

No. 808,631.

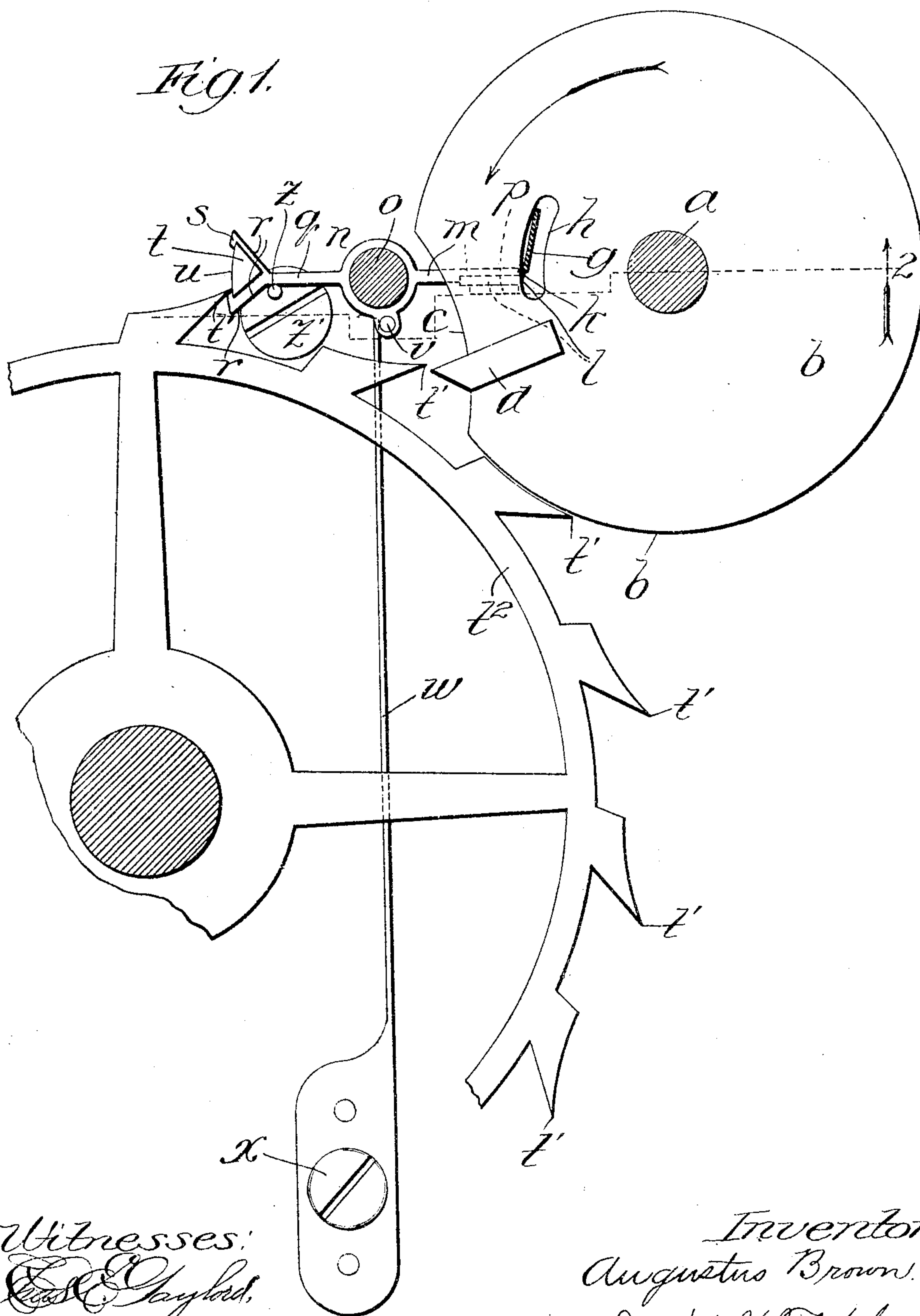
PATENTED JAN. 2, 1906.

A. BROWN.

CHRONOMETER ESCAPEMENT.

APPLICATION FILED JULY 13, 1904. RENEWED NOV. 18, 1905.

2 SHEETS--SHEET 1.



Witnesses:
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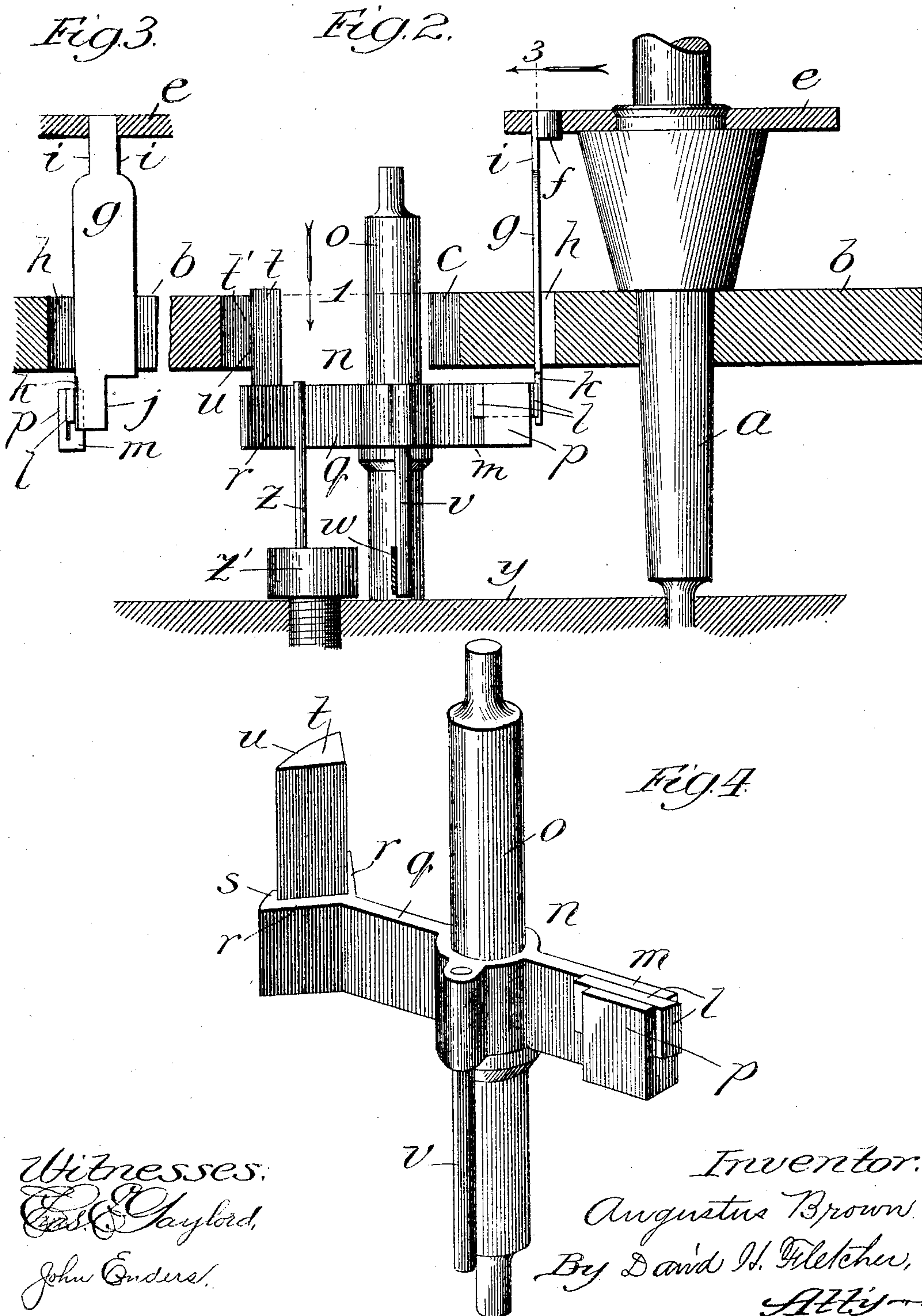
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Inventor:
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UNITED STATES PATENT OFFICE.

AUGUSTUS BROWN, OF ELGIN, ILLINOIS.

CHRONOMETER-ESCAPEMENT.

No. 808,631.

Specification of Letters Patent.

Patented Jan. 2, 1906.

Application filed July 13, 1904. Renewed November 18, 1905. Serial No. 288,060.

To all whom it may concern:

Be it known that I, AUGUSTUS BROWN, a citizen of the United States, residing at Elgin, in the county of Kane and State of Illinois, have
5 invented certain new and useful Improvements in Chronometer-Escapements, of which the following is a description, reference being had to the accompanying drawings, forming a part of this specification, in which corresponding let-
10 ters of reference in the different figures indicate like parts.

My invention relates to that type of chronometer-escapement having a pivoted detent; and the object of my invention is to so com-
15 bine, arrange, and construct the several co-acting parts as to greatly shorten the detent and decrease its weight, thereby largely eliminating the factors of inertia and momentum and preventing that tendency to rebound and
20 tremble from the shock of action and extraneous jars which is so objectionable in chronometer-escapements.

Further objects are to so construct and arrange the unlocking-spring that its flexion
25 may be very slight, thereby reducing its resistance to the momentum of the balance to a minimum, to avoid a recoil of the scape-wheel when unlocking, to provide a geometrically-balanced detent, and to avoid any liability to
30 set by decreasing to a minimum the angle of motion of the balance required to actuate the escapement, all of which is hereinafter more particularly described, and definitely pointed out in the claims.

35 In the drawings, Figure 1 is an enlarged sectional view in plan taken upon the line 1, Fig. 2, showing a portion of the escapement-wheel, the roller, and detent. Fig. 2 is a vertical sectional view taken upon the line 2, Fig.
40 1. Fig. 3 is a sectional view taken upon the line 3, Fig. 2, viewed in the direction of the arrow there shown; and Fig. 4 is a perspective view of the detent with its staff and jewels.

Referring to the drawings, *a* represents the
45 usual balance-staff, upon which is mounted a roller *b*, which is cut away, as shown at *c*, in the usual manner and is provided with an impulse-jewel *d*. Above the roller and parallel therewith is mounted a balance-arm *e*, Fig. 2,
50 which is rigidly attached to the balance-staff. Secured in a suitable opening in said balance-arm, preferably by means of a plug *f*, is an unlocking-spring *g*, which is parallel to the
55 wardly through a slot *h* in the roller. Said slot is curved in form and concentric with the

axis of the roller. The upper end of said spring is cut away, as shown at *i i*, Figs. 2 and 3, and the lower end, which projects through
said slot, is also cut away upon one side, as
60 shown at *j*, for the purpose hereinafter stated. One edge of the spring extending upwardly from its lower end is beveled, as shown at *k*, and is located in position to engage an un-
locking-jewel *l*, secured within one end of and
65 projecting from an arm *m* of a detent, generally designable by *n*. Said detent is mounted upon a staff *o*. The unlocking-jewel is made with flat parallel faces and is secured in
70 place in a notch formed in the end of the arm *m* by the spring-pressure of a member *p*, which is integral with said arm. The opposite arm *q* of said detent is provided with diverging arms
75 *r r*, having inturned lips *s s*, between which is placed and retained by the spring-pressure of
said arms a three-cornered locking-jewel *t*, which projects upwardly from the detent and is provided with a curved working face *u*, the
80 curve of which is concentric with the axis of said detent-staff. A pin *v* is rigidly attached to the hub of the detent and is projected down-
wardly therefrom into engagement with the end of a retaining or locking spring *w*, Figs.
1 and 2, which is rigidly attached at *x* to the
85 bottom plate *y* of the watch. A banking-pin *z* is projected upwardly from the screw *z'*, which is tapped into said bottom plate and is adapted to engage the arm *q* of the detent.
The turning of the screw serves to adjust the
90 position of the pin with reference to said detent in a manner common to such devices. The pressure of the spring *w* serves to normally retain the detent in its position against the banking-pin. When the detent is at rest
95 against the banking-pin, the locking-jewel is in position to engage a tooth *t'* of the escapement-wheel *t''*, which latter is mounted in the usual way.

The operation of said device is as follows:
When the balance oscillates in the direction
100 indicated by the arrow, the unlocking-spring *g* is brought into engagement with the unlocking-jewel *l*, thereby actuating the detent against the pressure of the retaining-spring
105 *w* and releasing the tooth *t'* from the locking-jewel *t*, thus enabling the next forward tooth to engage the impulse-jewel and impart an impulse to the balance. Upon the return
movement of the balance the flat face of the
110 unlocking-spring is brought into contact with the beveled face of the unlocking-jewel, thereby causing a sufficient deflection of said spring

to enable it to pass the jewel. In view of the fact that the spring is cut away, as shown at *j*, only one edge of said spring can be brought into direct contact with the unlocking-jewel, thus avoiding two interferences as the balance oscillates in opposite directions, it being understood that the normal position of the spring is governed by the contact of its opposite edges with the concave wall of the slot *h*, which forms a banking therefor, the flat wide spring describing the chord of the arc formed by the face of said slot, so that the contact portion only describes about half of that chord. Moreover, the cutting away or narrowing of the spring at *i i* enables it to twist slightly, and the result is that it passes the jewel in its reverse movement without causing any appreciable retardation of the momentum of the balance. The spring should be made quite thin and proportionately wide where it passes through the roller, the edges thereof resting normally against the wall of the curved slot, as stated, thereby preventing any tendency to adhere to the banking. By placing the unlocking-spring upon the balance-arm and arranging it parallel with the balance-staff I am enabled to shorten the detent to a little more than one-quarter of the diameter of the balance, which enables me to interpose said detent lengthwise between the locking-tooth and the axis of the balance, with its staff in a line substantially tangential to the circumference of the scape-wheel. A perfect balance of the detent is facilitated by making the arms thereof of equal length. The position described also enables the locking-jewel to be placed in the end of the detent, which position affords the further advantage that the curve of the acting face of the jewel may be made concentric with the axis of the detent, thereby obviating recoil in unlocking. The impact of the locking-tooth being at the end of the detent, a solid abutment is furnished therefor, all trembling is avoided, while the position and arrangement of the unlocking-spring enables it, when deflected from its normal position, to act along the line of centers.

It will be seen that the face of the locking-jewel is placed twelve degrees forward of the escape-wheel radius, thereby bringing the locking-point three degrees below the tangential line. This affords fifteen degrees of natural "draw," which, with the light and easily-poised detent, permits the use of a locking-face, as stated—*i. e.*, concentric with the axis of the detent-staff—while the tendency of the action of the locking-tooth upon the jewel is to draw the detent against the banking-pin.

By making the curve of the slot *h* concentric with the axis of the roller the position of the impulse-jewel may be adjusted laterally by moving the roller on the balance-staff to accommodate it to the position of the unlocking-jewel without changing the arc or path of movement described by the spring.

It will be observed that by making the arms of the detent of equal length and disposing the parts in the manner shown I am enabled to place the balance-staff, the banking-surface in the roller for the unlocking-spring, the detent-staff, and the impact-face of the locking-jewel at equal distances apart in the order mentioned. By this arrangement and the position of the unlocking-spring I am enabled to reduce the usual angle of motion of the balances required to actuate chronometer-escapements from twenty-two down to three degrees, an advantage too obvious to require special comment.

Having thus described my invention, I claim—

1. An escapement of the class described in which is combined a balance-arm, a balance-staff, an unlocking-spring mounted upon the balance-arm substantially parallel with the balance-staff, an escapement-wheel, a detent interposed longitudinally between said spring and the locking-tooth of said wheel, and yielding means for maintaining said detent in a normal position.

2. The combination in an escapement of the class described, of a balance-staff, an escapement-wheel, a detent interposed longitudinally between the balance-staff and the locking-tooth of the wheel, the staff of which detent is in a line substantially tangential to the circumference of the wheel, a locking-jewel upon one end and an unlocking-jewel upon the opposite end of said detent, means for yieldingly maintaining said detent in a normal position, a balance-arm and an unlocking-spring mounted upon said balance-arm in position to engage said unlocking-jewel.

3. A chronometer-escapement in which is combined a balance-staff, a balance-arm mounted thereon, an escapement-wheel having teeth adapted to act as locking-teeth, a pivoted detent interposed longitudinally between said balance-staff and such one of said locking-teeth as may be in immediate proximity thereto, means for yieldingly maintaining said detent in a normal position, a locking-jewel upon one end of said detent in position to successively engage said locking-teeth, an unlocking-jewel upon the opposite end, and a flat unlocking-spring having one end thereof attached to the balance-arm, said spring being arranged substantially parallel to the balance-staff.

4. In a device of the class described, the combination of an escapement-wheel, a pivoted detent, a balance-staff, a balance-arm mounted upon said balance-staff, and an unlocking-spring mounted upon the balance-arm parallel to said balance-staff and adapted to oscillate therewith.

5. In a device of the class described, the combination of an escapement-wheel having teeth upon its periphery adapted to act as locking-teeth, a balance-staff, a pivoted detent having its body located in a line substantially tangen-

tial to the circumference of the wheel, a balance-arm, an unlocking-spring mounted upon the balance-arm, a locking-jewel upon one end and an unlocking-jewel upon the other end of said detent, the former being normally in the path of movement of said teeth and the latter in the path of movement of the unlocking-spring.

6. In a device of the class described, the combination of an escapement-wheel, a pivoted detent, a balance-staff, a balance-arm thereon, a roller having a curved slot therein, said slot being concentric with the axis of the balance-staff, and an unlocking-spring having one end attached to the balance-arm, said spring being extended through said slot with the edges in normal contact with the outer edge of the slot.

7. In a device of the class described, the combination of an escapement-wheel, a pivoted detent, a balance-staff, a balance-arm mounted thereon, a roller having a curved slot therein, the curve of which is concentric with the axis of the balance-staff, and a wide flat unlocking-spring having one end attached to the balance-

arm, said spring being extended through said slot, which serves as a banking therefor, the lower or contact portion of said spring being cut away from one edge, whereby but a single contact or interference can occur between the spring and the unlocking-jewel with each oscillation of the balance-arm.

8. In a device of the class described, the combination with a balance-staff, a balance-arm thereon, an escapement-wheel and an unlocking-spring mounted on the balance-arm, of a pivoted detent having arms of substantially equal length, a locking-jewel, and an unlocking-jewel, said locking-jewel being upon one end and said unlocking-jewel upon the other end of said detent.

In testimony whereof I have signed this specification, in the presence of two subscribing witnesses, this 9th day of July, 1904.

AUGUSTUS BROWN.

Witnesses:

D. H. FLETCHER,
C. E. JORDAN.