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PROVISIONAL SPECIFICATION.

Improved Adding-apparatus.

I, GEORGES LAFOND, of 34, Faubourg St. Martin, Paris, in the French Republic, Engineer, do hereby declare the nature of this invention to be as follows:—

This invention relates to mechanical counters or adding-apparatus, sometimes known as “totalisers” and “cash registers.” It has for object to cause
5 these counters or registers to totalise the numbers of one or more units and their sub-divisions.

The improvements comprise 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.

10 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 shewn upon the accompanying drawings:—

15 1^o. A model based on the duodecimal system in the shape of a watch although this counter can be made in any other shape.

2^o. A model based on the decimal system for any sort of totalisation.

3^o. A model based on the French monetary system.

On the first drawing, Sheet 1, Figure 1 is a front view of this counter.

Figure 2 is a cross section made on line 2—2 of Figures 1 and 4.

20 Figure 3 is an elevation, in which the casing and the fixed dial-plates of the counter are supposed to be removed so that only the movable dials can be seen.

Figure 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, the said mechanism being held
25 in a special cage which is located in one piece with the case or casing of the counter.

Figures 5 and 6 are respectively a cross-section, and a plan view, of the cage supporting the mechanism of the counter.

30 Figures 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.

Figures 9 to 17 inclusive shew, in section and in plan, the various components of one of these movements or sets of wheelwork.

Figure 18, shews in section and in plan, a device special to certain of these movements.

35 Figures 19 and 20 are respectively a section and a part-plan of a modification of the movable dials of the counter.

The counter so shewn on Figures 1 to 4 is provided with a certain number of fixed dial-plates A, B, C, D, and E, upon which are respectively arranged
—Figures 3 and 2—movable dials *a b c d* and *e*. The fixed dial-plate A, Fig. 1,
40 belongs to an upper plate P solidly fastened on the pillars *p p p p* of a fixed ratchet wheel or plate P¹ which will be referred to hereafter and which is shewn

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on Figures 7 and 8; this fixed dial in the shape of a crown, is divided into, for example, 24 compartments marked respectively $\frac{1}{2}$ —1— $1\frac{1}{2}$ —2— $2\frac{1}{2}$ —3 and one of which a^1 being perforated, serves as a window and allows the particular number on the corresponding movable dial a^1 which is opposite, to be seen. The numbers or figures in question indicate pence or halfpence. 5

The fixed dials B, C, D, and E are arranged in the interior of the crown-dial A and are respectively controlled by the square ends which terminate the axes or rods $p^1 p^1 p^1 p^1$, fixed to the before mentioned ratchet plate P¹; they are divided, each into a certain number of compartments one of which serves as 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. 10

The windows in question are respectively marked $b^1 c^1 d^1$ and e^1 , see Figure 1. The dial B, Fig. 9, contains 20 compartments marked 1 to 20 and intended for shillings. The dials C, D and E, each comprise 10 compartments marked 1 to 10 and represent units, tens and hundreds of pounds according to the dial to which they belong. 15

The movable dial a belongs, Figs. 2, 4, & 5 to the cage of the mechanism; it is formed as a crown divided into 20 compartments marked like those of the fixed dial A and is connected by cross-pieces $q q q q q$ to the plate Q. At its periphery is a flange a^2 having a number of notches a^3 equal to the compartments of the said crown a . 20

The movable dials $b c d$ and e are located in recesses or sunk portions of the upper plate P, and are respectively solid with the parts $i i i i$, referred to later and seated on the axes or pivots $p^1 p^1 p^1 p^1$ before mentioned; they are divided, Figure 11, into as many compartments as the fixed dials B, C, D, and E under which they respectively are, and are marked in the same manner. Their peripheries are furnished with flanges r having notches r^1 , equal numerically to the compartments which they respectively possess. The flanges r and a^2 are in relief from the graduated bottom so as to form a cup within which the corresponding fixed dial is boxed, as shewn on Fig. 2. 25 30

These notched flanges 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 guide-mark consists in the example shewn, of two black marks or points placed one on each side of the notch which corresponds to zero. 35

It facilitates setting back to zero. Under each of these flanges is a ring m Fig. 12, furnished with a notch or groove m^1 , shaped as an inclined plane, the part or rôle of which is indicated later; all the rings m are fixed *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^1 is opposite the window of the corresponding fixed dial. 40

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 disc-ratchet P¹; the upper plate P and the dial-plates A, B, C, D, E; the 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 G¹, which latter can be of any desired shape and may be ornamented as desired, whilst the movable portion or cage is adjusted in a rebate g of the base G and can be revolved. 45

The ratchet-plate P¹ of the fixed portion is furnished with as many teeth as the dial a has compartments (24 for example) and with these teeth engages a spring-actuated pawl h mounted on the plate Q of the before mentioned cage. This click or pawl device has for object to maintain the said cage and consequently the movable dial a in the different successive positions which it can assume with relation to the plate-ratchet P¹ with which it is secured to the fixed dial A. 50 55

The plate ratchet P¹ serves as a support to the groups of wheelwork equal in

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number to that of the interior movable dials, for example, to the number of four.

These movements of sets of wheelwork correspond to the before-mentioned axes or rods $p^1 p^1 p^1 p^1$ on which are seated the fixed dials B, C, D, E, and on which are located the parts i respectively solid with the movable dials $b c d e$. Each of them is formed:—of a movable dial $b c d e$, Fig. 11, solid with a socket i , Fig. 13, which is nothing else than the previously mentioned part seated on the fixed axis or pivot p^1 and which connects it to a disc j , Fig. 14, furnished with a tooth j^1 ; of a ratchet k solid with the disc j and with the teeth of which a spring-pressed pawl engages, said pawl being mounted on a support which, for the group of wheelwork-movements of the “shillings” dial is a ratchet wheel l having 20 teeth (Fig. 16) and which for the sets of wheelwork-movements for the “pounds” dial, is a wheel l^1 , Fig. 18, having 10 pairs of teeth. These different parts are arranged, the one as regards the other, in the order shewn by Figures 2 and 4, and it will be remarked, besides, that the set of parts belonging to the dial e does not contain a disc having tooth j^1 . It will also be remarked that the part or ratchet wheel l of the movable “shillings” dial b is operated in the following manner by the tooth or pointer L mounted on the plate Q of the cage carrying the movable dial a and being spring-controlled.

At each complete turn of the movable dial a this tooth or pointer L (Figure 6) meets the inclined plane of a piece G^2 fixed interiorly to the casing G^1 and opposite the window a^1 of the fixed dial A. Owing to the movement of rotation, it enters 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.

The difference which results from this arrangement must therefore be shewn. Whilst the dials $c d e$ are rotated by the tooth j^1 of the disc j , acting at a given moment on the 10 toothed wheel of the set l^1 immediately above, the movable dial b is itself operated by the tooth L of the dial plate of the set immediately beneath, acting by means of the piece G^2 on the ratchet l of the before mentioned movable dial b . In short, the tooth L is to the dial a what the disc j having tooth j^1 is to the dials $b c$ and d .

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. Suppose also that the sum of £1-10-6 has to be registered.

The operator furnished with any suitable sort of pointer engages at the bottom, the end thereof in the notch r^1 of the movable dial of the “pounds” units (dial e) 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^1 of the before-mentioned ring m . Under these conditions the figure 1 of the movable dial e appears at the window e^1 . 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^1 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^1 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 finish 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 its tooth L or j^1 on the piece l or l^1 of the dial of the set immediately above, 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 totalised, 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^1 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 the

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piece or wheel l of the "shilling" 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^1 and thence to the movable "shillings" dial b fixed to the said ratchet k . It is the same for the tooth j^1 of the other dials with relation to wheel l^1 of the dials of the set immediately higher. It will, however, be remarked that this transmission can only take place in the opposite direction by reason of the method of connection carried out by the click device $k k^1$ and also that the ratchet l is rendered immovable in each position which it assumes by means of a retaining pawl h whilst the wheels l^1 are locked by the fixing of the corresponding disc j between the two pairs of teeth which are opposite it.

As is evident, my counter or register allows me to add or to totalise with the greatest facility, any sums whatever. In the case of the counter shewn, totalising can be effected up to £1000.

It is to be understood that although in the foregoing I have considered a counter or register having dials graduated according the English or duodecimal 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.

EXAMPLE NO. 2.

This example,—refer to Sheet 2 of the drawings,—assumes an arrangement of the dials other than the preceding. 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.

Considering the one of them, the movable dial is formed of as many flexible radial strips or plates a leading from a centre A , as the said dial should have divisions. The centre A is fixed as in the first model (Sheet 1) on a socket mounted on an axis or pivot fixed in the lower plate supporting the whole arrangement. Each strip or plate a is capable of itself bearing the number or figure of the movable dial which I have shewn juxtaposed securely to the centre, similar in that respect to those of Model No. 1.

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 as shewn in Figures 1 and 4. The outer end of these strips is partly folded over so as to form a wedge bearing against the ring m having an inclined plane, Model No. 1, and capable of abutting against the notch resulting from the inclination as above stated for the manipulating point. This folded wedge might be replaced in any suitable manner by a fixed point under the strip.

In short, the movable dial is furnished with as many wedges or manipulating points as it has divisions.

The ring having an inclined plane is fixed to the bottom of a cup adjoining the cover of the apparatus. In an economical construction, this ring might be dispensed with and the bottom of the cup formed with a notch opposite the window of the fixed dial, in which the wedge of the strip would abut and would serve as a support to these same wedges.

Another characteristic detail which I have adopted, is the interposition between the controlling devices and the connecting arrangements of the different dials between them, of toothed wheels for the purpose of causing the said dials to turn in the same direction as shewn on Figures 2 and 6, wherein each of the devices has been half shewn so as to better demonstrate the shape and working thereof.

Sheets 2 and 3, Figures 4, 5, and 6.

A is a movable dial formed of flexible radial strips or segments a ; a^1 is a dial numbered according to each of the flexible strips, and secured to the centre; a^2 folded over part forming wedge, at the outer end of each strip; a^3 is the manipulating button.

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B is a fixed dial mounted perpendicularly to the axis carrying-dial *c*, and having between the 1 and the 9 a window through which the number of the movable dial appears.

D. Cup fixed to the cover E and serving as support to the ring F having an inclined plane; (the inclined plane going from *f* to *f*¹ where abuts the wedge or point of the flexible strip of the movable dial).

G. Socket carrying at the upper end the movable dial, and at its lower end the ratchet H and toothed wheel I.

H. Ratchet opposing by means of its click *h* the movement rearwards *i.e.* to the left, of the movable dial. This arrangement is necessary to the first dial only.

I. Toothed wheel fixed to the ratchet H and engaging a similar wheel I¹; this latter is mounted on the intermediary axis C¹.

J. Disc having a tooth and secured to the wheel I¹ and controlling the wheel which has ten pairs of teeth K (see Fig. 5).

K. Wheel having ten pairs of teeth, loose on its axis and having a pawl.

L. Ratchet fixed to the socket of the movable dial No. 2, and operated by the click *k*.

I². Toothed wheel similar to I and I¹ mounted on and secured to the ratchet I on the socket of the movable dial No. 2.

P. Plate on which are mounted the axes carrying the various mechanisms.

Q. Casing of the apparatus.

The working is similar to that described for Model No. 1, with this difference that it is sufficient to press on the button in question and to bring it opposite the window of the fixed dial; the wedge of the flexible strip reaching the inclined plane causes this to give slightly and abuts against *f*¹.

Each dial also works separately and the transmission from one dial to the following is effected as described for Model No. 1 and, as in the foregoing model, the registering of the numbers can be effected in any desired order.

Figures 19 and 20, Sheet I, 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 centre *o*¹ as the said dial must have divisions. The centre *o*¹ is fixed like the before mentioned movable dials in the dial carrier which in the previous case carries the letter of the dial itself. The outer end of each of the said flexible strips has a small pointed button *s* bearing upon the previously mentioned ring *m* and capable of entering a notch *m*¹ of this latter as above described for the manipulating point. Briefly the movable dial has as many manipulating points as it has divisions; it is the principle of the preceding applied to type No. 1.

MODEL NO 3. SHEET 3.

This example combines the principles of No. 1 by the exterior crown and No. 2 by the formation of the dials within this crown.

In designing it, I have had regard to a rapid totaliser for cash or counter work, which I have shewn on Sheet 3 applied to the French monetary system; but it can be easily modified for others according to the above.

In this model and with regard to the example selected, the outer crown A and the movable dial *a* contain a double number of divisions of centimes. This arrangement has been adopted so that the operator has to cause the hand or lever M to traverse only a portion of the circumference to register his numbers or figures. The fixed dial B is shewn concentrically, with the movable crown A and occupies only one half of the right of this latter. A window *b* has been formed in the upper plate of the casing of the apparatus, at one of the ends of the sector forming the fixed dial for the appearance in succession of the numbers of the movable dial. The notches of the outer crown of Model No. 1 are here replaced by blocks or pillars *c* drilled centrally, in which holes the stud *m* of the handle M

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can engage. The operator pushes the stud of this handle which is furnished with a suitable grip, into the one of these holes *c* corresponding to the number he wishes to register and revolves the handle until he meets the abutment of the ring having an inclined plane, as above described, Model No. 1, opposite the window, as stated for the separate point.

It is understood that this exterior crown can also be provided with engagement notches which the stud of the handle could enter.

The control of the dial or the set immediately higher to the centimes, and of the units of francs is effected in the same manner as for No. 1 (by a tooth acting on a ratchet, at a given moment as for the pence and shillings). The control of the other dials by that of the units of the set immediately lower, can be obtained as described for No. 1 or that used in Model No. 2, *i.e.* with the interposition of the wheels fully toothed.

The handle has its pivot fixed to the casing of the apparatus. The buttons or cross-hatched blocks *c c* shewn on Sheet 3 of the drawing indicate the zeros of the movable dial. On this drawing only 3 small dials have been set out but any other number of them can be used. The construction of the movable dials of these inner dials is as described for Model No. 2.

This apparatus can rest on a socket, pedestal or other suitable support.

Dated this 31st day of January 1899.

For the Applicant,

GEDGE & FEENY,

60, Queen Victoria Street, London, E.C.,
Chartered Patent Agents.

COMPLETE SPECIFICATION.

Improved Adding-apparatus.

I, GEORGES LAFOND, of 34, Faubourg St. Martin, Paris, France, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to mechanical counters or adding-apparatus, sometimes known as "totalisers" and "cash registers."

It has for object to cause these counters or registers to totalise the numbers of one or more units and their sub-divisions. The improvements comprise 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 or adding-apparatus constructed 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. As examples, I have shewn upon the drawings accompanying my Provisional Specification,

1. A model based on the duodecimal system in the shape of a watch although this counter can be made in any other shape.

2. A model based on the decimal system for any sort of totalisation.

3. A model based on the French monetary system.

On the first drawing, Sheet 1, Figure 1 is a front view of this adding apparatus.

Figure 2 is a cross section made on line 2—2 of Figures 1 and 4. Figure 3 is another elevation, in which the casing and the fixed dial-plates of the counter are supposed to be removed, so that only the movable dials can be seen.

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Figure 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 wheel-work or movements therein contained, the said mechanism being held in a special cage which is located in one piece with the case or casing of the counter.

Figures 5 and 6 are respectively a cross-section and a plan-view of the cage supporting the mechanism of the counter.

Figures 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.

Figures 9 to 17 inclusive shew, in section and in plan, the various components of one of these movements or sets of wheelwork.

Figure 18 shews, in section and in plan, a device special to certain of these movements.

Figures 19 and 20 are respectively a section and a part-plan of a modification of the movable dials of the counter.

The counter or adding-apparatus so shewn on Figures 1 to 4 is provided with a certain number of fixed dial-plates A, B, C, D and E, upon which are respectively arranged—Figures 2 and 3—movable dials *a b c d* and *e*. The fixed dial-plate A, Figure 1, belongs to an upper plate P solidly fastened on the pillars *p p* . . . of a fixed ratchet wheel or plate P¹ which will be referred to hereafter and which is shewn on Figures 7 and 8; this fixed dial, in the shape of a crown, is divided into, for instance, 24 compartments marked respectively $\frac{1}{2}$,—1— $1\frac{1}{2}$ —2— $2\frac{1}{2}$ —3— and one of which *a*¹ being perforated serves as a window and allows the particular number on the corresponding movable dial *a*¹ which is opposite, to be seen. The numbers or figures in question indicate pence and half-pence.

The fixed dials B, C, D, and E are arranged in the interior of the crown dial A and are respectively controlled by the square-ends which terminate the axes or rods *p*¹ *p*¹ fixed to the before-mentioned ratchet-plate P¹; they are divided each into a certain number of compartments one of which serves as 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*¹ *c*¹ *d*¹ and *e*¹; see Figure 1. The dial B, Figure 9, contains 20 compartments marked 1 to 20 and intended for shillings. The dials C, D and E each comprise 10 compartments marked 1 to 10 and represent units, tens and hundreds of pounds, according to the dial to which they belong.

The movable dial *a* belongs, Figures 2, 4 and 5, to the cage of the mechanism; it is formed as a crown divided into 24 compartments marked like those of the fixed dial A and is connected by cross pieces *q q* to the plate Q. At its periphery is a flange *a*² having a number of notches *a*³ equal to the compartments of the said crown *a*.

The movable dials *b c d* and *e* are located in the recesses or sunk portions of the upper plate P, and are respectively solid or integral with the parts *i i i*, referred to later, and seated on the axes or pivots *p*¹ *p*¹ before mentioned; they are divided, Figure 11, into as many compartments as the fixed dials B, C, D and E under which they respectively are, and are marked in the same manner.

Their peripheries are furnished with flanges *r* having notches *r*¹ equal numerically to the compartments which they respectively possess. The flanges *r* and *a*² are in relief from the graduated bottom so as to form a cup within which the corresponding fixed dial is boxed, as shewn on Figure 2. These notched flanges 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 the corresponding fixed dials; this guide mark consists in the example shewn, of two black marks or points placed one of each side of the notch which corresponds to zero. It facilitates setting back to zero. Under each of these flanges is a ring *m*, Figure 12, furnished with a notch or groove *m*¹,

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shaped as an inclined plane, the part or rôle of which is indicated later; 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^1 is opposite the window of the corresponding fixed dial.

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 disc-ratchet P^1 , the upper plate P and the dial-plates A, B, C, D and E; the 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^1 , which latter can be of any desired shape and may be ornamented as desired whilst the movable portion or cage is adjusted in a rebate g of the base G and can be revolved.

The ratchet-plate P^1 of the fixed portion is furnished with as many teeth as the dial a has compartments (24 for example) and with these teeth engages a spring-actuated pawl h mounted on the plate Q of the before-mentioned cage. This click or pawl device has for object to maintain the said cage and consequently the movable dial a in the different successive positions which it can assume with relation to the plate ratchet P^1 with which it is secured to the fixed dial A.

The plate ratchet P^1 serves as a support to 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^1 p^1 on which are seated the fixed dials B, C, D, and E and on which are located the parts i respectively integral with the movable dials b , c , d e . Each of them is formed; of a movable dial b c d e , Figure 11, integral with a socket i , Figure 13, which is nothing else than the previously mentioned part seated on the fixed axis or pivot p^1 and which connects it to a disc j , Figure 14, furnished with a tooth j^1 ; of a ratchet k solid with the disc j and with the teeth of which a spring-pressed pawl engages, said pawl being mounted on a support which, for the group of wheelwork movements of the "shillings" dial, is a ratchet wheel l having 20 teeth (Figure 16) and which for the sets of wheelwork-movements for the "pounds" dial, is a wheel l^1 , Figure 18, having 10 pairs of teeth. These different parts are arranged the one as regards the other, in the order shown by Figures 2 and 4, and it will be remarked, besides, that the set of parts belonging to the dial e does not contain a disc having tooth j^1 . It will also be remarked that the ratchet-wheel l of the movable "shillings" dial b is operated in the following manner by the tooth or pointer L mounted on the plate Q of the cage carrying the movable dial a and being spring controlled.

At each complete turn of the movable dial a , this tooth or pointer L, Figure 6, meets the inclined plane of a piece G^2 fixed interiorly to the casing G^1 and opposite the window a^1 of the fixed dial A. Owing to the movement of rotation, it enters 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.

The difference resulting from this arrangement must therefore be shewn. Whilst the dials c d e are rotated by the tooth j^1 of the disc j , acting at a given moment on the 10-toothed wheel of the set l^1 immediately above the movable dial b is itself operated by the tooth L of the dial plate of the set immediately beneath, acting by means of the piece G^2 on the ratchet l of the beforementioned movable dial b . In short, the tooth L is to the dial a what the disc j having tooth j^1 is to the dials b , c , d .

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. Suppose also that the sum of £1-10-6 has to be registered. The operator furnished with any suitable sort of pointer engages at the bottom, the end thereof in the notch r^1 of the movable 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

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the pointer in question falls into or strikes the notch m^1 of the before-mentioned ring m . Under these conditions, the figure 1 of the movable dial c appears at the window c^1 . 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^1 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^1 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 finish 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 its tooth L or j^1 on the piece l or l^1 of the dial of the set immediately above, 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 totalised whatever be the order in which the movable dials are operated, as stated above. It is, however, proper to explain how the action of the tooth j^1 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 the piece or 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^1 and thence to the movable "shillings" dial b fixed to the said ratchet k . It is the same for the tooth j^1 of the other dials with relation to the wheel l^1 of the dials of the set immediately higher. It will, however, be remarked that this transmission cannot take place in the opposite direction by reason of the method of connection carried out by the click device k k^1 and also that the ratchet l is rendered immovable in each position which it assumes by means of a retaining pawl h whilst the wheels l^1 are locked by the fixing of the corresponding disc j between the two pairs of teeth which are opposite it.

As is evident, my counter or register allows me to add or to totalise with the greatest facility, any sums whatever. In case of the counter shown, totalising can be effected up to £1000.

It is to be understood that although in the foregoing I have considered a counter or register having dials graduated according to the English or duodecimal 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.

In order to simplify the mechanism for actuating or driving the movable dials, I have adopted the new arrangement shewn on drawings attached to this specification, and designated Sheet 1*. Figure 1* is a plan; Fig. 2* is an elevation looking towards lines C—D of Fig. 1*, and Fig. 3* is an elevation looking towards line A—B of Figure 1*.

As already described, the "shillings" wheel b is driven forward one division at each complete turn of the plate Q actuated by means of the notches a^3 and that by means of the finger L when it meets the abutment G^2 fixed to the interior of the casing G^1 .

This wheel transmits in its turn and successively to each of the wheels c d e which represent the units, tens and hundreds of pounds which are driven forward one division at each complete revolution of the preceding wheel. From this point the following modification may be made. The subsequent reference letters all relate to Sheet 1* of the annexed drawings.

The movable plate j of the "shillings" wheel is fitted with a snail A, Fig. 1*, which turns therewith when it is driven by the "pence" wheel. Upon the curve of the snail bears the end B of one arm of a bell-crank lever pivoted at B^1 .

The other arm B^{11} is fitted at its end with a pawl b engaging a toothed

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wheel C which is located upon the common axis of the wheel C¹ and actuates the movable dial of the "pounds" units. When the snail has made an entire revolution and the arm B is at the upper end of its curve it escapes under pressure from spring *b*¹¹, the lever pivots, and the arm B¹¹ by means of pawl *b* causes the wheel C to pivot and advance by one division. A retaining pawl *b*¹¹¹ 5 prevents the wheel C from moving more than one tooth at each impulse from the pawl and also from going back.

The movement of wheel C¹ is communicated to wheel D which controls the dial of the "tens" of pounds by means of the wheel *d* upon whose axis is placed a disc *d*¹ having only one tooth and engaging wheel D, so as to advance 10 the latter one division for each complete revolution it makes. A pawl *d*¹¹ mounted on plate *d*¹¹¹ prevents any rearward motion of wheel D.

Wheel E (that of the "hundreds" dial) is driven in a similar manner by means of wheel *e* actuated by wheel D. Wheel *e* secured on the axis of a disc *e*¹ having two teeth, engages at each revolution with wheel E which it advances by one 15 division.

These intermediary wheels *d* and *e* change the direction of rotation of D and E and cause both the latter to advance from right to left, and also leave to each its reciprocal independence which enables them to be moved by the hand if it is wished to commence with the higher numbers. 20

EXAMPLE No. 2.

This example, refer to Sheet 2 of the drawings left with the Provisional Specification, assumes an arrangement of the dials other than the preceding. They are now placed in a single line and for the manipulation of each of the 25 movable dials, there is no need of a separate point.

Considering the one of them, the movable dial is formed of as many flexible radial strips or plates *a* leading from a centre A as the said dial should have divisions. The centre A is fixed as in the first model (Sheet 1) on a socket mounted on an axis or pivot fixed in the lower plate supporting the whole arrangement. Each strip or plate *a* is capable of itself bearing the number or figure of the 30 movable dial which I have shewn juxtaposed securely to the centre, similar in that respect to those of Model No. 1.

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, as shewn in Figures 1 and 4. The outer end of 35 these strips is partly folded over so as to form a wedge bearing against the ring *m* having an inclined plane, Model No. 1, and capable of abutting against the notch resulting from this inclination as above stated for the manipulating point. This folded wedge might be replaced in any suitable manner by a fixed point 40 under the strip.

In short, the movable dial is furnished with as many wedges or manipulating points as it has divisions.

The ring having an inclined plane is fixed to the bottom of a cup adjoining the cover of the apparatus. In an economical construction, this ring might be 45 dispensed with and the bottom of the cup formed with a notch opposite the window of the fixed dial, in which the wedge of the strip would abut and would serve as a support to these same wedges.

Another characteristic detail which I have adopted is the interposition between the controlling devices and the connecting arrangements of the different dials 50 between them, of toothed wheels for the purpose of causing the said dials to turn in the same direction, as shewn on Figures 2 and 6, wherein each of the devices has been half shewn so as better to demonstrate the shape and working.

Sheets 2 and 3, Figures 4, 5 and 6.

A is a movable dial formed of flexible radial strips or segments *a*; *a*¹ is a dial 55 numbered according to each of the flexible strips, and secured to the centre;

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a^2 folded over portion forming wedge, at the outer end of each strip; a^3 is the manipulating button.

B is a fixed dial mounted perpendicularly to the axis carrying-dial c and having between the 1 and the 9 a window through which the number of the movable dial appears.

D cup fixed to the cover E and serving as support to the ring F having an inclined plane; the inclined plane going from f to f^1 where abuts the wedge or point of the flexible strip of the movable dial.

C socket carrying at the upper end the movable dial, and at its lower end the ratchet H and toothed wheel I.

H. Ratchet opposing by means of its click h the movement rearwards *i.e.*, to the left, of the movable dial. This arrangement is necessary to the first dial only.

I toothed wheel fixed to the ratchet H and engaging a similar wheel I^1 ; this latter is mounted on the intermediary axis C^1 .

J. Disc having a tooth j and secured to the wheel I^1 ; controlling the wheel which has ten pairs of teeth K, see Figure 6, Sheet 3.

K. Wheel with ten pairs of teeth, loose on its axis c^2 and having a pawl k .

L. Ratchet fixed to the socket of the movable dial No. 2 and operated by the click k .

I^2 . Toothed wheel similar to I and I^1 mounted on and secured to the ratchet on the socket of the movable dial No. 2.

P. Plate on which are mounted the axes carrying the various mechanisms.

Q casing of the apparatus.

The working is similar to that described for Model No. 1, with this difference that it is sufficient to press on the button in question and to bring it opposite the window of the fixed dial; the wedge of the flexible strip reaching the inclined plane causes this to give slightly and abuts against f^1 .

Each dial also works separately and the transmission from one dial to the following is effected as described for Model No. 1, and, as in the foregoing model, the registering of the numbers can be effected in any desired order.

Figures 19 and 20, Sheet 1, 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 the centre o^1 as the said dial must have divisions. The centre o^1 is fixed like the before-mentioned movable dials in the dial-carrier which in the previous case carries the letter of the dial itself. 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^1 of this latter as above described for the manipulating point. Briefly the movable dial has as many points as it has divisions; it is the principle of the preceding applied to type No. 1.

MODEL No 3. SHEET 3.

This example combines the principles of No. 1 by means of the exterior crown, and of No. 2 by means of the formation of the dials within this crown.

In designing it, I have had regard to a rapid totaliser for cash or counter work, which I have shewn on Sheet 3, applied to the French monetary system; but it can be easily modified for others according to the above.

In this model and with regard to the example selected the outer crown A and the movable dial a contain a double number of divisions of centimes. This arrangement has been adopted so that the operator has to cause the handle or lever M to traverse only a portion of the circumference to register his numbers or figures. The fixed dial B is shewn concentrically with the movable crown A and occupies only one half of the right of this latter. A window b has been formed in the upper plate of the casing of the apparatus, at one of the ends of the sector forming the fixed dial for the appearance in succession of the numbers of the movable dial. The notches of the outer crown of Model No. 1 are here

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replaced by blocks or pillars *c* drilled centrally in which holes the stud *m* of the handle *M* can engage. The operator pushes the stud of this handle which is furnished with a suitable grip, into the one of these holes *c* corresponding to the number he wishes to register and revolves the handle until he meets the abutment of the ring, having an inclined plane, as above described, Model No. 1, 5
opposite the window as stated for the separate point.

It is understood that this exterior crown can also be provided with engagement notches which the stud of the handle could enter.

The control of the dial or set immediately higher than the centimes, and of the units of francs is effected in the same manner as for No. 1 (by a tooth acting 10
on a ratchet; at a given moment, as for the pence or shilling). The control of the other dials by that of the units of the set immediately lower, can be effected as described for No. 1, or for that of No. 2, *i.e.*, with the interposition of wheels fully toothed.

The handle has its pivot fixed to the casing of the apparatus. The buttons or 15
cross hatched blocks *c c* shewn on Sheet 3 of the drawings indicate the zeros of the movable dial. On this drawing, only three small dials have been set out, but any number of them can be used. The construction of the movable dials of these inner dials is as described for Model No. 2.

The apparatus can rest on a socket pedestal or other suitable support. 20

I may adjoin to any of the forms of the above adding apparatus, for counter use, shop work and the like, any of the ordinary machines or means for imprinting on a band of paper, or ticket, the various sums added successively; and I may provide means for preventing tampering with the adding apparatus, such means comprising, for instance, keys or plugs for insertion into the apparatus and to 25
be kept when not in use by the person controlling the same. These devices may be of any well known type and I make no special claim thereto.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what 30
I claim is:—

1. In adding apparatus for adding units and sub-divisions of monetary or other value, the combination for each kind of indications of two superposed dials graduated in the same manner, the one being fixed and intended to serve as a guide-mark and having a window at its zero division; the other being movable and having a notched flange or provided with pierced blocks, in agreement with 35
its divisions and with those of the fixed dial; of a circular path provided with a notch in an inclined plane situated opposite the window of the fixed dial; of a pointer, rod or handle intended to be engaged in the notch or pierced block opposite a given division of the fixed dial and intended to cause the movable dial to turn until the said pointer, rod or other implement is stopped by the inclined plane of the said circular path, with the effect of imparting to the said movable dial an angular movement equal to the angle contained between the given division of the fixed dial and the window of the latter, substantially as described. 40

2. In adding apparatus for adding sub-divisions and units of monetary or other value, the combination for each kind of indications of a set of wheel- 45
work comprising;—a movable dial located under a fixed dial integral with a disc *j* having a driving tooth *j*¹ and with a ratchet wheel *k* and with a toothed wheel / or *l*¹ receiving an intermittent motion from an adjacent set, for instance, by means of the finger *j*¹ of the disc *j* of the said set and transmitting it by a pawl *k*¹ to the ratchet *k* and consequently to the movable dial; the said combination 50
having for objects to submit each movable dial to the action of that one of the order or set immediately beneath and to cause it to act upon that of the order immediately above, whilst preserving its independence, that is, whilst leaving it free to be actuated directly by hand, and also the motion of tooth *L* of a ratchet *l* and therefore of the corresponding movable dial, this tooth and this 55
ratchet being arranged as described with reference to Model No. 1.

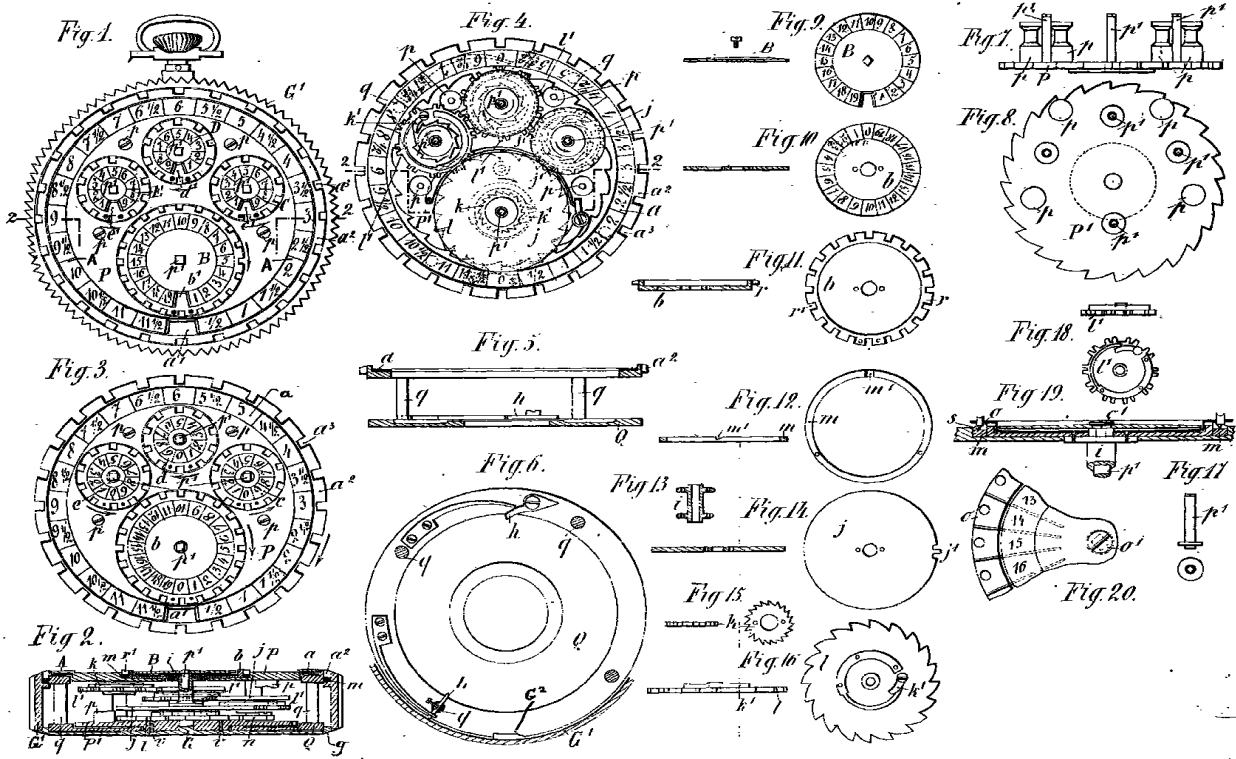
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3. In adding apparatus, the combination of a series of fixed dials A B C D E having windows, the said dials being integral with an upper plate P and with a ratchet wheel P¹ with a corresponding number of movable dials *a b c d e* located under the said fixed dials and provided with a notched flange allowing them to
5 be turned by hand by means of a pointer, and with wheel work of the kind claimed in Claim 2, intended to connect each movable dial with that of the set immediately above, substantially as described.
4. In adding apparatus, the special arrangement of movable dials provided with flexible radial strips equal in number to that of their divisions, the said
10 strips each possessing a pin or wedge intended to make friction with the circular path or ring *m* and to engage a notch *m*¹ with the result of stopping in their revolution the said movable dials at the time the said pin or wedge attains a position opposite the window formed in the fixed dials, substantially as above described.
- 15 5. In adding apparatus, the combination of a method of driving the "pounds" dials from the "shillings" wheel by means of a snail, of a bell-crank lever and of a pawl operating the "pounds" unit dial; the "pounds" tens and hundreds being driven by intermediary wheels *d* and *e* in always the same direction, substantially as described and illustrated on Sheet 4 of the drawings.
- 20 6. Adding apparatus, constructed, combined and arranged to work, substantially as herein described and as illustrated on the respective sheets of drawings.

Dated this Thirty-first day of October 1899.

For the Applicant,
GEDGE & FEENY,
Chartered Patent Agents.
60, Queen Victoria Street, London, E.C.,

25



[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

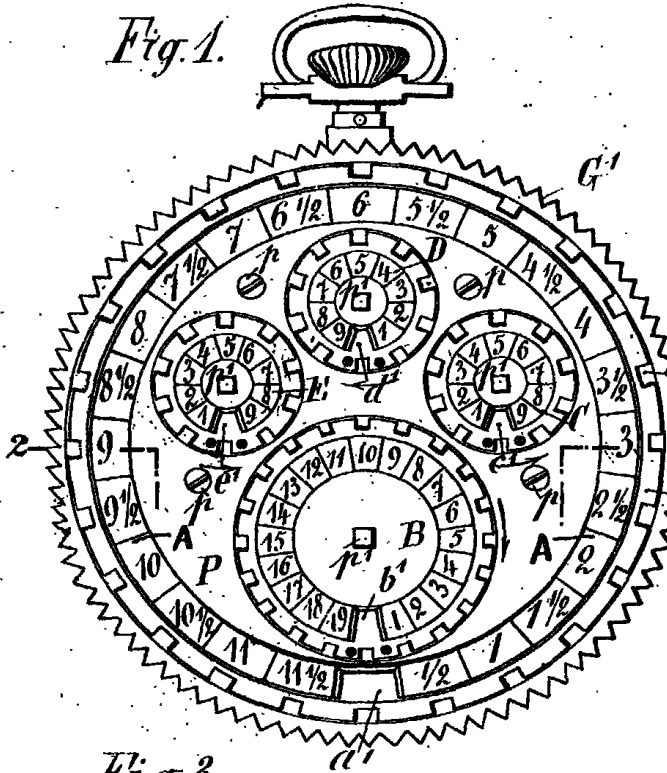


Fig. 4.

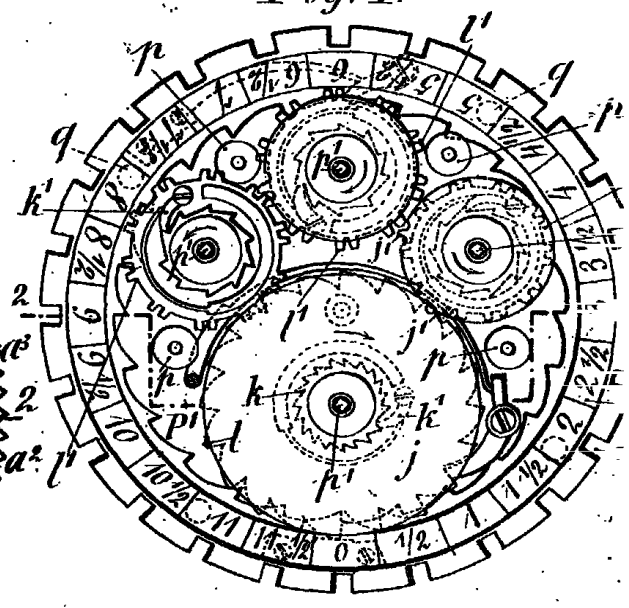


Fig. 3.

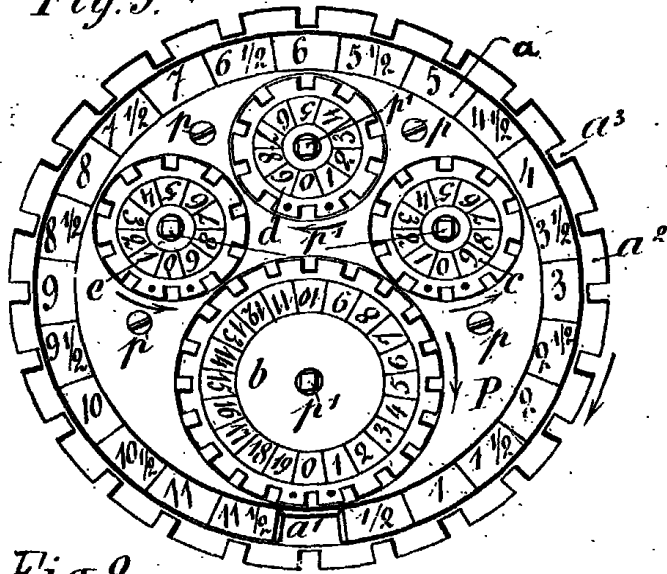


Fig. 5.

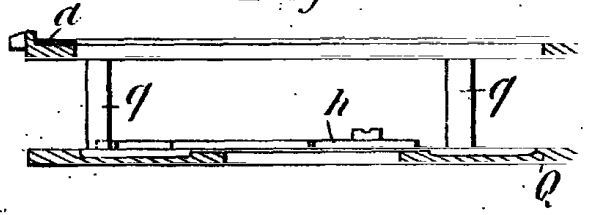


Fig. 2.

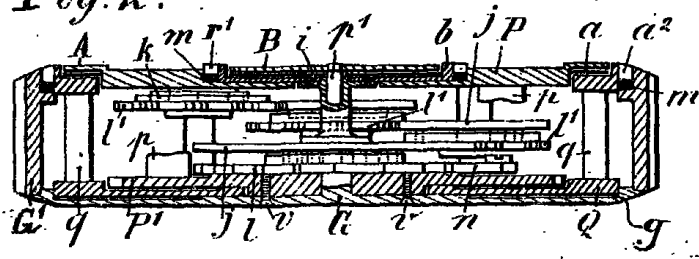
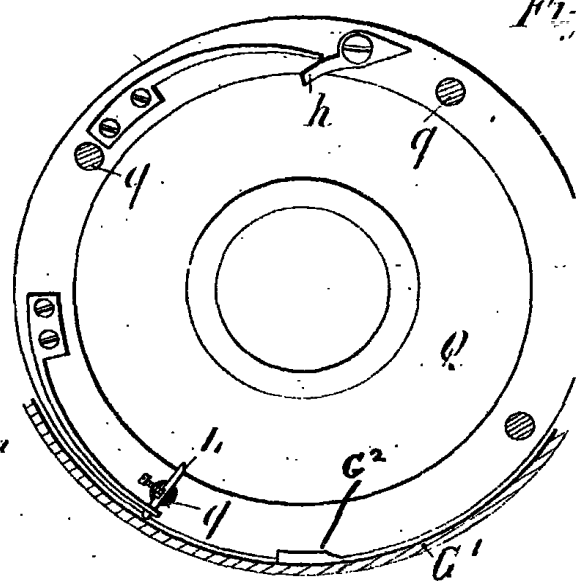
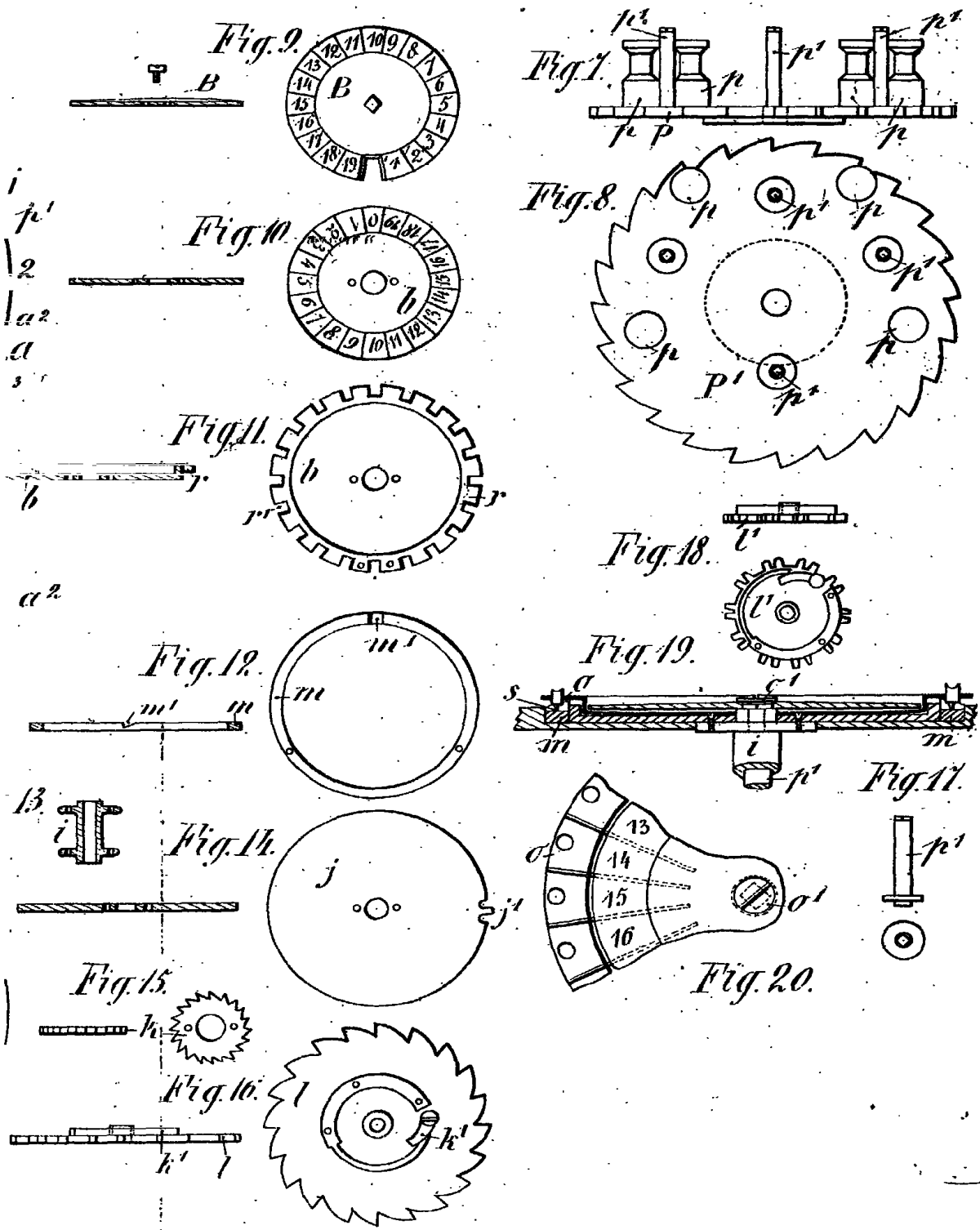


Fig. 6.





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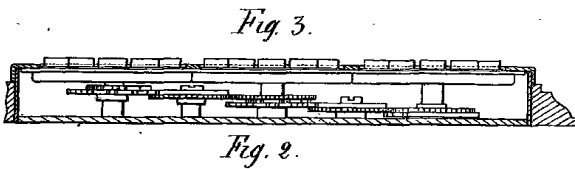


Fig. 3.

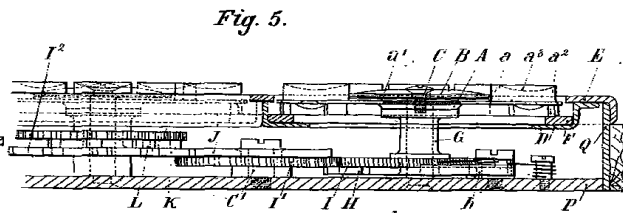


Fig. 5.

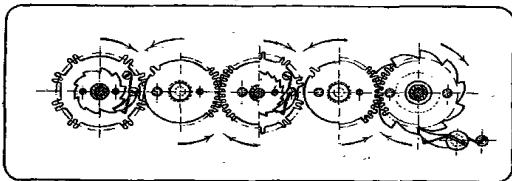


Fig. 2.

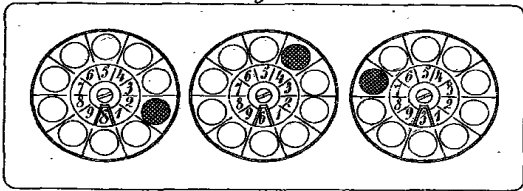


Fig. 1.

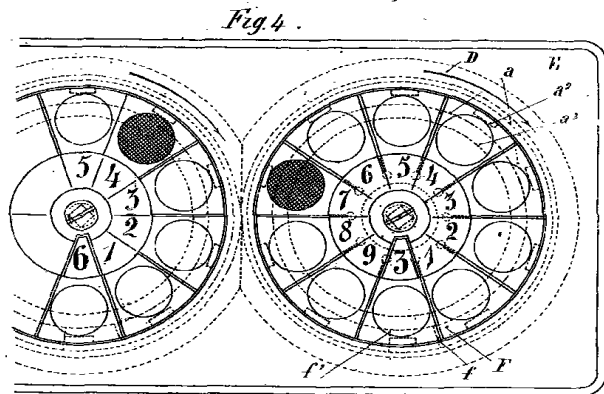


Fig. 4.

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Fig. 3.

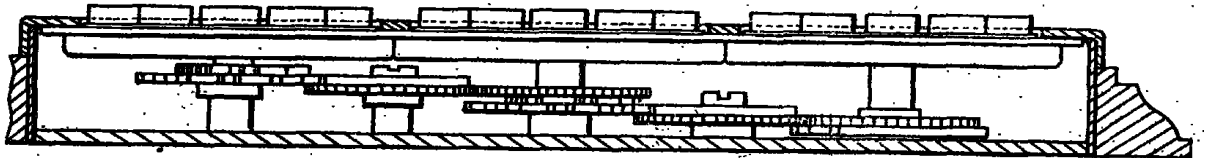


Fig. 2.

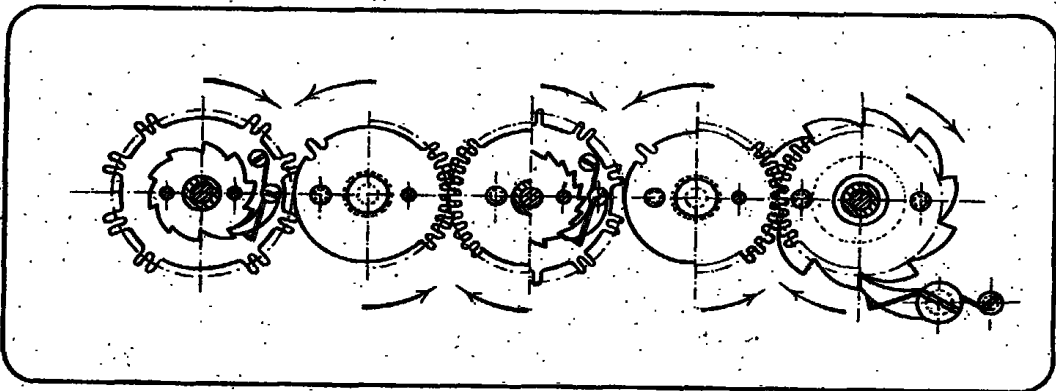


Fig. 1.

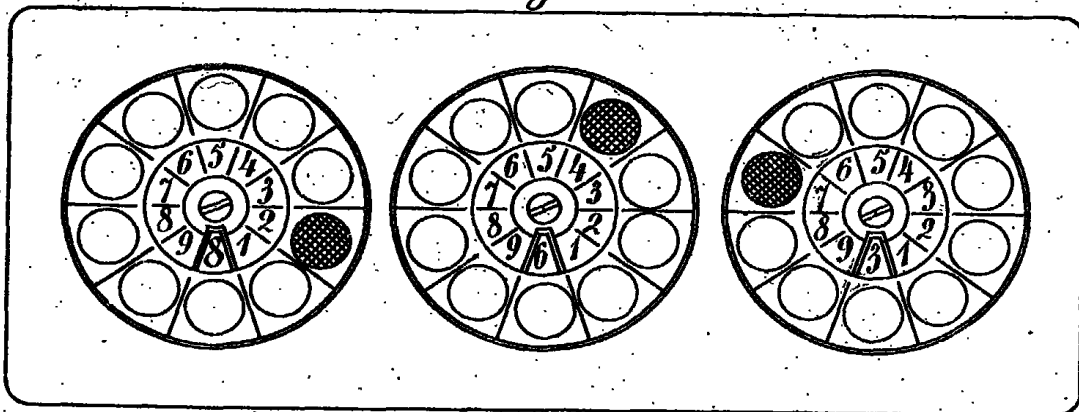


Fig. 5.

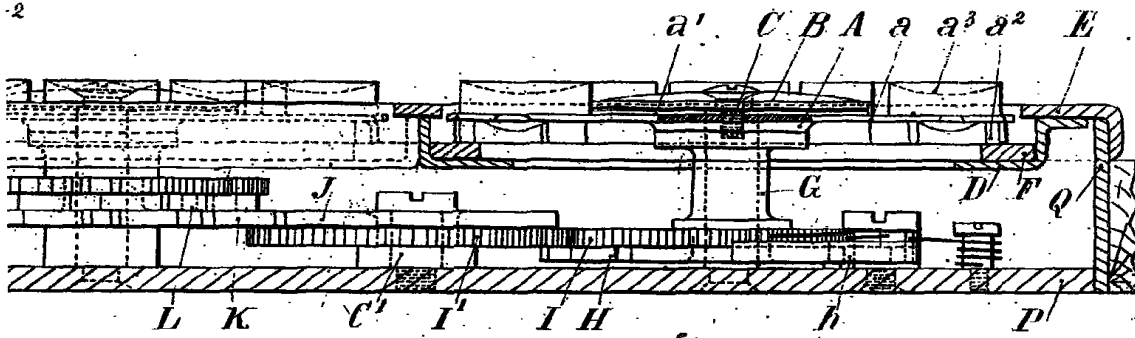
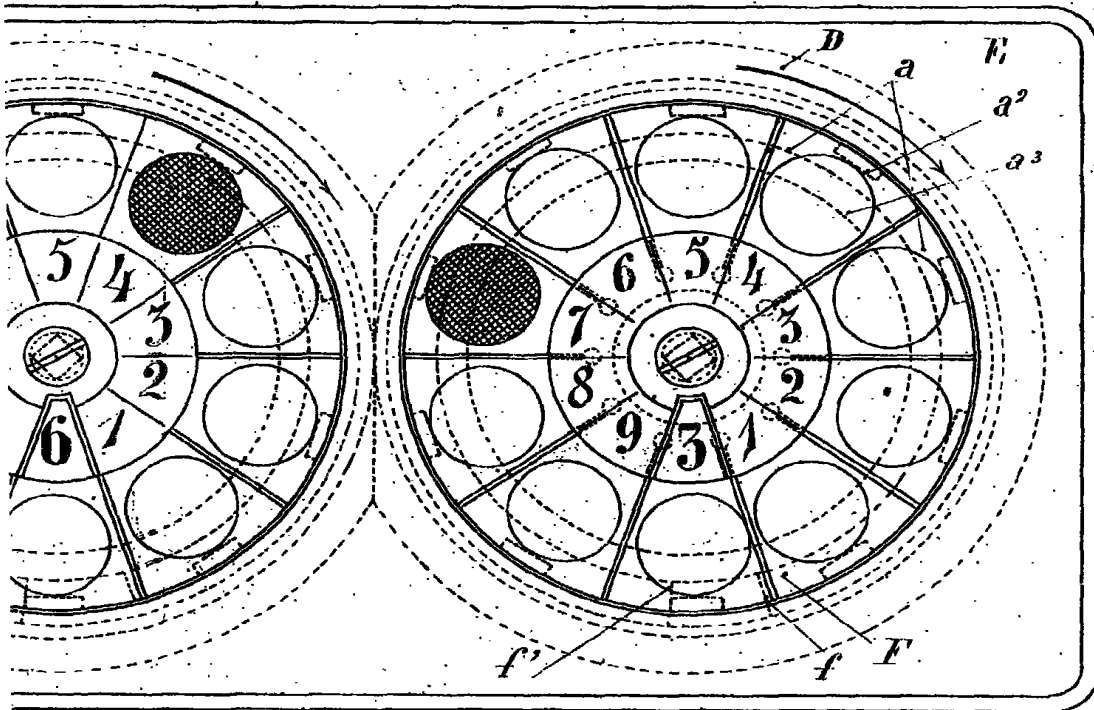


Fig. 4.



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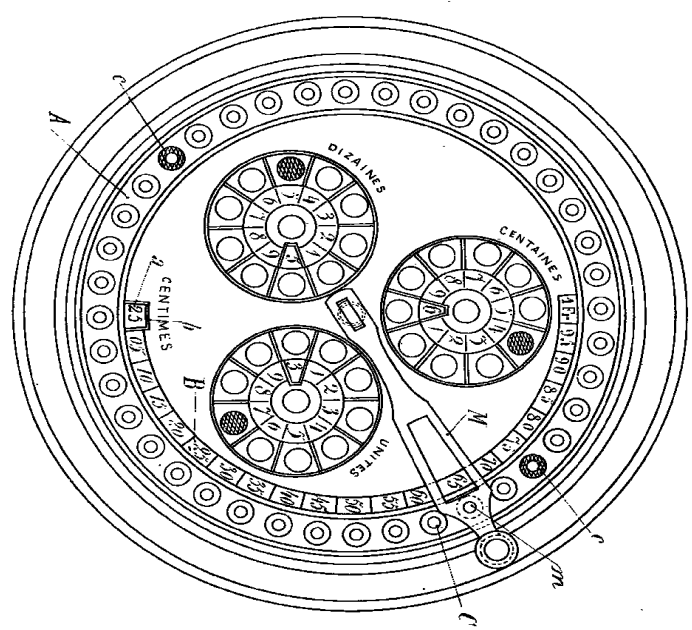


Fig. 7.

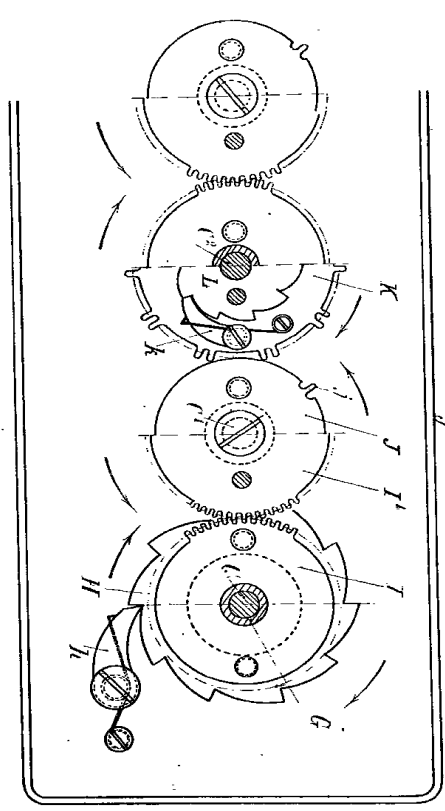
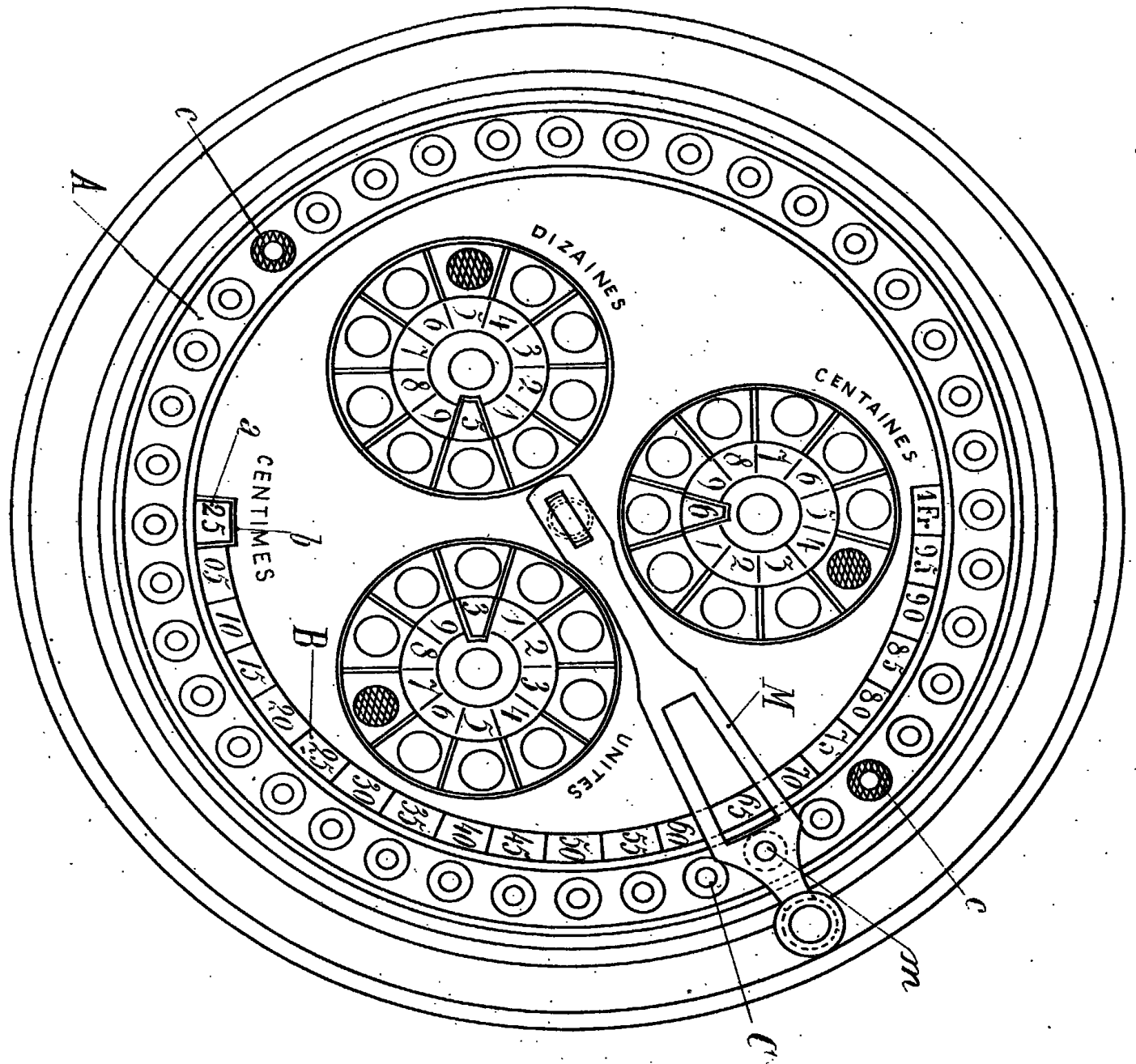


Fig. 6

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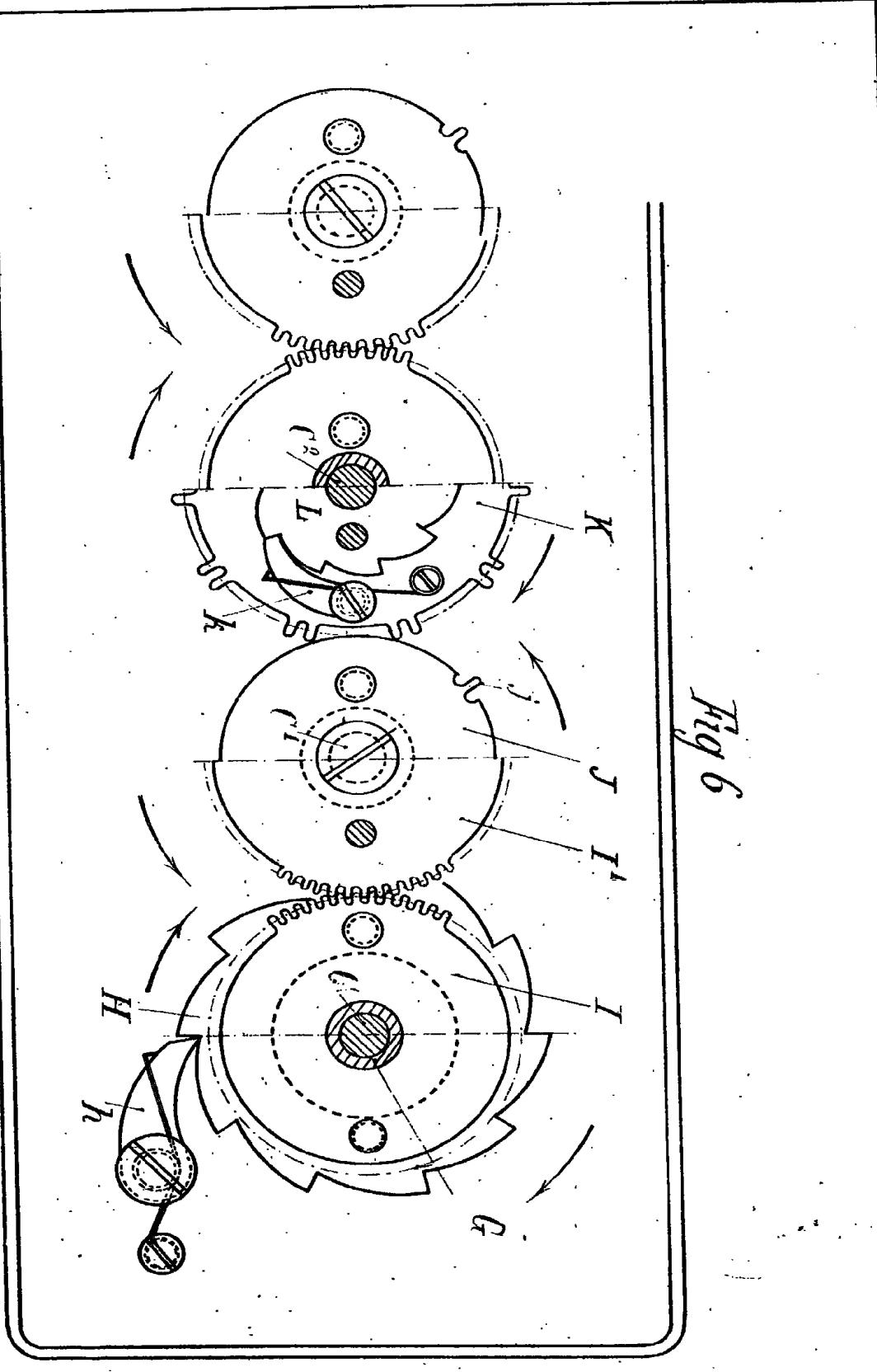
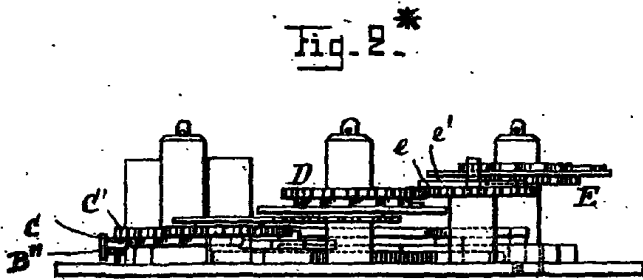
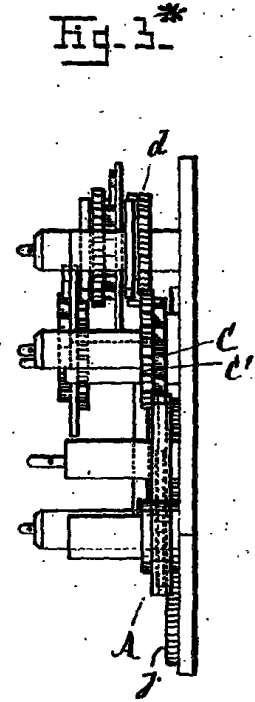
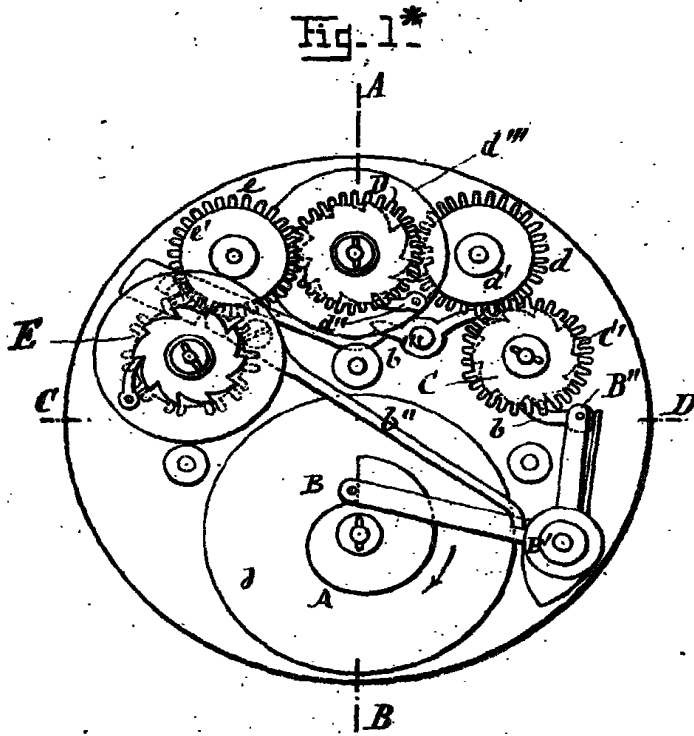


Fig 6

Fig. 7.



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