J. E. RICHARDS.

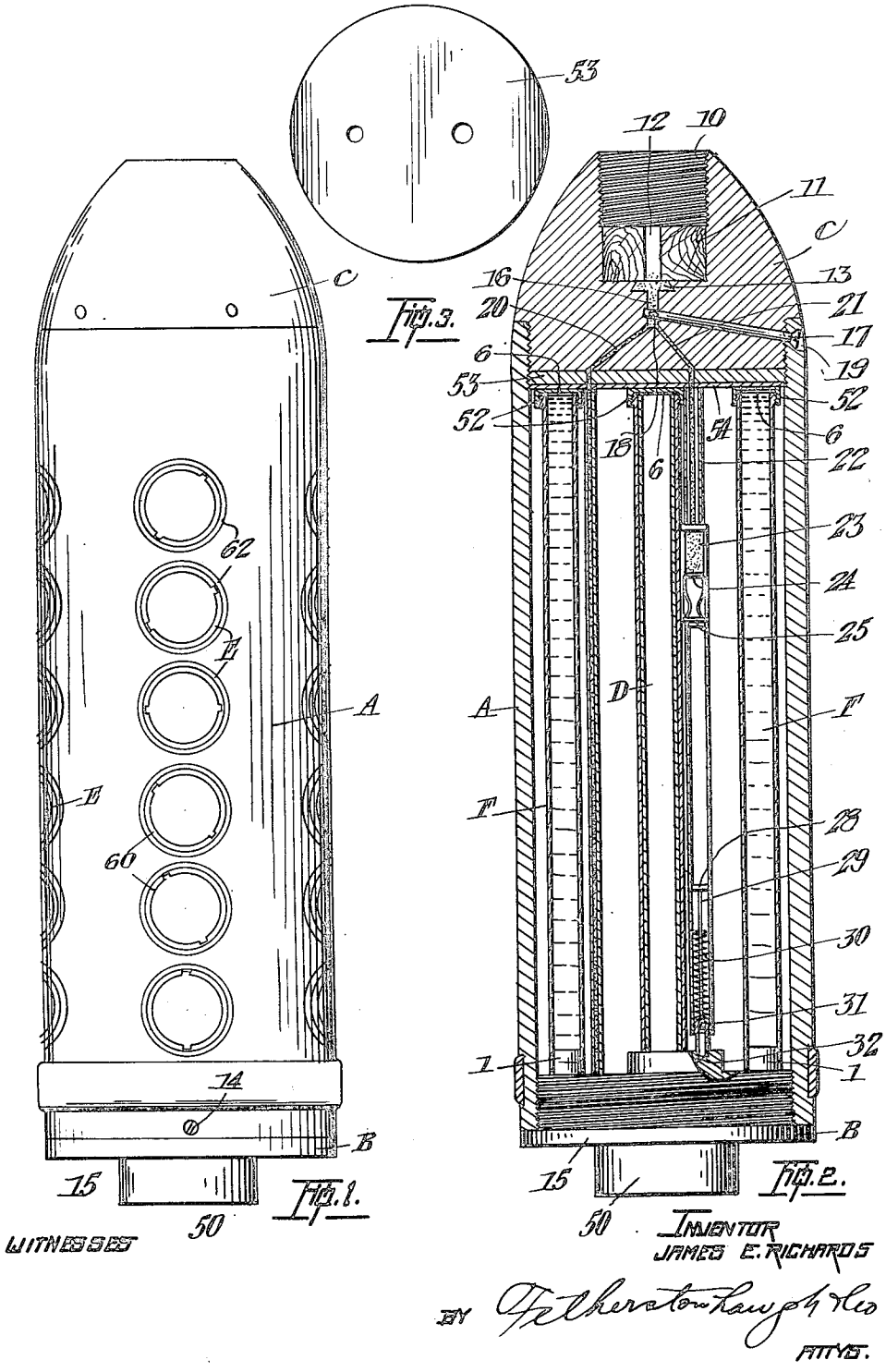
SHELL.

APPLICATION FILED OCT. 13, 1919.

1,350,339.

Patented Aug. 24, 1920.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

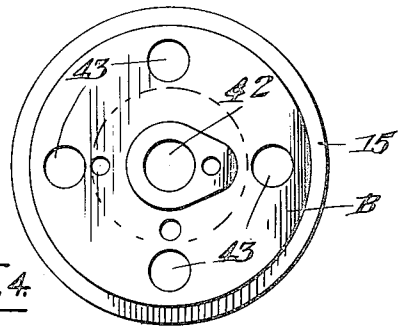


Fig. 4.

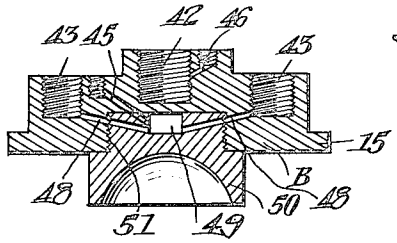


Fig. 5.

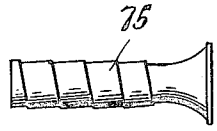


Fig. 7.



Fig. 8.

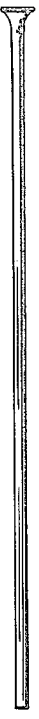


Fig. 9.

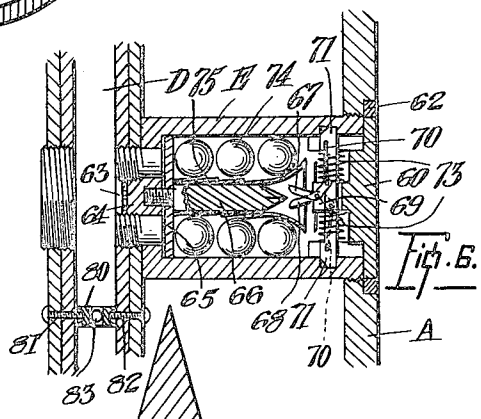


Fig. 6.

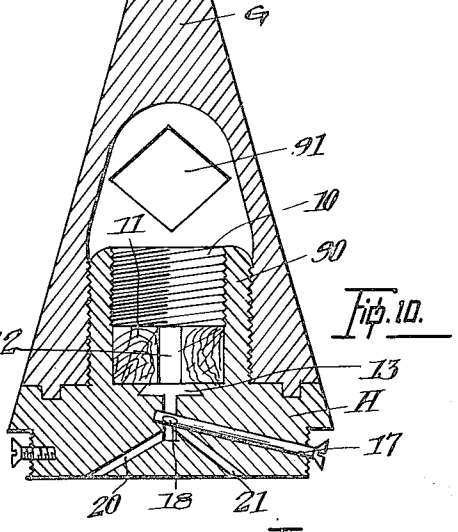


Fig. 10.

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4 SHEETS—SHEET 3.

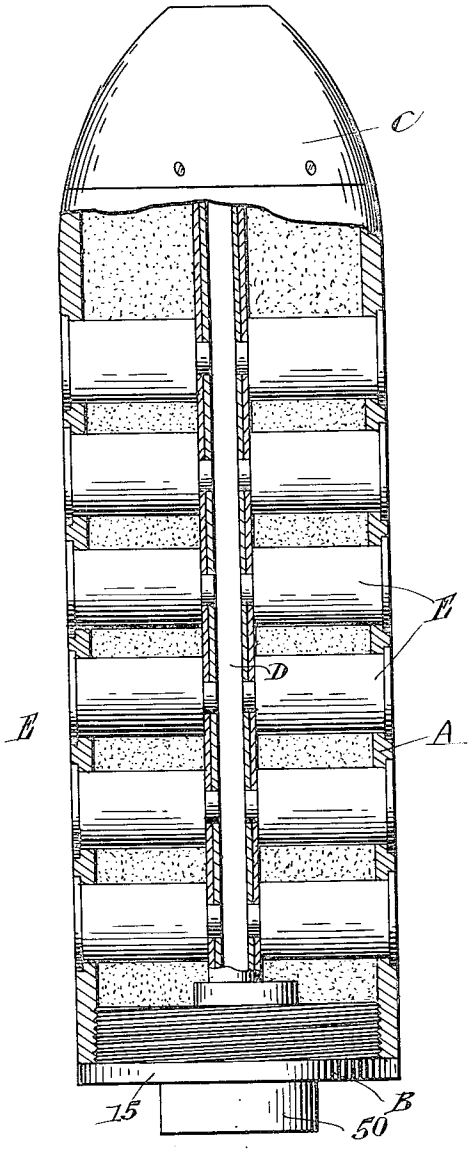


Fig. 11.

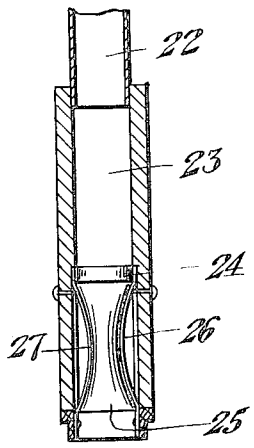


Fig. 13.

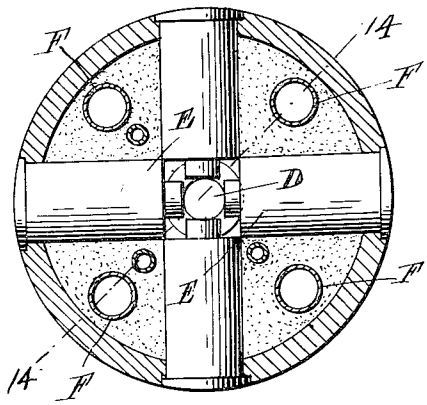


Fig. 12.

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4 SHEETS—SHEET 4.

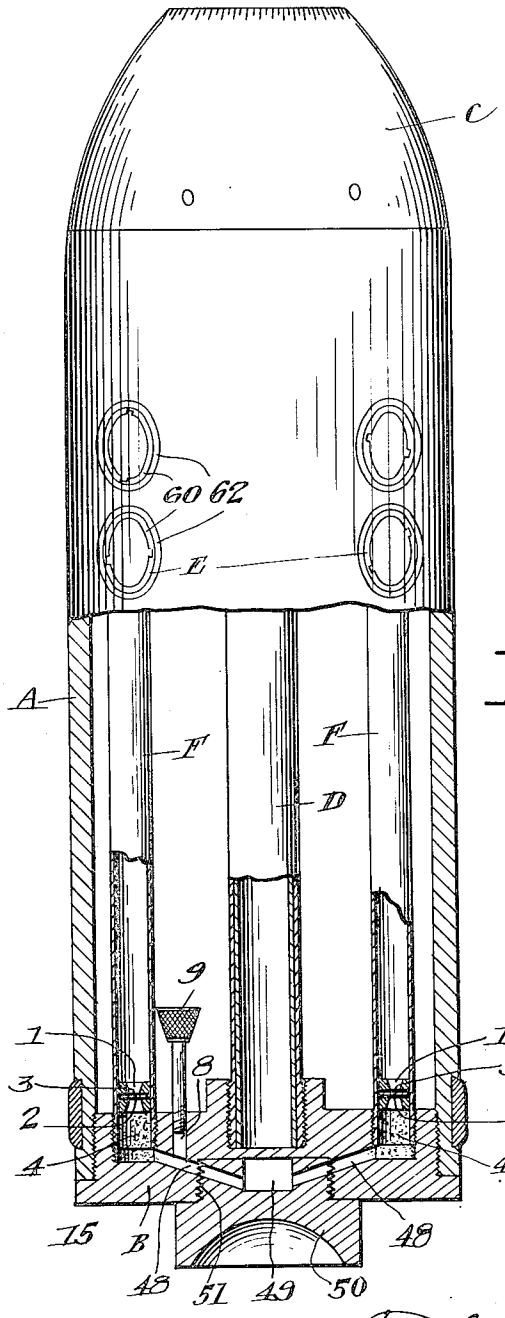


Fig. 14.

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UNITED STATES PATENT OFFICE.

JAMES EDWIN RICHARDS, OF HORTON TOWNSHIP, RENFREW COUNTY, ONTARIO, CANADA.

SHELL.

1,350,339. Specification of Letters Patent. Patented Aug. 24, 1920.

Application filed October 13, 1919. Serial No. 330,315.

To all whom it may concern:

Be it known that I, JAMES EDWIN RICHARDS, a subject of the King of Great Britain, and resident of the township of Horton, in the county of Renfrew, Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Shells, of which the following is a specification.

This invention relates to improvements in shells, and the objects of the invention are to combine the advantages of shrapnel with that of high explosives, and gas, and further to provide a shell which will be safe to handle, easy to manufacture and effective in operation, and it consists essentially of the improved construction hereinafter described in detail in the accompanying specification and drawings.

In the drawings:

Figure 1 is a side elevation of a shell embodying the invention.

Fig. 2 is a vertical sectional view.

Fig. 3 is a plan of the disk.

Fig. 4 is a plan view of the base with the end cap removed.

Fig. 5 is a cross section through the end cap.

Fig. 6 is a sectional detail through one of the shrapnel containing chambers.

Fig. 7 is a detail of the spring rotating member in the shrapnel chamber.

Fig. 8 is a detail of the safety screw.

Fig. 9 is a detail of a tube which may be used to load the cordite chamber.

Fig. 10 is a detail of an alternative form of an armour piercing head.

Fig. 11 is a section elevation taken at right angles to Fig. 2.

Fig. 12 is a transverse section of the shell.

Fig. 13 is an enlarged detail of the powder tube.

Fig. 14 is a longitudinal section on the line 14—14 of Fig. 12.

In the drawings, like characters of reference indicate corresponding parts in all the figures.

In the drawings, A represents the casing of suitable material such as forged steel; B represents the base of similar metal or other convenient metal having screw threaded engagement therewith; C represents the head and nose of the shell face having screw threaded engagement with the casing.

The head C is formed with a screw threaded socket 10 adapted to receive the fuse and priming mechanism. On the bottom of the socket 10, a block 11 of wood or similar material is provided and formed with a central perforation 12 through which the flash is carried from the fuse powder to the powder pan 13 formed in the head of the shell. The base B screws into the body of the shell and is provided with a projecting flange 15 which extends over the wall of the casing A and is adapted to prevent telescoping by the discharge of the gun; it is held in position by means of a plurality of set screws 14 extending through the casing into the base and countersunk in the shell.

Communicating with the powder pan 13 is a central perforation 16 extending downwardly through the head, passage of the flash through which is controlled by screw 17 extending transversely through the head and having a perforation 18 through it at the point where it passes through the perforation 16 whereby when turned in one direction the fire or flash may pass through the perforation 18 and when turned in the opposite direction it will cut off passage through the said perforation 16. The head of the screw is countersunk in a recess 19 in the casing.

The perforation 16, at its lower extremity communicates with two passageways 20 and 21, by which the fire is communicated respectively to the gas tubes and to the cordite tube, the latter of which is designed to propel the shrapnel.

The cordite tube is adapted to be the first ignited. The cordite tube D is centrally located and formed of suitable metal, preferably having a double wall the outer wall being shrunk on the inner wall. The passageway 21 leads to the powder tube 22 which is filled at its upper extremity with a suitable powder, and an enlarged section 23 is provided, at the bottom of which a lock 24 is provided, adapted to be projected against a piston 25, the said piston being held in normal position by means of side springs 26 and 27 riveted to the side of the tube. The piston is adapted to be projected longitudinally through the tube and to

strike against a piston 28 which is mounted on a rod 29 and spring held in normal position by means of a spring 30 extending through the bottom of the tube to a cross pin on the rod. The movement of the piston 28 and the rod 29 is adapted to explode the cap 31 which flashes through the passageway 32 and ignites the cordite in the tube D.

In loading the cordite the tube in Fig. 9 is used temporarily to provide a central core of rapidly ignitible powder in the cordite so that the explosion and fire will be rapidly communicated throughout the entire length of the same and the tube is withdrawn after use. The cordite tube communicates with a plurality of radial shrapnel chambers which extend from the cordite tube to the outer casing A, having their outer ends open and held in screw threaded engagement with suitable perforations provided in the casing.

The base B is provided with a central hole 42 to receive the cordite tube D and with four outer holes or sockets 43 to receive the gas tubes F, which are provided in the lower end with a pair of spaced valve rings 1, carrying a diaphragm 2 of mica or other suitable material which will stand the desired pressure and will not deteriorate by contact with the gas generating substance in the tubes F.

The mica diaphragm is rendered liquid and gas tight by the insertion of rubber rings or washers 3 on either or both faces of the said mica and these rubber rings will make a tight joint when the rings 1 are tightened into place.

The upper portions of the tubes F are filled with a gas generating substance, either in liquid or powdered state which will become gasified when the detonating charge 4 located below the mica diaphragm 2 is ignited by the detonating of the fuse.

It may be stated that the cordite tube may consist of the same quality of steel that is used in the army rifle barrel. The gas tubes are single tubes of hard thin steel while the cordite tube consists of two tubes, the outer tube being heated and drawn over the inner tube. The base is also provided with passageways or ports 45 and 46 to carry the fire. The base is further provided with passageways 48 leading from the holes or sockets 43 to a central fuse pan or recess 49 formed in the removable cap 50 which has screw threaded engagement with the walls of a threaded recess 51 formed in the base. Each of the tubes D and F is provided at the top with a screw cap 52 of gun metal or similar metal, having screw threaded engagement with the outer tube adapted to take up space between the end of the tube, and the top plate 53 which plate has screw threaded engagement with the inner wall of the casing A, and is formed with perforations connecting with the passages 20 and 21. There is preferably a washer 54 of felt or the like, between the plate 53 and the top of the tubes.

The caps 52 which engage the gas tubes F will be provided with rubber or like rings 6 to normally prevent leakage of the gas generating substance form the said tubes.

It will be seen that there are four rows of shrapnel or bullet chambers E, there being six chambers in each row, each chamber having about 18 bullets. The face of each bullet chamber is normally closed by a disk 60 countersunk in the casing and held in position by spring ring 62.

The cordite in the tube D communicates with the chamber E through a port 63 normally closed by a central projection 64 on the driving piston 65 which bears on a felt washer on that face adjacent to the tube D so that the gas generated by the explosion of the cordite will not escape past the piston but will exert a pressure thereon to give the necessary driving force thereto. The piston carrying a driving pin 66 adapted to spread a pair of crossed pivoted levers 67 and 68, which levers are centrally pivoted to projection 69 on the cap 60. The opposite ends of the levers are connected by links 70 with the slidable dogs 71, the ends of which are normally in engagement with notches or recesses in the chamber E, being held in such position by springs 73.

In this way when the ends of the levers are spread, the dogs will be sprung inwardly permitting the bullets and the cap 60 to be projected outwardly under the propelling force of the exploded cordite. To hold the shrapnel balls 74 in position a collapsible tube 75 is provided, which consists of spirally wound spring steel adapted to collapse and permit the driving pin 66 to move outwardly into engagement with the cross levers 67 and 68.

To divide the exploding gases evenly between the bullet chambers, I provide a baffle member 80 extending transversely across the tube, held in position by 4 screws 81 and 82, this member being formed with a perforation 83 which will be filled with powder, and through which the fire will pass.

The space in the body of the shell between the tubes D and F and the compartments E or any other vacant space between the parts of the fittings of the shell will be filled with a high explosive substance so that the shell will thus be a shrapnel, high explosive, and gas shell combined.

The high explosive substance will split the shell into fragments and scatter the same about, while the gas will also be spread by such explosion. The high explosive sub-

stance is detonated by the fuse 9 which is connected to the passageway 8 which in turn connects with the passageway 48.

In the alternative form of head shown in Fig. 10 a tapered armor piercing conical nose G is provided fitting onto the ordinary head piece H, and having a screw threaded engagement with a projection 90 thereon. The member G having an opening 91 in the side thereof through which the fuse may be adjusted. The head will in all cases contain or have fitted thereto the usual time fuse, the construction of which is well known in the art.

In the operation of the invention it will be seen that the fuse having ignited the powder in the passage 12 the fire will spread through the branches 20 and 21 and will first and in the manner already described ignite the powder in the cordite tube D which will propel the shrapnel balls from each of the chambers E; as the shell is turning these shrapnel balls will be thrown in all directions.

The powder or detonating substance beneath the mica disk will next be ignited so that the mica disk will be destroyed and access will thus be gained to the gas tubes F to generate the said gas from the substance contained therein, and almost simultaneously with this the high explosive in the body of the shell will be detonated and will split the shell up into fragments and spread the gas so that it will cover a large area and become very effective.

It will be seen that the present invention provides a simple and effective device by which the force of a high explosive may be combined with the searching qualities of the shrapnel. After all the shrapnel has been discharged the high explosive will shatter the remainder of the shell, scattering the fragments thereof in all directions.

As many changes could be made in the above construction, and many apparently widely different embodiments of my invention, within the scope of the claims, constructed without departing from the spirit or scope thereof, it is intended that all matter contained in the accompanying specification and drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim as my invention is:

1. In a shell, a shrapnel chamber, a cap normally closing the same, longitudinal movable spring held dogs normally holding the cap in closed position, crossed fixed levers connected to the dogs, and a driving piston having a driving pin adapted to engage said crossed levers.

2. In a shell, a shrapnel chamber, a cap normally closing the same, longitudinal movable spring held dogs normally holding the cap in closed position, crossed fixed levers connected to the dogs, and a driving piston having a driving pin adapted to engage said crossed levers, and a collapsible tube surrounding the driving pin, and a plurality of balls held in position by the collapsible tube.

3. A shell, comprising a base, a casing, a firing tube in the casing having a firing piston adapted to be propelled by powder therein, springs holding the firing piston in normal position, a spring held plunger adapted to be propelled by the firing piston, a cap adapted to be exploded by the spring held plunger on impact by the piston, a powder tube in communication with the cap, and a shrapnel chamber in communication with the firing tube.

4. A shell comprising a base, a casing, a firing tube in casing having a firing piston adapted to be propelled by powder, springs holding the firing piston in normal position, a spring held plunger adapted to be propelled by the firing piston, a cap adapted to be exploded by the spring held plunger, a powder tube in communication with the cap, a shrapnel chamber in communication with the firing tube, high explosive tubes and means for exploding the high explosive tube after the shrapnel has been propelled.

In witness whereof I have hereunto set my hand.

JAMES EDWIN RICHARDS.