No. 859,057.

PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 1.

Fig. 1.

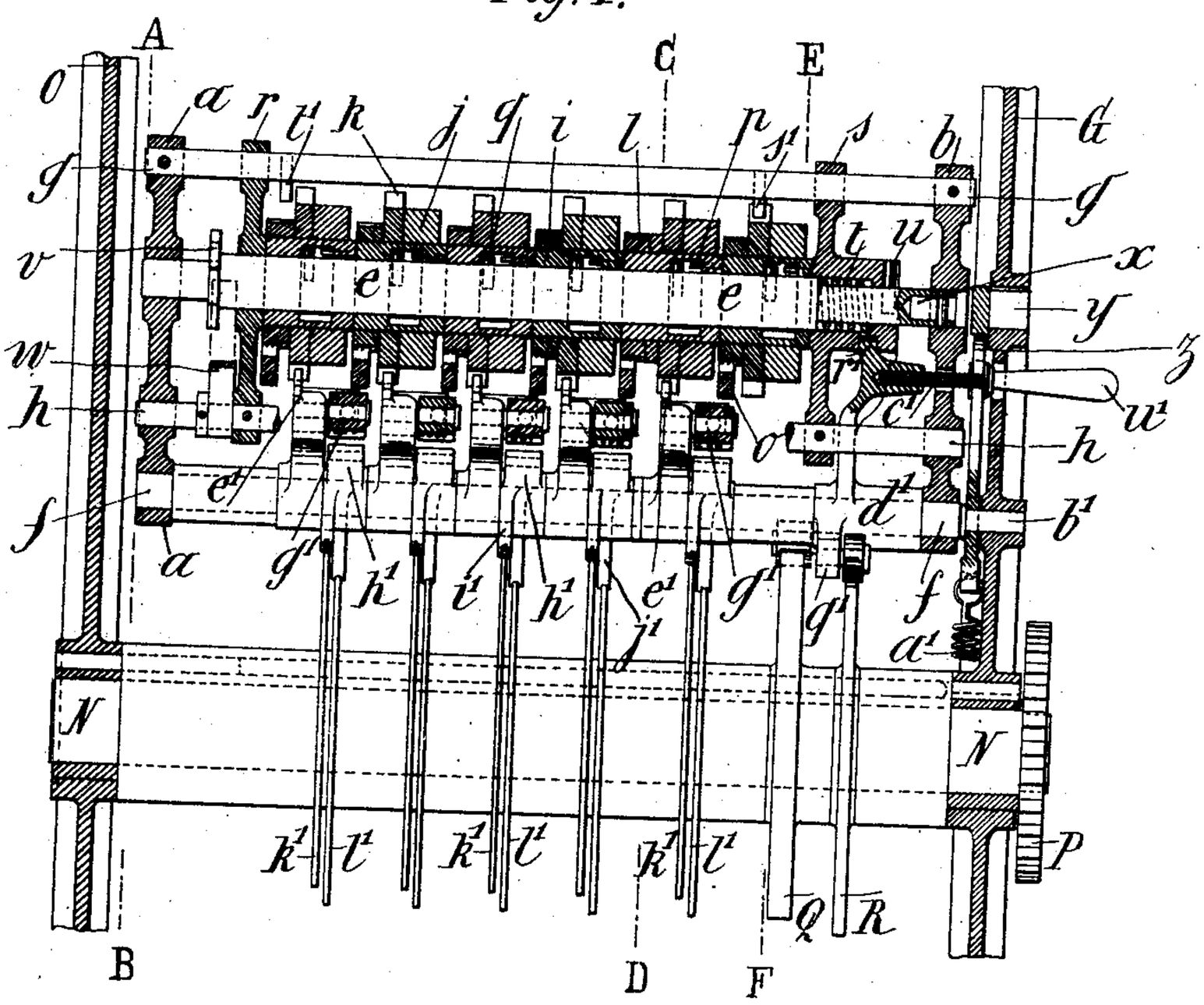
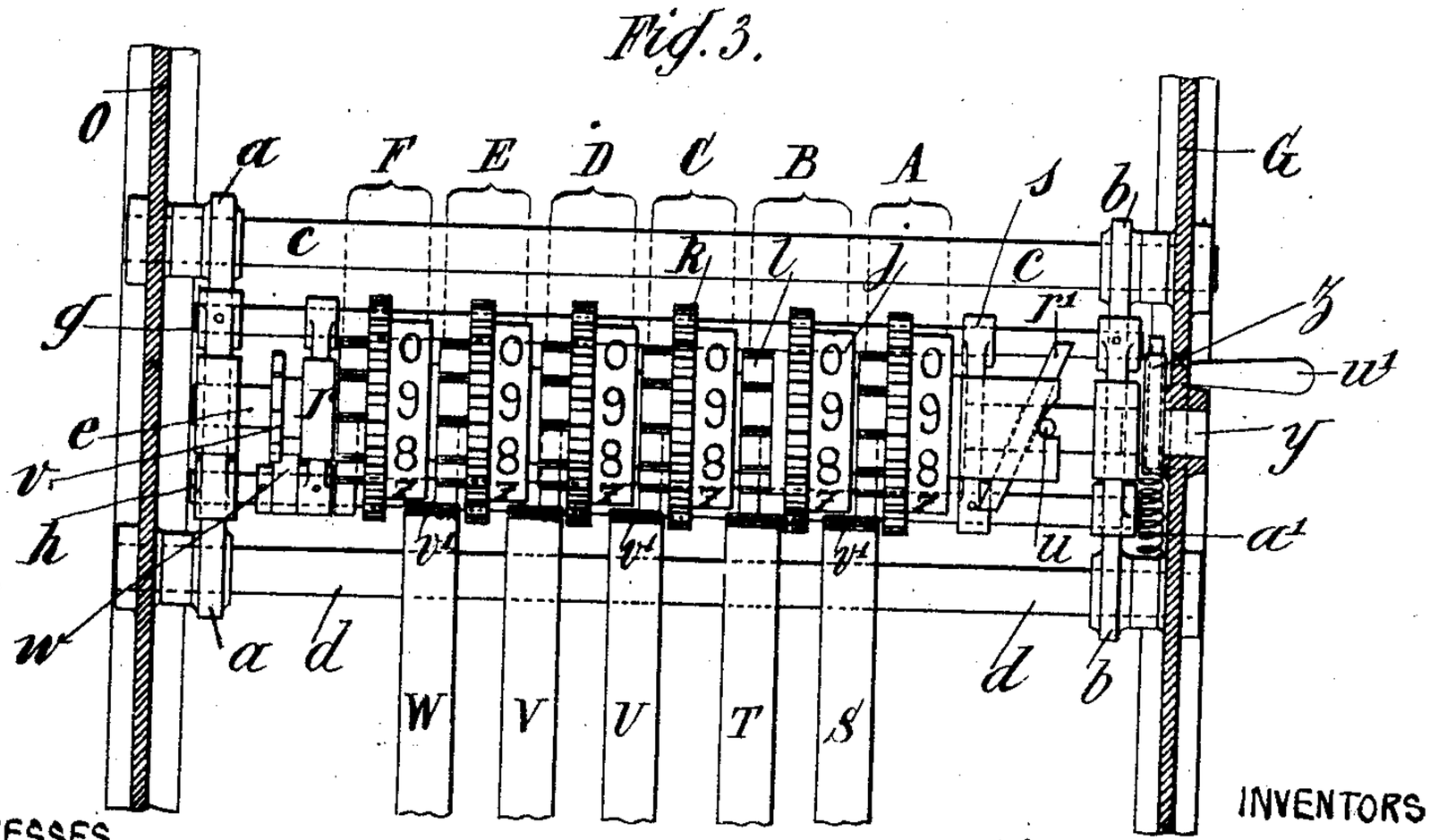


Fig. 3.



WITNESSES

Paul A. Blair

E. W. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057. PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 2.

Fig. 2.

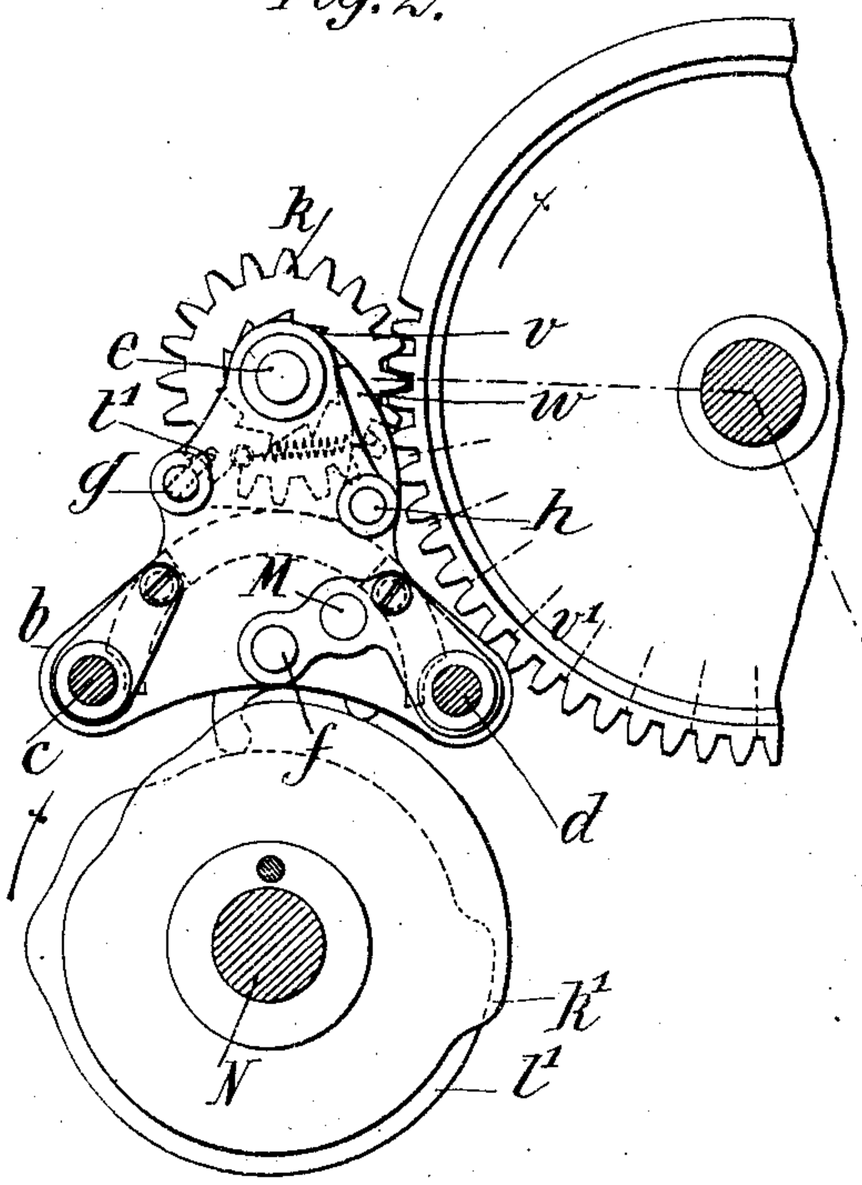


Fig. 3.

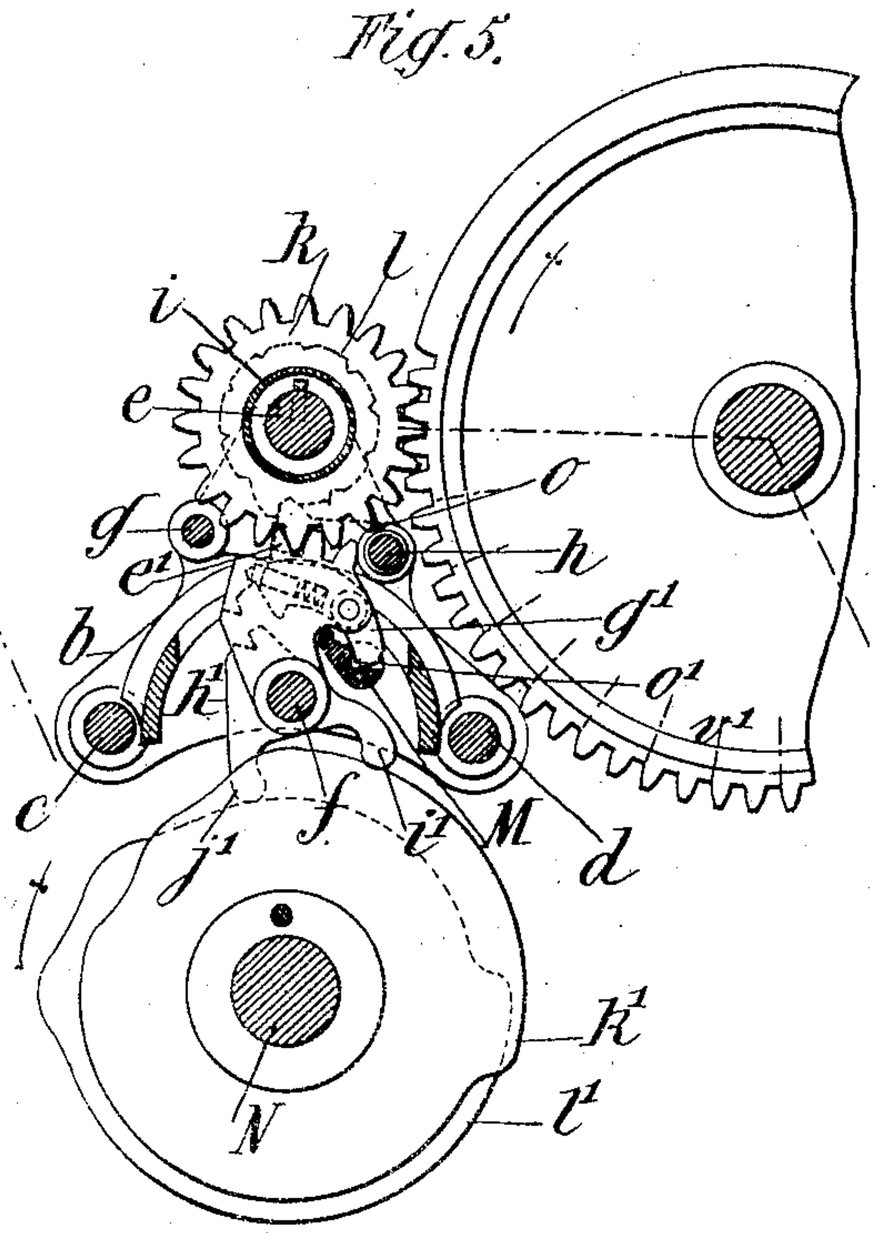
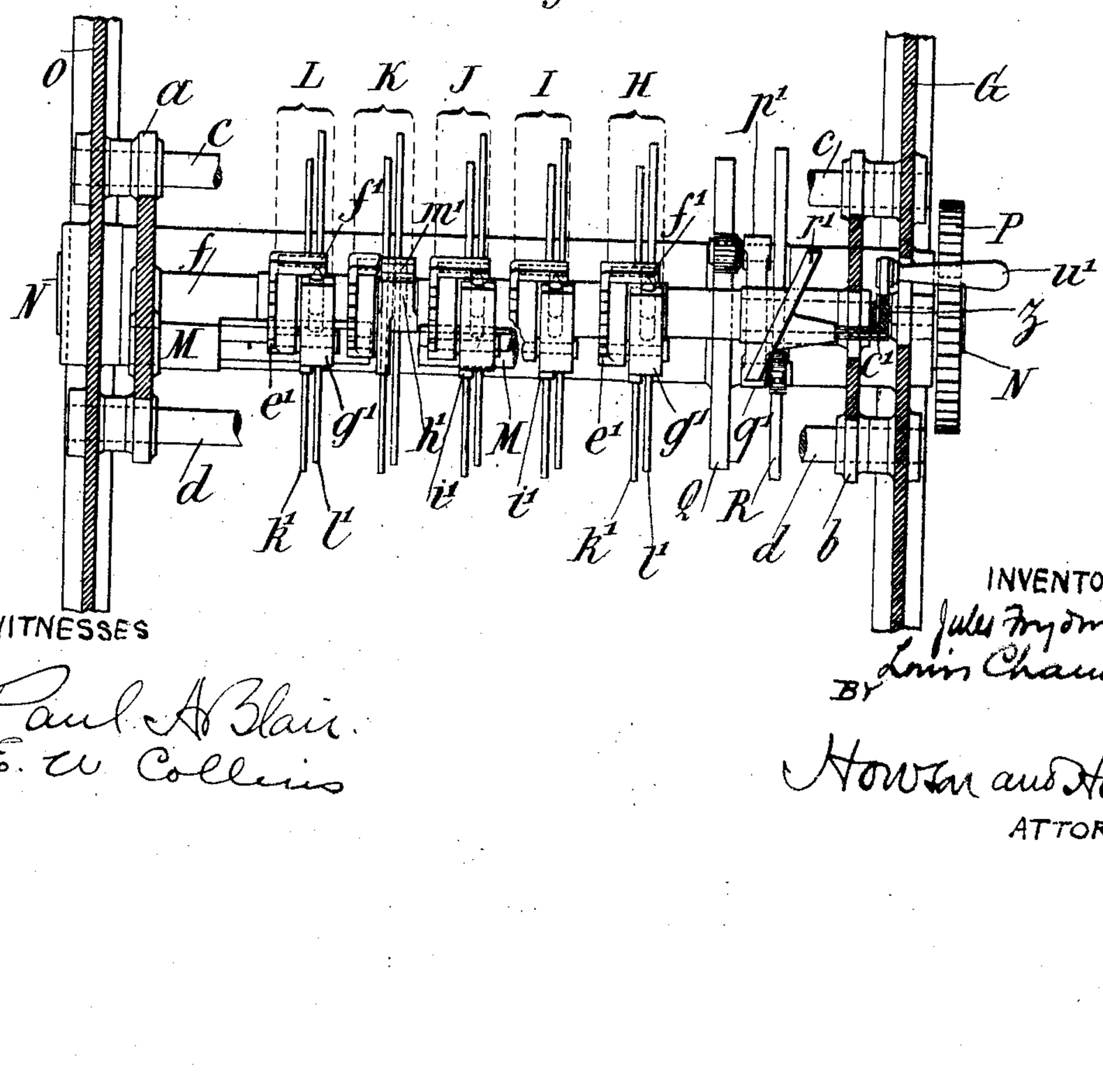


Fig. 4.



WITNESSES

Paul A. Blair.

E. W. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057.

PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 3.

Fig: 6

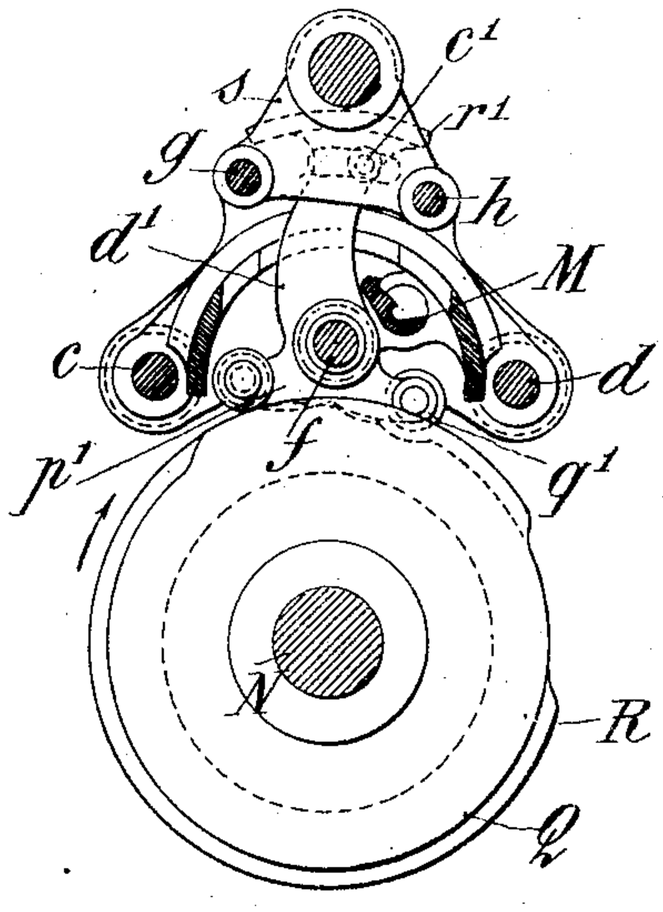


Fig: 7

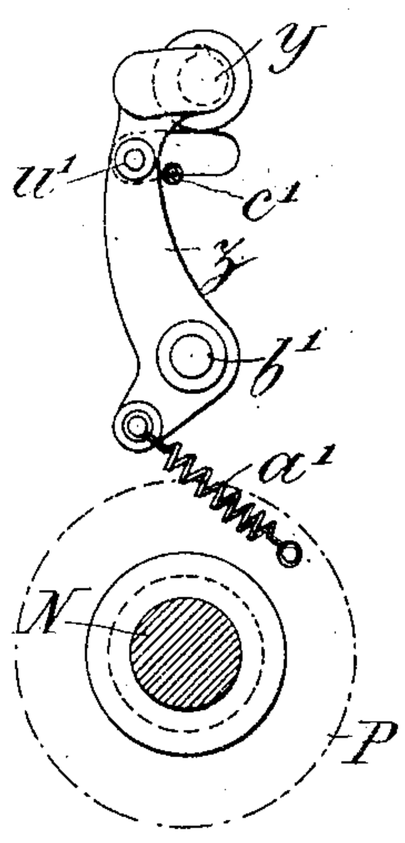


Fig: 12.

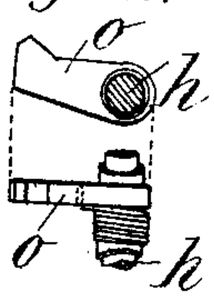


Fig: 13.

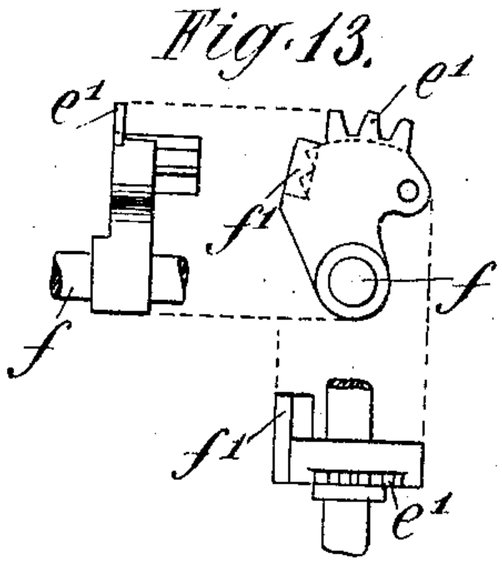


Fig: 14.

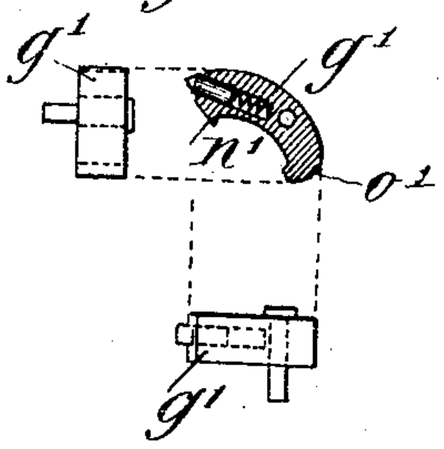
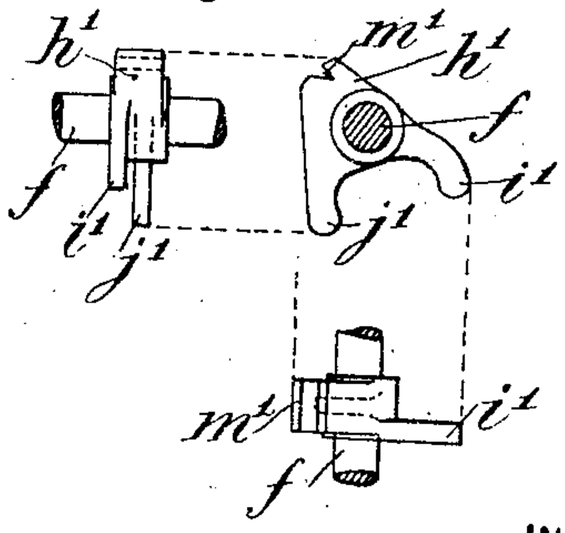


Fig: 15.



WITNESSES

Paul A. Blair

E. W. Collins

INVENTORS

Jules Frydmane

BY Louis Chambon

Howson and Howson

ATTORNEYS

No. 859,057.

PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 4.

Fig: 8.

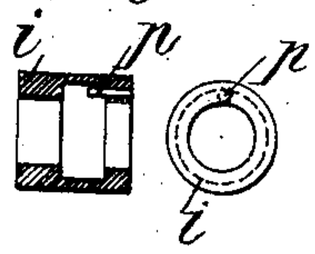


Fig: 9.

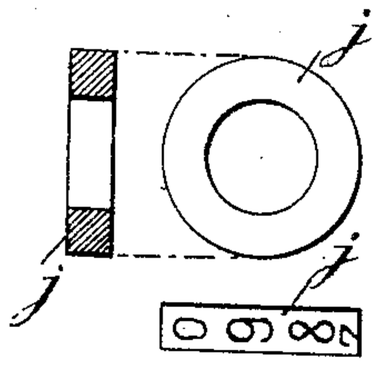


Fig: 10.

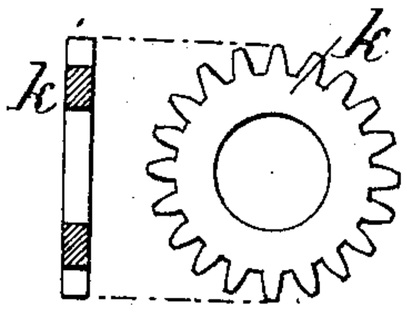


Fig: 11.

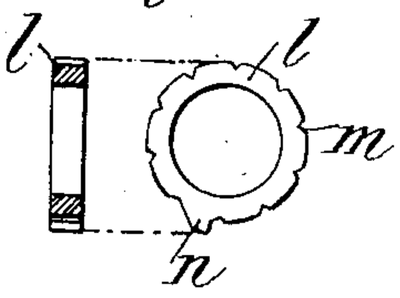


Fig: 16.

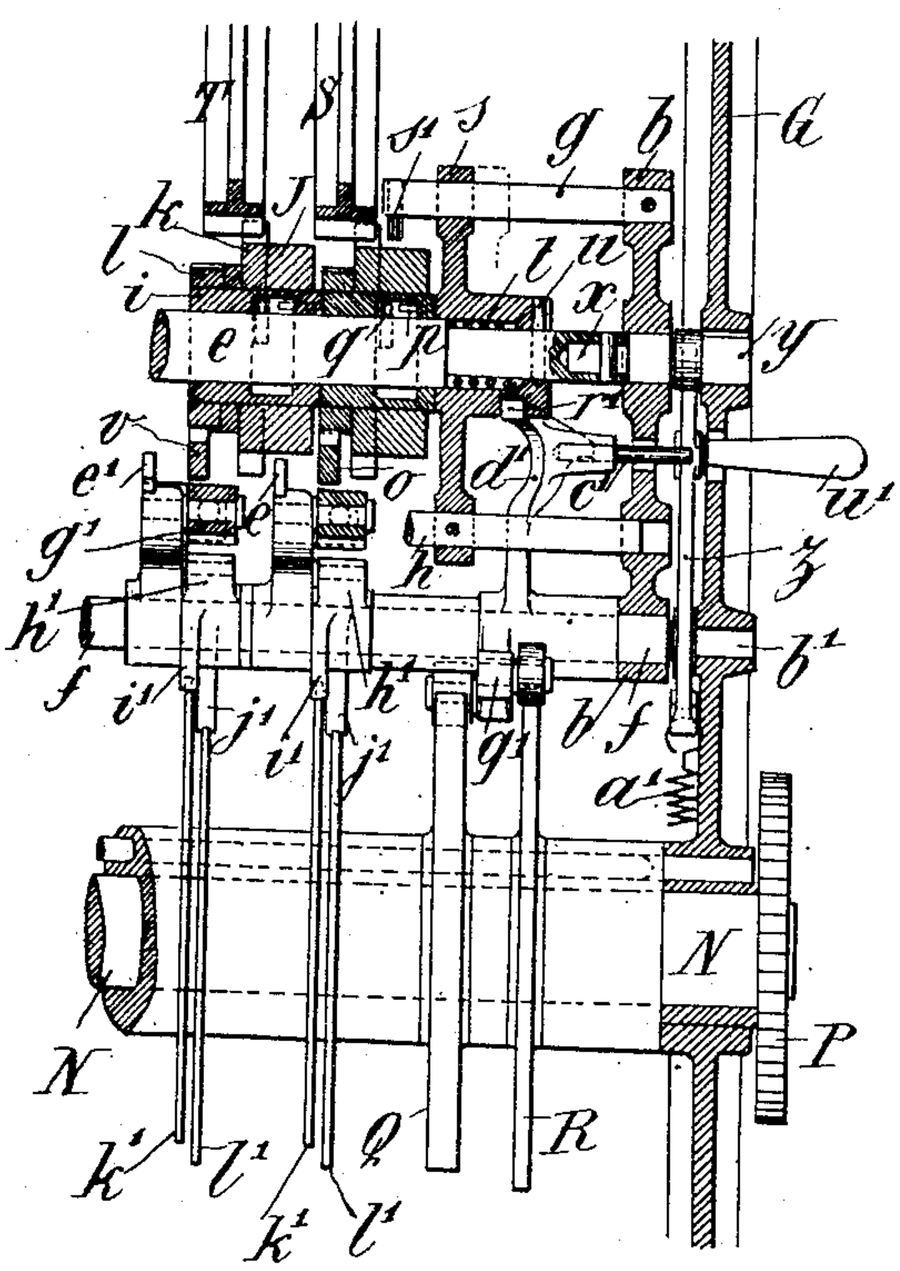
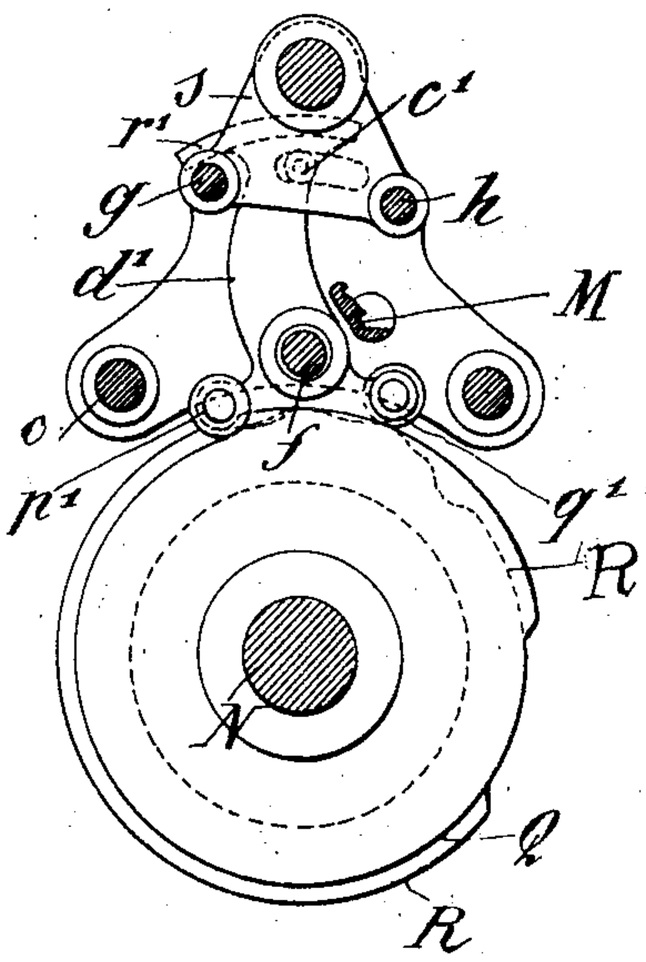


Fig: 17.



WITNESSES

Paul A. Blair

E. W. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057.

PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 6.

Fig: 18.

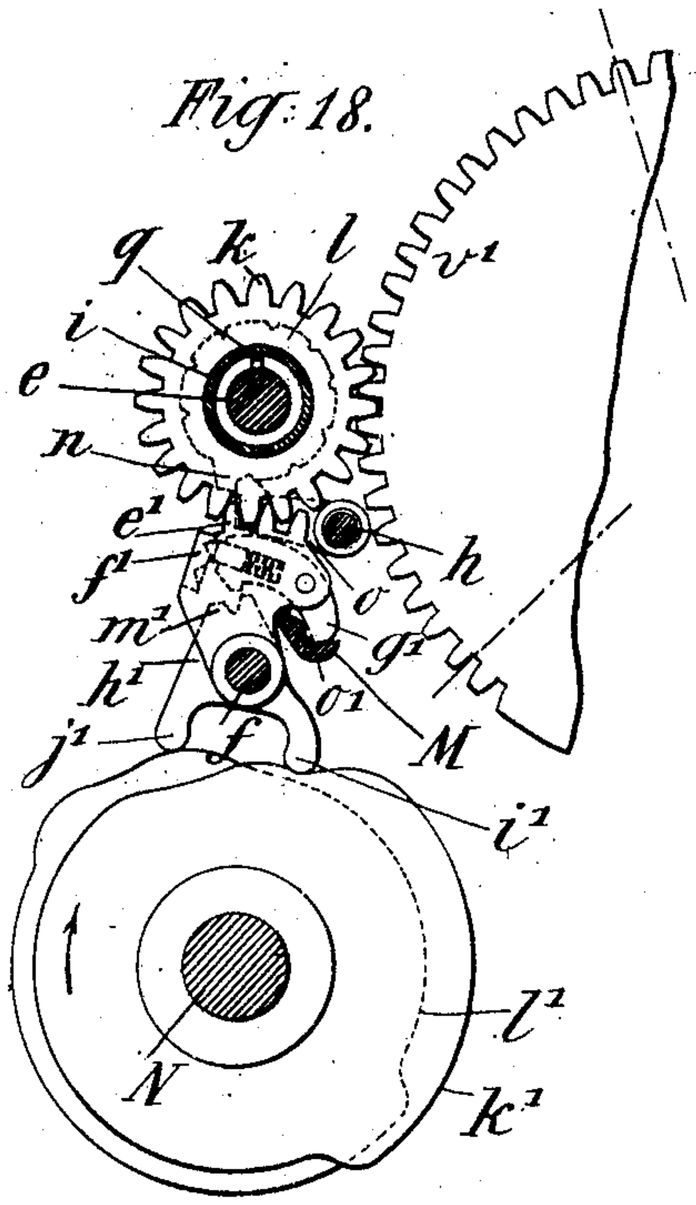


Fig: 19

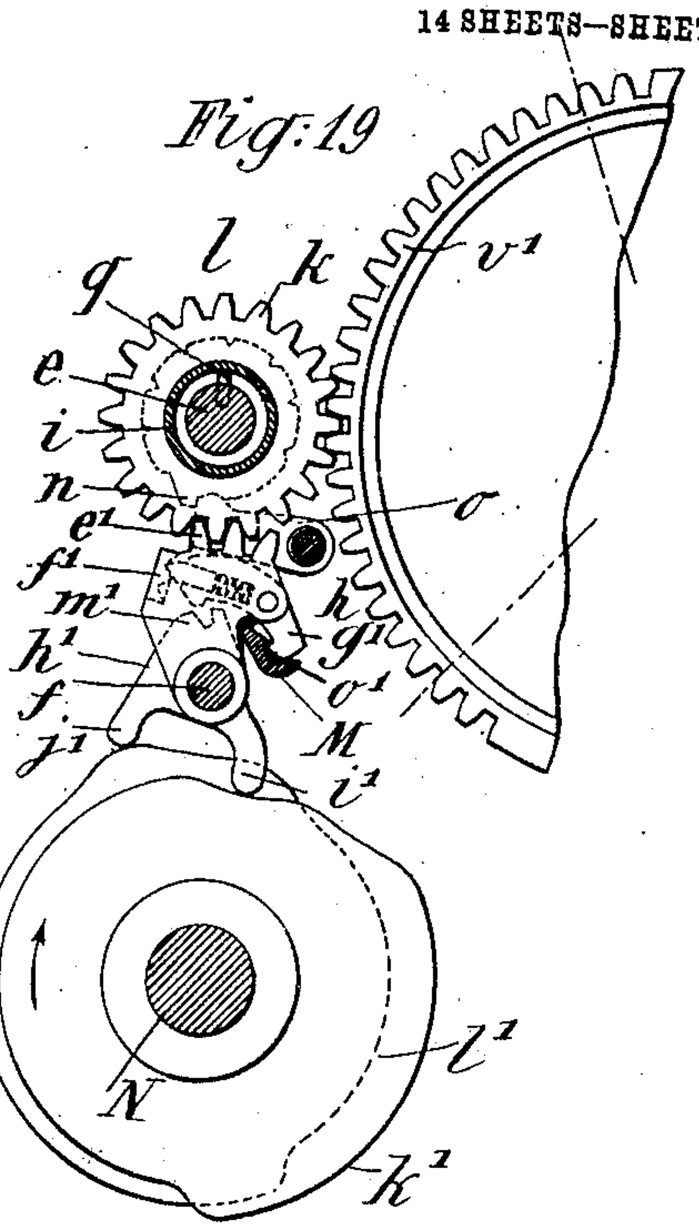


Fig: 22.

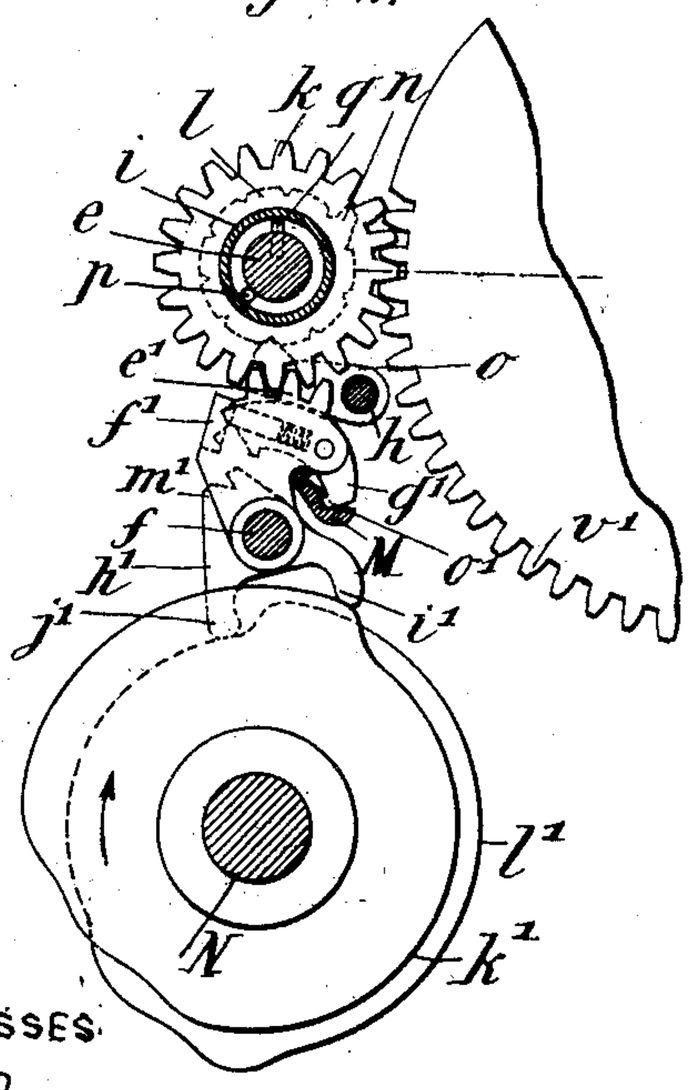
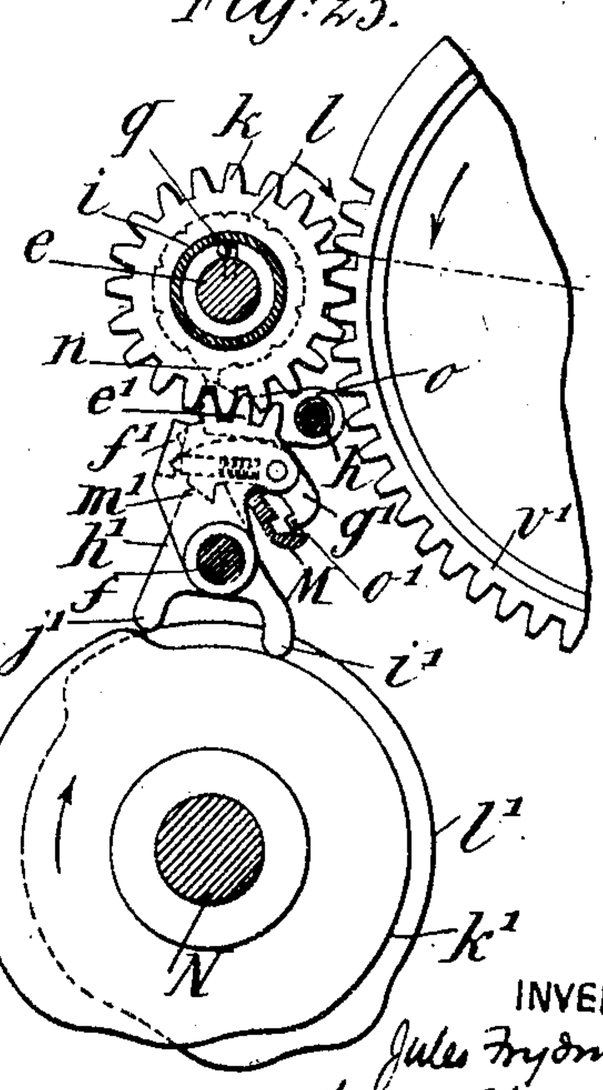


Fig: 23.



WITNESSES:

Paul A. Blair

E. W. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057. PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 6.

Fig. 20.

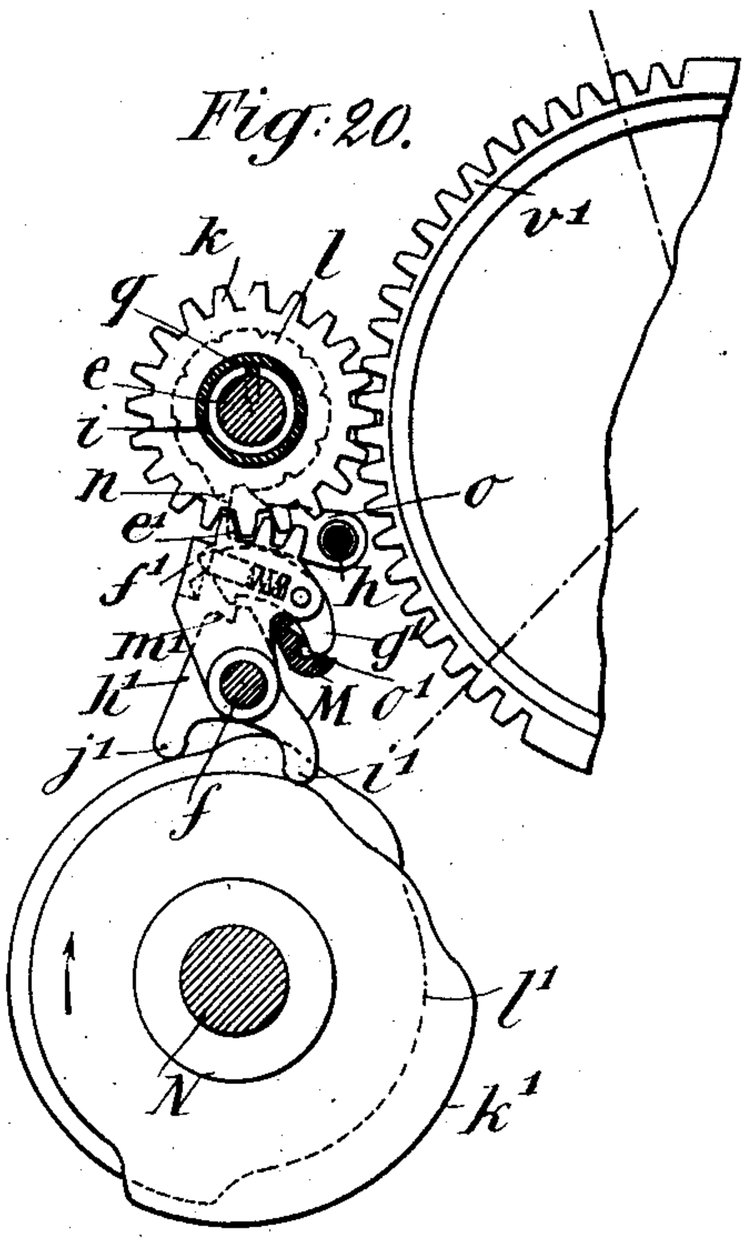


Fig. 21.

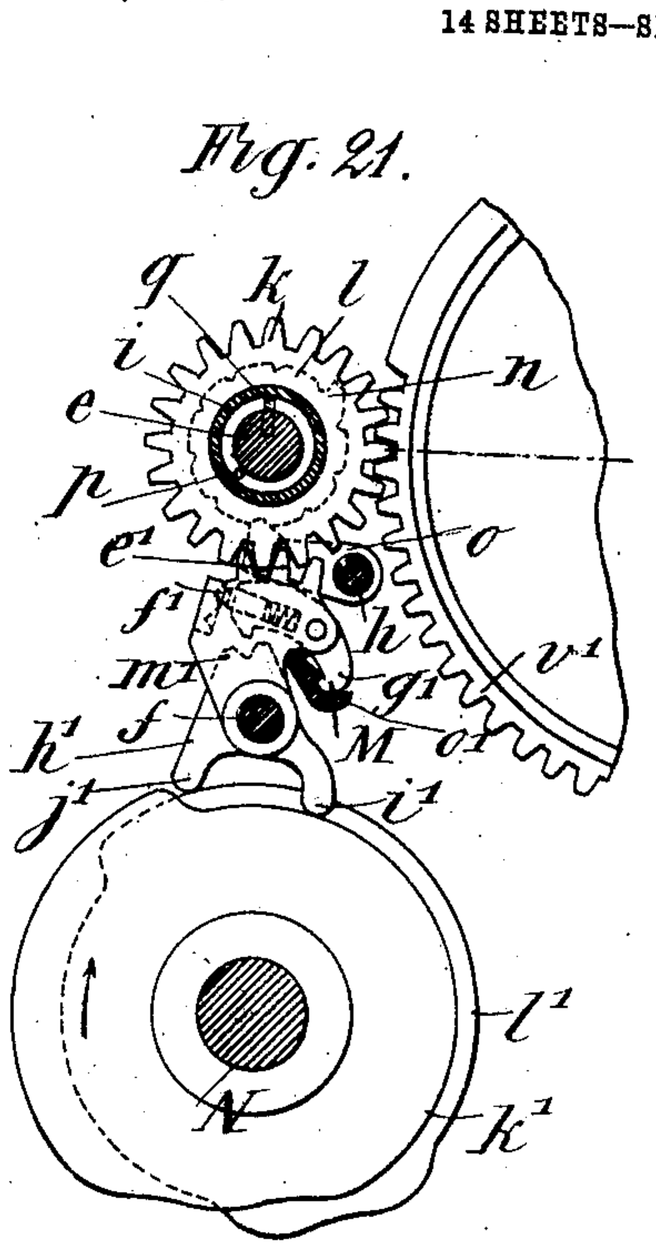


Fig. 24.

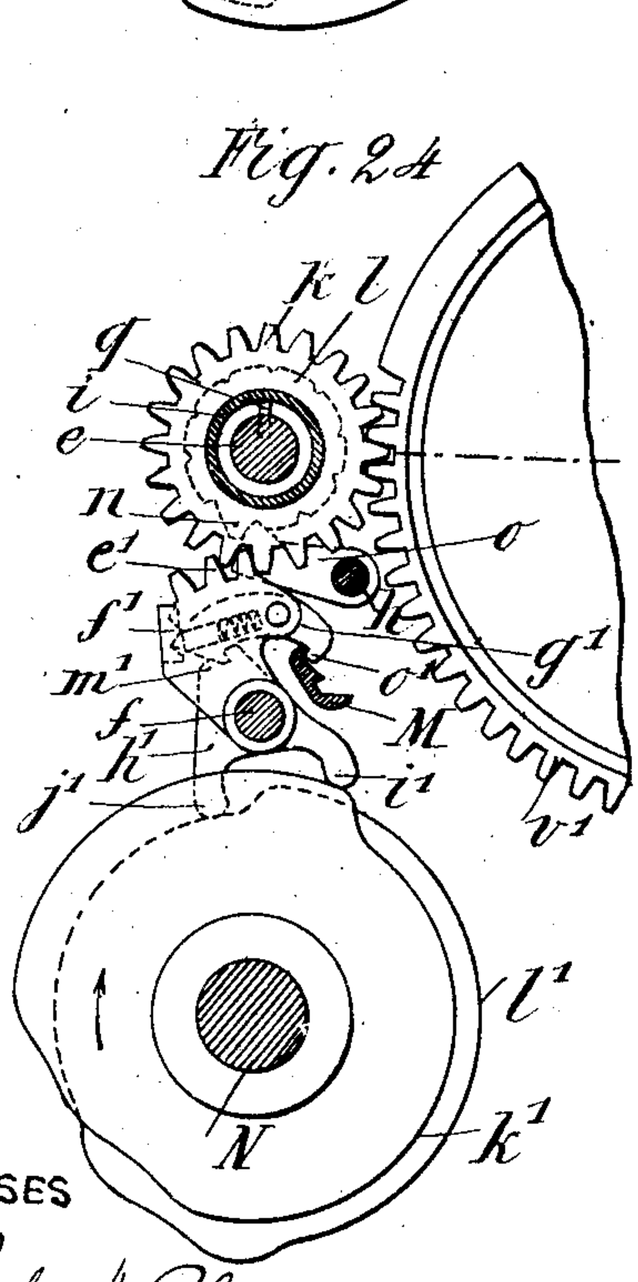
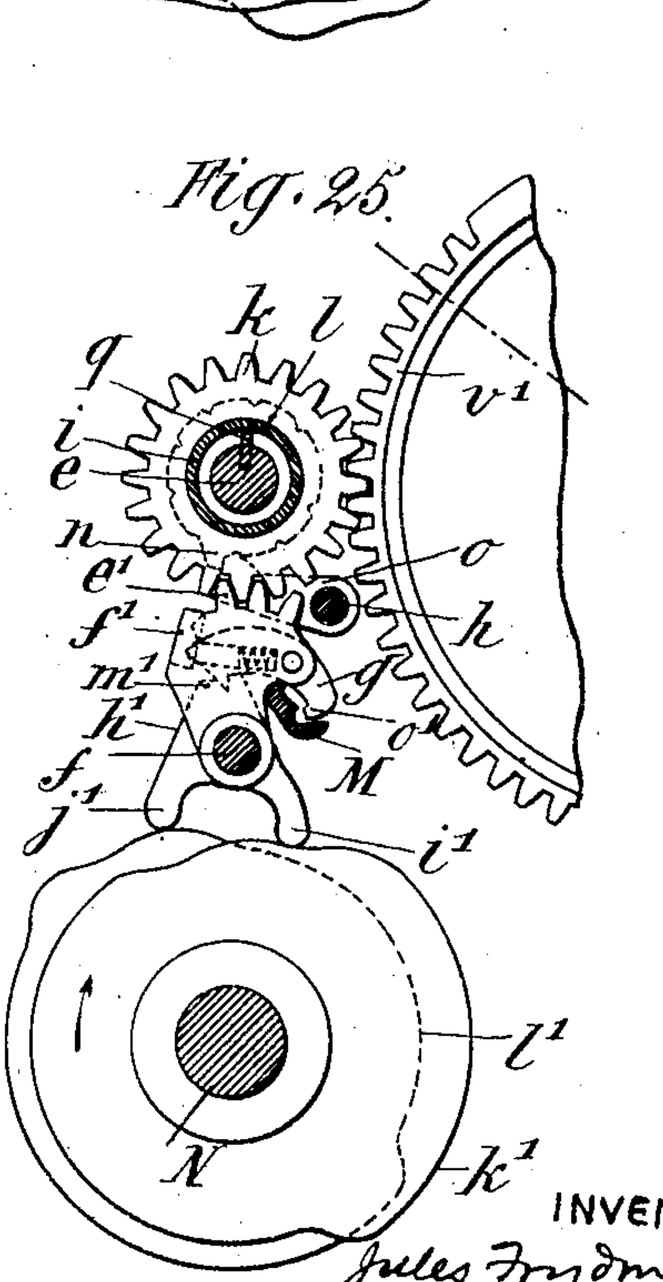


Fig. 25.



WITNESSES

Paul A. Blair.

E. W. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057.

PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 7.

Fig. 26.

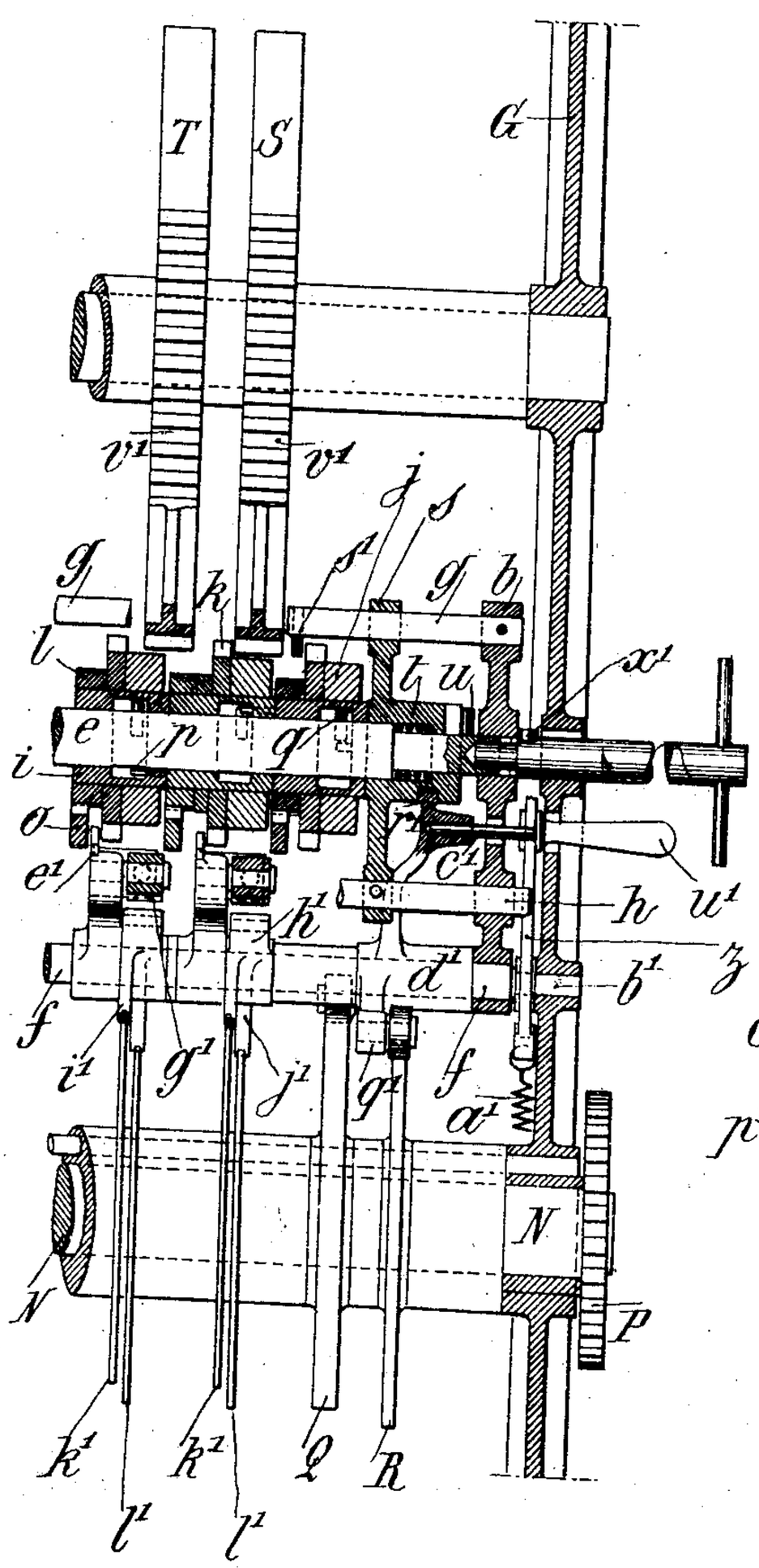
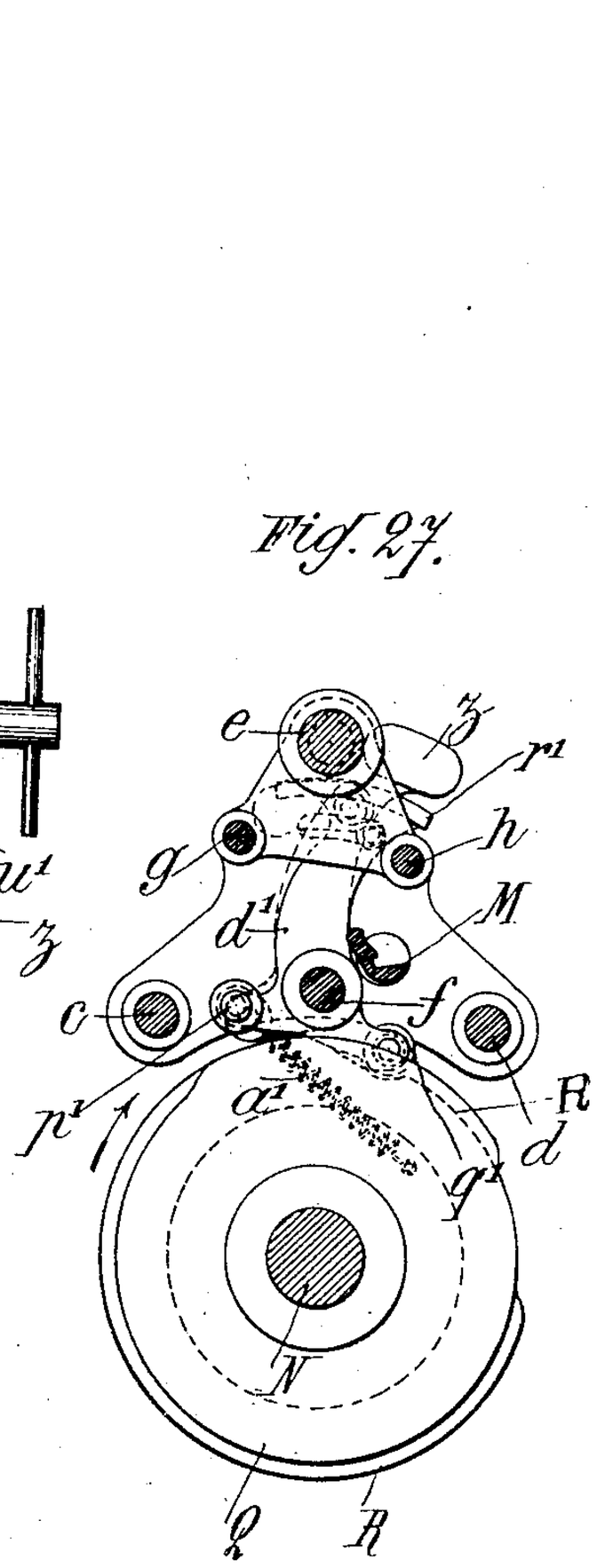


Fig. 27.



WITNESSES

Paul A. Blair

E. W. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057.

PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 8.

Fig. 28.

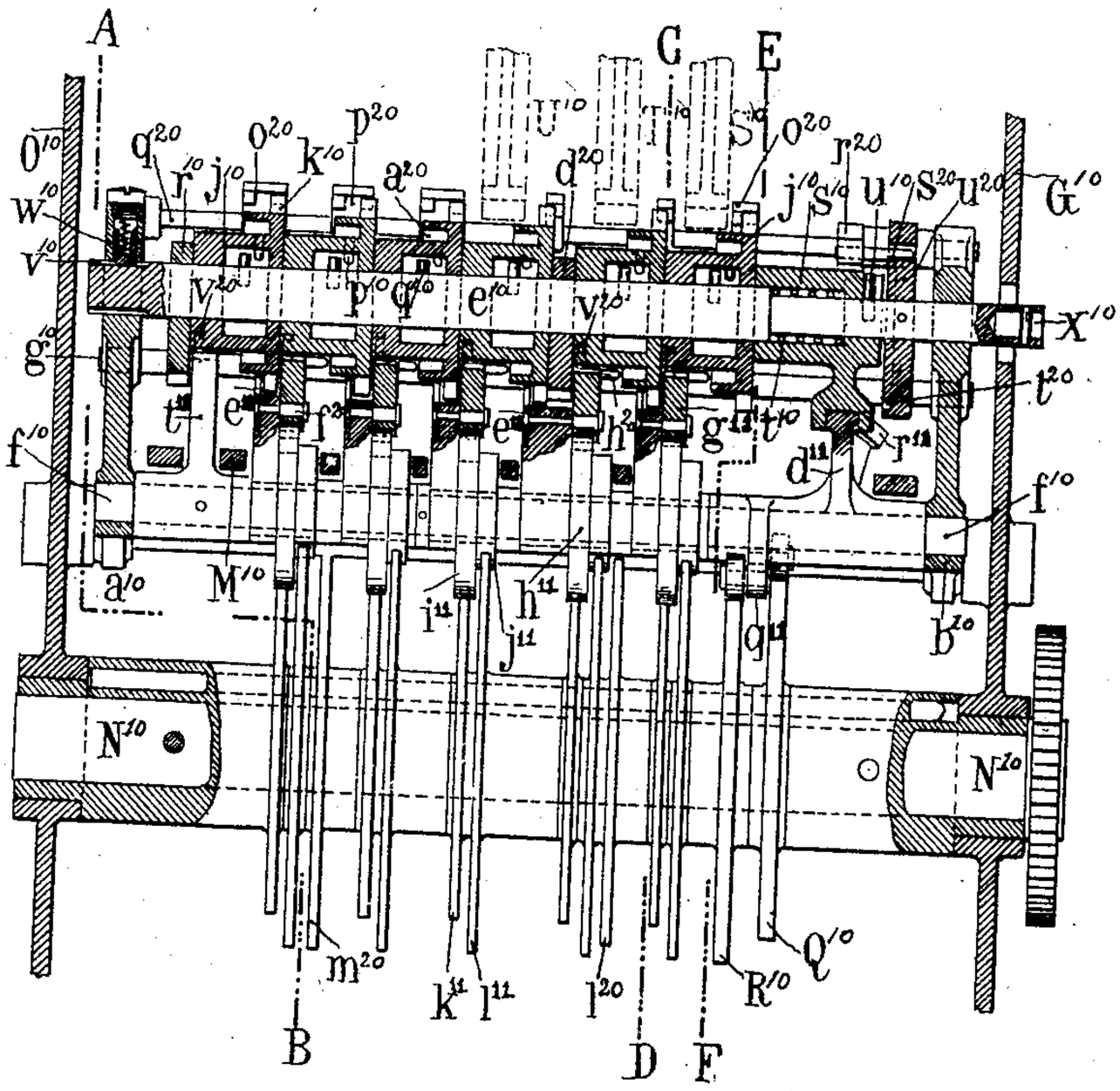
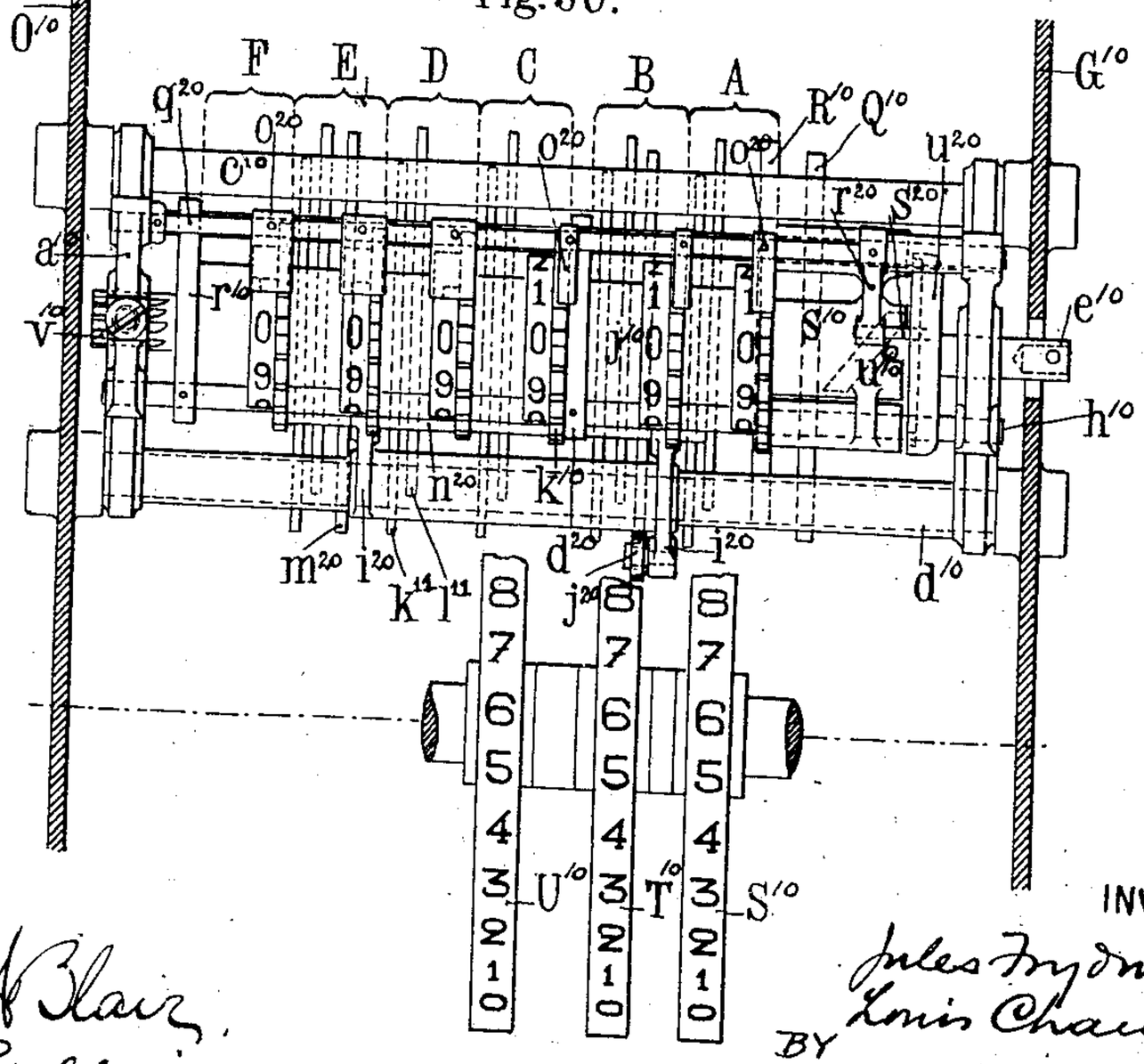


Fig. 30.



WITNESSES

Paul A. Blair.
E. W. Collins

INVENTORS

Jules Frydmane
Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057.

PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 9.

Fig. 29.

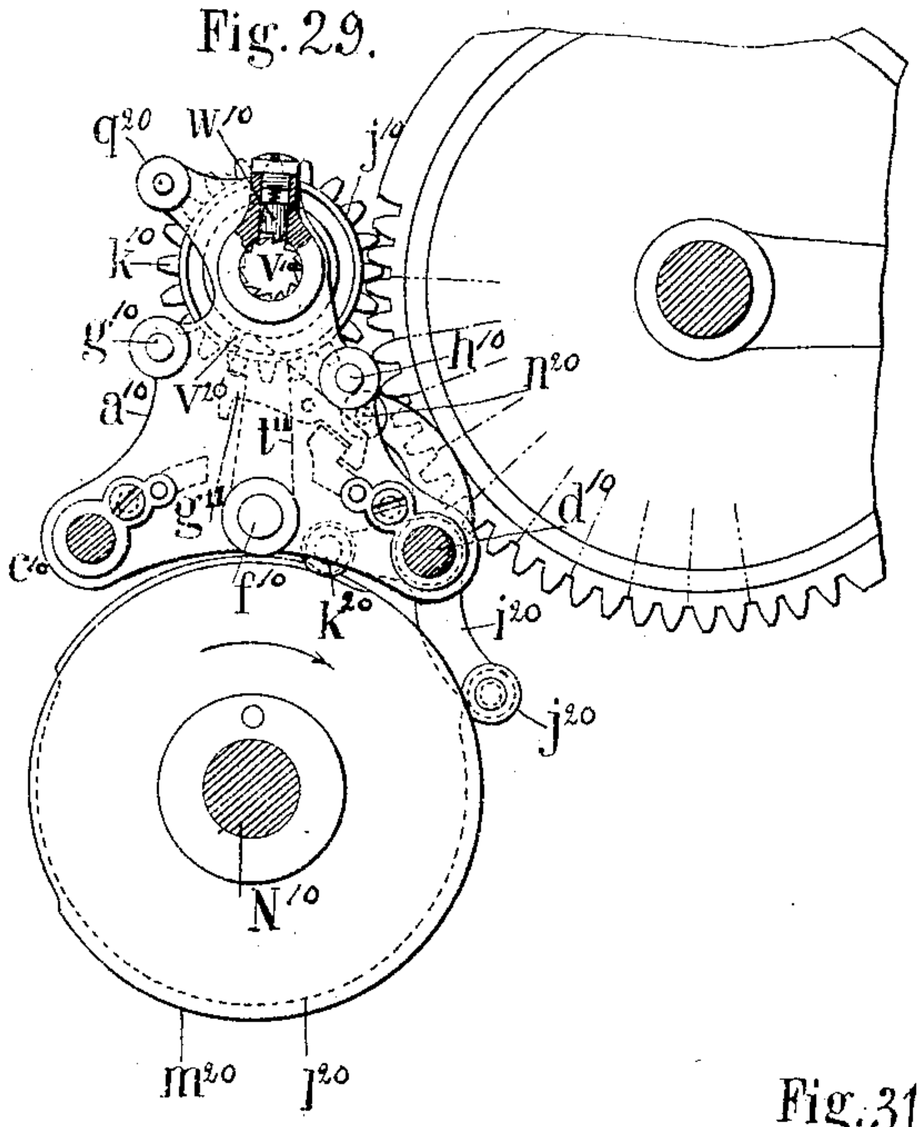


Fig. 32.

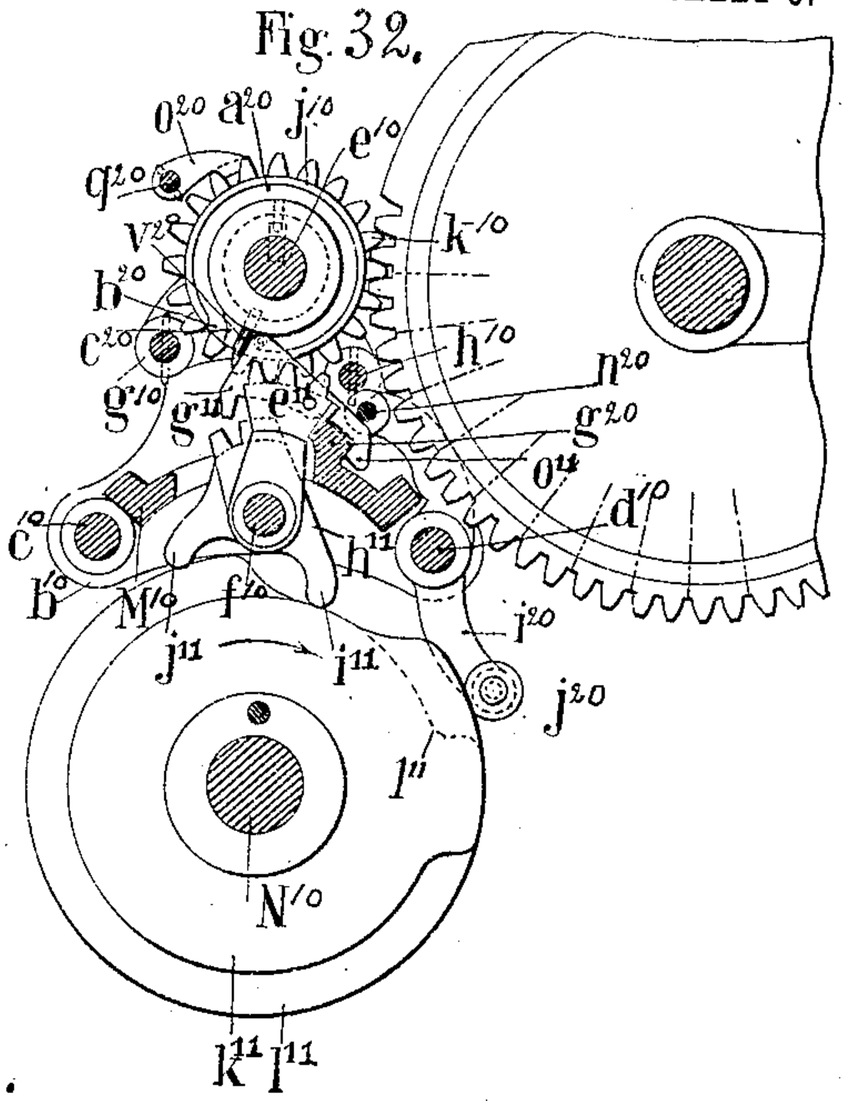


Fig. 31.

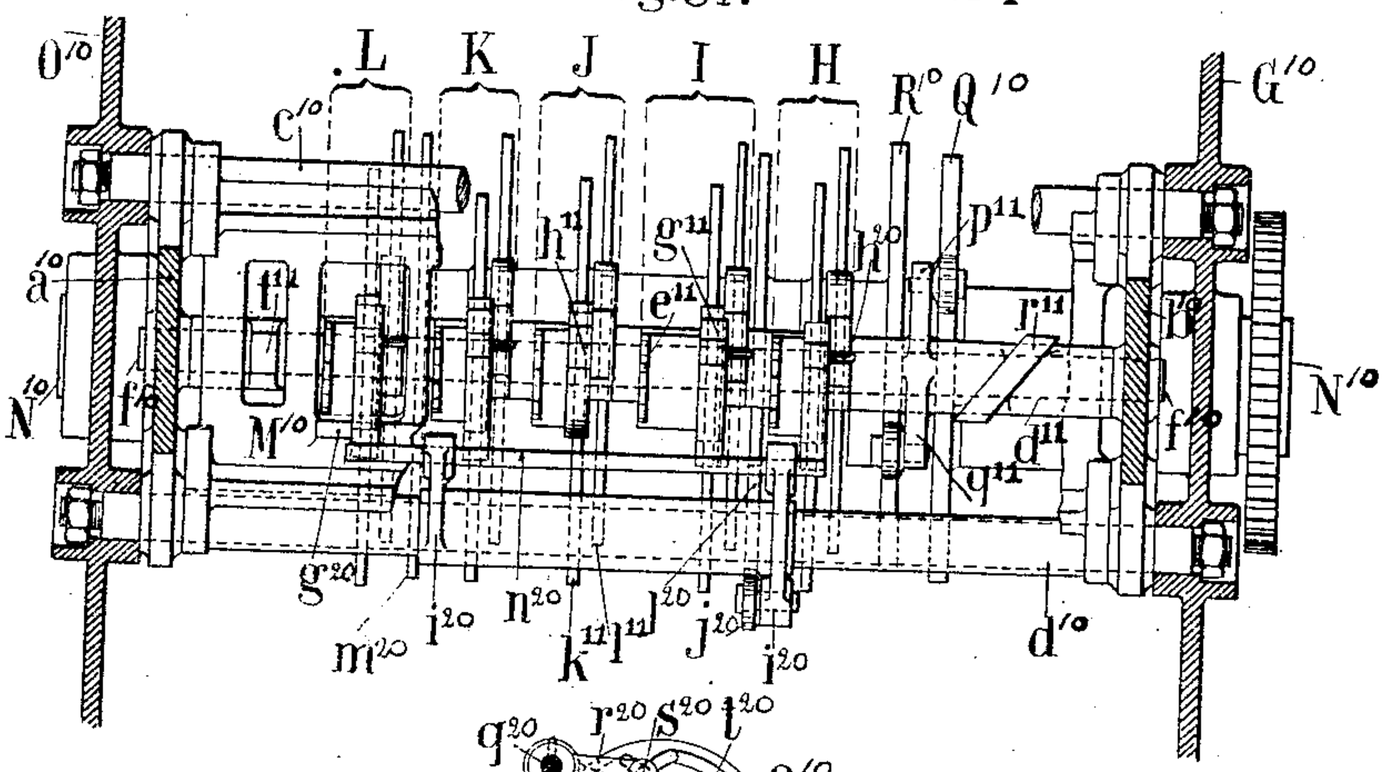
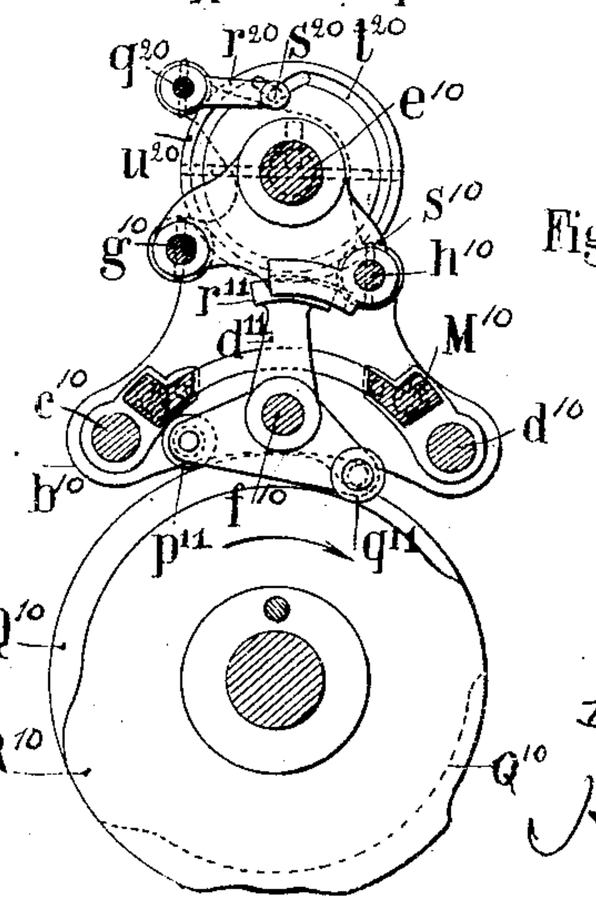


Fig. 33.



WITNESSES

Paul A. Blair.
E. W. Collins

INVENTORS

Jules Frydmane
Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057.

PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 10.

Fig. 35.

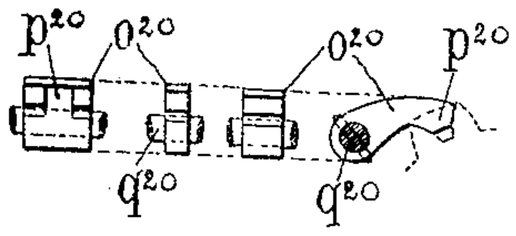


Fig. 34.

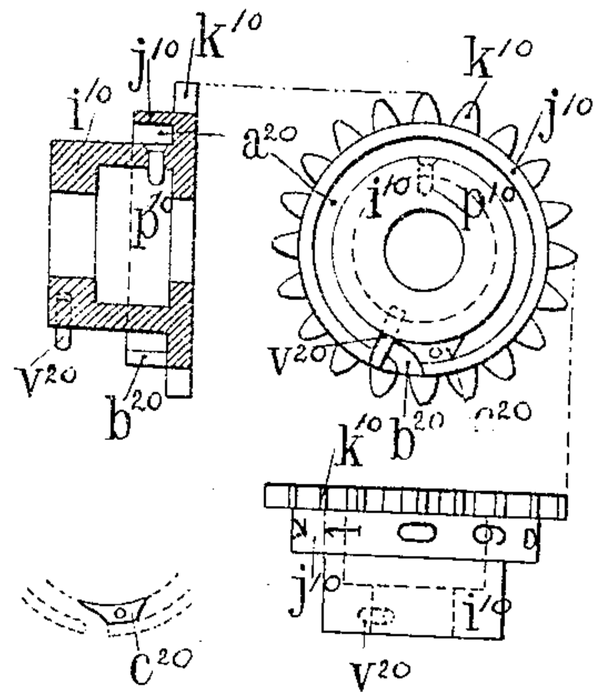


Fig. 36

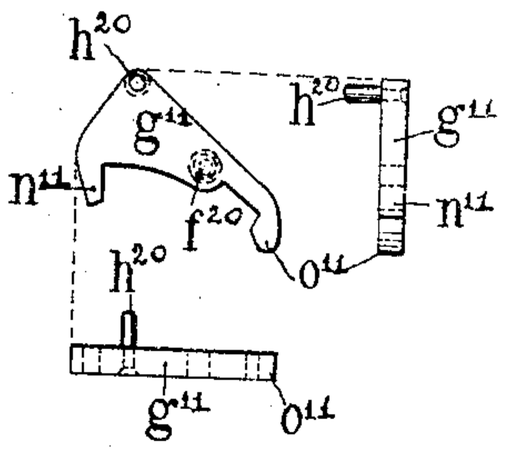


Fig. 37

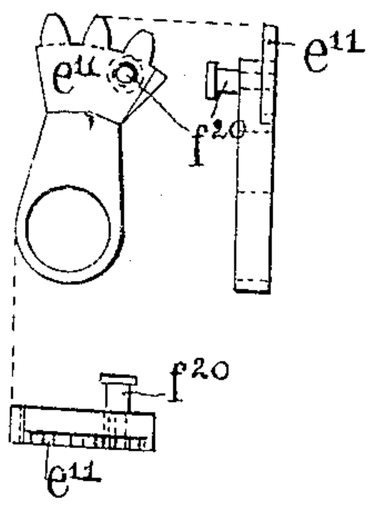
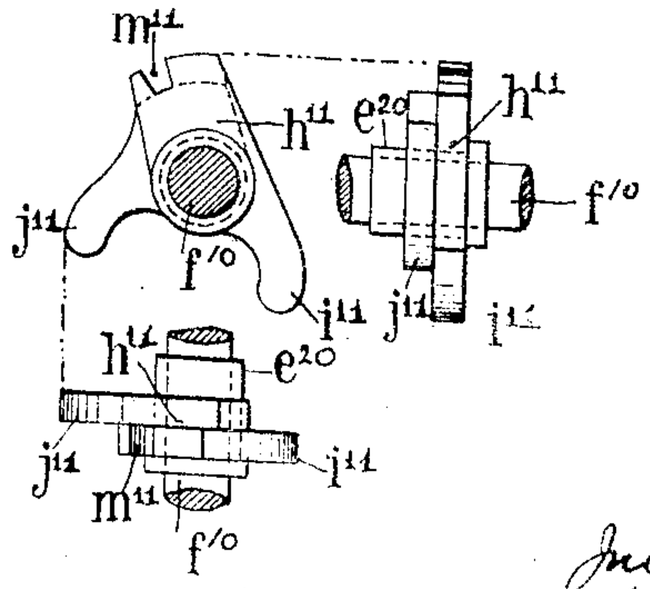


Fig. 38.



WITNESSES

Paul A. Blair

E. A. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057. PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 11.

Fig. 39.

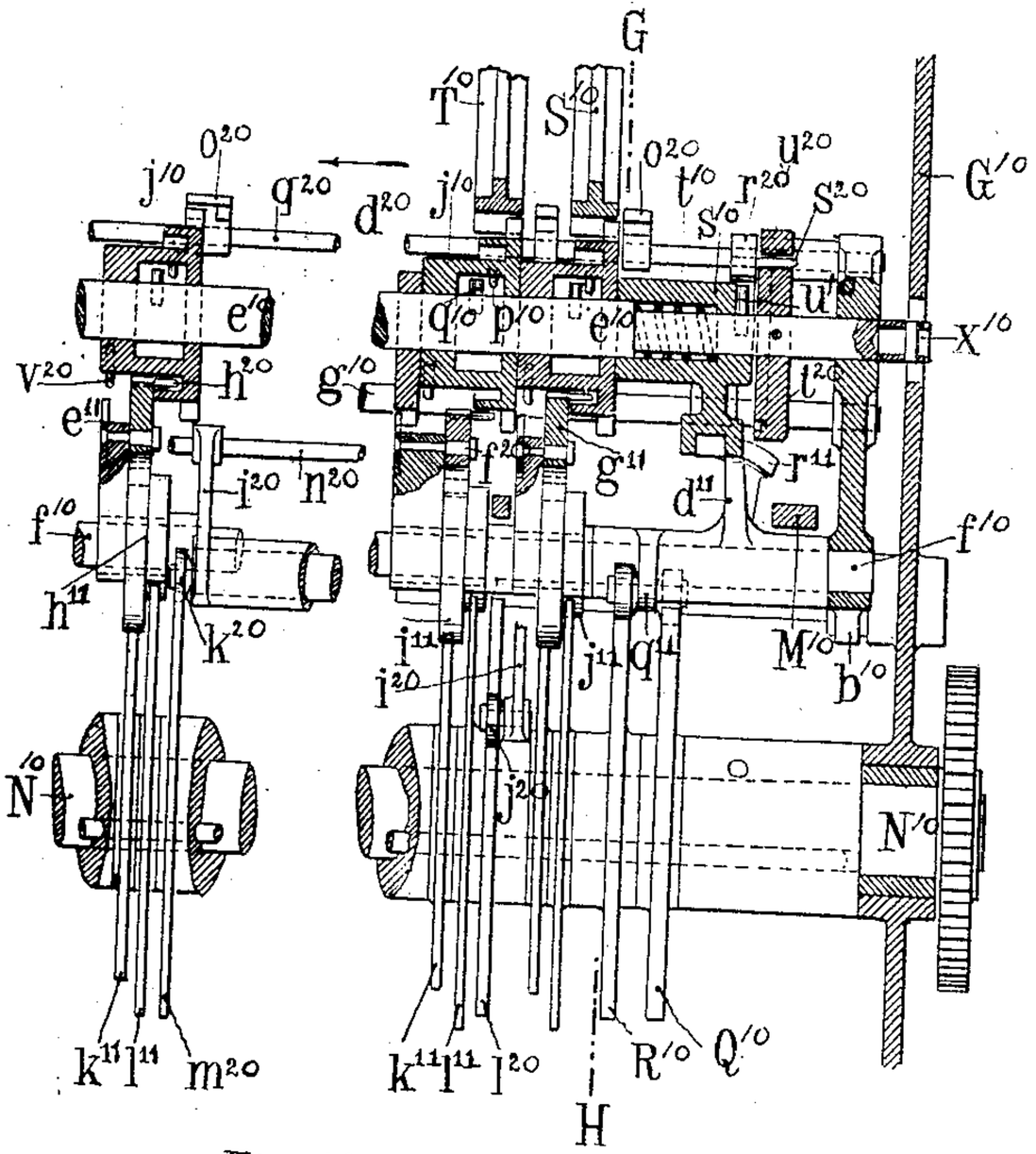


Fig. 40.

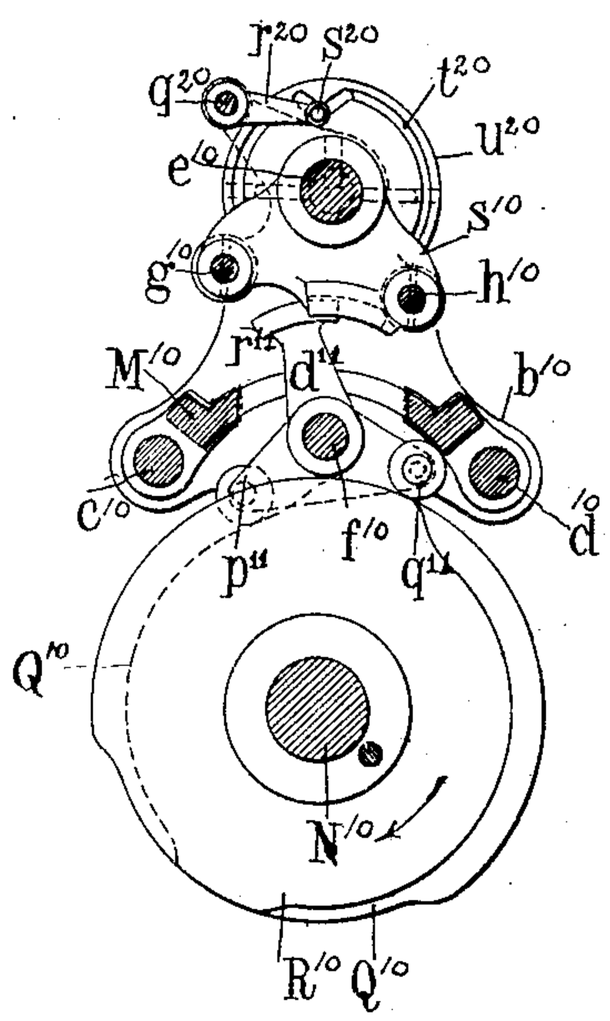


Fig. 41.

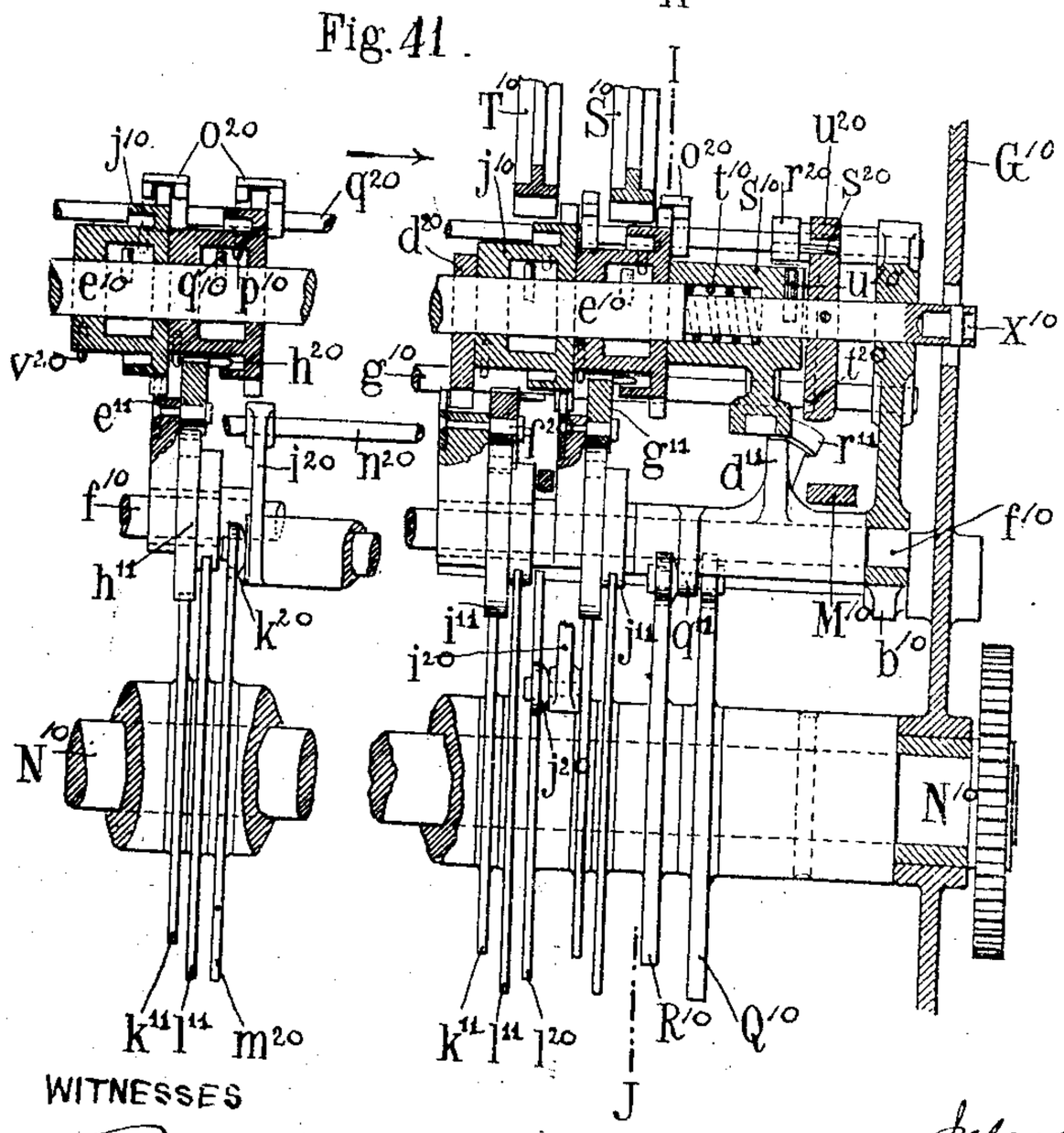
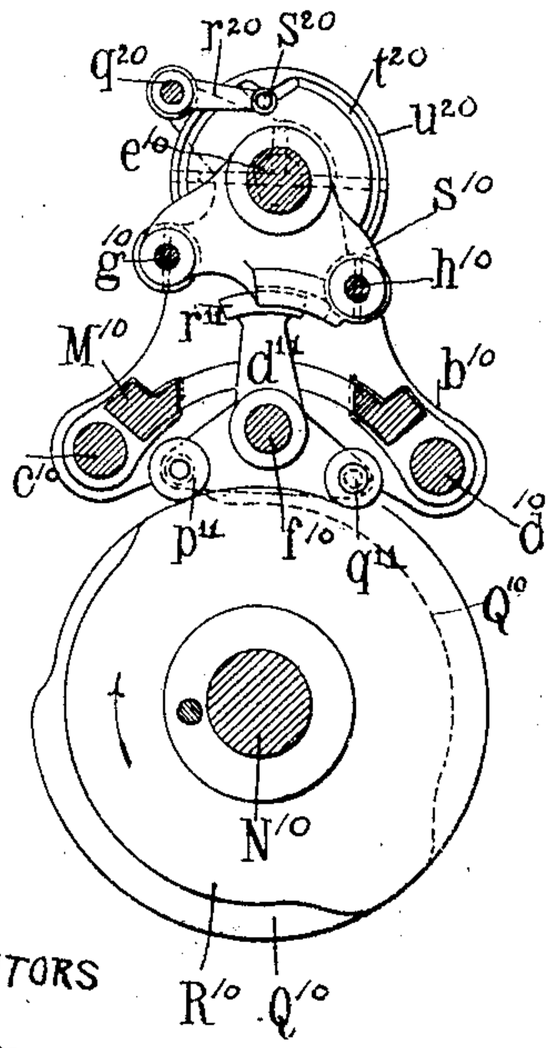


Fig. 42.



WITNESSES

Paul A. Blair

E. W. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057. PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 12.

Fig. 43

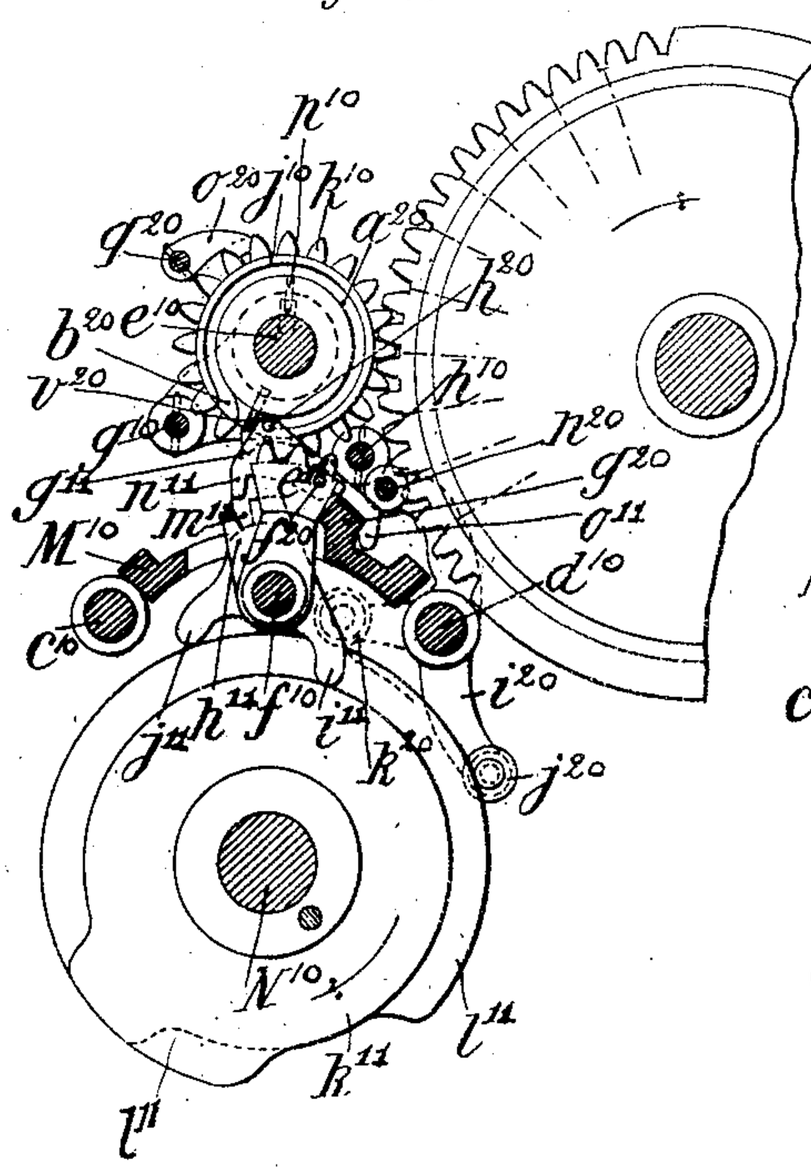


Fig. 44.

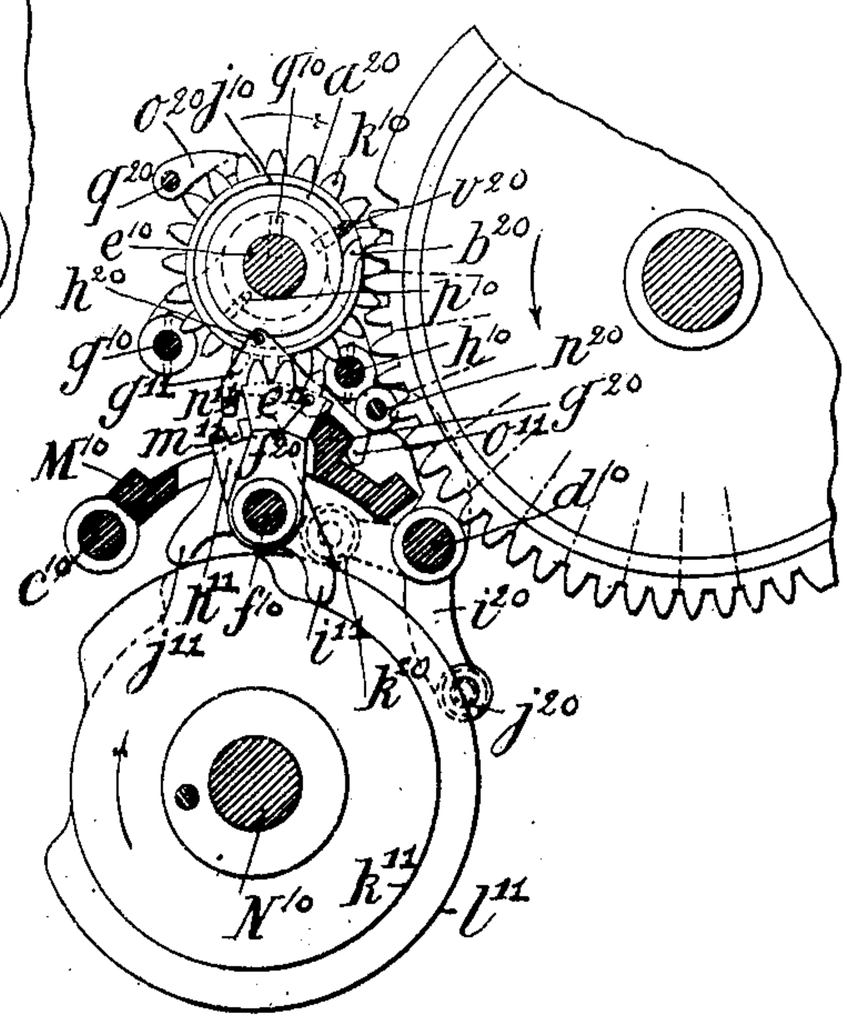


Fig. 46.

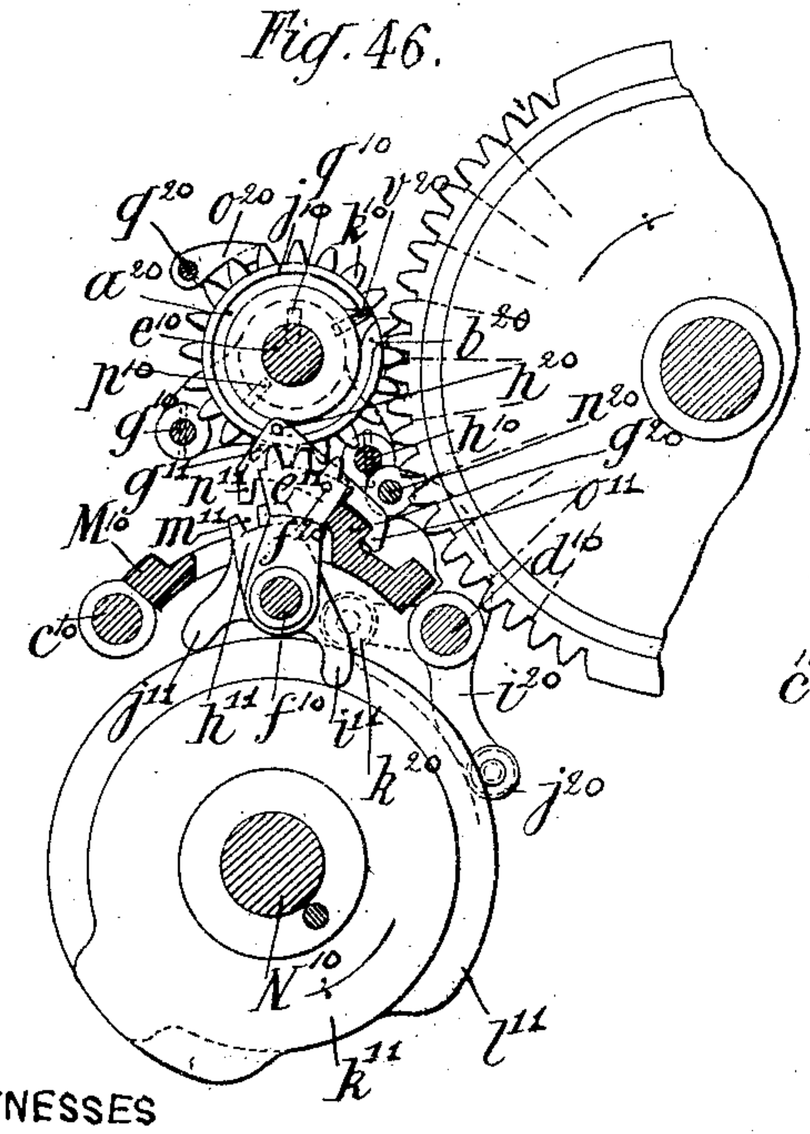
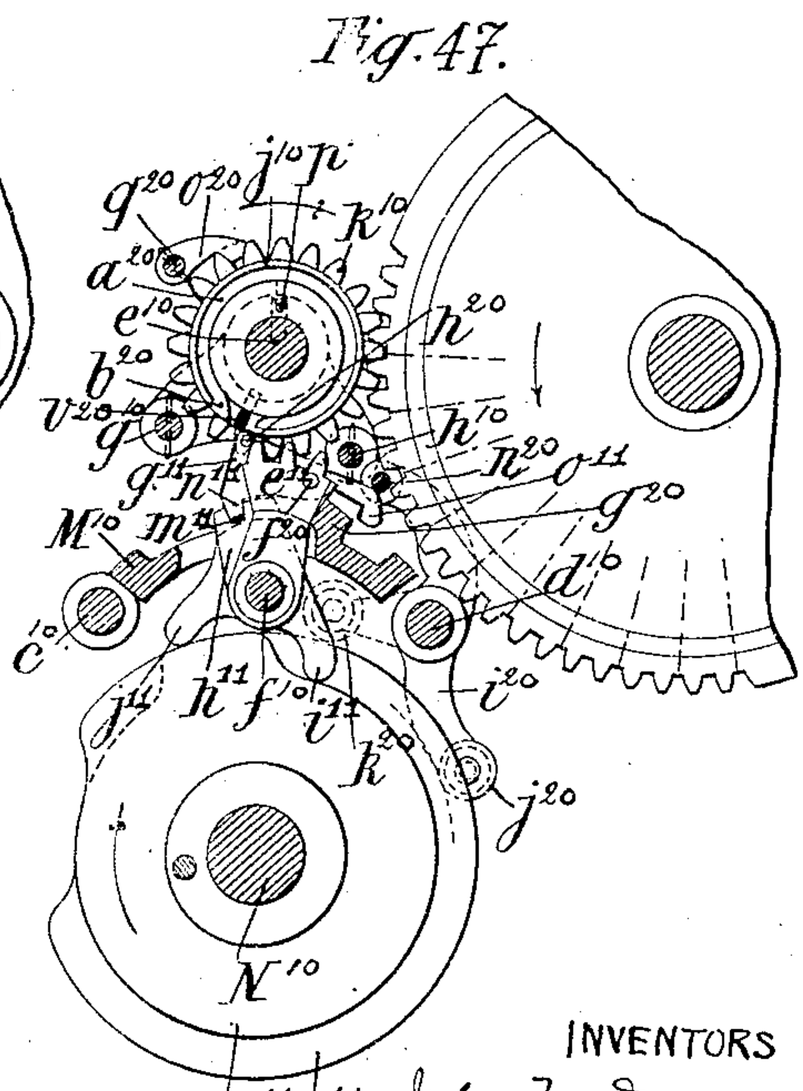


Fig. 47.



WITNESSES

Paul A Blair

E. A. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057. PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 13.

Fig. 45.

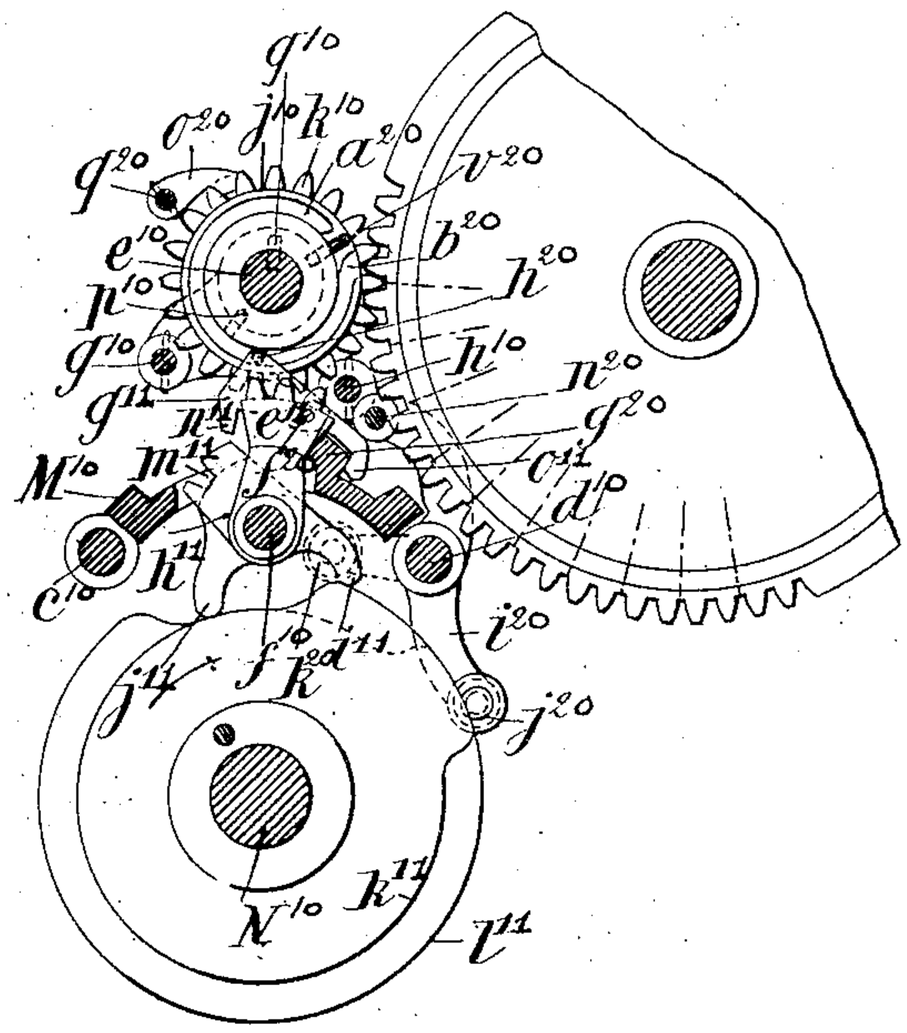


Fig. 48.

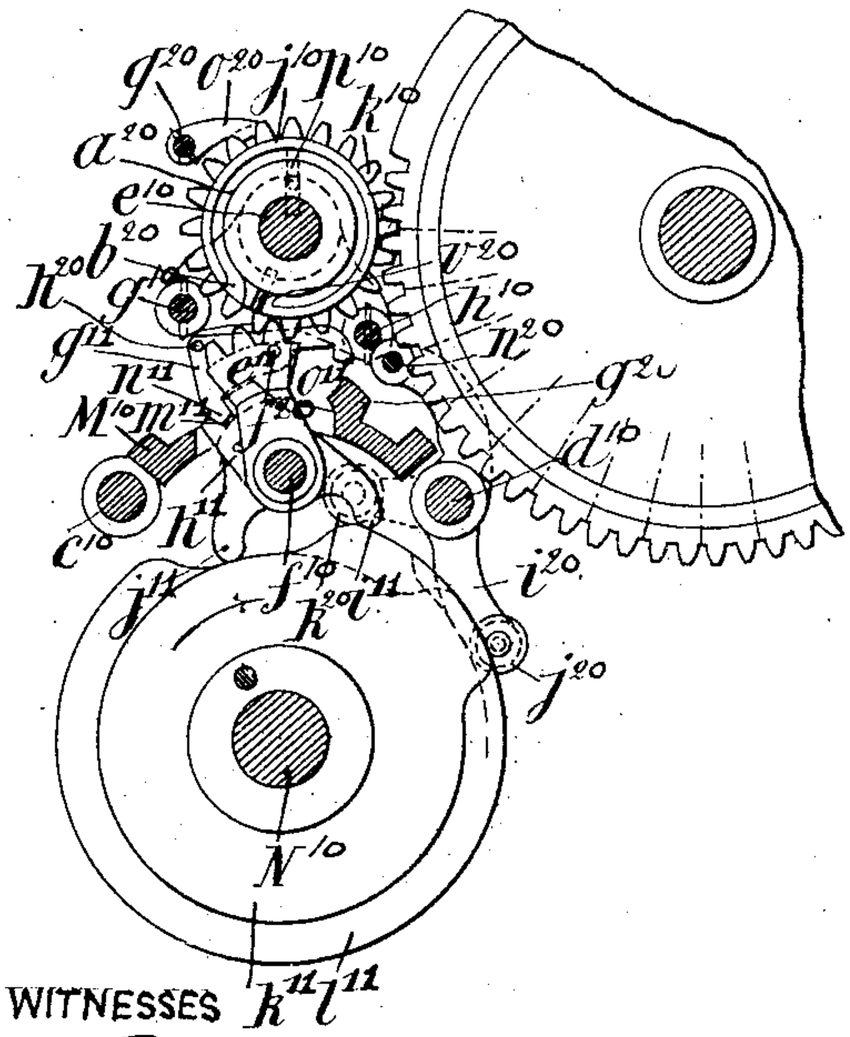
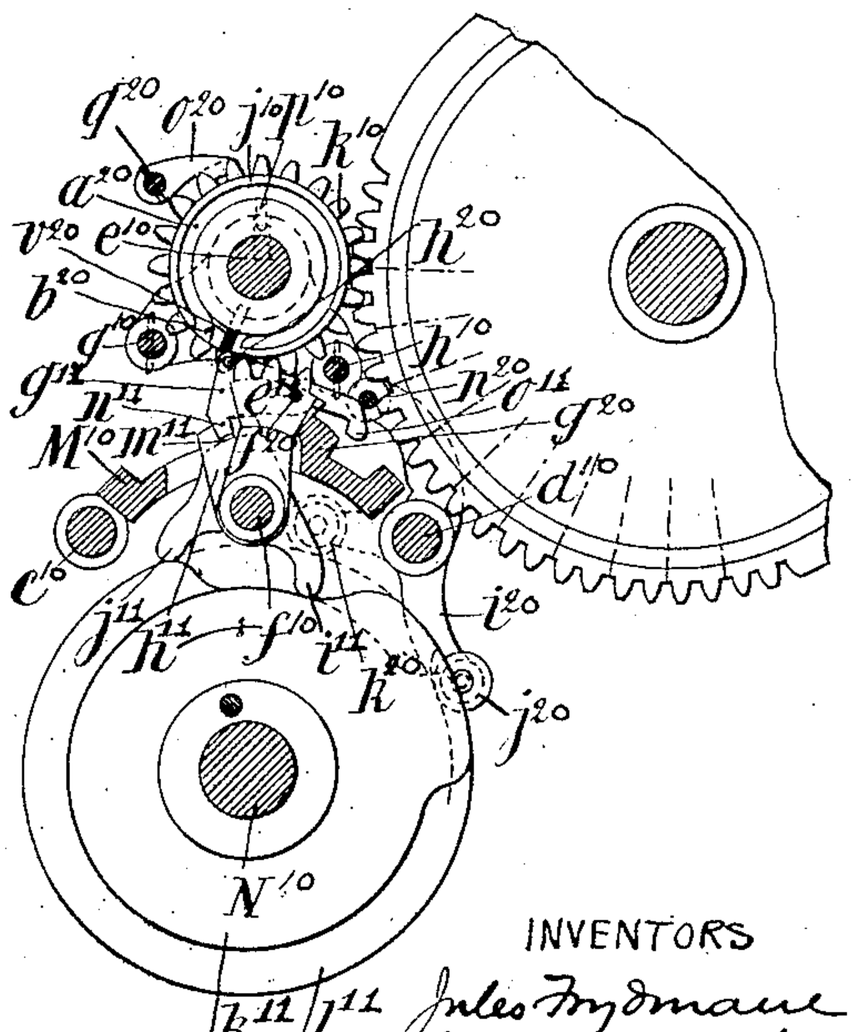


Fig. 49.



WITNESSES

Paul A. Blair.

E. U. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

No. 859,057. PATENTED JULY 2, 1907.

J. FRYDMANE & L. CHAMBON.

TOTALIZER.

APPLICATION FILED JAN. 6, 1905.

14 SHEETS—SHEET 14.

Fig. 50.

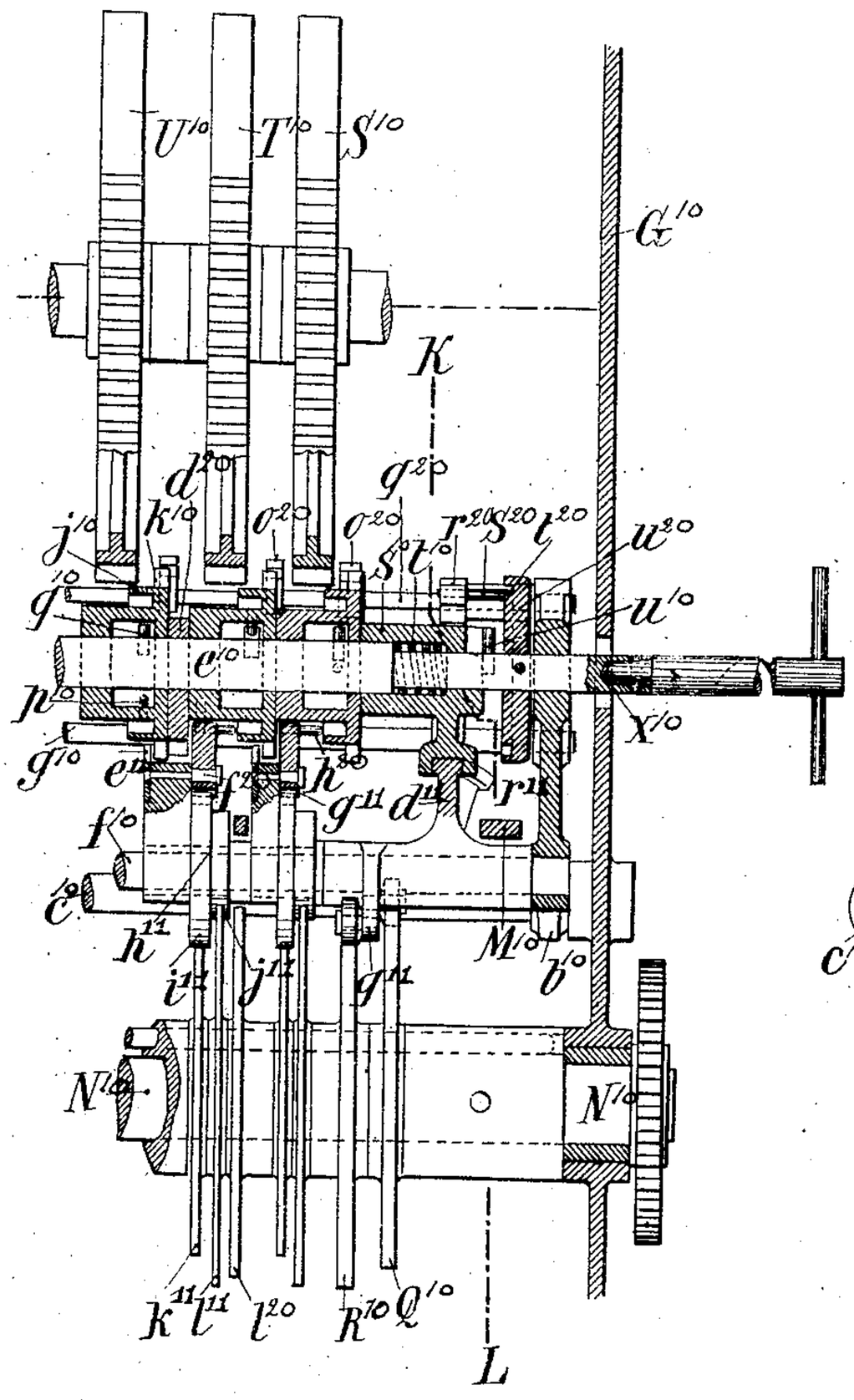
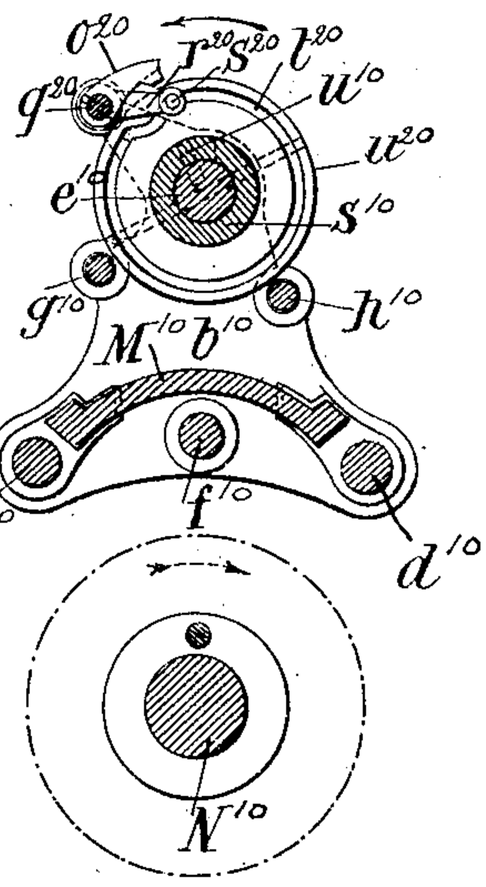


Fig. 51.



WITNESSES

Paul A. Blair.

E. W. Collins

INVENTORS

Jules Frydmane

Louis Chambon

BY

Howson and Howson

ATTORNEYS

UNITED STATES PATENT OFFICE.

JULES FRYDMANE AND LOUIS CHAMBON, OF PARIS, FRANCE.

TOTALIZER.

No. 859,057. Specification of Letters Patent. Patented July 2, 1907.

Application filed January 9, 1905. Serial No. 239,894.

To all whom it may concern:

Be it known that we, JULES FRYDMANE and LOUIS CHAMBON, both citizens of the Republic of France, and residing in Paris, France, (whose post-office address is 76 Rue de Réaumur, Paris, France,) have invented a Totalizer, (for which we have obtained a French patent, 9th January, 1904, No. 339,477,) of which the following is a specification.

This invention has for its object to provide a totalizer in which the totalizing units, wheels, or disks, are movable with certain operating means, or with certain carrying forward parts but which totalizing parts are only movable with such said parts, that is, in the usual normal operation of the machine, making it impossible for acquired momentum of the totalizing parts to cause them to be moved. In a way it is for producing a positive locking of the parts except when properly actuated from the aforesaid parts, thus obviating the use of spring detaining fingers, as commonly used in the art.

In the two embodiments of our invention as hereinafter illustrated and described, we have shown sufficient parts of a totalizer necessary to a complete understanding of our invention. These parts are adapted for use in that type of apparatus shown in the U. S. Patent to Jules Frydmane, No. 738,670, of September 8, 1903.

In the accompanying drawings Figure 1 is a longitudinal sectional view of so much of our improved totalizer necessary to an understanding of this invention, parts having been removed for clearness, and it shows the totalizer in a condition of repose, *i. e.*, the totalizing wheels out of engagement with the operating disks and engaged by the carrying forward parts; Fig. 2 is a section on line A B, Fig. 1; Fig. 3 is a plan view of Fig. 1; Fig. 4 is a plan of the carrying forward devices, the totalizers being removed; Fig. 5 is a section on the line C D, Fig. 1; Fig. 6 is a section on the line E F, Fig. 1; Fig. 7 is a detail of part of the resetting apparatus; Fig. 8 is a detail in section and end elevation of the sleeve of the totalizer; Fig. 9 is a detail in section, side elevation and plan of the figured collar for the totalizer; Fig. 10 is a detail in section, and end elevation of the gear wheel of the totalizer; Fig. 11 is a detail in section and end elevation of the carrying forward disk of the totalizer; Fig. 12 is a detail in side elevation and plan of a lever coöperating with the disk of Fig. 11, and pawl of Fig. 14; Fig. 13 is a detail in end and side elevations and in plan of the toothed segment which constitutes the prime member of the carrying forward mechanism; Fig. 14 is a deatil in end elevation, longitudinal section and plan of a spring dog or pawl adapted to control the toothed segment of Fig. 13; Fig. 15 is a detail in end elevation, side elevation and plan of the cam operated anchor adapted to engage the dog at certain times and thereby actuate the toothed segment; Fig. 16 is a sectional view similar to the right hand of Fig. 1 but showing the composing means engaged with the totalizers and the latter, free of the toothed segment of the carrying forward apparatus; Fig. 17 is a section showing the device for shifting the totalizers into different operative positions; Figs. 18 to 25 are similar detail views with the parts in different positions to readily illustrate the operation of transfer or non-transfer from one wheel to the next; Fig. 26 is a view similar to Fig. 16 but with the parts in position for setting at zero, in this position the totalizing disks being free of the operating wheels and also of the carrying forward toothed segment; Fig. 27 is a view smilar to Fig. 17 and bears the same relation to Fig. 26 as that figure does to Fig. 16; Fig. 28 is a view similar to Fig. 1 but of our preferred modified construction of totalizer; Fig. 29 is a cross section on the line A—B, Fig. 28; Fig. 30 is a plan view of Fig. 28;. Fig. 31 is a plan of the carrying forward members of Fig. 28; Fig. 32 is a section on the line C—D, Fig. 28; Fig. 33 is a section on the line E—F, Fig. 28; Fig. 34 is a detail in section, end veiw and plan of the totalizing wheel of this modification; Fig. 35 is a view in end elevation of three of the positioning stops of Fig. 28 and also a side view of any one of them; Fig. 36 is a detail in side, and end elevation and in plan of the dog or pawl; Fig. 37 is a detail in side and end elevation and in plan of a carrying forward segment; Fig. 38 is a detail in side and end elevation and in plan of the cam operated anchor; Fig. 39 is a view similar to 28 with parts omitted showing the totalizers engaged by the operating means; Fig. 40 is a sectional view on the line G—H, Fig. 39; Fig. 41 is a view smilar to 28 and 39 but with the totalizer wheels in position between the positions of those two figures, in engagement with the carrying forward segment; Fig. 42 is a section on line I—J, Fig. 41; Figs. 43 to 45 inclusive, are similar sectional views to illustrate the operation when no transfer is effected; Figs. 46 to 49 are similar sectional views to illustrate the operation when a transfer is effected; Fig. 50 is a view of the right-hand end of Fig. 28 showing the parts in resetting position; and Fig. 51 is a sectional view on the line K—L, Fig. 50.

Referring to the modification shown in Figs. 1 to 27, and particularly to Figs. 1, 3, and 16, in the side plates O, G, of the apparatus, we mount a cam shaft N provided with a pinion P adapted to be revolved during each operation of the machine. This shaft is provided with cams Q and R adapted to engage certain rocking levers to automatically move the totalizer wheels into two positions, one the position of Fig. 1, where toothed totalizer wheels are engaged with suitable stop means (stationary stop s^1 and toothed segments e^1), and the second position that of Fig. 16, where the toothed totalizer wheels engage the composing wheels and are free from all stop means, all as hereinafter described. The shaft N also carries a number of sets of cams, two in each set k^1 and l^1, each pair of cams adapted to act to lock or operate a

device hereinafter referred to as an anchor h^1. The pairs of cams for the units, tens, etc., may to advantage be so secured to the shaft N as to cause their recessed surfaces for the operation of the anchors, to come successively into operation so that units will first be transferred to tens, then tens to hundreds, etc. The direction of rotation of these cams and shaft N is indicated by the arrows. Above the cam shaft we mount a carriage formed of transverse rods, *c*, *d*, secured in the side plates O, G, and carrying cheek plates *a*, *b*. In the cheek plates *a*, *b*, we mount a shaft *f*, a shaft *e*, and a guide rod *g*. The shaft *f* carries above the cams Q, R, a freely rocking arm d^1 (Figs. 16 & 17) carrying a helicoidal flange r^1 at one end adapted to shift the shaft *e* as hereinafter described, and two cam levers q^1, p^1, engaging the cams Q, R, (see Figs. 6 and 17). Beneath every totalizer wheel, save that of the highest value, we freely mount upon the shaft *f* an anchor h^1 (Fig. 15) adapted to be rocked by the cams k^1 l^1 for which purpose it is provided with legs i^1, j^1, its upper part is provided with a recess m^1 adapted to engage with a hooked end n^1 of a pawl g^1 which is pivoted to the toothed segment e^1 now to be described. The toothed segment e^1 (Fig. 13) is also freely mounted upon the shaft *f* and is provided with gear teeth e^1 upon its crown, while at its rear a projection f^1 is located containing an upper and a lower detent recess. The pawl g^1 (Fig. 14) which is pivoted to the toothed segment is provided at its rear with a spring pressed detent adapted to enter such recess in the projection of the segment to hold the pawl in one of two positions. These positions are determined by a spring pressed lever *o* mounted upon a shaft *h* also mounted within the cheek plates *a*, *b*, and in turn the lever *o* is operated by a certain transfer disk of the totalizer wheels to be hereinafter described. When the lever *o* is depressed, the detent of the pawl g^1 engages the lower recess of the projection f^1, and is raised into the upper position only by a movement of the anchor to be hereinafter described. Across the machine in the cheek plates *a*, *b*, we locate a stationary governing grooved bar M with which a booked end o^1 of the pawl g^1 may engage, when it is free to do so, owing to the detent being in the upper recess of the projection f^1. The shaft *h* is longitudinally slidable in its supports and carries a pawl *w* engaging a ratchet *v* (Figs. 1, 2, and 3) on the shaft *e*. The pawl *w* is preferably wider than the ratchet *v* so that the shaft *e* may be slid to a slight extent independently of the shaft *h* and yet not disengage the two. The shaft *e*, which carries the totalizer wheels, is mounted in plates *r*, *s*, (Fig. 1) slidable upon the guide rod *g*, and secured to and sliding with the shaft *h*. One end of the shaft *e* passes through a hub on the plate *s*, the lower part of which hub on its exterior, is grooved so that the helicoidal flange r^1 of the shifting lever d^1 may fit it. A pin *u* on the shaft abuts against and normally rests within a recess in the end of the hub, which recess is in the form of a pocket with one sloping and one straight side (Fig. 3). Within the center of the hub is a chamber containing a spring *t* normally acting to bear upon a shoulder of the shaft *e*, to hold it, with the stud or pin *u*, in the recess (Figs. 1 and 16). The extreme end of the shaft where it passes through the cheek plate *b*, is formed with an opening *x* for the reception of the key (Fig. 26). In the side frame G of the apparatus opposite the opening *x*, we provide an opening *y* normally closed by a plate secured to a lever *z* mounted at b^1 in the frame and maintained by a spring a^1 in a position against a pin c^1 secured in the shifting lever d^1 and passing through a slot in the plate *b*. An operating arm or handle u^1 extending outside the machine is secured to the lever *z* to move it away from the opening *y* to admit the key, at the same time moving the pin c^1 an extraordinary distance to compress the spring *t* and free the pin *u* from its pocket, for the purpose of resetting, as hereinafter set forth. The totalizing wheels themselves consist of hubs *i* freely mounted upon the shaft *e*, one next the other; the hubs have an enlarged inner chamber provided with a pin *p* projecting part way into it. The shaft *c* has a number of pins *q*, in the position of Fig. 26, located in the path of the pins *p*, but in all other positions free of such pins. Upon each hub we mount a toothed wheel *k* and a numbered disk or ring *j*; also a transfer disk or collar *l* having a number of recesses *m*, and one extra long transfer tooth *n*. The tooth *n* is adapted to engage the lever *o*, before described (Fig. 23). Upon the guide rod *g*, we provide stationary stops t^1 and s^1, one to engage the lowest value wheel, and one the highest, when the highest value wheel is not engaged by the toothed segment which transfers to it, and when the lowest value wheel is not engaged by its composing wheel. The composing wheels are herein shown as of the same construction and operation as shown in the before mentioned patent. They turn in the direction of the arrow. They are represented as S, T, U, V, W, and are provided with teeth v^1. Normally these wheels occupy a position free of the toothed totalizer wheels *k*, to one side of them so that upon the sidewise motion of the wheels *k* the two will be interlocked Fig. 16. It will be noted that in this modification there is one less composing wheel than totalizing wheels (Fig. 3), whereby a number greater by one figure as a result of addition by several operations may be indicated by the totalizer. The highest totalizing wheel is in engagement with the stop *t'* only when the composing wheels are being operated.

In operation, as many composing wheels as required are rotated that distance required to produce the number one desires to totalize, as will be understood upon reference to the before mentioned patent. Then the cam shaft N is given a complete revolution. The first effect of the shaft N is to move the wheels *k* from the position of Fig. 1 to that of Fig. 16 by means of the shifting lever d^1, which through its helicoidal flange r^1 moves the hub of the plate *s*, the shaft *e* and everything carried thereon to the left, disengaging the segments e^1 from the wheels *k*, and engaging the composing wheels with their respective totalizer wheels *k*, the lowest value wheel disengaging the stop s^1 and the highest value wheel engaging the stop t^1. The composing wheels are now caused to return to their initial position, each rotating its totalizing wheel a proper distance, in no case more than a whole revolution. The long transfer tooth *n* of the transfer collar *l* will either not reach the lever *o* or as in its normal position (Fig. 20) it will reach and pass it, according to the prior position of the tooth *n* and the extent of subsequent rotation of the collar *l*. If it does not strike the

lever *o*, (Fig. 21) no effect is produced upon the detent held pawl g^1, but if it does strike the lever *o*, said lever in turn strikes the dog or pawl g^1 depressing it to cause the detent to pass from the upper to the lower recess in the projection f^1 of the segment and to lift the nose o^1 out of the grooved rod M (see Fig. 23). Prior to the time of depression of the pawl whether the pawl is to be depressed or not, the cams l^1 and k^1 act to throw the anchor into the position shown in Fig. 21, *i. e.*, with the recess m^1 in position to receive the tail or hook n^1 of the pawl g^1, should it be depressed, as in Fig. 23. After the operation of the detent carrying pawl g^1 by the long tooth *n* through the lever *o*, when a number is to be carried forward, (Fig. 17) the cams Q, R, come into play to return the helicoidal flange r^1 (Fig. 17) to cause the parts to be moved from the position of Fig. 16 to that of Fig. 1, that is, to disengage the composing wheels from the totalizer wheels and cause said totalizer wheels to engage with the segments of the next higher number to permit the "carrying forward of the tens". If the pawl, lever *o*, and tooth *n*, over any particular anchor, had not been operated but had been left in the upper detent and recessed position that anchor idly oscillates into the position of Fig. 22, but if any particular pawl has been thrown, then Fig. 24 illustrates what occurs, in which the anchor recess m^1 grips the tooth n^1 of the pawl and pulls pawl and segment into the position shown, to move the totalizer wheel of the next higher number one-tenth of a revolution. The parts remain in such position (that of Fig. 24) until the next operation, that is, until the totalizer wheels have been removed from the influence of the segments and moved into the control of the composing wheels again.

At the beginning of a fresh operation the anchor, pawl, and sector are first moved into the position of Fig. 25 (in view of the configuration of the cams) from the normal position in Fig. 20 and the nose o^1 is stopped by the grooved rod M immediately after the anchor is moved into the position of Figs. 18 and 19. This is caused by the bevel end of recess m^1 of the anchor which forces the pawl upward to cause its detent to engage the upper recess, and its nose o^1 to again grip the grooved bar M. The machine is then in condition for a repetition of the totalizing operation hereinbefore described.

To reset the apparatus at zero, (Figs. 26 and 27) we first move handle u^1 in a direction to uncover the opening *y*, and to also move the shifting lever d^1 by contact of the pin c^1, with the handle u^1, in a direction contrary to that in which it is automatically moved by said lever d^1 to shift the wheels clear of the segments and stationary stops (see Fig. 26). We then insert a key and turn the key and shaft in the direction of the arrow, which has the following effects:—It forces the pin up the incline of the hub, to compress the spring *t* and draw the studs *q* into line with the pins *p* on the exterior of the hubs, so that upon a complete revolution of the key and shaft, all pins *p* will be engaged by the pins *q* and the wheels *k* returned to zero, whereupon the pin *u* will drop into the pocket of the hub and the pins withdrawn from engagement with each other. The key will then be removed and the parts restored.

The modification illustrated in Figs. 28—51, inclusive, is our preferred form of apparatus. It will be seen from the following description that this modification is very similar in principle and operation to the first described form. There is, however, one main feature of difference, and that is, that in the device disclosed in the first modification it is at the beginning of a fresh operation that the mechanism is set for such operation, while in the preferred form at the end of a completed revolution the mechanism is left in condition for a fresh operation, or in the normal position. This feature is primarily due to the outline of the cams Q^{10}, R^{10}, which through the intermediate mechanism shift the totalizing wheels from the normal position (Fig. 28) to the engaging position (Fig. 39), then to the carrying forward position (Fig. 41) and back to the normal position, all in one operation as will now be fully described in detail. Another important structural difference lies in the locking mechanism for positively engaging and locking the totalizing wheels at all times except during the resetting operation, to prevent fraudulent turning of the wheels. Minor structural differences will be noted in the carrying forward mechanism, all of which are clearly shown in the detail figures of this modification and hereinafter described. It consists (Figs. 28, 30, or 31) of the frame plates O^{10}, G^{10}, and cam shaft N^{10}, a pair of side plates a^{10}, b^{10}, carrying a shaft f^{10} for the carrying forward mechanism and totalizer wheel shifter, a shaft e^{10} for the totalizer wheels and setting disk, a stop shaft q^{20}, guide shafts h^{10}, g^{10}, a shaft d^{10}, the pawl locking rod and levers and a grooved rod M^{10}. The cam shaft has three different sets of cams. Cams Q^{10}, R^{10}, together act upon the rollers p^{11}, q^{11} of the shifting lever d^{11}, which is mounted on the shaft f^{10}. Cams l^{20}, m^{20}, act together on rollers j^{20}, k^{20}, of levers i^{20}, on shaft d^{10}, which carry a rod n^{20}, at their ends, which rod is adapted to lock the pawls in position, as hereinafter described. Cams l^{11}, k^{11} are secured on the cam shaft N^{10}, one pair for each carrying-forward mechanism so located as to perform their carrying forward functions successively, first units, then tens, etc. Each set of cams l^{11}, k^{11}, acts upon the legs j^{11}, i^{11}, of an anchor h^{11}. (Figs. 38, 43, and 49.) The shaft f^{10} carries the shifting lever d^{10} provided with helicoidal flange (r^{11} Figs. 41 & 42) engaging a slot in the hub S^{10} of the shaft e^{10} to shift the hub, shaft, and wheels into the following positions: Position of Fig. 28 which is the normal position with the wheels locked by the fixed stops; position of Fig. 39 with the wheels engaged with the composing wheels or operating means for adding a number; and position of Fig. 41 with some of the wheels engaged by the toothed segments and some with fixed stops, during the operation of carrying forward a number. The anchors h^{11} are also freely pivoted on the shaft f^{10}; they are provided with a surface on the arc of a circle with a shaft as a center, interrupted by an opening or mouth m^{11}, for the reception of a hook n^{11} of the pawl g^{11}, which is pivoted on the toothed segment e^{11}, at f^{20}. The pawl g^{11} also has a hook o^{11} adapted to lie against or to engage with the groove of the rod M^{10}, or the surface g^{20} of the rod M^{10}, and a pin h^{20} adapted for co-operation with the wheel k^{10}. The segment e^{11} is loosely mounted on the shaft f^{10}. The projecting finger t^{11} is also fastened to the shaft f^{10} for a purpose to be hereinafter described. Plates r^{10}, d^{20} and a hub

plate S^{10} serve to hold the totalizer wheels in position on the shaft e^{10}, and they are themselves guided on rods g^{10}, h^{10}. The shaft e^{10} is capable of a limited motion relative to the totalizers secured by the compression of the spring t^{10} within the hub S^{10}. Each totalizer wheel k^{10} is comprised of gear teeth, a hub i^{10}, and numeral band or collar j^{10}, an interior chamber provided with a pin p^{10}, a pin v^{20} on its outside and a groove a^{20} at b^{20}. The stop rod q^2 carries stationary stops o^{20}, (Fig. 32) each fast to the rod q^{20} and provided with noses p^{20} to take into the respective wheels k^{10}. The stop for the unit wheel is broad enough to engage the unit wheel when in normal position of Fig. 28, and also in the position for carrying forward of Fig. 41. The stops for the tens and hundreds are of a width to engage in a normal inoperative position (Fig. 28) while the stops for the balance of the wheels for which there are no corresponding composing wheels, are each provided with two teeth, one engaged when in normal position, and the other in position of Fig. 39 (or composing position). The resetting mechanism comprises a disk u^{20} keyed on the shaft e^{10}, which is formed with a cam groove t^{20} opening into a slot in the disk in which a pin s^{20} of a lever r^{20} fast on the shaft q^{20} engages. The end of the shaft e^{10} is formed at x^{10} for the reception of a key, a pawl W^{10} engaging teeth v^{10} on the shaft e^{10} prevents it from rotating in the wrong direction. The shaft e^{10} is provided with pins q^{10} which in setting position only are adapted for contact with the pins p^{10} of the wheels k^{10}. A pin u^{10} on the shaft e^{10} normally occupies a pocket on the end of the hub S^{10}. We have shown this device as provided with but three composing wheels S^{10}, T^{10}, and u^{10}. Their operation may be that of the patent herein mentioned.

In operation, the composing wheels are first actuated the amount desired, the cam shaft N^{10} is then turned by any suitable means such as shown in our prior patent mentioned to cause cams Q^{10}, R^{10}, to throw the lever d^{11} and flange r^{11}, to move the totalizing wheels k^{10} from the position of Fig. 28 to that of Fig. 39, thereby bringing each wheel into mesh with a composing wheel, or where no composing wheel occurs into mesh with one tooth of one of the fixed stops o^{20}. The composing wheels are then rotated to rotate the totalizing wheels k^{10} and add the numbers. It will be noted that when the wheels k^{10} are shifted from the position of Fig. 28 to that of Fig. 39, that the pins h^{20} were caused to enter the groove a^{20} of the wheels k^{10}. The cams Q^{10}, R^{10} then shift the parts on the shaft e^{10} into position of Fig. 41, thereby engaging the totalizing wheels from the composing wheels yet still remaining in engagement with the carrying forward means. If the wheel has been rotated to such an extent that a "carrying forward" should be effected, (Fig. 41) the opening b^{20} will cause the pin h^{20} to pass below the wheel k^{10} and ride on its periphery, Fig. 47 and force the nose n^{11} of the dog, into the mouth m^{11} of the anchor h^{11}. To permit this, the cams l^{20}, m^{20}, first release the locking rod n^{20} so that the nose o^{11} may rise. If no carrying forward is to be effected, the pin h^{20} does not leave the groove. In this position of Fig. 41, it will be seen that the unit wheel only is grasped by its fixed stop o^{20}, all the others being engaged by the segments e^{11}. The cams l^{11}, k^{11}, now rock their anchors h^{11}, and such segments as are not held engaged by their pawls, for as the pawls rock, their noses o^{10} bear upon the raised portion g^{20} of the grooved rod M^{10}. This rocking of the segment, as before described in the first modification, serves to perform the carrying forward Fig. 48. The cams Q^{10}, R^{10}, now return the parts to the normal position of Fig. 28 and the anchors are rocked back into normal starting position Fig. 43. Before this rocking has taken place, it will be seen that all the segments have been moved free of the groove of wheel k^{10}, the dogs not already engaged by the segments dropping upon the curved surface of the anchor until the anchor's mouth m^{11} is immediately below the nose n^{11} of the pawl; Fig. 46 immediately the cams l^{20}, m^{20}, throw the rod n^{20} to lock the pawls in position in the groove of the bar M^{10} at the same time releasing them from the anchor's grip. The apparatus is then in condition for a repetition of the operation just described. To reset this device, we insert a key on the key way x^{10}, and rotate the shaft e^{10} causing the pin u^{10} to be displaced as shown in Fig. 50, which compresses the spring t^{10} and moves the pins q^{10} into position to act upon the pins b^{10} of the wheels k^{10}. The stud S^{20} is now released from the deep slot, and the cam disk u^{20} rotated with the shaft e^{10}. The first effect of the disk's rotation is to lift the lever r^{20} and release each stationary stop o^{20} (see Fig. 51) so that, when the pins q^{10} strike the pins p^{10}, their wheels may turn until the pins v^{20} of the wheels strike against the pawls or in the case of the highest value wheels against the stop t^{11} of the shaft f^{10}. At this position the pin u^{10} again drops into place when all the wheels will register zero and the part s^{10} will then have been returned to position for operation.

It will readily be seen in the modification herein before described, in Figs. 1 to 27 inclusive, that the wheels S, T, U, V, W, form composing means for operating the totalizer wheels, that the toothed segment constitutes the prime factor of the carrying forward means, that the spring detent in the pawl in combination with the tooth n of the totalizer wheels, constitutes a selective mechanism. A locking means, or means for preventing rotation of the wheels, may be considered to be the groove and the engaging nose of the pawl, which prevents the movement of the toothed segment. In the apparatus as shown in Fig. 28 *et seq.* the wheels S^{10}, T^{10}, U^{10} form the composing means, the prime factor of the carrying forward means, being the toothed segment, while the groove and outlet therefrom of the wheels k^{10} in combination with the pin on the segment, constitutes the selective means. The stationary stops, pawl and governing groove, taken with the cam-controlled rod n^{20} form the locking means or means for preventing the rotation of the wheels.

I claim as my invention

1. A totalizer comprising composing means, totalization wheels, and carrying forward mechanism, and means for at all times securing the totalizing wheels from rotation except when positively engaged by the carrying forward mechanism or composing means, and cams for actuating the carrying forward mechanism, said carrying forward means including selective mechanism associated with the totalization wheels adapted at certain times to cause said totalizing wheels to control said carrying forward mechanism to effect a carrying forward operation.

2. A totalizer comprising a number of independently revoluble totalizing wheels, composing means therefor, carrying-forward mechanisms, and mechanism for operating

them, stop mechanism for positively engaging the wheels when not under influence of the composing wheels, and means for moving the wheels into position for said stop mechanism and for the composing means.

3. A totalizer comprising a number of independently revoluble totalizing wheels, composing means therefor, carrying forward mechanisms and mechanism for operating them, said carrying forward mechanism comprising a segment and a pawl, and means for actuating them, mechanism for positively engaging the wheels when not under influence of the composing wheels, and means for moving the wheels into position for said engaging mechanism, and for the composing means.

4. A totalizer having composing means, and totalizer wheels and means for positively governing the wheels in all positions, in combination with a carrying forward device, comprising a segment, a pawl, and means for causing the release and operation of the pawl.

5. A totalizer having composing means and totalizing wheels, and means for positively governing the wheels in all positions, a carrying forward device, comprising a segment, a pawl, and a governing groove for the pawl, and means for causing the release and operation of the pawl from the groove.

6. A totalizer having composing means and totalizing wheels, and means for positively governing the wheels in all positions, a carrying forward device, comprising a segment, a pawl, an anchor, and a governing groove for the pawl, and means for holding the pawl in the groove.

7. A totalizer comprising a number of totalizing wheels, composing wheels, and carrying forward parts, selective mechanism for causing a totalizing wheel to control the carrying forward mechanism to effect a carrying forward operation at certain times, and locking mechanism to prevent the rotation of said totalizing wheels, means for shifting the totalizing wheels to cause their release from the locking means after their engagement either with the composing wheels or carrying forward mechanism.

8. A totalizer comprising a number of totalizing wheels, composing wheels, and carrying forward parts, selective mechanism for causing a totalizing wheel to control the carrying forward mechanism to effect a carrying forward operation at certain times, and locking mechanism to prevent the rotation of said totalizing wheels, means for shifting the totalizing wheels to cause their release from the locking means after their engagement either with the composing wheels or selected carrying forward mechanism, said wheels being engaged by the composing wheels upon one shift of its totalizing wheels and engaged by the selected carrying forward mechanisms upon a second shift of said wheels.

9. A totalizer comprising a number of totalizing wheels, composing wheels, and carrying forward parts, selective mechanism for causing a totalizing wheel to control the carrying forward mechanism to effect a carrying forward operation at certain times, and locking mechanism to prevent the rotation of said totalizing wheels, means for shifting the totalizing wheels to cause their release from the locking means after their engagement either with the composing wheels or a selected carrying forward mechanism, each totalizing wheel having a mechanism associated therewith, adapted to positively prevent its rotation except when the selective mechanism has been called into action.

10. A totalizer comprising a number of totalizing wheels, composing wheels, and carrying forward parts, selective mechanism for causing a totalizing wheel to control the carrying forward mechanism to effect a carrying forward operation at certain times, and locking mechanism to prevent the rotation of said totalizing wheels to cause their release from the locking means after their engagement either with the composing wheels or a selected carrying forward mechanism, and means for preventing the movement of said totalizing wheels, except when engaged by the composing or carrying forward mechanism.

11. A totalizer comprising a number of totalizing wheels, composing wheels, and carrying forward parts, selective mechanism for causing a totalizing wheel to control the carrying forward mechanism to effect a carrying forward operation at certain times, and locking mechanism to prevent the rotation of said totalizing wheels, means for shifting the totalizing wheels to cause their release from the locking means after their engagement either with the composing wheels or a selected carrying forward mechanism, said wheels being engaged by the composing wheels upon one shift of the totalizing wheels, and engaged by the selected carrying forward mechanisms upon a second shift of said wheels, and means for preventing the movement of said totalizing wheels except when engaged by the composing or carrying forward mechanisms.

12. A totalizer comprising a number of totalizing wheels, composing wheels, and carrying forward parts, selective mechanism for causing a totalizing wheel to control the carrying forward mechanism to effect a carrying forward operation at certain times, and locking mechanism to prevent the rotation of said totalizing wheels, means for shifting the totalizing wheels to cause their release from the locking means after their engagement either with the composing wheels or a selected carrying forward mechanism, means for preventing the movement of said totalizing wheels except when engaged by the composing or carrying forward mechanisms, additional totalizing wheels unprovided with composing wheels, and means therefor adapted to prevent their rotation when said composing wheels are engaged with the first composing wheels.

13. A totalizer comprising a plurality of totalizing parts, composing wheels for engaging and operating them, carrying forward parts adapted to be operated by one totalizing part and to operate another, and means for normally holding and preventing the movement of said parts except with either the attendant movement of a composing wheel or a carrying forward part, and a resetting device adapted to move said totalizing wheels out of engagement with all means normally holding them, and means connected therewith to limit the return movement of the wheels to cause zero to appear.

14. A totalizer comprising a number of totalizing wheels, composing wheels, and carrying forward parts, selective mechanism for causing a totalizing wheel to control the carrying forward mechanism to effect a carrying forward operation at certain times, and locking mechanism to prevent the rotation of said totalizing wheels, means for shifting the totalizing wheels to cause their release from the locking means after their engaging either with the composing wheels or carrying forward mechanism, means for preventing the movement of said totalizing wheels except when engaged by the composing wheels or carrying forward mechanism, additional totalizing wheels unprovided with composing wheels, means adapted to prevent their rotation when said composing wheels are engaged with the first composing wheels, and a resetting device adapted to release said means preventing the rotation of the wheels.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses.

JULES FRYDMANE.
LOUIS CHAMBON.

Witnesses:
LEON CRANCKEN,
ARCHIBALD R. BAKER.