

May 13, 1947.

J. E. MIDDLEMISS

2,420,324

MECHANICAL TIME FUSE

Filed Dec. 15, 1939

Fig. 1

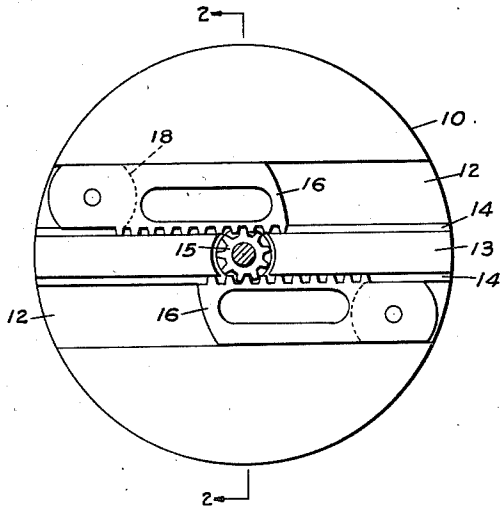


Fig. 2

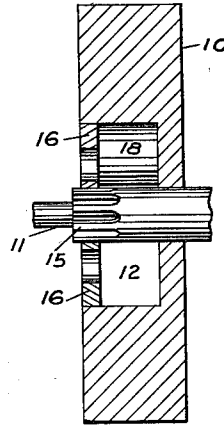


Fig. 3

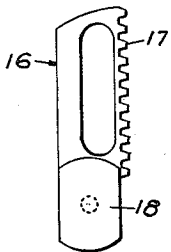


Fig. 4



Inventor
Joseph E. Middlemiss

By:

G. Kessenich & J. H. Church
Attorneys

UNITED STATES PATENT OFFICE

2,420,324

MECHANICAL TIME FUSE

Joseph E. Middlemiss, Philadelphia, Pa., assignor
to United States of America, as represented by
the Secretary of War

Application December 15, 1939, Serial No. 309,415

1 Claim. (Cl. 102—83)

(Granted under the act of March 3, 1883, as
amended April 30, 1928; 370 O. G. 757)

1

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to a centrifugally operated rack device for driving a pinion suitably connected in driving relation with the clockwork train of a mechanical time fuse for projectiles.

The rack device of this invention comprises a pair of opposed radial movable racks which function in the same general manner as the racks in U. S. Patent No. 1,970,207 and British Patent No. 265,583.

It is an object of the invention to so arrange the rack device as to facilitate the testing of the fuse.

It is a further object of the invention to so arrange the rack device that it may be used for testing the fuse and thereafter be reengaged with its cooperating pinion to re-run the clockwork train without necessity of reversing the clockwork mechanism, whereby the time consumed in testing will be materially reduced and the accuracy of adjustment materially increased due to the elimination of burring the escapement gear teeth of the clockwork which invariably accompanies running the clockwork train in reverse direction.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

Fig. 1 is a plan view of a fragmentary portion of a fuse with the present invention embodied showing the racks near the outer extremity of their outward movement;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a bottom plan view of one of the racks of this invention; and

Fig. 4 is a view in side elevation of the rack shown in Fig. 3.

Referring now to the drawings by characters of reference and more particularly to Fig. 1 there is shown a supporting member 10 which is generally a circular plate or disk member. Several disks such as member 10 are superimposed upon each other to form a support for the complete clockwork train but as they form no part of the present invention they are omitted from the drawings for the sake of clarity.

The member 10 is axially bored to provide a bearing for the spindle or arbor 11 of a clockwork train governed by the escapement gener-

2

ally employed in such trains as is well understood in the art.

As shown in Figs. 1 and 2 the supporting member 10 is formed with two similar parallel chordal grooves 12 having rectangular side and bottom defining walls. The grooves 12 are disposed equidistant on either side of the axis of spindle 11 and the portion 13 of plate 10 lying between the grooves 12 is formed with the guideways 14 for a purpose made clear hereinafter.

Spindle 11 is either milled to provide an integral pinion 15 or a separate pinion is suitably secured to the spindle as may be desired and two oppositely acting similar rack members 16 are disposed with one in either groove 12 to act upon the pinion 15 and arbor 11 for driving the connected clockwork train not shown.

Each rack member 16 comprises a rack 17 of rectangular cross-section and of substantially the depth of the guideways 14 fitted in the grooves 12 and engaging the pinion 15 in driving relation. The racks 17 each have weights 18 suitably attached thereto so proportioned that the center of gravity of the rack member 16 will fall within the weight 18 as secured to the rack 17. In accordance with the invention the weights 18 are so shaped externally as to fit the grooves 12 in sliding relation and serve to guide the movement of the racks in cooperation with the guideways 14.

In operation the racks 16 are inserted in the grooves 12 with the rack teeth adjacent the weights engaging the pinion 15 and the weights 18 disposed on a circle concentric with the axis of pinion 15. When a projectile armed with a fuse embodying the racks 16 is fired the rotation of the projectile will cause the centrifugal force developed to act upon the weighted racks and move them outwardly in the grooves 12. Outward movement of the opposed racks will exert a driving torque on the spindle 11 through pinion 15 and drive the clockwork train connected with the spindle 11. By this arrangement the initial starting torque is high as compared with the sector racks used in the art heretofore and as the torque increases with the increase in distance of weights 18 from the axis of spindle 11 the increased torque with outward displacement of the racks will compensate for the retardation of the projectile in rotation as it passes through its trajectory.

In testing the fuse for accuracy at the conclusion of manufacture the fuse is spun about its axis by means of a machine for such purpose and the weighted racks are forced outward by centrifugal force to drive the clockwork train. Dur-

3

ing this test operation the fuse escapement may be adjusted if necessary and at the conclusion of the operation the weighted racks are simply withdrawn from the grooves 12 and reinserted with the teeth thereof adjacent the weighted ends engaging the pinion 15 as above described. In this manner the necessity of running the clockwork train in reverse to reposition the racks for subsequent actuation by centrifugal force is obviated which saves the time of running clockwork train in reverse and the wear and burring of the teeth of the delicate escapement device. Hence a substantial saving of time is effected in testing each fuse which is a critical item in quantity production and the accuracy of adjustment after being made will not be disturbed by the introduction of factors not compensated for, such as a worn or burred escapement, resulting from the reverse driving of the clockwise train after adjustment is made.

Having now particularly described what is at present a preferred embodiment of the invention I claim and desire to secure by U. S. Letters Patent:

In a fuse in combination, a cylindrical supporting member formed with two parallel chordal grooves having rectangular side and bottom defining walls, said grooves being disposed

4

one on either side of the axis of the member equi-distantly and being formed to provide guideways in the upper portions of their adjacent defining walls, a spindle mounted axially of the supporting member adapted to drive a clockwork train, a pinion secured to the spindle, a rack of generally rectangular cross-section having teeth adapted to engage the pinion in driving relation mounted in each of said grooves with its teeth disposed in the guideway thereof, said racks being slidable throughout the length of the grooves and provided at their outer end portions with depending weights engaging the grooves in guiding relation.

JOSEPH E. MIDDLEMISS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,970,207	Varand	Aug. 14, 1934

FOREIGN PATENTS

Number	Country	Date
265,588	Great Britain	May 2, 1928