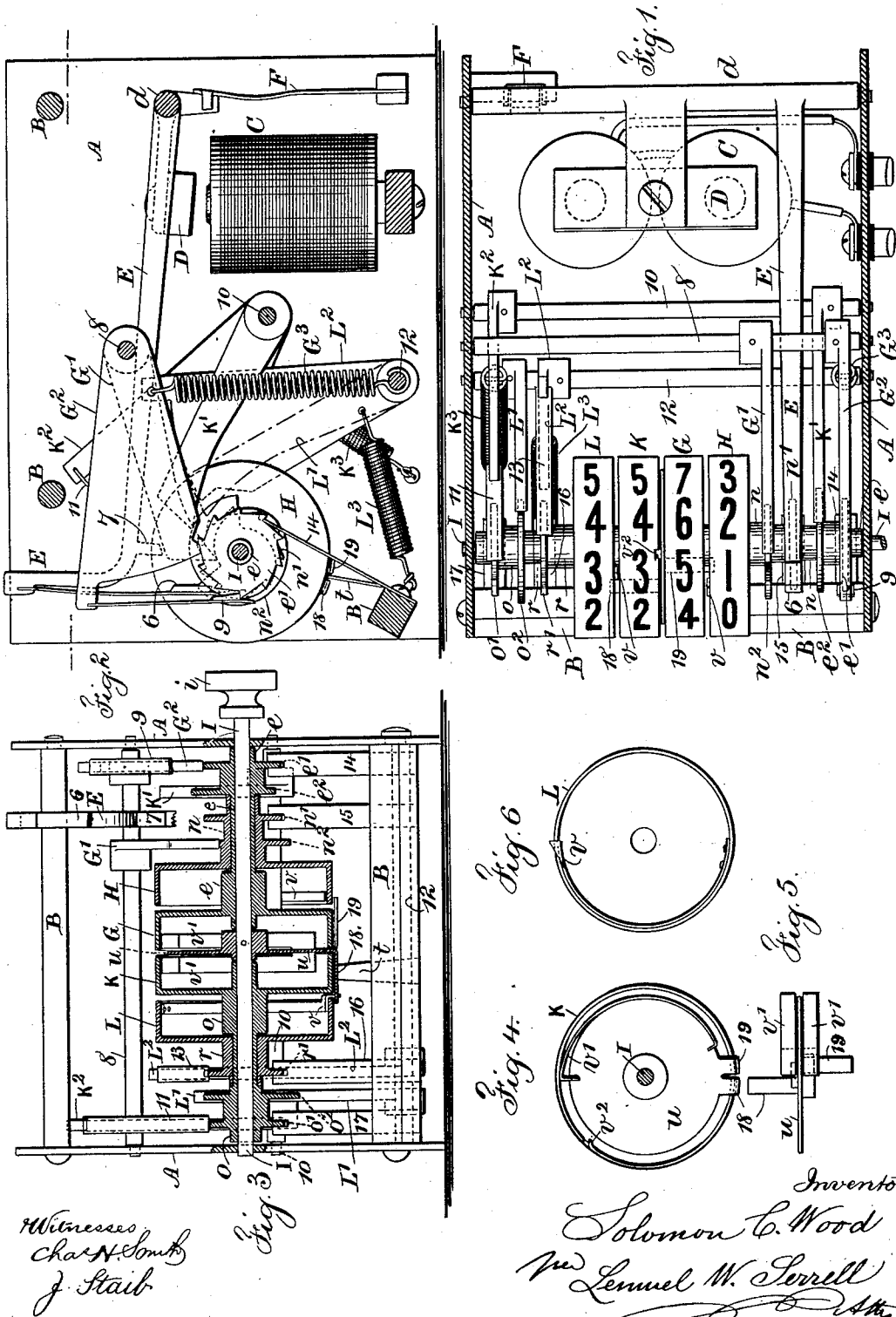


(No Model.)

S. C. WOOD.
COUNTING APPARATUS.

No. 548,794.

Patented Oct. 29, 1895.



UNITED STATES PATENT OFFICE.

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COUNTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 548,794, dated October 29, 1895.

Application filed February 4, 1895. Serial No. 537,211. (No model.)

To all whom it may concern:

Be it known that I, SOLOMON C. WOOD, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented an Improvement in Counting Apparatus, of which the following is a specification.

Counting devices have been made for indicating the rotations of printing-presses, engines, cash-registers, &c.; but when the wheel or disk having the tens upon it is turned at the same time that the wheel or disk is that contains the units more power is consumed in turning the two than in turning the one, and so on the power required to turn three disks or number-wheels is greater than that required for two, and when the thousands number-wheel is turned still greater power is required.

Where the power is given by a machine or by hand there is little difficulty in turning these number-wheels, even where there are four or five of such wheels that are periodically turned together; but in apparatus that is worked electrically difficulty is experienced in obtaining the necessary power from an electromagnet and the required range of movement without the expenditure of a heavy battery power or current.

The present numbering-machine is especially available in connection with an electromagnet for actuating the same, and it is adapted to use in the counting apparatus shown in Patent No. 526,140, granted September 18, 1894, to Henry J. Bang; but the improvement is not necessarily limited to such a counting apparatus.

In the present improvement the units-wheel is turned by a direct application of power, and in its rotation a spring is strained by a gradual movement, and when the units-wheel is turned from "9" to "0" the spring is allowed to exert its force to move the tens-wheel one notch, thus distributing the force required to turn the tens-wheel one notch over the entire or nearly entire rotation of the units-wheel, and in like manner the gradual rotation of the tens wheel strains another spring, and when the tens-wheel is turned from "9" to "0" the spring is liberated that turns the hundreds-wheel one notch, and so on, thus unifying

ing the power required for actuating the counting apparatus and adapting such counting apparatus especially to an electromagnetic device for giving motion to the counting apparatus.

In the drawings, Figure 1 is a plan view with portions of the frame in section. Fig. 2 is an elevation with the side plate removed. Fig. 3 is a section through the number-wheels and their tubular axes. Fig. 4 is an elevation of the central disk and one number-wheel. Fig. 5 is a plan of the pawls and disk, and Fig. 6 is an elevation of one of the number-wheels and the pawl thereon.

The side plates A are connected together by cross bars or columns B, and at C is represented an electromagnet with an armature D upon the pivot *d*, and the lever or arm E extends to the device that actuates the units-wheel, and there is a spring F to raise the armature D and lever-arm E, and the electric current to the magnet is to be pulsated in any desired manner to actuate such electromagnet, and I remark that while this improvement is especially adapted to an electromagnet as the motor I do not limit myself thereto.

The cross-shaft I is supported in holes or bearings upon the side plates or frames A, and it is provided with a thumb-wheel *i*, by which such shaft I may be rotated by hand, and upon this shaft I is a tube *e*, receiving at its inner end the tens-wheel G, and around this tube *e* is a shorter tube *n*, carrying at its end the units-wheel H, and separate from but in line with the tube *e* is tube *o*, carrying at its inner end the hundreds-wheel K, and around this tube *o* is a tube *r*, carrying at its inner end the thousands-wheel L. By this arrangement the number-wheels G H K L are closely adjacent, and the numbers upon their peripheries are to be in regular order from "0" to "9."

Upon the tube *n* is a ratchet-wheel *n'*, which is engaged by an actuating-pawl 6 upon the lever-arm E, which pawl is advantageously made as a spring, and there is a stop-block 7 on the other side of the lever E, adapted to come down upon the ratchet-teeth *n'* in succession and prevent the inertia from carrying the units-wheel H more than one space

at a time, and by this means the units-wheel will be moved around progressively as the electromagnet is energized or the power otherwise applied.

5 Upon the tube n is a cam n^2 , which is in the form of a regular progressive volute, and this cam n^2 acts upon a lever G' , pivoted upon a rod 8, and having a lever-arm G^2 and actuating-pawl 9, which is adjacent to and acts on
10 the ratchet-wheel e' upon the tube e , and upon this lever-arm G^2 is a stop for the ratchet-wheel e' to prevent the same turning too far, and the spring G^3 , that is connected to the lever-arm G^2 , is strained by the cam n^2 acting
15 upon the lever G' and raising the same, the spring G^3 being strained as the pawl 9 is lifted preparatory to taking another tooth, and the movement given by the cam n^2 is sufficient to cause the pawl 9 to engage another tooth
20 in the wheel e' before the lever G' is liberated by the end of the cam n^2 separating from the same, and when this separation takes place as the units-wheel is turned from "9" to "0" the spring G^3 acts through the lever G^2 and
25 pawl 9 to turn the ratchet-wheel e' and move the tens-wheel one space.

Upon the tube e is a cam e^2 , similar to the cam n^2 , and this in turn acts progressively upon the lever K' , which is pivoted upon a
30 rod 10 and is provided with an arm K^2 with a pawl 11 to engage the ratchet-wheel o' upon the tube o of the hundreds-wheels K , and there is a spring K^3 acted upon by the lever K' , which spring is strained by the action of
35 the cam e^2 , as such cam draws the pawl 11 back to engage another tooth, and when the cam e^2 separates from the lever K' and allows the latter to be drawn down by the spring K^3 the ratchet-wheel o' is turned and with it the
40 tube o , and the hundreds-wheel K is moved one space.

Upon the tube o there is a cam o^2 , which acts upon the lever L' , pivoted upon a rod 12, and provided with an arm or lever L^2 , having
45 a pawl 13, that engages the ratchet-wheel r' upon the tube r of the thousands-wheel L , and the spring L^3 , that is connected with the lever L^2 , is strained by the cam o^2 , as such cam draws back the pawl 13, and when the cam o^2
50 clears the lever L' the spring L^3 acts upon the lever L^2 and pawl 13, turning the thousands-wheel one space. By this arrangement the number-wheels are turned progressively, and in the movements of the respective number-
55 wheels the springs are strained gradually by the scroll-cams and furnish the power for turning the successively - higher number-wheels when the cams separate from their respective levers, thus distributing the power
60 required in rotating the respective number-wheels, so that but little more power is required from the electromagnet or other actuating device at one time than at another time and the movements of the number-wheels are
65 reliable, and each pawl-lever is provided with a stop to prevent the inertia of the ratchet-

wheel and number-wheel causing the parts to turn too far, and there are springs or pawls 14 15 16 17 to the respective ratchet-wheels e' n' o' r' .

In counting devices, especially those adapted to keep tally of barrels, boxes, or other articles passing along an incline or skid, it is desirable to return the counting device to zero after tally has been copied off, so as to start
75 afresh. With this object in view the cross-shaft I and the thumb-wheel i can be turned to carry with them the number-wheels and bring the ciphers in line, and to effect this a disk or plate u is permanently fastened to the shaft
80 I and is interposed between the tens and hundreds wheels, and the ends of this plate are bent outwardly in opposite directions, as at 18 19, forming fingers or plates closely adjacent to the surfaces of the number-wheels G
85 K , and extending across to the units and thousands wheels H and L , as shown in Figs. 1 and 3, and upon the respective units and thousands wheels are pawls v , that are engaged by the plate u and its fingers 18 and 19.
90 These pawls v are advantageously made of thin metal in the form of curved springs, with the ends beveled, as latches, and the spring-pawls v of the thousands and units wheels are bent, so that the points project between
95 such wheels and the adjacent ones, so as to be engaged by the fingers 18 and 19, respectively, and the pawls for the tens and hundreds wheels may be similarly made or preferably they are upon the plate u , as shown at
100 v' , to engage projections v^2 on the insides of the tens and hundreds wheels. Hence when the cross-shaft I and the plate u are rotated by the thumb-wheel i and the plates 18 and 19 engage the pawls and turn the number-wheels in
105 the direction of their ordinary rotation such number-wheels are carried around, together with their ratchet-wheels, beneath the respective pawls until all the ciphers are brought into line and brought to the place where they
110 are observed through any suitable opening, and there is a spring t , the end of which is sufficiently close to the surface of one of the number-wheels to arrest one of the fingers 18 or 19 to prevent the plate u and the cross-
115 shaft being rotated by the friction of either of the tubes carrying the number-wheels, but which spring t yields when the shaft is rotated by hand; and it will be observed that the spring-pawls v yield and run under the fingers 18 19 or the projections v^2 pass the
120 pawls v' when being rotated along with the respective number-wheels, so that such pawls are not arrested by either the plate u or the fingers 18 19 while the number-wheels are being
125 rotated progressively.

I claim as my invention—

1. The combination with a shaft and its support, of tens and hundreds wheels and their tubular axes around such shaft and extending in opposite directions, and units and thousands wheels and their tubular axes around

the tubular axes of the tens and hundreds wheels and also extending in opposite directions for bringing the respective wheels closely adjacent to each other, and ratchet wheels upon the outer ends of the respective tubular axes and levers and pawls for moving the respective number wheels progressively, substantially as set forth.

2. The combination with a shaft and its support, of tens and hundreds wheels and their tubular axes around such shaft and extending in opposite directions, and units and thousands wheels and their tubular axes around the tubular axes of the tens and hundreds wheels and also extending in opposite directions for bringing the respective wheels closely adjacent to each other, and ratchet wheels upon the outer ends of the respective tubular axes, and levers and pawls for moving the respective number wheel progressively, a cam on the axis of the units wheel and a spring and lever moved thereby for straining the spring to give motion to the pawl of the tens wheel, substantially as set forth.

3. The combination with a shaft and its support, of tens and hundreds wheels and their tubular axes around such shaft and extending in opposite directions and units and thousands wheels and their tubular axes around the tubular axes of the tens and hundreds wheels and also extending in opposite directions for bringing the respective wheels closely adjacent to each other, and ratchet wheels upon the outer ends of the respective tubular axes, and levers and pawls for moving the respective number wheels progressively, cams on the axes of the units and hundreds wheels, and levers and springs acted upon by such cams, and an electro-magnet for actuating the

lever and pawl that move the units wheel, substantially as set forth.

4. The cross shaft I and the number wheels in combination with the tubes *en or* around such cross shaft and connected with the respective number wheels, the ratchet wheels upon the respective tubes, the levers and pawls for moving the same, springs connected with the levers that turn the tens, hundreds and thousands wheels, and cams for gradually straining such springs and allowing them to act to turn the respective wheels when liberated from the cams, a plate connected with the cross shaft with fingers adjacent to the surface of the number wheels, and spring pawls for rotating such number wheels and bringing the ciphers into line, substantially as set forth.

5. The combination with a shaft and its support, of tens and hundreds wheels and their tubular axes around such shaft and units and thousands wheels and their tubular axes around the axes of the tens and hundreds wheels for bringing the respective wheels closely adjacent to each other, and ratchet wheels upon the outer ends of the respective tubular axes, and levers and pawls for moving the respective number wheels progressively, a head upon the shaft by which the same can be turned by hand, a plate and fingers connected with the plate and the shaft and pawls with projecting ends to be engaged by the fingers for turning the number wheels around to zero, substantially as set forth.

Signed by me this 23d day of January, 1895.

SOLOMON C. WOOD.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.