

April 10, 1928.

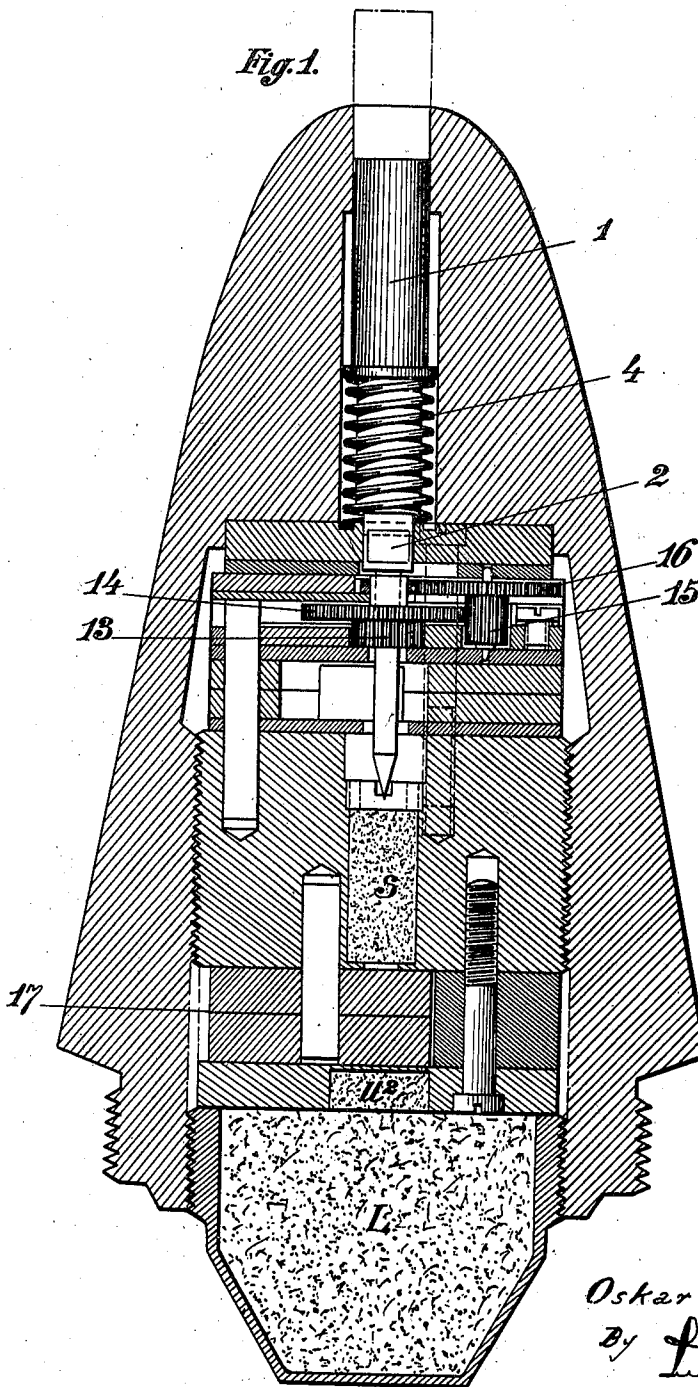
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O. JUNGHANS

PERCUSSION FUSE

Filed Oct. 7, 1926

2 Sheets-Sheet 1



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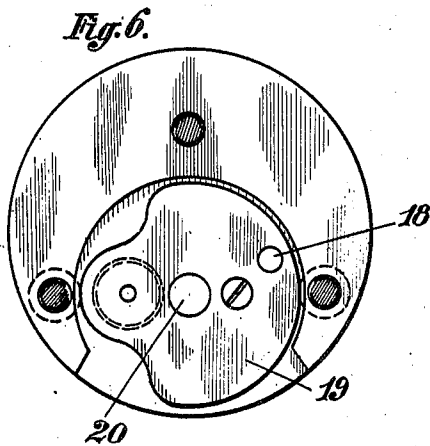
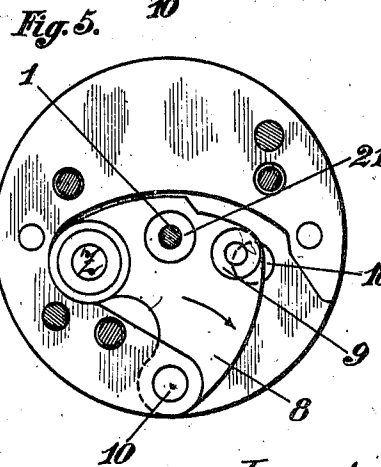
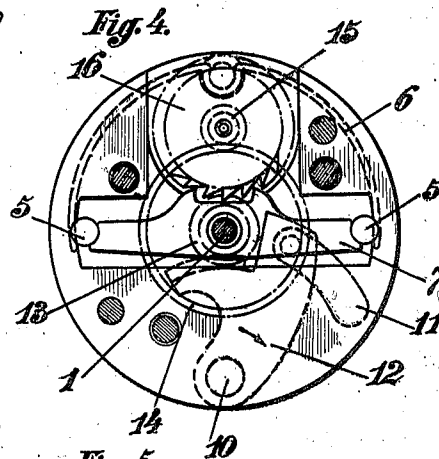
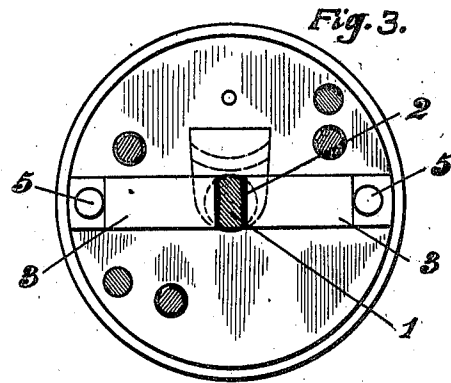
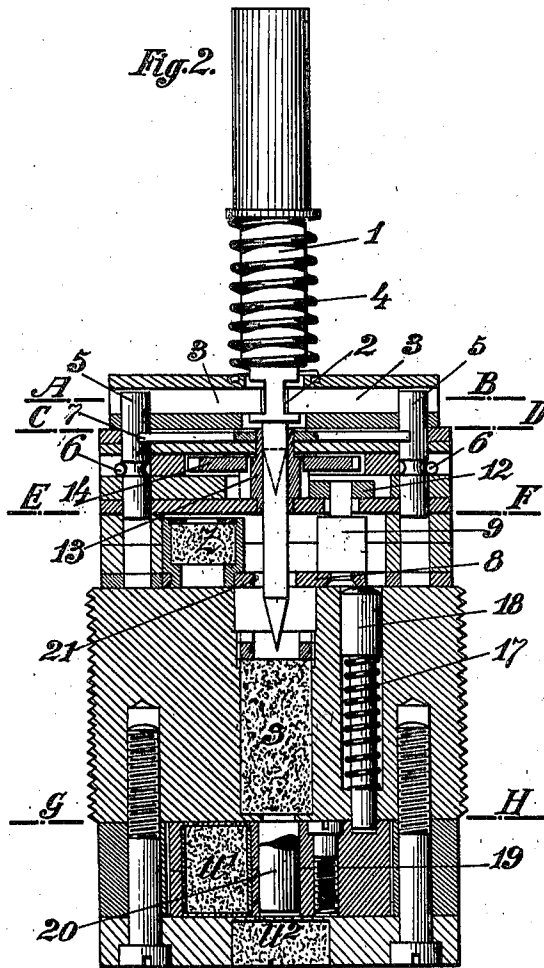
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PERCUSSION FUSE

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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE.

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## PERCUSSION FUSE.

Application filed October 7, 1926, Serial No. 140,106, and in Germany May 21, 1926.

My invention relates to percussion fuses and more particularly to that sort of fuses in which the igniting or percussion pin normally is located entirely within the casing so as to be concealed and out of sight but is removed from such position so as to project from the top face of the fuse, upon firing.

The object of my invention is to provide a percussion fuse of the stated type with a safety mechanism adapted to act in a most reliable manner so that there will be no danger or risk of ignition at the transport or handling or in the gun upon firing.

With this object in view the safety mechanism of the fuse is constructed and arranged, according to the invention, in a manner that both the usual percussion cap and the igniting charge or body employed for transmitting the explosion of the said cap to the explosive charge of the projectile are held in a safe position and prevented from occupying the firing position upon firing of the gun or ordnance, until a certain period of time controlled by a clockwork, will have elapsed.

With the above recited object in view, reference is had to the following specification and drawings in which there is exhibited one example or embodiment of the invention which is in no way intended as a limitation upon the scope of the appended claims as it is to be clearly understood that variations and modifications which fairly fall within the true scope of said claims may be resorted to when found expedient.

In the accompanying drawings forming a part of this specification wherein like characters designate like parts throughout the several views:

Figure 1 is a longitudinal central section of the fuse with the improved safety device;

Figure 2 is a similar section but displaced for 90° and with the outer casing removed;

Figures 3 to 6 are cross-sections taken on the lines A—B, C—D, E—F and G—H, respectively.

The igniting or percussion pin 1 is axially mounted in the top end of the fuse in the usual manner, that is so as to be displaceable lengthwise therein. The upper part of the pin is preferably made of a suitable light metal whilst the lower part thereof forming the striking point, is made of steel and provided with two diametrically opposed recesses 2 for the reception of two sliding bars

3 which normally, that is prior to firing and subsequent impact, engage in said recesses so as to lock the pin and hold the same in safe position, as clearly shown in Figures 2 and 3. In this locked position of the pin 1 the spring 4 encircling the same and abutting against a collar of the pin is under tension, while the two sliding bars 3 are in turn locked by two lengthwise displaceable vertical rods 5 having each an annular recess for the accommodation of the two ends of a yoked spring 6 which thus acts to hold the two rods 5 in their locking positions, as will be seen in Figures 2 and 4. Engaged with the two bolts 5 are the ends of the balance 7 of a clockwork so that the bolts are properly arrested and prevented from accidental movement.

I desire to have it understood that the particular mechanism which I have described thus far, for the purpose of locking the percussion pin, is simply one which has commended itself to me, but which is not at all necessary, since other locking means may be used in lieu thereof.

The percussion cap Z is mounted on a plate 8 supporting a fly-weight 9 and pivotally mounted so as to be capable of rotation about the pivot 10. The fly-weight 9 is elongated to form a stud engaging, through a segmental slot 11 of an intermediate plate of the fuse body, in a toothed sector 12 which is likewise pivotally mounted on the pin or pivot 10. The said toothed sector 12 is positively connected with the balance 7 by means of a train of wheels comprising a pinion 13, a spur gear 14, a pinion 15 and a balance wheel 16, so as to be controlled by the latter, the balance 7 being mounted on the upper journal of the pinion 13 and capable of oscillating thereabout.

In the position of the movable parts of the fuse shown in the drawings, the percussion pin 1 is locked by the sliding bars 3 with its lower end extending through an axial bore of the pinion 13 and centrally through an aperture 21 of the plate 8, see Fig. 5, which aperture is spaced from the axis of the pivot 10 the same distance as the percussion cap Z mounted in the plate 8 or in other words, the centres of the aperture 21 and of the cap Z lie in the same arc of a circle described about the axis of the pin 10 so that when the axis of the pin 1 coin-

cides with the centre of the aperture 21 as shown in the drawings, the percussion cap Z necessarily must occupy a position laterally or out of the path of the pin 1 as will be readily understood on inspection of Figure 2.

The plate 8 is in contact with the head of a locking pin 18 controlled by a spring 17 coiled about the lower end thereof, and engaging with its lower extremity in a bore of a disc-shaped heavy plate 19 mounted on a pin 20 so as to be revoluble thereabout. The plate or disc 19 carries an explosive body  $U^1$  for transmitting ignition from the cap Z and the igniting charge S to the explosive charge of the projectile. As will be seen the movable igniting body  $U^1$  normally lies eccentrically displaced with relation to the axis of the fuse or the pin 1 or, in other words, in staggered relationship to the upper portion S of the igniting charge and the lower portion  $U^2$ , see Figure 2, the two igniting explosive bodies S and  $U^2$  being stationary and occupying a central position in axial alinement with the pin 1.

It will be seen that in the described arrangement the igniting charge of the fuse is divided to comprise three portions S,  $U^1$  and  $U^2$  and is normally interrupted inasmuch as the portion  $U^1$  thereof is eccentrically displaced therefrom and the heavy body of the plate 19 is interposed between the portions S and  $U^2$  of the igniting charge in substitution for the intermediate portion  $U^1$  thereof, with the result that should ignition of the main ignition charge S occur accidentally in manipulating the projectile, on transport or untimely upon firing, there will be no danger of an explosion of the projectile since the ignition will remain limited to the charge S and cannot be transmitted to the explosive charge of the projectile, as there is no communication between the explosive bodies S and  $U^2$ .

The clockwork obtains its motive power by the retarding effect of the rotor 8.

The operation of the safety mechanism in the fuse is as follows:

Upon firing the two axially displaceable locking rods 5 will fly back owing to shock action, so that the two sliding bars 3 and the balance 7 of the clockwork are unlocked. Due to centrifugal action evolved by the rotation of the projectile, the two sliding bars 3 then slide radially outwards and away from the pin 1 which thus will be free to fly forwards under the action of the spring 4 to occupy the impact position indicated in dot-and-dash lines in Figure 1. At the same time the weighted plate 8 carrying the percussion cap Z is released and caused by centrifugal action to turn about the pivot 10 in the direction of the arrow depicted in Figure 5, but the rotation of the plate 8 is retarded by the mentioned clockwork

so that the cap Z will not at once be brought to the igniting position or in coaxial alinement with the pin 1 but after a predetermined length of time depending upon the adjustment of the clockwork. Simultaneously therewith the aperture 21 of the plate 8 through which the pin 1 projected prior to its movement into the impact position, will occupy a position over and above the top of the locking pin 18 so that the latter can rise under the pressure of its spring 17 and thereby be disengaged from the disc-shaped heavy plate 19. The thus liberated plate or disc 19 then will be free to turn about its pivot 20 due to centrifugal action, to occupy a position in which the igniting body  $U^1$  will be in axial alinement with the pin and with the igniting bodies S and  $U^2$  so as to form a uniting link between the two bodies S and  $U^2$ .

In this way the igniting charge of the fuse comprising the three portions or bodies S,  $U^1$  and  $U^2$  will form, upon the firing of a shot, an uninterrupted communication between the percussion cap Z and the main igniting charge L, see Figure 1, so that upon impact of the projectile the explosive charge of the latter will be ignited.

What I claim is:

1. A percussion fuse in which the percussion pin normally lies concealed within the casing of the fuse comprising a percussion cap, a divided igniting charge composed of a plurality of single explosive bodies which normally occupy safe positions so as not to communicate with each other, but which upon firing are permitted to communicate with each other for the purpose of igniting the explosive charge of the projectile, means for ensuring the safe and active positions of the said explosive bodies, forming the igniting charge, and means including a clockwork for retarding the interconnection of the said bodies to active position for a predetermined length of time after firing.

2. A percussion fuse in which the percussion pin normally lies concealed within the casing of the fuse, comprising a percussion cap, a divided igniting charge composed of a plurality of single explosive or igniting bodies, a plate carrying the said cap and adapted to rotate about a stationary pivot, an aperture in said plate for the percussion pin to normally engage therein, so that the percussion cap will occupy a lateral position out of the way of the said pin, a flyweight attached to the said plate, a clockwork operatively connected with the said plate through the agency of the said flyweight, a disc adapted to rotate about a stationary pivot and carrying one of the several igniting bodies and a spring-controlled locking pin adapted to normally lock the said disc with the igniting body thereon in safe or eccentric position, and to be arrested

in locking position by the said plate, the arrangement being such, that the said disc is prevented from rotation and from placing the igniting body thereon in central active position that is in axial alinement with the other igniting bodies until the cap has been previously moved to occupy such central active and alined position.

3. A percussion fuse comprising a casing;  
10 a percussion pin concealed within the casing;

a plurality of single explosive bodies arranged in spaced relation in the casing, said bodies being in communication with each other so that upon firing the explosive charge will be ignited; and means including a clockwork for retarding the interconnection of the said bodies to activity for a predetermined length of time after firing.

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In testimony whereof I affix my signature.

DR. OSKAR JUNGHANS.