To all whom it may concern:

Be it known that I, FRANK T. CROWELL, a citizen of the United States, and a resident of Dover, county of Morris, and State of New Jersey, have invented an Improvement in Mechanical Delay Elements for Fuses, of which the following is a specification.

The invention described herein may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without payment to me of any royalty thereon, in accordance with the act of March 3, 1883.

The subject of this invention is a mechanical delay element for fuses. Mechanical delay fuses for projectiles are generally complicated structures including a large number of fragile and delicate parts and involving intricate and uncertain operation. The principal object of the present invention is to provide a simple and economical delay element which will positively insure a delay period of a predetermined interval of time and which may be adapted to all types of ammunition whether dropped from aircraft or propelled from guns.

According to the invention an impact plunger is carried when in unarmed position at one end of a rod or column which is formed with threads leading to a primer detonator at the opposite end of the column. On impact the plunger, which includes firing pins, is constrained to be rotatably advanced along the column by means of a guide pin riding on the threads and is thereby positively delayed before priming the primer.

To these and other ends, my invention consists in the construction, arrangement, and combination of elements, described hereinafter and pointed out in the claims forming a part of this specification.

A practical embodiment of my invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a view in elevation of a long delay element constructed in accordance with the invention;

Fig. 2 is a top plan view;

Fig. 3 is a side elevation of a short delay element; and

Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Referring to the drawings by numerals of reference:

In carrying out the invention there is provided a column 11, one end formed with a flanged head 12 and the other end reduced and partially threaded for the reception respectively of a carrier 13 held in place by a lock nut 14. The exposed face of the carrier is formed with a number of cavities 15 in which are disposed primer detonators 16, the flash from which may pass through communicating apertures 17 in the carrier and nut assembly to the booster charge of the fuse.

The intermediate portion of the column is formed with a spiral thread or threads 18, the total length of the thread regulating the interval of delay between impact of the projectile and detonation of the fuse. The origin 19 of the thread adjacent the flanged head 12 is curved to gradually approach in direction the axis of the column so as to facilitate the initial rotary movement of the plunger 20. If desired, the pitch of the threads may be gradually diminished towards the detonating end of the column.

The plunger 20 is an annular member having an inside diameter slightly greater than the outside diameter of the thread and is constrained to rotatably advance along the column by means of a guide pin 21 carried by the plunger and engaging the thread 18.

The inner face of the plunger is provided with a plurality of firing pins 22 arranged to strike the primer detonators 16 on expiration of the delay interval.

The plunger is normally held in unarmad position until impact by means of shear wires 23 radially disposed in the plunger and inserted in suitable apertures or slots in the column. When the delay element is to be used with shells the flanged head 12 or the nut 14 in the case of nose fuses may conveniently abut against the fuse body where it acts to support and prevent rearward movement of the plunger during setback so that the shear wires may be preserved intact until they are broken on impact of the shell.
It is obvious that this delay mechanism may be conveniently used with either base or nose fuses for shells and bombs, the position of the firing pin and primer being reversed as desired. It is also apparent that should there exist a practice of issuing fused shells a removable safety pin may readily be provided to prevent rotation of the plunger.

While in the foregoing there has been illustrated and described such combination and arrangement of elements as constitute the preferred embodiment of my invention, it is nevertheless desired to emphasize the fact that interpretation of the invention should only be conclusive when made in the light of the subjoined claims.

I claim:

1. A mechanical delay element for fuses embodying a column formed with a flanged head and a threaded portion, a plunger embracing the column and adapted to be supported on setback by the flanged head, shear wires for normally holding the plunger in unarmed position, a carrier mounted on the other end of the column, elements of ignition carried by said plunger and carrier, and a pin carried by the plunger and engaging the thread for constraining rotatable advancement of the plunger along the column on impact.

2. A mechanical delay element for fuses embodying a column formed with a spiral thread having a gradually curved origin, an annular plunger normally held in unarmed position on the column at the origin of said thread, said plunger formed with an inside diameter greater than the outside diameter of the thread, a pin carried by the plunger and engaging the thread for constraining rotatable advancement of the plunger on impact, firing pins carried by said plunger, and a detonator carrier on the forward end of the column.

3. A mechanical delay element for fuses embodying a column, a carrier mounted on one end thereof, a plunger normally held in inoperative position on the other end, elements of ignition carried by the carrier and plunger, and cooperating means on the column and plunger whereby the plunger is constrained to be rotated on the column when impelled forward on impact.

4. A mechanical delay element for fuses embodying a column, a carrier mounted on one end thereof, a plunger normally held in inoperative position on the other end, elements of ignition carried by the carrier and plunger, and means for causing the plunger to be rotated on the column when impelled forward on impact.

5. A mechanical delay element for fuses embodying a column formed with a flanged head, a plunger embracing the column and adapted to be supported on setback by the flanged head, and shear wires for normally holding the plunger in unarmed position.

FRANK T. CROWELL.