

No. 692,189.

Patented Jan. 28, 1902.

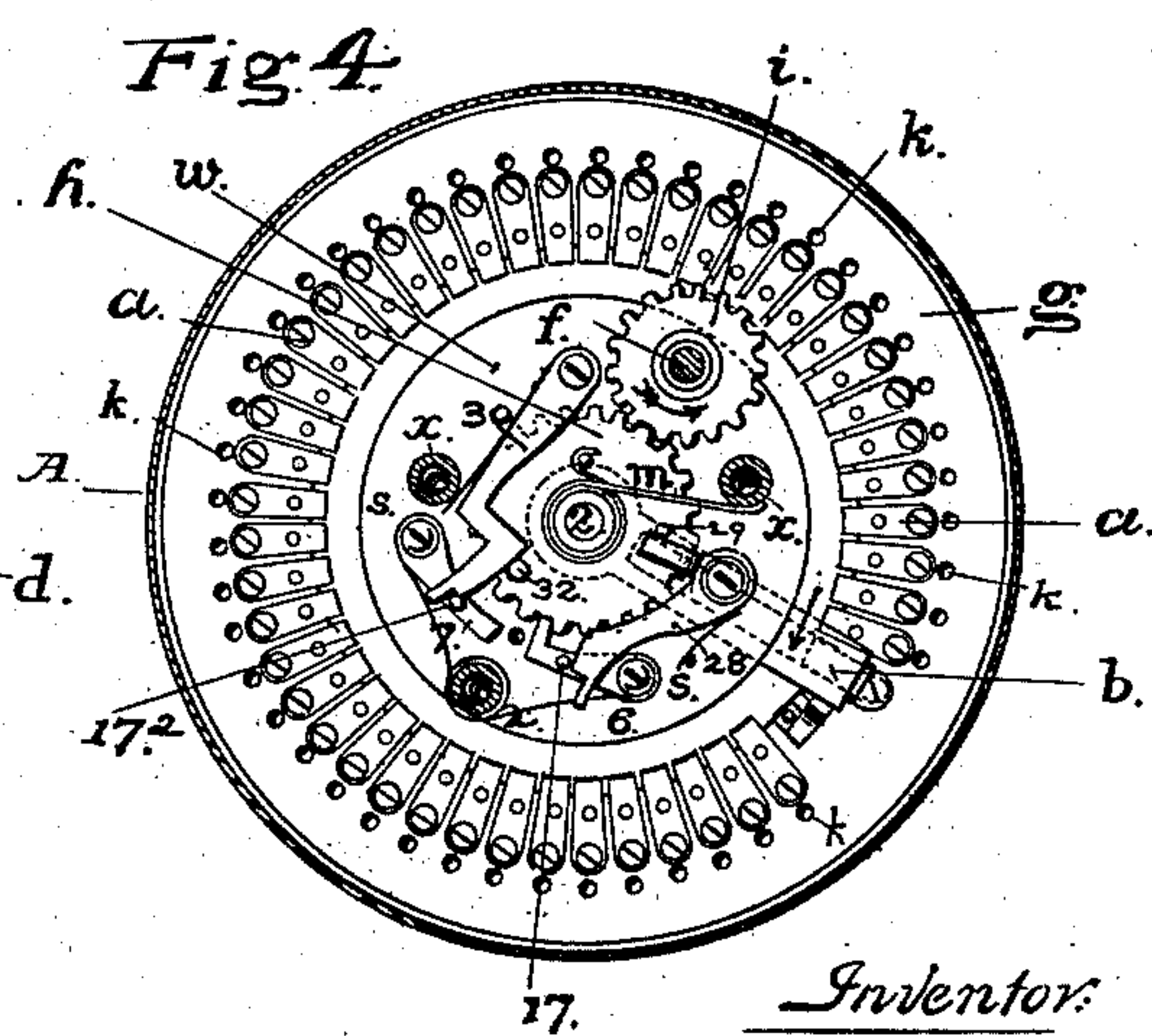
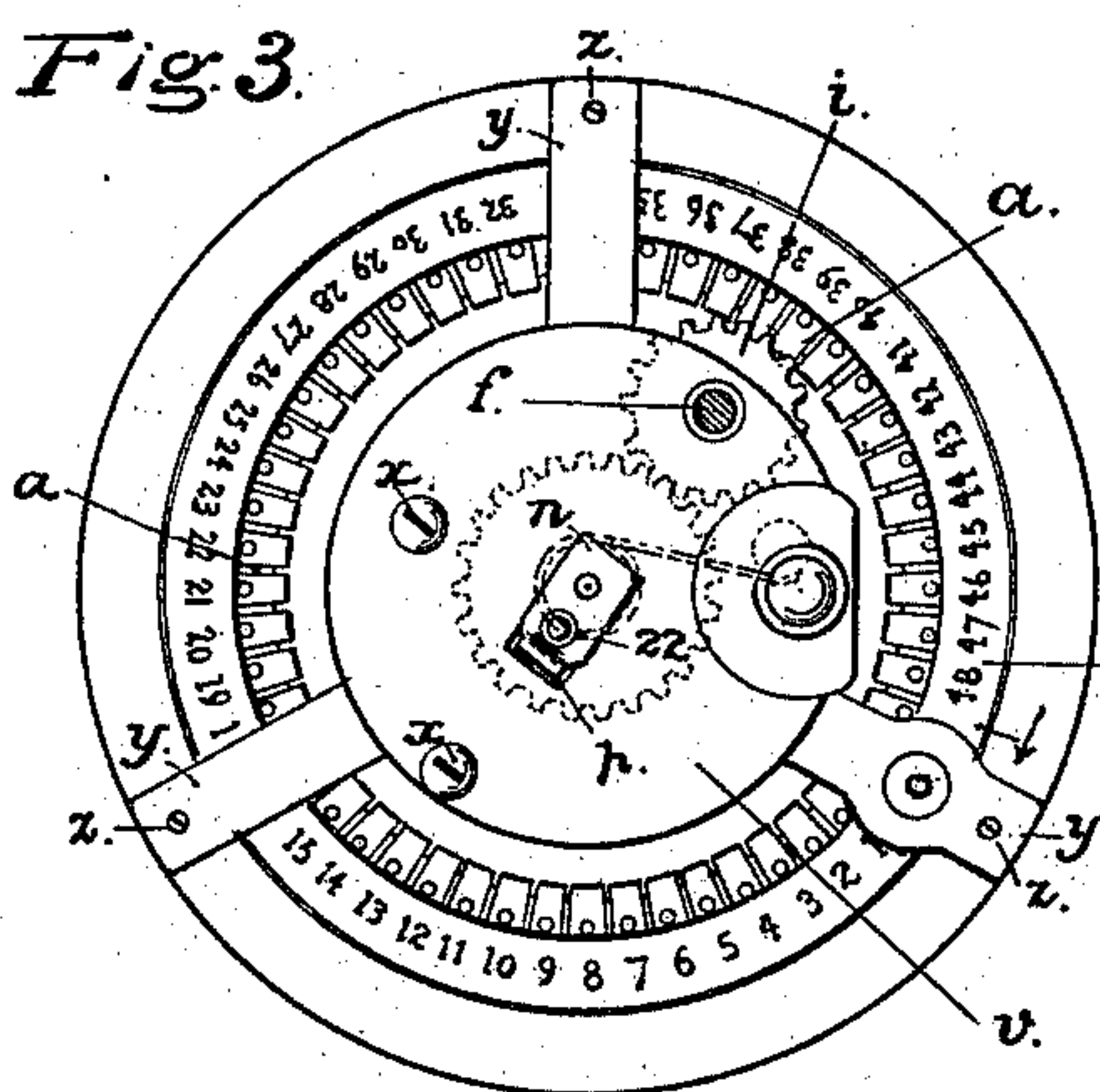
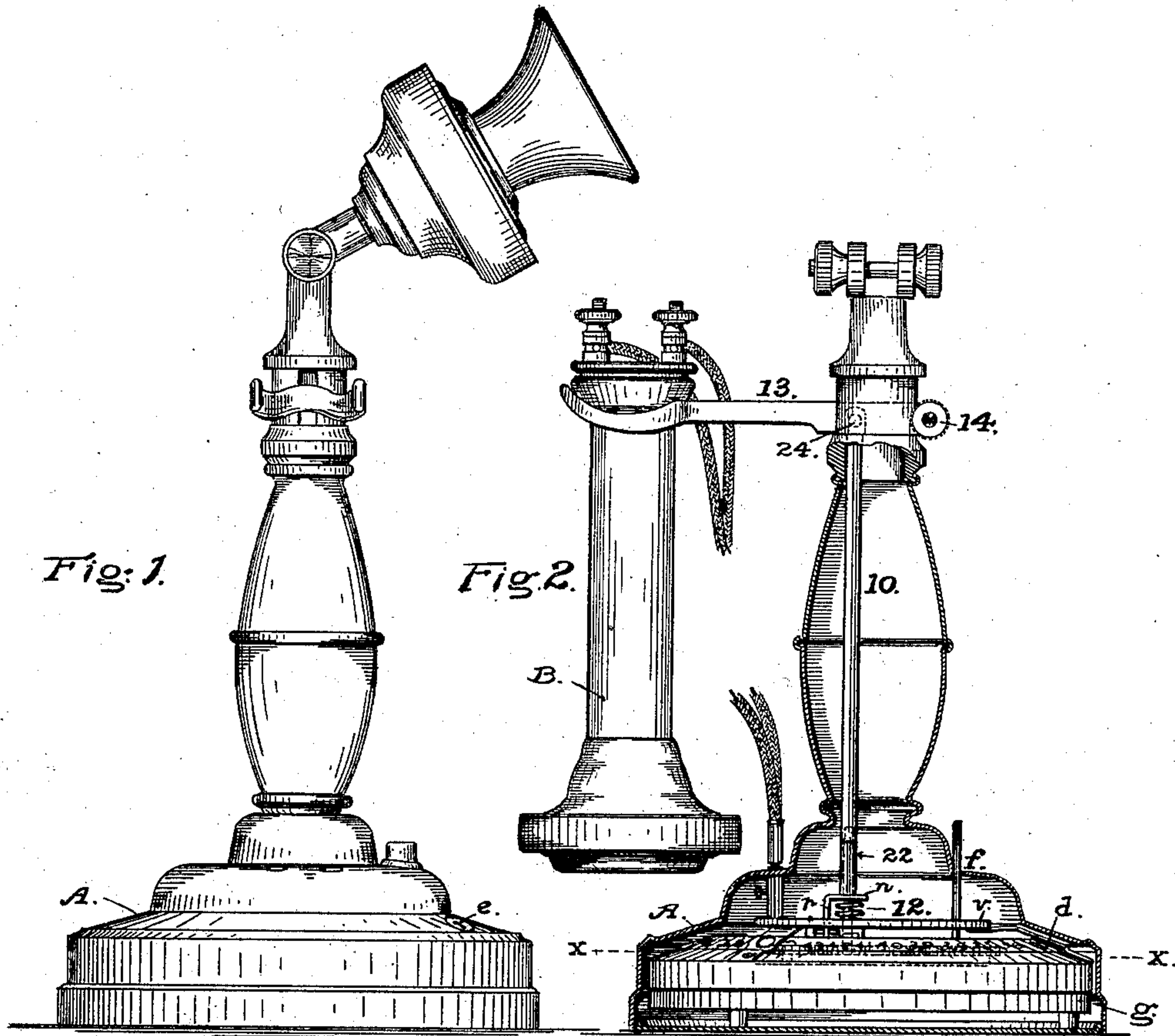
A. K. ANDRIANO.

SWITCHING MECHANISM FOR INTERCONNECTING TELEPHONE LINES.

(Application filed Apr. 16, 1900. Renewed June 22, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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Inventor:

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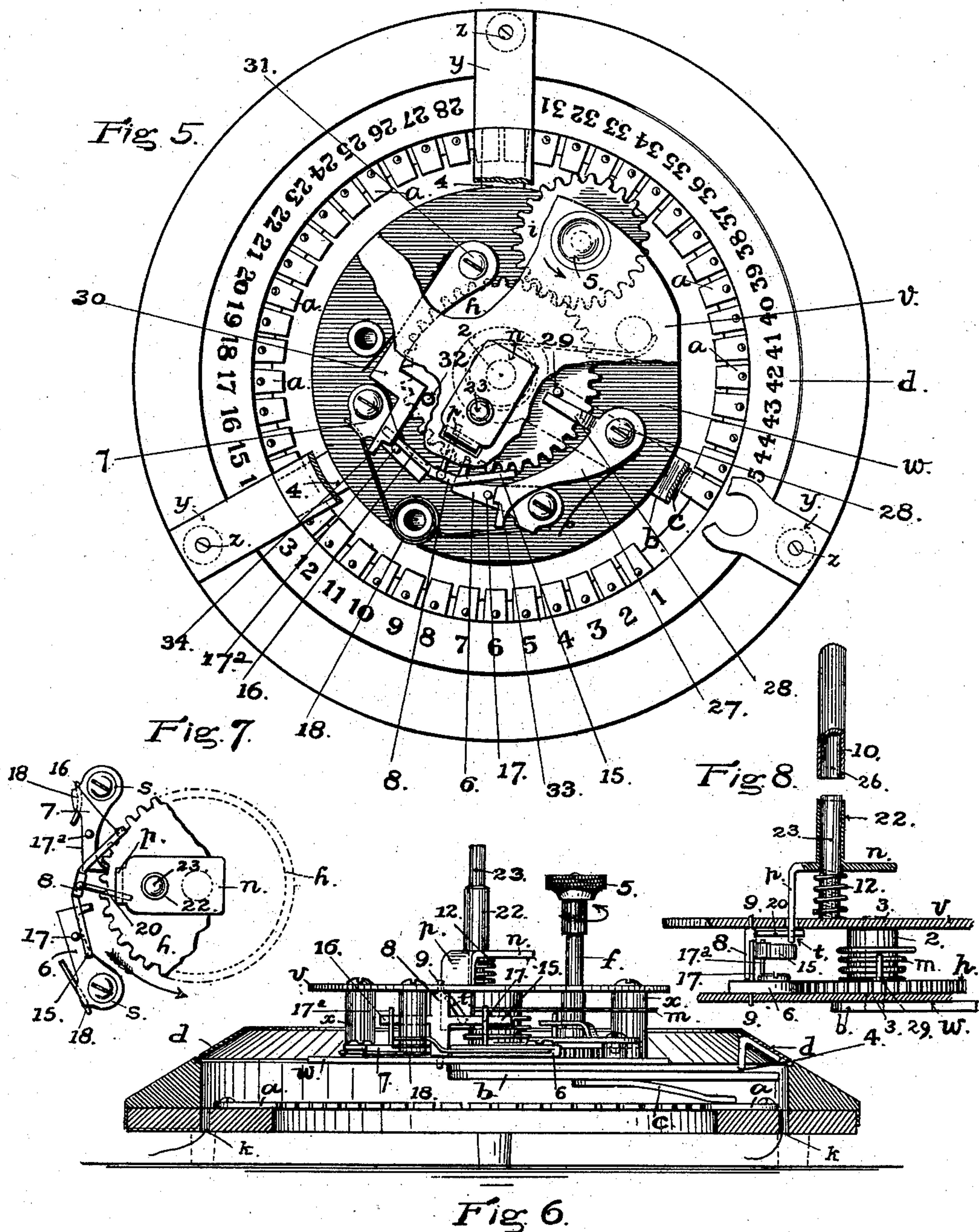
**A. K. ANDRIANO.**

# SWITCHING MECHANISM FOR INTERCONNECTING TELEPHONE LINES.

(Application filed Apr. 16, 1900. Renewed June 22, 1901.)

(No Model.)

**2 Sheets—Sheet 2.**



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# UNITED STATES PATENT OFFICE.

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## SWITCHING MECHANISM FOR INTERCONNECTING TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 692,189, dated January 28, 1902.

Application filed April 16, 1900. Renewed June 22, 1901. Serial No. 65,544. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT K. ANDRIANO, a citizen of the United States, and a resident of the city and county of San Francisco and State of California, have invented new and useful Improvements in Switching Mechanism for Interconnecting Telephone-Lines, of which the following is a specification.

This invention relates to improvements made in switching mechanism for telephone systems composed of a comparatively small number of lines combined for operation on the interconnecting plan, wherein each party through the switch mechanism at his own instrument has individual connection with the other instruments in the system to call up and talk with any other party without the interposition of a central station and an operator.

The object of the invention is to provide a switch mechanism of enlarged capacity capable of affording connection with a considerable number of lines on the interconnecting plan and of such compact form and arrangement that a considerable number of line-contacts, together with the entire switch mechanism, can be contained in the base of a portable telephone-stand for the desk or table.

The invention further provides a means in connection with the switching mechanism for locking the movable contact-arm when the instrument is not in use, whereby the switch cannot be moved off the "home" contact of the instrument until the receiver is taken off the telephone-hook for use and the switch cannot be moved and left off the line of the instrument by careless or mischievous persons playing or tampering with the same.

The following description explains at length the nature of the said invention and the manner in which I proceed to construct, apply, and carry out the same, reference being had therein to the accompanying drawings, forming part thereof.

The drawings illustrate the improved switch mechanism as applied to and embodied in a desk-telephone or portable instrument containing all the switch operating and locking mechanism in its base; but it should be under-

stood that the same are applicable to and readily arranged in a stationary instrument to be fixed in a permanent manner to the wall.

Figure 1 is an elevation of a desk-telephone containing the switch mechanism in its base. Fig. 2 is an elevation taken from the left-hand side of Fig. 1, with the shell or body of the stand in section. Fig. 3 is a section taken horizontally through the base at the line  $x x$ , Fig. 2. Fig. 4 is a plan or top view of the base-block, showing the circle of stationary line-contacts, the movable switch-arm, and parts of the mechanism for moving and setting it. Fig. 5 is a plan or top view of Fig. 3 on an enlarged scale, with the stationary top plate broken away to expose parts beneath. Fig. 6 is an elevation, principally in longitudinal section, on an enlarged scale, of the base-block and the switch-operating mechanism. Fig. 7 is a plan in detail of parts of the locking mechanism. Fig. 8 is an elevation, principally in section, of the same parts.

The principal parts of the switch mechanism comprise a circle of stationary line-contacts  $a a$ , a traveling arm  $b$ , carrying the movable contact  $c$  of the switch and movable in a circle over the stationary contacts, an annular dial-plate  $d$ , moving uniformly with the contact  $b c$  behind a sight-opening  $e$  in the inclosing case  $A$  and bearing the switch-numbers on its upper or outer face, and a setting-shaft  $f$ , geared into the switch-arm by a spur-gear  $h$  and a pinion  $i$ , by which the contact-arm is turned and set from the outside of the case.

The stationary contacts  $a a$ , through which all the instruments in the system are interconnected in the usual way, are arranged in a circle upon an insulating base-block  $g$ , the individual line-wires being carried from the outside through holes  $k$  and fastened to the contacts. A separate frame composed of a top and bottom plate  $v w$ , united by posts  $x x$ , carries the contact-arm  $b$  and its setting and locking mechanism. This frame is supported in the open center of the base-block by arms  $y y$ , fastened to the top plate and extending over the contacts to the rim of the base-block, to which they are secured by screws  $z$ . The



movable contact-arm under the bottom plate is fixed on the end of a spindle or short shaft 2, fitted to turn in bearings 3 3 in the frame, and the arm has a clear sweep all around the circle of contacts on the surrounding base-block. The annular dial-plate being rigidly attached to the shaft 2 by radial arms 4 4, the two parts move together as the shaft 2 is turned by means of the shaft *f* and the gear and pinion *h i*, connecting the two shafts together, as before described. The position of the movable contact-arm with relation to the fixed contacts is always indicated by the switch-number on the dial that is exposed to view at the sight-opening, and the movable arm is set to any selected line by turning the knob 5 on the end of the setting-shaft in the direction indicated by the small arrow until the number on the dial corresponding to the number of the required switch is shown at the sight-opening. In its movement from right to left, as indicated by the arrow in Figs. 3, 4, 5, and 7, the movable contact *b* leaves the line-contact or home contact of the instrument and traverses the circle of stationary contacts until the required number on the switch-dial is seen at the opening. On reaching that point the arm *b* is held on the contact *a* by that one of the two dogs 6 7 which prevents the gear *h* from turning backward or from left to right, but allows it to turn forward. In this forward movement the coiled spring *m*, attached at one end to the gear and at the other to the stationary frame, is put in tension to throw back the contact-arm to its starting-point at the home contact when the gear is released by the dog 7. The other dog 6 when thrown into the teeth of the gear prevents the contact-arm from moving forward and locks it on the home contact, and thus while the dog 7 controls the gear in one direction of its motion the other dog 6 locks the switch and holds the contact-arm on the user's individual line until the gear is unlocked again. These dogs are brought into action singly, and as one is set into engagement with the gear the other is moved away and held out of action mechanically from the movements of the telephone-hook on its pivot, so as to lock the switch while the receiver B remains on its hook 13 and to release the switch for operation only when the receiver is taken off. The locking device to prevent the switch-arm from being moved off the home contact of the instrument except when a switch is to be made by the user is thus thrown into and out of action through the movements of the telephone-hook as the receiver is taken off for use, and the same mechanism throws back the switch-arm to zero or the home contact after a switch and as soon as the receiver is hung up. This locking device (shown in Figs. 6, 7, and 8) is composed of the two dogs 6 7, pivoted at *s s* on the bottom plate and engaging the spur-gear *h* from opposite directions, the rocking switch-piece 8, hung on pivots 9, the slide-plate *n*, having a down-

wardly-bent leaf or member *p*, with an inclined slot *t*, and the rod 10 and coiled spring 12, through which the movements of the telephone-hook 13 on its pivot 14 are caused to depress and hold down the slide *n p* when the receiver is hung up and to release and throw up the slide when the receiver is taken down for use. On the switch-piece 8 two rigid arms 15 16, extending horizontally in opposite directions at an angle to each other, make contact with the upright pins 17 17<sup>a</sup> in one or the other of the two dogs, according to the direction in which the piece is thrown, whether to the right or the left, thereby setting and holding one dog out of action and allowing the spring 18 behind the other dog to throw that piece into the gear. A bar or third arm 20 on the switch-piece 8 midway between its two rigid arms extends horizontally toward the center of the frame and into the slot *t* in the slide, which has such degree of inclination out of the perpendicular that the vertical movement of the slide *n p* produces oscillating movement of the switch-piece on its pivots, in one direction acting on the dog 6 and in the opposite direction on the dog 7. The downwardly-bent member of the slide extends through an opening in the top plate, and the slide is provided with a tubular post 22 on the top, fitted to slide on a fixed guide-post 23 on the top plate. This guide-post is set in line with the push-rod 10, loosely attached at 24 to the lever of the telephone-hook between the pivot 14 and the hook and having a hollow lower end 26 fitting loosely upon the end of the guide-post 22 and resting on the top of the tubular guide 23. The coiled spring 12, setting against the lower side of the slide-plate, throws that piece upward when the weight of the receiver is taken off the hook and by lifting the slide *n p* throws the switch-piece 8 into the position represented in Fig. 7, thereby setting back the locking-dog 6 and releasing the dog 7. In this position of the parts the gear *h* is free to turn in the direction of the arrow, but is held at any point in its rotation wherever it may be set until the dog is thrown away from the gear by the reverse movement of the switch-piece 8, which takes place when the slotted slide *n p* is depressed by the downward movement of the telephone-hook. By this means the movable switch-arm is locked as long as the telephone-hook is held down by the receiver and the switching mechanism is inoperative until after the telephone-hook is released by the person desiring to use the instrument.

To prevent the dogs 6 and 7 from engaging the gear and holding or locking the same before the arm has completed its travel and returned to the required position on the home contact, a pivoted latch setting in operative relation to each dog engages a pin or stop on the upper side of the dog and holds that piece back until the arm has finished its movement, at which moment the latch is thrown back by a stop-pin on the top side of the gear and the



dog is free to move into the teeth of the gear *h* under the action of the spring 18.

The latch 27, that controls the dog 6, is pivoted at 28 and is thrown back by a stop-pin 5 29 on the gear. The latch 30, controlling the other dog *i*, is pivoted at 31 and is acted upon by the stop-pin 32 to release the dog at the proper time. A shoulder 33 on one latch engages the pin 17 on one dog, and a similar 10 shoulder 34 catches and holds the pin 17<sup>a</sup> on the other dog.

In the substitution of individual switching and ringing devices at each telephone to dispense with the service of an operator and place 15 each user in the system into connection with all the other lines on the system it becomes necessary not only to overcome the complicated arrangement of the central switchboard, so as to place every line in the system on the 20 switch at each instrument, but also to provide against carelessness or forgetfulness on the part of the user in returning his own instrument to the line again after having connected with another party for talking. The first 25 of these objections is overcome by the construction of the switching mechanism above described, which is of such simple character and compact arrangement that it can be disposed and concealed within the base of a portable stand no larger than the ordinary single-line desk-telephone, and the second is entirely removed by providing an automatic switch-locking device whereby the switch-setting mechanism is locked when not in use 35 and remains so until the receiver is taken from its hook, and, on the other hand, when the receiver is hung up after use the switch is thrown back automatically on the line again. Provision is thus made for the carelessness of 40 the user and for the accidental disturbance of the switch by mischievous or thoughtless persons who in playing with the switch may throw and leave the instrument off the line. These risks and contingencies affecting the 45 practical and continuous operation of the lines are effectively provided for and guarded against in the foregoing construction.

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

1. In a telephone-switch, a plurality of stationary contacts, a movable contact, and controlling means holding the movable contact normally locked on the home contact while 55 the receiving-telephone is hung up whereby the switch cannot be moved in either direction until the receiver is taken from its support for use, and means operatively connecting said support with the controlling means to throw the same into or out of action by the 60 act of taking down or hanging up the receiver.

2. In a telephone-switch the combination, with a plurality of stationary contacts including the home contact of the subscriber, and a movable contact, of a locking device and 65 means operatively connecting the same with the subscriber's-telephone hook, whereby the movable contact is normally locked on the home contact and cannot be moved while the receiver is hung up. 70

3. In a telephone-switch, a plurality of stationary contacts in a circle including the home contact of the instrument, a movable contact-arm adapted by its movements to connect the instrument with any selected one of the stationary contacts, means for setting and holding 75 the arm thereon, a spring to return the arm to the home contact when released, a dial provided with switch-numbers carried by said arm and set by its movements with respect 80 to a sight-aperture to indicate the position of the arm, a telephone-hook, and a locking device operatively connected with the telephone-hook and adapted to prevent the contact-arm from being moved in either direction away 85 from the home contact while the receiver is on the hook and to release the said arm from operation only after the receiver is removed.

4. In a telephone-switch, the combination of stationary contacts in a circle, a movable 90 contact-arm adapted to travel thereon, means for setting said arm comprising a setting-shaft and gears connecting said shaft and arm, a spring for returning said arm, and a locking device comprising a dog engaging one of the 95 gears to lock the same, a slide, a switch-piece connecting the slide with the dog, a telephone-hook, means connecting the telephone-hook with the slide, whereby the same is held down by the hook while the receiver remains on the 100 hook, and a spring adapted to throw up the slide and actuate the switch-piece when the receiver is removed.

5. The combination, with the stationary contacts and the movable contact-arm traveling in a circle on said contacts, of the setting-shaft 2, gears and pinion *h i*, dogs 6 7, latches 27 30, and means actuated by the movements of the telephone-hook to throw 105 one of the dogs into action and the other out of action by taking down and by hanging up the receiver, whereby the switch is rendered inoperative when the receiver is on the hook and is released by the act of taking down the receiver for use. 115

In testimony that I claim the foregoing I have hereunto set my hand and seal.

ALBERT K. ANDRIANO. [L. S.]

Witnesses:

EDWARD E. OSBORN,  
M. REGNER.