

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION.

### Improvements in or relating to Clockwork-operated Fuses for Projectiles.

We, TAVANNES WATCH CO. SOCIÉTÉ ANONYME, a Swiss corporation, of Tavannes, Canton of Berne, Switzerland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to clockwork-operated fuses for projectiles of the type in which the clockwork movement is operated by a power spring and is provided with regulating balance and with a key adapted to effect simultaneously the winding of said power spring and the setting of the fuse for the regulation of the time of ignition of the charge of the projectile. A fuse of this type is described in our prior Specification of Letters Patent No. 219,941.

Since in fuses of this type the mass of the said key for the simultaneous winding and regulation is comparatively large compared with that of the clockwork gearing, it is necessary to disengage this key at the moment of the departure of the projectile in order, on the one hand, to prevent a deregulation of the fuse by reason of the angular inertia of the key when the projectile is suddenly rotated, and, on the other hand, to reduce the work of the power spring.

The object of the invention is to provide a device for automatically disconnecting the key combined in such a manner with the regulating balance of the fuse that the whole room in the interior of the fuse is at the disposal of the balance so that it may make its oscillations from the moment of the disconnection of the key.

This object is achieved by connecting the key to the power shaft of the fuse by an intermediate shaft constituted by

two telescopic parts, one being an axially movable inner portion which slidably fits a pinion in constant mesh with a toothed portion of the key and which is caused to withdraw by inertia at the moment of the departure of the projectile so that the key becomes disconnected from the power shaft and thus gives free room to the regulating balance of the fuse; the second part is a hollow outer portion carrying a fixed pinion which is in constant mesh with a pinion carried by the power shaft and which makes the same angular movements as the inner portion of the telescopic shaft.

The annexed drawing represents, by way of example, two embodiments of the invention.

Fig. 1 is a plan view of the first embodiment showing in dotted lines the regulating balance arranged beneath the upper plate of the fuse.

Fig. 2 is a detail view showing separately one arrangement of the telescopic shaft in longitudinal section, while

Fig. 3 is a similar view showing the second form thereof.

In the embodiment shown in Figs. 1 and 2 the cylindrical casing of the fuse is marked 1, and 2, 3 and 4 are superposed transverse plates constituting together the frame of the clockwork movement of the fuse. The intermediate shaft for the simultaneous winding and regulation of the fuse is constituted by two telescopic parts 5 and 6 arranged parallel with the power shaft (not shown) of the fuse. Before firing of the projectile this shaft mechanically connects a toothed portion 7, indicated in Fig. 1 in dotted lines, of the key (not shown) for winding and regulating the fuse to the power shaft of the latter by means of a pinion 8 mounted on the inner por-

[Price 1/-]

tion 5 of the telescopic shaft, which is square in cross-section so as to act as a feather, and of a pinion 9 keyed to the lower extremity of the outer portion 6 of said shaft. The pinion 9 is in constant mesh with a pinion (not shown) carried by the power shaft of the fuse. The square portion 5 is normally held projecting half-way out of the portion 6 as shown in Fig. 2 by means of a split annular spring 10, forced into four notches 11 provided in the edges of the square portion 5. This spring 10 is housed in a groove 12 of the plate 3 between the bottom of this groove and the end of the portion 6 of the telescopic shaft in such a manner as normally to prevent any axial displacement of the part 5. The action of the spring 10 when the part 5 is withdrawn by inertia also assures that the part 5 does not hinder the function of the balance 18 as a consequence of the vibrations to which the projectile is subjected during its flight.

The top end of the part 5 projects beyond the pinion 8, the hub of which is journalled in a circular hole 13 in the plate 2, and serves as a locking member for a bell-crank lever 14 which pivots on the plate 2, about a set-screw 15 and carries a pin 16 which may be displaced in a circular slot 17 provided in this plate 2. The pin 16, which projects below the plate, serves to give an impulse to the regulating balance 18 of the fuse at the moment of the departure of the projectile to which the fuse is applied, when by inertia the part 5 forces open the spring 10 and moves into the portion 6 so as to leave all the space between the plates 2 and 3 available for the oscillations of the balance 18, to disengage the key from the power shaft and to release the bell-crank lever 14, which latter thereupon, under the action of centrifugal force, moves so as to give the desired impulse to the balance 18.

In the constructional form according to Fig. 3, the lever 14 is omitted and the impulse is given by the part 5 directly to the balance 18, by means of a notch 19 provided in said part 5.

In this embodiment the spring 11 is housed between the pinion 8 and a bridge 20 fixed on the upper plate 2.

The inner portion of the telescopic shaft may be of any section whatever so long as it allows the driving of the exterior part of said shaft in an angular direction during the simultaneous setting and winding-up by means of the key.

Having now particularly described and

ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A clockwork-operated fuse for projectiles of the type having a regulating balance and a key adapted to effect simultaneously the winding of the power spring of the clockwork movement and the regulation of the time of ignition of the projectile, in which the said key for the simultaneous winding and regulation is mechanically connected to the power shaft of the fuse by an intermediate shaft constituted by two telescopic parts, one being an axially movable inner portion slidably fitting a pinion in constant mesh with a toothed portion of the said key and which, at the moment of the departure of the projectile, is withdrawn by inertia so as to disconnect the key from the power shaft and to give free room to the regulating balance of the fuse, and the second part being a hollow outer portion carrying a fixed pinion which is in constant mesh with a pinion on the power shaft.

2. A fuse as claimed in Claim 1, in which the inner portion of the intermediate telescopic shaft is of square section and is normally held projecting from the exterior portion of this shaft by means of annular split spring which, at the moment of firing, is forced open to allow the said square portion to move within the outer portion by the action of inertia.

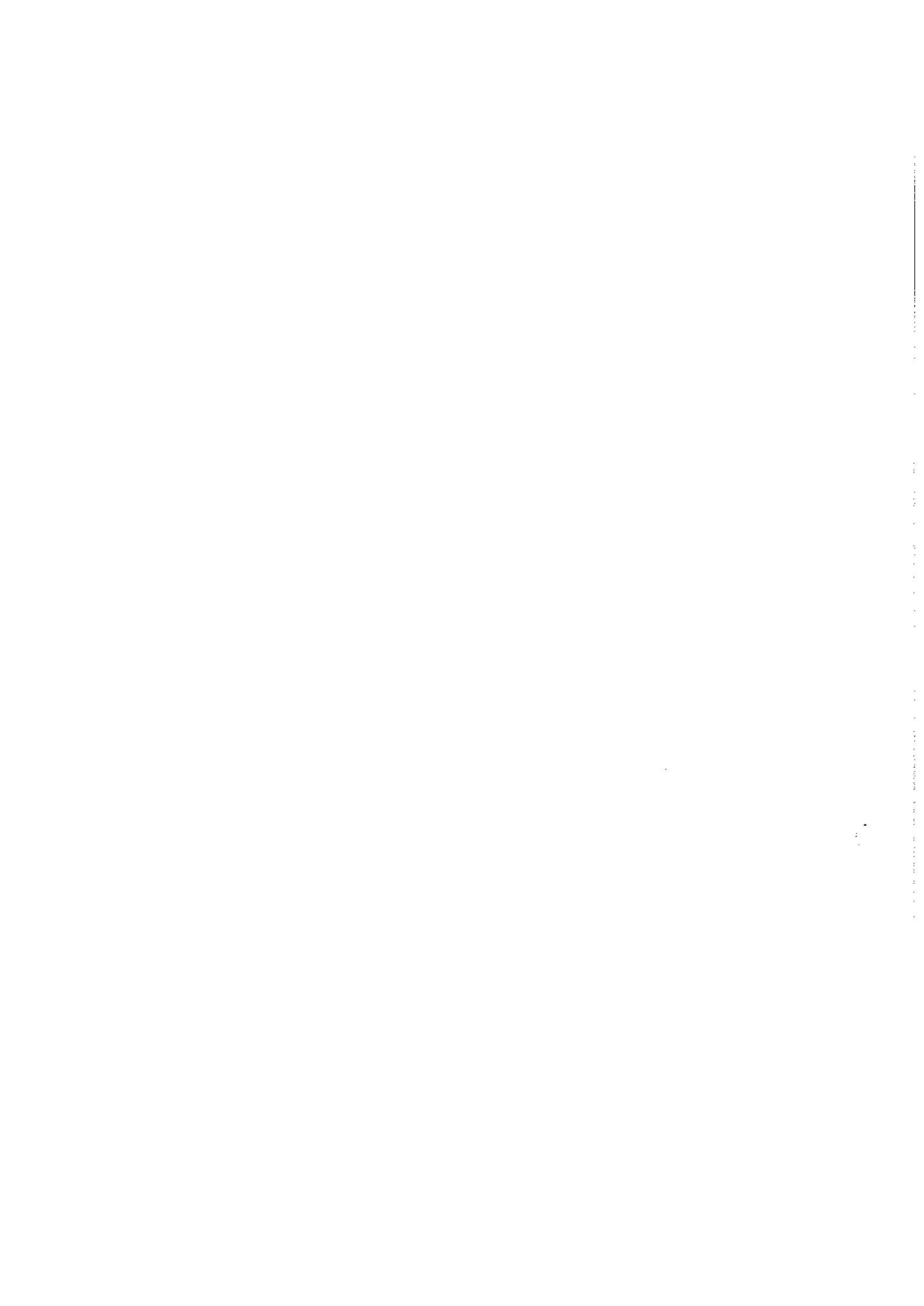
3. A fuse as claimed in Claims 1 and 2, in which the annular spring is housed between the bottom of a groove provided in the casing of the clockwork and the end of the outer portion of the telescopic shaft in such a manner as to prevent any axial displacement of the inner portion of this shaft before firing and also when the latter is withdrawn by inertia.

4. A fuse as claimed in Claims 1 and 2, in which the annular spring is arranged between a bridge fixed on the clockwork casing and the pinion meshing with the key.

5. The mechanism for use in clockwork-operated fuses for projectiles constructed and operating substantially as described with reference to Figs. 1 and 2 or Fig. 3 of the annexed drawings.

Dated this 18th day of June, 1925.

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[This Drawing is a reproduction of the Original on a reduced scale.]

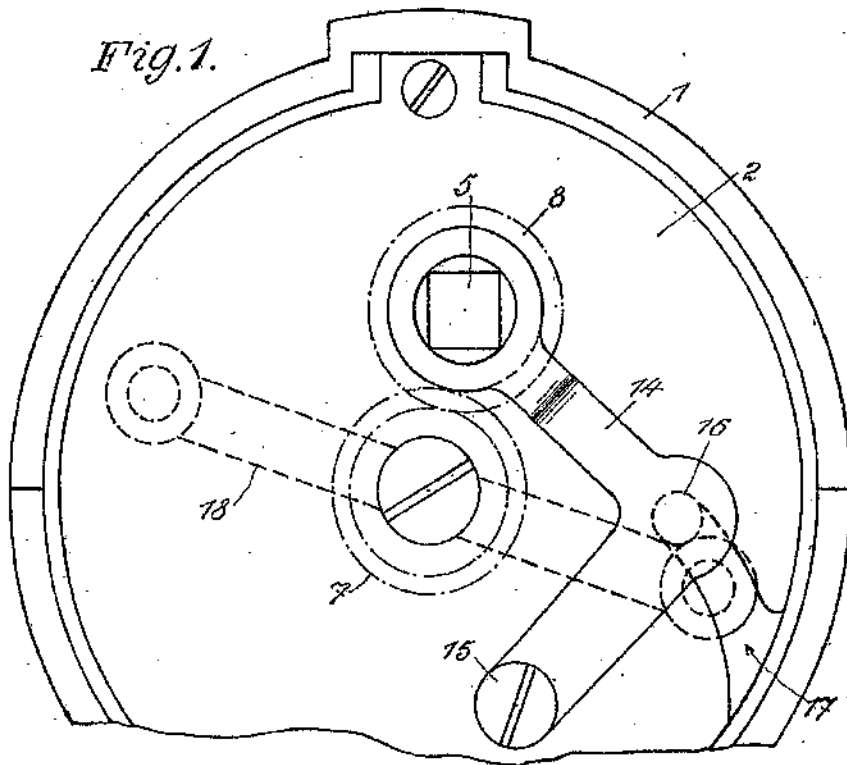


Fig. 2.

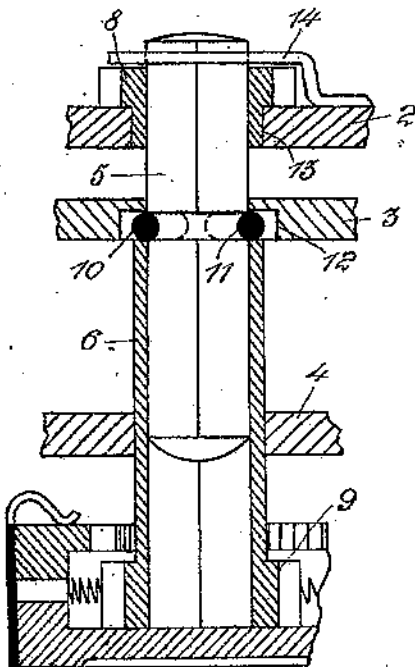


Fig. 3.

