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PERCUSSION IGNITING DEVICE FOR CLOCKWORK FUSES

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Fig.3

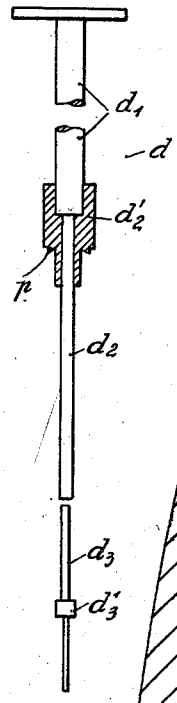



Fig.1

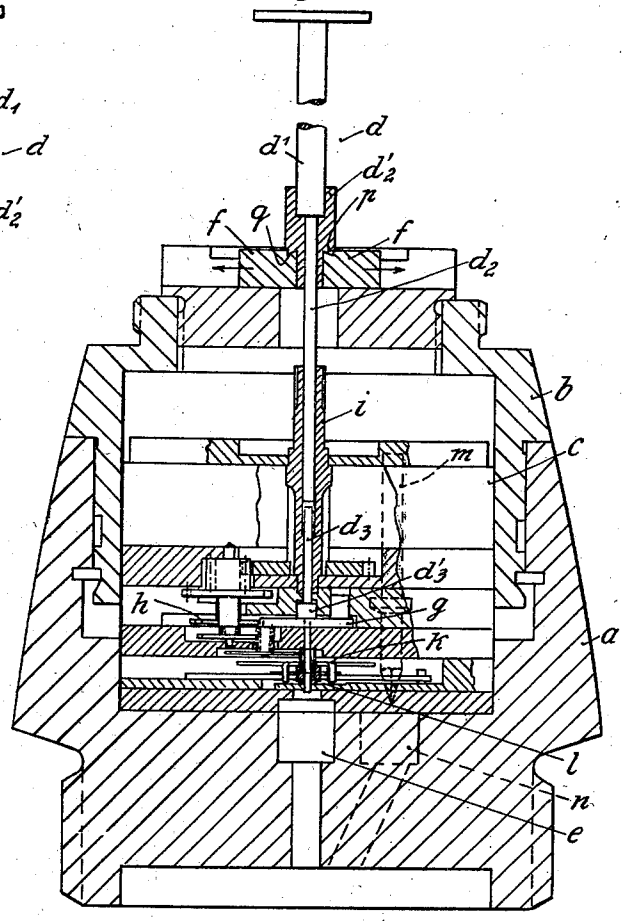
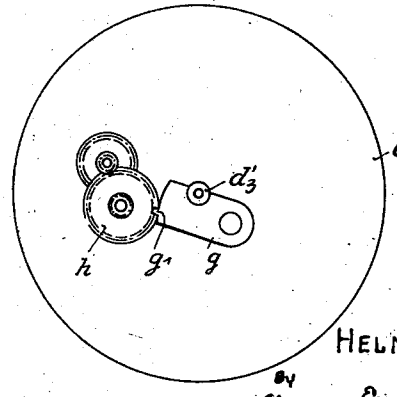



Fig.2




Inventor:
HELMUT JUNGHANS

By
Young, Emery & Thompson
ATTYS.

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## PERCUSSION IGNITING DEVICE FOR CLOCKWORK FUSES

Helmut Junghans, Schramberg-Sulgen, Eckenhof, Wurttemberg, Germany

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4 Claims. (Cl. 102—37)

The present invention relates to percussion igniting devices for clockwork fuses, and applies particularly to devices of that type in which the member for transmitting the impact to the detonating cap is divided into several parts, the terminal part, which pierces the cap, being passed through the hub of the balance wheel.

Such percussion igniting devices are known in the case of the so-called "self-destructive" fuses. Such fuses are intended to be detonated by direct impact on the target, and are also equipped with a self-destructive time device, for the purpose of breaking-up the projectile while still in the air, in the event of its missing the target. This last-mentioned self destructive device is set for an unalterable period of time, which need not be absolutely precise. For this reason, there was no difficulty in arranging the barrel-safety device and the field or muzzle safety device, in such a way that the striking pin passed through the hub of the balance wheel, and served as a shaft for the latter. It was desired to increase the friction of the balance-wheel bearing, for producing a braking action, which necessitated the use of a strong pin.

In the case of clockwork fuses working as precision time fuses it is necessary that the balance wheel should be centrally mounted with respect to the fuse, and also that the striking pin should be arranged in the longitudinal axis of the fuse, so as to pierce the detonator cap properly. In the contrary, to self-destructive impact fuses the aim in view is to minimize the friction in the balance-wheel bearing, that is to say, the balance wheel must be mounted on a very slender shaft. Accordingly, the invention is based on the problem of making the striking pin as slender as possible at the part where it passes through the hub of the balance wheel. The only way in which this problem can be solved is to provide a striking pin which is as slender either throughout its length, or only at its end portion, as required for the mounting of the balance wheel. Even subdividing the striking pin into several parts, as is known in the case of self-destructive impact fuses, would not lead to the desired result, since, when firing the shot, the entire pin would be subjected to compression stress, as far as the time safety device was concerned. According to the present invention, the several parts are or locked individually by independent devices, barrel and transport safety devices for example. With such a construction, the end part can be so slender that the timing accuracy of the balance wheel is not impaired by friction, and moreover, the pin can no longer bend, thereby impeding the movement of the central wheel of the fuse, nor can the end, carrying the balance wheel of the pin become deflected and the regulator become disturbed.

Other features and advantages of the invention will be gathered from the following description and accompanying drawing of a typical embodiment of the invention, in which:

Fig. 1 is a longitudinal axial section through a clockwork fuse, only such parts of the impact ignition device and pinion gear being shown as are necessary for understanding the invention.

Fig. 2 shows the field safety device coacting with the ignition portion of the striking pin, and

Fig. 3 represents the striking pin.

The ignition device $c$ is in the casing $a$, $b$ of the fuse. The typical embodiment shown is a mechanical (clockwork) time fuse also highly sensitive to impact. The igniter $d$ extends centrally, from the nose (not shown) as far as the detonator cap $e$. The ignition pin $d$ (see Fig. 3) is divided into three parts, the first part $d_1$ of which, the so-called impact member, rests at its lower part on the head of the second part, $d_2$ the so-called transmission member, and is guided in a sleeve $d'_2$, surrounding the latter. The lower end of the transmission member $d_2$ is above, the so-called striker pin $d_3$, which acts upon the detonator cap $e$. The impact member $d_1$ and transmission member $d_2$ are supported by the cheeks $f$, of the barrel-safety device, which engage the sleeve $d'_2$, in known manner. The barrel safety device operates to prevent ignition of the fuse while the projectile is in the barrel of the gun. The striker pin $d_3$ in turn is seated, by means of its collar $d'_3$, on the segment $g$ of the field-safety device, gearing, by means of the tooth $g_1$, with its control pinion $h$. The bottom end of the transmission member $d_2$, and the head end of the striker pin $d_3$, are guided in an axial bore of the shaft $i$ of the center wheel. The slender lower end $d_3$ of the striker pin acts as the shaft upon which is mounted the balance wheel $k$ provided with a bored hub $l$. The ignition device for the timing mechanism is independent of that for the impact mechanism, $m$ denoting the striking pin and $n$ the detonator cap of the said timing mechanism. The construction of this mechanism is immaterial to the invention. The sub-division of the ignition pin $d$ into several parts is also of considerable advantage from the point of view of manufacture,

as it would be a troublesome matter to make an ignition pin comprising the three parts $d_1$, $d_2$, $d_3$ or even one with only the two parts $d_2$ and $d_3$. A pin of such length is liable to be not quite straight and to seize in its guide, whereby it might fail to work properly or affect other operations. This would be specially feared in the case of the through portion $d_3$ which carries the balance wheel $k$. The sub-division of the ignition pin into several short parts, and the securing of said parts by separate safety devices, which may be of correspondingly light construction, is a matter of importance in cases where the conditions of space in the fuse are greatly restricted. Thus the employment of a small striker pin, according to the present invention, also enables a correspondingly thin time-safety segment $g$ to be housed in the limited space available, one too thin to withstand the inertia effect of a pin consisting of the combined weights of the parts $d_3$ and $d_2$.

The impact ignition device functions in the following manner. After the rotary movement of the projectile has been started by firing the shot, the two cheeks $f$ of the barrel-safety device fly apart, under the action of centrifugal force, but only after the projectile has issued from the barrel. Until then, and during the propulsion of the projectile within the barrel the transmission member $d_2$, by its inertia, forces its projection $p$, into the recesses $q$ of the cheeks $f$, as shown in Fig. 1 with such force as to maintain them in position despite the rotary movement. After separation of the cheeks $f$, the impact and transmission members are now free, whereas, the ignition member $d_3$ is still restrained by the field safety segment $g$. Directly the projectile leaves the barrel, the clockwork for the precision timing begins to run, and the pinion $h$ shown in Fig. 2 pushes the field safety segment $g$ from under the collar $d'_3$ of the striker pin $d_3$, so that the fuse becomes set for ignition timed to occur after the projectile has traversed the required distance corresponding to the setting of the clockwork, or, if the projectile should hit the target before the clockwork releases the pin $d_3$, the impact pin $d$, will determine the ignition by acting through the aligned parts $d_2$, $d_3$.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A clockwork fuse for artillery projectiles comprising, precision clockwork including a balance wheel, an impact ignition pin, safety means so constructed and arranged as to normally engage said impact ignition pin but releasing it at the end of the acceleration of the projectile, a detonator in alignment with said impact ignition pin, a striker pin of substantially smaller diameter than said impact ignition pin and disposed in alignment with the latter and between it and the detonator, said striker pin forming a shaft for said balance wheel, and a second safety means so arranged as to engage said striker pin at least until the end of said acceleration period, said impact and striker pins being arranged in the longitudinal axis of the fuse.

2. A clockwork fuse for artillery projectiles comprising, precision clockwork including a balance wheel, ignition means including a detonator and a plurality of separate aligned pins arranged in the longitudinal axis of the fuse, one of said pins being a relatively massive impact pin and another of said pins being a light and slender striker pin cooperating with the detonator and forming a shaft for said balance wheel, and a separate and independently operative safety device engaging each of said impact and striker pins of said ignition means.

3. A clockwork fuse according to claim 2, in which a transmission pin is provided between the impact member and the striker pin.

4. A clockwork fuse according to claim 2, in which a transmission pin is provided between the impact pin and the striker pin, and in which a sleeve is provided connecting said impact pin to the transmission pin, said sleeve being engaged by a safety device.

HELMUT JUNGHANS.