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Patented Dec. 19, 1899.

M. MOSLER.

MANIPULATING ATTACHMENT FOR COMBINATION LOCKS.

(No Model.)

(Application filed Apr. 4, 1898.)

2 Sheets—Sheet 1.

Fig. 1.

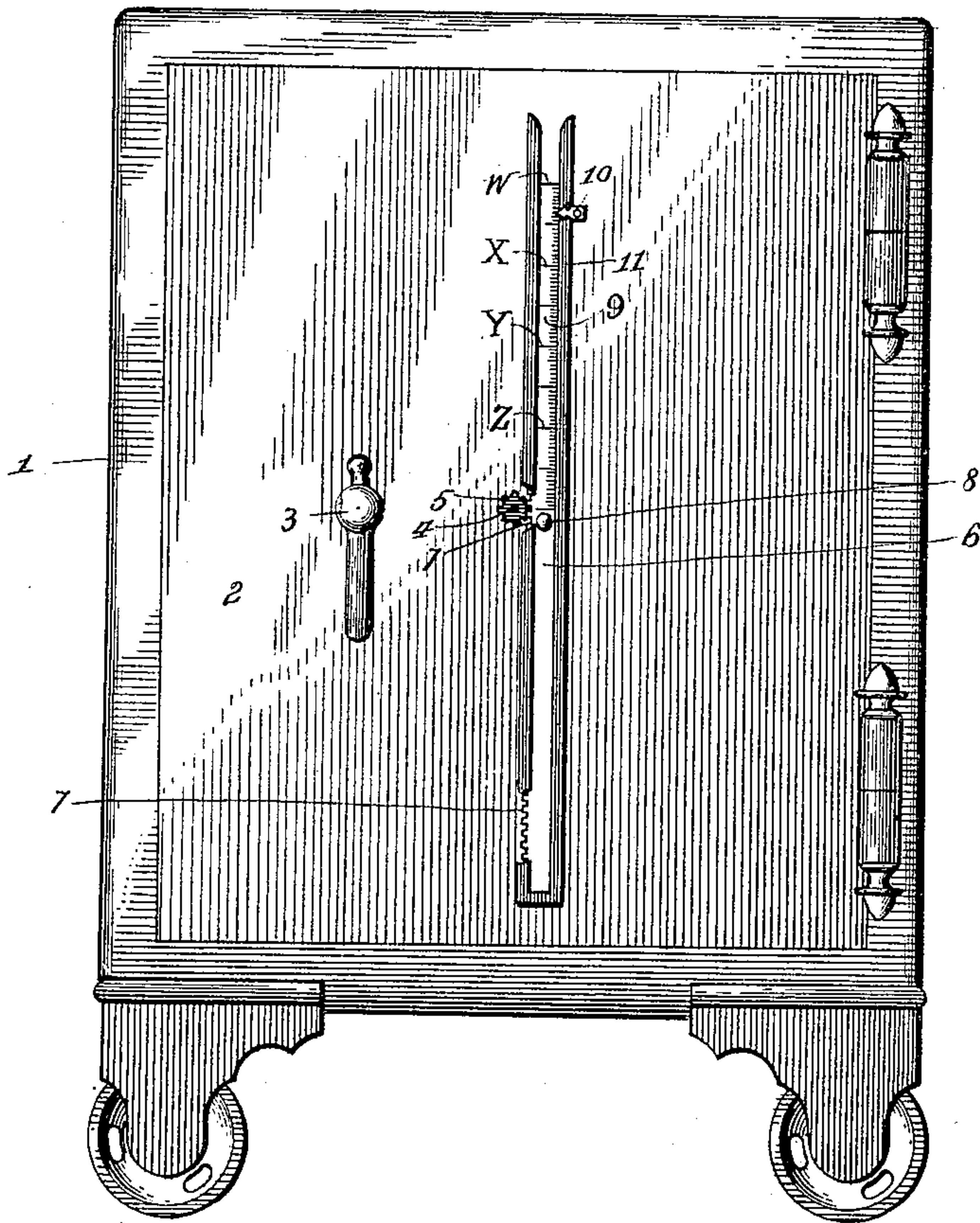


Fig. 11.

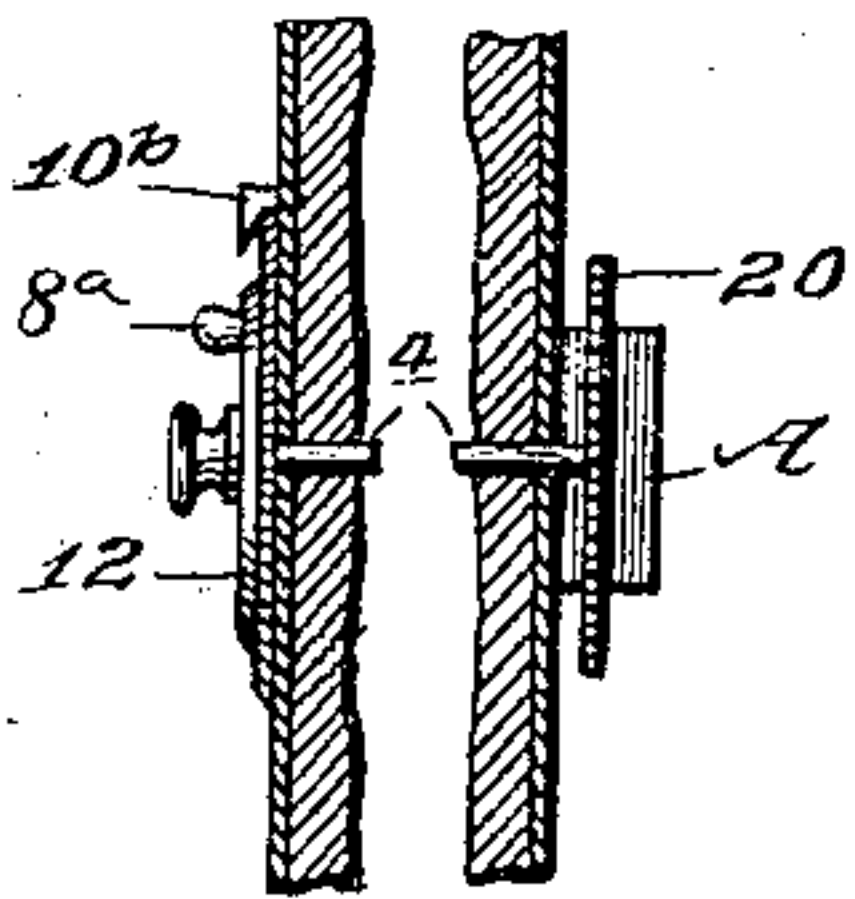


Fig. 12.

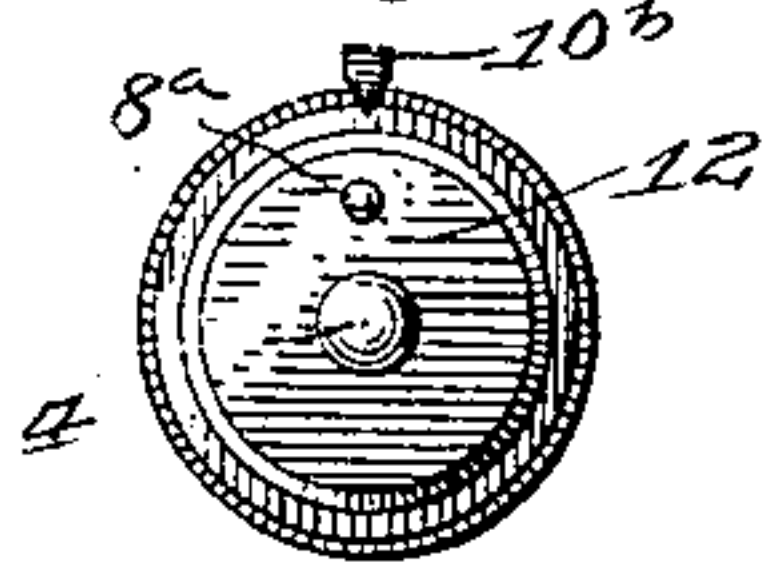


Fig. 13.

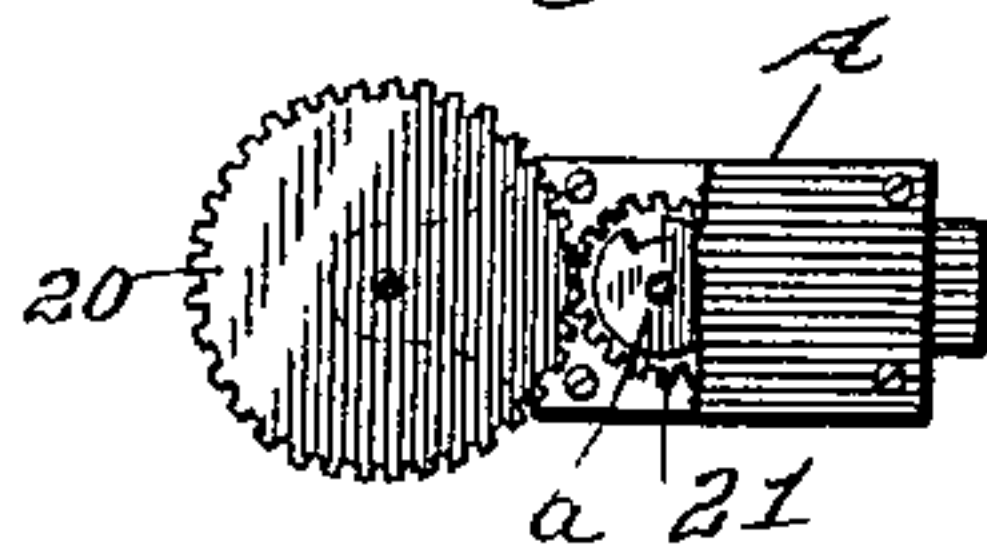
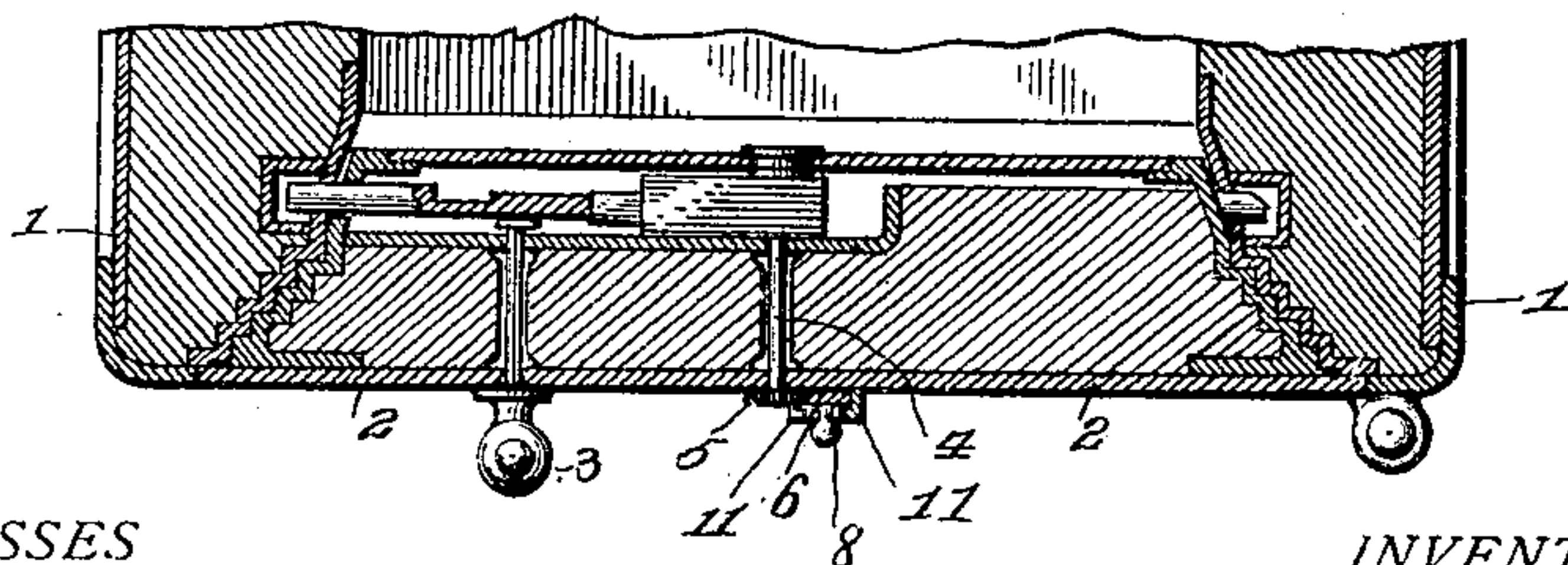


Fig. 2.



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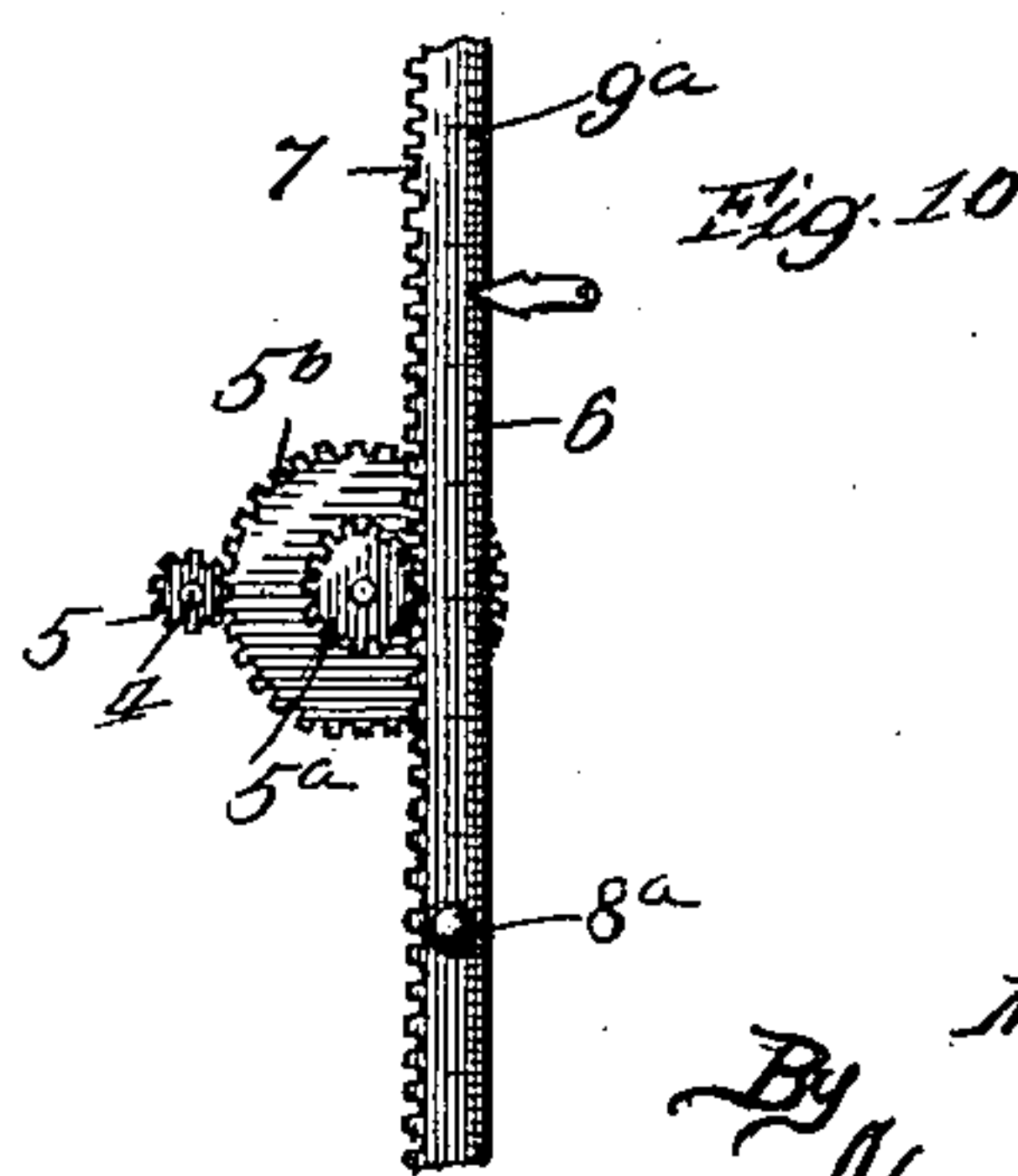
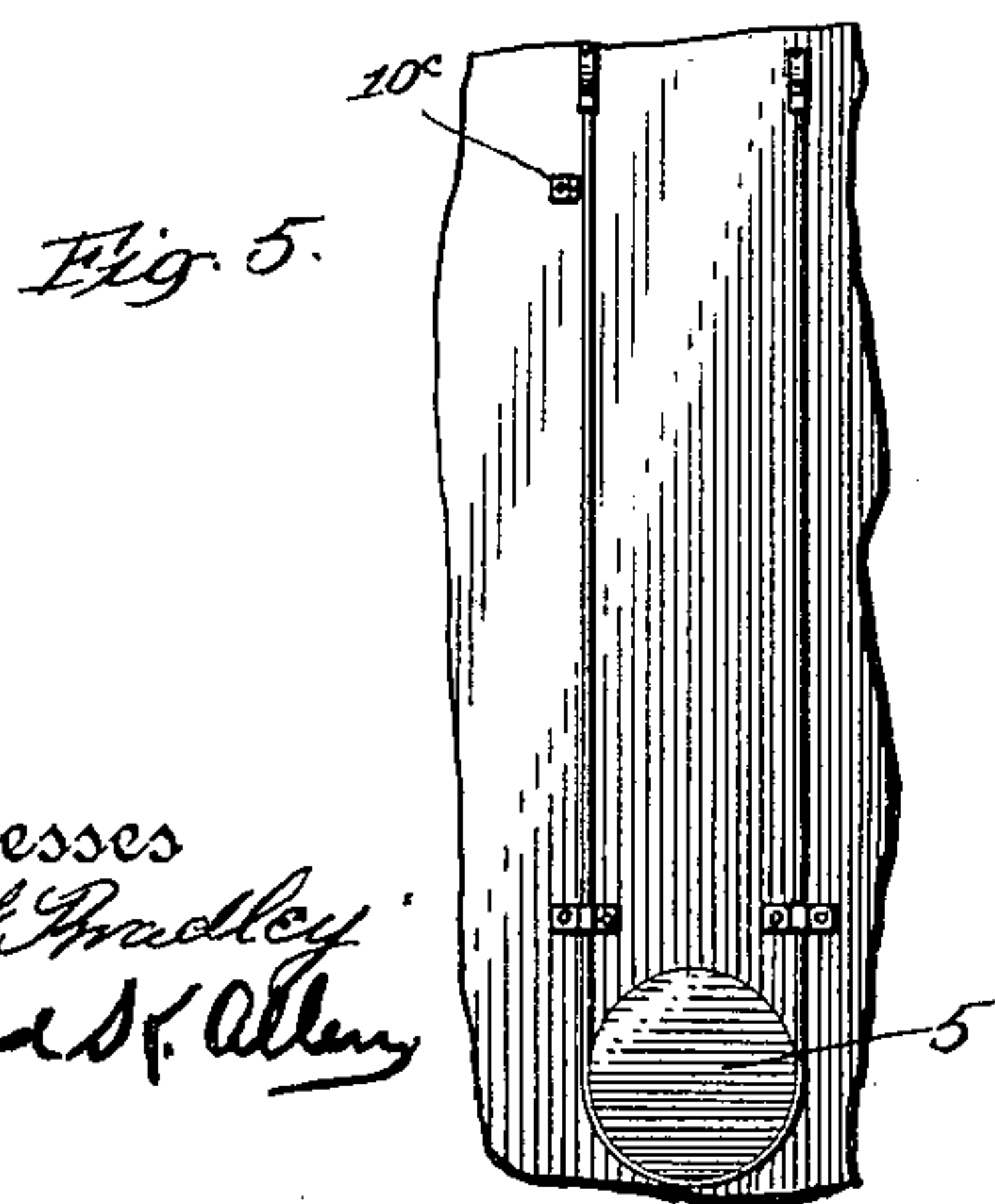
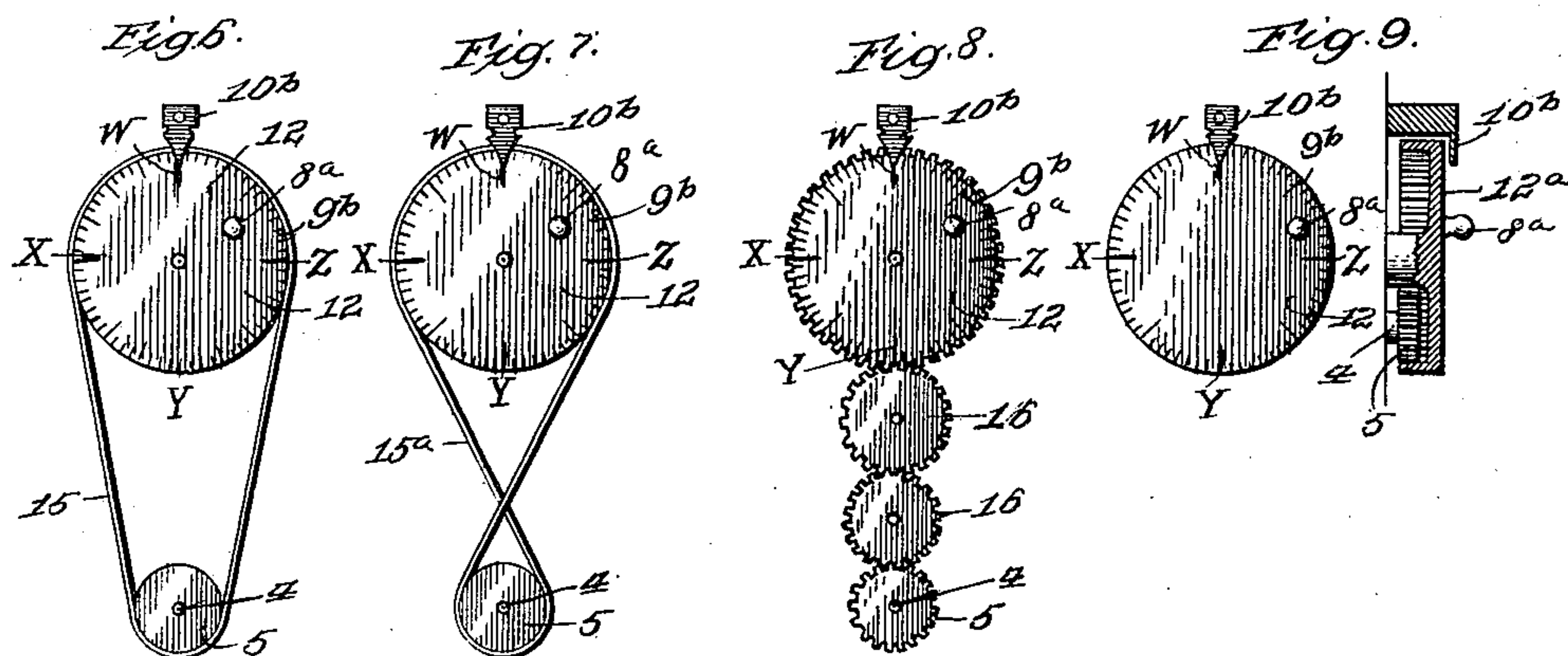
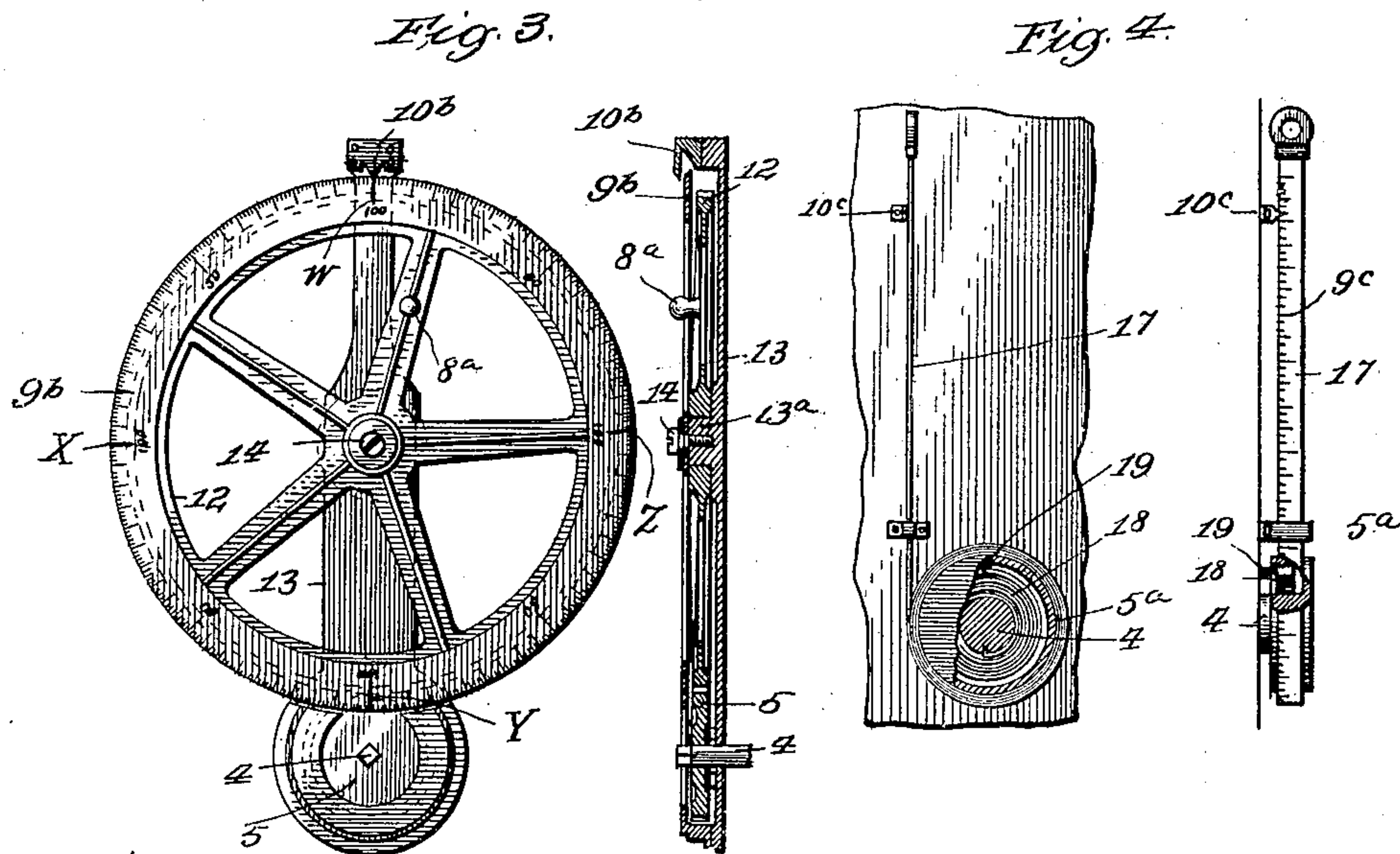
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE

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## MANIPULATING ATTACHMENT FOR COMBINATION-LOCKS.

SPECIFICATION forming part of Letters Patent No. 639,599, dated December 19, 1899.

Application filed April 4, 1898. Serial No. 676,429. (No model.)

*To all whom it may concern:*

Be it known that I, MOSES MOSLER, a citizen of the United States, and a resident of New York, in the county and State of New York, have invented certain new and useful Manipulating Attachments for Combination-locks, whereof the following is a specification.

Combination of permutation mechanism, while necessarily designed for reasons of safety to release their controlled locks only upon the precise execution of certain predetermined movements of the tumblers, is nevertheless unnecessarily inconvenient for manipulation and difficult of accurate adjustment, such inconvenience and difficulty arising not only from the construction of the indicating-dial, but from its location, which on small safes is generally out of easy reach.

The objects of my present invention are to avoid inconvenience of access to the indicating parts and facilitate accuracy of adjustment by combining with or applying to the spindle or other actuating portion of the permutation mechanism a manipulating attachment which shall extend to a position where it can be easily handled by the operator without assuming an inconvenient posture and through the medium of which the tumblers may be set to unlocking position with ease and despatch and by a single direct stroke or movement of the attachment for each tumbler to be set regardless of the number of revolutions required of the spindle to set the tumbler.

The above-recited ends to be attained may be accomplished by a number of different mechanisms, of which several types will be hereinafter specifically described for purposes of illustration of the principles of my invention. For instance, the controlling-spindle of the permutation-tumblers may be provided with a gear-wheel, with which is meshed a rack that extends upward or in any other direction to bring it into convenient reach and which has such a length of stroke that it can impart any given number of revolutions to the spindle by a single continuous movement of the rack, while a suitable pointer located at a convenient point for observation indicates, in connection with a scale upon the rack, the extent of movement imparted to the tumblers, such scale being divided into sec-

tions by colors or other easily-distinguishable means to indicate the extent of movement corresponding to the respective revolutions of the spindle.

Another type of actuating attachments may be represented by a drive-wheel having connections through which it rotates the spindle and which is of sufficient diameter to amplify the movement of the spindle and cause any necessary number of revolutions of the spindle to result from a single continuous movement of the manipulating-wheel (preferably less than a whole revolution) in one direction, while such manipulating-wheel is of sufficient diameter or is so located that a pointer, in connection with a scale marked on said wheel, may be located convenient for inspection and the scale on the wheel being divided into sections corresponding to the revolutions of the spindle. The connection between the manipulating-wheel and the spindle may be made by directly gearing the wheels together, or said connection may be made through the medium of a belt on the manipulating-wheel and a relatively smaller wheel on the spindle, said belt being either direct or crossed, or said connection between the driving and driven parts may be made through the medium of a train of gearing.

A third type of manipulating attachment may be represented by a tape or equivalent flexible manipulating connection wound upon the spindle or drum carried thereby and serving by a scale on the tape and a fixed indicator to determine the extent of rotary movement imparted to the spindle. Both ends of the tape may extend from the drum and serve to rotate the latter in opposite directions by pulling the respective ends alternately, or one end may be attached to the drum and wound upon it, so as to rotate the drum in one direction, rotation in the opposite direction being imparted when the tape is slackened by a spring contained within the drum. In some types of attachments which I shall describe the parts automatically return to normal position when released, and thereby serve the additional purpose of an automatic disconcerting means for the tumblers. If the permutation-spindle be located in convenient position for inspection of the scale, the ex-



tension of the actuating attachment from it will be unnecessary, while the remaining features may be present.

My invention therefore consists in the several novel features individually as well as collectively.

My invention is not limited in scope to any special form or type of actuating attachment, but consists, broadly, in the combination, with a controlling part of the permutation mechanism of a lock, of an actuating attachment having connection therewith through which it adjusts each of the several tumblers by a single stroke or movement of the actuating attachment in one direction; also, the use of such actuating attachment as a means for bringing the mechanism within easy access for manipulation and inspection by the operator; also, the use upon the actuating attachment of a scale divided into sections corresponding to the respective revolutions of the spindle, preferably colored or otherwise rendered easily distinguishable, and each section of the scale being subdivided into the customary points corresponding to the various positions to which the gatings of the several tumblers may be arbitrarily adjusted in selecting the "combination."

My invention will be fully understood upon reference to the accompanying drawings, which illustrate several forms of attachments embodying the several features of my said invention, and in which—

Figures 1 and 2 are respectively a front view and a horizontal section through the lock of a safe to which an attachment embodying the features of my invention is applied. Fig. 3 represents by front view and vertical axial section the toothed-wheel type of my invention. Fig. 4 represents by front and edge views, partly in section, the tape and winding-drum type, a spring being here employed for rotating the spindle-drum in one direction. Fig. 5 represents by front view the type shown in Fig. 4, wherein the tape is employed for rotating the drum in both directions. Figs 6 and 7 represent two embodiments of the belt form of multiplying connections. Fig. 8 represents an embodiment of the driving-wheel type wherein a train of gear is employed. Fig. 9 represents by front and axial sectional views another embodiment of the driving-wheel type wherein the driving-wheel is internally meshed with the driven part carried by the spindle. Fig. 10 is a modified embodiment of the type shown in Fig. 1. Figs. 11, 12, and 13 show the application of the principles of my invention to the side shaft combination safe-lock, Fig. 11 being a vertical section through the door, Fig. 12 a full view of the dial, and Fig. 13 an inside elevation of the multiplying connections.

Referring to the drawings, 1 represents a safe, vault, or like structure, and 2 the door thereof, which is provided with an ordinary handle 3 and with a tumbler-spindle 4, all of which may be of any usual construction. To

the tumbler-spindle 4 I apply a turning-wheel 5 of toothed or other form, according to the type of manipulating attachment which is to be applied.

In Figs. 1, 2, and 10 the wheel 5 is of toothed form and intermeshes with an actuating rack-bar 6, provided on its lower portion with teeth 7 and with a controlling-handle 8, while on its upper portion it is marked or otherwise provided with a scale 9, which, in connection with a fixed pointer 10, will indicate the extent of movement of the rack-bar. The scale on the rack-bar is divided into as many sections as there are changeable tumblers to the permutation mechanism. I have shown the bar 6 provided with four sections *w*, *x*, *y*, and *z*. Each of these is again divided into points corresponding to the positions which the tumblers may be adjusted in setting up the combination. The relations of the toothed portion of the rack-bar and the toothed wheel 5 are such that the spindle 4 will be rotated once for each section of the scale which is moved past the pointer 10, while the individual points of the scale correspond to portions of revolutions. The rack-bar is mounted to slide vertically in a guide-way 11. Inasmuch as the tumblers of permutation-locks can ordinarily not be disconcerted until the bolts are cast the rack-bar 6 will remain elevated to the point at which the combination ends; but as soon as the bolts are cast and the fence is withdrawn from the tumblers the spindle can of course rotate and the rack-bar will then be free to drop. It therefore follows that with this form of attachment the tumblers will be automatically disconcerted by the mere act of closing the safe and shooting the bolts. The form shown in Fig. 10 differs from that described with reference to Figs. 1 and 2 in that an intermediate multiplying-gear 5<sup>a</sup> 5<sup>b</sup> is introduced between the rack 6 and the wheel 5 on spindle 4, and the scale 9<sup>a</sup> is marked directly upon the rack-bar. Such a construction may be convenient in places where the spindle is carried by the door at a convenient height for inspection of the scale without having the vertical extension.

The types illustrated by Figs. 3, 6, 7, 8, and 9 employ driving-wheels 12 of enlarged diameter, so that a single stroke or movement less than a whole revolution in either direction will always be sufficient to impart any number of necessary revolutions to the spindle, while said driving-wheels, either by reason of their enlarged diameter or by being spaced apart from the spindle, present the scales 9<sup>b</sup>, marked upon them in convenient position for inspection in connection with an indicator 10<sup>b</sup>. In the form shown in Fig. 3 the wheel 12 is toothed and geared directly to the wheel 5 and the scale 9<sup>b</sup> is separate from said wheel to attach to it at its center, so as to rotate with the wheel, as indicated in the sectional portion of the view. A handle 8<sup>a</sup> serves to rotate the wheel with its scale. The wheel



is carried by a suitable mounting 13, which incloses the wheel 5 at its lower end and affords a bearing 13<sup>a</sup>, over which the hub of the wheel is secured by a screw 14, which also holds the scale in place. The forms shown in Figs. 6 and 7 employ belts 15 15<sup>a</sup>, the former being straight and the latter crossed, to establish connection between the driving-wheels 12 and the driven wheel 5 on the spindle 4. These driving-wheels 12 are not of such large diameter as that shown in Fig. 3, but sufficiently increased in size over the driven wheels 5 in said Figs. 6 and 7 to cause the necessary amplifying of movement, and their scale 9<sup>b</sup>, carried upon the face of the wheel, may be brought within convenient position for inspection by employing the necessary length of belt 15 or 15<sup>a</sup>. The form shown in Fig. 8 embodies similar principles to those shown in Figs. 6 and 7, but differs in that a train of gearing 16 is substituted for the belt 15 or 15<sup>a</sup>. The form shown in Fig. 9 is an embodiment of the same type, except that no provision is made for removing the scale to a distant point for convenient inspection. With this form it is assumed that the spindle 4 is located at such a position as is general in the case of very large safes or vaults, so that a scale associated with it can be readily examined. The driving-wheel is represented by 12<sup>a</sup>, and the driven wheel 5 is geared to an internal tooth on said driving-wheel.

The type illustrated by Figs. 4 and 5 employs a drum 5<sup>a</sup>, fixed to the spindle 4 beneath its outer face, as shown in the edge view Fig. 4, and having wound upon it a tape 17, which imparts movement to it and which carries a scale 9<sup>c</sup>, which will, in connection with a fixed pointer 10<sup>c</sup>, indicate the extent of movement imparted to the drum 5<sup>a</sup>. In Fig. 4 the inner end of the tape is attached to and wound upon the drum, so that it will impart rotation to the drum in one direction. Rotation of said drum in the opposite direction is caused by a spring 18, contained within the drum, having one end fixed to the spindle 4 and the other end secured to a fixed pin 19, or said spring being otherwise interposed between the drum and the fixed point, so as to impart rotation to the drum in the direction opposite to that imparted from the tape. The embodiment illustrated in Fig. 5 differs from that described with reference to Fig. 4 in that both ends of the tape project from the drum, while an intermediate portion is coiled about it, and the drum may thus be rotated in opposite directions by alternately pulling the respective ends of the tape.

Two of the forms which I have described embody features of my invention, except that the feature of extending the indicator to a point distant from the spindle is not present in Fig. 9. The forms represented in Figs. 1, 2, and 10 show gravitating rack-bars, which serve the additional function of automatically disconcerting the tumblers when the bolts are cast. The form shown in Fig. 4 employing

a spring will also assume a normal position when the tape is released and when the bolts are cast, and this form also embodies the automatic disconcerting feature.

In Figs. 11, 12, and 13 is illustrated the facility with which my invention may be applied to the side-shaft type of combination safe-locks—that is to say, locks having the lock mechanism suitably incased and with the operating-spindle 4 disposed to one side of and connected by gearing 20 21 to the drive-tumbler *a* through the case. To install my invention in such a lock, it is simply necessary to arrange the connections between the actuating and indicating means (here illustrated as the dial 12) and the lock mechanism, so that one stroke or movement of said indicating and actuating means—*e. g.*, one revolution or less of dial 12—will develop into the necessary number of revolutions of the tumblers and to divide up the indicating means into sections and points corresponding, respectively, to revolutions and parts of revolutions of the dials, as heretofore explained with reference to other forms. The dial is merely typical of some actuating and indicating means, and this part, as well as the multiplying-gearing between it and the lock mechanism actuated by it, may be substituted by other forms of corresponding parts.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In combination with a rotating spindle of permutation mechanism carrying a plurality of tumblers in train; a manipulating attachment, and multiplying-gear connections through which a single stroke of the manipulating attachment is amplified into a plurality of revolutions of said spindle; substantially as and for the purpose set forth.

2. In combination with a rotating spindle carrying a plurality of tumblers, a moving member having multiplying-gear connection with the tumbler-spindle through which a single movement imparted to it corresponds to a plurality of revolutions of the tumblers on said spindle, to be set; said moving member being divided by colors or other readily-distinguishable means into sections corresponding to numbers of revolutions of the tumblers, and having such sections divided into points corresponding to parts of revolutions or positions to which the gatings of the tumblers may be adjusted in setting up the combination.

3. The combination of a side-shaft combination safe-lock having a plurality of tumblers, a moving member through which the tumblers are driven, and which is divided into sections and points measuring, on the moving member, its movements corresponding respectively to revolutions and parts of revolutions to be imparted to the tumblers, and a multiplying-gear interposed between the moving member and the tumblers, developing in the tumblers one revolution for each section traveled by the moving member.



4. In combination: a side-shaft combination safe-lock having a gear-wheel in driving relation to its tumblers, a controlling-spindle having on its inner end a multiplying-gear wheel intermeshing with the gear-wheel of the tumblers, and of such relative size as to multiply one or less than one revolution of the spindle in either direction into the necessary revolutions to set the respective tum-

blers, and an indicator for said spindle divided into sections and points corresponding respectively to revolutions and parts of revolutions of the tumblers; substantially as and for the purposes set forth.

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