

No. 641,501.

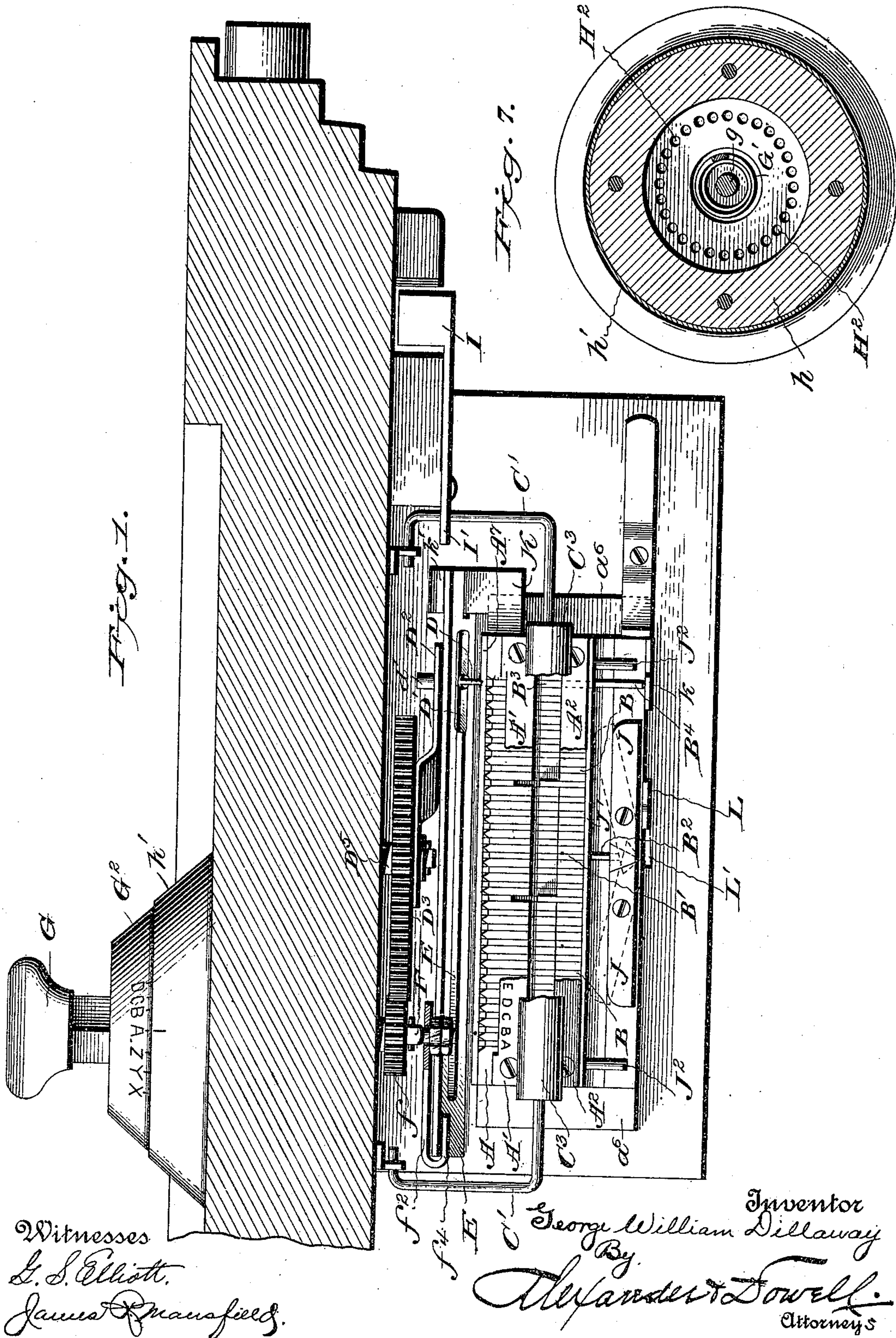
Patented Jan. 16, 1900.

G. W. DILLAWAY.
PERMUTATION LOCK.

(Application filed Apr. 24, 1899.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses
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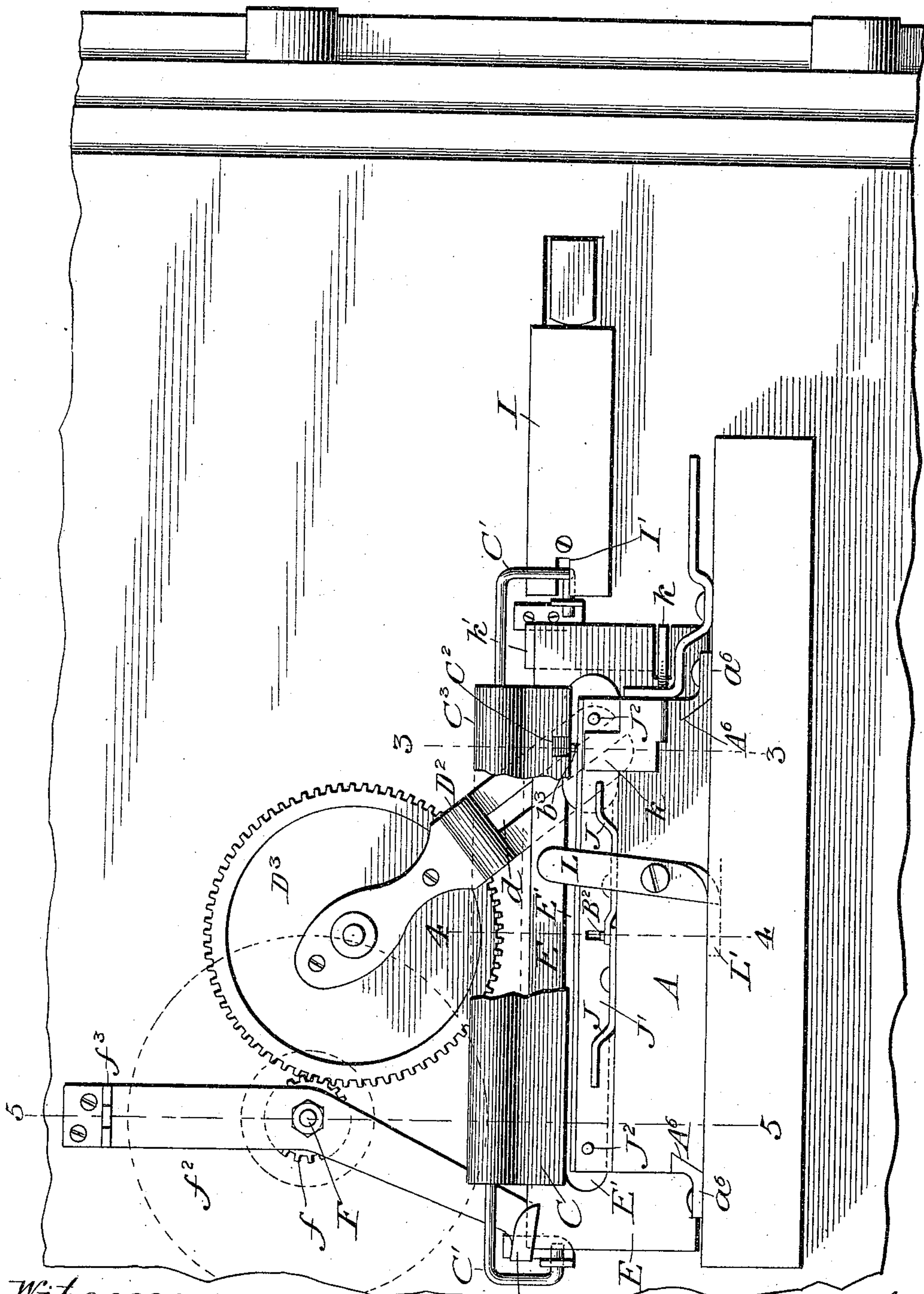
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4 Sheets—Sheet 2.



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Fig. 2.

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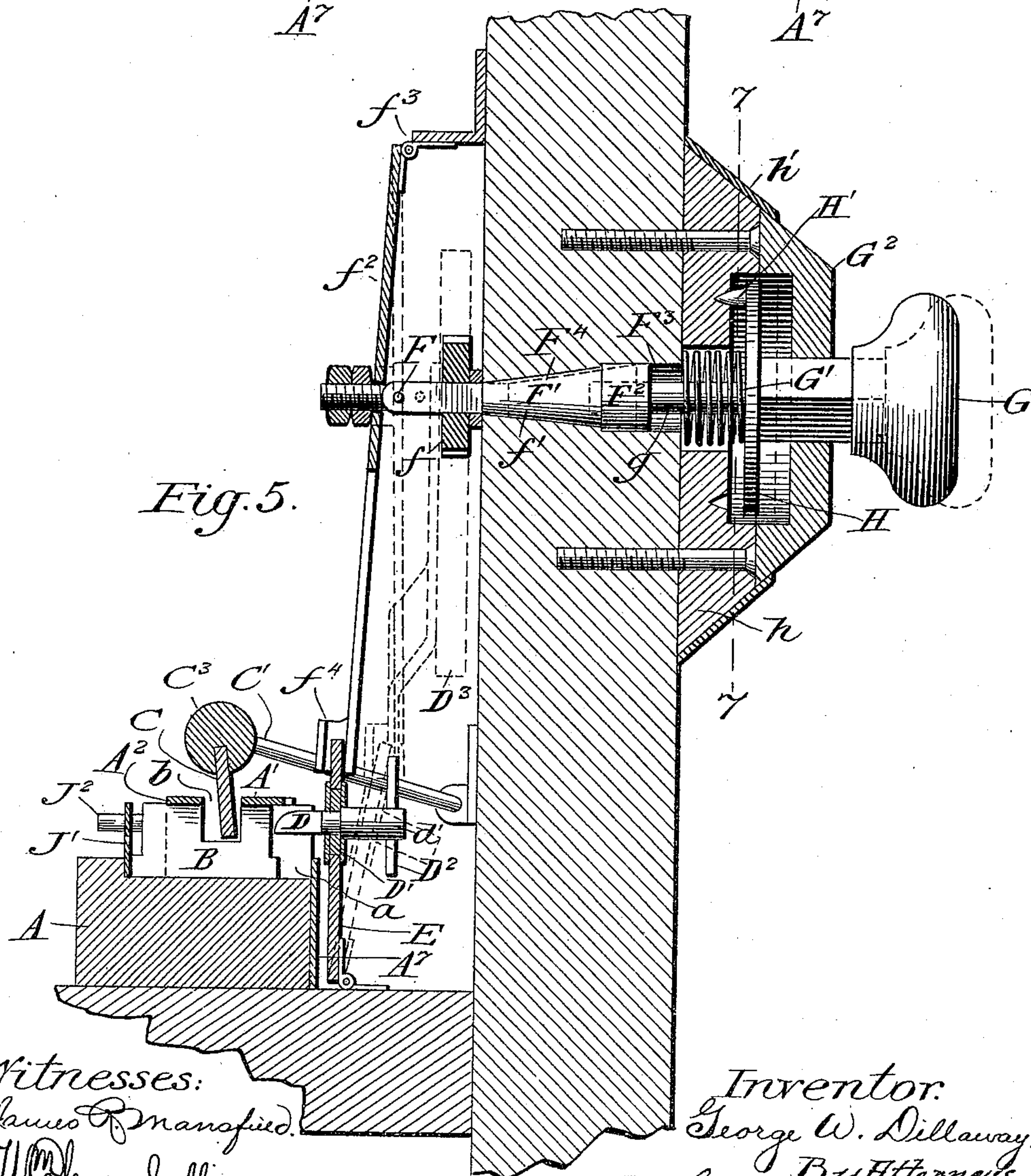
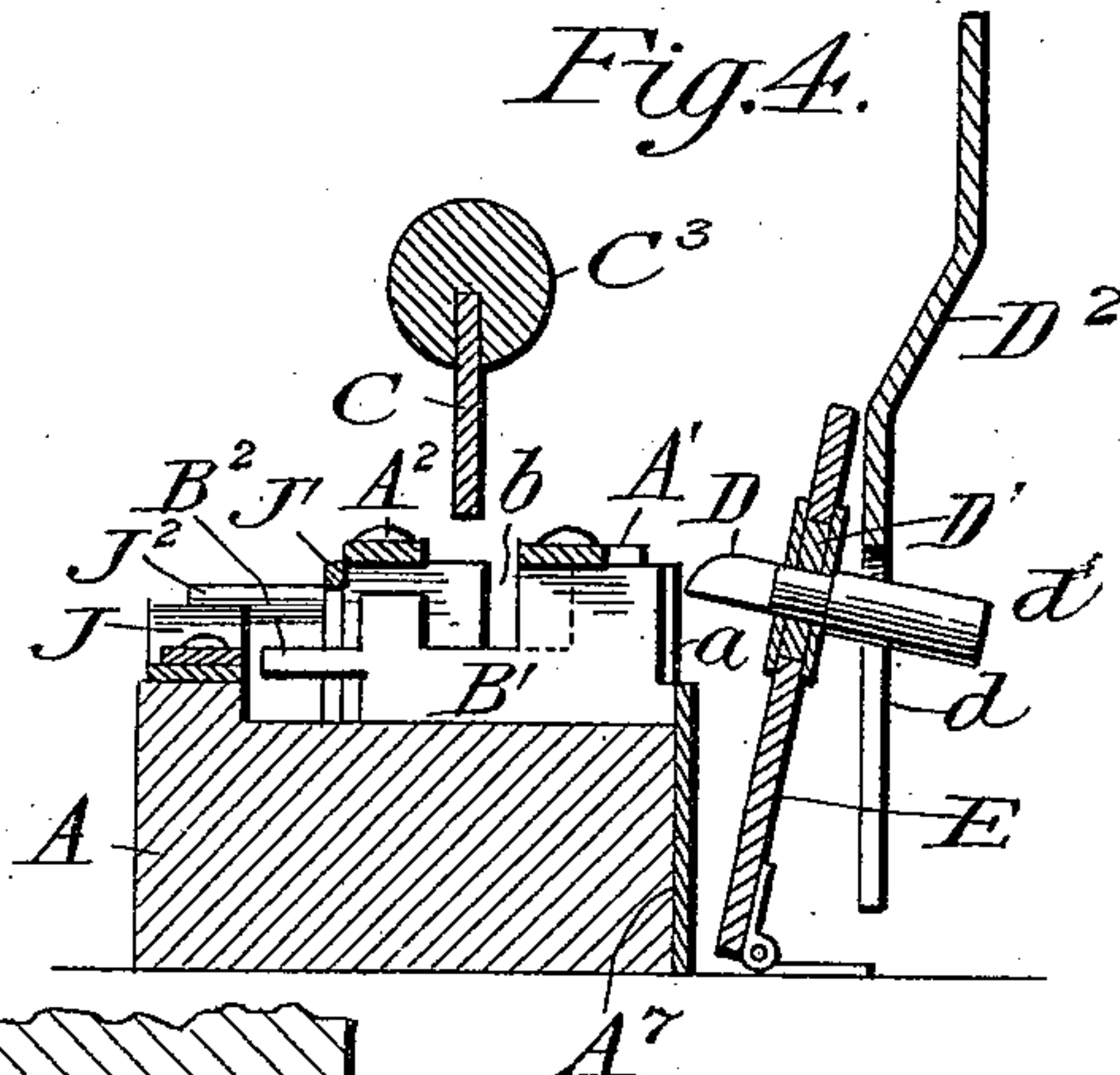
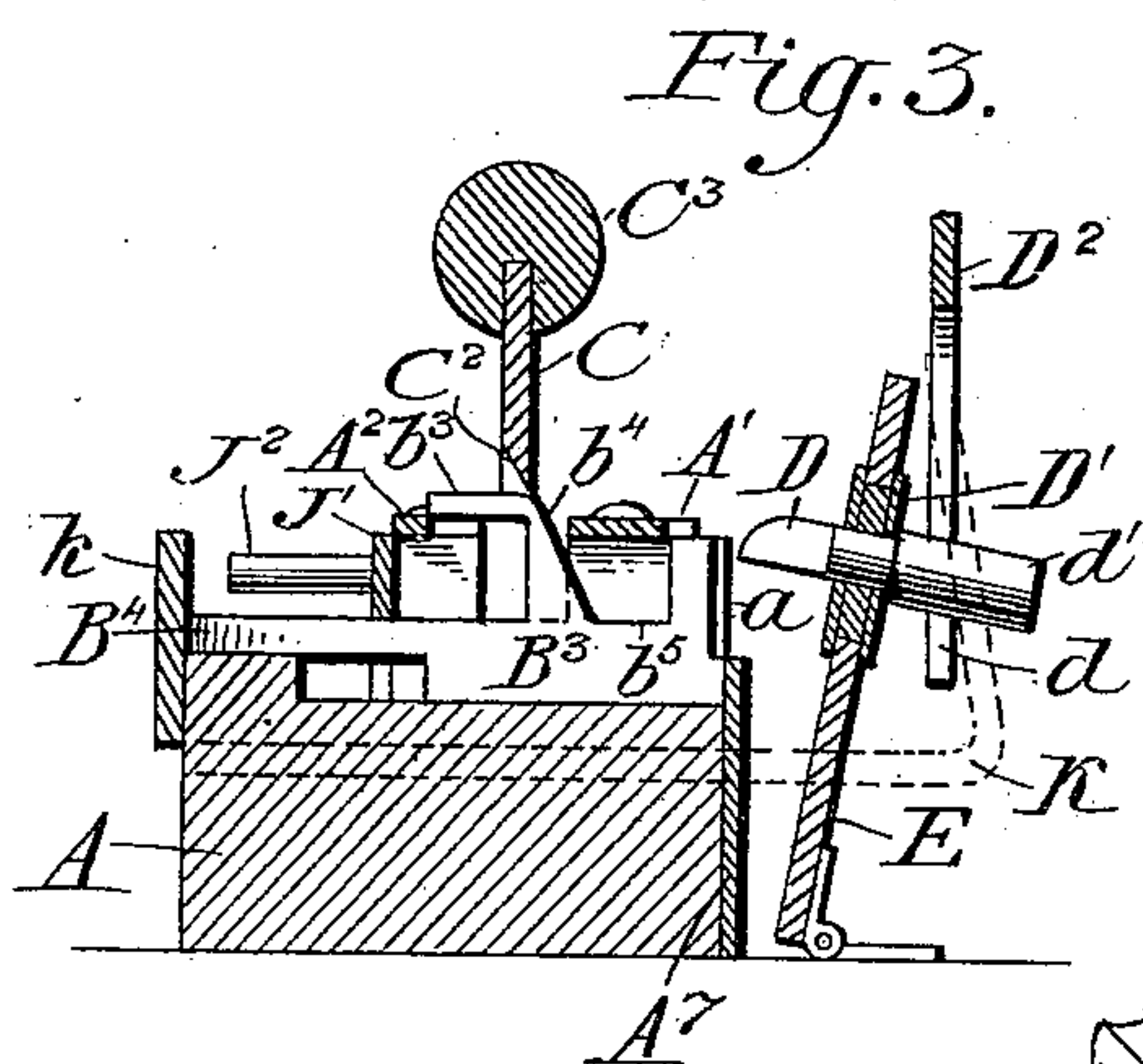
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Fig. 6.

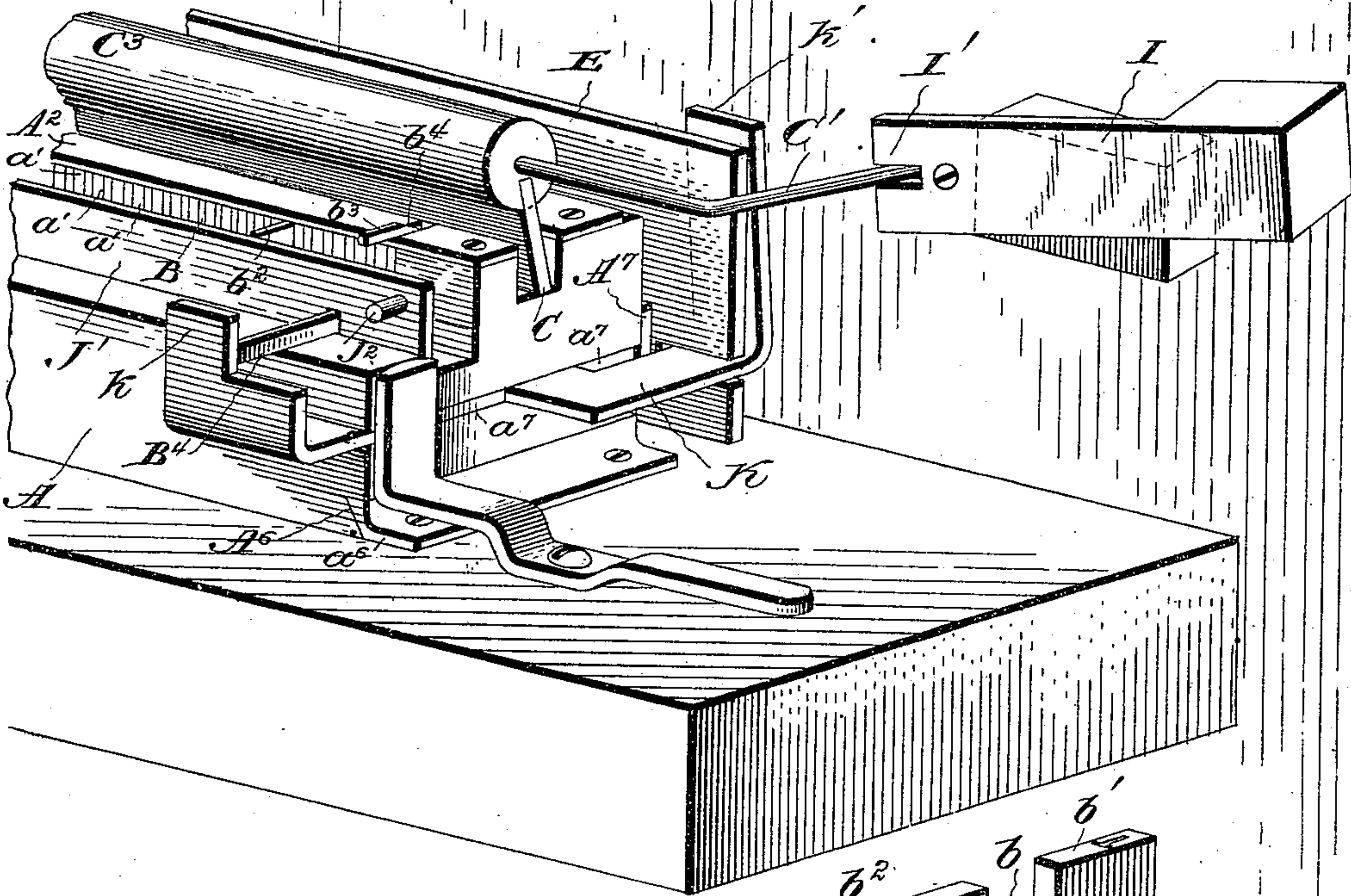


Fig. 8.

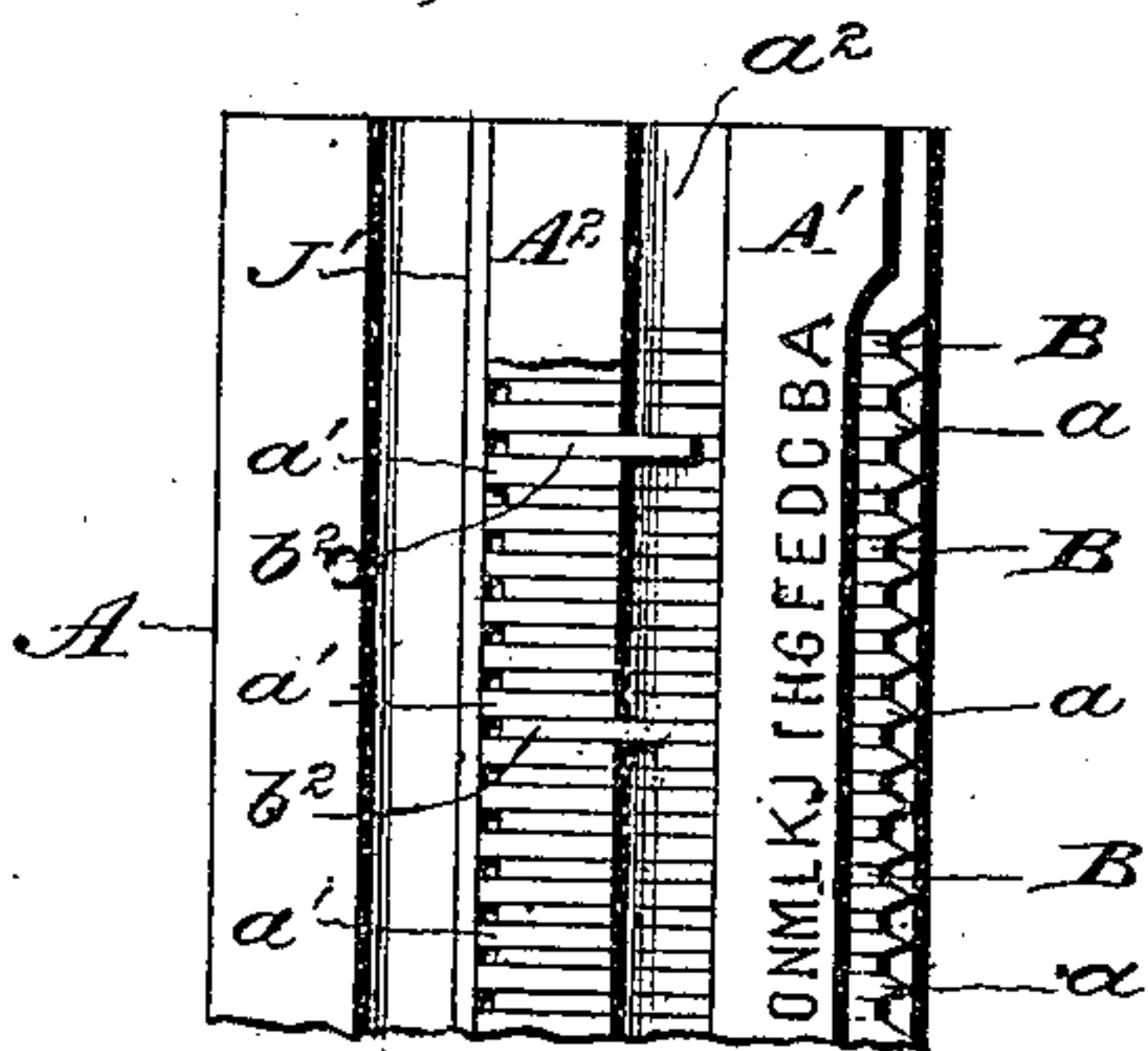


Fig. 9.

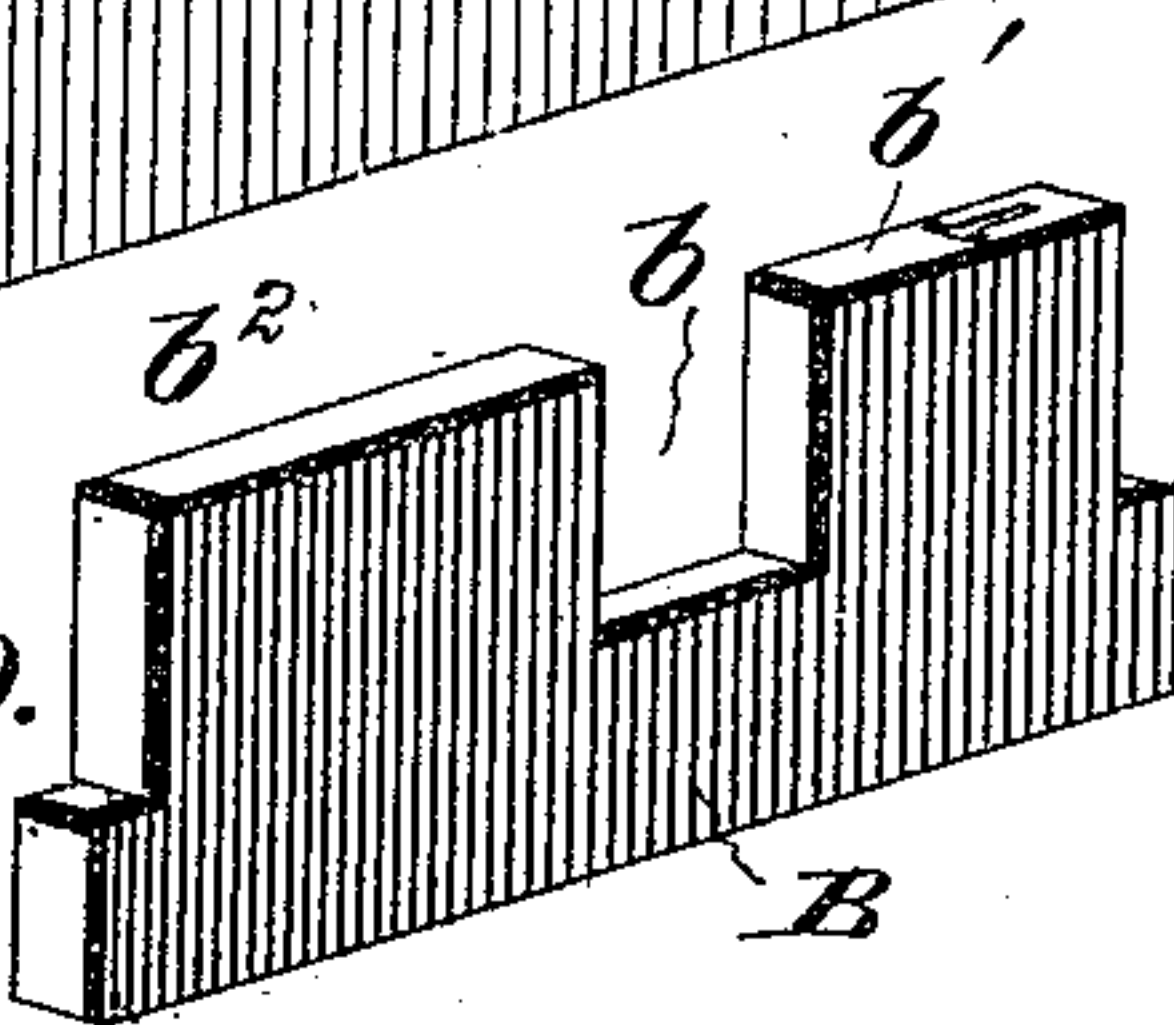
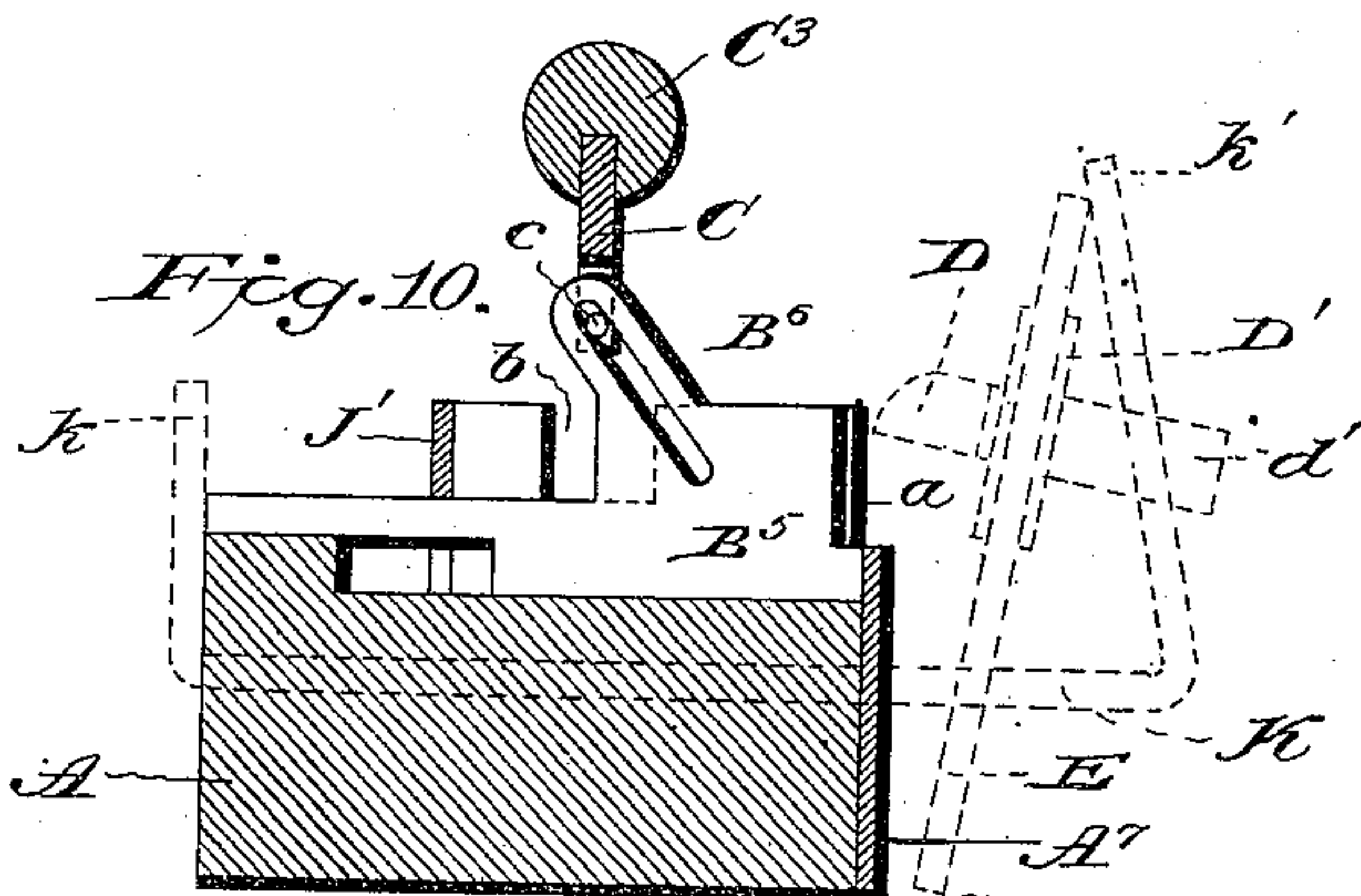


Fig. 10.



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UNITED STATES PATENT OFFICE.

GEORGE WILLIAM DILLAWAY, OF MUSCATINE, IOWA.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 641,501, dated January 16, 1900.

Application filed April 24, 1899. Serial No. 714,230. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WILLIAM DILLAWAY, of Muscatine, in the county of Muscatine and State of Iowa, have invented certain new and useful Improvements in Permutation-Locks; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in permutation-locks; and it consists in the novel combinations and constructions of parts hereinafter claimed.

The accompanying drawings illustrate the best form of lock now known to me embodying my invention; but as the form of the lock when the invention is once known can be varied in details I do not herein limit myself to the specific constructions of lock shown in the drawings and hereinafter described.

Referring to the drawings, Figure 1 is a top plan of the lock, partly broken away. Fig. 2 is a rear view thereof, partly broken away. Fig. 3 is a detail vertical section on line 3 3, Fig. 2. Fig. 4 is a similar vertical section on line 4 4, Fig. 2. Fig. 5 is a similar section on line 5 5, Fig. 2. Fig. 6 is a detail rear perspective. Fig. 7 is a detail of the handle-guiding device. Fig. 8 is a detail top plan view of the tumbler-holder and tumblers. Fig. 9 is an enlarged perspective view of one of the tumblers. Fig. 10 is a detail sectional view of a modification.

Referring to the drawings, A designates the tumbler case or holder of the lock, which, as shown, consists of a rectangular block provided on its upper surface with two parallel series of tumbler guide-fingers a a' , separated by a longitudinal groove a^2 . The fingers a are preferably beveled on their front edge, so as to facilitate entrance into the slots between the fingers, and in each slot, between the fingers, is placed a reversible tumbler B, which in the construction shown is rectangular in form, so as to fit easily in one of the slots between the adjoining fingers, and each tumbler is provided on its upper edge with a notch b , which notch is nearer to one end of the tumbler than the other and divides the upper surface thereof into a short or idle portion b' and a long or locking portion b^2 . The

idle portion may bear a number or letter or other indicating character corresponding to the number or indicating character of the slot in which it is to be placed—i. e., indicating characters may be marked on the block A beside the slots, or, preferably, may be made on a plate A' , overlying the fingers a and assisting in retaining the tumblers in the grooves. A plate A^2 may also be placed across the fingers a' for the same purpose. If the tumblers are set so that all the locking portions b^2 are in line with the front row of fingers a , as indicated in Fig. 3, the notches b coincide with the groove a^2 between the series of fingers a a' , and when in this position the tumblers stand normally in non-locking position—that is, not in position to prevent the unlocking of the device. If any one or more of the tumblers B are reversed, so that the locking portions b^2 are in line with the fingers a' , parts b^2 will then project into the groove a^2 , as shown in Fig. 8, and such tumblers will then be normally in locking position—that is, they would obstruct the groove a^2 and prevent the descent of the locking bar or plate C, hereinafter referred to. It is obvious, therefore, that any number of the tumblers B may be made the active or normal locking-tumblers by reversing them or turning them around so that the parts b^2 are in the rear row of fingers a' .

The locking bar or plate C stands normally over the groove a^2 , and until this plate can enter said groove the bolts will be locked, as hereinafter described. Of course so long as any locking portion b^2 of the active tumblers projects into the groove a^2 the locking-plate cannot enter the groove.

When any of the tumblers are in active locking position, as described, before the plate can enter the groove a^2 it is necessary to push such tumblers out of the way until their notches b register with groove a^2 , and this is accomplished by means of a selector and pusher, which in the construction shown consists of a pin D, mounted on a slide D' , guided in a slot E' in a hinged or rocking plate E, that is pivoted just in front of the block A, the slot E' extending horizontally in front of the line of tumblers, as shown, and by moving the slide D' back and forth pusher D can be brought opposite any tumbler in any slot of

the block, and then by pushing plate E forward the pusher D is projected into the slot against the tumbler therein and pushes the tumbler backward, as indicated in Fig. 5.

5 The slide D' may be shifted by means of an arm D², attached to a gear D³, pivoted on a suitable stub-shaft D⁵ above the plate E, said arm having a slot *d*, engaging a pin *d'* on the slide, so as to permit the arm to reciprocate
10 the slide back and forth as the gear D³ is oscillated. The gear D³, as shown, is operated by a pinion *f*, slidably but not rotatably mounted on a shaft F, which is connected to a conical plug F', that has a cylindrical head F², fitting
15 in a cylindrical bore F³ in the wall of the safe or casing of the lock, the inner portion of the plug being tapered, as shown at *f'*, and the inner portion of the bore in which the plug is contained being also tapered, as shown at
20 F⁴, so that if said plug is pushed too far inward it will jam in the bore, so that it will be impossible to force it inward through the bore. The face of this plug at the exterior side of the wall of the lock (or safe-door to
25 which it is applied) is connected to the stem *g* of an operating-handle G, which may be pushed outward by a spring G', interposed between the wall of the safe and a disk H on the stem *g*, as shown in Fig. 5. This spring
30 normally projects the handle G and disk H outward, thereby pulling the plug outward with it, the normal position of the parts being such that the face of the plug will be flush with the face of the safe.

35 The spring G' and disk H are inclosed in a conical casing *h*, resembling an ordinary permutation-lock indicator, and on the handle G, exterior to the disk H, is a conical plate G², the edges of which are tapered in conformity with the taper of the casing *h*. The
40 plate G² may be kept close to casing *h* by means of a band *h'* on the casing, as shown, so that the plate can rotate with the handle, but has no longitudinal movement therewith.
45 The casing *h* or plate G², or both, may be provided with indicating-marks, as shown, there being at least one mark for each tumbler in the lock, and these marks being so located that the operator can by turning the handle
50 G until a certain point on the plate G² registers with some particular mark on the casing *h* bring the pusher D opposite the slot containing the tumbler bearing the same mark. He can then by pushing the handle inward
55 cause the pusher to engage with such tumbler and push the latter inward.

In the construction shown the inner end of the shaft F is loosely connected to a hinged bar *f*², which is hinged at its upper end, as
60 shown at *f*³, while its lower bifurcated end *f*⁴ loosely engages or is connected to the tilting plate E, so that when the handle G is pushed inward the plate E is rocked forward, throwing pusher D into one of the slots and pushing
65 back the tumbler therein, as is evident from the drawings. To enable this action to occur, the shaft and handle G are capable of

both rotary and longitudinal movement, the handle G being made angular, so that it will rotate the plate G², but can slide freely there-
70 through. The disk H is fixed to the handle G, so that it partakes of both movements thereof, and this disk is provided with a controlling-finger H', which is adapted to enter one of a series of perforations H² in the face-
75 plate of the lock or door to which it is attached, so as to prevent the rotation of the shaft F and handle G when the lock is pushed inward and to also prevent the latter being
80 pushed inward until the pusher D has been shifted into exact position to engage with some one of the tumblers.

The locking-plate C in the construction shown is preferably suspended vertically above the slot *a*² by means of hinged arms C'.
85 One of said arms C' engages the bifurcated end I' of a pivoted bolt-locking lever I, which is oscillated into unlocking or bolt-releasing position by the entrance of the locking-plate into the groove *a*² and is thrown into locked
90 position so long as said plate C is lifted and kept out of the groove. Of course this plate remains in lifted position or out of the groove so long as any locking-tumblers are in locking position or will be kept out of this groove
95 if any of the non-locking tumblers are improperly shifted in their slots, as might be done by any one attempting to tamper with the locks, for if any one of the non-locking tumblers be shifted backward it will prevent
100 the entrance of the locking-plate into the groove even should the proper tumblers (which had been adjusted to normally keep it out of the groove) be shifted into unlock-
105 ing position, because it is necessary with my lock not only that the locking-tumblers be shifted into unlocking position, but that all the other non-locking tumblers remain in their normal non-locking position. In other
110 words, in my lock a certain number of tumblers can be selected as the normal locking-tumblers and will normally stand in position to prevent the entrance of the locking-plate into this groove, while the remaining tumblers
115 will normally stand in position to permit the plate to enter into the groove. This locking-plate, therefore, cannot enter the groove until every one of the locking-tumblers are moved into unlocking position, and if any one tampering with the lock displaces any of
120 the non-locking tumblers they will prevent the entrance of the locking-plate into the groove, and although he may subsequently move all the normal locking-tumblers into
125 unlocking position, yet he will not be able to open the lock; but before it can be opened it will be necessary to return all the non-locking tumblers to non-locking position and the locking-tumblers to locking position. This,
130 however, can be easily accomplished by means of one certain "setting-tumbler," (designated as B' in the drawings,) which setting-tumbler is provided with a notch *b* like the others, adapted to register with the groove *a*², but is

provided with a rearwardly-projecting finger B^2 , which is adapted to engage an oscillating lever or levers J, pivoted on the top of block A in rear of the tumblers, said levers being adapted to engage with the push-plate J', which lies in rear of all the tumblers and will be pushed back by the displacement of any one of them, as indicated in Fig. 5. If, therefore, a mistake has been made in pushing any one of the tumblers, the operator can shift the pusher D in position to engage the setting-tumbler B', (determining this by a known mark on the index-plate G^2 ,) and when tumbler B' is pushed backward its inner end operates the levers J, which in turn push plate J' forward toward the fingers a' , throwing all the tumblers back into their originally-set position. The first tumbler that is thereafterward displaced will force the plate J' backward, and by so doing will cause the levers J to return the tumbler B' to original position. The plate J' may be guided by pins J^2 , attached to block A and projecting through perforations in the plate, as shown.

As a further precaution against the descent of the plate C and as a means of providing a "day-lock," I provide one of the tumblers with positive means for controlling the rise and fall of the plate C, even if all the other tumblers be in unlocked position, so that it will be necessary to actuate this particular tumbler after the permutation locking-tumblers have been displaced. For this purpose I employ the tumbler B^3 . This is provided with an upstanding finger b^3 , which (when the tumbler B^3 is in normal position) stands above and across the slot a^2 and obstructs the entrance of the locking-plate. The front end of this finger b^3 , however, is beveled, as at b^4 , and leads into a notch b^5 , which is adapted to register with groove a^2 when the tumbler B^3 is moved backward by the pusher D and will permit the descent of the locking-plate if the other tumblers are all in proper unlocking position at the time. This tumbler B^3 is, moreover, provided with a rearwardly-projecting finger B^4 , which when the tumbler is pushed inward engages the upturned end k of a bent rod K, that extends forward beyond the hinged plate E and has an upstanding finger k' , which normally impinges against the front edge of this plate. When the tumbler B^3 is pushed backward by the pusher D, it moves rod K backward by the engagement of projection B^4 with arm k , causing arm k' to follow up the plate E; but when plate E is pulled back to normal position by spring G' and intermediate connections, thereby retracting the pusher, it causes arm k' to pull rod K forward, and it, through arm k , pulls tumbler B^3 forward, and then the bevel b^4 on the tumbler rides against a bevel C^2 on the locking-plate and forces the latter out of the groove a^2 and holds it up out of the groove, the plate resting on arm b^3 until the tumbler B^3 is again displaced. By this means the locking-plate is positively raised, and in so doing the bolt-

locking devices are thrown in position to positively prevent the unlocking of the bolts.

As shown, the locking-plate C stands over slot a^2 and is weighted, as at C^3 , so as to cause it to drop by gravity into the groove a^2 when permitted; but, if desired, the tumbler B^3 could be replaced by a tumbler B^5 . (see Fig. 10,) which is provided with an inclined groove B^6 , engaged by a pin c on the locking-plate, so that this tumbler would move the locking-plate positively into and out of the slot.

For convenience the tumbler-carrying block A may be made removable, so that it and the tumblers can be slid out from under the locking-plate to permit the tumblers to be set or rearranged at will and adjusted into normal locking or unlocking position, according to the permutation-sign desired. As shown, the ends of block A are formed with dovetailed grooves A^6 , engaging dovetailed guides a^6 , secured to the support for the block, and when slid into position the face of the block abuts against a plate A^7 , by which the tumblers are all kept in alinement and prevented from going too far forward. The block may be detachably secured in position by means of the lever L and slot L' or any other suitable attaching devices. The bar K may be detachably secured in a groove a^7 in the end of the block A, as shown, if desired.

When the tumblers are in normal unlocking position, Fig. 3, the index-marks thereon, on the portion b' thereof are covered by the plate A^2 ; but when they are adjusted to normal locking position the index characters thereon appear on the portion b' projecting from beneath said plate, so that by noting the characters appearing on the projecting ends of the tumblers the locking-tumblers will be known and can be selected by the index and handle G. In unlocking it is not necessary that the unlocking-tumblers be selected or shifted in any particular order. It is necessary, however, that all the locking-tumblers shall first be pushed back before the day-lock tumbler B^3 is pushed back, and it is further necessary that none of the other non-locking-tumblers shall have been disturbed.

To lock the safe, the handle is turned until the index registers with a mark corresponding to the setting-tumbler B' , and then is pushed back, whereupon all the tumblers are thrown into normal position by the plate J, and the safe cannot be unlocked until they are properly displaced under conditions just recited. However, if it is frequently desired to open the lock during the day after it has been once opened the setting-tumbler should not be operated, as the other tumblers will remain in unlocking position until the setting-tumbler is pushed back; but the tumbler B^3 will then serve as the sole and temporary means of locking the plate.

To change the permutation, the block A, with the tumblers, can be removed from its position and any number of tumblers desired can be made locking-tumblers (which it will

be necessary to shift before the lock can be opened) by simply reversing them in their slots or by turning them so that the parts b^2 are in rear of the groove a^2 , and any tumblers that are not to be locking-tumblers are left in position or turned so that their parts b^2 will be in front of the groove a^2 . It will thus be obvious that the tumblers can be changed from normal locking to normal unlocking position by simply reversing them or turning them around endwise in their grooves. Suppose, for example, that the permutation was U S X. The tumblers U S X would be placed in their slots so that the parts b^2 were at the rear of the groove a^2 , and then when the tumblers are in normal position it will be impossible for the plate C to enter the groove until each one of these tumblers U S X have been pushed backward by the pusher and none of the others disturbed. These three tumblers may be pushed back in any order, and after they are pushed back it is then necessary to push back the day-lock tumbler B^3 , whereupon the plate can descend. The tumbler B^3 can then be used also as the day-lock, or by pushing back the setting-tumbler B' the entire combination will have to be operated to unlock the safe.

I have simply given an instance of a selection of three tumblers for the permutation; but obviously any number might be employed, as desired; but I do not consider it advisable to select a very large number of tumblers, because of the double safety feature of the lock—to wit, the displacement of a wrong tumbler necessitating the resetting of the entire set before it can be opened.

I have shown the tumblers arranged in a straight series and operated indirectly from the handle. In some forms of lock the pusher might be connected directly with the handle and operated directly thereby and the tumblers may be arranged in a curved series vertically or horizontally or concentric to the pusher, or in simple forms of lock the handle might be attached directly to the pusher and slide in a groove in front of the tumblers.

It is obvious that the invention is capable of modification and embodiment in various forms within the scope of my invention and embodying the essentials thereof, and therefore, while I consider the form which I have illustrated the best now known to me, I do not wish to confine myself to the specific construction shown, but shall undertake to here disclose the many modifications of the device which have occurred to me or may occur to others when the invention is made known to them.

Having thus described my invention, what I therefore claim as new, and desire to secure by Letters Patent thereon, is—

1. In a lock, the combination of a locking-plate, with an endwise-reversible tumbler adapted to normally lock the plate, when in one position, but not to lock it when reversed; with means for moving said tumbler so as to

permit the unlocking of the plate when the tumbler is in locking position, and means for simultaneously returning the tumbler and locking-plate to normal or locked position.

2. In a permutation-lock, the combination of a series of tumblers, a locking-plate controlled by the tumblers, an adjustable pusher adapted to operate any of the tumblers, and means adapted to be operated by the pusher for returning all the tumblers simultaneously to normal or reset position whenever desired.

3. In a permutation-lock, the combination of a series of tumblers, a locking-plate controlled by the tumblers, an adjustable pusher adapted to operate any of the tumblers and a "day-lock" tumbler which must be operated after the other locking-tumblers have been shifted into unlocking position before the lock can be opened and means for returning the day-lock tumbler to locking position independently of the other tumblers, substantially as described.

4. In a permutation-lock, the combination of a series of tumblers, a locking-plate controlled by the tumblers, an adjustable pusher adapted to operate any one of the tumblers, and means adapted to be operated by the pusher for returning all the tumblers simultaneously to normal or reset position whenever desired; with a day-lock tumbler which must be operated after the other locking-tumblers have been shifted into unlocking position before the lock can be opened.

5. In a permutation-lock, the combination of a series of removable and reversible tumblers, a locking-plate controlled thereby, and an adjustable pusher adapted to operate any of the tumblers, singly and successively; with means for returning all the tumblers simultaneously to normal or reset position whenever desired, the said means being also operated from and by said pusher.

6. In a permutation-lock, the combination of a series of reversible tumblers, a locking-plate controlled thereby, an adjustable pusher adapted to operate any of the tumblers singly, and successively, and a day-lock tumbler which must be operated by the pusher after the other locking-tumblers have been shifted into unlocking position before the lock can be opened, said day-lock tumbler being also constructed and adapted to immediately return to locked position independently of the other tumblers.

7. In a permutation-lock, the combination of a series of reversible tumblers, a locking-plate controlled by the tumblers, an adjustable pusher adapted to operate any of the tumblers, singly and successively; and means for returning all the tumblers simultaneously to normal or reset position whenever desired; the said means being also mediately operated by said pusher; with a day-lock tumbler which must be operated by said pusher after the other locking-tumblers have been shifted into unlocking position before the lock can be opened, said day-lock being constructed and

adapted to immediately return the plate to locked position.

8. In a permutation-lock, the combination with a vertically-movable straight locking bar or plate, of a horizontal series of parallel tumblers adapted when in one position to normally lock the plate; with means whereby any one or more of the tumblers can be successively displaced, and means for returning all the displaced tumblers simultaneously to their normal position.

9. In a permutation-lock, the combination with the locking bar or plate, of a series of reversible tumblers adapted when in one position to normally lock the plate and when reversed to normally not interfere with the plate; with an adjustable pusher whereby any one or more of the tumblers can be successively displaced, means for returning all the displaced tumblers to their normal position, and means for returning the locking-plate to normal position.

10. In a lock, the combination of the locking plate or bar, a sliding tumbler for locking said plate, a pusher for operating said tumbler, and the sliding bar adapted to be moved in one direction by the tumbler when the latter is shifted to unlocking position, and to be thrown back in the opposite direction by the pusher when the latter is retracted, and thereupon return the tumbler and plate to locking position.

11. In a lock, the combination of the bolt-locking lever, a locking plate or bar for operating said lever, a sliding tumbler for locking said plate, the longitudinally-movable pusher for operating said tumbler, and the sliding rod adapted to be moved in one direction by the tumbler, when the latter is shifted to unlocking position, and to be thrown back in the opposite direction by the pusher, when the latter is retracted, said rod thereupon returning the tumbler to locking position, and said tumbler returning the locking-plate to locked position.

12. In a lock, the combination of the locking bar or plate, the day-lock tumbler for locking said plate, the pusher for operating said tumbler, and the sliding bar or rod adapted to be moved in one direction by the day-lock tumbler when the latter is shifted to unlocking position and to be thrown back in the opposite direction by the pusher when the latter is retracted, and thereupon return the day-lock tumbler and plate to locking position, in combination with a series of tumblers any one or more of which may be set to prevent the movement of the locking-plate until they are displaced, notwithstanding the movement of the day-lock tumbler, substantially as described.

13. In a lock, the combination of the locking bar or plate, the sliding day-lock tumbler for operating said bar, the longitudinally-movable pusher for operating said tumbler, and the sliding rod adapted to be moved in one direction by the day-lock tumbler when

the latter is shifted to unlocking position, and to be thrown back in the opposite direction by the pusher when the latter is retracted, and thereupon return the day-lock tumbler to locking position, said tumbler in its return also returning the locking-plate to locking position; with a series of tumblers any one or more of which may be set to lock the said plate until they are displaced by the pusher and thereby prevent the descent of the plate until they are displaced, notwithstanding the movement of the day-lock tumbler, and means for returning the locking-tumblers to normal position, after displacement.

14. In a permutation-lock, the combination of a locking bar or plate, a series of tumblers adapted to lock the plate, and a pusher for displacing any one of said tumblers; with a day-lock tumbler adapted to be operated by said pusher and to normally lock the plate when all the other locking-tumblers have been displaced and to return to locking position independently of the other tumblers, substantially as described.

15. In a permutation-lock, the combination of a locking bar or plate, a series of independently-reversible tumblers adapted when in one position to normally lock the plate and when reversed to normally not interfere with the plate, and a pusher for displacing any one of said tumblers; with a day-lock tumbler adapted to lock the plate when all the other tumblers have been displaced, said day-lock tumbler being operated by the pusher and being adapted to return the locking-plate to normal locked position, substantially as described.

16. In a permutation-lock, the combination of a locking bar or plate, a series of tumblers adapted to lock the plate, and a pusher for displacing any one of said tumblers; with a day-lock tumbler adapted to lock the plate when all the other tumblers have been displaced, said day-lock tumbler being operated by the pusher and being adapted to return the locking-plate to normal locked position, and a setting-tumbler and devices whereby all the locking-tumblers are returned to normal position, substantially as described.

17. In a permutation-lock, the combination of a locking bar or plate a series of independently-reversible tumblers adapted when in one position to normally lock the plate and when reversed to normally not interfere with the plate, and a pusher for displacing any one of said tumblers; with a day-lock tumbler adapted to lock the plate when all the other tumblers have been displaced, said day-lock tumbler being operated by the pusher and being adapted to return the locking-plate to normal locked position, a setting-tumbler adapted to be operated by said pusher, the levers, and sliding plate operated by said setting-tumbler whereby all the reversible tumblers are returned to normal position, substantially as described.

18. The combination of the locking-plate,

a series of independently endwise-reversible locking-tumblers adapted to normally lock the plate when in one position but not to lock it when reversed, and the rearwardly-slotted block carrying said tumblers, said block being removable with the tumblers from the lock to facilitate the rearrangement of the permutation.

19. In a permutation-lock, the combination with a locking bar or plate, the longitudinally-grooved and transversely-slotted block opposite said locking-plate; and a series of removable endwise-reversible notched tumblers in the slots of said block adapted to lock the plate when the notches therein do not register with the groove in the block, said block and tumblers being removable from the other parts of the lock, for the purpose and substantially as described.

20. In a permutation-lock, the combination with a vertically-movable locking bar or plate, the removable longitudinally-grooved and transversely-slotted block opposite said locking-plate; with a horizontal series of sliding endwise-reversible tumblers in the slots of said block adapted to lock the plate, when the notches therein do not register with the groove in the block, an adjustable pusher for shifting said tumblers singly and successively, said block being removable with the tumblers from the lock to facilitate the rearrangement of the permutation, for the purpose and substantially as described.

21. In a permutation-lock, the combination of a locking bar or plate, a series of parallel tumblers, a movable plate in front of said tumblers, an adjustable pusher carried by said plate, means for adjusting said pusher longitudinally of the series of tumblers, and means for moving said plate to cause said pusher to displace any tumbler, substantially as described.

22. In a permutation-lock, the combination of a locking bar or plate, and connections between the same and the bolt-locking devices; with a removable series of parallel reversible tumblers, a slotted hinged plate in front of said tumblers, an adjustable pusher carried by said plate, means for adjusting said pusher longitudinally of the series of tumblers, and means for rocking said plate to cause said pusher to displace any tumbler, substantially as described.

23. In a permutation-lock, the combination with a locking bar or plate, a longitudinally-grooved and transversely-slotted block, a series of notched tumblers mounted in the slots of said block adapted to lock the plate until their notches register with the groove in the block, a movable plate in front of said block, a longitudinally-adjustable pusher on said plate and means for rocking said plate to cause the said pusher to displace any one of the tumblers.

24. In a lock, the combination of a locking-plate, the series of locking-tumblers, the movable pusher in front of said tumblers, the ro-

tatable and longitudinally-movable shaft, indicating devices connected to said shaft, and connections substantially as described, whereby its rotary movement shifts the pusher longitudinally of the series of tumblers, and its longitudinal movement imparts a similar movement to the pusher, substantially as described.

25. In a lock, the combination of a locking-plate, the series of locking-tumblers, the plate in front of said tumblers, the pusher mounted on said plate and longitudinally adjustable thereon, the rotatable and longitudinally-movable shaft, indicating devices connected to said shaft, and connections substantially as described whereby its rotary movement shifts the pusher longitudinally on the plate, and its longitudinal movement imparts a similar movement to the pusher, substantially as described.

26. The combination of a series of removable and reversible tumblers, a hinged locking-plate, and connections between said locking-plate and the bolt-locking devices; with a movable plate in front of the tumblers, a pusher thereon adapted to displace the tumblers when the plate is moved toward the block, a hinged lever for operating said plate, a rotary shaft having a loose connection with said lever and adapted to swing the latter when the shaft is moved endwise, and a gear provided with an arm engaging the said slide to shift the plunger longitudinally of the plate, said gear being operated by the rotary movement of said shaft, substantially as described.

27. The combination of the longitudinally-grooved block, a series of removable and reversible tumblers having notches adapted to register with the groove in the block, a hinged locking-plate adapted to enter the groove of the block when the notches of the tumbler register therewith, and connections between said locking-plate and the bolt-locking devices; with a hinged plate in front of the tumbler, a slide thereon, a pusher on said slide adapted to displace the tumblers when the plate is swung toward the block, a hinged lever for operating said plate, a rotary shaft having a loose connection with said lever and adapted to swing the latter when the shaft is moved endwise, a gear provided with an arm engaging the said slide to shift the tumbler longitudinally of the plate, said gear being operated by and from the rotary movement of the shaft, substantially as described.

28. In a permutation-lock, the combination of the longitudinally-movable and rotatable shaft, and connections for operating the locking mechanism therefrom; with a disk or arm fixed on said shaft and adapted to prevent rotation of the shaft when the same is moved longitudinally, substantially as described.

29. In a permutation-lock, the combination of the longitudinally-movable and rotatable shaft, and connections for operating the locking mechanisms therefrom; with the index-

plate rotatable with said shaft, a disk or arm fixed on said shaft and provided with a tooth adapted to enter one of a series of perforations and prevent rotation of the shaft when the same is moved longitudinally for the purpose and substantially as described.

30. In a permutation-lock, the combination of a locking-plate, a series of tumblers adapted to lock said plate, a sliding and longitudinally-movable pusher adapted to displace the tumblers and a rotatable and longitudinally-movable shaft and connections substantially as described whereby said shaft is caused to operate said pusher and shift the same laterally when the shaft is rotated, and to shift it longitudinally when the shaft is moved longitudinally, substantially as described.

31. In a permutation-lock, the combination of a locking-plate, a series of tumblers adapted to lock said plate, a sliding and longitudinally-movable pusher adapted to displace the

tumblers singly; and a rotatable and longitudinally-movable shaft and connections substantially as described between the shaft and pusher, whereby the shaft is caused to operate said pusher and shift the same laterally when the shaft is rotated, and to shift it longitudinally when the shaft is moved longitudinally; with tumbler-indicating devices for determining the extent of rotation of the shaft, and an arm on said shaft provided with a tooth adapted to engage with one of a series of perforations and prevent rotation of the shaft while it is moving longitudinally.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

GEORGE WILLIAM DILLAWAY.

In presence of—

WILLIAM C. SULLIVAN,
JAMES R. MANSFIELD.