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Patented Nov. 21, 1899.

A. S. WINSTON.
PERMUTATION LOCK.

(Application filed Sept. 22, 1899.)

(No Model.)

2 Sheets—Sheet 1.

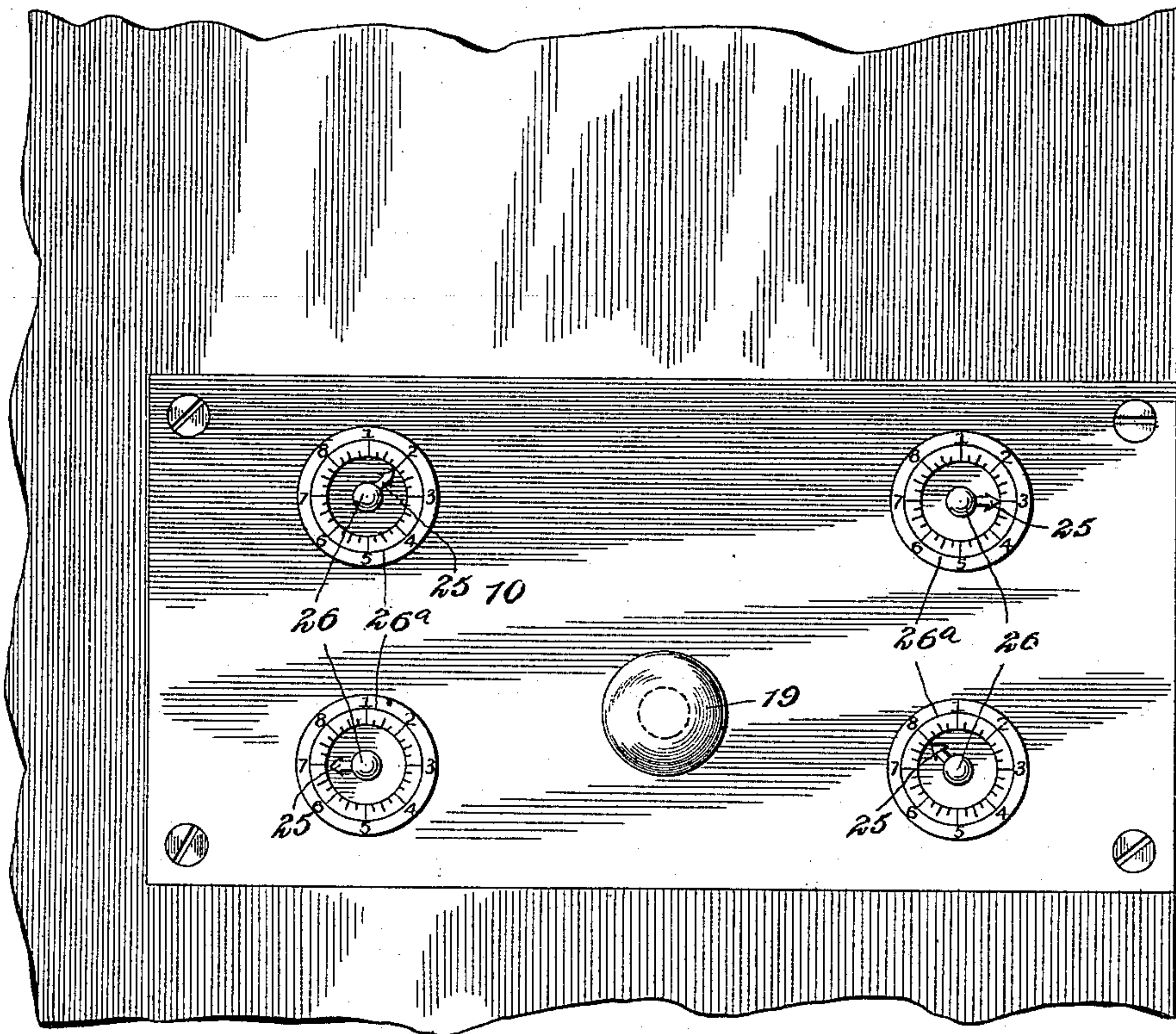


Fig. 1.

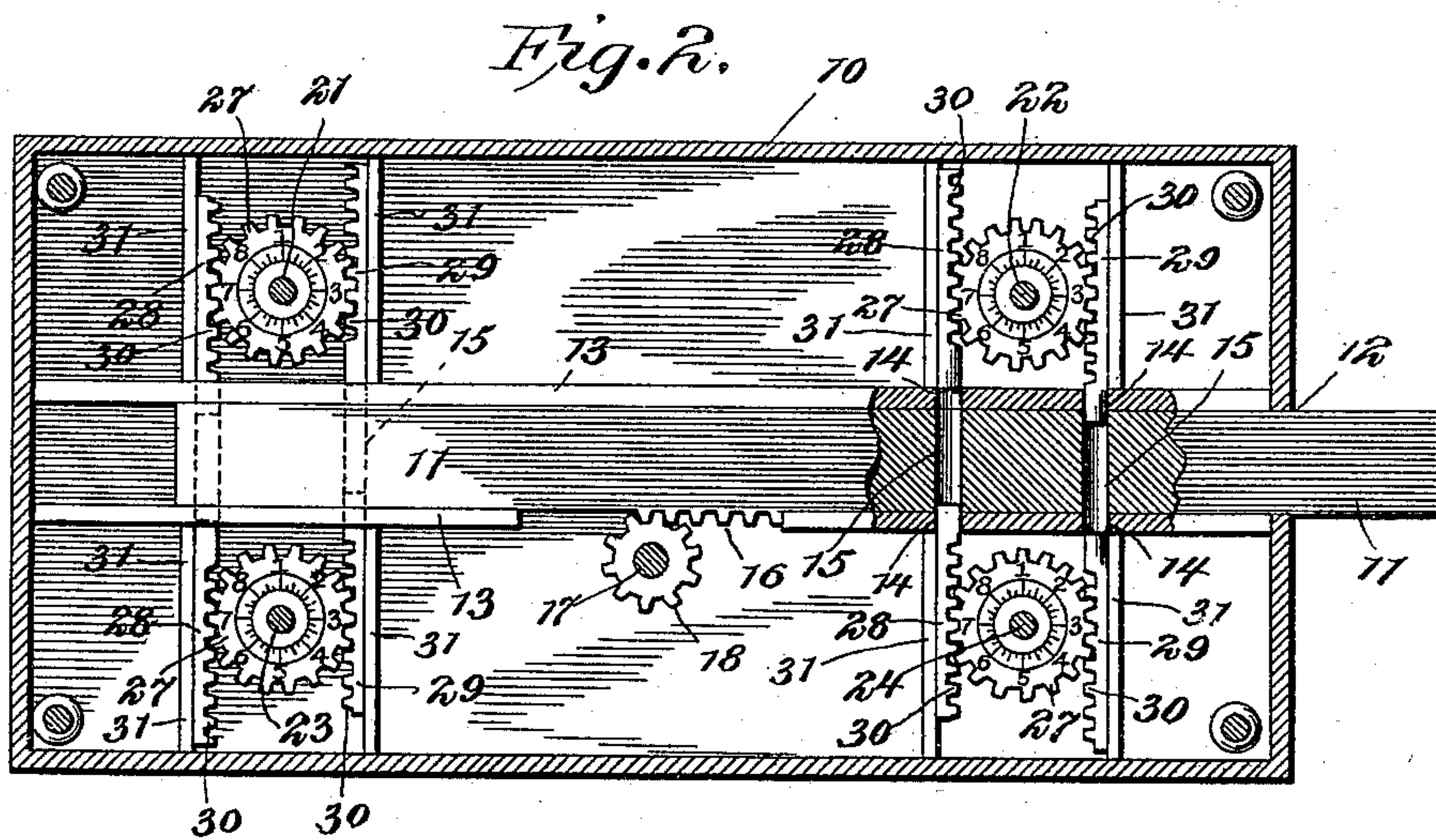


Fig. 2.

Witnesses

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Fig. 3.

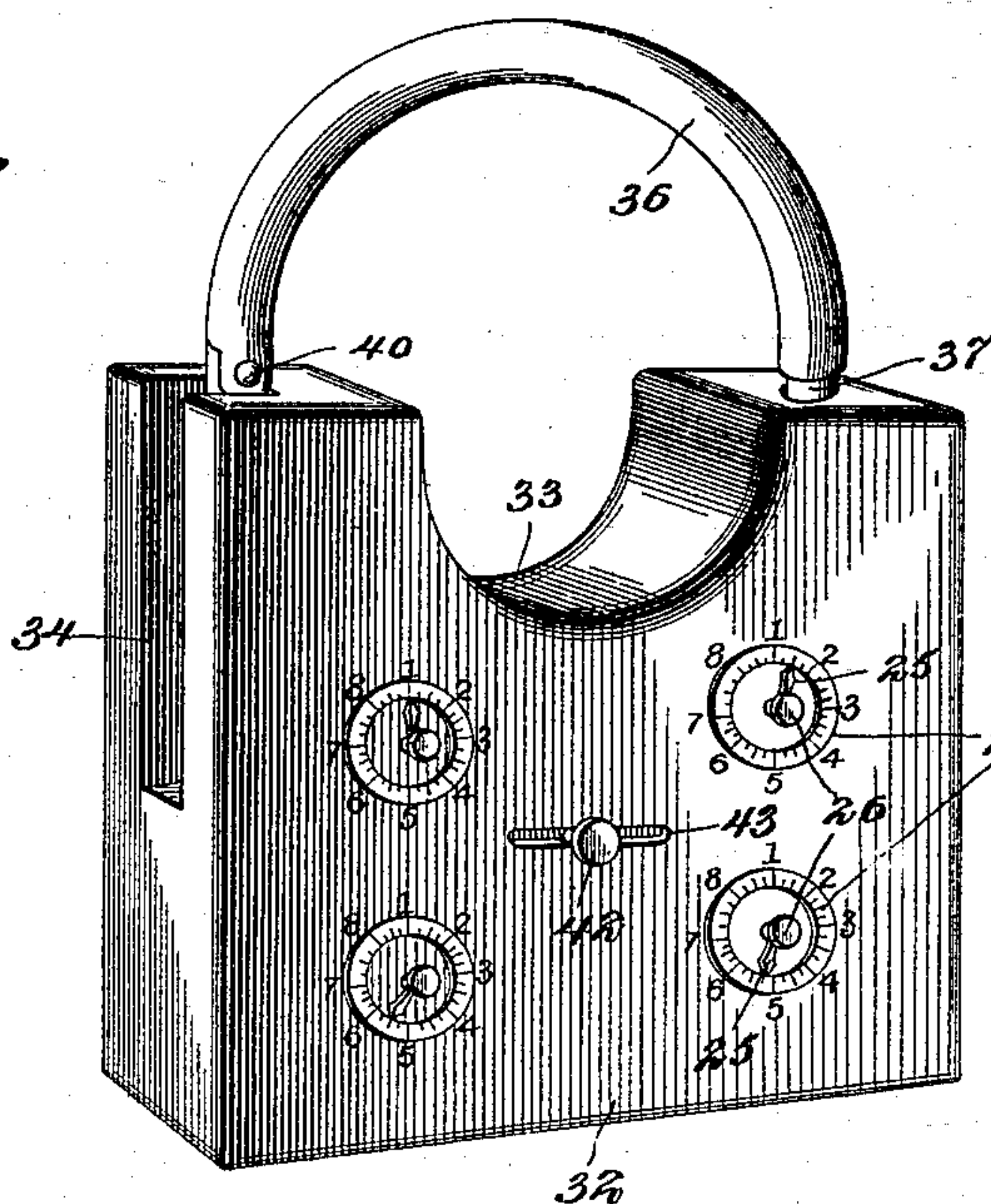


Fig. 5.

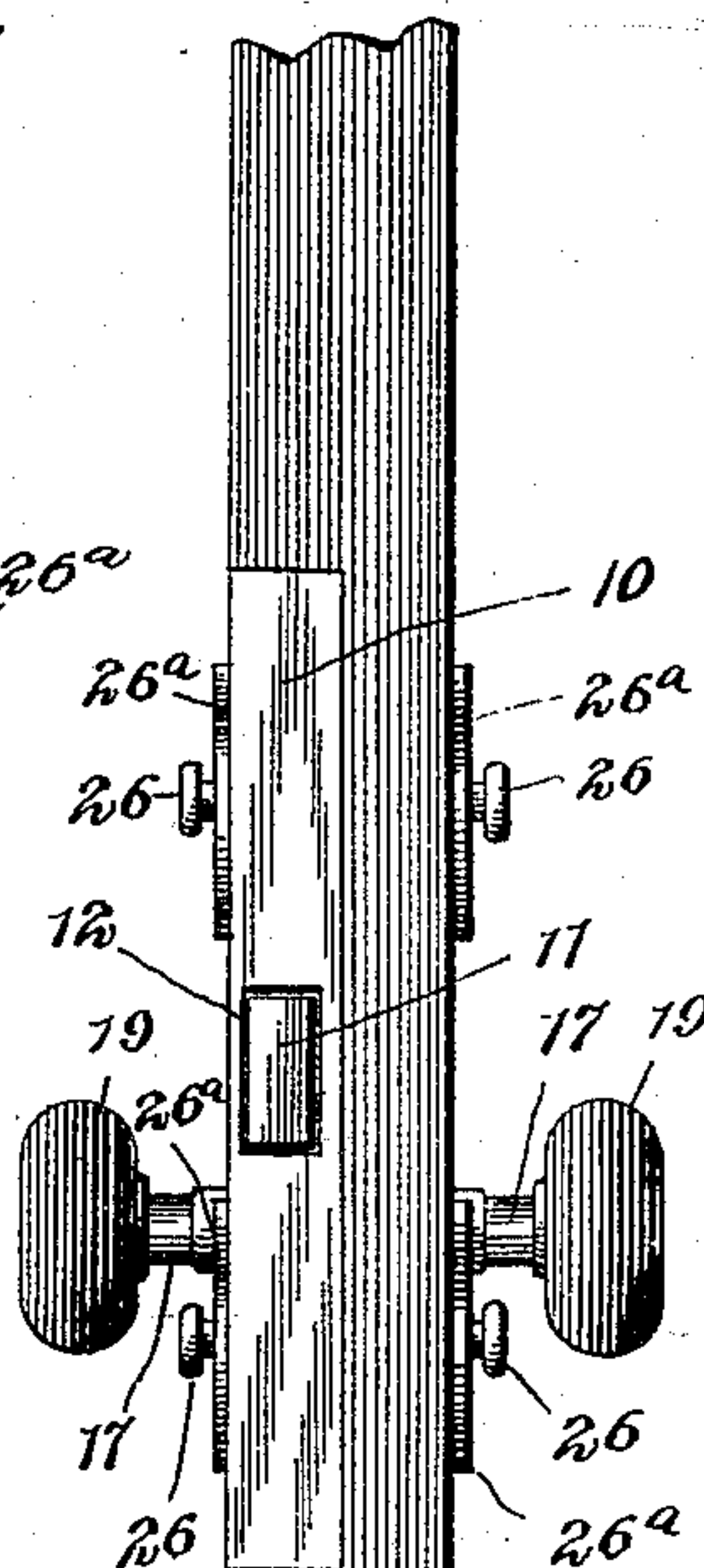
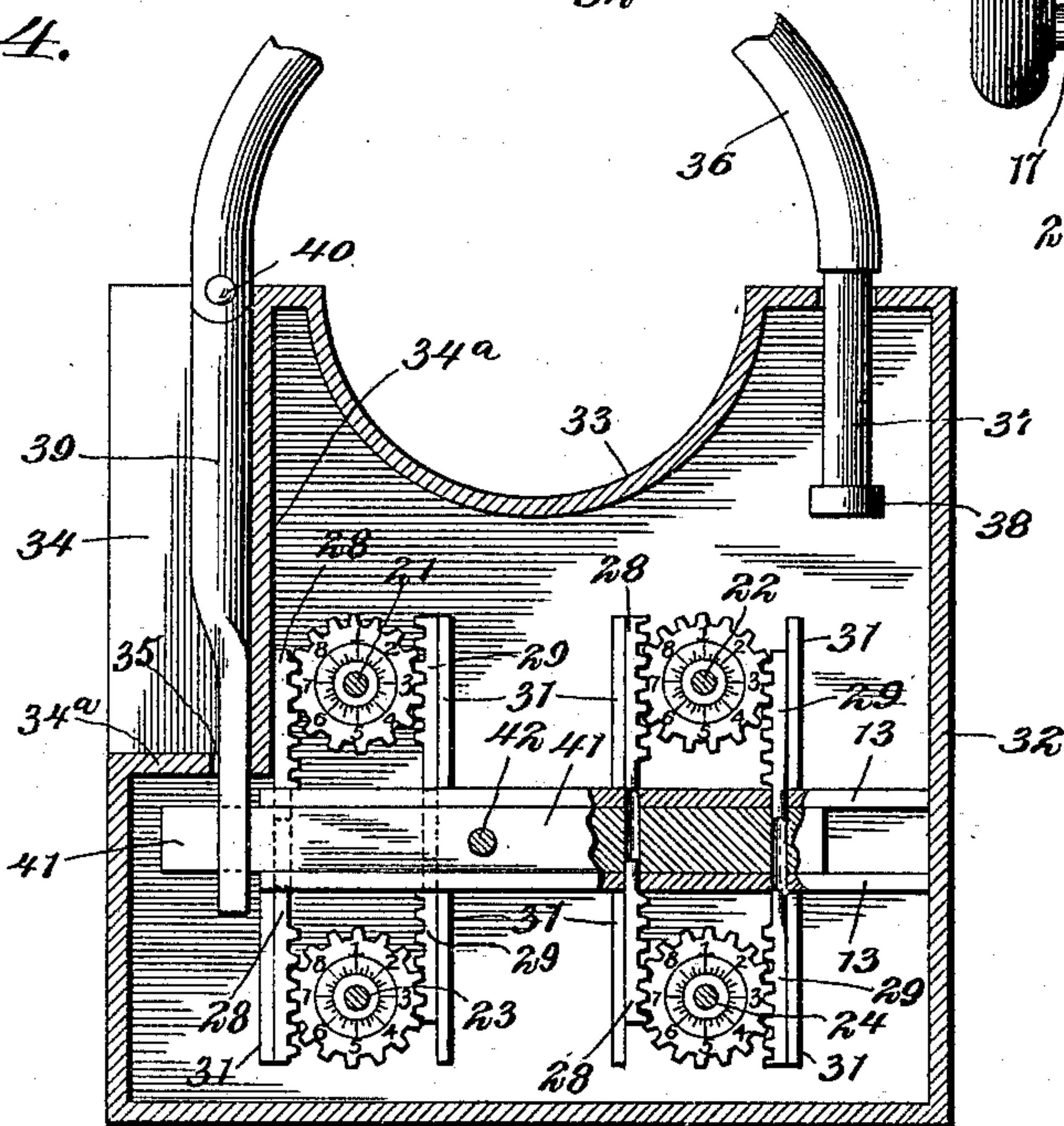


Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

ARTHUR S. WINSTON, OF COVINGTON, TENNESSEE.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 637,688, dated November 21, 1899.

Application filed September 22, 1899. Serial No. 731,282. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR S. WINSTON, a citizen of the United States, residing at Covington, in the county of Tipton and State of Tennessee, have invented a new and useful Permutation-Lock, of which the following is a specification.

This invention relates to improvements in permutation-locks adapted to be constructed for use either as a door-lock or as a padlock.

The object of the invention is to provide an improved construction dispensing with the use of a key and depending entirely for its operation on the adjustment of a plurality of tumblers into certain positions in order to release the locking-bolt, said tumblers arranged in sets and operable in such manner that they contribute to the security of the lock.

With these ends in view the invention consists in the novel combination, construction, and arrangement of parts, which will be hereinafter fully described and claimed.

In the drawings, Figure 1 is an elevation of a permutation-lock applied to a portion of a door. Fig. 2 is a sectional elevation of the lock shown by Fig. 1, disclosing the interior operating mechanism thereof and representing the bolt in its shot or projected position. Fig. 3 is a perspective view of a padlock constructed in accordance with my invention. Fig. 4 is a vertical sectional elevation of the lock shown by Fig. 3. Fig. 5 is an edge view of a door with the lock shown by Figs. 1 and 2 applied to said door and illustrating the arrangement of the spindles by which the tumbler-rods and the locking-bolt may be actuated from either side of the door.

Like numerals of reference are used to indicate like and corresponding parts in each of the several figures of the drawings.

I will first proceed to describe the door-lock shown by Figs. 1 and 2, in which the numeral 10 indicates the casing, which is of generally rectangular form, although the shape of the casing is not material. Within this casing is supported a slidable bolt 11, one end portion of which is adapted to be extended through a slot 12 when the bolt is shot. The bolt is confined or limited to slidable movement within the casing by and between the parallel guides 13, said guides arranged in horizontal positions above and below the bolt-slot. The upper guide is preferably continuous, but the lower guide is divided or inter-

rupted, so as to receive the series of teeth constituting a rack on the lower edge of the bolt. The guides are provided at intervals with transverse openings 14, (see Fig. 2,) and in the bolt is a series of tumbler-passages 15, which when the bolt is shot or projected coincide or register with the apertures 14 in the guides. The gear-teeth on the lower edge of the bolt form the rack 16, and this bolt is operated through the medium of a spindle 17, the latter having a spur-gear 18 made fast therewith in a position to engage with the bolt-rack, whereby the rotation of the spindle in one direction will operate to project the bolt and a reverse rotation of the spindle will retract the bolt. This spindle passes through the lock-casing below the bolt, and it is also designed to pass through the door, so that its ends may be provided with knobs 19 on the inside and outside of the door.

21 22 23 24 designate the tumbler-operating spindles, each of which is actuated separately from every other spindle, each spindle being designed to operate a pair of slidable tumbler-rods. The spindles 21 22 pass transversely through the casing, near the ends thereof and above the horizontal plane of the locking-bolt. The remaining spindles 23 24 are disposed in the casing below the bolt 11 and near the ends of said casing, said last-named spindles being arranged, preferably, in the vertical planes of the spindles which lie above the bolt. Each of the series of individually-operable spindles passes entirely through the casing and the door, so that it may be provided with a knob 26 at each end, which permits the spindle to be manipulated either from the outside or the inside of the door. Each spindle is also provided with an index or pointer 25, the same being secured in a radial position on the spindle, so as to traverse the graduations of a dial-plate 26^a, which may be fastened to the casing or to the door and which is arranged concentric with the spindle. The pointers or indices 25 on the series of individually-operable spindles are set or arranged in different positions with relation to the tumbler-rods which are associated with said spindles, so that the tumbler-rods of each spindle will be freed from the locking-bolt only when the pointer indicates a number on the dial different from the numbers indicated by the pointers on the dials associated with the remaining spindles

of the series. Each spindle carries a spur-gear pinion 27, the face of which is preferably inscribed with numerals corresponding to the numerals on the dial-plate associated with the spindle. Combined with the spur-gear of each spindle is a pair of slidable tumbler-rods 28 29, which are disposed on opposite sides of the spindle and its spur-gear and in positions substantially at right angles to the locking-bolt. The tumbler-rods of each pair are provided on their opposing faces or edges with gear-teeth forming the racks 30, with which the spur-gear pinion of the spindle is arranged to mesh, whereby the tumbler-rods will be actuated simultaneously in opposite directions on the rotation of the gear and its spindle. It is evident that in one position of the spindle and gear both of the tumbler-rods will be moved to positions free from the tumbler-passages in the bolt, and in these positions of the parts the pointer 25 will register with the proper number on the dial-plate. This applies to the pairs of tumbler-rods associated with the several spindles; but the pointers on the spindles should be arranged to register with different numbers on the dials in order to carry out the object of the invention to the best possible advantage. The tumbler-rods associated with each gear and spindle are confined slidably by guides 31, fixed within the casing in positions at right angles to the guides 13 and contiguous to the slots 14 therein, so that the inner ends of the tumbler-rods will normally fit in the openings 14, whereby the bolt-guides 13 coact with the rod-guides 31 to assist in holding the tumbler-rods in proper operative relation to the spur-gear and the bolt.

In the operation of the lock, assuming that the bolt is projected or shot and that the several pairs of tumbler-rods are engaged with the bolt, the operator manipulates the spindle 21 to turn the pointer opposite the proper number on the dial to move the spur-gear 27, which operates to withdraw the inner ends of the pair of tumbler-rods from the passages 15 in the bolt. Each of the remaining spindles 22, 23, and 24 are turned for the pointers to register with the proper numbers on their dials, so that all the pairs of the tumbler-rods will be retracted from the bolt, after which the bolt-adjusting spindle 17 may be turned to make the gear 18 retract the bolt. It will be observed that the rotation of either spindle will operate to move the pair of tumbler-rods in opposite directions, so that when one rod is withdrawn the other rod is projected into engagement with the bolt; but both of these rods are not free from the bolt until the pointer reaches the proper index on the dial, whereby the spindle may be manipulated without releasing the bolt until the proper number is reached, so that the pair of oppositely-movable tumbler-rods contribute to the security of the lock.

The permutation mechanism as herein described may be embodied in a padlock, as

represented by Figs. 3 and 4 of the drawings. This padlock has a casing 32, the major portion of which is preferably formed of cast metal. In the upper edge of the casing is a semicircular recess 33, and in one edge of the casing is a slot 34, said slot being closed on its inner side and ends by a wall 34^a, having a slot 35 to receive the shackle. This shackle is or may be arched, so that the shackle may have its arched portion register with the recess 33. One end of the shackle is formed with a cylindrical stem 37, adapted to pass through an opening in the case, the inner end of said stem being formed with a head 38, which limits the outward movement of the shackle when it is withdrawn in order to disengage it from the bolt. This shackle is, furthermore, provided with an extension-arm 39, which is hinged or pivotally connected at 40 to the free portion of the arched shackle, the extension-arm adapted to be fitted in the slot 34, so that it may pass through the opening 35 and enter the casing for an opening in said extension-arm to lie in the path of the locking-bolt 41. This locking-bolt has a knob 42, arranged to pass through and to play in a slot 43, provided in the casing. The knob may be moved horizontally to adjust the bolt in either direction, and when the bolt is moved to the left in Fig. 4 it will enter the opening in the extension-arm of the shackle, thereby confining the shackle in its locked position. With the slidable bolt is associated the guides 13 to direct the endwise travel of said bolt. The series of tumbler-operating spindles 21 to 24, inclusive, are supported in the outer casing in the same manner and in the same relation to the bolt as in the construction shown by Fig. 2, and with each spindle is associated the pair of rack-formed tumbler-rods 28 29, which are slidably confined by the guides 31. The permutation mechanism of the padlock is substantially the same as in the door-lock, and the mode of manipulating this mechanism is similar in both types of lock. It is evident that the retraction of the bolt from the opening of the extension-arm 39 releases the shackle, so that it may be withdrawn until the head 38 of the stem abuts against the lock-casing, at which time the free end of the extension-arm is withdrawn from the casing and into the slot 34 thereof, thus permitting the extension-arm to be turned on its pivot 40, so as to clear the casing and facilitate the adjustment of the shackle in disengaging it from the object which is secured by the lock.

From the foregoing description, taken in connection with the drawings, it will be perceived that I have provided a permutation-lock which wholly dispenses with the use of a key, so that the loss of the key does not render the lock useless. The lock can be opened only by a person supplied with the combination necessary to the proper adjustment of the spindles for disengaging the tumbler-rods from the bolt, and the employment

of the series of spindles adds to the security of the lock, although the exact number of spindles shown may be varied. Owing to the simplicity of construction the lock may be
 5 manufactured and sold quite cheaply and the number of parts being reduced to a minimum the lock is not liable to get out of order.

The padlock shown by Figs. 3 and 4 has its operating elements housed or contained with-
 10 in a casing which protects said elements from the admission of rain or snow, so that the parts will not corrode and become inoperative. The hinged extension-arm on the unconfined end of the shackle is an advantageous fea-
 15 ture of the padlock, because it permits the shackle to be manipulated in a manner to facilitate disengagement from the hasp.

Changes may be made in the form and proportion of some of the parts, while their essential features are retained and the spirit of
 20 the invention embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

25 In the door-lock shown by Figs. 1 and 2 it is evident that the combination can be changed within very wide limits and in an expeditious manner. The lock can be opened to enable access to be had to the interior thereof, the
 30 rod or rods of one or more of the spindles can be detached, and then one or more of the spindles can be turned as desired to change the position of the index to the scale, and thus vary the combination, after which the rods may be
 35 replaced and the lock again closed.

It is to be observed that in each embodiment of my invention the tumbler-rods constitute locking elements arranged for move-
 40 ment in paths at right angles to the bolt and that the locking elements are grouped in pairs, so as to be movable in opposite directions simultaneously.

One of the peculiar features of my lock consists in so arranging the oppositely-movable
 45 locking elements that they will in one position be both free from the locking-bolt; but a slight movement in either direction of the actuating device or spindle serves to shift the positions of the locking elements, so that one
 50 of them will be projected into locking engagement with the bolt, thereby promoting the efficiency of the lock.

Having thus described the invention, what I claim is—

55 1. In a permutation-lock, the combination with a slidable bolt, and means for adjusting said bolt, of a series of individually-operable spindles each having an index associated therewith, and a pair of tumbler-rods con-
 60 nected operatively with each spindle and movable simultaneously thereby in opposite directions into operative relation with the locking-bolt, substantially as described.

2. In a permutation-lock, the combination
 65 with a slidable bolt, guides therefor and means for manually adjusting the bolt end-
 wise, of a series of individually-operable spin-

dles, a pair of oppositely-movable rack-
 formed tumbler-rods contiguous to each spin-
 dle, a gear-pinion on each spindle meshing
 70 with the tumbler-rods and adapted to project the same into or from engagement with the bolt, guides which confine the tumbler-
 rods to slidable movement in paths at right
 angles to the bolt, dial-plates concentric with
 75 each spindle, and pointers carried by the spindles, the pointers on the several spindles arranged to register with different index characters on the dials in withdrawing the pairs
 80 of tumbler-rods from the bolt, substantially as described.

3. In a permutation-lock, the combination of a bolt having the transverse tumbler-passages, means for adjusting said bolt, a series of individually-operable spindles each having
 85 a gear-pinion and an index, a pair of rack-formed tumbler-slides disposed on opposite sides of each spindle and its gear and arranged to enter the passages in said bolt, and means for confining each pair of tumbler-rods
 90 in slidable relation to the gear and to the bolt, substantially as described.

4. A permutation-padlock comprising a casing having a shackle-receiving slot, 34, the shackle confined slidably on the casing, an
 95 extension-arm pivoted to the unconfined end of the shackle and adapted to pass through the slot in the casing, a bolt, tumbler-rods slidably confined with relation to the bolt, and spindles geared to said tumbler-rods, sub-
 100 stantially as described.

5. In a permutation-lock, the combination with a locking-bolt, of a group of oppositely-movable locking elements, and an actuating device common to said locking elements and
 105 connected therewith to make all the elements, in one position thereof, free from said bolt, said actuating device and the locking elements arranged for a movement of the actuating device in either direction to shift at
 110 least one locking element into interlocking engagement with the bolt, substantially as described.

6. In a permutation-lock, the combination with a locking-bolt, of a pair of locking ele-
 115 ments, and an actuating-spindle common to and connected operatively with said locking elements to shift the latter simultaneously in opposite directions, said locking elements being so related to the spindle as to be simulta-
 120 neously retracted thereby from engagement with the bolt and also adapted on a movement of the spindle in either direction to be shifted in directions for at least one locking element to have interlocking engagement
 125 with the bolt, substantially as described.

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

ARTHUR S. WINSTON.

Witnesses:

C. P. SIMONTON,
 J. N. BIDDLE.