

Feb. 27, 1923.

1,447,023

C. KAISER

PROJECTILE

Filed Feb. 3, 1922

3 sheets-sheet 1

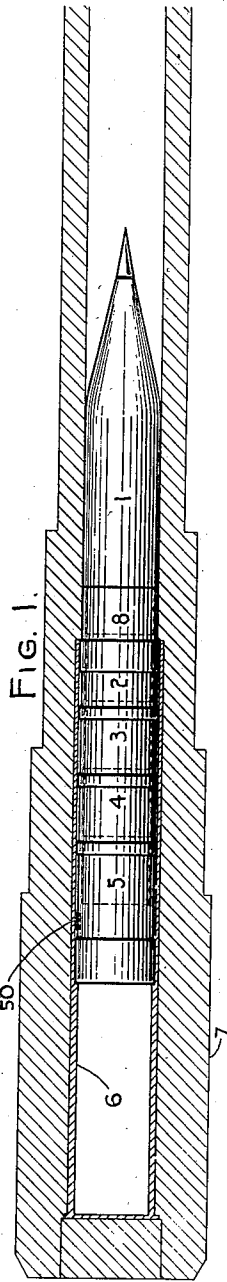


FIG. 1.

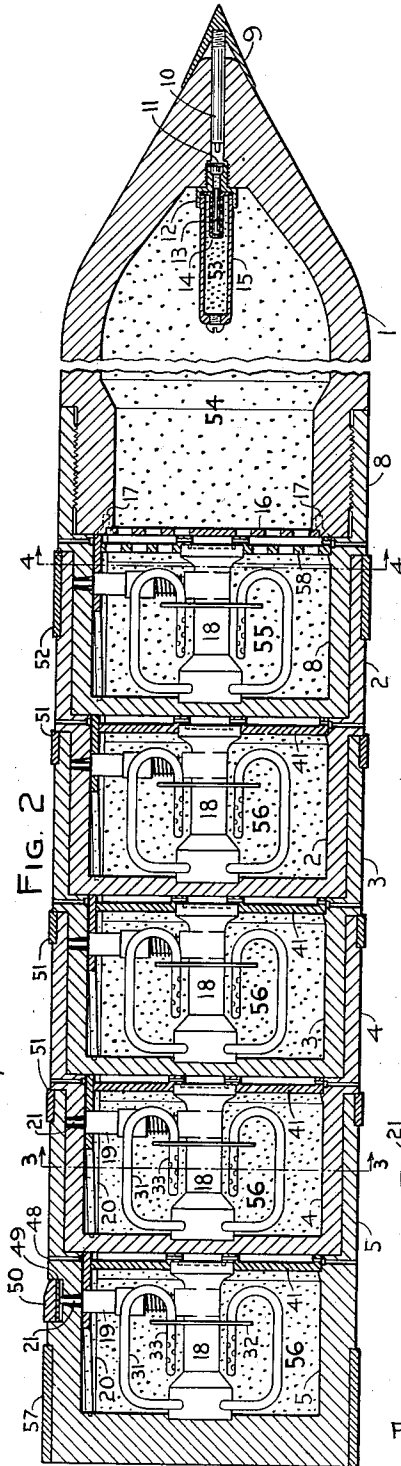


FIG. 2.

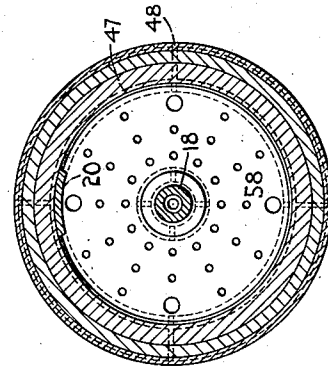


FIG. 4.

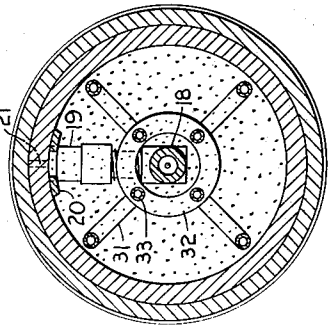


FIG. 3.

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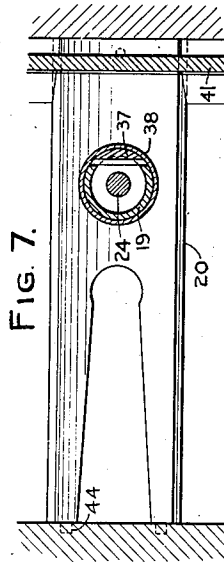
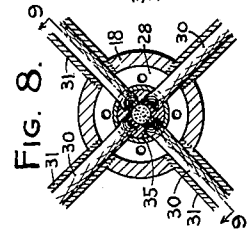
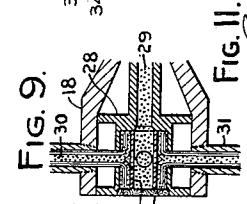
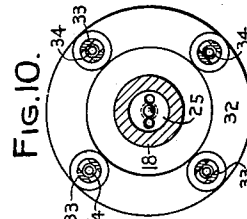
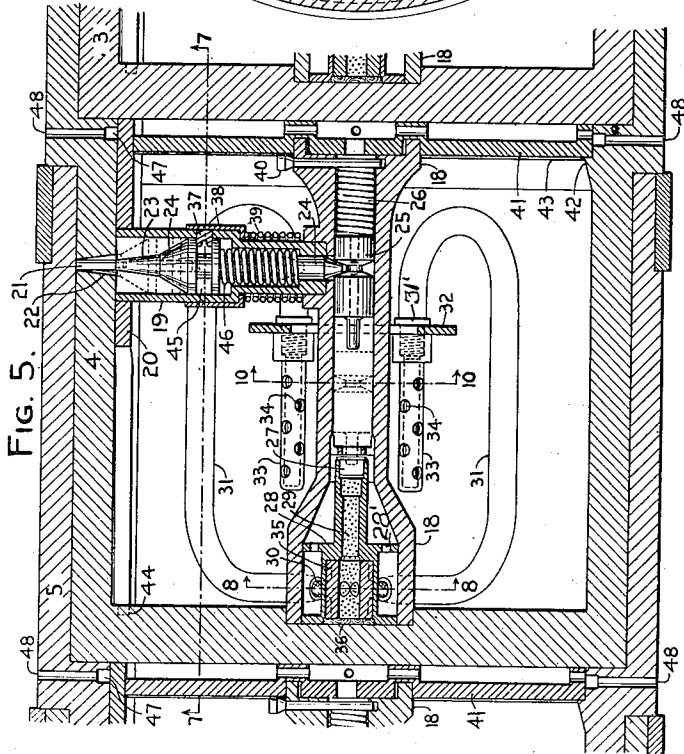
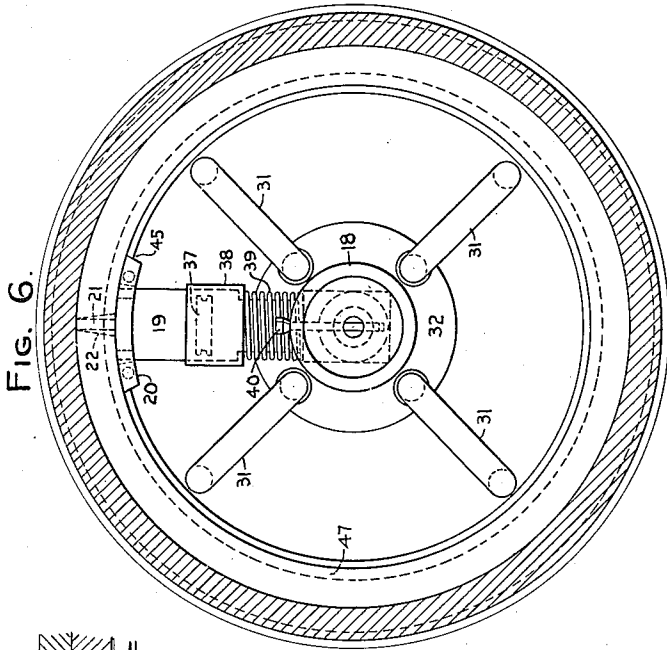
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PROJECTILE

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3 sheets-sheet 2



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UNITED STATES PATENT OFFICE.

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PROJECTILE.

Application filed February 3, 1922. Serial No. 533,759.

To all whom it may concern:

Be it known that I, CHRISTIAN KAISER, a citizen of the United States, residing at Great Falls, in the county of Cascade and State of Montana, have invented certain new and useful Improvements in Projectiles, of which the following is a specification.

This invention relates to long range projectiles, and has for its object to provide a projectile of such class, with means in a manner as hereinafter set forth, and capable after the projectile is fired to cause it to travel to an extremely great distance, by way of example, a range of from 100 to 150 miles.

The invention has for its further object, to provide the projectile with means, after it is fired, to automatically apply thereto successive accelerating or boosting impulses, during the flight of the projectile, under such conditions causing the projectile to travel an extremely long distance.

The invention has for its further object, to provide the projectile with a plurality of inherent impulse elements, one operating in advance of the other and successively exploding during the flight of the projectile to impart a successive series of accelerations or boosting impulses thereby causing the projectile to travel an exceedingly long distance.

The invention has for its further object, to provide the projectile with a plurality of inherent impulse elements, one independent of the other, operating one in advance of the other and successively exploding and separating from the projectile, under such conditions decreasing the weight of the projectile and imparting a successive series of accelerations or impulses during the flight of the projectile whereby there is obtained for the latter an extremely long range.

Further objects of the invention are to provide a projectile for the purpose set forth which is comparatively simple in its arrangement and construction, efficient in its use, having means to automatically provide for a successive series of impulses during the flight thereof to obtain an extremely long range therefor, and comparatively inexpensive to manufacture.

With the foregoing and other objects in view, the invention consists of a novel construction, combination and arrangement of parts, as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:—

Figure 1, is a sectional elevation illustrating the projectile contained within a shell and the whole arranged within a cannon;

Figure 2, is a longitudinal section through the improved projectile;

Figure 3, is a transverse section on line 3—3 of Figure 2 taken through one of the propelling chambers or section;

Figure 4, is a similar view on line 4—4 of Figure 2 through the detonating explosion chamber;

Figure 5, is a central, longitudinally sectional view showing one of the impulse elements or propelling explosion chambers showing the automatic firing mechanism and time fuse arrangement.

Figure 6, is an end view of one of the impulse elements or propelling explosion chambers with the cover plate 41 and covering fabric 43 omitted in order to show the interior thereof;

Figure 7, is a detail longitudinal section on line 7—7 of Figure 5 showing the stay plate which holds the firing mechanism in place;

Figure 8, is a detailed transverse section through the fuse ignition chamber on the rear end of the firing pin on line 8—8 of Figure 5;

Figure 9, is a longitudinal detailed section on line 9—9 of Figure 8;

Figure 10, is a detailed transverse section through a firing pin body and detonating primers and supports on line 10—10 of Figure 5;

Figure 11, is a perspective view of the fuse and igniting powder retainer; and

Figure 12, is a longitudinal section

through a slightly modified form of projectile.

Referring more in detail to the accompanying drawing the numeral 1 designates the bullet, which may be solid or of the shrapnel or gas-filled type, and 2, 3, 4, 5, and 8 are the independent impulse elements or propelling explosion chambers which form, with the bullet 1, the complete projectile, the same being mounted within the shell 6 which is to contain the charge for the initial discharge of the projectile from the cannon 7. The shell 6 is here shown as being disposed within a cannon 7 ready for being fired. That portion of the wall of the shell 6 surrounding the charge, for initial discharge of the projectile, being thicker than that portion of the wall of the shell 6, which surrounds the impulse elements or propelling explosion chamber, and by this arrangement an annular shoulder is provided which constitutes an annular seat for the base of the projectile when mounted in the shell 6.

Each of the propelling explosion chambers 2, 3, 4 and 5 comprises a cylindrical body having its forward end counter-bored to provide an internal shoulder or seat for the next forward chamber, the chambers 4, 3, 2, and 8 having their rear portions reduced in diameter so as to telescope or nest within the next succeeding chamber and engage on the internal shoulder thereof. Each chamber is designed to contain an explosive which when fired, will impart an added impetus or acceleration to the preceding projectile section. Throughout its flight the projectile will be intermittently boosted through the successive explosions of the chamber, the final charge in chamber 8 serving to explode the main charge in the bullet 1 unless the latter shall strike its object previously thereto in which latter instance a pointed cap 9 on the forward end or nose of the bullet will crush over the nose and drive the firing pin 10, carried by the cap 9, rearwardly to explode a primer 11, the pin 10 extends into the bullet 1 to within a short distance of the primer 11, the latter is fitted into a recess formed in the inner end of a hollow plug 12, which is filled with an explosive charge and connects the primer 11 with a more powerful primer 13, mounted in a flanged perforated thimble 14 which is secured in a threaded collar formed on the plug 12. The purpose of this arrangement is to cause the exploding of the main charge in the explosive bullet, in case the bullet strikes a target before the explosion of a charge in a detonating chamber, which is connected with and communicates with the bullet at the rear end of the latter. This detonating chamber will be presently referred to. When the charge in the plug 12, is ignited by the primer 11, the primer 13 is operated, to

ignite a detonating charge 53 contained within a cylinder 15 and finally exploding the main charge 54 of the bullet. Obviously the bullet will explode whether it hits prematurely or not, and by the proper timing of the several explosions the bullet will explode during its flight even if it has not hit its object. The main charge is confined within the bullet 1 by a perforated plate 16 closing its rear end.

The impulse or propelling chamber 8, is also what may be termed a detonating chamber, is constructed similar to the other impulse elements, except that the sleeve which projects forwardly and which is indicated at 8', is threaded for the purpose of attaching it to the rear end of the bullet 1, and further that its cover plate 58 is perforated. The purpose of the impulse element 8, is to detonate or explode, through the perforated plates 16 and 58, the main charge 54 in the bullet 1, just before the latter reaches its target, in case an explosive bullet, as illustrated, is used.

Within each impulse element or propelling explosion chamber, is fixed a firing pin body or guide 18, in the form of a tube having a flared inner end seated in a recess in the rear wall of the body of the element. The firing pin body or guide 18 has its outer end also flared, and the said outer end is engaged in an annular recess formed in the closure plate 41 of the element.

The firing pin body 18, near its forward end is provided with a firing pin 25, formed with a peripheral annular groove to receive the pointed inner end of a plunger or trigger, and which when engaged in the groove of the firing pin 25, retains the latter in position against the action of a coiled spring 26 which has its forward end held by a pin 40, mounted in the forward end of the firing pin body 18. At the rear end of the firing pin body 18, is a fuse ignition chamber containing a hollow double flanged holder 28, for a primer 27, which ignites a powder charge 29 in the holder 28. At the rear of the holder 28, and within the same, is arranged a fuse retainer 35. Fixedly connected to the rear of the firing pin body 18, as well as opening into the ignition chamber formed at the rear end of the firing pin body 18, are a plurality of bent tubes 31, preferably four in number, and through which extend fuses 30, these latter pass through the wall of the ignition chamber in the firing pin body 18 and also through the wall of the chamber in the holder 28, in which is mounted the fuse retainer 35. The ends of the fuses are split, to expose the combustible carried thereby and the split end of each fuse is spread apart and extended in a longitudinal groove on the periphery of the retainer 35. The number of grooves on the periphery of the retainer 35, equal the num-

ber of fuses as shown four in number. The retainer 35 is hollow so as to receive the explosive charge 29, and the wall of each longitudinal groove of the retainer, is provided with an opening for communication with the explosive charge 29, within the retainer 35.

The fuses extend throughout the length of the tubes 31, and terminate in contact with primers 34, which are disposed around the firing pin body 18. The primers 34 are contained in the perforated and threaded primer thimbles 33. A spacing ring 32 is provided for the fuse tube and primer thimbles, and which is clamped between the threaded bell on the end of a primer thimble and an annular shoulder near the threaded end of a fuse tube.

Disposed at right angles with respect to the firing pin body 18 is a cylindrical guide 19, which is held securely in position by having one end fitting tightly into a socket in the body 18 and its other end mounted in an opening formed in a stay plate 20. The guide 19 has mounted thereon, a shiftable sleeve 38 and arranged within the guide 19 is a spring controlled plunger 24, which at its inner end, extends into an annular groove formed in the firing pin 25. Plunger 24 is held in engaging position with the firing pin 25, against the outward pressure of the spring 46, by a segmental locking block 37, in the guide 19 and engaging in a groove 45 formed in the plunger 24. Removably attached to the outer end of the plunger 24, is a stud of a tapered intermediate extension pin 23 carrying an outer extension pin 21, the latter is of such a length as to extend into the tapered opening 22 formed in the wall of the explosion chamber.

The stay plate 20 is curved to fit the inner wall of the explosion chamber and serves as a support and locator for the guide 19. It is held in place, at its forward end by the engagement of its bevelled or dove-tailed edges, with similar bevelled edges 45 of a notch cut through the shoulder 42, on the inner wall of the explosion chamber. The rear end of the stay plate 20 is held in position, through the medium of a pair of studs 44.

The sleeve 38 is held in position on the guide 19, to cover the lock block 37, by the pressure of a spring 39, mounted on the inner end of the guide 19 and interposed between a shoulder on said guide and the firing body 18.

In assembling, the automatic firing mechanism, with the exception of the extension pin 21, is slid into position within the explosion chamber, and pin 21 is inserted through the hole 32. The base of the explosion chamber is then inserted and pressed back into the bell or apron of the explosion chamber adjoining at the rear, the air es-

caping through openings in the outer flange of cover plates 41, 58, thence into the annular groove 47 and thence through the ports 38 in the outer wall.

The extension pin 21, when the parts are in the position referred to, has a bearing against the wall of the bell of the adjoining chamber, and provides what may be termed a secondary support for the plunger 34, thereby holding it and the firing pin 35 securely in place and as long as the two explosion chambers or impulse elements remain in the same relative position.

After the parts have been assembled, in the manner as referred to, the sleeve 38 is pressed back against the action of its spring 39, and the locking block 37 is then removed, after which the sleeve 38 is returned to its original position closing the slot formed by the removal of the block 37.

The explosive charge 56 or 5, is now packed into the explosion chamber and covered by the fabric 43, and also the cover plate 41 or 58.

The impulse element or propelling explosion chamber 55, as it does not seat in an impulse element at the rear thereof, must be provided with a device to coact with the extension pin 21, and the device, as shown, consists of a release block 50, fitted into a slot or pocket in the outer wall of impulse element or propelling chamber 5, and said release block 50 is held in place before the charge in the explosion chamber 5 is exploded, by the surrounding wall of the shell 6. When the release block 50 is in position, it holds elements 21 and 23, that is the plunger pins, the plunger 24 and firing pin 25 in place. In assembling, before the projectile is loaded into shell 6, the release block 50 is held in place by a clamp, which surrounds the impulse element or explosion chamber 5. The clamp slides forwardly, as the projectile enters the shell, in such a manner as to provide a support for the block 50 until the latter is engaged by the wall of the shell 6.

Soft metal powder rings intended to engage the rifle barrel of the cannon, are indicated at 51, 52 and 57.

In operation the projectile is first fired from the cannon by the initial explosion of the charge in the shell 6, as the projectile travels out through the barrel of the cannon, the release block 50 bears against and is retained in place by the wall of the barrel. On leaving the muzzle of the gun or cannon, this block 50 and the outer extension pin 21 fly off, due to the action of the plunger spring 46 forcing the plunger 34 outwardly to the position shown in the dotted lines, Figure 5. This action of the plunger 34, forces the tapered pin 23 in the opening 22 completely closing it. When the plunger spring 46, forces the plunger 34 outwardly, it causes the release of the firing pin 25,

which is driven back by the spring 26, to the position shown in the dotted lines in Figure 5. The air contained in the firing pin body 18, is free to pass forward, through the providing of the firing pin 25, with longitudinally extending ports as shown in Figure 10. The firing pin 25 on striking a primer 27, explodes the same and ignites the powder charge 29 and through the latter, ignites the slit ends of the fuses 30, whose length and rate of burning have been previously determined to correspond to the desired range, the gases resulting from the combustion of the powder charge 29 and fuses 30, are free to escape through the perforated flange of holder 28, through the tube of the firing pin body 18, thence through the ports of the firing pin 25, a center opening in the plate 41, into the space forwardly of the plate 41, thence through radial openings in the inner and outer flanges of the plate 41, into the annular groove 47 formed in the wall of the explosive chamber, and discharged through the ports 48.

The fuses 30, burning at their other ends ignite the detonating primers 34, which explode the charge 56 in the impulse element or propelling explosion chamber 5. The explosion of this charge exerts its force in all directions giving an impetus or boost to the velocity of the forward part of the projectile and stripping off the propelling explosion chamber 5 from the adjoining propelling explosion chamber 4, thereby uncovering the extension pin 21 of the propelling explosion chamber 4, when the foregoing described operation of firing is repeated, as well as, in connection with propelling explosion chambers, 3, 2 and 8.

With reference to the modified form shown in Figure 12, the difference with respect to the construction shown in Figure 2, is that a tube is fixed to the bullet on the forward end of the projectile, which tube is to serve as a barrel chamber, from which each succeeding impulse element or the propelling explosion chamber will be discharged, the purpose being to better utilize the force of such propelling explosion, by confining the compressed gases behind the projectile for changing the time for the sections being ejected as the flight proceeds. It will be noted further that each impulse element or propelling explosion chamber from the rear chamber indicated at 5, has a greater distance to travel before leaving the end of the tube, and the pressure of the gases against the part of the projectile remaining would therefore be effected to a regular increasing time interval, as the initial velocity of the projectile expended itself.

It will be observed that in either form a projectile is provided which will be accorded added impetus or boosts at regular intervals throughout its flight and that should

the bullet strike before the final explosion of the boosting charges the bursting charge will immediately become effective. It will be noted that the arrangement of the firing pin unit within each chamber is such that great reinforcement of the rear or bottom wall of the chamber is afforded at a central or axial point so that the entire projectile is longitudinally braced. The explosion of the propelling charges does not affect the previous charges since the several sections have telescopic fit and will readily become displaced at the proper moment.

What is claimed is:

1. A projectile comprising, a bullet and a plurality of propelling chambers attached thereto in order, each section or chamber constituting an entirety and mechanically controlling the firing of the propelling charge in the next preceding chamber, and a skirt attached to the bullet and inclosing the chambers, said skirt having its rear end open.

2. A projectile comprising an explosive chamber having an opening through its side wall, a firing pin within the chamber, a stem for normally holding the pin inoperative, means for urging the stem to a position for releasing the pin and closing the wall opening of the chamber, and means for holding the stem in its pin holding position, said means being secured in its operative position by the encircling element from which the chamber is expelled.

3. A projectile comprising a plurality of telescopic explosive chambers, the forward chamber having a side wall opening normally closed by the telescoping rear chamber, a firing pin in each chamber, a lock for holding the pin inoperative, said lock being held operative by the telescoping rear chamber, and a spring for urging the lock to its inoperative position when its chamber is expelled from the telescoping chamber.

4. A projectile comprising a plurality of propelling chambers designed for being successively exploded, mechanical means under the control of the next succeeding section or chamber for firing the charge, and means for the rearmost chamber for effecting an operation of its mechanical means immediately following the movement of the projectile from the muzzle of the cannon.

5. A projectile comprising a plurality of propelling chambers telescopically related, firing means within each chamber for exploding the charge therein and embodying a firing pin, and a pin lock normally held operative by a telescoped chamber.

6. A projectile comprising a plurality of propelling chambers, the forward section of each chamber telescoping the rear end of the next preceding section, said chambers having radial openings normally closed by the telescoping chamber, charge firing means within each chamber, and means projecting

through the openings and releasable upon displacement of the telescoping chamber for starting operation of the firing means.

7. A projectile comprising an explosive chamber having a side wall opening, a firing pin, a guide tube for the pin secured in the chamber, a second guide tube extending from the first guide tube to the side wall of the chamber about the opening therein, a valve for closing the opening slidable in the second guide tube and adapted to be held inoperative by an encircling member into which the chamber is placed, and means for securing the firing pin inoperative and operable upon the seating of the valve to release the firing pin.

8. A projectile comprising a bullet, a propelling chamber telescoping the rear end thereof, a firing pin, an axially arranged guide tube in the chamber for guiding the pin and forming a stay for the chamber, and a charge adapted to be ignited by the firing pin.

9. A projectile comprising a bullet, a propelling chamber telescoping the rear end thereof, a firing pin, a guide tube for the latter within the chamber, a timed fuse, a tube housing the fuse and supported by the guide tube, and fuse-igniting means within the guide tube set in operation by the firing pin.

10. A projectile comprising a bullet, a propelling chamber telescoping the rear end thereof, a firing pin, a guide tube for the latter within the chamber, a timed fuse, a tube housing the fuse and supported solely by the guide tube, and an igniting charge holder arranged within the guide tube for supporting a primer in the path of the firing pin.

11. A projectile comprising a bullet, a propelling chamber telescoping the rear end thereof, a firing pin, a guide tube for the latter within the chamber, a plurality of fuse tubes secured to the guide tube, an annular spacing ring encircling the guide tube and having openings to receive the fuse tubes, and primer housings threadedly connected to the latter and clamping the same to the spacing ring.

12. A projectile comprising an explosive chamber having a side wall opening, a firing pin, a guide tube for the pin secured in the chamber, a second guide tube extending from the first guide tube to the side wall of the chamber about the opening therein, a valve slidable in the second guide tube for closing the side wall opening, means for urging the valve to a seating position, and means for locking the firing pin inoperative, said means movable by and during the seating movement of the valve to release the firing pin.

13. A projectile comprising a bullet, a propelling chamber telescoping the rear end

thereof, a firing pin, a guide tube for the latter within the chamber, means operable by the pin for igniting a charge in the chamber, a pin-locking stem for holding the pin inoperative, a spring tending to render the stem inoperative, and means engaged by an encircling element from which the chamber is expelled for releasably holding the stem operative.

14. A projectile comprising a bullet, a propelling chamber telescoping the rear end thereof, a firing pin, a guide tube for the latter within the chamber, means operable by the pin for igniting a charge in the chamber, a pin-locking stem for holding the pin inoperative, a spring for displacing the stem when the latter is released, a guide for the stem, a locking block insertible through the guide for temporarily holding the stem operative, a spring-pressed sleeve slidable over the guide and block for securing the latter in position, and means for releasably holding the stem operative when the projectile is disposed for firing.

15. A projectile comprising an explosion chamber, means therein for exploding a charge and embodying a firing pin, said chamber having an opening through its side wall, means releasably holding the pin in operative and having a part adapted for closing the wall opening when the pin is released, and means exterior of the chamber for holding the second means operative and adapted to be displaced during flight of the projectile to permit the pin to function.

16. A projectile comprising a bullet having a tubular rearwardly extending skirt, and a plurality of successively operating explosive chambers housed within the skirt and adapted for being discharged from the rear end of the skirt.

17. A projectile comprising a bullet having a tubular skirt, and a propelling chamber contained within the skirt and detachably connected to the bullet for bodily escaping rearwardly through the skirt with a propelling influence.

18. A projectile comprising a shell, a bullet, a plurality of lengthwise disposed and successively operated impulse elements mounted in said shell and each provided with an explosive charge, the forward one of said elements having the bullet connected therewith, each of the other of said elements provided with means at its forward end for exteriorly overlapping the element in advance thereof, each of said elements further including successively released spring actuated devices for firing said charges for automatically applying successive accelerations or boosting impulses to the rear of the bullet during the flight thereof thereby providing for an increased range for the projectile during the flight thereof, one of said

devices being controlled by said shell and the other of said devices controlled by said means.

5 19. A projectile comprising a bullet, a series of telescopic propelling elements arranged rearwardly of the bullet and one of said elements telescoping the bullet at the rear thereof, an axially arranged firing pin body within each of said elements and provided with a firing pin, a charge adapted to

be ignited by the firing pin, a laterally disposed locking device for the pin, means arranged exteriorly of said elements for controlling said locking devices and means whereby said locking devices are successively 15 released to obtain boosting impulses to the bullet during flight thereof.

In testimony whereof I affix my signature.

CHRISTIAN KAISER.