

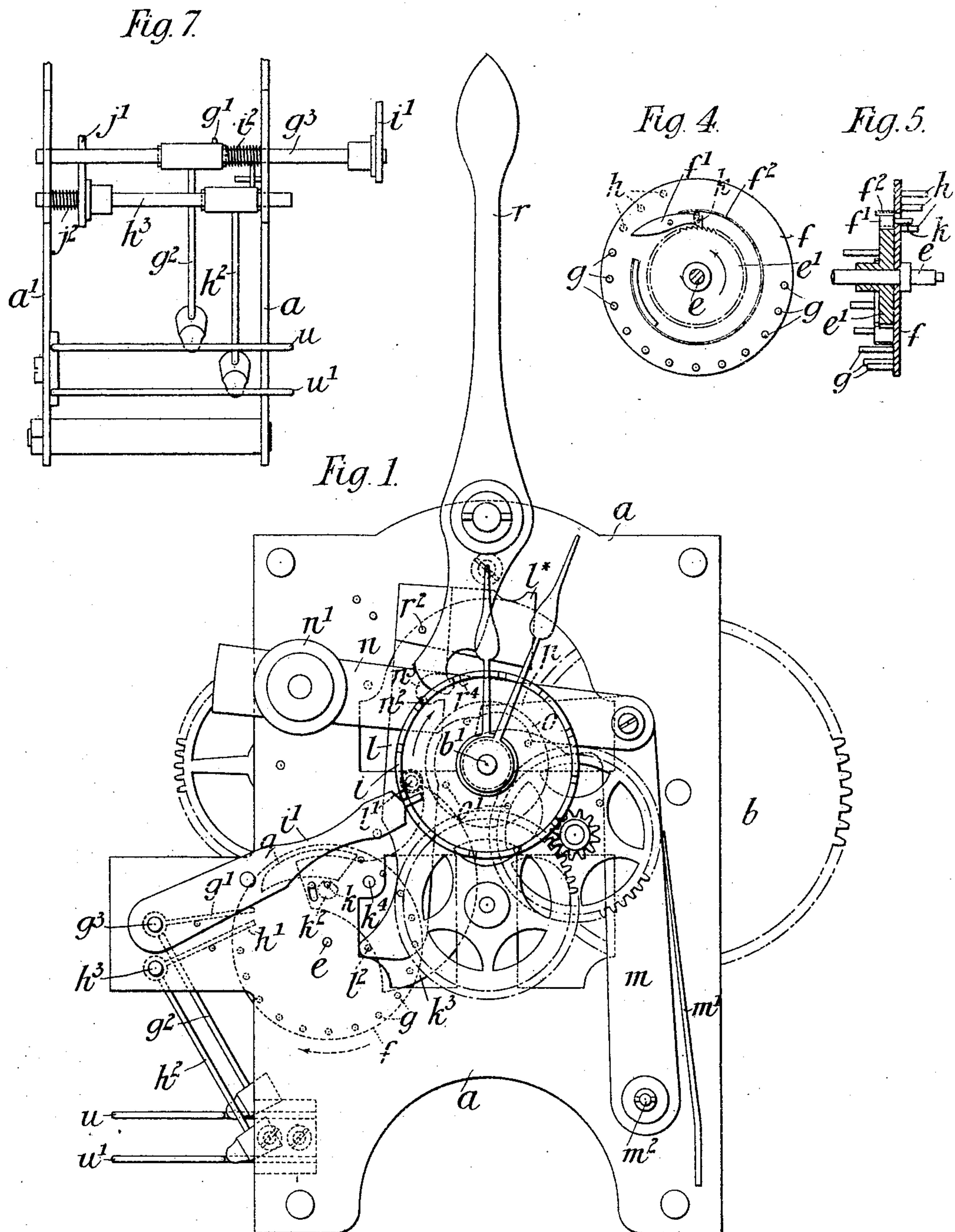
(No Model.)

5 Sheets—Sheet 1.

E. O. CACCIALUPI.
CLOCK STRIKING MECHANISM.

No. 500,704.

Patented July 4, 1893.



Witnesses
Malvina Maccaroni
F. L. Middleton

Inventor
Epimaco O. Caccialupi
By *Fitchurst Humphreys*
Attys.

(No Model.)

5 Sheets—Sheet 2.

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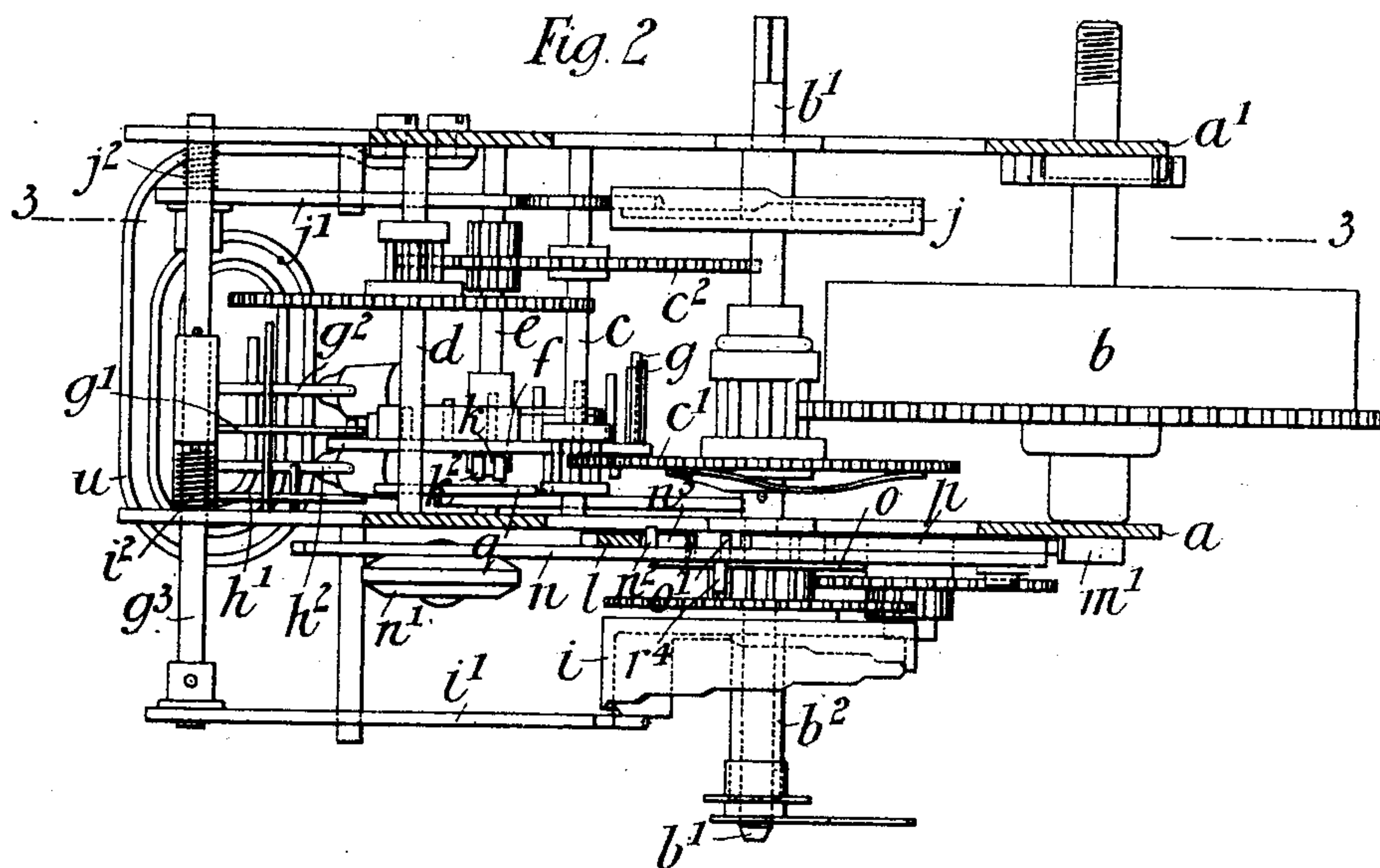
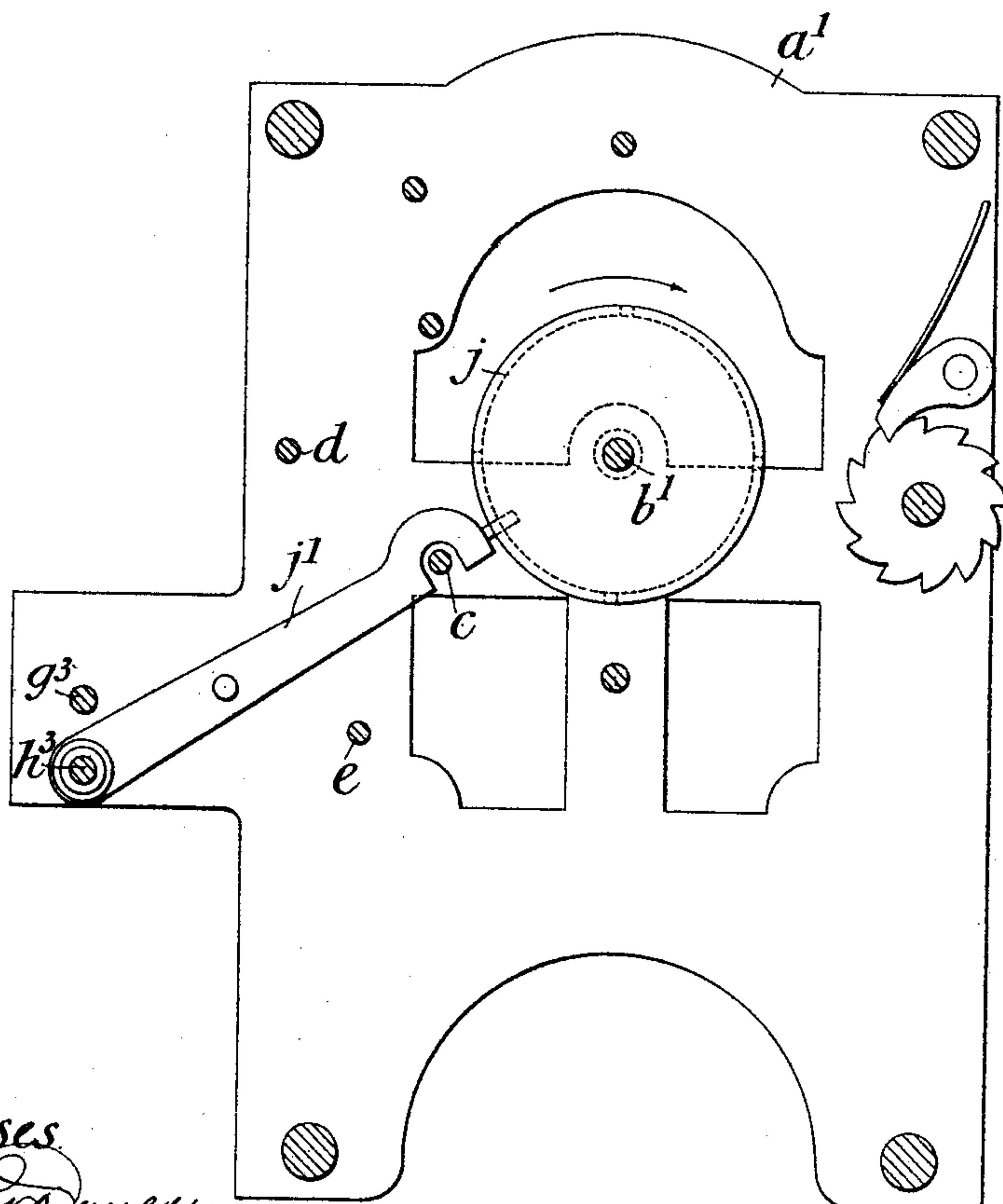


Fig. 3



Witnesses
Mellorn McCullahan
F. L. Middleton

Inventor

Epimaco O. Caccialupi
64 Fetherstonhaugh Co
ATLVS

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Fig. 8.

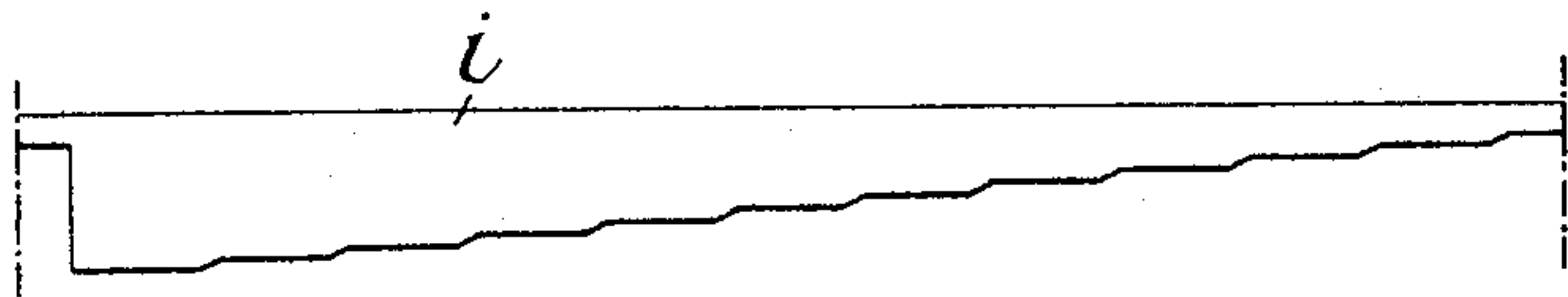


Fig. 9.

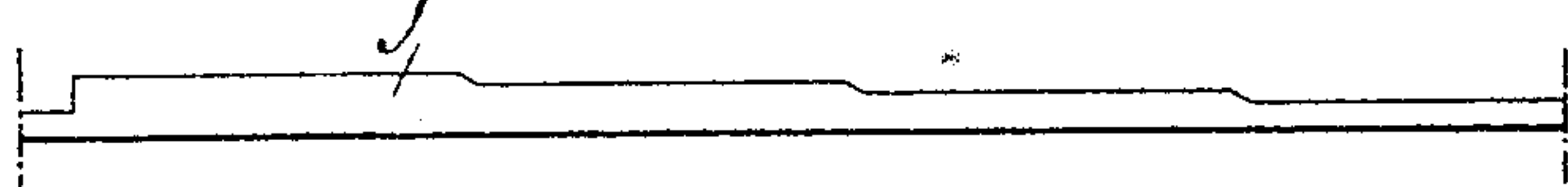


Fig. 6.

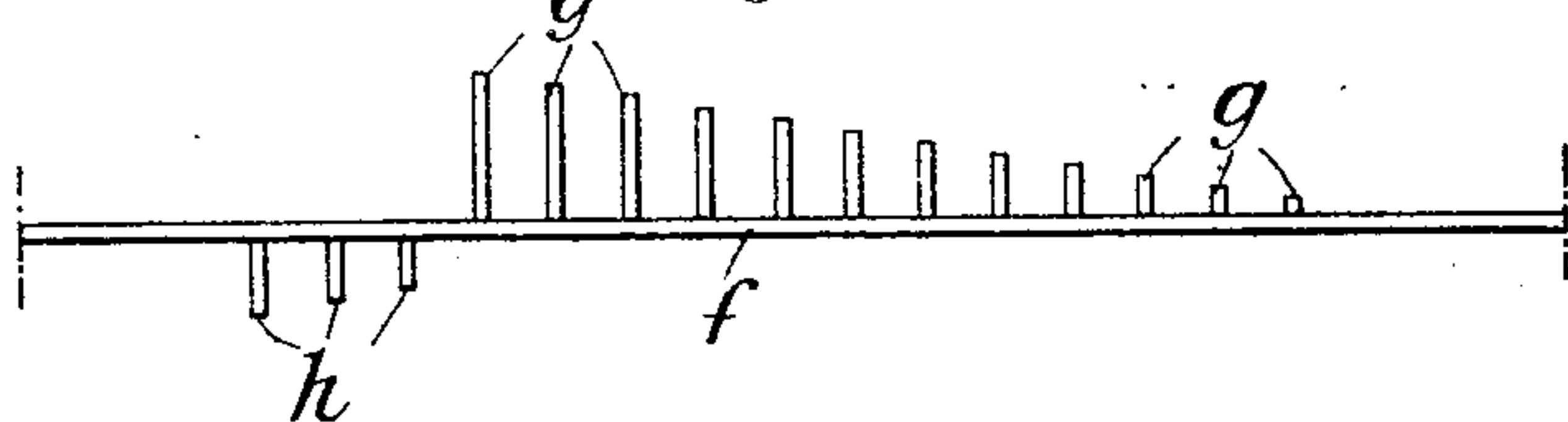
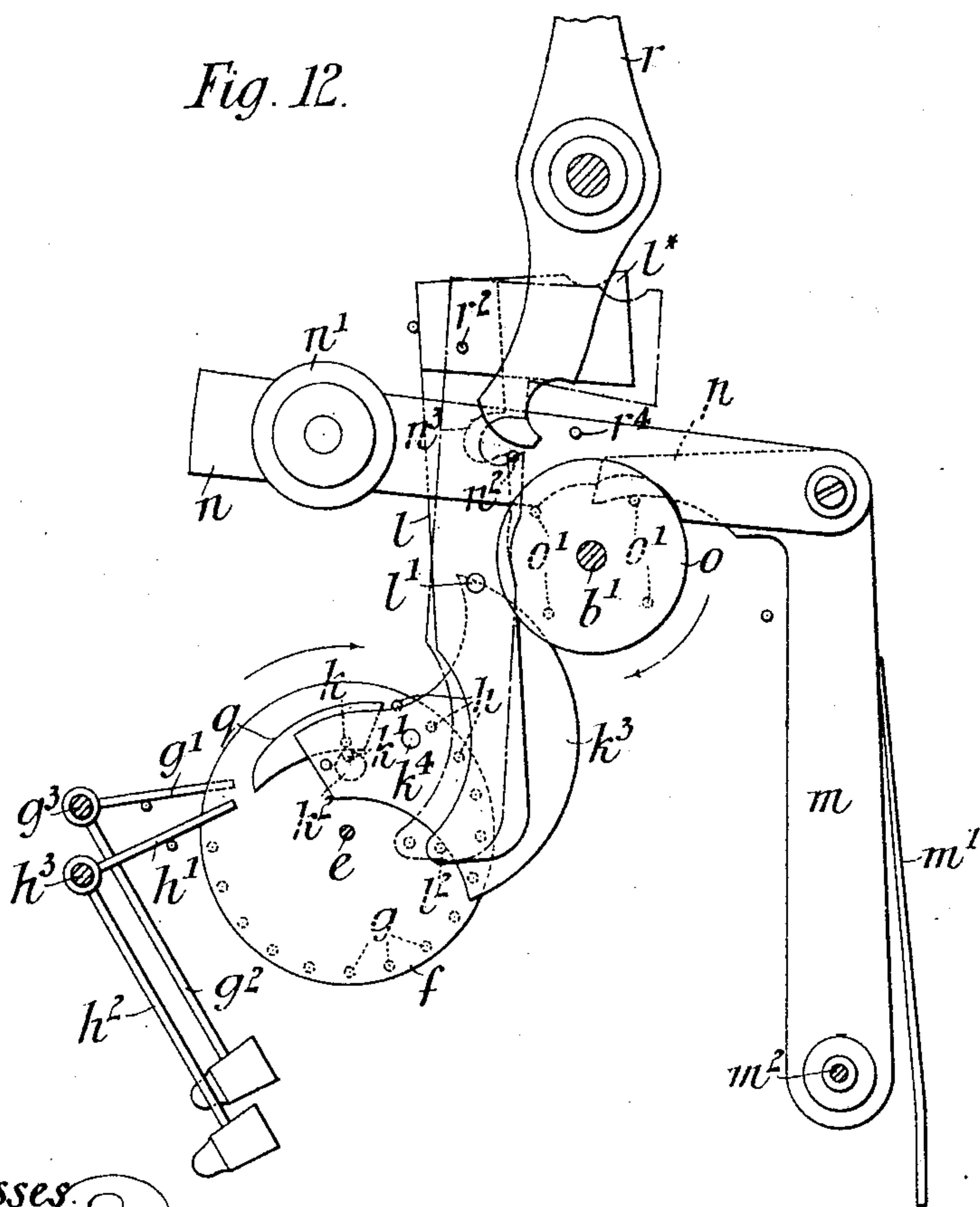


Fig. 12.



Witnesses.

Charles Maclean

F. L. Middleton

Inventor

Epimaco O. Caccialupi

By Fetherstonhaugh & Co.

Attys

(No Model.)

5 Sheets—Sheet 4.

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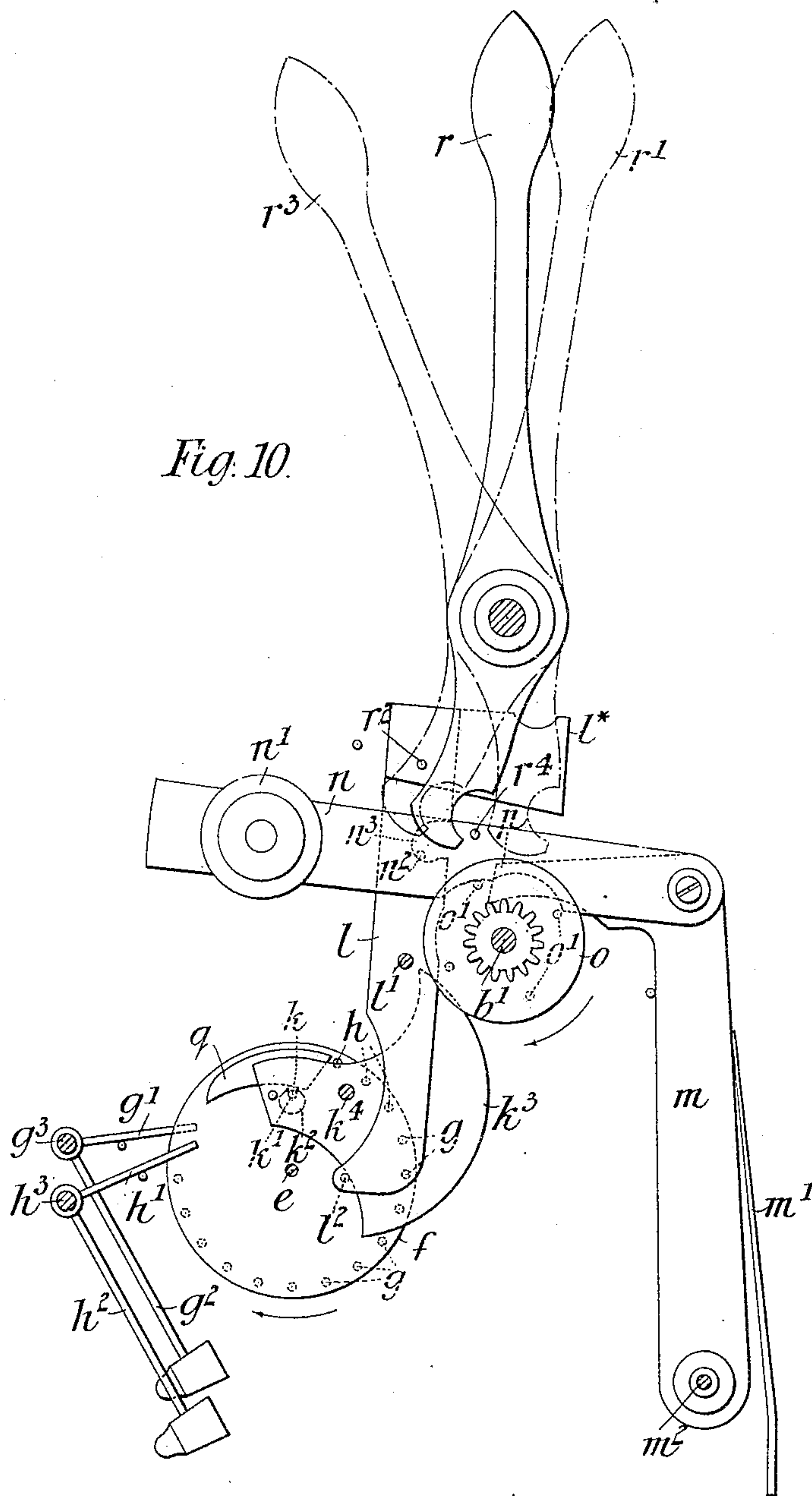


Fig. 10.

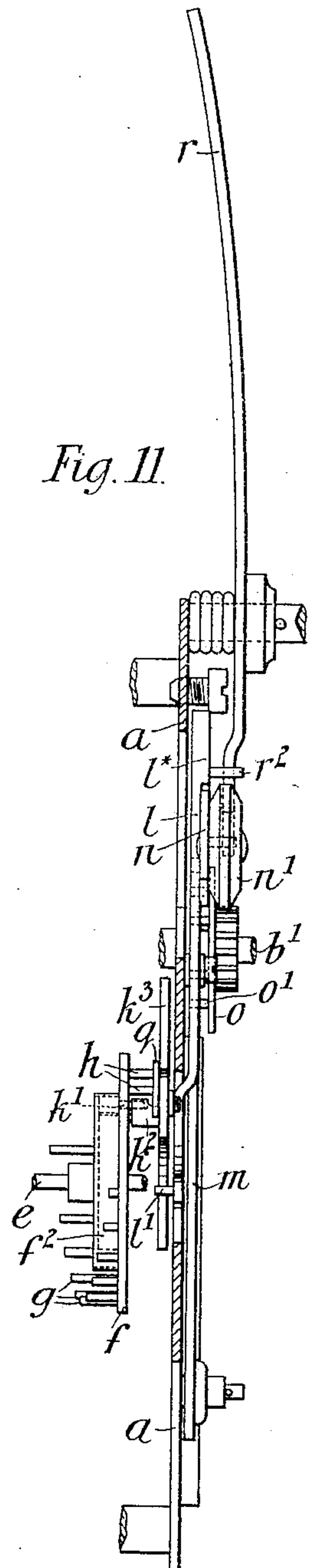


Fig. 11.

Witnesses
Walter M. Mason
F. L. Middleton

Inventor
Epimaco O. Caccialupi
by Fetherstonhugh & Co
Attys

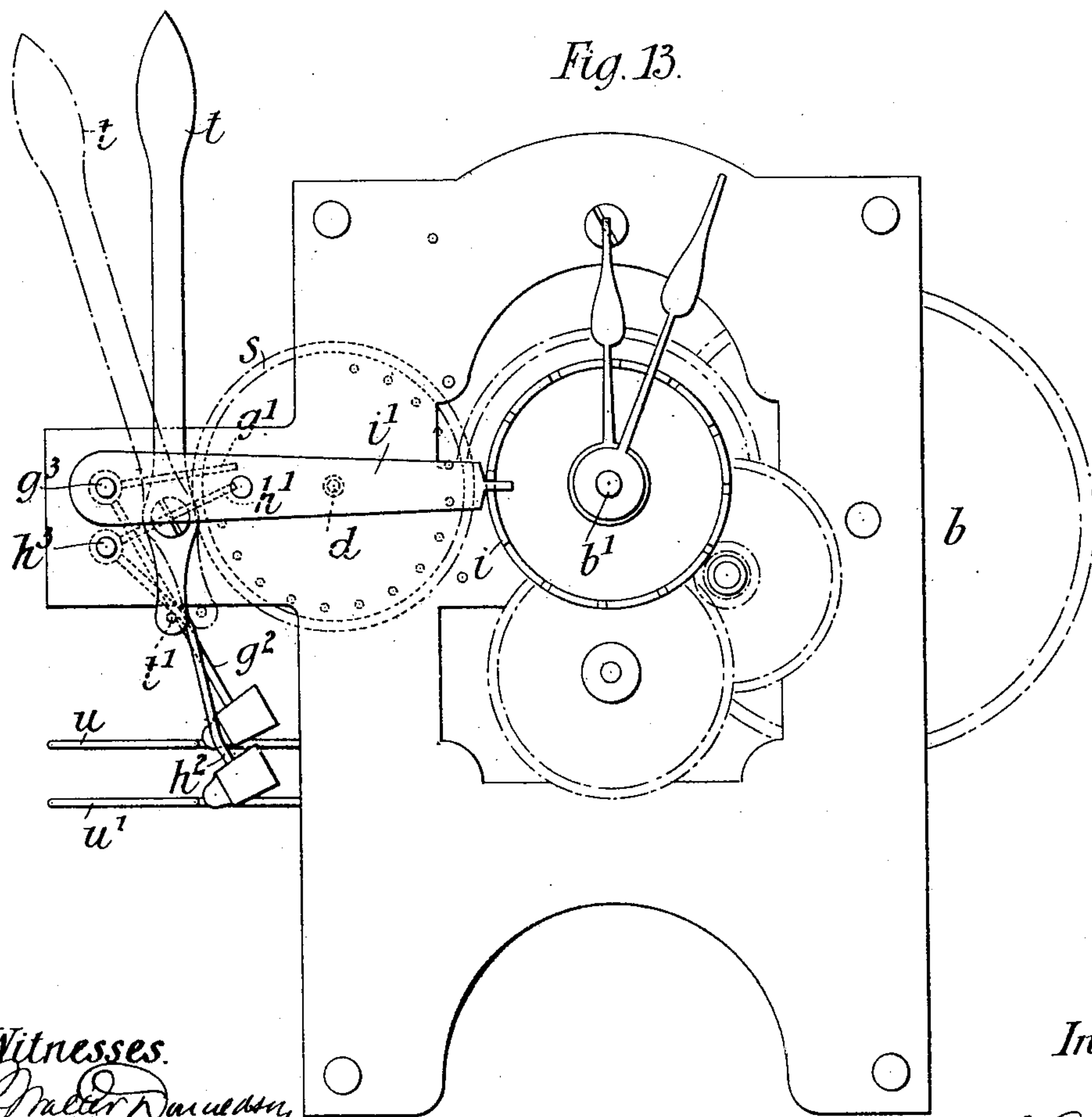
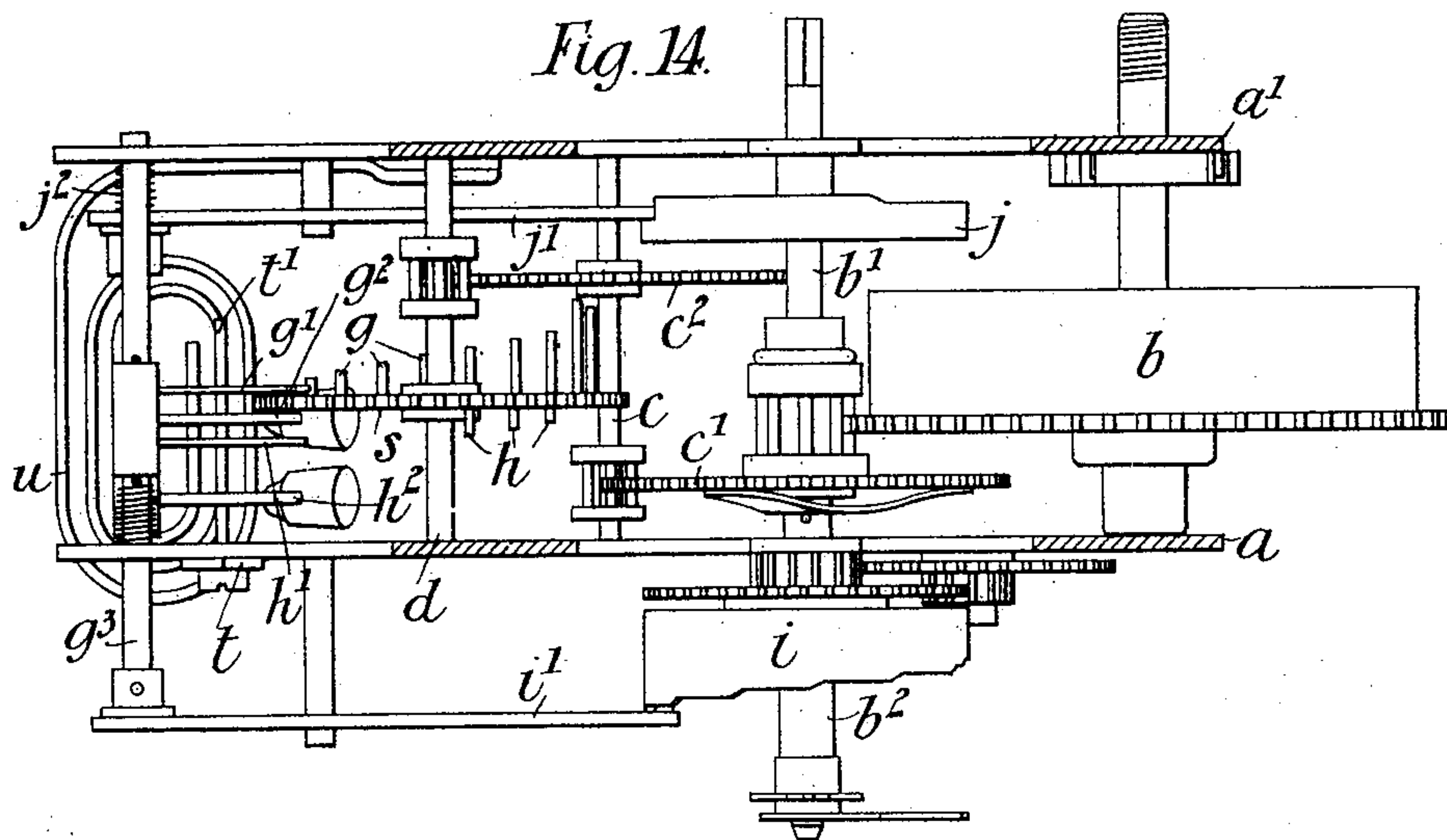
(No Model.)

5 Sheets—Sheet 5.

E. O. CACCIALUPI.
CLOCK STRIKING MECHANISM.

No. 500,704.

Patented July 4, 1893.



Witnesses.

Miller W. Wadsworth
F. L. Middleton

Inventor

Epimaco O. Caccialupi
by Fetherstonhugh & Co
Attys.

UNITED STATES PATENT OFFICE.

EPIMACO OLIVIERI CACCIALUPI, OF SAN SEVERINO, ITALY, ASSIGNOR OF
ONE-HALF TO ALFREDO ANGELI, OF LONDON, ENGLAND.

CLOCK STRIKING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 500,704, dated July 4, 1893.

Application filed January 4, 1893. Serial No. 457,278. (No model.)

To all whom it may concern:

Be it known that I, EPIMACO OLIVIERI CACCIALUPI, a subject of the King of Italy, residing at San Severino, Italy, have invented new and useful Improvements in Striking Mechanism for Clocks, of which the following is a specification.

This invention relates to striking mechanism for clocks.

Hitherto the striking mechanism of a clock has generally been substantially distinct from the other parts thereof and operated by a separate spring or weight and train of wheels.

The object of this invention is to provide striking mechanism which can be worked from the wheels of the clock direct without the intervention of a special spring or weight and for this purpose a graduated series of pins is fixed to a special wheel driven by the clock mechanism or to one of the wheels of the clock mechanism itself, the said pins being designed to act upon a suitable striking lever which is moved in order to place it in the path of one or more of the graduated series of pins, according to the hour to be struck, by means of a cam. In cases where the striking mechanism is to strike the quarters as well as the hours a second set of graduated pins is employed designed to operate upon a separate striking lever which is also moved to place it in the path of one or more of the said pins by means of a cam.

To enable the said invention to be fully understood it shall be described by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of ordinary spring clock mechanism having the improved striking mechanism applied thereto; and Fig. 2 is a sectional plan. Fig. 3 is a section on the line 3—3 Fig. 2. Figs. 4 to 9 are views illustrating the construction of details. Fig. 10 is a view of part of the striking mechanism; and Fig. 11 is a side view of the same, the said view also showing in section the plate carrying the several parts. Fig. 12 is a view similar to Fig. 10 illustrating the operation of the striking mechanism. Figs. 13 and 14 are an elevation and a sectional plan of a clock mechanism having a slightly modified form of striking mechanism applied thereto.

Similar letters of reference indicate corresponding parts in all the figures.

a, a' are the front and back plates carrying the mechanism, and b is the spring barrel, b' the first arbor carrying the minute hand, and b^2 the sleeve mounted upon the arbor b' and carrying the hour hand.

c is the second arbor driven by the wheel c' upon the arbor b' and carrying the wheel c^2 which transmits motion to the third arbor d .

e is the special arbor carrying the striking wheel f , the said arbor being geared to the wheel c^2 upon the second arbor of the clock. The striking wheel f is not fixed to the arbor e but is loose thereon and provided with a pawl f' acted upon by a spring f^2 and adapted to engage with and be disengaged from a ratchet wheel e' fixed upon the said arbor e (as shown in Figs. 4 and 5 which are an elevation and section of the said striking and ratchet wheels) in such a manner that, when the pawl is in engagement with the ratchet wheel, the striking wheel will rotate with the arbor, while, when the pawl is out of engagement with the said ratchet wheel, the striking wheel will remain stationary, the arbor and ratchet wheel only rotating.

Upon the striking wheel f is fixed on one side a graduated series of twelve pins g, g , as shown in Figs. 4 and 5 and in Fig. 6 which is a development of the said wheel, the said pins being designed to act upon a lever g' connected with a hammer g^2 for striking the hour bell or gong and pivotally mounted on an arbor g^3 , Fig. 7, which figure represents a partial side view of the clock. If the clock is to strike the quarters (except at the hour) also three pins h , corresponding to the three quarters are fixed upon the other side of the said striking wheel, but if it is also desired to strike the quarter at the hour four pins are employed. These quarter hour pins act upon a lever h' for operating a hammer h^2 striking a bell or gong which has preferably a different tone from the hour bell or gong to enable the hour and quarter bells or gongs to be readily distinguished, the said lever and hammer h', h^2 being pivotally mounted upon the arbor h^3 , Fig. 7. The lever g' of the hour-hammer

g^2 is shifted from time to time, so that it will be engaged by one, two, three or more of the graduated series of pins g, g according to the hour to be struck, by a graduated or stepped cam i , mounted upon the sleeve b^2 carrying the hour-hand and preferably driven therewith so that it makes one revolution in twelve hours. The said cam, which acts upon a bar i' secured to the arbor g^3 carrying the lever and hammer g', g^2 against which lever the graduated pins g, g operate, is provided with a series of twelve steps as shown in Fig. 8 which is a development of the said cam, the said steps corresponding respectively to the twelve pins g, g . The lever h' operated by the pins h, h for striking the quarters is moved to engage the said pins by a graduated cam j , secured to the minute arbor b' , through the medium of a bar j' , the said cam which is shown developed in Fig. 9 having three steps corresponding to the three pins h, h ; the bars i', j' are caused to bear against their respective cams by springs i^2, j^2 mounted respectively on the arbors g^3, h^3 .

With the described arrangement it will be understood that assuming it to be one o'clock and the cam i to be so fixed upon the sleeve b^2 of the hour-hand that the arm i' is upon the lowest step of the said cam, the lever g' of the hammer g^2 will be so far away from the wheel f that only the longest pin g will strike the said lever and thereby chime the hour during the rotation of the wheel f . At two o'clock the arm i' will rest upon the next step of the cam i so that two of the pins g will strike the lever g' and so on until when twelve o'clock is reached the highest step of the cam i will be against the arm i' so that all of the twelve pins g, g will act upon the lever g' to move the hammer and strike the bell. The operation of the cam j is similar to that of the cam i except that when the arm j' is upon the lowest step of the said cam j none of the pins h, h strike the arm h' , this being the position when the minute hand indicates the hour. When the said cam j has moved so that the arm j' is upon the second step, one pin h strikes the lever h' and thereby chimes the first quarter, when upon the third step two pins strike and when upon the fourth step the three pins strike. If the quarters are to be struck at the hours, it is obvious that four pins h are used, the longest striking when the arm j' is upon the lowest step of the cam j .

In order that the pawl f' through the medium of which motion is imparted to the striking wheel f shall be held out of engagement with its ratchet wheel e' except at such times as the clock is to strike, a pin k is fixed to the said pawl, which pin is designed normally to rest in a notch k' in a lug k^2 formed upon a weighted lever k^3 pivoted at k^4 , as shown clearly in Figs. 10 and 11, the said weighted lever serving normally to retain the pawl out of engagement with ratchet wheel e' . To cause the disengagement of this pin

upon the pawl from the notch in the lug the weighted lever k^3 is arranged to be moved to release the said pin k , thereby allowing the pawl to engage with its ratchet wheel. This movement of the said weighted lever is effected automatically by the clock by the following means.

To the front plate a of the framing of the clock a lever l (termed the disengaging lever) is pivoted at l' , the said lever carrying a pin l^2 bearing against the underside of the weighted lever k^3 . A second lever m acted upon by a spring m' and termed the spring-lever is also pivoted to the plate a at m^2 . To the spring-lever is pivoted a third lever n carrying at one end a weight n' and termed the lifting lever. The lifting lever n carries a pin n^2 which, when the striking mechanism is silent, rests in a notch n^3 in the disengaging lever l , the latter being in such a position as to allow the weighted lever k^3 to have its notched lug k^2 in engagement with the pin k of the pawl f' of the striking wheel f so that the said pawl is held out of engagement with the ratchet wheel e' .

Upon the arbor b' carrying the minute wheel is arranged a disk o having upon it four pins o', o' placed at equal distances apart; one of which pins, prior to the striking at each quarter of an hour, commences to act upon the lifting lever n to lift the pin n^2 thereon upward in the notch n^3 in the disengaging lever l , then to act upon the end of an arm p of the spring-lever m to move the same backward against the pressure of its spring m' thereby at the same time moving the lifting lever n so that the pin n^2 carried thereby is drawn out of the notch n^3 in the disengaging lever l and then to lower the lever n . By the time that the striking is to take place, the operating pin o' upon the disk o has moved so far as to become disengaged from the arm p upon the spring-lever m , whereby the said spring-lever is free to move forward again under the impulse of its spring at the same time pushing forward the lifting lever n so that the pin n^2 strikes against the side of the disengaging lever l just below the notch n^3 , as shown in Fig. 12 (which is a view similar to Fig. 10 but showing the parts in different positions), thereby oscillating the said lever and moving the weighted lever k^3 by means of the pin l^2 to cause the notched lug k^2 carried thereby to disengage from the pin k upon the pawl f' , when the said pawl under the action of its spring engages with the ratchet wheel and thereby causes the rotation of the striking wheel f . As the rotation of the disk o continues the next following pin o' thereon to that which previously lifted the lever n impinges against the under side of the said lever and lifts it to allow the lever l under the action of the weighted lever k^3 to move from the position shown in full lines in Fig. 12 to that shown in dotted lines, the said weighted lever k^3 being thereby allowed to move into position to allow the pin k of the pawl f' to

engage in the notch k' and be thereby lifted to disengage the said pawl from the ratchet wheel e' .

In order that after the striking is completed the pin k shall properly enter the notch k' , a curved plate or projection q is formed or fixed upon the front of the weighted lever k^3 , which plate or projection is designed to be acted upon by the longest quarter striking pin h and be depressed so as to move the weighted lever to allow the pin k to pass to a position immediately over the notched lug k^2 when it is then released so that the said lug can rise to engage with and lift the pin.

To cause the clock to "repeat" at any time when desired a hand-lever r is provided, which lever is adapted when moved to the position indicated by the dotted lines r' in Fig. 10 to operate against a pin r^2 on the disengaging lever l so as to move the latter independently of the spring and lifting levers and cause the weighted lever k^3 to disengage the notched lug k^2 from the pin k ; and for entirely silencing the striking mechanism the said hand-lever is arranged to act (when moved to the position indicated by the dotted lines r^3 , Fig. 10) upon a pin r^4 on the lifting lever n so that the latter pushes back the lever m against the pressure of its spring m' so far that the pin n^2 thereon is out of the notch n^3 and the arm p thereon out of the path of the pins o' of the disk o , the said lever n also locking the lever l in its normal position by bearing against the under edge of a plate l^* formed on the top of the lever l .

If it is desired that the striking mechanism shall strike the half hours and hours only, only two pins o' are placed upon the disk o , and if the hours only are to be struck, only one pin o' is used.

In cases where the striking mechanism is only required for "repeating," the striking wheel can be secured to its arbor so that it always rotates therewith, a lever being simply provided for normally holding the hammers out of contact with the bells or gongs, in which case all the automatic releasing mechanism hereinbefore described is dispensed with. Also in this case the special striking wheel hereinbefore described can be dispensed with and the striking pins placed upon one of the ordinary wheels of the clock. This latter arrangement is shown in Figs. 13 and 14 wherein the pins g, g and h, h are represented as being fixed to a gear-wheel s (forming one of the wheels of the ordinary train of the clock) upon the third arbor d hereinbefore referred to. In this modification the wheel s is always rotating; in order therefore to hold the lever-arms g', h' out of contact with the pins g, h except when the clock is required to strike, a lever t having a bar t' is mounted upon the framing of the clock. The said lever t when moved into the position indicated by the dotted lines in Fig 13 moves the rods of the hammers g^2, h^2 by its bar t' so that the lever-arms g', h' will be held out of the path

of the pins g, h when, however, the said lever is in the position shown in full lines the lever-arms g', h' will be in the path of the said pins so that the clock will strike.

u, u' are wire gongs upon which the hammers g^2, h^2 respectively strike. These gongs as hereinbefore stated are preferably of different tones and, as shown in the drawings, are of a somewhat oval form so that the hammers shall strike the gongs properly, notwithstanding the fact that the hammers are moved by the cams i', j' . It is obvious that instead of the gongs shown ordinary circular gongs or bells may be used. In this case, however, it is preferable to arrange the hammers so that their position relatively to the bells do not alter, the rods g^3, h^3 being adapted to slide through sockets on the hammer-rods and the levers g', h' fixed to the rods g^3, h^3 so as to move therewith under the action of the cams.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, it is declared that what is claimed is—

1. In combination with the clock mechanism an arbor driven thereby, carrying a ratchet wheel, a striking wheel mounted on the arbor carrying a pawl engaging the ratchet wheel, a weighted lever for causing the disengagement of the pawl and ratchet, and means operated by the clock mechanism for causing said pawl to engage the ratchet to strike the hour, substantially as described.

2. In combination with the clock mechanism, an arbor driven thereby carrying a ratchet wheel, a striking wheel mounted on the arbor having a pawl engaging the ratchet wheel, a weighted lever for holding the pawl normally out of engagement with the ratchet, means operated by the clock mechanism for lifting the weighted lever to permit the pawl to engage the ratchet, and a manually operated lever for independently lifting the weighted lever, substantially as described.

3. In combination with the clock mechanism, an arbor driven thereby carrying a ratchet wheel, a striking wheel mounted on the arbor having a pawl for engaging said ratchet, a weighted lever for holding the pawl normally out of engagement with the ratchet, a series of levers controlled by the clock mechanism for raising the weighted lever to release the pawl to strike the hour, and a hand lever movable in one direction to lock said levers and prevent the striking of the clock and in the opposite direction to positively operate the pawl and cause the clock to repeat, substantially as described.

4. In a striking mechanism for clocks the combination of a striking wheel having a graduated series of pins on one side for striking the hours and a second graduated series of pins on the other side for striking the quarters, levers in connection with the gong-hammers adapted to be operated by the said pins, and two cams, one fixed upon the sleeve

carrying the hour-hand of the clock and the other upon the arbor to which the minute hand is attached the said cams being designed to move the said levers so that they will be
5 struck by one or more of the pins, substantially as, and for the purpose, described.

5. In a striking mechanism having a striking wheel driven by the clock spring or weight and adapted to be connected with and dis-
10 connected from the clock, the combination with the weighted lever through the medium of which a pawl upon the striking wheel is

disengaged from the ratchet wheel on the arbor carrying the said striking wheel, of a series of levers such as *l, m, n* operated by 15 a disk carrying pins, substantially as described.

EPIMACO OLIVIERI CACCIALUPI.

Witnesses:

G. F. REDFERN,

Of the firm of G. F. Redfern & Co., Patent Agents, 4 South Street, Finsbury, London, England.

A. ALNUTT.