Nov. 23, 1937. E. P. BEAUMONT 2,100,233

AUTOMATIC CHAIN LOCK

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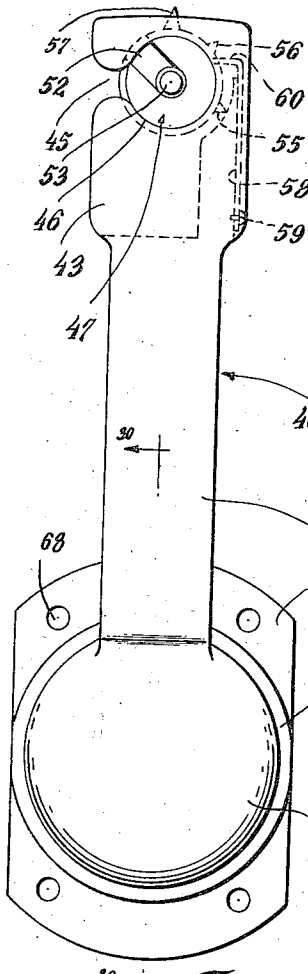


Fig. 1.

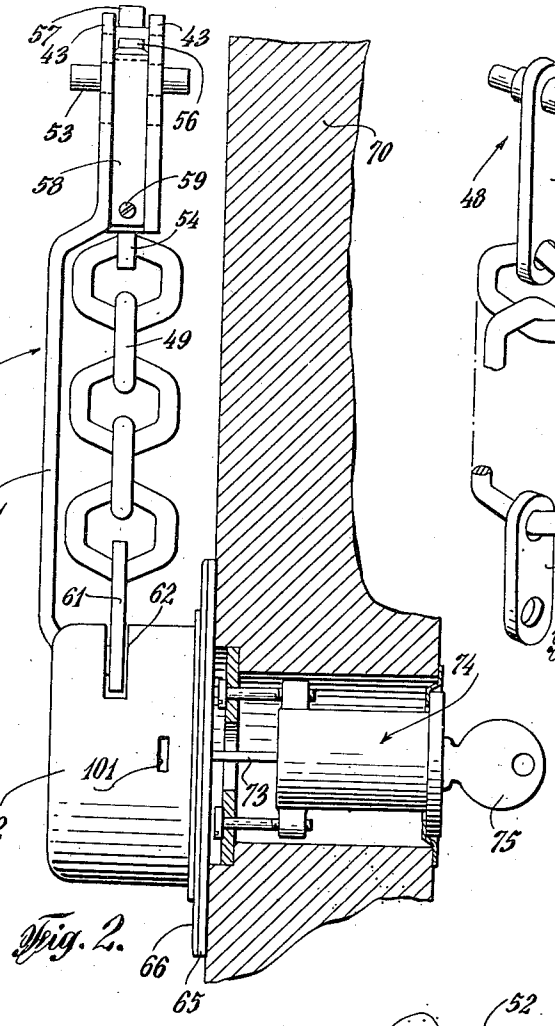


Fig. 2.

Fig. 3.

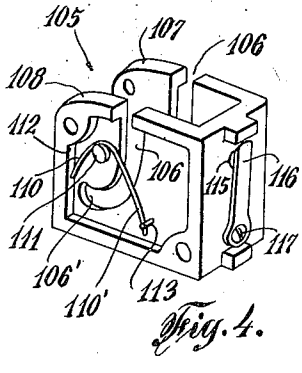


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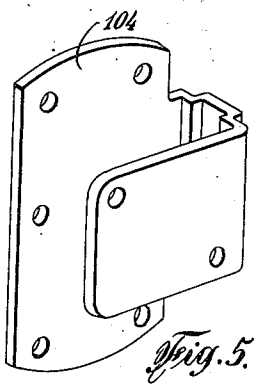


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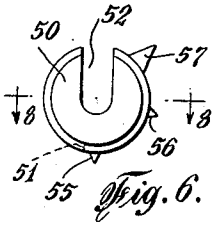


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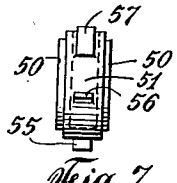


Fig. 7.

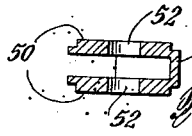


Fig. 8.

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Fig. 9.

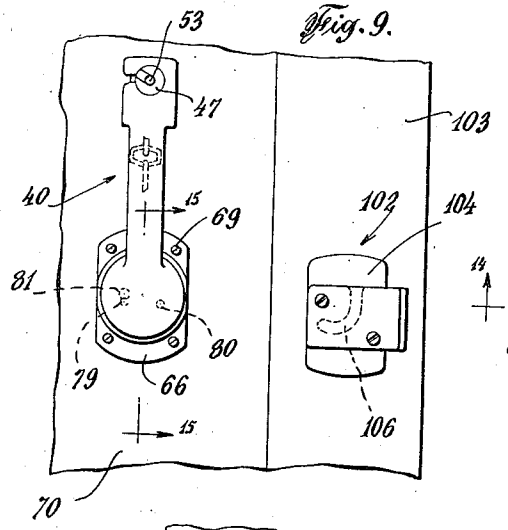


Fig. 10.

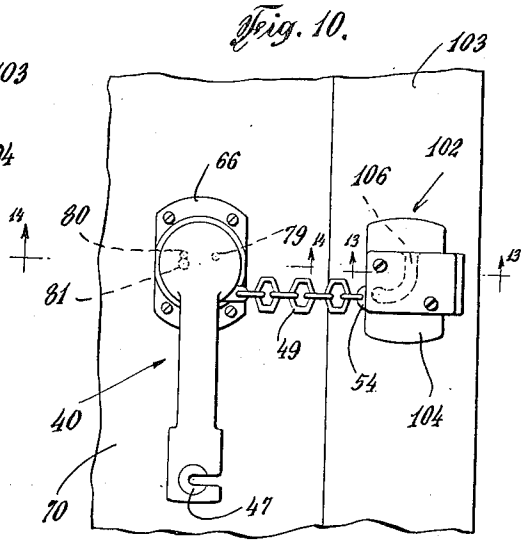


Fig. 12.

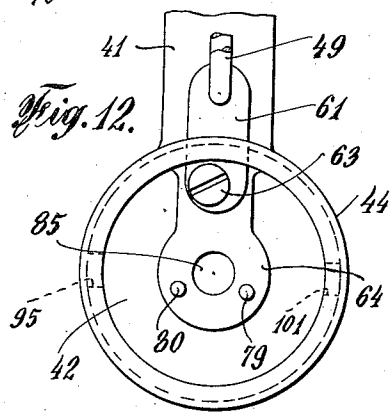


Fig. 11.

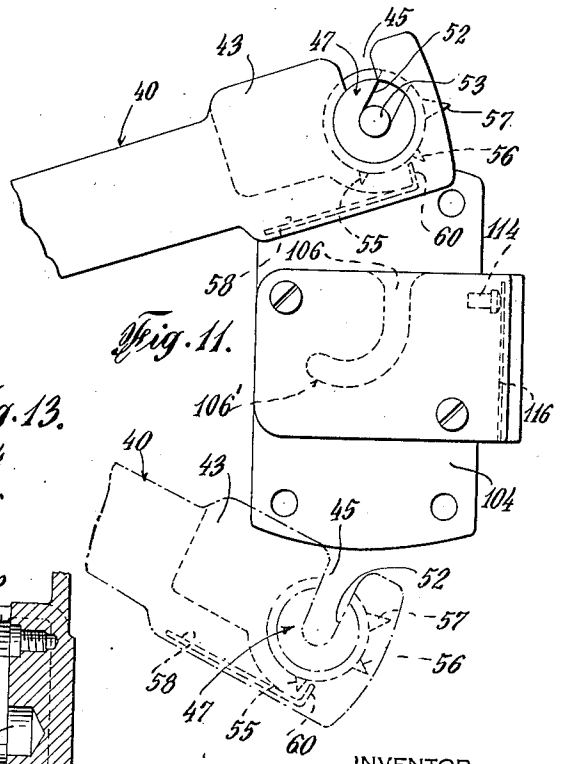


Fig. 13.

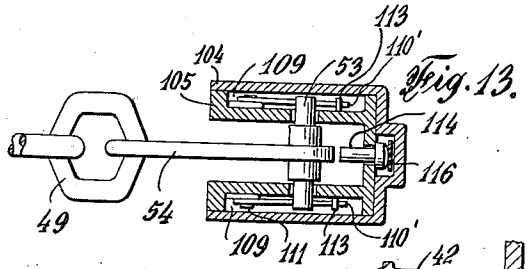


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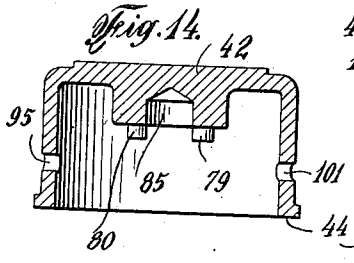
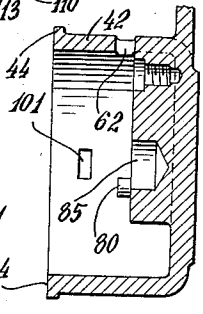


Fig. 15.



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Fig. 16.

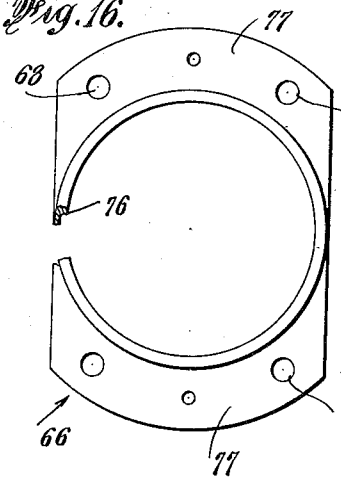


Fig. 17.

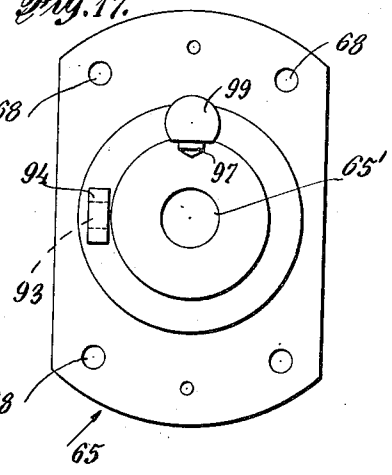


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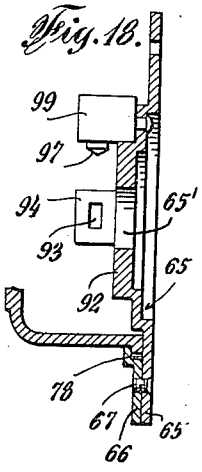


Fig. 19.

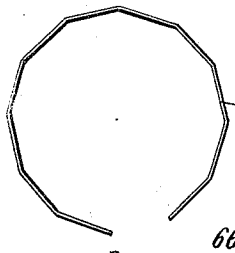


Fig. 28.

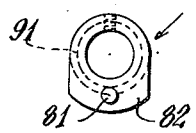


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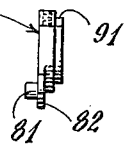


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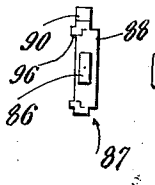


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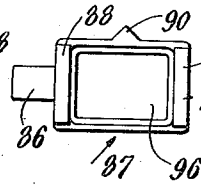


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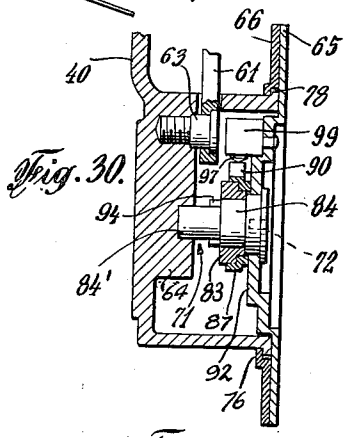


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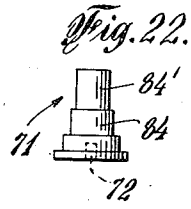


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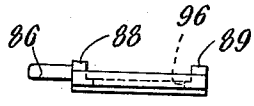


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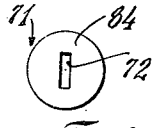


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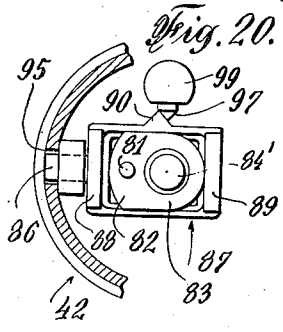


Fig. 21.

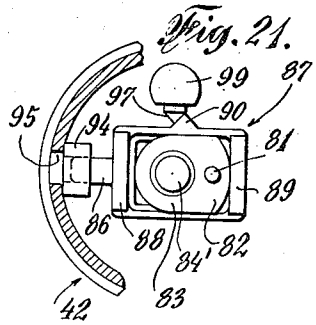
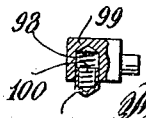


Fig. 27.



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Fig. 31.

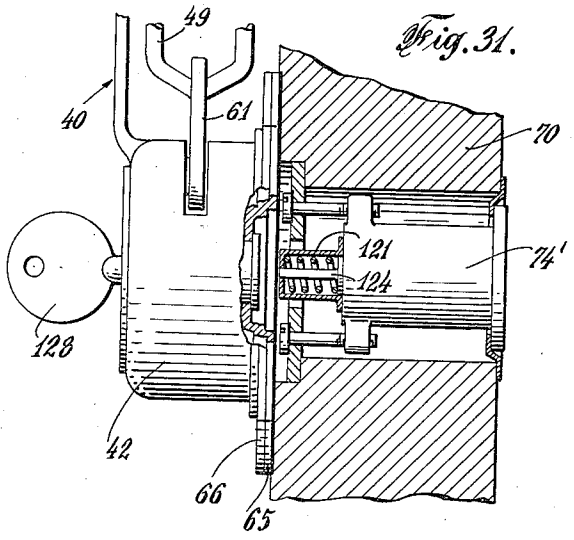


Fig. 33.

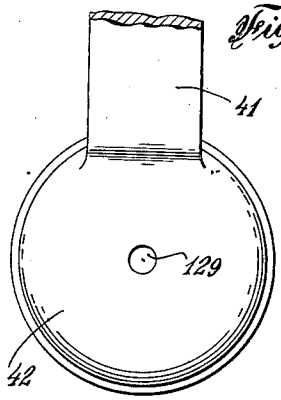
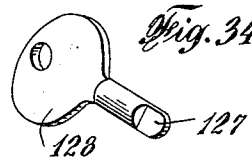


Fig. 34.



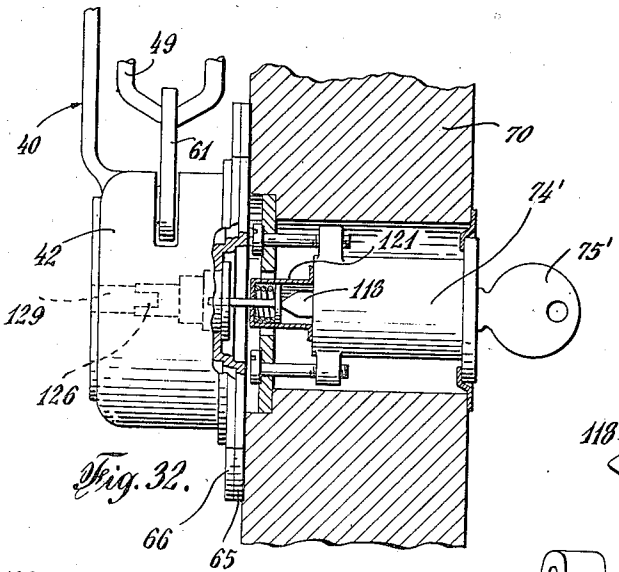


Fig. 32.

Fig. 35.

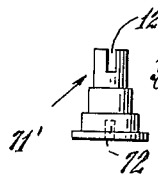


Fig. 36.



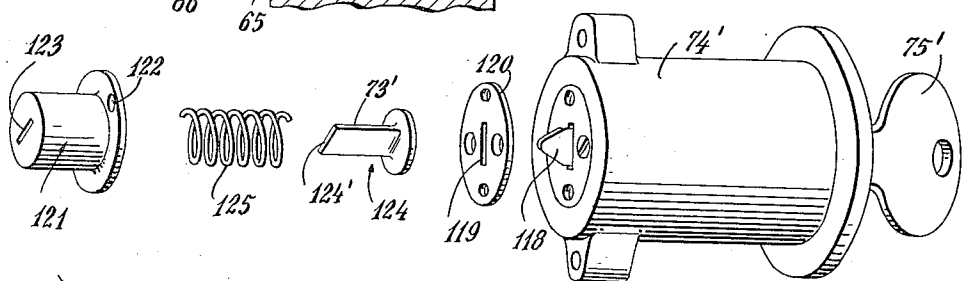


Fig. 37.

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Patented Nov. 23, 1937 2,100,233

UNITED STATES PATENT OFFICE

2,100,233

AUTOMATIC CHAIN LOCK

Eugene P. Beaumont, New York, N. Y., assignor to Whiting Manufacturing Company, Minneapolis, Minn., a corporation of Minnesota

Application September 29, 1936, Serial No. 103,099

18 Claims. (Cl. 70—93)

The present invention relates to locks, the components of which are permanently mounted on a door and its jamb, and more particularly to the type for effecting a chain connection.

An object of this invention is to provide a novel and improved lock for automatically effecting a chain connection between a door and its jamb, and for automatically removing such connection, by key controlled means operative from the outside surface of the door, and also from the inside.

Another object is to provide a novel and improved lock of the type described with a chain-end conveying means which is normally immovable from its rest positions.

Still another object hereof is to provide in a lock of the character mentioned, a novel and improved means for preventing the free end of the chain from falling off the conveying means during the interval it is required to be associated with such conveying means.

Another object of this invention is to provide a lock of the class set forth wherein the chain is automatically made taut when the connection as aforesaid is effected between a door and its jamb.

Another object hereof is to provide a lock of novel and improved construction for effecting a chain connection as aforesaid, wherein the free end of the chain cannot be removed from the keeper during the continuance of such connection, except with the necessary key to undo such chain connection.

Still a further object of this invention is to provide in a lock offering the aforementioned features, novel and improved means for actuating its various component and co-operative mechanisms in proper timed relation.

A further object hereof is to provide a novel and improved mechanism in locks generally, whereby the lock will remain inoperative although its cylinder is motivated by persons attempting to "pick" the lock.

Other objects and advantages will become evident as the disclosure proceeds herein.

To accomplish these objects, I provide in an embodiment of my invention, a chain-end conveying arm which is rotatably mounted on the inside surface of the door, and adapted by a key-operative means actuated from the outside surface of the door, to be swung past a keeper on the jamb, which is provided with a crotch member to intercept and receive the free end of the chain from the conveying arm; the other end of the chain being permanently fixed on said arm. A lock means on the arm, holding the free end of the chain in secure position on the conveying arm, is automatically opened upon entering the keeper, thereby releasing the free end of the chain to be intercepted by the crotch upon movement of the conveying arm from rest position. Thus, is a chain connection effected between the door and its jamb, with no possibility that the free end of the chain fall accidently from the arm, as may be the result of inertia or momentum, if said lock means were absent.

Upon upward movement of the conveying arm upon reverse operation of the key-actuated means, the free end of the chain resting in the crotch, is intercepted by said arm, while the lock means mentioned, is closed automatically before entirely emerging from the keeper. In this manner, the chain connection is undone, and the free end of the chain again secured to the conveying arm.

Another locking means, which I include, to secure the conveying arm at its remote rest positions, is automatically opened to release said arm for movement upon initial turning movement of the key when the chain connection is desired to be effected and when said connection is desired to be removed. Provision is also made to automatically stretch the chain taut when the connection is effected across door and jamb, by having the opening in the crotch curved at the bottom thereof materially towards the axis of rotation of the conveying arm and away from the arcual path transversed by the free end of the chain while on said arm. When the chain connection is to be removed, spring means shift the free end of the chain to a position in said arcual path, during the early stage of upward movement of the conveying arm.

In a modification shown herein, I provide that the key-operative cylinder is normally independent of the lock proper, so that by a suitable key, the lock is operative by a person inside the room. Also, with a specially designed key, the cylinder operative from the outside surface of the door, becomes mechanically related to the lock mechanism proper, by a clutch means motivated by said key, whereby the lock is operative from the outside.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the embodiments shown herein be deemed illustrative and not restrictive, and that the patent shall cover whatever features of patentable novelty exist in the invention disclosed; reference being had to the appended claims rather than to the spe-

cific description herein to indicate the scope of the invention.

In the accompanying drawings, forming part of this application, similar characters of reference indicate corresponding parts in all the views.

Fig. 1 shows a front view of that part of my lock which includes the conveying arm.

Fig. 2 is a side view thereof, shown mounted on a door and associated with key-operative mechanism.

Fig. 3 is a perspective view of the chain and end links used in this device.

Fig. 4 is a perspective of the crotch member, which serves as the keeper of the free end of the chain during the continuance of the chain connection between the door and its jamb.

Fig. 5 is a perspective view showing the frame in which the crotch member is permanently mounted. This frame is secured on the jamb.

Fig. 6 is a front view of the locking means carried on the conveying arm, for securely holding the free end of the chain on said arm.

Fig. 7 is a side view of said locking means.

Fig. 8 is a section taken at line 8—8 in Fig. 6.

Fig. 9 is a diagrammatic representation showing an embodiment of a lock constructed in accordance with the teachings of this invention, as appearing while the door is unlocked, meaning, free of a chain connection.

Fig. 10 is a similar view showing a chain connection between the door and jamb as accomplished with my present invention.

Fig. 11 is a diagrammatic representation showing the ultimate positions of the locking device employed to hold the free end of the chain on the conveying arm, and the means used to operate said locking device upon movement of the said arm.

Fig. 12 is a rear view of a fragment of the conveying arm, showing a casing structure for housing various actuating mechanism hereafter described.

Fig. 13 is a section through the keeper taken at line 13—13 in Fig. 10.

Fig. 14 is a section through the casing per se, taken at line 14—14 in Fig. 9.

Fig. 15 is a section through the casing taken at line 15—15 in Fig. 9.

Fig. 16 shows a member used for journalling the casing end of the conveying arm with respect to a base plate.

Fig. 17 shows such a plate.

Fig. 18 is a fragmentary section showing the manner of assembly of such journal construction.

Fig. 19 shows a friction spring included in said assembly.

Fig. 20 is a fragmentary diagrammatic representation of the mechanism within the casing used to maintain the conveying arm fixed at its respective rest positions.

Fig. 21 is a like representation, showing the conveying arm unlocked and free for movement about the axis on which it is mounted.

Fig. 22 shows the shaft included in such mechanism.

Fig. 23 is an end view of said shaft.

Fig. 24 is a front view of the member carrying a bolt for locking the conveying arm in fixed position.

Fig. 25 is a plan view thereof.

Fig. 26 is an end view thereof.

Fig. 27 is a section through a means used to accelerate movement of said bolt carrying member.

Fig. 28 shows the cam used to actuate said arm locking means and to move said arm in proper timed relationship.

Fig. 29 is a side view of said cam.

Fig. 30 is a fragmentary section through the casing and its contents taken at line 30—30 in Fig. 1.

Fig. 31 shows a modified form of the device in a view similar to that of Fig. 2, where however the cylinder and lock proper are independent, with a clutch means "in open position" included.

Fig. 32 shows the same with the clutch means in "engaged" position, due to the insertion of a proper key.

Fig. 33 is a fragmentary view of the front of the casing of Fig. 31.

Fig. 34 shows a key used for operating the lock from the inside surface of the door.

Fig. 35 shows the shaft used in the embodiment of Fig. 31.

Fig. 36 shows the key used for actuating the cylinder and shifting the clutch mechanism.

Fig. 37 is an "exploded" view showing the components of the clutch mechanism and the key-operative cylinder on which they are mounted.

In the drawings, the chain conveying arm designated generally by the numeral 40, comprises a strap 41, integral and terminating at one end in an inverted cup or casing 42, and at the other end in a pair of spaced plate elements 43, which are parallel to the flanged rim 44 of said casing. Each of these plate elements 43, is bifurcated hook-like to form crotches having the respective openings 45, directly opposite one another. Between said crotches or hooks so formed, in the respective enlarged circular portions 46 of their openings 45, is freely journalled the member generally indicated by the numeral 47, which serves as a means to lock or secure the free end 48 of the chain 49, to the conveying arm 40. This journalled member 47, consists of a pair of outwardly flanged discs 50, secured respectively at the sides of an arcuate spacer element 51, extending around about half their periphery; each of said discs being provided with openings 52, to receive the ends of the cross pin 53, of the bar link 54, which constitutes the free end 48 of the chain 49. On the periphery of the spacer element 51, are a pair of outwardly extending stop pins 55 and 56, and the tooth 57, all spaced from one another. A blade spring 58, secured by a screw 59 onto the conveying arm 40, between the plates 43, has an inward finger 60, which presses against the spacer element 51, to cause a drag; said finger lying between the pins 55 and 56, to limit the range of axial rotational movement of the lock means 47. The bar link 61, which is at the other end of the chain 49, lies through slot 62 in the wall of the casing 42, and is permanently pivotally secured by a screw 63 onto boss 64 within, and which is integral with the casing.

It is evident that the end 48, of the chain 49, is free to be removed from the conveying arm 40, when the respective sets of openings 52 and 45 are in alignment, and is secured or locked to the arm, when said openings are out of alignment. In the former instance, the set up is that of an open hook, while in the latter, that of a closed eye.

The flanged rim 44 of the casing 42, sits free within an internal annular channel formed by

the superimposed members 65 and 66, which are secured together by screws 67, to form the unitary structure illustrated in Fig. 1, and are provided with the holes 68, for mounting same by screws 69, onto the inside surface of a door 70. Member 65 is a stepped dished base, having a central opening 65' for the mounting of the shaft numbered 71, which is a multi-shouldered headed pin, provided with a non-circular socket 72, in its headed end, for the reception therein of the rectangular-sectioned shank 73, a component of an ordinary key-operated tumbler mechanism designated by the numeral 74, which is common in present day lock manufacture, adapted to turn longitudinally upon turning the key 75, and immovable when said key is withdrawn from the mechanism. Member 66 is a ring having an inward flange 76 at one end, and the segmental flange 77, which segments conform to the outline of the base member 65. A split, multi-lateral narrow blade spring 78, lies free along the circular edge of the flange 44, to offer resistance against the action of gravity on the conveying arm 40.

A pair of pins 79 and 80, extend within the casing 42 from the boss 64, and are positioned in the path described by the pin 81 extending from the tooth 82 of cam 83, secured on the shaft 71, on shoulder 84 thereof, so that the angular travel of pin 81, from the time it leaves contact with pin 79, until it comes into contact with the pin 80, is 180 degrees. The shank end 84' of the shaft 71, sits free to rotate within socket 85 in said boss 64.

A means is provided to prevent movement of the conveying arm 40 at various times, and consists of a bolt 86, extending outwardly from a side of a rectangular frame numbered 87, which is provided with a pair of opposite upwardly extending cam engagement elements 88 and 89, one of which is at the bolt 86. On a side of said frame between said elements 88 and 89, is an outwardly extending tooth 90. This frame 87, is positioned about the hub 91, of the cam 83, and is free to slide on the surface of platform 92 of the base 65, with bolt 86 within and beyond slot 93, in post 94, secured on the base 65 within the casing 42, so that when said frame 87, is fully shifted to one side of its possible line of travel, the bolt 86 will pass into slot 95 in the wall of the casing 42, and when said frame is shifted to the other of its remote positions, said bolt 86 will move out of said slot 95, thereby unlocking the arm 40, so that it is free to move with respect to the base 65. The elements 88 and 89, are in the path of the tooth 82 of the cam 83, and it is to be noted that the width of the opening 96 in the frame 87, equals the diameter of the cam hub 91, while the length of said opening exceeds such dimension by at least the throw of the cam tooth 82.

To accelerate movement of said frame 87, a hollow conical-pointed pin 97, which contacts the frame tooth 90, extends from and is free to slide in socket 98 of the post 99, fixed to the base 65, against action of the compression spring 100 in said socket. This mechanism hastens movement of the bolt 86, into and out of the casing slots 95 and 101, which slots are diametrically opposite one another in the wall of the casing 42.

The keeper designated generally by the numeral 102, is adapted to be mounted on the jamb 103, and consists of a bracket member 104, which holds the chain-end receiving member indicated as 105. This latter, is a U-structure having opposite openings 106, for receiving the ends of the cross pin 53, and the space between the crotches 107 and 108 so formed, is sufficient to admit the free end of the conveying arm 40 therethrough. Upon assembly of members 104 and 105, chambers 109 are formed, within which reside the ejector springs 110, each of which is mounted on its respective pin 111, extending from the member 105; an arm of each of said springs resting against the wall 112, and the other arm against the stop pin 113, in their respective chambers 109. This latter arm 110' is free to be moved away from its stop pin 113 by the cross pin 53, against which said spring is adapted to act.

A headed pin 114, is loosely slidably mounted in the bore 115, with its shank projecting within the member 105 between the crotches 107 and 108, and is so maintained by a leaf spring 116 secured at one of its ends by a screw 117 to said member 105 as shown in Fig. 4. The components of the lock mounted on the door and jamb as illustrated in Fig. 9, are in such relative position that this pin 114, lies in the path of the tooth 57, and is employed to trip same to axially shift the lock member 47, into open and closed positions, depending upon the direction of movement of the conveying arm 40, as will be hereafter further explained.

The open end portion of each of crotch openings 106, is along the circular path transversed by the ends of the cross pin 53, while the closed lower portion 106' of each of said openings are of small radius and extend towards the door 70.

The lock component mounted on door 70, as shown in Fig. 9, is positioned so that the conveying arm 40, is in locked condition vertically upwards, at which time, said door is unlocked, and the mechanism enclosed in the casing 42, is in assembled relationship as illustrated in Fig. 20. Also at this time, the cross pin 53 of the chain 49, lies locked in member 47, whose openings 52 are out of alignment with respect to the crotch openings 45 respectively of the conveying arm 40, in which set up, the finger 60 of the spring 58, is against the stop pin 56, and the cam pin 81 lies in contact with and is directly above the pin 79. It is evident that upon movement of the conveying arm 40 about the axis on which it is mounted, the ends of the cross pin 53 will travel in a circular path, having such axis as the center thereof.

The keeper 102, is mounted on the jamb 103, in the manner as previously explained, namely, so that the open end portion of each of the crotch openings 106, is along the aforesaid circular path, while the closed lower portion 106' of each of these crotch openings, extends towards the door, that is, said keeper 102, is so fixed in position that when the conveying arm 40, is at rest and locked in downward vertical position, the ends of cross pin 53 shall be at the bottom end of 106'. To enable said portion 106' of the crotch openings in the keeper to be of substantial length in extension towards the door and away from the locus of travel of the ends of said cross pin 53, the point of attachment of the fixed end of the chain 49, meaning the position of the screw 63, is to the right of the vertical line of symmetry of the arm 40 in Fig. 9, so that said point shall be to the left of said line when the arm 40 is in downward vertical position as shown in Fig. 10. It is also to be noted that while arm 40 is as in Fig. 9, the movable arms of each of the ejector springs 110, will lie across the respective crotch

openings 106, of the crotches 107 and 108, and against the stop pins 113.

Commencing with the condition shown in Fig. 9, as explained, the operation of the device to effect the chain connection illustrated in Fig. 10, is as follows:

Key 75, inserted in cylinder 74, is turned to rotate shaft 71, whereby cam pin 81 will move away from pin 79, towards pin 80. Before said shaft has made a half turn, tooth 82 of the cam 83, will contact frame element 89, thereby shifting the frame 87, whose tooth 90 will now urge pin 97 into its socket 98 compressing the spring 100. As soon as the apex of the tooth 90 passes a little beyond the apex of the pin 97, the compressed spring 100 will force said pin out of its socket 98, and with a quick motion will hastily shift the frame 87, to its other remote position as shown in Fig. 21, whereby bolt 86 is withdrawn from the casing slot 95, to free the conveying arm 40 for movement, before the pin 81 contacts pin 80, when the shaft 71 has completed its first half turn, meaning 180 degrees of rotation. The position of arm 40 is still as illustrated in Fig. 9, however, the spring 79 will keep it from movement due to any action of gravity, and the related position of the various components of mechanism within the casing 42, is as represented in the Fig. 21.

During the entire second half turn of the shaft 71, pin 81 is in contact with pin 80, whereby the arm 40 will be rotated 180 degrees and assume a position as in Fig. 10. Referring to the diagrammatic showing of Fig. 11, when arm 40, in its downward movement passes through the keeper 102, the ends of the pin 53, enter the crotch openings 106, and tooth 57 coming into contact with the pin 114, will cause axial movement of the member 47, whereby crotch openings 52 will come in alignment with the respective crotch openings 45, releasing the free end of the chain called 48. The finger 60 of spring 58, is now up against the stop pin 55. Any further contact at this time between tooth 57 and pin 114, will shift the latter against action of the spring 116, but member 47 will have no further axial turning.

The free end 48 of the chain is thus deposited by the conveying arm 40 and intercepted by the keeper 102, and said arm continues to move downward pulling the chain 48 taut into 106' against the action of the spring arms 110'. The chain connection between the door 70 and its jamb 103 is thus effected, and before the conveying arm 40 aforesaid, has come to rest to its position shown in Fig. 10, the cam 83 has engaged the frame element 88, whereby the frame 87 is shifted towards its initial position, and such movement is accelerated by action of the spring 100 as hereinabove explained, whereupon the bolt 86 will rub a little distance along the inner wall of the casing 42, and finally enter the casing slot 101, to lock the conveying arm 40 to the fixed base 65. Key 75 may now be withdrawn. Cam pin 81 is now under pin 80 and in contact therewith, and it is to be noted that crotch openings 52 and 45 are in alignment, that is, in condition to receive the free end 48 of the chain upon restoring the conveying arm to its initial position of Fig. 9, which will now be explained.

To remove the chain connection, key 75 is turned to rotate shaft 71 in the opposite direction than heretofore. During the entire first half turn, cam pin 81 will move away from pin 80, towards pin 79, and, action of the cam 83, will shift bolt 86 out of casing slot 101, thereby releasing the conveying arm 40, for movement upwards through the keeper 102, and to its initial position as in Fig. 9, which occurs during the second half turn of the shaft 71.

During this entire second half turn of the shaft 71, pin 81 is in contact with pin 79, whereby the arm 40, will be rotated upwardly and will pass through the keeper 102, where the ends of the pin 53 will enter the crotch openings 45 and will enter the crotches 52 of the lock member 47. Tooth 57 thereafter comes into contact with the pin 114, to cause axial movement of the member 47, whereby the free end 48 of the chain becomes locked to the conveying arm 40, for the crotch openings 52 will be out of alignment with respect to their related crotch openings 45. Axial movement of said member 47 will cease as soon as stop pin 56 is against the finger 60 of the drag spring 58. Any further contact between said tooth 57 and pin 114, will cause the latter to move against action of the blade spring 116. It is to be noted that at the commencement of the upward or return movement of the conveying arm 40, the tautness of the chain 49 was relieved, and the stressed springs 110' caused pin 53 to be shifted to lie within the upper part of the crotch openings 106, so as to be in the locus of travel for proper reception by and within the crotch openings 52 of the lock member 47. Before the conveying arm 40 had finally come to rest to its position illustrated in Fig. 9, the cam 83 had again acted so that bolt 86 was shifted to ultimately enter the casing slot 95. The chain connection has been undone, and the conveying arm is again locked in position to the fixed plate 65.

In the embodiment described, the key-operative cylinder means indicated generally by the numeral 74, is permanently mechanically related with the lock mechanism proper of Fig. 1, for the shank 73 is in constant connection with the shaft 71. The device is operable from the outside surface of the door only, and when the chain connection is effected as illustrated in Fig. 10, it is impossible for a person inside the room to remove the chain end 48 from its keeper 102.

To enable the device to be operated from both the outside and inside of a room, I provide a clutch means on a slightly changed cylinder mechanism, as shown in the last sheet of the drawings, so that the cylinder means indicated generally by the numeral 74' is normally wholly independent and without any physical connection with the lock mechanism proper of Fig. 1. I remove the shank 73 of the ordinary cylinder means 74, and provide the key 75' which fits such cylinder mechanism, with a forward tab 118, adapted to pass through and project outwardly from the shank slot 119 in the end plate 120 which turns with the cylinder. Within a cup 121, having a flanged rim 122 the size of the plate 120, and a shank slot 123 in its bottom, is a headed shank 124 capable of slidable movement therein, carrying the coil spring 125 thereabout. The length of the shank 124 is such that its end 124' lies within the slot 123. This cup 121, with its related components as described, is secured to said end plate 120. When the key 75' is inserted in the cylinder mechanism 74', its tab 118, will enter the cup 121, thereby pushing the headed shank 124 into the socket 72 of the shaft 71, to establish mechanical connection with the lock mechanism of Fig. 1.

Upon withdrawal of the key 75', the spring 125, which had been compressed, will shift the headed shank 124 to its initial position, whereby the key-

operated cylinder means 74', and the lock mechanism of Fig. 1, are divorced, for said shank will withdraw from its connection with the shaft 71.

Such feature of separation is readily adaptable to all manner of locks employing the every-day cylinder means, and it is to be noted that such construction is desirable, for although some unauthorized person shall tamper with the cylinder and be successful in turning the cylinder rotor, yet the lock mechanism proper would not be operated.

The end of the shaft 71', is slotted as at 126, to receive the tab 127 of the key 128, which is insertable through the bore 129 in the front surface of the casing 42, whereby the lock may be operated from inside the room, provided of course mechanism to accomplish the purpose of that shown in Fig. 37, is included in the installation. Whether key 128 is used from the inside of the room, or key 75' from the outside surface of the door, the operation of the lock mechanism proper is identical with that heretofore set forth.

Having set forth my invention and how its teachings may be employed, I claim:

1. In a lock for a door and its jamb, the combination of, a chain secured at one end whereby it remains mounted on one of them, a pair of members, each adapted to admit and engage the free end of the chain, mounted on the door and jamb respectively, one fixed and the other pivoted; the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for swinging the pivoted member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement, and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb, locking means adapted to removably engage the pivoted member to fix its position, and means actuated by said key-operative means to motivate said locking means to fix the position of the pivoted member after a chain connection has been effected or removed and to release said pivoted member at each commencement of operation of said key-operative means.

2. A device as in claim 1, including means to independently accelerate the release of the pivoted member from its locking means, a little after the commencement of operation of the key-operative means.

3. In a lock for a door and its jamb, the combination of, a chain secured at one end whereby it remains mounted on one of them, a pair of members, each adapted to admit and engage the free end of the chain, mounted on the door and jamb respectively, one fixed and the other pivoted; the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for swinging the pivoted member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement, and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb, locking means carried on the pivoted member adapted to secure the free end of the chain to said pivoted member, and means adapted to move said locking means to secure the free end of the chain to the pivoted member and to release same in proper timed relationship depending upon whether a chain connection is being made or undone between the door and jamb.

4. A device as in claim 3, including a locking means adapted to removably engage the pivoted member to fix its position, and means actuated by the key-operative means to move this last mentioned locking means to fix the position of the pivoted member after a chain connection has been effected or removed, and to release said pivoted member at each commencement of operation of said key-operative means.

5. In a lock for a door and its jamb, the combination of, a chain secured at one end whereby it remains mounted on the door, a pair of members, each adapted to admit and engage the free end of the chain, one mounted pivotally on the door and the other fixed on the jamb; the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for swinging the pivoted member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement, and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb, locking means carried on the pivoted member adapted to secure the free end of the chain to said pivoted member, and means adapted to move said locking means to secure the free end of the chain to the pivoted member while a chain connection is being removed, and to release said free end of the chain from the pivoted member while a chain connection is being effected.

6. A device as in claim 5, including a locking means adapted to removably engage the pivoted member to fix its position, and means actuated by the key-operative means to move this last mentioned locking means to fix the position of the pivoted member after a chain connection has been effected or removed, and to release said pivoted member at each commencement of operation of said key-operative means.

7. In a lock for a door and its jamb, the combination of, a chain secured at one end whereby it remains mounted on one of them, a pair of members, each adapted to admit and engage the free end of the chain, mounted on the door and jamb respectively, one fixed and the other pivoted; the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for swinging the pivoted member past the fixed member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement, and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb, a locking element provided with an extending tooth, movably mounted on the pivoted member, adapted to be shifted to secure the free end of the chain to said pivoted member, or to free said end thereon, and an element carried by the fixed member, adapted upon movement of the pivoted member past the fixed member, to trip said tooth, thereby shifting said locking element on the pivoted member to secure the free end of the chain to the pivoted member and to release same in proper time relationship depending upon whether a chain connection is being made or undone between the door and jamb.

8. A device as in claim 7, including means mounted on the pivoted member, to control the movement of the locking element thereon.

9. In a lock for a door and its jamb, the combi-

nation of, a chain secured at one end whereby it remains mounted on the door, a pair of members, each adapted to admit and engage the free end of the chain, one mounted pivotally on the door and the other fixed on the jamb; the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for swinging the pivoted member past the fixed member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement, and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb, a locking element provided with an extending tooth, movably mounted on the pivoted member, adapted to be shifted to secure the free end of the chain to said pivoted member, or to free said end thereon, and an element carried by the fixed member, adapted upon movement of the pivoted member past the fixed member, to trip said tooth, thereby shifting said locking element on the pivoted member to secure the free end of the chain to the pivoted member while a chain connection is being removed, and to release said free end of the chain from the pivoted member while a chain connection is being effected.

10. A device as in claim 9, including means mounted on the pivoted member, to control the movement of the locking element thereon.

11. In a lock for a door and its jamb, the combination of a chain, a pair of members, each adapted to admit and engage the free end of the chain, one mounted pivotally on the door and the other fixed on the jamb; one end of the chain being fixed to the pivoted member, and the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for swinging the pivoted member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement, and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb; the distance between the position of the point of attachment of the chain onto the pivoted member and the point of final engagement of the free end of the chain in the fixed member, being greater than the distance between the position of said point of attachment of the chain on the pivoted member and the point of initial engagement of the free end of the chain in the fixed member, whereby the chain is pulled taut upon movement of the pivoted member after a chain connection between the door and jamb has been effected, and loosened upon reverse movement of said pivoted member.

12. In a lock for a door and its jamb, the combination of, a chain, a pair of members, each adapted to admit and engage the free end of the chain, one mounted pivotally on the door and the other fixed on the jamb; one end of the chain being movably mounted on the door, and the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for swinging the pivoted member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement, and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb; the pivoted member, in its movement, being adapted to shift the position of the end of the chain which is permanently on the door, whereby the chain is pulled taut after a chain connection has been effected, and loosened upon reverse movement of the pivoted member.

13. In a lock for a door and its jamb, the combination of a chain, a pair of members, each having a crotch adapted to admit and engage the free end of the chain, one member mounted pivotally on the door and the other of said members fixed on the jamb; one end of the chain being fixed to the pivoted member, and the free end of the chain removably engaged in the crotch of one of said members; the entrance portion of the opening of the crotch on the jamb, lying in the circumference of the circle of the locus of travel of the vertex of the opening of the crotch of the pivoted member, and the vertex portion of the opening of the crotch on the jamb, lying within said circle off its circumference, a spring means on the fixed member adapted to be stressed upon movement of the free end of the chain toward the vertex in the crotch on the jamb upon the chain becoming taut, and adapted to shift the free end of the chain from the vertex portion into the entrance portion in the opening of said crotch on the jamb upon loosening of the chain, a key-operative means adapted to be actuated from the outside surface of the door for swinging the pivoted member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement, and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb; the distance between the position of the point of attachment of the chain on the pivoted member and the point of final engagement of the free end of the chain in the crotch of the fixed member, being greater than the distance between the position of said point of attachment of the chain on the pivoted member and the point of initial engagement of the free end of the chain in the crotch of the fixed member; whereby the chain is pulled taut and into the vertex portion of the opening of the crotch on the jamb, thereby stressing the spring means, upon movement of the pivoted member after a chain connection between door and jamb is effected, and loosened thereafter upon reverse movement of said pivoted member whereby the spring means will shift the free end of the chain from the vertex portion into the entrance portion of the opening of the crotch on the jamb to lie in the aforesaid locus of travel of the vertex of the crotch of the pivoted member.

14. In a lock for a door and its jamb, the combination of, a chain secured at one end to remain mounted on the door, a plate mounted on the door, an arm member pivotally mounted on the plate, a shaft journalled on the plate, a cam carried on the shaft, a keeper member mounted on the jamb; said arm member and keeper member being each adapted to admit and engage the free end of the chain; the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for turning said shaft, locking means on the plate adapted to removably engage the arm member to fix its position, and means controlled by the cam to disengage the locking means from the arm member and swing said arm member, whereby the free end of the chain is conveyed to leave the said member with which it is in engagement and to enter the other of said members to effect

or remove a chain connection between the door and the jamb, and then lock the arm to the plate again.

15. A device as in claim 14, including means to independently accelerate the release of the arm member from its locking means.

16. A device as in claim 14, including a friction means in contact with the arm member, adapted to oppose the action of gravity on said member.

17. In a lock for a door and its jamb, the combination of, a chain secured at one end to remain mounted on the door, a plate mounted on the door, an arm member pivotally mounted on the plate, provided with a pair of slots, a shaft journalled to the plate, a cam carried on the shaft, a keeper member mounted on the jamb; said arm member and keeper member being each adapted to admit and engage the free end of the chain; the free end of the chain being removably engaged in one of said members, a key-operative means adapted to be actuated from the outside surface of the door for turning said shaft, a lock bolt movably mounted on the plate extending into one of the slots to fix the position of the arm member, and means controlled by the cam to shift the bolt out of said slot in said arm member and to swing the arm member, whereby the free end of the chain is conveyed to leave the said member with which it is in engagement and to enter the other of said members to effect or remove a chain connection between the door and the jamb, and then to shift the bolt into the other slot in the arm member.

18. In a lock for a door and its jamb, the combination of, a chain secured at one end to remain mounted on the door, an arm member mounted pivotally on the door, having an opening adapted to admit the free end of the chain, a cylindrical member journalled through the arm, having an opening longitudinally thereof adapted to admit the free end of the chain from the opening in the arm; a tooth extending from the journalled member, a member mounted on the jamb, adapted to admit and engage the free end of the chain; the free end of the chain being removably engaged in either the journalled member or the member on the jamb, a key operative-means adapted to be actuated from the outside surface of the door for swinging the arm member whereby the free end of the chain is conveyed to leave the said member with which it is in engagement and to enter and become engaged by the other of said members to effect or remove a chain connection between the door and jamb and an element projecting from the member on the jamb, adapted to trip the tooth to rotatably shift the journalled member whereby the free end of the chain is either locked to the arm or made free to be released therefrom depending whether a chain connection is to be effected or to be removed.

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