N. SPICER.

Lever Escapement.

No. 26,531. Patented Dec. 20, 1859.

Fig. 1

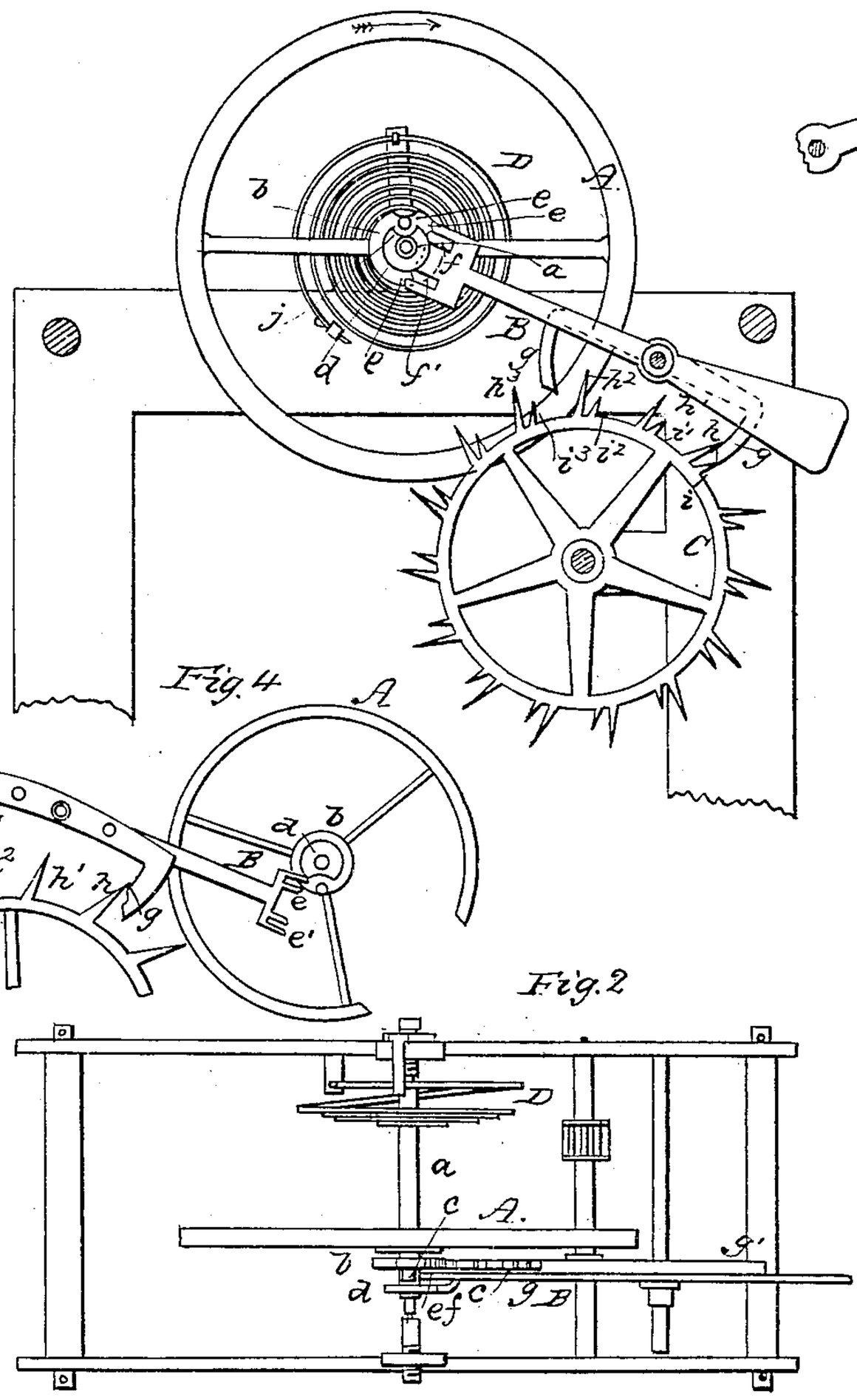

Fig. 3

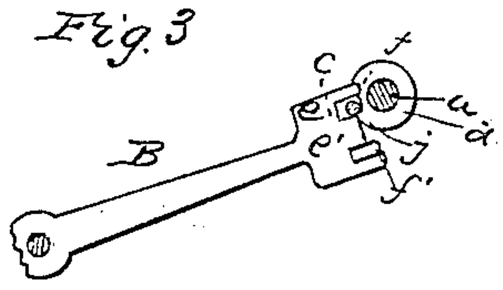

Fig. 4

Fig. 2

WITNESSES

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NATHAN SPICER, OF ST. PAUL, MINNESOTA.

LEVER-ESCAPEMENT FOR TIMEPIECES.

Specification of Letters Patent No. 26,531, dated December 20, 1859.

To all whom it may concern:

Be it known that I, NATHAN SPICER, of St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Lever-Escapements for Watches and Clocks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a front view of a lever escapement with my improvement adapted for a clock. Fig. 2, is a top view of the same. Fig. 3, is a back view of a portion of the lever. Fig. 4 exhibits a modification of the scape wheel and pallets.

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

The object of my invention is to obtain a longer movement *i. e.* a greater amount of revolution of the balance for every vibration of the lever and pallets, and a longer intermission of the movement of the scape wheel than is done by the lever escapements in common use and thereby to enable watches and clocks to be made to run for a greater length of time with the same number of wheels as are commonly employed or for the same length of time with a smaller number of wheels and less power of spring.

My invention consists in providing the escapement lever with two or more forks to operate upon the same pin or cylinder attached to the balance wheel for the purpose of giving to the balance two or more impulses in the same direction for every single vibration of the lever, and furnishing the escapement wheel with two sets of teeth operating in combination with a single pair of pallets or otherwise in an equivalent manner providing for a duplex action, thus making an escapement of novel character which may be termed the "duplex lever escapement."

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

A, is the balance to whose arbor *a*, is attached the plate *b*, in which is secured the cylinder or pin *c*, which works in the forks of the lever, and the banking collet *d*. This balance and the parts attached are the same as in many other lever escapements.

D, is the balance spring applied in the usual manner.

B, is the lever made with two forks *e*, *e'*, to operate upon the cylinder or pin *c*, and with two teeth *f*, *f'*, to operate in combination with the banking collet *d*.

g, *g'*, are the pallets arranged in the usual manner upon the lever.

C, is the scape wheel having on its rim a set of long teeth *h*, *h'*, h^2, h^3, and a set of shorter ones *i*, *i'*, i^2, i^3, the latter nearly close to and in advance of the former.

The operation of the escapement is as follows: I will first suppose the several parts to be in the respective positions represented in Fig. 1. The balance is moving in the direction of the arrow shown upon it, with the impulse it has received from the action of the lower fork *e'*, of the lever on the pin *c*, said impulse having been derived from the tooth *i'*, of the scape wheel acting on the pallet *g'*. The lever is now held stationary by the teeth *f*, *f'*, and banking collet and the scape wheel is detained by the tooth *h*, resting against the pallet *g'*, above its inclined face; but when the pin *c*, strikes into the upper fork *e*, of the lever and the notch *j*, in the banking collet at the same time arrives at the tooth *f*, the pin *c*, depresses the forked end of the lever and raises the pallet *g'*, so far as to liberate the tooth *h*, and allow the said tooth to operate on the inclined end of the said pallet *g'*, and so cause the fork *e*, to give a second impulse to the balance wheel in the same direction in which it is moving. The lever is moved by the action of the tooth *h*, so far that the pallet *g*, is depressed to a position in which its inclined face is within the circle described by the points of the shorter teeth of the scape wheel and so caused to stop the short tooth i^3, and arrest the wheel, but by this time the balance spring begins to resist so strongly that before the pin *c*, can pass round far enough to strike the back of the fork *e*, its resistance overcomes the impulse of the balance and the latter commences to return. When the pin *c*, in the returning movement of the balance strikes into the fork *e*, it raises the said fork and the pallet *g*, to such a degree as to liberate the tooth i^3, and permit the said tooth to act upon the inclined face of the said pallet to give impulse to the balance in the direction in which it has commenced to move viz. the opposite direction to that indicated by the arrow in Fig. 1. The scape wheel after its short tooth i^3, has thus acted upon the pallet *g*, is arrested by its long tooth h^3, strik-

ing the same pallet above its inclined face, until the pin c, comes around again and strikes into the forked end of the lever and the pallet g, high enough for the tooth h^3, to act upon the inclined face of the said pallet and give a second impulse to the balance in the same direction. Thus it will be understood, the balance wheel receives two impulses in each direction, viz. one from one of the short teeth of the scape wheel and another from one of the long teeth and these two impulses are sufficient to give it two complete revolutions for every vibration of the lever in either direction.

This escapement is susceptible of some modifications, as for instance the set of teeth i, i', i^2, i^3, may be dispensed with by providing two faces on the pallets as shown in Fig. 4. Each of the teeth h, h', h^2, h^3, will act first upon the upper and then upon the lower of the two inclined faces and so be caused to give two impulses to the balance for every vibration of the lever in either direction, and I regard the double pallets operated upon in this way by a single set of teeth as equivalent to the single pallets and two sets of teeth first described. The principle of operation of this escapement may be still further extended by the use of the two sets of teeth shown in Fig. 1, in combination with the double pallets and with a lever having four forks, for the purpose of giving four instead of two impulses to the balance in the same direction for every single vibration of the lever.

I do not claim the employment of two sets of teeth on the same scape wheel as two sets have been used in various forms of the duplex escapement. But

What I claim as my invention and desire to secure by Letters Patent, is—

The combination of the two sets of teeth on the scape wheel and the single pair of pallets or their equivalent with two or more forks on the lever operating upon and operated upon by a single pin or cylinder attached to the balance, the whole operating substantially as herein set forth for the purpose specified.

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Witnesses:
S. S. Eaton,
David Burlock.