

G. LAFOND.
REGISTER.

(Application filed Apr. 18, 1899.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.

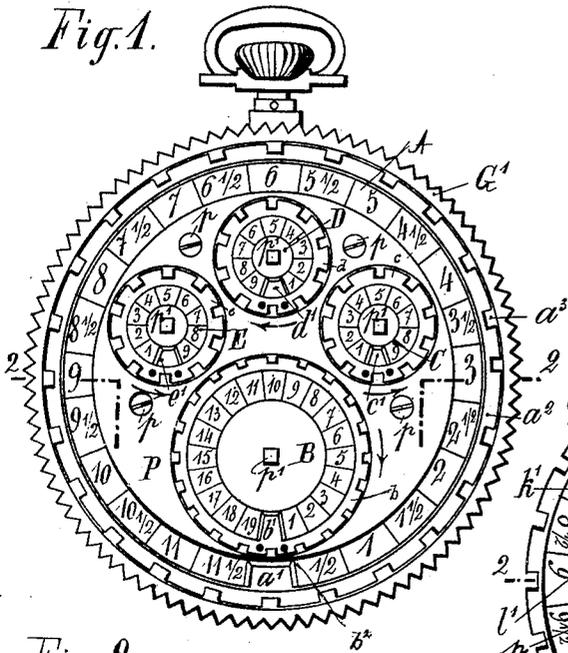


Fig. 4.

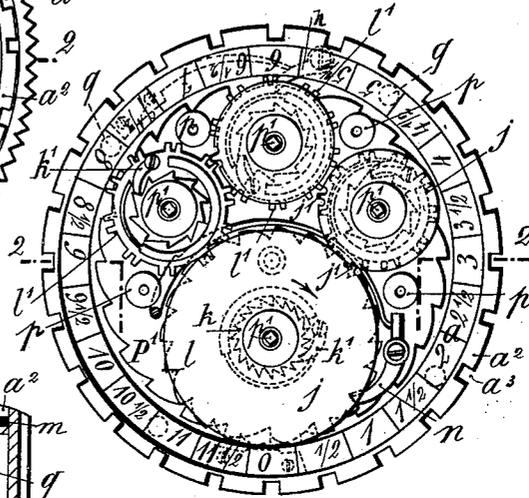


Fig. 2.

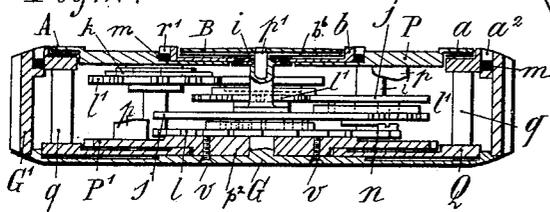


Fig. 3.

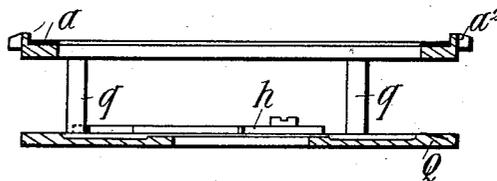
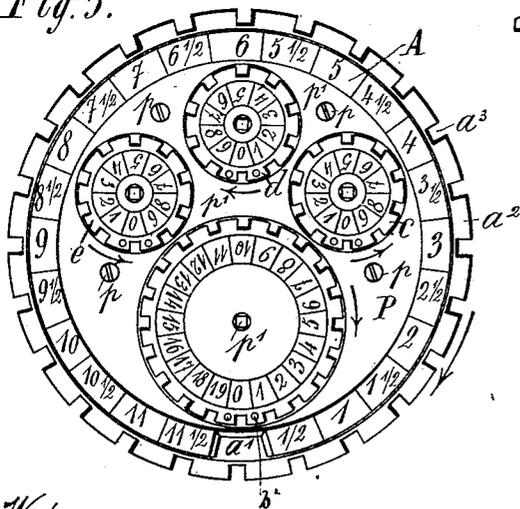


Fig. 5.

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 Etienne Larran

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 Georges Lafond

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(Application filed Apr. 18, 1899.)

4 Sheets—Sheet 2.

(No Model.)

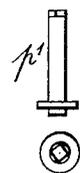
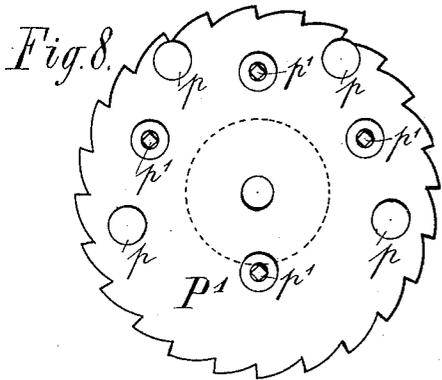
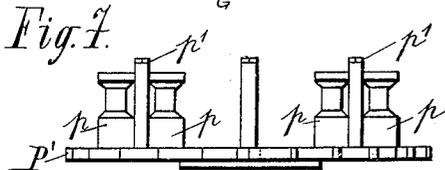
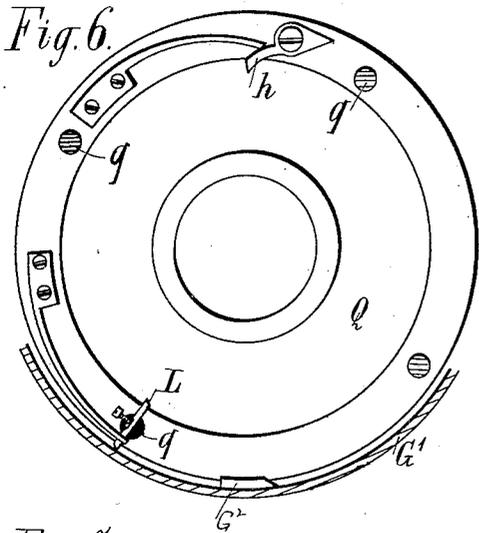


Fig. 17.

Fig. 18.

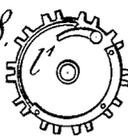
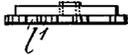
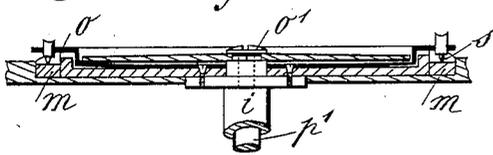


Fig. 19.



Witnesses:
Alphonse Jarras

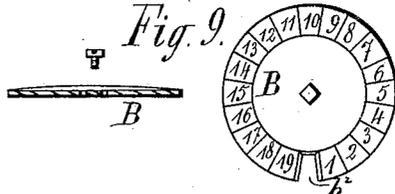


Fig. 9.

Fig. 10.

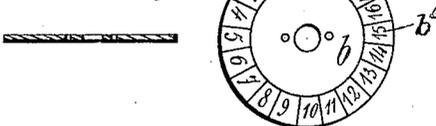


Fig. 11.



Fig. 12.

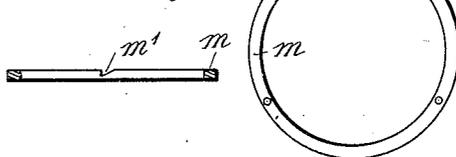


Fig. 13.

Fig. 14.



Fig. 15.

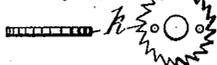
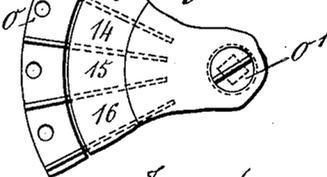


Fig. 16.



Fig. 20.



Inventor:
Georges Lafond

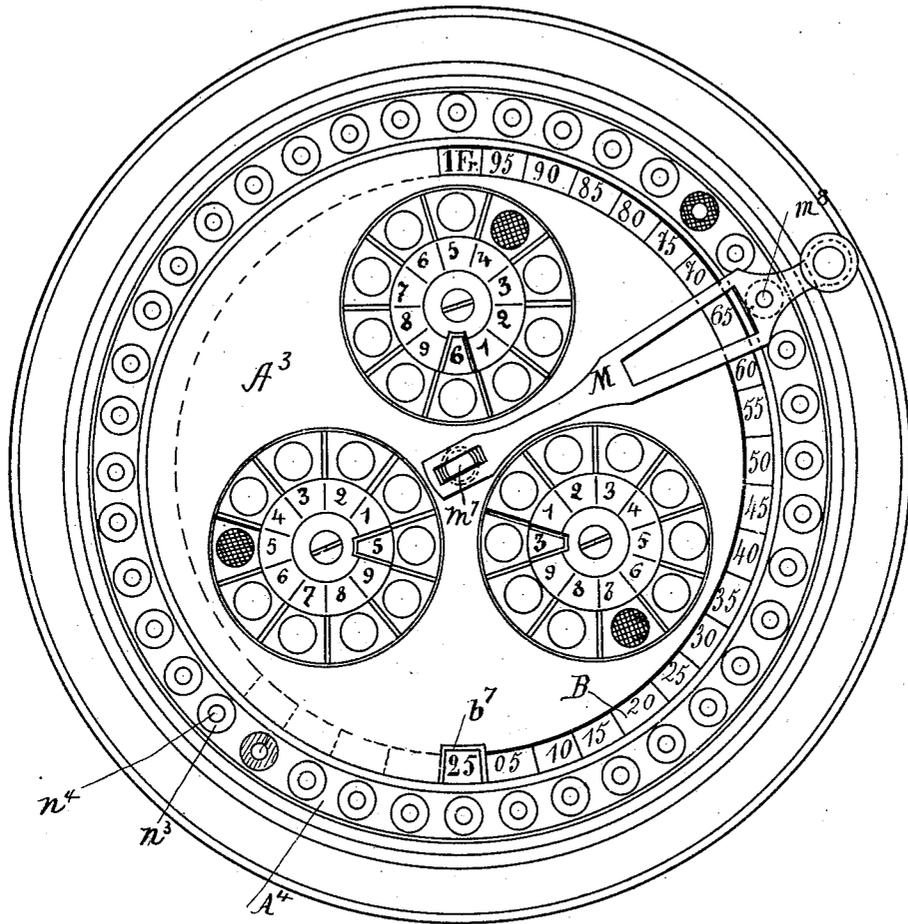
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4 Sheets—Sheet 4.

(No Model.)

Fig 27.



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UNITED STATES PATENT OFFICE.

GEORGES LAFOND, OF PARIS, FRANCE.

REGISTER.

SPECIFICATION forming part of Letters Patent No. 653,250, dated July 10, 1900.

Application filed April 18, 1899. Serial No. 713,473. (No model.)

To all whom it may concern:

Be it known that I, GEORGES LAFOND, engineer, of 34 Faubourg St. Martin, Paris, France, have invented a new and useful Improvement in and Relating to Mechanical Counters or Registers, which is fully set forth in the following specification.

This invention relates to mechanical counters, sometimes known as "totalizers" and "cash-registers."

It has for its object to cause these counters or registers to totalize the numbers of one or more units and their submultiples.

The improvement comprises certain particular mechanical arrangements and the general working of these arrangements in such a manner that they are embodied in a concise form and that their manipulation is easy.

Mechanical counters according to my invention can be based on the decimal or duodecimal system, or any other system of numeration applied to a monetary or other system. By way of example I have shown upon the accompanying drawings, first, a model based on the English monetary system in the shape of a watch, although this counter can be made in any other shape; second, a model based on the decimal system for any sort of totalization, and, third, a model based on the French monetary system.

Figure 1 is a front view of a counter embodying the invention. Fig. 2 is a cross-section made on line 2 2 of Figs. 1 and 4. Fig. 3 is an elevation in which the casing and small or inner fixed dial-plates of the counter are supposed to be removed. Fig. 4 is a third elevation in which the upper plate, serving as a support to the movable dials, is removed, so as to show the interior mechanism with all the wheelwork or movements therein contained. Figs. 5 and 6 are respectively a cross-section and a plan view of the cage for supporting the mechanism of the counter. Figs. 7 and 8 are respectively a cross-section and a plan view of a support on which the various movements or sets of wheelwork are arranged to operate. Figs. 9 to 17, inclusive, show in section and in plan the various components of one of these movements or sets of wheelwork. Fig. 18 shows in elevation and in plan a device special to certain of these movements. Figs. 19 and 20 are respectively a

section and a part plan of a modification of the movable dials of the counter. In Figs. 21 to 26, inclusive, I have shown another embodiment of my invention, Fig. 21 being a plan view, and Fig. 22 a similar view showing the top of the casing and the fixed and movable dials removed and parts of the wheels of the mechanism broken away or omitted to show other underlying wheels. Fig. 23 is a longitudinal vertical section. Fig. 24 is a plan view of part of the apparatus. Fig. 25 is a vertical longitudinal section through Fig. 24, and Fig. 26 is a view similar to Fig. 22 of part of the apparatus.

The counter so shown on Figs. 1 to 4 is provided with a certain number of fixed dial-plates A, B, C, D, and E, under which are respectively arranged, Figs. 3 and 2, movable dials *a*, *b*, *c*, *d*, and *e*. The fixed dial-plate A, Fig. 1, belongs to an upper plate P, solidly fastened on the pillars *p p p p* of a fixed ratchet-wheel or plate P', which will be referred to hereinafter and which is shown in Figs. 7 and 8. This fixed dial is divided into, for example, twenty-four compartments, marked, respectively, " $\frac{1}{2}$," "1," " $1\frac{1}{2}$," "2," " $2\frac{1}{2}$," "3," &c., and one of which, *a'*, Figs. 1 and 3, being perforated, serves as a window and allows the particular number on the corresponding movable dial *a*, which is beneath, to be seen. The numbers or figures in question indicate pence or half-pence.

The fixed dials B, C, D, and E, Fig. 1, are respectively located in recesses in the upper face of dial A and B and are respectively carried by the square ends which terminate the axes or rods *p' p' p' p'*, fixed to the before-mentioned ratchet-plate P'. They are divided each into a certain number of compartments, one of which is cut away to form a window to allow the numbers or figures of the movable dials *b*, *c*, *d*, and *e* to be seen, which latter are respectively underneath the said fixed dials. The windows in question are respectively marked *b'*, *c'*, *d'*, and *e'*. (See Fig. 1.) The dial B, Fig. 9, has spaces marked "1" to "20" and intended for shillings. The dials C, D, and E, Figs. 1 and 3, each comprise ten spaces marked "1" to "10," and represent units, tens, and hundreds of pounds, according to the dial to which they belong.

The movable dial *a*, Fig. 5, is fixed to the cage of the mechanism. It is formed as a crown divided into twenty spaces marked like those of the fixed dial A and is connected by 5 pins or posts *q q q q* to the plate Q, Figs. 2 and 5. At its periphery is a flange *a*², having a number of notches *a*³ equal to the spaces of the said dial *a*.

The movable dials *b*, *c*, *d*, and *e*, located in 10 recesses or sunk portions of the upper plate P, are respectively secured to the sleeves *i i i i*, Figs. 2 and 13, referred to later, and surrounding the axes or pivots *p' p' p' p'* before mentioned. Each dial *b*, *c*, *d*, and *e* carries a dial-plate *b*⁶, *c*⁶, *d*⁶, and *e*⁶, respectively, 15 (only one of which, *b*⁶, is shown in the drawings, see Figs. 1 and 10,) which rests in the recess formed by the flange *r*, Fig. 11, about the periphery of each dial. Each dial-plate 20 *b*⁶, &c., is divided into spaces corresponding in number to and marked in the same manner as the spaces on dials B, C, D, and E, under which they are located. The peripheries of dials *b*, *c*, *d*, and *e* are furnished with flanges 25 *r* and have notches *r'*, Fig. 11, equal numerically to the spaces on dial-plate *b*⁶, &c. The flanges *r* project upwardly about dials B, C, D, and E, so as to form cups, within which these fixed dials are boxed, as shown in Fig. 2. 30 The notched flanges *r* are provided with any kind of a guide-mark which allows of quickly perceiving the position of the zero of the movable dials, hidden or concealed, as stated above, by the corresponding fixed dials. This 35 guide-mark consists in the example shown of two black marks or points *b*³, Figs. 1 and 3, placed one on each side of the notch which corresponds to zero. This facilitates turning the movable dial to position to display the zero through the window of the fixed dial. 40 Under each of these flanges is a ring *m*, Fig. 12, furnished with a notch or groove *m'*, shaped as an inclined plane, the function of which is indicated later. All the rings *m* are fixed— 45 *i. e.*, they are attached to the bottom of the hollows or recesses formed in the plate P, and in such a manner that the said notch *m'* is opposite the window of the corresponding fixed dial.

50 From the foregoing it will be at once perceived that there are two essential portions of the mechanism. The one is fixed and comprises the disk-ratchet P', the upper plate P, and the dial-plates A, B, C, D, and E. The 55 other is movable and comprises the plate Q and the dial *a*, forming the cage of the mechanism, as also the dials *b*, *c*, *d*, and *e*. The fixed portion is seated at and fixed by means of screws *v* to the base G of a casing G', which 60 latter can be of any desired shape and may be ornamented, as desired, while the cage, Fig. 5, rests against an elevation on the base G and fits on and can be revolved about a depending hub *p*² on ratchet-wheel P', Figs. 2 65 and 7. The ratchet-plate P' of the fixed portion is furnished with as many teeth as the dial *a* has spaces—twenty-four, for example—

and with these teeth engages a spring-actuated pawl *h*, Figs. 4 and 5, mounted on the plate Q of the before-mentioned cage to permit the cage (and consequently the movable 70 dial *a*, carried by the cage) to rotate in only one direction and to hold the cage firmly in any position at which it may be brought to rest. The plate-ratchet P' serves as a support to 75 the groups of wheelwork equal in number to that of the interior movable dials—for example, to the number of four. These movements or sets of wheelwork correspond to the before-mentioned axes or rods *p' p' p' p'*, on 80 which are seated the fixed dials B C D E and on which are located the sleeves *i*, respectively secured to the movable dials *b c d e*. To the lower end of each sleeve *i* is secured a disk *j*, Fig. 14, having a tooth *j'*. A ratchet- 85 wheel *k*, Fig. 15, is secured to the disk *j* and is engaged by a spring-pressed pawl *k'*, which for the group of wheel movements for the “shillings-dial” B is a ratchet-wheel having twenty 90 teeth, Fig. 16, and which for the sets of wheelwork movements for the “pounds-dial” is a wheel *l*, Fig. 18, having ten pairs of teeth. These different parts are arranged, the one as regards the other, in the order shown by Figs. 2 95 and 4, and it will be remarked besides that the set of parts belonging to the last dial *e* of the series does not embrace a disk *j* having tooth *j'*. It will also be remarked that the ratchet-wheel *l* of the movement of the movable shillings-dial *b* is operated in the following manner 100 by the tooth or pointer L, mounted on the plate Q of the cage carrying the movable dial *a*, said pointer L being normally held by its spring out of operative position with relation to the ratchet-wheel. At each complete turn 105 of the movable dial *a* this tooth or pointer L, Fig. 6, meets the inclined plane of a piece G², Fig. 6, fixed interiorly to the casing G' and opposite the window *a'* of the fixed dial A. Owing to the movement of rotation it enters 110 one of the teeth of the ratchet *l* and causes this latter to advance by one division or tooth, and consequently the movable dial *b* by one number. It will thus be seen that while the dials *c d e* are rotated by the tooth *j'* of the 115 disk *j* acting at a given moment on the ten-toothed wheel *l* of the set of wheels immediately above (see Fig. 2) the movable dial *b* is itself operated by the tooth L of the dial-plate of the set immediately underneath, acting 120 by means of the piece G² on the ratchet *l* of the before-mentioned movable dial *b*. In short, the tooth L acts for the dial *a* as the disks *j*, having teeth *j'*, acts for the dials *b*, *c*, and *d*. 125

This is how the arrangement works: Suppose all the movable dials *a*, *b*, *c*, *d*, and *e* are at zero—*i. e.*, that the zero of each dial appears at the windows of the corresponding fixed dials—and suppose also that the sum 130 of one pound, ten shillings, and six pence has to be registered. The operator furnished with any suitable sort of pointer engages the end thereof in the notch *r'* of the mov-

able dial of the pounds units (dial *c*) placed opposite the number "1" of the corresponding fixed dial C and causes the said movable dial to turn until the pointer in question falls into or strikes the notch *m'* of the before-mentioned ring *m*. Under these conditions the figure "1" of the movable dial *c* appears at the window *c'*. The same operation is performed upon the movable shillings-dial *b*, which is so rotated that its figure "10" is brought opposite the window *b'* of the fixed dial B. I proceed in the same fashion for the movable "pence-dial" *a*, which I turn so that the figure "6" appears opposite the window *a'* of the fixed dial A. It should be remarked that the operation can be reversed—that is, may be commenced at the pence-dial and finished at the pounds-dial, which does not affect the final result. For any other sum I proceed in corresponding fashion. It will be noted that each time a movable dial makes a complete revolution it acts by means of pointer L (for dial *a*) or a tooth *j'* (for dials *b* *c* *d*) on the ratchet-wheel *l* or gear-wheels *l'* set immediately above, Fig. 2, in such a manner as to cause this dial to be revolved to the extent of one division. The result is that the various sums successively added or registered are totalized, whatever be the order in which the movable dials are operated, as stated above. It is, however, convenient to explain how the action of the tooth *j'* of any one of the movable dials is transmitted to the dial of the immediately-higher set. When, for instance, the finger or tooth L of the pence-dial meets a tooth of the wheel *l* of the shillings-dial, this tooth L causes the said wheel to revolve to the extent of one tooth, and this partial rotation is transmitted to the ratchet *k* by the pawl *k'*, Fig. 4, and thence to the movable shillings-dial *b*, fixed to the said ratchet *k*. It is the same for the tooth *j'* of the other dials with relation to the wheel *l'* of the dials of the set immediately higher. It will, however, be remarked that this transmission cannot take place in the opposite direction, for the reason that the pawl *k'* will ride over the teeth of ratchet *k* and also that the ratchet *l* is rendered immovable in each position which it assumes by means of a spring-actuated retaining-pawl *n*, Fig. 4, while the wheels *l'* are locked by the fixing of the corresponding disk *j* between the two pairs of teeth which are opposite it.

As is evident, my counter or register allows me to add or to totalize with the greatest facility any sums whatever. In the case of the counter shown totalizing can be effected up to one thousand pounds.

It is to be understood that although in the foregoing I have considered a counter or register having dials graduated according to the English coinage I can divide out the said dials according to the French monetary or decimal system, which difference does not necessitate departure from the principle of my invention.

Figs. 21 to 26 illustrate an arrangement of the dials other than that hereinbefore de-

scribed. They are now placed in a single line, and for the manipulation of each of the movable dials there is no need of a separate point. Each of the movable dials is formed of as many flexible radial strips or plates leading from a central plate as the said dial has divisions. At the center of the dial the plate is fixed to an axis or pivot projecting upwardly from a lower plate supporting the whole arrangement. Each of the strips is fitted with a button for the purpose of manipulating the movable dial and which for the strip corresponding to the cipher or zero is cross-ruled or cross-hatched in Figs. 1 and 4. The outer end of these strips is partly bent over, so as to form a finger or stop bearing against a ring having a notch therein and capable of abutting against the vertical wall of the notch. This bent-over finger or stop might be replaced in any suitable manner by a fixed point under the strip. The ring against which the fingers bear is fixed to the bottom of a cup under the cover of the apparatus. In an economical construction this ring might be dispensed with and the bottom of the cup, in which would be formed a notch opposite the window of the fixed dial and in which the finger of the strip would abut, would serve as a support to these same fingers.

Another characteristic detail I have adopted is the interposition between the controlling devices and the connecting arrangements of the different dials of toothed wheels for the purpose of causing the said dials to turn in the same direction and as shown in Figs. 22 and 26, wherein each of the devices has been half shown, so as to better demonstrate the shape and working thereof.

Referring to Figs. 21 to 26, A is a movable dial formed of flexible radial strips or segments *a*¹, secured at their inner ends to the upper end of a sleeve G¹, which latter fits about and turns on a vertical pin or post *c*¹. Over the inner ends of strips *a*¹ and to the upper end of post *c*¹ is secured an annular dial-plate *a*², numbered in accordance with the number of strips *a*¹. At its inner end each strip *a*¹ is bent over or turned down so as to form a finger *a*³, (see Fig. 25 and dotted lines Fig. 24,) which is adapted to rest against and travel along plate F², which has in its upper face a notch similar to the notch *m'* of Fig. 12. Secured to the upper face of each strip *a*¹ is a manipulating-button *a*⁴. The button corresponding to the zero-space on the dial-plate is for ready identification cross-ruled or cross-patched, as shown in Figs. 21 and 24. B² is a fixed dial secured at the upper end of the pin or post *c*¹ and divided into a number of spaces, from one of which the material is removed to form a window through which the numbers on the movable dial may be observed. D² is an annular cup-shaped ring, Fig. 25, secured to the under side of the cover E and serving as a support for the ring F². (See Fig. 25.) H² is a ratchet-wheel secured at the lower end of sleeve G¹. *h*² is a spring-

actuated dog preventing a reverse movement of ratchet-wheel H^2 , this arrangement being necessary to the first dial only. I^2 is a toothed wheel fixed to the ratchet-wheel H^2 and engaging a similar wheel I' . This latter is mounted on the intermediary axis c^5 . J^2 is a disk having a tooth j^2 secured to the wheel I' and controlling the wheel K^2 , which has ten pairs of teeth (see Fig. 5) and is loose on the axis c^4 , and having a pawl k^2 . L^2 is a ratchet-wheel fixed to the sleeve G^4 of the movable dial No. 2 and operated by the pawl k^2 . I^2 is a toothed wheel similar to I and I' , mounted on and secured to the ratchet-wheel L^2 . P^2 is a plate on which are mounted the axes carrying the various mechanisms, and Q^2 the casing of the apparatus. The working is similar to that described for the apparatus of Figs. 1 to 20, with this difference: that it is sufficient to press on one of the buttons a^3 and to bring it opposite the window of the fixed dial. The finger or stop of the flexible strip reaching the inclined part of the notch causes the strip to give slightly and abuts against the end wall of the notch. Each dial also works separately, and the transfer from one dial to the following is effected as in the operation already described, and the registering of the numbers can be effected in any desired order.

Figs. 19 and 20 represent a movable dial actuated in such a manner that the operator need not have recourse to a separate pointer to work the counter. In these figures the dial, properly speaking, is composed of as many flexible radial strips o , leading from a center o' , as the said dial has divisions. The outer end of each of the said flexible strips has a small pointer-button s bearing upon the previously-mentioned ring m and capable of entering a notch m' of this latter, as above described for the manipulating-point. Briefly, the movable dial has as many manipulating-points as it has divisions.

In Fig. 27 I have shown an embodiment of my invention based on the French monetary system. The construction and operation of this counter or register are substantially the same as that illustrated in Figs. 1 to 20, with obvious additions of certain features shown in Figs. 21 to 26, excepting such differences as are hereinafter mentioned. Only three sets of inner small fixed and movable dials are employed and the numbering on the large fixed dial A^3 extends only half-way about the circumference thereof, opening b^7 being cut in the space corresponding to the zero position of the series of numbers. The movable dial A^4 beneath dial A^3 has a double series of numbers thereon, each extending half-way around the same. Instead of notches in the outer edge of the large movable dial, as shown in Figs. 1, 3, and 4, I here employ a series of blocks or projections n^3 , centrally perforated at n^4 . M is a handle pivoted to a lug m^7 , which is rotatably mounted on dial A^3 . At its outer end said handle carries a pin m^8 ,

which when the handle is lowered enters and projects through one of the perforations n^4 and bears at its lower end against a ring (not shown in Fig. 27) similar to ring m , (shown in Figs. 1 and 12,) having notches or depressions therein similar to m' of Fig. 12 at points corresponding to the zero positions on the fixed dial. The blocks or projections n^3 , which are cross-lined on Fig. 27, are located opposite the zero-spaces on the movable dial A^4 .

The manner of operating the apparatus to register numbers will be apparent.

What I claim as new is—

1. In a register or counter, two circular dials disposed one above the other and having a series of numbers arranged along the edge thereof, the upper dial being fixed and having an opening therethrough in the space corresponding to the zero position, through which opening a number on the lower dial is adapted to be exposed for observation, a bearing-surface beneath the outer edge of the movable dial against and along which a point or finger depending from the movable dial is adapted to travel, said bearing-surface having a depression therein at a point corresponding to the location of the observation-opening in the fixed dial.

2. In a register or counter, two circular dials disposed one above the other and having a series of numbers arranged along the edge thereof, the upper dial being fixed and having an opening therethrough in the space corresponding to the zero position, through which opening a number on the lower dial is adapted to be exposed for observation, and the lower dial having a series of openings or recesses therein in proximity to the numbers on the fixed dial respectively, said openings or recesses being adapted to be engaged by the point of a pin or the like for rotating the movable dial, and a bearing-surface beneath the outer edge of the movable dial against and along which the point of said pin is adapted to travel in imparting a rotary movement to the movable dial, said bearing-surface having a depression therein at a point corresponding to the location of the observation-opening in the fixed dial.

3. In a register or counter, two circular dials disposed one above the other and each having a series of numbers arranged about the upper face thereof, the upper dial being fixed and having an opening therethrough in the space corresponding to the zero position through which opening a number on the lower dial is adapted to be exposed for observation, and an upwardly-projecting flange around the edge of the movable dial concentric to the fixed dial, said flange having openings therein corresponding to the numbers on the dials respectively and adapted to be engaged by the point of a pin or the like for rotating the movable dial.

4. In a register or counter, a plurality of circular dials, each having a series of numbers thereon and arranged in pairs indicating

different denominations, each pair comprising a lower rotatable dial and an upper fixed dial, the latter having an opening in the space corresponding to the zero position through which a number on the rotatable dial is adapted to be exposed for observation, a shaft rotatable with each movable dial, a toothed wheel for each shaft, a pawl-and-ratchet connection between each shaft and its toothed wheel, and a finger or tooth carried by each shaft and adapted upon a complete rotation of its corresponding movable dial to engage the toothed wheel of the shaft of the next highest denomination and move said dial a distance of one space.

5. The combination with a circular casing, of two large dials located one above the other concentrically within said casing, the upper dial being fixed and the lower dial rotatable, a plurality of small dials arranged one above another in two or more pairs within the circumference of the large dials, the upper dial of each pair being fixed and the lower dial rotatable, and gearing for communicating motion from the large outer movable dial to the small movable dials in succession.

6. The combination with a circular cup-like casing, of an annular frame arranged concentrically and rotatable within said casing, said frame carrying a dial about its upper face, a fixed frame secured to the bottom of the casing and located within said rotatable frame and embracing an upper dial-plate, a dial on said plate in juxtaposition with reference to the dial on the rotatable frame, small circular fixed and rotatable dials arranged concentrically, the former above the latter, and both entirely within the circumference of the large dials and supported on the fixed frame, and gearing whereby rotary motion may be communicated from one of the movable dials to the other.

7. The combination with a circular cup-like casing, of an annular frame arranged concentrically and rotatable within said casing, said frame carrying a dial about its upper face, a fixed frame within said rotatable frame, said fixed frame consisting of a lower disk secured to the bottom of the casing, posts on said disk, a dial-plate supported on the upper ends of said posts and carrying a dial juxtaposed with relation to the movable dial, pins on said fixed frame projecting upwardly through openings in the dial-plate,

small fixed dials secured to the upper extremities of the pins above the dial-plate of the fixed frame, bearing-sleeves one on each of said pins, small movable dials one carried by each of said sleeves and located below the small rotatable dials respectively, and suitable gearing or devices connecting the rotatable frame carrying the large rotatable dial and the sleeves carrying the small rotatable dials whereby movement may be communicated from one of said dials to the others in succession.

8. The combination with a circular cup-like casing, of an annular frame arranged concentrically and rotatably within said casing, said frame carrying a dial about its upper face, a fixed frame within said rotatable frame, said fixed frame consisting of a lower disk secured to the bottom of the casing, posts on said disk, a dial-plate supported on the upper ends of said posts and carrying a dial juxtaposed with relation to the movable dial, pins on said fixed frame projecting upwardly through openings in the dial-plate, small fixed dials secured to the upper extremities of the pins above the dial-plate of the fixed frame, bearing-sleeves one on each of said pins, small movable dials one secured to the upper end of each of said sleeves, a disk secured to the lower end of each sleeve and having a finger or tooth projecting from its edge, (excepting that for the dials for indicating the highest denomination,) a toothed or gear wheel rotatably mounted on each pin below the disk on the sleeve, the toothed wheel corresponding to each rotatable dial (excepting that of the small rotatable dial indicating the lower denomination) being in position to be engaged by the tooth on the disk corresponding to another rotatable dial, a pawl-and-ratchet connection between each disk and its juxtaposed toothed wheel, and means for imparting motion from the rotatable frame to the toothed wheel corresponding to the small rotatable dial indicating the lowest denomination.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGES LAFOND.

Witnesses:

CLEMENT GUY,
ALPHONSE DARRAR.