

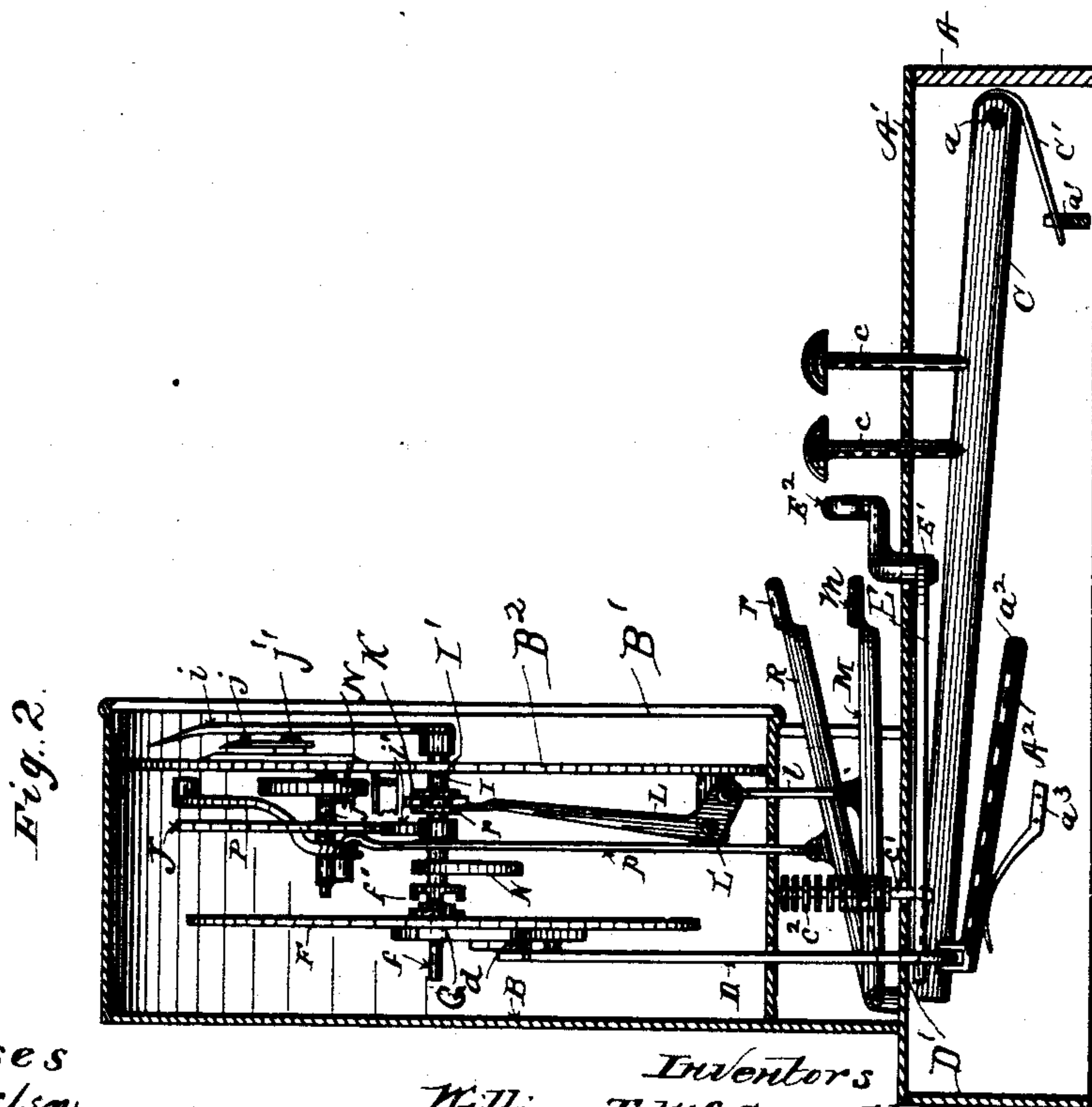
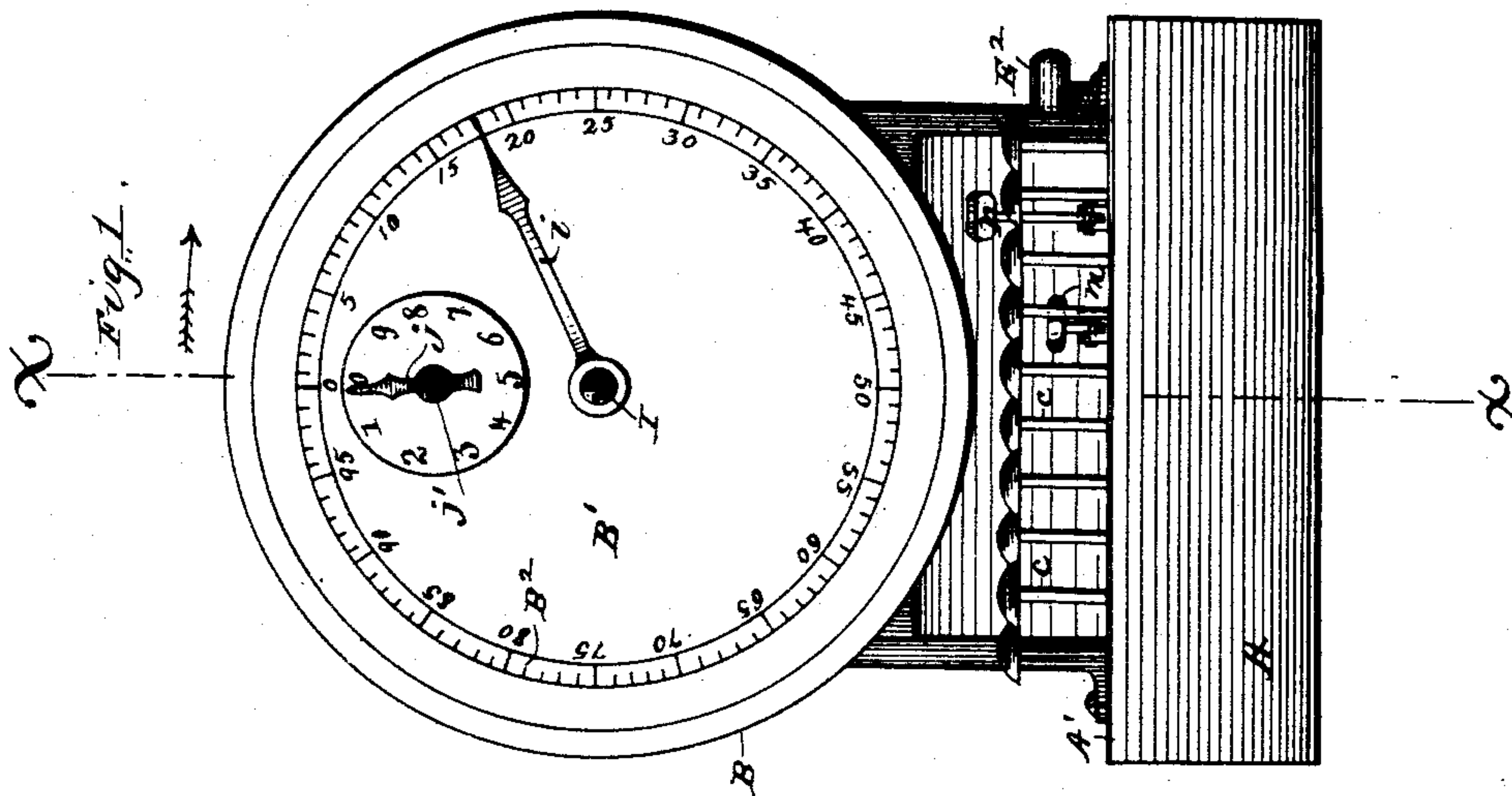
(No Model.)

2 Sheets—Sheet 1.

P. O'CONNOR & W. T. McCONNELL.
COMPUTING MACHINE.

No. 438,820.

Patented Oct. 21, 1890.



Witnesses
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By Leggett & Leggett
Atty's.

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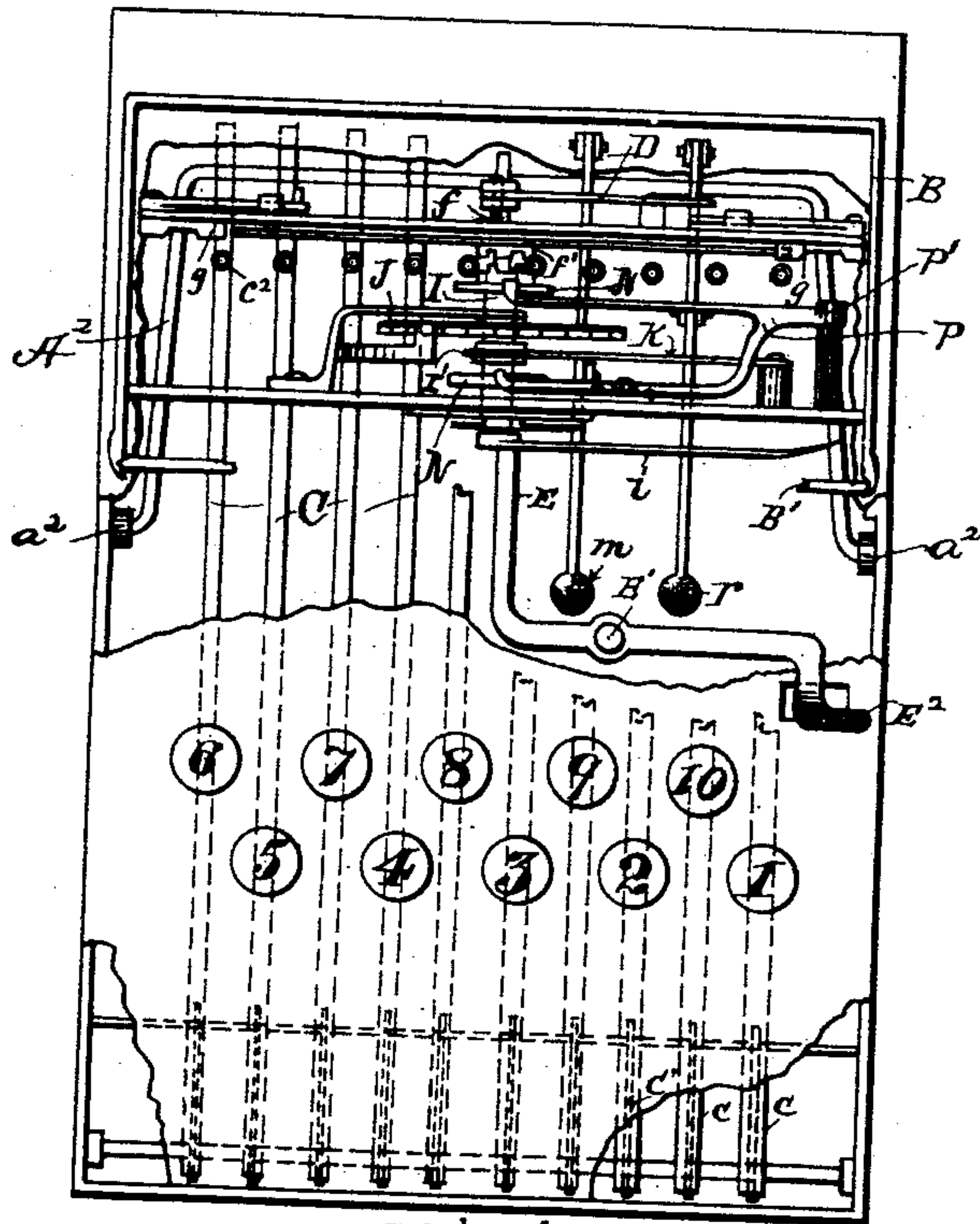


Fig. 4.

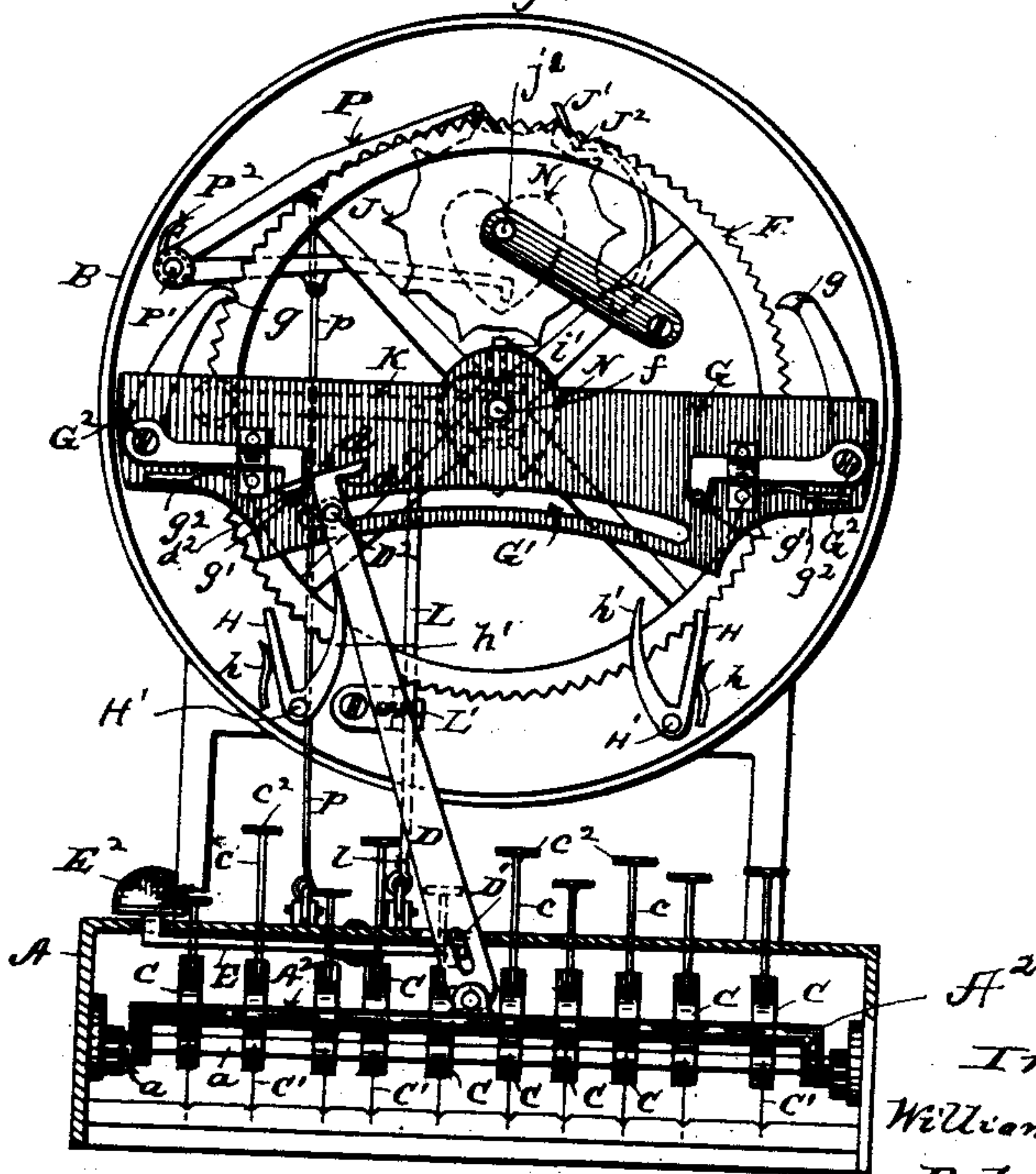


Fig. 3.

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UNITED STATES PATENT OFFICE.

PATRICK O'CONNOR AND WILLIAM T. McCONNELL, OF YOUNGSTOWN, OHIO.

COMPUTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 438,820, dated October 21, 1890.

Application filed November 27, 1889. Serial No. 331,827. (No model.)

To all whom it may concern:

Be it known that we, PATRICK O'CONNOR and WILLIAM T. McCONNELL, of Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Computing-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

Our invention relates to improvements in computing-machines; and it consists in certain features of construction and in combination of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a front elevation. Fig. 2 is a section on line $x x$ of Fig. 1. Fig. 3 is a rear elevation with the back-plate removed, portions being in section. Fig. 4 is a plan, portions being broken away to show the internal construction.

A represents a hollow base constructed, preferably, of sheet metal, the base being substantially an inverted box, the top plate or wall thereof A' serving as a table for the key-board. Upon this table and near the rear end thereof is mounted a casing B, this casing having usually a glass front B' for protecting the pointers, and rearward of the glass plate is located the dial-plate B^2 , the latter having two circular scales marked thereon, the larger scale representing units, the divisions thereof being numbered from 1 to 100. The divisions of the smaller scale represent hundreds, and is marked from 1 to any desired number—in the present instance from 1 to 10, so that the small dial may register one thousand. (See Fig. 1.) Under the table is located a series of levers C, pivoted at the front end in common on a rod a , the latter being attached to the base. Each lever has attached a spring for holding the rear end of the key normally elevated in position resting against the underside of the table, or against any attachment of the table that may serve as a stop to limit the upward movement of the lever. Spring C' (shown more clearly in Fig. 2) is well adapted to the purpose, the free end of the spring engaging a notch in plate a' , by which arrangement the levers are held in place lengthwise of rod a , plate a' be-

ing set edgewise relative to the spring. However, any suitable arrangement of springs for elevating the respective levers will answer the purpose. Each lever C has attached a pin c , extending up through a hole in the table and terminating in a key, these keys being numbered from 1 to 10, as shown in Fig. 4. Each lever C and near the rear end of the latter has attached a slight screw-threaded rod c' , these rods extending up through holes in the table, and above the table are provided, respectively, with thumb-nuts c^2 . These thumb-nuts by engaging the top of the table serve as stops to limit the depression of the keys. The thumb-nut or stop that regulates key 1 is adjusted so that in depressing this key the pointer mechanism for the units-scale is moved one notch, while the stop or thumb-nut c^2 , that regulates key 2, is adjusted so far above the table that in depressing key 2 the mechanism aforesaid is advanced two notches, and so on throughout the series of keys.

In operating the device, by depressing a given key the pointer of the units-scale is advanced along the units-scale the number of spaces corresponding with the number of the key. For instance, if key 9 is depressed, the pointer will advance nine numbers on the scale, and so on. Levers C at or near the rear ends thereof all rest on a bail A^2 , this bail being pivoted to the base at a^2 . One or more springs a^3 are arranged to engage the bail and hold the latter normally elevated. With such construction the depression of any one key will correspondingly depress the bail, and on releasing such key the key and bail will return to their normal or elevated position.

For transmitting the movement of the bail A^2 to the mechanism above there is provided a pitman D, the latter being pivoted to the bail. (See Figs. 2 and 3.) The pitman, above the fulcrum thereof, is provided with a slot D' , in which slot operates the rear end of a bell-crank lever E, the latter being pivoted at E' to the table and having a thumb-piece E^2 projecting above the table, the upturned end of the lever below the thumb-piece operating in a slot in the table. By manipulating this lever E by means of the thumb-piece E^2 thereof the pitman D may be swung laterally

from the position at the left hand (shown in Fig. 3) to a corresponding position at the right hand, and reversed.

The horizontal spindle f for operating the pointer of the units-scale extends forward and rearward, and has rigidly mounted thereon a ratchet-wheel F , the latter having one hundred teeth to correspond with the numbers of the units-scale on the dial, and the two sides of each tooth being at about the same incline, so that pawls may actuate the wheel in either direction.

G is a link somewhat resembling the link of a reversing-engine, this link being fulcrumed at the longitudinal center thereof on the spindle f . This link has a curved slot G' , in which slot operates a stud D^2 of the pitman D , this stud having some lost play in the slot in moving the pitman endwise. To the extremes of the link are pivoted, at G^2 G^3 , pawls g g , these pawls being of the bell-crank-lever variety shown, the free end of the pawls being adapted to engage the teeth of the wheel F . The lateral arm of each pawl is provided with a pin g' , and the upper end of the pitman has a cross-head d for engaging these pins, the lower edge of the cross-head and on either side of the pitman being provided with inclines d' and d^2 , arranged substantially as shown, so that in swinging the pitman to the right hand or to the left the one leg of the cross-head will first ride over and then retain its hold on the opposing pin g' . Springs g^2 are attached to the link G in position with the free ends of the springs engaging the respective pawls g , these springs acting in the direction to disengage the pawls from wheel F , so that the idle-pawl is always disengaged from the wheel.

Retaining-pawls H are provided, these pawls being of the forked variety shown and pivoted, respectively, at H' , these pawls acting in reverse direction on wheel F . Springs h are provided for holding the respective pawls H to their engagement with the wheel, and arms h' are in position to be respectively engaged by the pitman D near the extremes of the lateral throw of the pitman, by which engagement the pawl is forced back against the action of the spring h and thereby disengaged from the wheel.

Pointer i of the units-scale is attached to the forward end of the sleeve I , the latter being mounted loose on spindle f . A clutch (shown at f') is provided, the one member of the clutch being connected with the sleeve and the other member with the spindle f , whereby with the clutch in its closed position the sleeve and attached pointer are rotated with the spindle. Any variety of clutch will answer the purpose.

For holding the clutch closed we provide a spring K , this spring being secured to the casing and the forked free end thereof operating in an annular groove of the collar I' , the latter being mounted on and secured to the sleeve I . By bending the spring forward

the sleeve is moved forward endwise on the spindle, so as to disengage the members of the clutch, in which position of parts and by means of mechanism hereinafter described the pointers may be returned to "0" without rotating the wheel F .

The pointer j for the scale of hundreds is mounted on a short spindle j' , and on this spindle is mounted the toothed wheel J , the latter having the same number of teeth as there are numbers or divisions of the small scale, in the present instance ten. Sleeve I is provided with a pin i' , that once in a revolution of sleeve I and pointer i engages and actuates the wheel J one notch, thereby moving the pointer j one number of the small scale. A spring J' has a V-shaped bend J^2 , for engaging the notches of the wheel J . This spring serves at once as a retaining-pawl and as an adjuster for wheel J , whereby pointer j always registers with the number of its scale, and hence not much accuracy is required of pin i' in performing its function. For returning the pointers to "0," we provide the following mechanism: First, for opening the clutch we provide a bell-crank lever L , pivoted at L' , arranged in position as shown, with the upright arm thereof bearing against the rear side of spring K . The lateral arm of this lever is connected by rod l with a lever M , this lever M being fulcrumed at the rear end thereof, and at the forward end being provided with thumb-piece m , by depressing which the sleeve I is moved forward, so as to open or disengage the two members of the clutch, and in so doing the pin i' is moved forward out of the way of the wheel J .

NN are "heart-cams" mounted, respectively, on spindles j^2 and sleeve I .

P is a forked lever pivoted at P' , the free end of the respective prongs of this lever being adapted to engage the periphery of the respective cams NN . A spring P^2 holds the lever P normally disengaged from the cams NN . A rod p connects the lever P with a lever R . The latter is pivoted at the rear end thereof and the forward end is provided with a thumb-piece r , by depressing which the forked lever P is caused to simultaneously engage the two cams NN , by which engagement the cams are rotated in the one direction or the other to return the respective pointers to "0," the arrangement being such that the pointers reach "0" simultaneously with the free end of lever P reaching the bottom of the depressions of the heart-cams. The operator therefore first depresses lever M to open the clutch and depresses lever R to return the pointer to "0," the two levers M and R for convenience being arranged in close proximity to each other.

In operating the machine for adding, the pitman D is adjusted to the position shown in Fig. 3, whereby by depressing the different keys the pointer i is advanced and indicates the sum total. Having added, for instance, a column of figures, suppose it is desired to sub-

tract from such sum. First, the operator shifts the pitman D to its position at the right hand relative to the view in Fig. 3 by grasping the thumb-piece E² and swinging the lever E, after which by depressing any of the keys the wheel F is reversed and the pointer *i* is moved backward on the scale. Suppose after adding the pointer *i* indicates the number "87" on the scale and from this it is desired to subtract "27." After shifting the pitman D for the purpose, through the medium of bell-crank lever E, by twice depressing the key 10 and depressing the key 7 the pointer *i* will be turned back to number "60" of the units-scale. The same result would be attained by three times depressing key 9.

In depressing the pitman the first action thereof is to force the connected pawl *g* to its engagement with wheel F, after which engagement the further downward movement of the pitman tilts the link G and rotates the wheel. The first part of the upward movement of the pitman releases the pawl, and the spring thereof disengages it from the wheel, after which the further upward movement of the pitman reverses the link G.

Various modifications may be had without departing from the spirit and purpose of our invention. For instance, the functions of spindle *f* and sleeve I might be exchanged—that is to say, the pointer *i* might be attached to the spindle *f* and the wheel F might be secured to the sleeve I—in which case the clutch would be located at the forward end of the sleeve, and the collar I', the pin *i'*, and the cam N (shown connected with the sleeve) would be transferred to and connected with the spindle *f*. With such modified construction of course the spindle would move forward in opening the clutch; but the general result would be the same with either construction, and there is very little choice between the two constructions.

What we claim is—

1. In a computing-machine, the combination, with a scale and co-operating pointer, of a reversing-link having pawls or equivalent devices thereon and a pitman adapted to engage one or the other of these pawls, whereby the pointer is turned forward or backward, substantially as set forth.

2. In a computing-machine, the combination, with a scale, co-operating pointer, and a toothed wheel on the spindle, which carries

the pointer, of a reversing-link having spring-actuated pawls at or near its ends, and a pitman adapted to engage one or the other of the pawls, whereby the pawl engaged is thrown into contact with the teeth of the wheel and the pointer is turned forward or reversed, substantially as set forth.

3. In a computing-machine, the combination, with a scale and co-operating pointer and a toothed wheel on the spindle, which carries the pointer, of a reversing-link fulcrumed on the spindle, said link having spring-actuated bell-crank-shaped pawls pivoted at or near its ends, a pitman adapted to engage one of these pawls and keep it in engagement with the toothed wheel, depressible keys, and connecting mechanism for rocking the link, substantially as set forth.

4. In a computing-machine, the combination, with a series of depressible keys having graduated stops, a depressible bail engaging the series of keys, substantially as indicated, of a pitman connecting respectively with the bail and with a reversing-link, and suitable attachments for shifting the pitman to reverse the machine, substantially as set forth.

5. In a computing-machine, the combination, with a series of keys, a bail, a pitman, and a reversing-link, substantially as indicated, of a scale, a pointer, a toothed wheel for actuating the pointer, and pawls connected with the link for engaging the toothed wheel, said pawls being made to engage the wheel by the engagement of the pitman with the respective pawls, substantially as set forth.

6. In a computing-machine, the combination, with a series of depressible keys, and a bail pivoted in position to be operated by the depression of the keys, of a reversing-link, a pitman connected with the bail and reversing-link, a circular scale, and a co-operating pointer adapted to be moved by the depression of the keys and bail and to be reversed by the shifting of the pitman, substantially as set forth.

In testimony whereof we sign this specification, in the presence of two witnesses, this 16th day of September, 1889.

PATRICK O'CONNOR.
WILLIAM T. McCONNELL.

Witnesses:

I. A. JUSTICE,
D. A. WALKER.