referring in detail to the drawings, the new key locking adapters 2 consist basically of a face plate 4, a key-operated lock 6, a rotatable bolt operating member 8, a rotatable cam member 10, a slidable bolt 14, a bolt slide-way 16 and a bolt operating link 18.

In the form of key locking adapter shown in FIGS. 2-6, inclusive, the face plate 4 is provided at the top and bottom with a pair of mounting lugs 20 and 22 attached, such as by welding, to the face plate 4. These lugs 20 and 22 are employed for mounting the key locking adapter in a door frame 24 as shown in FIG. 1, in the matter to be described more fully below.

The key operated lock 6 is mounted on the front of the face plate 4 with the rotatable barrel 26 extending through the face plate. The lock 6 is held in this position by means of a pair of machine screws 28 provided with extended heads which are drilled and tapped to receive a second pair of machine screws 30. A small block 32 is welded to the lug 20 and this block 32, along with the two machine screw heads 28, form a platform for the plate 34 which is held in position by the machine screws 30 and 36.

The rotatable bolt-operating member 8 comprises a central circular portion 38, an annular element 40 extending from the back side of the central portion 38, and an annular lug portion 42 extending from the front side. This member 8 is rotatably held upon the plate 34 by extending through the circular hole 44 therein and is held against lateral movement relative to the plate by a pair of spring retaining washers 46 and 48.

The rotatable cam member 10 comprises two semi-circular edge portions 50 and 52, the edge portion 52 being smaller in diameter than the edge portion 50, so that the junctions 54 between these two edge portions form operating projections upon the cam.

The central body portion 56 of the cam 10 extends through the circular opening 58 in the rotatable member 8 so that the cam is rotatably carried concentrically within the annular element 40 of the operating member 8. The cam 10 is retained in this opening 58 by the retaining spring washer 60 which bears against the retaining lug portion 62 formed on the front end of the cam member 10.

A short adapter plate 64 is positioned in matching slots formed in the rear end of the rotatable barrel 26 and in the front end of the cam member 10, thereby connecting the cam to the lock barrel to cause the cam to rotate simultaneously with the rotation of the lock barrel.

The slideway 16 for the bolt 14 comprises a pair of blocks 66 and 68 welded to the back of the face plate 4 and the top lug 22, respectively. Both of these blocks have a pair of holes 70 drilled therein to receive the ends 72 of the U-shaped members 74. These U-shaped members may be adjusted relative to the blocks 66 and 68 by means of the Allen screws threaded into the tapped holes 76 in the blocks 66 and 68, thereby providing an adjustment of depth to form a snug slideway for the sliding bolt 14.

The lower end of the bolt 14 is provided with a slot 78 to receive the upper end 80 of the arcuate link 18, the link 18 being pivotally held within the slot 78 by the machine screw 82. The other end 84 of the link 18 is pivotally held on the annular element 40 by a headed pin 86.

A pin 88 is fixed through the annular element 40 so that the inner end 90 extends inwardly of the annular element to form abutment means for engaging the operating projections 54 formed upon the cam 10. At the same time, the head portion 92 of the pin 88 extends outwardly of the annular element 40 and serves as means, in cooperation with the machine screw head 30 (see FIG. 4) and the pin 94 (see FIG. 5) to limit rotation of the annular element 40, which is an integral part of the rotatable operating member 8, to less than 180°, while the cam member 10 can be rotated a complete 360° before it is stopped by the inner extension 90 of the pin 88.

Mortise bolts of the type used on tubular frame doors for operation by a hand latch lever include a bolt member 96 usually provided at the lower end with a cylindrical extension 98, which is generally threaded. This bolt 96 connects to a pivoted latch mechanism (not shown) which fits through an opening of the size corresponding to the face plate 4 of the key locking adapters as above described. Accordingly, in order to install one of the new key locking devices of this invention, the hand operated pivoted latch unit is removed from the tubular door frame 24 and the bolt member 96 is unscrewed from its connection to the removed latching device, and is, in turn, threaded or otherwise inserted into the upper end of the bolt 14 of new key operated adapter. In order to prevent the bolt member 96 from being unscrewed or otherwise removed by unauthorized persons when the locking device has been installed in a tubular frame door, the Allen screw 100 is tightened up against the end extension 98 of the bolt member 96. Then, the key locking device 2 is inserted through the opening in the tubular door frame and is positioned so that the face plate 4 is flush with the outer face of the door frame and with the upper and lower retaining lugs 20 and 22 positioned as shown in FIG. 2. Then, the beveled head machine screws 102 are threaded to the plates 20 and 22 and into the bolts 104 which are welded to the back surfaces of the lugs 20 and 22. Finally, the Allen screws 106 are tightened up against the machine screws 102 by means of an Allen wrench which is inserted through the small holes 108 drilled in the front vertical edge of the door frame. Thus, with the door closed and locked, small holes 108 will be inaccessible, and it will be impossible for someone to unscrew the machine screws 102 and remove the key locking adapters 2.

The form of key locking device shown in FIGS. 7 to 9, comprises a face plate 110 which can be formed with an integral mounting lug portion 112 and a rearwardly extending top end portion 114 formed by stamping and bending a sheet of metal to obtain the shape illustrated in FIG. 7. A top mounting lug 116 and an L-shaped rearwardly extending member 118 can be welded to the plate member 110 to form a face plate arrangement and slideway equivalent to those incorporating in the key locking device as shown in FIGS. 1 to 6. In this modified form, suitable rectangular openings 120 are cut in the extensions 114 and 118 to slidably receive the bolt 14.

In these modified forms of locking device, the cam 10 comprises the flat plate 122 which is held by machine screws 124 onto the extension 26 of the rotatable barrel of tumbler lock 6. The bolt operating member 8 has a circular opening 126 in the circular web portion 128, the circular hole 126 being just large enough to permit the member 8 to be slipped over the lock barrel extension 26. Hence, the cam member 10 being fastened by the screws 124 to the barrel extension 26, holds the rotatable member 8 in a free rotating condition upon the barrel extension 26.

The tumbler lock 6 is held on the face plate 110 by a pair of machine screws 130 and 132, the latter having an elongated head so that it serves the double purpose of acting as stop means for the pin 134 which extends through the annular element 40 on the rotatable member 8. A second machine screw 136 with an elongated

5

head functions as the second stop means for the pin 134, thus restricting rotation of the annular element to less than 180°.

The arcuate link 138 is pivotally held at its ring shaped end 140 within the slot 78 of bolt 14 by machine screw 82. The other end 142 of the link 138 is pivotally carried on the annular element 40 by pin 144.

The method of operation of the new locking devices of this invention is fundamentally the same for the different specific embodiments shown in the different figures of the drawing, but it can best be explained with reference to FIGS. 4 and 5.

The tumbler lock 6 will be of any standard commercially obtainable variety and this constitutes one of the important features of the new locking devices since it enables the tumbler lock section of the device to be provided or replaced from regular stock, i.e., the new locking units do not require specially constructed key operated tumbler locks. With this standard form of tumbler lock, the lock barrel is rotated by the key through 360° to a position which permits the operating key to be inserted or withdrawn.

FIG. 4 shows the position of the locking device when the bolt is retracted, i.e., the open or unlocked position. Conversely, FIG. 5 shows the position in the closed or locked position. Since the cam member 10 is connected to the rotatable barrel of lock 6, turning of the key in the lock will impart an identical rotation of the cam member 10. On the other hand, member 8 is not directly connected for rotary movement to any element of the new device and its rotation is effected by abutment of the inner end 90 of pin 88 with the projections 54 formed between the junctions of semicircular faces 50 and 52 of the cam member 10. To move the bolt 14 from the open door position in FIG. 4 to the locked position in FIG. 5, the lock barrel and in turn the cam 10 is rotated by the key in the direction of the arrow shown on FIG. 5. For the first 180° of this rotation, the member 8 will remain stationary, and then the projection 54 on the cam 10 will engage the inward extension 90 of the pin 88 and rotate the member 8 around slightly less than 180° until the pin 88 engages the stop pin 94. At this point, the key can be removed from the lock and the bolt 14 will be in the up position with the bolt extension 96 properly engaging the door frame to lock the door.

The bolt 14 is positively locked in either the up or down position, as shown in FIGS. 4 and 5, when the operating key is withdrawn from the lock 6. This is an important feature because it prevents unauthorized persons from tampering with the lock and will not enable the bolt to be forced by a wedging device into an unlocked position when the door is closed and locked, as is the case with spring operated dead latch locking devices. Furthermore, aside from the need for drilling the two small holes 108 in the vertical edge of the door frame, the new locking devices of this invention may be installed in tubular frame doors to replace hand operated mortise extension bolts without any other alteration of the door. Such replacement can be made quickly and inexpensively. Furthermore, the locking devices of this invention, although simple in construction, are structurally strong and require a minimum of maintenance. The major wear will be in the tumbler lock itself and since this can be of standard and commercially available form, replacement and repair of the locking device can be accomplished without need for obtaining special forms of locks.

Having provided a complete description of the invention in such manner as to distinguish it from other inventions and from what is old, and having provided a description of the best mode contemplated of carrying out the invention, the scope of patent protection to be granted the invention is defined by the following claims:

I claim:

1. In a key-operated actuating device for mortise ex-

6

tension bolts on tubular frame doors, a face plate, a key operated tumbler lock mounted on the front of said face plate and having a rotatable barrel extending through said face plate, a rotatable bolt-operating member comprising a circular central portion and an annular element extending from one side of said central portion, a rotatable cam carried concentrically within said annular element, said cam comprising two semi-circular edge portions, one of said edge portions having a radius smaller than the other, the junction between the two edge portions forming operating projections upon said cam, a pin extending through said annular element to engage said operating projections, stop means positioned externally of said annular element to engage a portion of said pin which extends outwardly from said annular element thereby to limit rotation of said annular element to less than 180°, means connecting said cam to said lock barrel for causing the cam to rotate with the barrel, a sliding bolt carried in a slideway on the back of said face plate and an arcuate link pivotally connected at one end to said annular element and pivotally connected at the other end to said sliding bolt to effect a sliding of the bolt upon rotation of said annular element.

2. A key locking adapter for mortise extension bolts on tubular frame doors comprising a face plate, a key operated lock mounted on the front of said face plate and having a rotatable barrel extending through said face plate, a sliding bolt carried in a slideway on the back of said face plate, an annular element rotatably mounted on the back of the face plate, means to limit the rotation of said annular element to less than 180°, a rotatable cam positioned concentrically within said annular element, means projecting inwardly of said annular element to engage operating projections upon said cam to cause said annular element to rotate through less than 180° while the cam is rotated through 360°, means connected to said annular member and to said sliding bolt to effect a sliding of the bolt upon rotation of said annular element, and means connecting said cam to said lock barrel for causing the cam to rotate with the barrel.

3. A key locking adapter for mortise extension bolts on tubular frame doors comprising a face plate, a key operated lock mounted on the front of said face plate, and having a rotatable barrel extending through said face plate, a sliding bolt carried in a slideway on the back of said face plate, a mounting plate supported upon standards behind the face plate and parallel thereto, an annular element rotatably mounted in a circular opening in said mounting plate, a rotatable cam journaled concentrically within said annular element, a pin extending both inwardly and outwardly of said annular element, said cam comprising a pair of opposed semi-circular portions, the one of which has a radius slightly less than the inside radius of said annular element and the radius of the second semi-circular portion being not greater than the radius of the first semi-circular portion minus the length of the inward projection of said pin, an arcuate link pivotally mounted at one end to said sliding bolt, the other end of the link being pivotally mounted on said annular element and a connector plate means connecting said cam to said rotatable barrel to cause the cam to rotate with the barrel.

4. A key locking adapter for mortise extension bolts on tubular frame doors comprising a face plate, key operated lock mounted on the front of said face plate, and having a rotatable barrel extending through said face plate, a sliding bolt carried in the slideway on the back of said face plate, an annular element journaled on said lock barrel so that the annular element is free to rotate independently on the lock barrel, a cam plate positioned concentrically within said annular element and fixed to the lock barrel for rotation with the barrel, a pin extending through the annular element, with portions thereof extending both inwardly and outwardly of the annular

element, operating projections upon said cam to engage the inward extension of said pin and effect a rotation of the annular element during a portion of rotation of the cam, and an arcuate link pivotally connected at one end to said bolt and pivotally connected at the other end to said annular element whereby the bolt is reciprocated upon rotation of said annular element.

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