

(No Model.)

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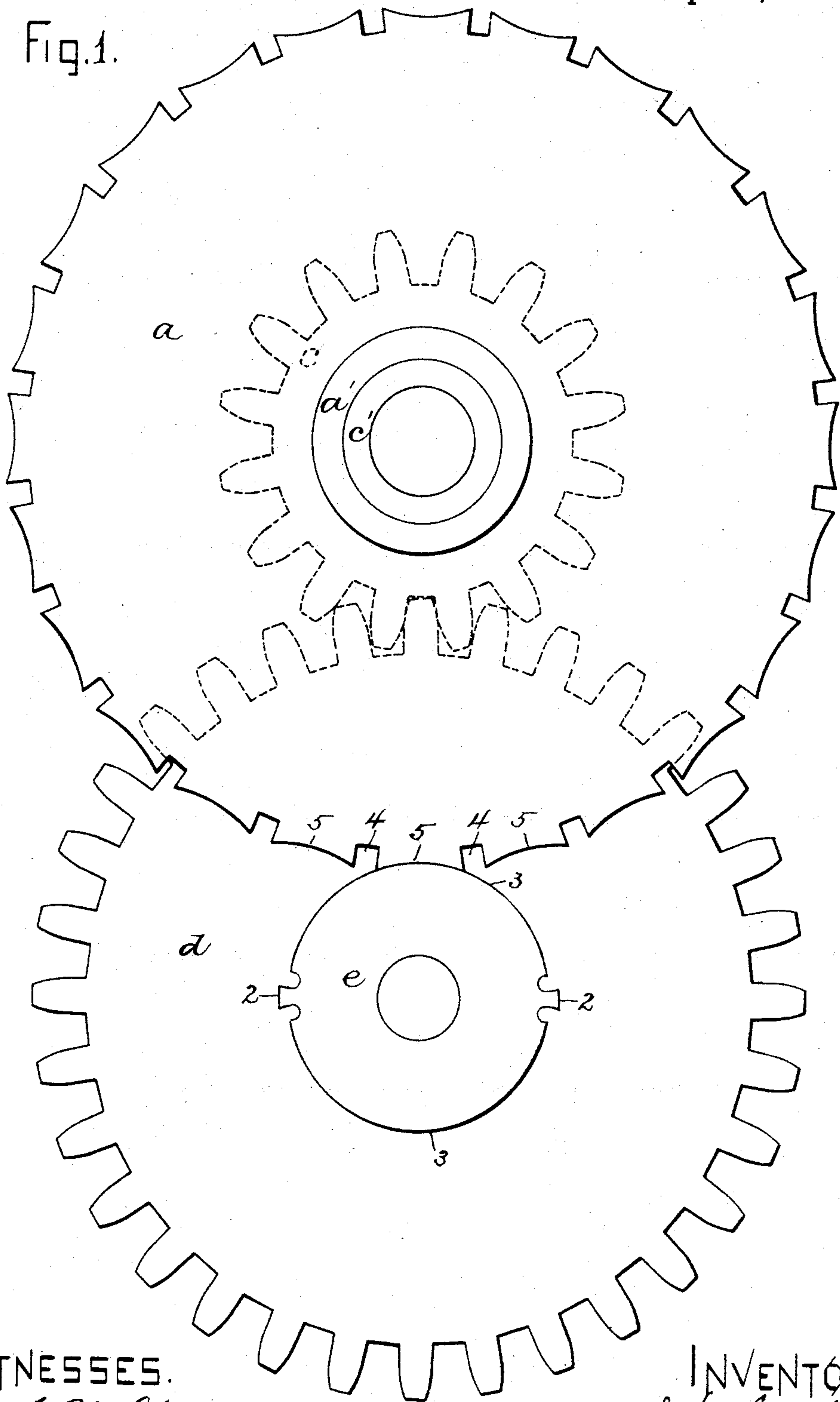
D. H. CHURCH.

DIAL TRAIN FOR TIME PIECES.

No. 339,377.

Patented Apr. 6, 1886.

Fig. 1.



WITNESSES.

A. L. White  
H. Brown

INVENTOR

D. H. Church  
by M. H. Brown  
Atty.

(No Model.)

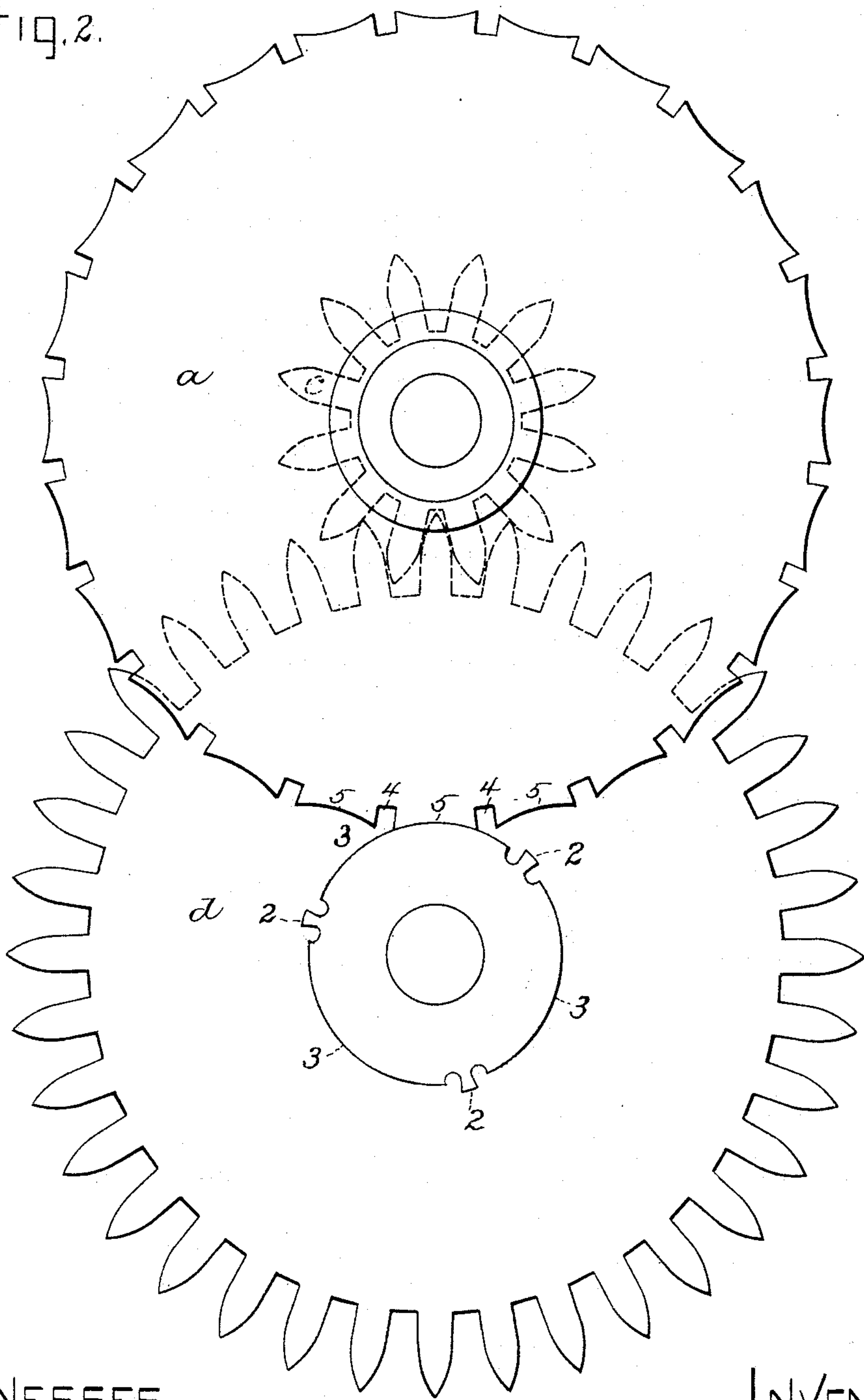
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D. H. CHURCH.  
DIAL TRAIN FOR TIME PIECES.

No. 339,377.

Patented Apr. 6, 1886.

Fig. 2.



WITNESSES.

A. L. White  
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(No Model.)

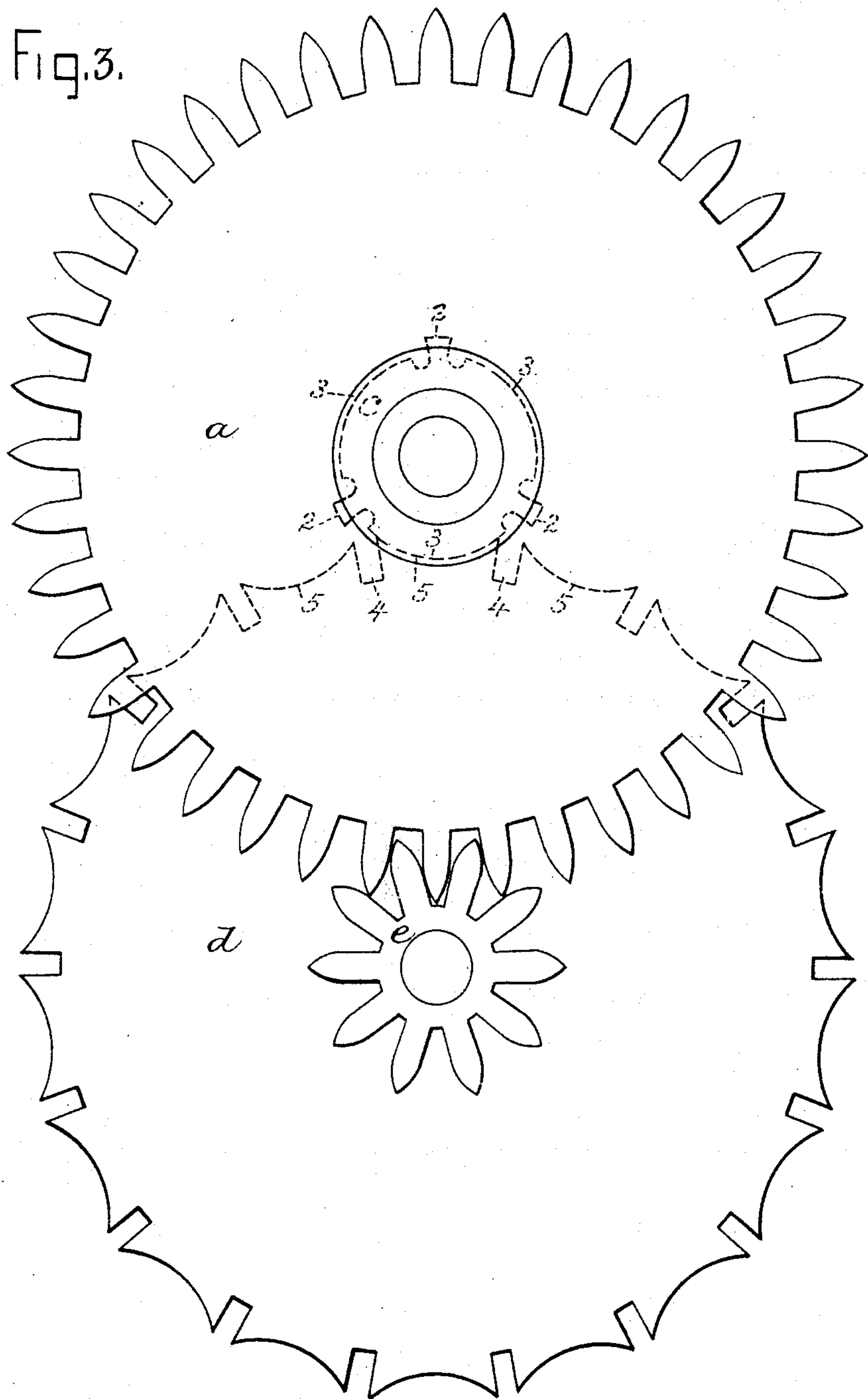
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Fig. 3.



WITNESSES.

A. L. White  
H. Brown

INVENTOR.

D. H. Church  
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Attys

(No Model.)

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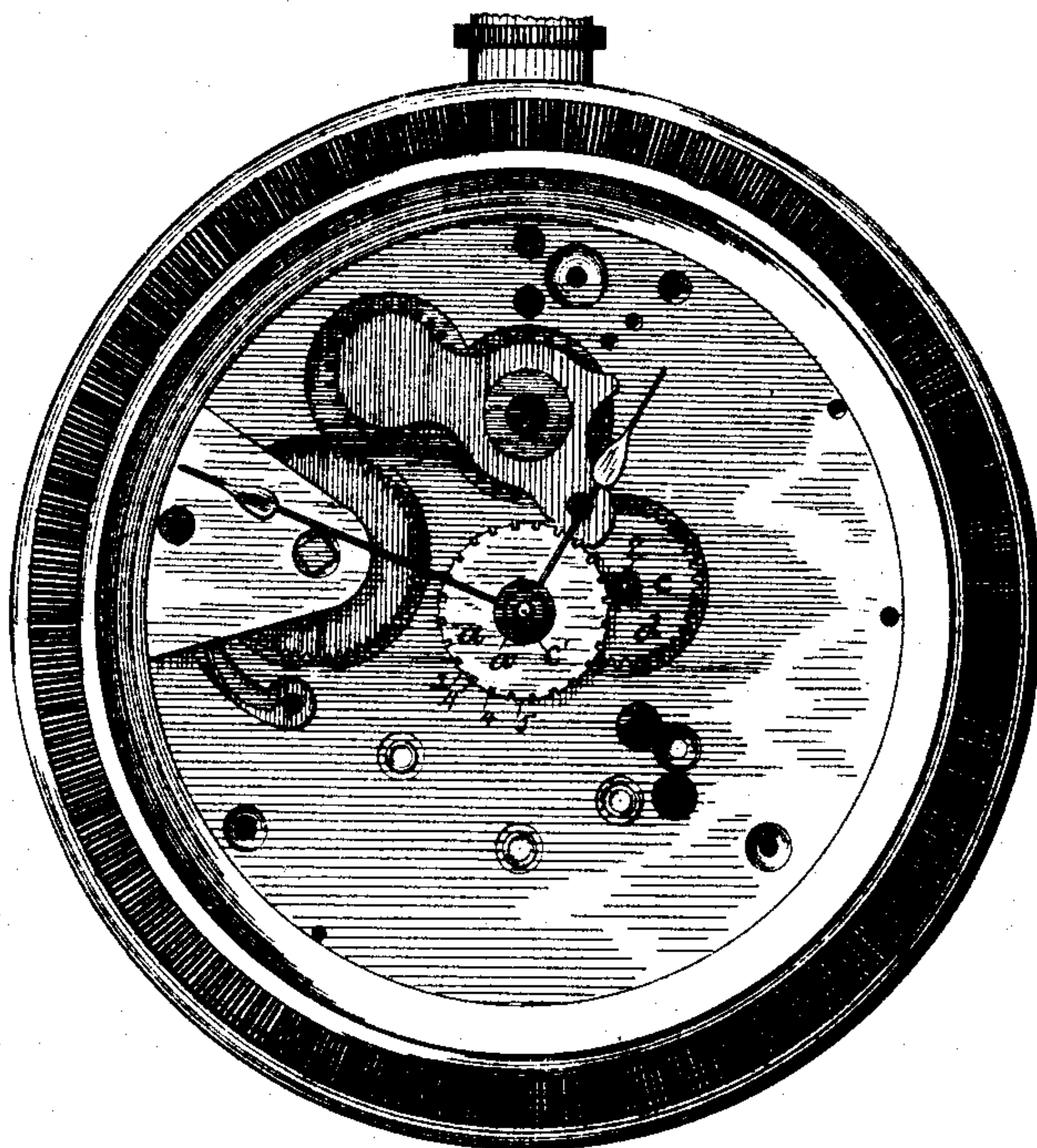
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*Fig. 4.*



*Witnesses.*

*Chas. R. Burr*  
*Thomas Durant*

*Inventor.*

*D. H. Church*  
*by Wright & Brown*  
*his Attorneys.*



# UNITED STATES PATENT OFFICE.

DUANE H. CHURCH, OF WALTHAM, MASSACHUSETTS.

## DIAL-TRAIN FOR TIME-PIECES.

SPECIFICATION forming part of Letters Patent No. 339,377, dated April 6, 1886.

Application filed March 7, 1885. Serial No. 158,055. (No model.)

*To all whom it may concern:*

Be it known that I, DUANE H. CHURCH, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Hour-Hand Trains for Watches and Clocks, of which the following is a specification.

This invention relates to the gearing for the hour-hand train of watches; and it consists in the combination, with the usual propelling mechanism, of the gearing and connections hereinafter described, whereby the hour-hand or both hands may be driven intermittently and the hour-hand may be made to travel round the dial only once in twenty-four hours.

Of the accompanying drawings, forming a part of this specification, Figures 1, 2, and 3 represent different forms of trains, whereby the hour-hand may be intermittently impelled. Fig. 4 represents a front view of a watch having my improvement, the dial being removed.

In the drawings, *a* represents the hour-wheel, having the usual annular holder or collar, *a'*, to which the hour-hand is affixed.

*c* represents the cannon-pinion, having the annular shoulder *c'*, to which the minute hand is affixed.

*d* represents the minute-wheel, meshing with the cannon-pinion and driven thereby, and *e* represents the minute-wheel pinion, which rotates with the minute-wheel and meshes with and imparts motion to the hour-wheel.

In carrying out my invention, I form the intermeshing perimeters of suitable parts of the above-described train in such a manner that the hour-wheel, instead of moving continuously, as heretofore, is moved only at intervals, each movement preferably occupying a half of each hour, and being followed by an equal period of rest, so that the hour-wheel and its hand makes only one complete rotation in every twenty-four hours, instead of two complete rotations.

In the examples shown in Figs. 1 and 2, the intermittent movement of the hour-wheel is effected by the form of the perimeters of the minute-wheel pinion and hour-wheel. The perimeter of the minute-wheel pinion is composed of two or more teeth, 2 2, and convex surfaces 3 3, which separate the teeth 2, and are concentric with the axis of the pinion.

The perimeter of the hour-wheel is composed of alternating recesses 4, formed to receive the teeth 2 of the pinion *e*, and concave surfaces 5, closely fitting the concave surfaces 3. The rotation of the pinion *e* has no effect on the hour-wheel, excepting when a tooth of the pinion coincides with a recess of the hour-wheel, the hour-wheel being prevented from moving at other times by the projection of the convex surfaces of the pinion into the concave surfaces of the hour-wheel. It will be seen, therefore, that the hour-hand is alternately moved and held at rest, its periods of action and inaction depending on the relative number of teeth on the pinion and recesses in the hour-wheel. These numbers are such in the examples shown in Figs. 1 and 2 that the hour-wheel is moved continuously for thirty minutes and remains at rest during the succeeding thirty minutes. As the cannon-pinion *C* moves with uniform rotative speed, as is usual, the rate of rotation of pinion *e* will be determined by the relative size and number of teeth on the cannon-pinion and on pinion *d*, which receives its motion therefrom, as pinion *d* carries forward the pinion *e*. When the pinions are proportioned as in Fig. 1, the pinion *e* will make half a revolution in an hour; when as in Fig. 2, pinion *e* makes one-third of a revolution in an hour. In either case but one tooth on the pinion *e* will engage with the hour-hand wheel, and consequently the hour-hand will receive but one forward impulse during the hour, and will remain locked until the next tooth on said pinion *e* moves into operative position. The hour-hand is thus caused to make but one complete circuit over the dial in twenty-four hours, and enables the hour-marks on the dial to be numbered from one to twenty-four. The hour-hand is preferably so placed that when it is at rest it will stand between the hour-marks, and during each movement will cross the succeeding hour-mark.

In the modification shown in Fig. 3 the cannon-pinion and minute-wheel are formed, respectively, like the minute-wheel pinion and hour-wheel shown in Figs. 1 and 2, and the minute-wheel pinion and hour-wheel are provided with intermeshing teeth of the ordinary form. In this case the minute-wheel and its pinion rotate intermittently and impart the

same intermittent rotation to the hour-wheel, the relative numbers of teeth 2 and recesses 4 being such that the hour-wheel is moved and arrested three times in each hour, each movement and period of rest occupying ten minutes.

It is obvious that the periods of action and inaction of the hour-wheel may begin and end at any part of the hour, and may be more or less frequent without departing from the spirit of my invention.

The invention is applicable to clocks as well as to watches.

I claim—

1. In a time-movement, the combination, with a continuously-impelled center arbor, of an hour-hand driving-train, formed, substantially as described, to alternately move and hold the hour-hand, as set forth.

2. In a time-movement, the combination,

with a continuously-impelled center arbor, of an hour-hand driving-train composed in part of a wheel and pinion, the latter having alternating teeth and convex surfaces, and the former having alternating recesses and concave surfaces, as set forth.

3. In a time-movement, the combination, with the continuously-impelled center arbor and minute-wheel, of the minute-pinion having alternating teeth and convex surfaces, and the hour-wheel having alternating recesses and concave surfaces, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 3d day of March, 1885.

DUANE H. CHURCH.

Witnesses:

C. F. BROWN,  
A. L. WHITE.