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PATENTED JAN. 1, 1907.

H. MAXIM.
DETONATING FUSE.

APPLICATION FILED JAN. 29, 1903.

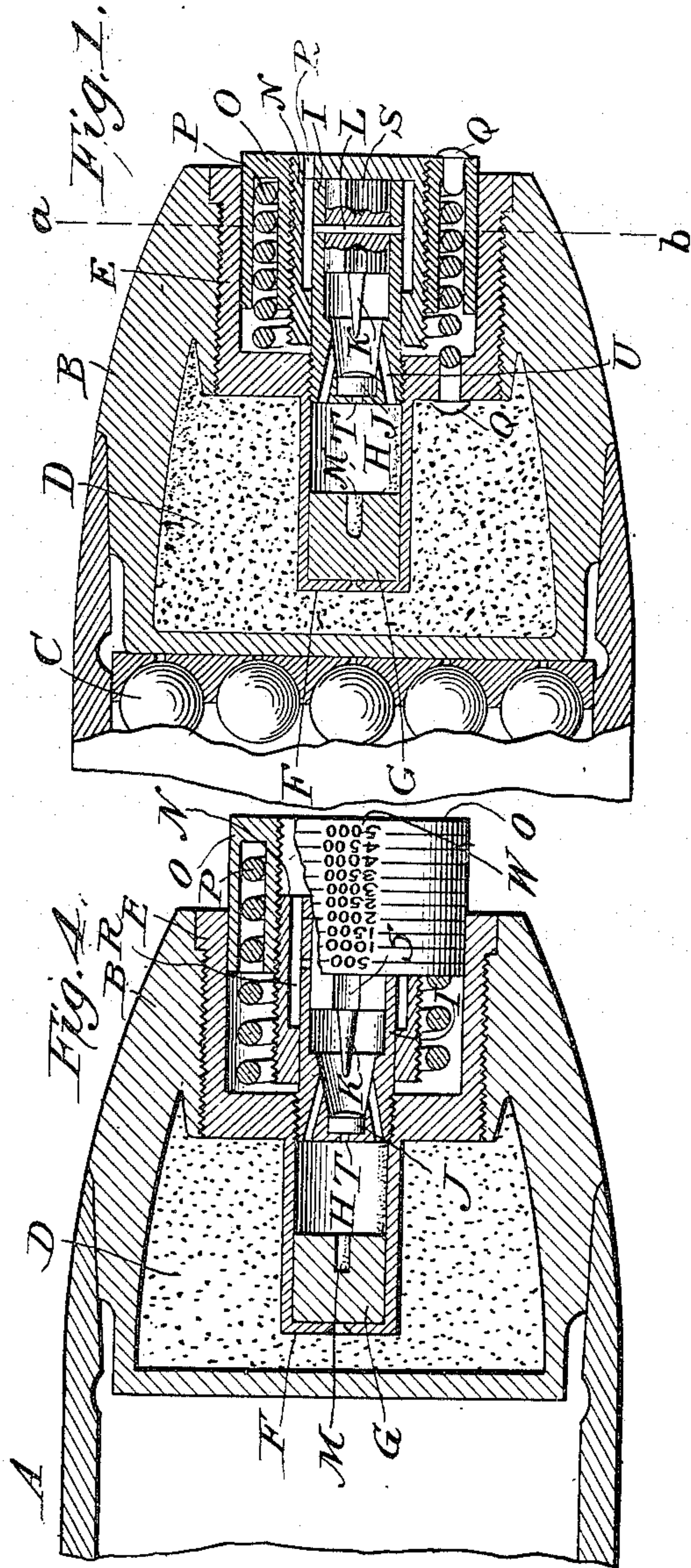


Fig. 3.

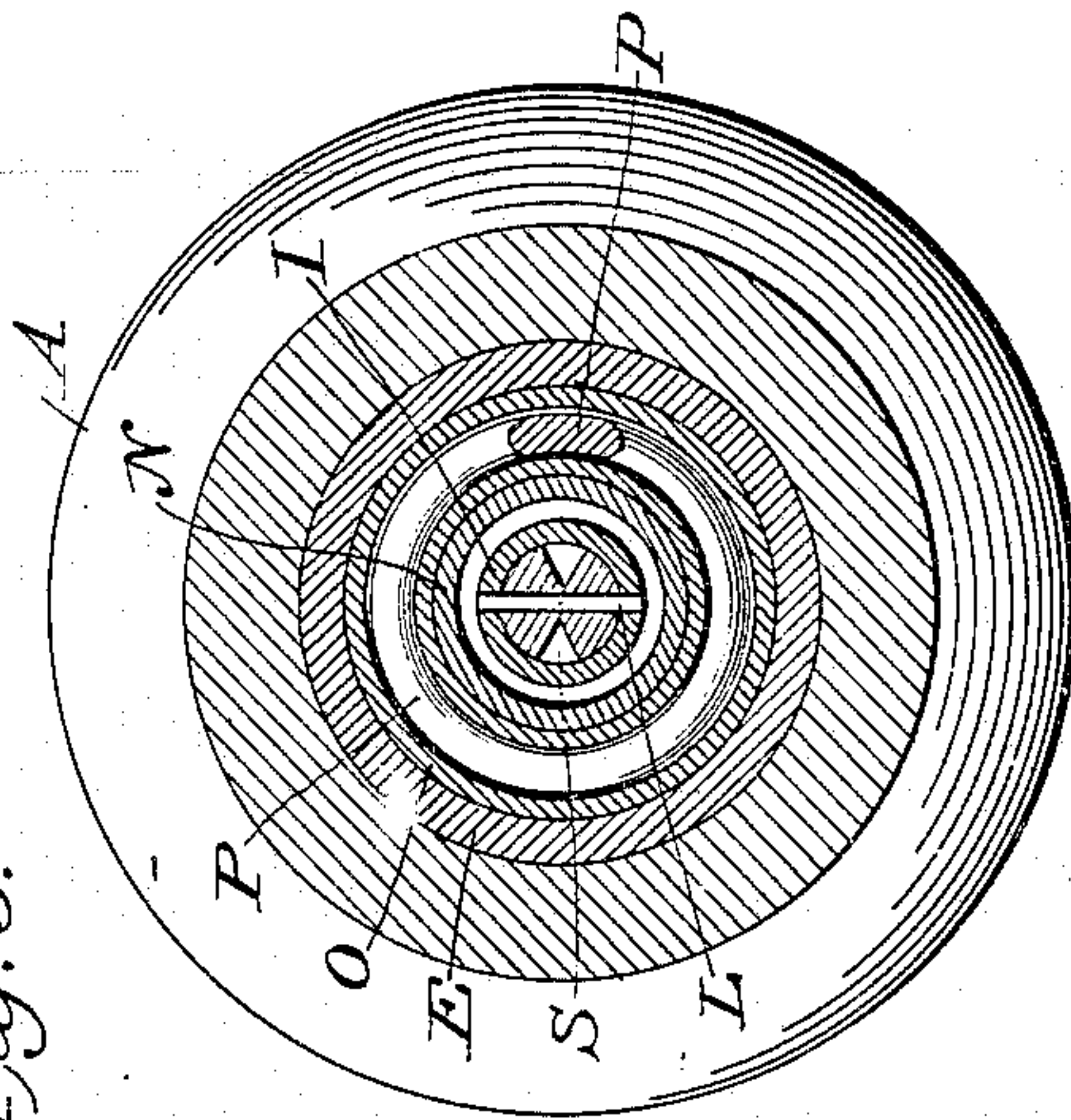
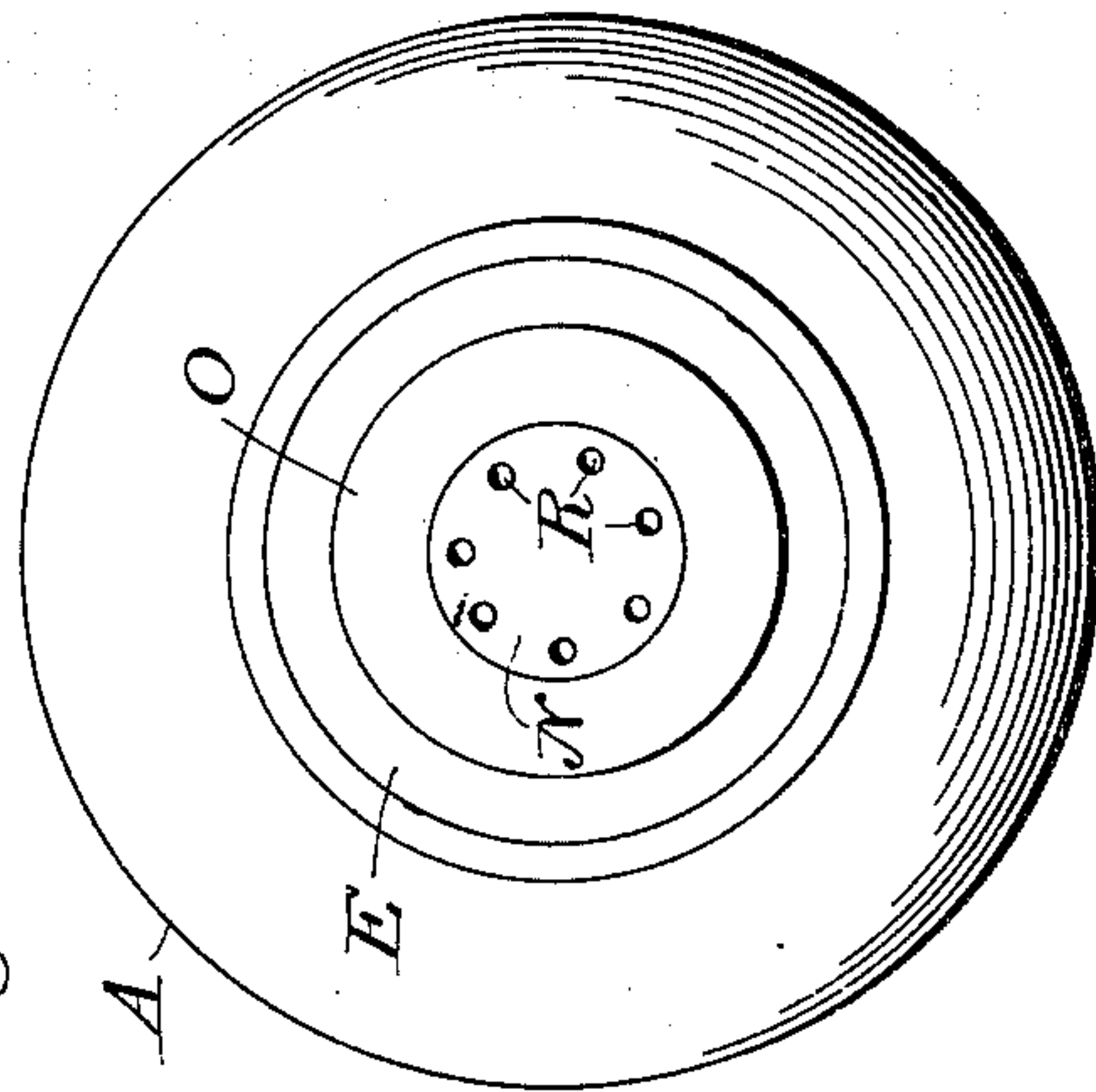


Fig. 2.



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DETONATING-FUSE.

No. 840,226.

Specification of Letters Patent.

Patented Jan. 1, 1907.

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To all whom it may concern:

Be it known that I, HUDSON MAXIM, of 891 Sterling Place, Brooklyn, county of Kings, city and State of New York, have invented a new and useful Improvement in Detonating-Fuses, which invention is fully set forth in the following specification.

The present invention relates to improvements in time-fuses for projectiles, and especially those adapted for use in shrapnel and field-shell.

The object of the invention is to provide a fuse which may be so set that the ignition of the bursting charge of the projectile may be timed to take place with the greatest possible degree of accuracy, while the fuse shall at the same time consist of but few parts and those simple of construction and inexpensive of manufacture.

In carrying out the invention a body of self-combustive material, like colloidal smokeless-gunpowder material or a mixture of smokeless-powder material or other colloidal or agglutinating material with a small quantity of black gunpowder incorporated therewith, is provided, and this is solidly incased in a tube or receptacle, to the walls of which it is sealed or attached or agglutinated in such wise as to preclude the ignition of the surface of the material between it and the wall of the tube or casing. The body of the self-combustive compound is impervious to the flame of ignition, and means are provided for igniting the said body of material upon one end or surface only, so that the body is consumed with a definite and uniform rate of combustion through its entire depth or length. The casing or receptacle for this body of self-combustive compound is provided with an aperture or apertures communicating with the bursting charge of the projectile, so that as soon as the body of self-combustive material is burned through the flame at once communicates with the bursting charge, setting it on fire and exploding the projectile. Means are further provided for igniting the self-combustive material by the force of acceleration of discharge of the projectile from the gun, and means are further provided for choking or impeding the escape of the products of combustion of the self-combustive compound, causing the material to be consumed with greater or less rapidity, according to the degree in which the free escape of the gases is prevented or choked off. To secure this end,

the aperture is closed by a cap or plug or valve held in position by a spring, and means are provided for increasing or lessening the tension of the spring and the consequent pressure of the valve or cap upon its seat. Means are also provided to enable reading or ascertaining the amount of tension placed upon the spring and the amount of pressure of the plug or valve upon its seat in consequence of the spring tension whereby the time required for the consumption through its entire depth of the self-combustive material to the aperture communicating with the bursting charge of the projectile may be determined with great nicety.

Referring to the drawings, Figure 1 is a longitudinal central section of the fuse with the remainder of the projectile partly in section and partly in elevation. Fig. 2 is an end view of the projectile and fuse. Fig. 3 is a transverse section of Fig. 1 on the line A B. Fig. 4 is a longitudinal elevation, partly in section, of the fuse and adjacent parts of the projectile.

In Fig. 1, A is the body of the projectile, and B is the nose portion of the projectile, providing a chamber D for the bursting charge of gunpowder. Into this nose portion B is screwed the casing E of the fuse, having a tubular extension F entering the chamber D and into the bursting charge. In the rearward extension is a body G of self-combustive material, between which and the forward parts of the fuse is provided a small combustion-chamber H. A thimble I is screwed into the casing E, and into the rearward end of this chamber is affixed a percussion-cap J, and a firing-pin K is mounted in the thimble I, to which it is affixed by a shear-pin L. A small aperture or depression M to facilitate ignition is provided in the forward end of the body of self-combustive compound G. A thimble or cap N is placed over the forward end of the thimble I, forming a valve-seat between the closed end of the cap or thimble N and the open end of the thimble I. The thimble N is provided with a screw-thread upon its outer surface, to which is affixed a spring-holder O with a corresponding screw-thread upon its inner surface and containing a coiled spiral spring P, the spiral spring P being attached to the holder O and casing E by screws or rivets Q. Gas-exits R are provided in the thimble N, which serve to allow the escape of the products of combustion of the compound G

through and from the valve-seat between the
thimble I and the thimble N, while grooves S
are cut in the body of the firing-pin K to al-
low the free passage of the products of com-
bustion past the firing-pin. A small aper-
ture T is provided through the forward end
of the thimble I for the passage of the flash
to ignite the body of self-combustive ma-
terial G, which is facilitated, preferably, by a
small quantity of granular powder placed in
the chamber H. Passages U are provided
between the chamber H into the space con-
taining the firing-pin in the thimble I for the
free escape of the products of combustion
generated in the chamber H.

In Fig. 4 the spring-holder O is shown
thrown out part way by turning the valve-
thimble N, which puts the spring under
greater tension and increases the pressure of
the valve-thimble N upon its seat, formed
between it and the end of the thimble or tube
I, which causes the self-combustive com-
pound G to be consumed with such rapidity
as to cause the explosion of the gunpowder
charge D when the projectile shall have
traveled a distance of two thousand five
hundred yards. A portion of the spring-
holder in this figure is in elevation, showing
markings in yards upon its surface. The
flight of the projectile through the air will
cause a considerable pressure to be exerted
upon the forward end of the spring-holder O
and upon the forward end of the valve-cap
or thimble N, due to the resistance of the at-
mosphere or to the pressure of the air, and
this will materially aid in placing pressure
upon the valve-seat and for accelerating the
combustion of the self-combustive com-
pound G. It is obvious that this area may
be increased, if desired, even to that nearly
equaling the cross-sectional area of the pro-
jectile itself, thereby subjecting the valve-
seat to still greater pressure.

What is claimed is—

1. A fuse for projectiles, provided with
means for timing the explosion of the pro-
jectile by regulating the pressure upon the
products of combustion or the conditions of
confinement of a body of self-combustive ma-
terial, whereby the speed of its combustion is
made correspondingly rapid or slow, as de-
sired.

2. In a fuse for projectiles, provided with a
body of self-combustive material, means for
igniting the self-combustive material, and
means for regulating the speed of combus-
tion of the self-combustive material.

3. In a fuse for projectiles, provided with a
self-combustive material, with means for ig-
niting the self-combustive material, means
for increasing or lessening the pressure of the
products of combustion escaping from the
self-combustive material.

4. In a fuse for projectiles provided with a

body of self-combustive material impervious
to the products of combustion, interposed
between an igniting means and the bursting
charge of the projectile, means regulating or
increasing or diminishing the rapidity of
combustion of the self-combustive material.

5. In a fuse for projectiles provided with a
body of self-combustive material impervious
to the products of its combustion, means con-
fining its combustion to but one surface of
the body.

6. In a fuse for projectiles, provided with a
body of self-combustive material interposed
between an igniting means and the bursting
charge of the projectile, means igniting the
self-combustive body, and means regulating
the rate of combustion of the self-combustive
body.

7. In a fuse for projectiles, provided with a
self-combustive body interposed between an
igniting means and the bursting charge of the
projectile, a valve interposed in the path and
opposing the escape of the products of com-
bustion escaping from the self-combustive
body.

8. In a fuse for projectiles, provided with a
body of self-combustive material interposed
between an igniting means and the bursting
charge of the projectile, a valve for the es-
cape of the products of combustion of the
self-combustive compound, with means regu-
lating the pressure of the valve upon its seat.

9. In a fuse for projectiles, provided with a
body of self-combustive compound interposed
between an igniting means and the bursting
charge of the projectile, and provided with a
passage for the escape of the products of
combustion, a valve closing the passage, with
means for controlling the resistance of the
valve to the escape of the products of com-
bustion.

10. In a fuse for projectiles, provided with
a self-combustive material interposed be-
tween an igniting means and the bursting
charge of the projectile, means for impeding
free escape of the products of combustion of
the self-combustive compound, exerted or
actuated by atmospheric pressure or resist-
ance to the projectile during flight.

11. In a fuse for projectiles, a fuse-cham-
ber, a self-combustive material therein be-
tween an igniting means and the bursting
charge of the projectile, and means actuated
by the resistance of the air during the flight
of the projectile and regulating the pressure
in said chamber.

In testimony whereof I, HUDSON MAXIM,
have signed this specification in the presence
of two subscribing witnesses.

HUDSON MAXIM.

Witnesses:

S. T. CAMERON,
ELISHA KELLER CAMP.