

No. 885,559.

PATENTED APR. 21, 1908.

C. J. WOODWARD.
DOOR LATCH.

APPLICATION FILED AUG. 1, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

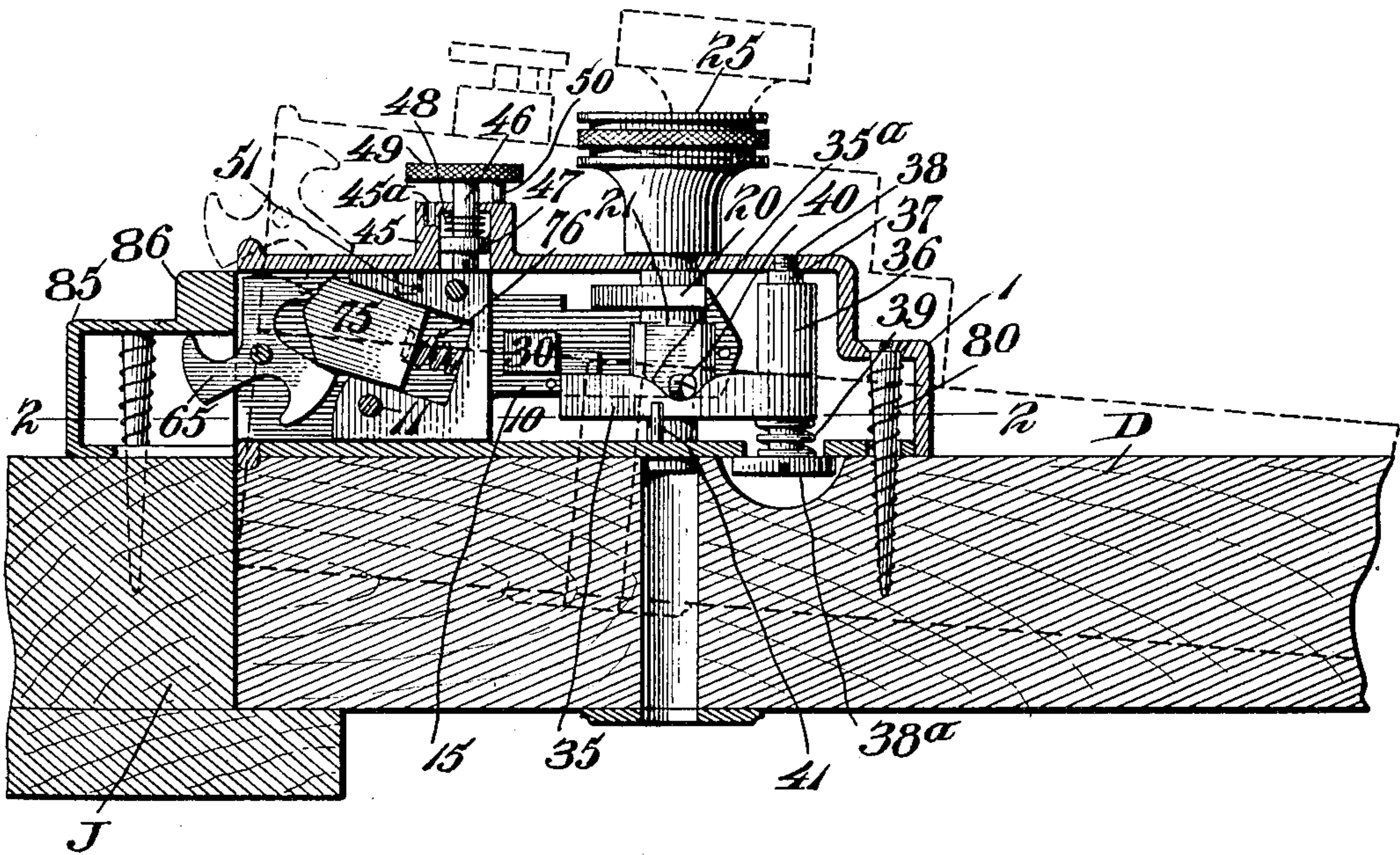


Fig. 2.

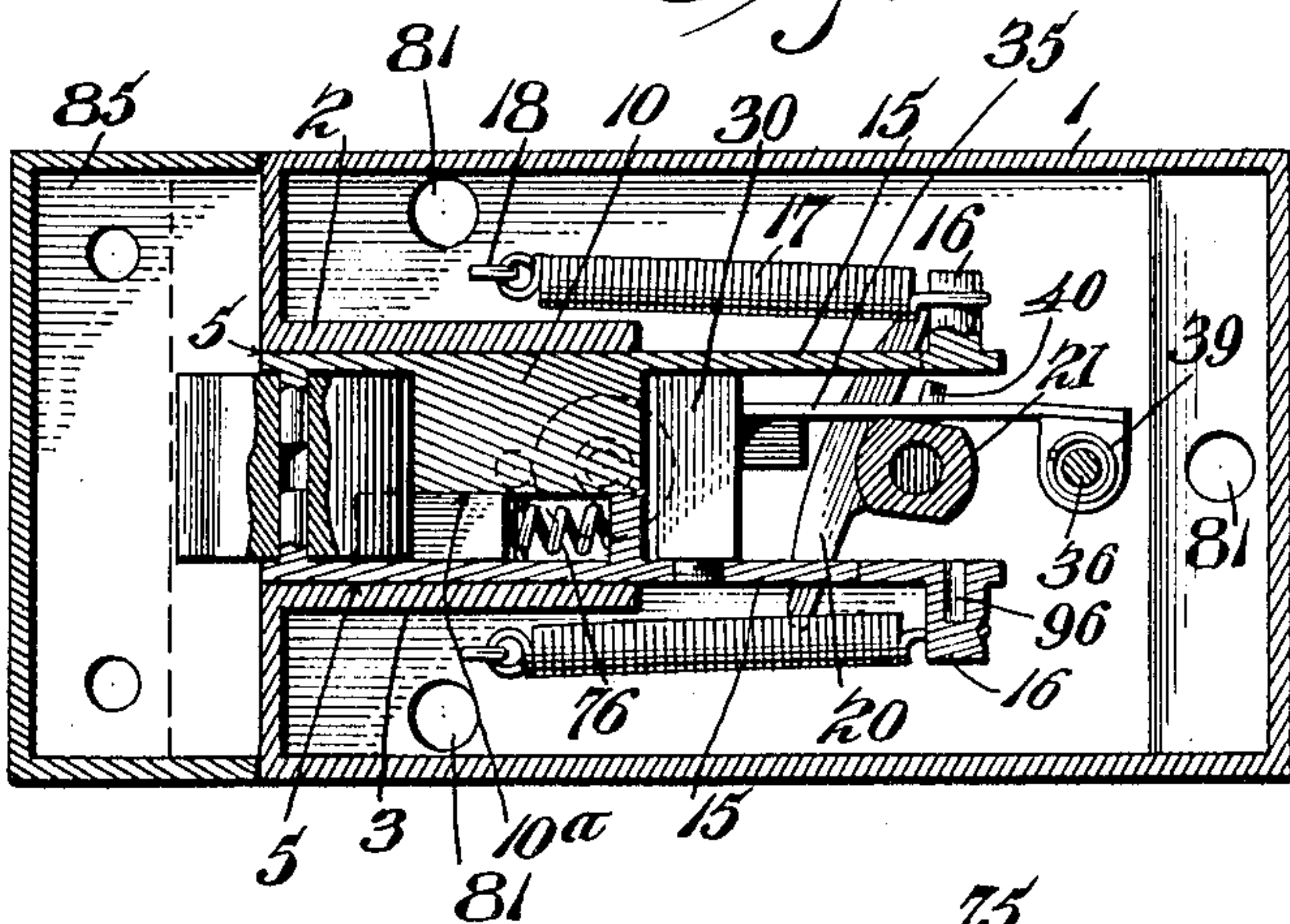


Fig. 3.

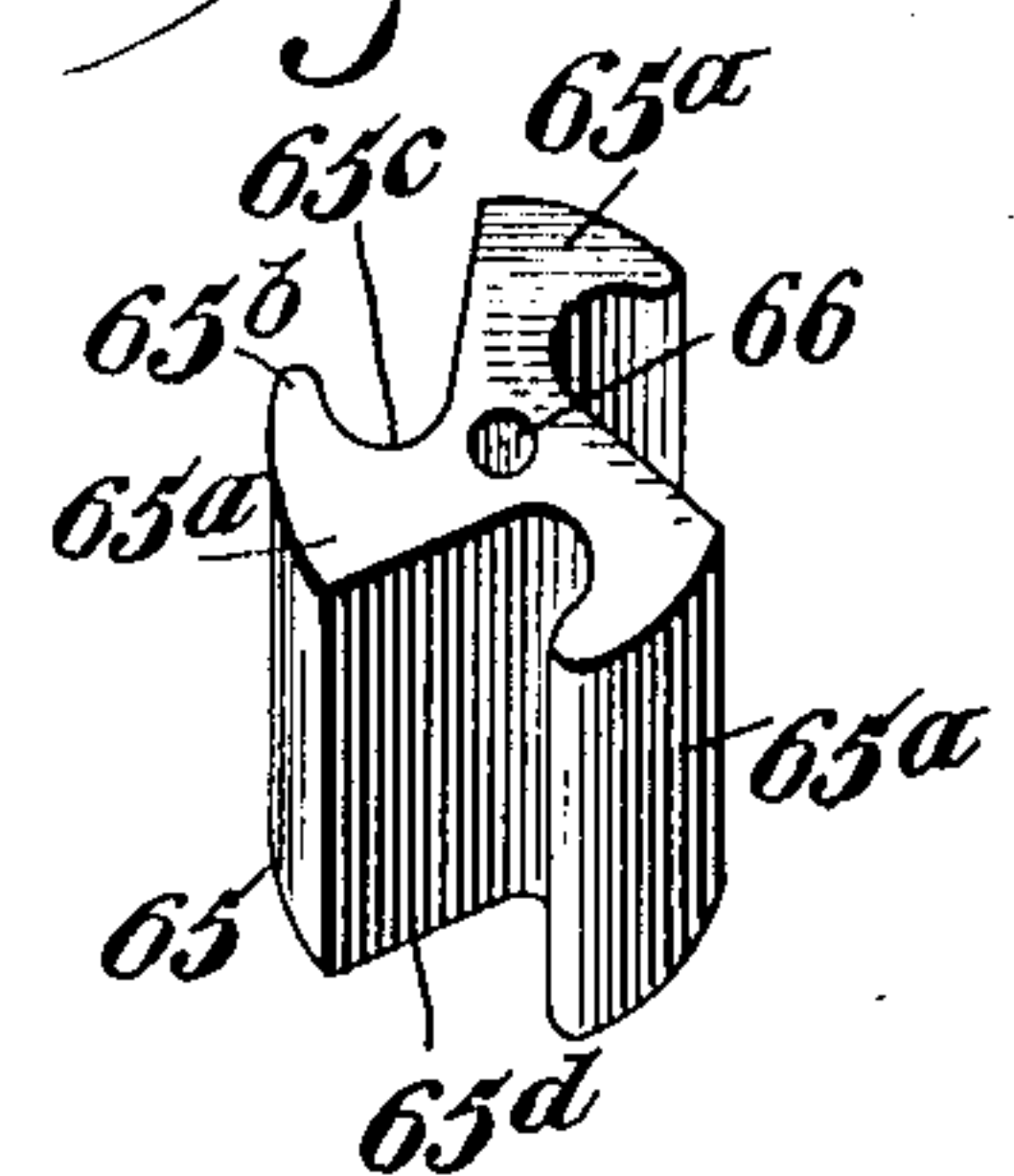
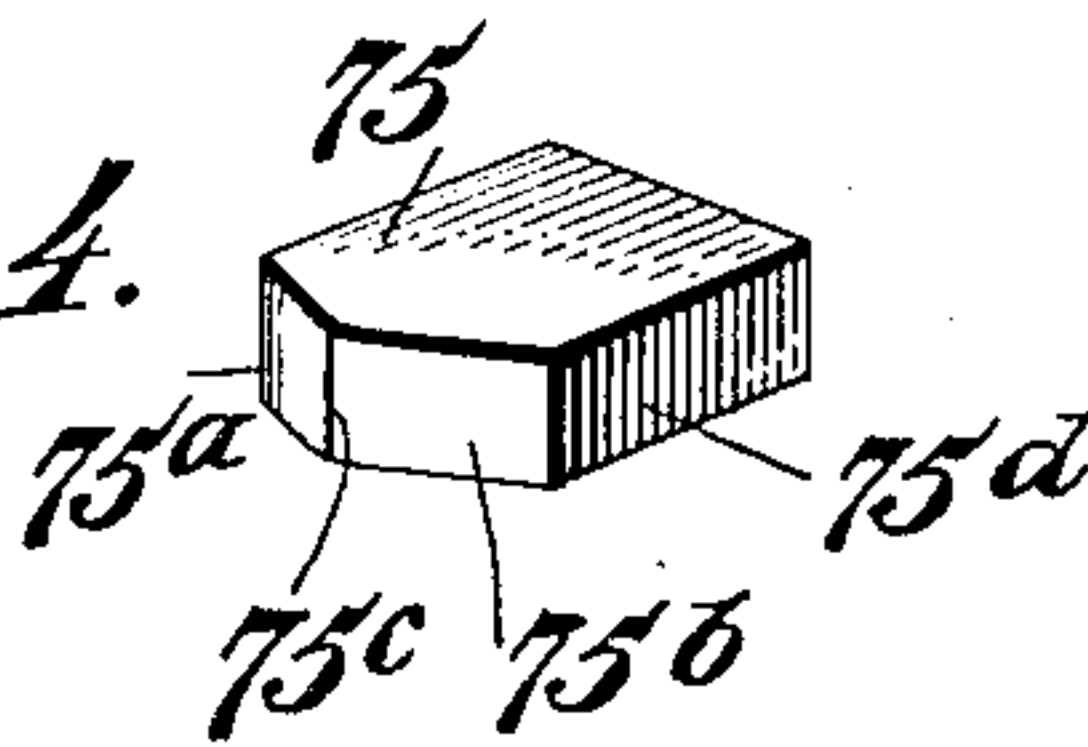


Fig. 4.



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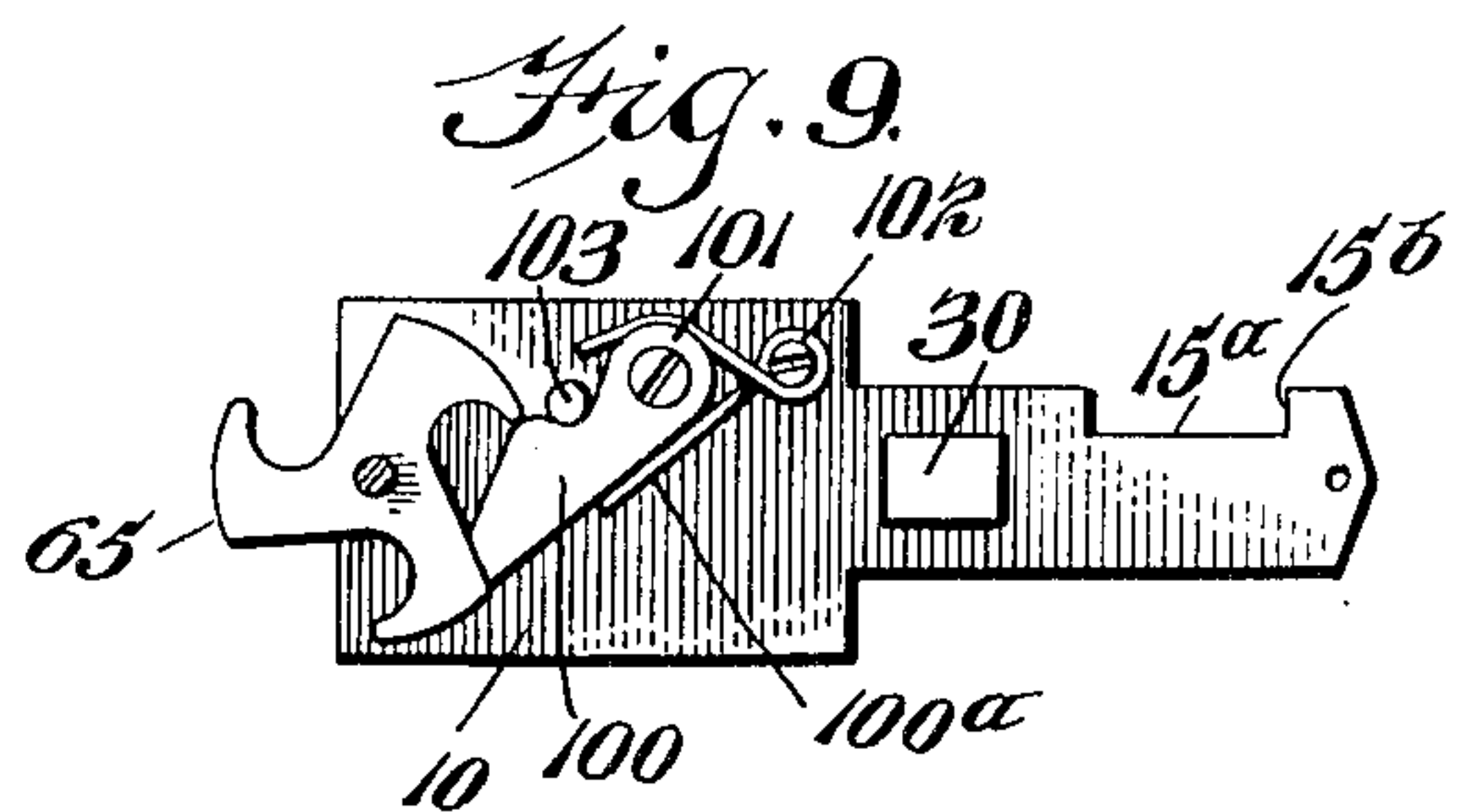
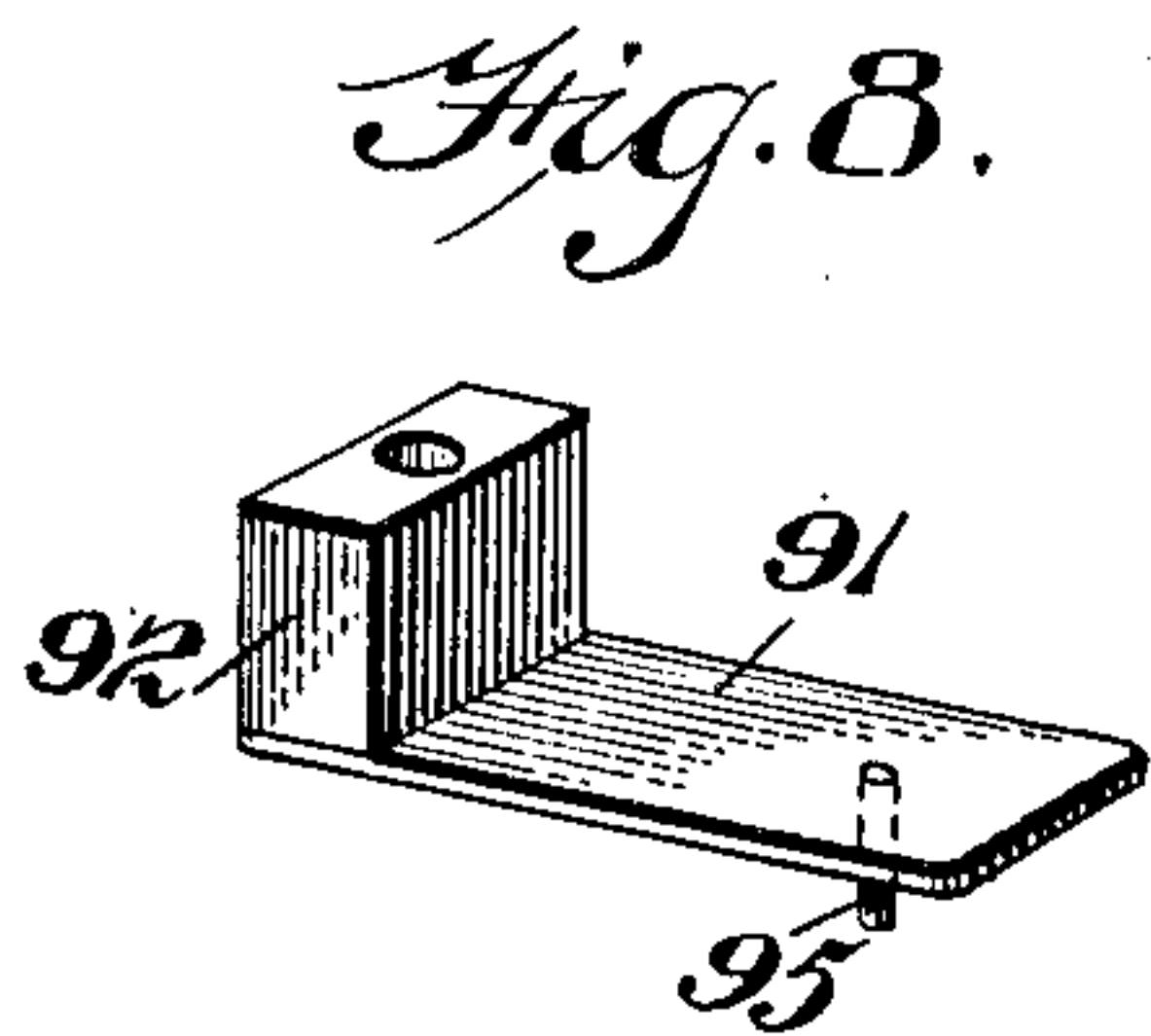
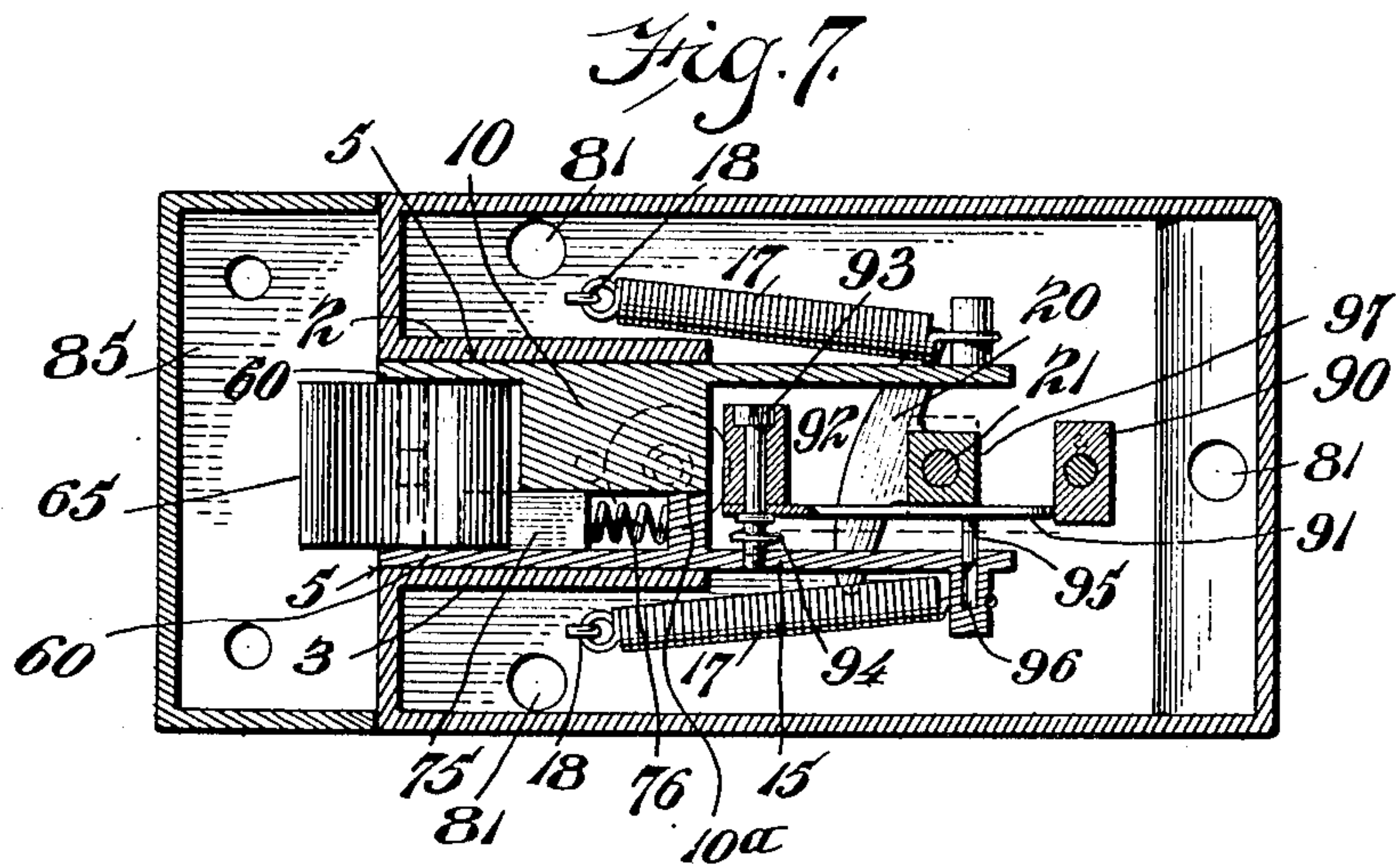
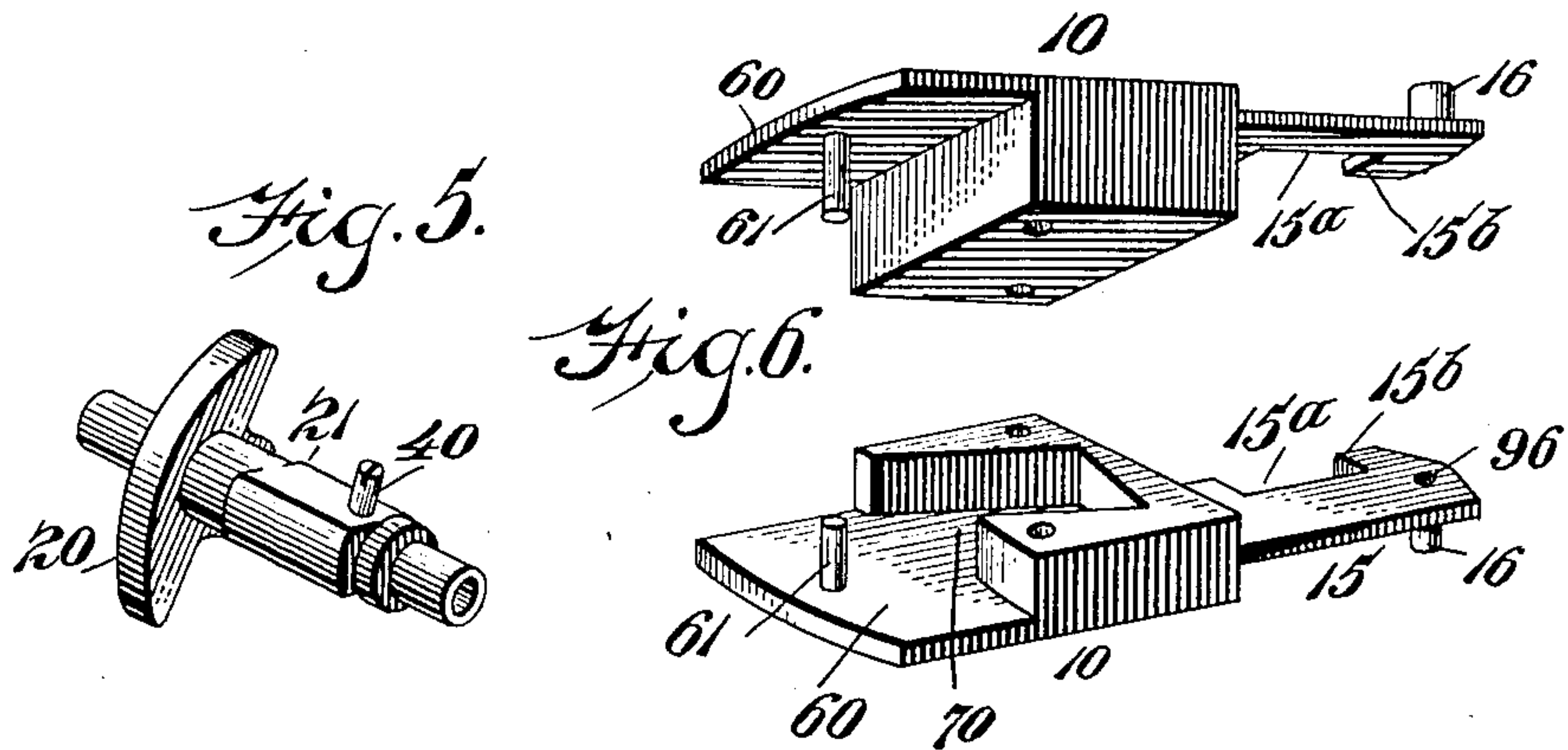
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2 SHEETS—SHEET 2.



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DOOR-LATCH.

No. 885,559

Specification of Letters Patent.

Patented April 21, 1908.

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To all whom it may concern:

Be it known that I, CHARLES J. WOODWARD, a citizen of the United States, residing in the borough of Brooklyn, in the city and State of New York, have invented certain new and useful Improvements in Door-Latches, of which the following is a specification.

The object of my invention is to provide a simple and improved form of spring night-latch which will offer but little resistance to the closing of a door, and which will at the same time afford an absolutely secure lock when in closed position which will insure against the improper opening of the door by springing or wedging back the latch from the keeper. In effect my improvements provide a dead latch which will spring into locked position.

To this end my improved door latch comprises a sliding bolt normally held against movement by a suitable tumbler, in combination with an automatically locking latch-member, preferably in the form of a rotatable latching wheel mounted upon the sliding bolt and acted upon by a spring operated tumbler constructed and arranged to permit the free step by step rotation of the latching device in one direction and prevent the rotation of the latching device in the opposite direction. With this improved form of latch it will be understood that in the closing operation the latching device will rotate into locked engagement with the keeper upon the door jamb, and that the unlocking operation is accomplished by some hand operated device acting upon the main locking tumbler and sliding bolt for withdrawing the bolt and latching device away from the keeper.

The sliding bolt of the latch is provided with suitable springs for retaining it in its locked position, the tumbler device being arranged to lock the bolt in the same position. The rotary latching device is preferably in the form of a cycloidal wheel formed with a plurality (preferably three) of arms or members which successively act as keeper engaging members and tumbler engaged members. The spring operated tumbler for the rotatable latching device is preferably formed of a sliding block mounted in a suitable guide-way or recess upon the locking bolt and formed with angular faces which engage the arms or members of the rotary latching wheel. This latching tumbler is mounted upon the sliding bolt at an angle to the lon-

gitudinal axis of the bolt, so that one of its inclined faces will be engaged by an arm of the rotary latching device in the closing movement of the latch to force the tumbler inwardly to permit the rotation of the latching device into engagement with the keeper, while the other inclined face of the latching tumbler is presented against the rear edge of one of the arms of the latching wheel in the locking movement to act as an auxiliary device for quickly completing the movement of the latching wheel into locked engagement with the keeper of the lock. In locked position one edge of the latching tumbler engages the rear face of one of the latching arms for holding the latching wheel securely against rearward rotation. Other forms of tumblers or retaining dogs may be used for locking the rotating latch wheel in one direction while permitting it to rotate in the other direction, such for instance as a simple pivoted dog or pawl arranged in operative relation to the latch wheel. I have found, however, that the spring operated sliding tumbler produces the best results.

The locking tumbler for the main sliding bolt of the latch may be of any approved construction, but I prefer to employ a novel form of tumbler invented by me and comprising a suitable stop mounted either upon the latch case or the sliding bolt, and a tumbler member supported upon a pin or bolt in operative relation to said stop and movable parallel with its supporting pin or axis against the action of a retaining spring through a cam device operated by the hand wheel or knob of the latch. It will be understood that when the tumbler stop is mounted upon the latch bolt, the supporting pin or axis for the tumbler must be mounted upon the lock case, and when the stop is mounted upon the case the supporting axis for the tumbler must be mounted upon the sliding bolt.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings, and afterwards point out the novelty in the annexed claims.

In said drawings Figure 1 is a horizontal sectional view of a section of a door, having my improved door latch in position thereon, the latch being shown in longitudinal section. Fig. 2 is a vertical longitudinal sectional view taken on the line 2—2 of Fig. 1. Figs. 3, 4, 5 and 6 are detail perspective views of parts of my improved latch. Fig. 7 is a

view similar to Fig. 2 showing a modified form of main locking tumbler for the sliding bolt. Fig. 8 is a detail perspective view of the modified form of main locking tumbler shown in Fig. 7. Fig. 9 is a detail plan view of a modified form of dog or tumbler for the rotary latching wheel.

Referring first to the form of latch illustrated in Figs. 1 to 6 of the drawings, which is the preferred form of my invention, 1 is the case within which the operative parts of my improved latch are mounted. This case 1 is formed with interior guide walls 2 and 3 extending longitudinally of the case and forming the central longitudinal guide-way or channel 5 in which is freely mounted the longitudinally movable sliding bolt 10.

The sliding bolt 10 is preferably formed, for the sake of convenience in manufacture, in two sections, which separate on the line 10^a in Figs. 2 and 7. The two sections of the sliding bolt are secured together by rivets or screws indicated at 11 in Fig. 1. One of the bolt sections has a solid central portion, while the other bolt section is recessed to receive the tumbler of the rotating latching wheel hereinafter referred to.

Projecting rearwardly from the main portion of each section of the sliding bolt is a longitudinal arm or plate 15, each one of which is formed with a laterally projecting pin or lug 16 engaged by one end of a spiral spring 17 which is attached at its opposite end to a pin 18 secured in the latch case. The springs 17 retain the latch bolt 10 normally in its forward locking position in the case 1.

Each of the longitudinal arms or plates 15 of the sliding bolt 10 is cut out at 15^a on one edge to form a shoulder 15^b for the engagement of the double rocker arm 20 keyed to the rotary spindle 21 which is suitably journaled in the lock case and is provided at its outer end with the operating knurled hand wheel 25. By rotating the hand wheel 25 it will be observed that the rocker arm 20 engaging one of the shoulders 15^b will draw the bolt 10 back into the lock case. Located between the two arms 15 of the sliding bolt is a tumbler stop or post 30 with which the main locking tumbler is adapted to engage.

35 is the main locking tumbler which consists in the preferred form of the mechanism, of a rigid arm projecting from and formed integral with a supporting hub 36 which is freely mounted upon a pin or post 37 seated at 38 in the top of the lock case. Arranged between the hub portion 36 and the head 38^a of the supporting post 37 is a spiral spring 39 which normally holds the tumbler in locked position, the end of the tumbler arm 35 resting in this normal position in engagement with the post or stop 30. One edge of the tumbler arm 35 is cut out as indicated at 35^a to form a cam face with which a pin or lug 40

engages. This pin or lug 40 extends radially from the rotary spindle 21 so that when said spindle is operated by the hand wheel 25, the pin or lug impinging against the cam face 35^a will shift the tumbler arm 35 parallel with the supporting post 37 so as to take the engaged end of the tumbler arm out of the path of the tumbler stop or post 30 so as to free the sliding bolt 10 from the locking action of the tumbler and permit it to be moved in the lock case by the action already described of the rocker arm 20 upon one of the shoulders 15^b. It will, of course, be understood that there must be lost motion between the rocker arm 20 and the shoulders 15^b sufficient to permit the pin or lug 40 to disengage the tumbler from the post 30 prior to the sliding action of the bolt. A pin 41 projecting from the lock case rests above the tumbler arm 35 for loosely confining it in operative relation to the rotary spindle 21.

Upon the outer face of the lock case 1 is a recessed boss 45 in which is mounted a rotatable and longitudinally movable pin 46 carrying an annular collar 47 for confining an expansion spiral spring 48 upon the pin 46. The pin 46 has a milled operating wheel or head 49 carrying a limiting and positioning pin or lug 50 projecting inwardly from its inner face and adapted to engage in a recess 45^a within the boss 45 to permit the spring 48 to press the pin 46 inwardly into engagement with a locking opening 51 formed in the sliding bolt 10. The purpose of this is to retain the sliding bolt in unlocked position when it is desired to leave the door unlatched.

Each of the sections of the sliding bolt 10 is formed with a forwardly projecting plate 60 supporting an inwardly projecting journal pin 61. The two plates 60 of the sliding bolt are arranged parallel to receive the rotatable latching wheel 65 which has an axial opening 66 freely journaled upon the pins 61. This latching wheel 65 is formed with a plurality of radial locking arms 65^a, each one of which arms has a forwardly presented hook or nose 65^b formed by recessing the forwardly presented face of each arm as indicated at 65^c. The rotatable locking wheel 65 is supported between the plates 60 of the sliding bolt 10 in front of a rectangular recess or pocket 70 formed in one of the sections of the sliding bolt. This recess or pocket 70 is presented at a slight angle to the longitudinal axis of the sliding bolt as best shown in Fig. 1 of the drawings, and loosely mounted in said pocket or recess 70 is a sliding tumbler block 75 formed with the outwardly presented inclined faces 75^a and 75^b sloping in opposite directions from the angular end 75^c. The rear end of the tumbler block 75 is bored out as indicated in dotted lines to receive the end of an expansion spring 76 which is confined between the bored end of block 75 and the inner end of the rectangular recess

or pocket 70, for the purpose of giving the tumbler block 75 a spring tendency to move outwardly in its recess or pocket.

The lock is designed to be secured to a door as shown in Fig. 1 by suitable wood screws, one of which is indicated at 80, said screws passing through openings 81 in the lock case into the door D. The door jamb J constructed as usual, has secured to its inner face a keeper 85 having a heavy striking rib or portion 86 which is presented in proper position to engage the flat rearwardly presented faces 65^d of the locking arms of the rotary latching wheel 65, to cause the latching wheel to rotate past the striking portion 86 of the keeper into locked engagement therewith as shown in Fig. 1 of the drawings, in which the parts of the latch are in normal locked position. In this normal position of the parts the short inclined face 75^a of tumbler block 75 rests in engagement with one of the noses 65^b of latching wheel 65, and the inner edge 75^d of the tumbler block rests in engagement with the rear face 65^d of one locking arm 65. In this locked position of the latch it will be observed that the engagement of the edge 75^d of tumbler block 75 with the rear face 65^d of the latching wheel, will prevent the rearward rotation of the latching wheel, while the engagement of the nose 65^b of one of the locking arms 65 with the under face of the keeper 85 will prevent the forward rotation of latching wheel 65. The wheel 65 will thereby be rigidly held against rotation in either direction by these means. Furthermore it will be observed that the main locking tumbler 35 in engagement with the tumbler post 30 will firmly hold the bolt 10 in its locked position, so that the latch will be securely locked and can only be released by the operation of the hand wheel 25 which withdraws the bolt 10 and with it the rotary latching wheel 65.

Assuming that the door has been opened and it is thrown to, it will be observed that when the face 65^d of one of the locking arms 65^a of wheel 65 engages the outer striking portion 86 of keeper 85 (it being understood that the bolt in closing operation is firmly held against motion in the casing by its controlling tumbler) causing latching wheel 65 to rotate forwardly, or in the direction following the noses 65^b, the nose 65^b which at the moment is in engagement with the inclined face 75^a of latch controlling tumbler 75, causes tumbler 75 to move inwardly in its recess or pocket to permit said rotary motion of the latching wheel. This rotating motion into locked position causes the hook end of the locking arm following the arm which engaged the striking portion of the keeper to be moved into engagement with the under face of the keeper, and the hook end of the arm which engaged the striking portion of the keeper to be moved around into engagement with the cam faces 75^a of the tumbler. The

final portion of the rotary step of the wheel 65 into locked position is made more positive by the cam action of the inclined face 75^b upon the outer edge of the rear face 65^d, which accelerating action takes place the instant that the outer edge of face 65^d passes the pointed end 75^c of the tumbler block 75. This accelerating action of the tumbler upon the rotating latch wheel insures the quick latching of the door, it being understood that the moment the latching wheel is in proper locked engagement with the keeper, tumbler block 75 will spring forward to securely engage the tumbler wheel and prevent all possibility of the rebounding of the latch.

In Figs. 7 and 8 I have shown a slightly modified form of main locking tumbler for my improved lock. In this form of the tumbler mechanism it will be observed that the tumbler stop or post 90 is secured to the casing while the tumbler arm or plate 91 is projected rearwardly from the hub portion 92 slidably mounted upon a pin or bolt 93 secured in one of the arms 15 of the bolt 10. A spring 94 is arranged between the arm 15 and the tumbler 91, 92, for normally holding the same in position to engage the stop 90. A guide pin 95 projects from the face of the tumbler 91 and moves freely in a socket 96 in the arm 15. The rotary controlling spindle 21 is formed with a squared cam member 97 which normally rests in engagement with the tumbler 91, so that upon the rotation of spindle 21 said cam member 97 will engage tumbler arm 91 and move the tumbler upon its supporting pin 93 so as to disengage the tumbler from the stop 90 and free the bolt preparatory to its inward longitudinal movement under the action of the rocker arm 20. Fig. 8 shows the modified form of tumbler detached from the rest of the mechanism.

In Fig. 9 I have shown a modified form of tumbler dog for engaging and controlling the rotating latching wheel 65. In this form of the device I employ a dog 100 pivoted to the bolt 10 at 101 and held by a spring 102 in engagement with the lock 103. In this normal position of the dog 100 it will be observed that its flattened end 100^a engages the rear face of one of the locking arms of locking wheel 65 and prevents the rearward rotation of said locking wheel. The forward motion of the locking wheel when the door is being closed, causes one of the locking arms to press against a curved face 100^b to move the dog against the action of its spring out of the path of the rotating locking arm.

The operation of my improved latching mechanism has been explained above in connection with the description of the structure.

The importance of the improved structure is due mainly to its simplicity and to its security. The closing action of the latch is very rapid and on this account there is no danger of the rebounding of a door which is thrown

closed with too much force. The arrangement of the rotating latching wheel with its locking tumbler upon the bolt which is in turn secured against motion by the main locking tumbler renders the latch absolutely secure against attack. The latch cannot be sprung or wedged inwardly in the case because of the rigid support of the sliding bolt and it is absolutely impossible to rotate the latching wheel on the bolt to release it, since it is securely held against motion in one direction by its controlling tumbler and against motion in the other direction by its engagement with the keeper.

A very important feature of my invention is the exact shape of the rotatable latching wheel 65. It will be observed that each locking arm 65^a has a rearwardly presented striking face 65^d extending approximately parallel to the radius of the locking wheel, and a forwardly presented semi-circular cut out or recessed face 65^c. The striking face 65^d of one locking arm merges into the cut out face 65^c of the succeeding locking arm. By this shaping of the locking arms of the latching wheel it is possible to provide a very close and accurate engagement between the latching wheel and the striking nose of the keeper, since the recessed front faces of the locking arms permit the movement of the locking arms into locked position by the combined rotation of the latching wheel and closing motion of the door upon which the lock is mounted. The terms "forwardly presented" and "rearwardly presented" herein employed refer to the arrangement of the parts with respect to the direction of rotation of the locking wheel.

What I claim is:

1. In a device of the character described, the combination of a suitable casing member, and a bolt member sliding therein, with a tumbler stop mounted upon one of said members, a tumbler-supporting pin mounted upon the other of said members, a bolt-controlling tumbler mounted upon said pin and movable parallel with the axis thereof into and out of engagement with said tumbler stop, and means for operating said tumbler and bolt member.

2. In a device of the character described, the combination of a suitable casing member, and a bolt member sliding therein, with a tumbler stop mounted upon one of said members, a tumbler-supporting pin mounted upon the other of said members, a bolt-controlling tumbler slidingly mounted upon said pin and movable parallel with the axis thereof into and out of engagement with said tumbler stop, a spring engaging said tumbler to yieldingly hold it in engaged position, an operating spindle, a cam device actuated by said spindle for shifting the tumbler upon its supporting pin, and means upon said spindle for operating the bolt member.

3. In a device of the character described, the combination of a suitable casing member, and a bolt member sliding therein, with a tumbler stop mounted upon one of said members, a headed tumbler-supporting pin mounted upon the other of said members, a bolt-controlling tumbler having a bored hub which is slidingly mounted upon said pin and movable thereon parallel with the axis thereof into and out of engagement with said tumbler stop, a spring mounted upon said pin between its head and said tumbler to yieldingly hold the tumbler in engagement with said stop, an operating spindle, a cam device actuated by said spindle for shifting the tumbler upon its supporting pin, and means carried by said spindle for engaging and moving the bolt in the casing.

4. In a device of the character described, the combination of a locking bolt, means normally locking said bolt, and an automatically locking latch-member suitably mounted upon said bolt.

5. In a device of the character described, the combination of a locking bolt, means normally locking said bolt, a latch-member mounted upon the bolt, and a latching tumbler engaging and controlling said latch-member.

6. In a device of the character described, the combination of a locking bolt, a tumbler adapted to prevent motion of said bolt, a rotatable latching wheel journaled upon the bolt, and a latching tumbler mounted upon the bolt and engaging said latching wheel.

7. In a device of the character described, the combination of a locking bolt, means normally preventing motion of said bolt, and an automatically locking latching wheel journaled upon said bolt and formed with a plurality of locking arms each one of which has a forwardly presented recessed face and a rearwardly presented approximately radial face.

8. In a device of the character described, the combination of a locking bolt, means normally preventing motion of said bolt, a rotatable latching wheel journaled upon said bolt and formed with a plurality of locking arms having forwardly presented recessed faces and rearwardly presented radial faces, and a latching tumbler engaging and controlling said latching wheel.

9. In a device of the character described, the combination of a locking bolt, means normally preventing motion of said bolt, and an automatically locking latching wheel journaled upon said bolt and formed with a plurality of approximately radial locking arms, each one of said arms having a forwardly presented recessed face and a rearwardly presented approximately radial face, the recessed face of one locking arm merging into the approximately radial face of an adjacent locking arm.

10. In a device of the character described, the combination of a locking bolt, latching device journaled upon the bolt, and a latching tumbler mounted upon the bolt, and engaging said latching device and adapted to prevent movement in one direction only.

11. In a device of the character described, the combination of a locking bolt, a locking tumbler adapted to prevent motion of said bolt, means for operating said locking tumbler and bolt, a latching device journaled upon the bolt, and a spring operated latching tumbler mounted upon the bolt and engaging said latching device and adapted to prevent the movement of said latching device in one direction only.

12. In a device of the character described, the combination of a locking bolt, and means normally preventing motion of said bolt with an automatically locking latch suitably mounted upon said bolt, and means engaging said latch to accelerate its locking movement.

13. In a device of the character described, the combination of a locking bolt, a locking tumbler adapted to prevent motion of said bolt, a rotatable latching wheel journaled upon the bolt, and a spring operated latching tumbler mounted upon the bolt and engaging said latching wheel and adapted to normally prevent rearward rotation of said latching wheel and to accelerate the forward rotation of said wheel when operated.

14. The combination of a bolt, a main locking tumbler securing said bolt against motion, a latching wheel journaled upon said bolt and formed with a plurality of approximately radial locking arms, a latching tumbler mounted upon the bolt and engaging said latching wheel, and means for operating said main locking tumbler and bolt.

15. The combination of a sliding bolt, means normally securing said bolt against motion, a latching wheel journaled upon said bolt and formed with a plurality of approximately radial locking arms, a spring operated latching tumbler mounted upon the bolt and normally engaging one of said latching arms to lock said wheel against backward rotation, said latching tumbler having a cam face with which said latching arms engage on their forward movement to move the tumbler back out of their path, and means for operating said bolt.

16. The combination of a bolt, and means for operating said bolt, with a latching wheel journaled upon said bolt and formed with a plurality of approximately radial locking arms, a spring operated latching tumbler mounted upon the bolt and normally engaging one of said latching arms, to lock said wheel against backward rotation, and a cam face upon said latching tumbler adapted to engage said latching arms for accelerating the forward locking motion of the latching wheel.

17. The combination of a bolt, a main locking tumbler securing said bolt against motion, and means for operating said locking tumbler and bolt, with a latching wheel journaled upon said bolt and formed with a plurality of approximately radial locking arms, an angular longitudinally movable tumbler mounted upon the bolt in operative relation to said latching wheel and formed with two inclined-faces and a wheel-locking edge, and a spring for operating said latching tumbler.

18. The combination of a locking bolt, a main locking tumbler therefor, a rotary latching wheel journaled upon said bolt and formed with a plurality of locking arms, and a spring operated sliding tumbler mounted upon said bolt and formed with angular faces which are adapted to engage said latching wheel.

19. The combination of a lock casing, a locking bolt slidably mounted in said casing and formed with a tumbler-receiving recess, a rotary latching wheel journaled upon said bolt and formed with a plurality of locking arms, and a spring operated sliding tumbler mounted in the recess of said bolt and formed with angular faces which are adapted to engage said latching wheel.

20. The combination of a locking bolt having means for normally securing it in locked position, with a rotary latching wheel journaled upon said bolt and formed with a plurality of radial locking arms, each of said locking arms being recessed or cut out upon its forward face, a tumbler mounted upon the locking bolt and adapted to engage and control said latching wheel, and a keeper with which said latching wheel engages.

21. The combination of a locking bolt having means for normally securing it in locked position, with a rotary latching wheel journaled upon said bolt and formed with a plurality of radial locking arms, and a tumbler mounted upon the locking bolt and adapted to engage and control said latching wheel, said sliding tumbler being mounted upon the locking bolt at an angle to its longitudinal axis.

22. The combination of a locking bolt having means for normally securing it in locked position, with a rotary latching wheel journaled upon said bolt and formed with a plurality of radial locking arms, and a tumbler mounted upon the locking bolt, and adapted to engage and control said latching wheel, said latching wheel being journaled at the forward end of the locking bolt, and said sliding tumbler being arranged at an angle to the longitudinal axis of the bolt and engaging said latching wheel to one side of its center of rotation.

23. The combination of a locking bolt having means for normally securing it in locked position, with a rotary latching wheel journaled upon said bolt and formed with a plu-

ality of radial locking arms, a tumbler receiving recess or pocket formed in the locking bolt and extending at an angle to the longitudinal axis of the bolt, a sliding tumbler mounted in said recess or pocket and formed with oppositely inclined angular faces at its engaging end, and a spring operating upon said sliding tumbler.

24. The combination of a locking bolt formed of two longitudinally separated sections with a journal pin projecting inwardly from each section, with a latching device journaled upon said pins, and a tumbler mounted upon the locking bolt and adapted to engage said latching device.

25. The combination of a locking bolt, formed of two longitudinally separated sections with a journal pin projecting inwardly from each section, and a tumbler receiving recess or pocket formed in one of said sections and closed by the other of said sections, with a latching device journaled upon said pins,

and a sliding tumbler mounted in said recess or pocket and engaging said latching device.

26. The combination of a locking bolt having means for normally securing it in locked position, said locking bolt being formed of two longitudinally separated sections with a journal pin projecting inwardly from each section, and a tumbler receiving recess or pocket formed in one of said sections and closed by the other of said sections, with a rotary latching wheel journaled upon said pins and formed with a plurality of radial locking arms, a sliding tumbler mounted in said recess or pocket, and formed with oppositely inclined angular faces at its engaging end, and a spring operated upon said sliding tumbler.

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Witnesses:

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