

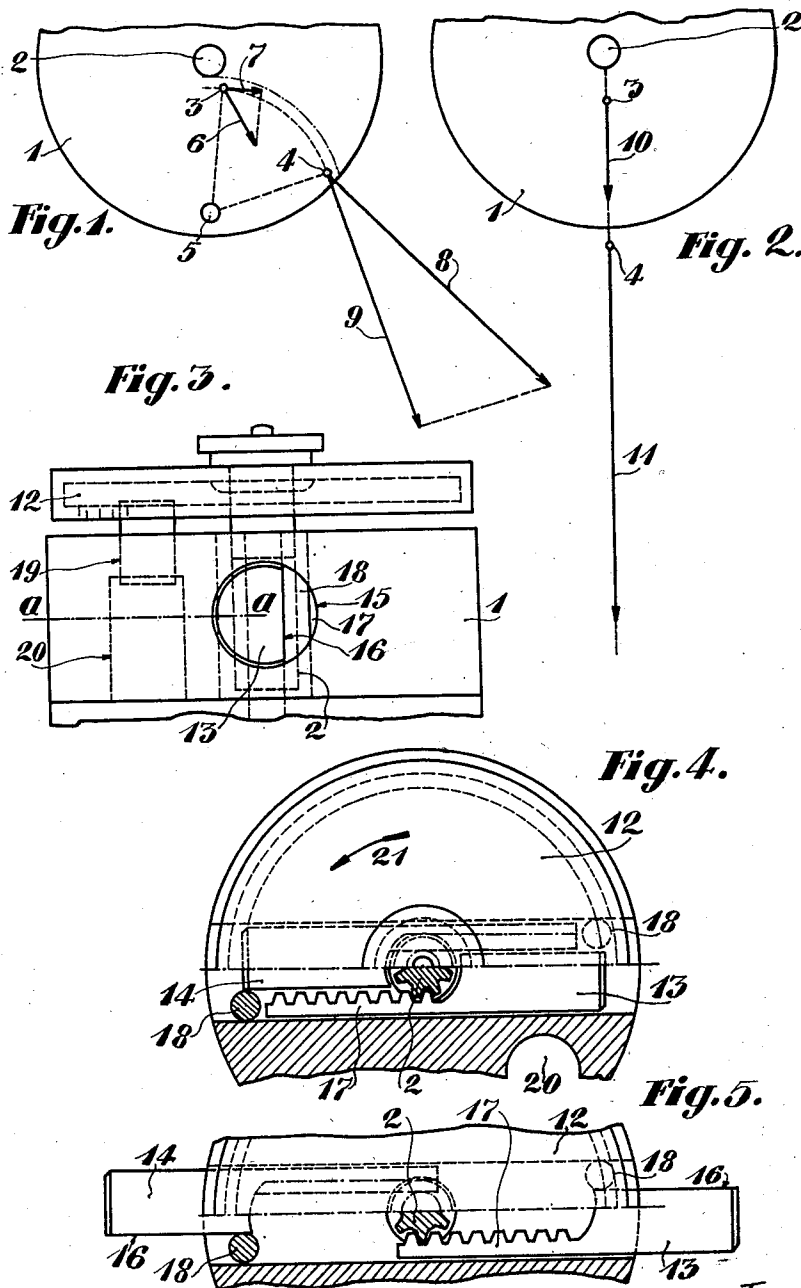
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FUSE MECHANISM FOR PROJECTILES

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## UNITED STATES PATENT OFFICE

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## FUSE MECHANISM FOR PROJECTILES

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Various types of centrifugal automatic time fuse mechanism for projectiles are known, in which a weight is provided on a toothed sector or on a wheel gearing with the central shaft of the clockwork movement. In such mechanisms, the weight describes an arc in moving.

Contrary to these known devices the device according to the invention comprises a radially movable bolt or bolts provided with teeth so arranged that they engage a pinion or pinion teeth of the central shaft situated on the axis of the fuse cap.

In the annexed drawing:

Figure 1 is a diagrammatic representation of the operation of a prior art centrifugal fuse motor.

Fig. 2 is a diagrammatic representation of the operation of a centrifugal fuse motor according to the present invention.

Fig. 3 is an elevational view of a centrifugal fuse motor constructed according to the present invention.

Fig. 4 is a plan view of the centrifugal fuse motor, a portion of the structure being shown in horizontal section taken on line *a— a* of Fig. 3.

Fig. 5 is a similar but fragmentary plan view of the fuse motor with the driving weights extended.

Fig. 1 illustrates the action of priming mechanism operated by a weighted toothed sector, while Fig. 2 illustrates the action of the device according to the invention.

In both figures, 1 represents the clockwork seen in plan, and 2 the central shaft provided with teeth or a toothed pinion with which engages a sector in the first case and a straight rack in the second case.

The points 3 and 4 represent two positions of the weight at its centre of gravity. At 5 in Fig. 1 is represented the pivot of the toothed sector supporting the centrifugal weight.

With reference to Fig. 1, when the weight is at 3, it can be seen that it is subjected to a centrifugal force 6 which will resolve into a force 7 available for the operation of the sector, this force being tangential to the arc of the said sector, and into another force, not represented, exerting an action on the pivot 5. It is easily ascertained that the weight 3, here represented at its starting point, is very near the center. Consequently, the force 6 is comparatively small and its serviceable component 7 excessively small. The component pressing the sector against its pivot 5 will, on the contrary, be comparatively large.

When the sector reaches a position near the

end of its course, the weight situated at 4 is then subjected to a much higher centrifugal force 8, the useful component 9 of which is almost of the same order.

The inconvenience of such an arrangement is that at the start, the action of the weight is small and, consequently, a relatively heavy weight must be provided for obtaining even a small effect.

At the end of the course, the action of the weight is, on the contrary, considerable, and if a very heavy weight has been chosen, the strain which it will exert on the gears of the various movable parts will be too great and may have a destructive effect on these gears.

Finally, the pivotal reaction not only against the component of the weight, but also against the centrifugal force acting on the whole sector, produces a rather considerable braking of this member, further tending to decrease the disposable energy at the moment when the centrifugal sector is set in action.

Also it is to be noted that the adjustment of a sector with its pivot and the place that it occupies leads to a rather complicated construction.

In Fig. 2, it can be seen that a weight moving radially while drawing behind it a rack acting on the shaft pinion produces a better result. The starting point of the weight being for instance at 3, it is seen that the centrifugal force 10 at this point is already considerable and, on the other hand, that it is completely utilized at the operation of the clockwork, this force becoming notably greater as a final point such as 4 is approached.

By comparing the force 10 of Fig. 2 with the force 7 of Fig. 1, it can be ascertained that a weight capable of giving to this force 7 the amount of 10, would be such that the force 9 to which it would give place in the position 4 of Fig. 1, would be much greater than the force 11 of Fig. 2.

There is therefore a great advantage in arranging the weights according to the invention, which is practically done as follows:—

Fig. 3 shows a part view, in elevation, of the clockwork 1 and its toothed central shaft 2, the same mechanism being shown in plan in Figs. 4 and 5, one half representing the section *a— a* of Fig. 3.

At 12 is represented the driving disc for the release of the percussor or hammer (not illustrated) and at 13 and 14 are represented two weights radially movable and centrifugally operated bolts, which Fig. 4 shows at rest and Fig. 5 at the end of their movement.

These bolts, of cylindrical shape, are arranged in a cylindrical opening 15 occupying a diameter

of the body of the clockwork and each bolt has a flat portion 16 and a rack 17 acting on the toothed central shaft 2.

Two pins 18 serve as guides to the flat portions 16 of the bolts and the whole is held in the position of rest of Fig. 4 by a locking-pin 19, capable of withdrawing through inertia into a cylindrical chamber 20 at the moment of firing the projectile.

This pin, of any known type, then releases the driving disc 12 for the release of the percussor which disc under the action of the bolts on the central shaft, begins to rotate in the direction of the arrow 21. The bolts 13 and 14 move outwards away from the center and occupy at the end of their movement the position shown in Fig. 5.

It is evident that a construction comprising two bolts is preferable because it is better balanced than a construction having only one bolt, although it may be possible to construct a similar arrangement having only one radial bolt.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In fuse mechanism for projectiles of the character described, a cylindrical casing, a shaft axially mounted in said casing, gear teeth formed on said central shaft, a driving disk for the percussor of the fuse keyed directly on said shaft, radially slidable members adapted to be actuated by centrifugal force mounted in said casing transversely to the axis thereof, rack teeth on said members directly engaging with the gear teeth of said shaft, means for guiding said radially slidable members in their movement, and a locking pin for said driving disk adapted to be released from said disk by inertia when the projectile is fired.

2. In fuse mechanism for projectiles of the character described, a cylindrical casing, a shaft axially mounted in said casing, gear teeth formed

on said central shaft, a driving disk for the percussor of the fuse keyed directly on said shaft, radially slidable members adapted to be actuated by centrifugal force mounted in said casing transversely to the axis thereof, said radially slidable members being in the form of cylinders and each having a substantially semi-cylindrical portion extending from one end thereof, rack teeth formed on the flat surface of the semi-cylindrical portions and directly engaging with the teeth formed on said shaft, means for guiding said radially slidable members in their movement, and a locking pin for said driving disk adapted to be released from said disk by inertia when the projectile is fired.

3. In fuse mechanism for projectiles of the character described, a cylindrical casing, a shaft axially mounted in said casing, gear teeth formed on said central shaft, a driving disk for the percussor of the fuse keyed directly on said shaft, radially slidable members adapted to be actuated by centrifugal force mounted in a diametrically extending cylindrical passage provided in said casing, said members being cylindrical and provided with flat guiding surfaces, semi-cylindrical extensions provided on the members, the flat portion of the semi-cylindrical extensions facing in the same direction and being parallel to the flat guiding surfaces, the flat portions of the semi-cylindrical extensions facing each other and embracing the toothed shaft, gear teeth formed on said flat portions and directly meshing with the teeth on said shaft, means engaging said flat guiding surfaces for guiding said radially slidable members in their movement, and a locking pin for said driving disk adapted to be released from said disk by inertia when the projectile is fired.

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