

2,401,788

Filed Aug. 13, 1942



Inventor
Henry J. De N. McCollum
By Williams, Bradbury & Hinkle
Attorneys

UNITED STATES PATENT OFFICE

2,401,788

INCENDIARY BOMB

Henry J. De N. McCollum, Chicago, Ill.; Thelma McCollum executrix of said Henry J. De N. McCollum, deceased

Application August 13, 1942, Serial No. 454,654

7 Claims. (Cl. 102-6)

1

The present invention relates to incendiary bombs, and more particularly to a bomb of this type adapted to be dropped from aircraft and to start fires over a considerable area substantially simultaneously.

One of the objects of the present invention is to provide a novel incendiary bomb of extremely light weight for any particular caliber when unloaded, and which may be transported in the unloaded condition and which after arriving at its destination can be loaded with incendiary material readily available at all airports.

Another object of the present invention is to provide a novel incendiary bomb which uses liquid fuel as the principal incendiary ingredient.

Another object of the present invention is to provide a liquid fuel incendiary bomb having novel mechanism for igniting the liquid fuel and the vapors thereof upon impact.

Still another object of the present invention is to provide an incendiary bomb which can be manufactured rapidly in production at extremely low cost.

Still another object of the present invention is to provide an incendiary bomb that is well adapted to be manufactured and used in a wide variety of calibers.

Still another object of the present invention is to provide a novel incendiary bomb adapted to have a greater destructive effect than other incendiary bombs of equal caliber.

Other objects and advantages will become apparent from the following description of a preferred embodiment of my invention which is illustrated in the accompanying drawing.

In the drawing, in which similar characters of reference refer to similar parts throughout the several views:

Figure 1 is a side elevation of an incendiary bomb embodying the present invention, and

Fig. 2 is a longitudinal, medial sectional view of the bomb illustrated in Fig. 1.

The bomb illustrated in the drawing is made up of four principal structural elements. The nose cap indicated generally by the numeral 10 closes the lower end of the bomb and, as will be described more fully subsequently, provides a carbureting mechanism for producing a combustible mixture. The tail cap indicated generally by the numeral 12 closes the upper end of the bomb, and includes a set of fins 14 and igniter mechanism indicated generally by the numeral 16 attached to a casting 17. The intermediate portion of the bomb is formed of a cylindrical sleeve 18, which in the present illustration, may be considered as a length of extruded plastic tubing. The end caps 10 and 12 close the ends of the cylindrical portion 18 and are held together by a length of pipe 20 extending axially through the bomb and threaded into the two caps. The two

2

caps and the pipe 20, therefore, provide the principal strength-giving elements of the bomb, while the plastic tubing 18 is held under compression between the end caps and serves with the caps and the pipe 20 to form an annular tank 21 when the parts are in assembled relationship.

The nose cap 10 is made up of an annular plate 22, formed as a casting in the present illustration, which on its upper side in a central location has an upwardly extending, internally threaded spud 24 adapted to be threaded to the lower end of the pipe 20. At its peripheral edge the plate has an upwardly extending flange 26 adapted to embrace the lower portion of the cylinder 18, the edge of the cylinder being seated against a gasket 28 located upon the upper face of the plate.

The external peripheral edge of the plate is threaded to receive a sheet metal annular end cap 30 which serves to form an annular carburetor float bowl, in a manner to be described presently, the sheet metal of this cap being formed to provide a generally rounded nose, the central portion of which is rolled inwardly to provide a Venturi throat 32 connected to the lower end of the pipe 20. That is, the upper end of the Venturi throat tube projects into the pipe 20 sufficiently to insure communication between these elements when the elements are in assembled relationship.

Near its peripheral edge, the annular plate 22 has a small passage 34 extending therethrough, the lower end of this passage being closed by a tapered plug valve 36 secured to a float valve arm 38. The outer end of this arm is pivoted to a bracket 40 which extends downwardly from the lower surface of the plate 22 near its edge, and may, if desired, be cast as an integral element therewith. The opposite end of the arm 38 is attached to a ring-type float 42 which surrounds the Venturi-forming portion 32 of the sheet metal cap 30.

When a predetermined quantity of liquid reposes within the float bowl, the float 42 will rise because of its buoyancy and will move the plug 36 upwardly, thus closing the passage 34. In order to permit a free flow of liquid through the passage 34 into the float bowl, this bowl is vented to the atmosphere by a vent tube 44 which extends from a position above the maximum liquid level within the bowl to the outside atmosphere. This tube conveniently can be located with its upper end within the bowl adjacent the venturi and can be soldered or otherwise suitably secured to the adjacent annular surface of the sheet metal cap. Its lower end extends through an opening in the cap into a position adjacent the axis of the bomb within the inlet portion of the Venturi throat 32. As the bomb falls, air will be communicated by this tube to the space above the liquid level, thus preventing the existence of a subatmospheric pressure within the float bowl.

Similarly, to vent the tank 21, a tube 45 extends upwardly from an opening through the plate 22 to a position above the fuel level in the tank. For a reason that will appear presently, the upper end of this tube should be in approximate alignment longitudinally with the passage 34.

A carburetor jet tube 46 is provided at its upper end with jet openings 48 located axially of the bomb at approximately the smallest portion of the Venturi throat 32. This tube extends downwardly and is curved to one side and extends through the annular wall of the carburetor bowl 30 so as to communicate with the fuel therein.

The upper end cap casting 17 has a threaded filling opening through the side wall thereof closed by a threaded plug 50. Preferably, this plug should be located between a pair of adjacent fins 14 in a position contiguous to the upper end of the tube 45, so that the bomb can be rested upon its side with the filling opening, the vent tube opening, and the passage 34 uppermost, thus permitting the tank to be filled with gasoline or other liquid fuel through this opening without causing fuel to run through the passage 34 or vent tube 45. When the bomb is thus filled, only a small air space will remain within the tank.

The fins 14 may be constructed and attached to the upper casting in any suitable manner, those shown being formed of sheet metal and connected to the casting by welding. In order to restrain the speed of the bomb in its downward flight, the upper ends of these fins may be attached to an annular plate 52 which serves as an air brake.

The inner edges of the upper portions of the fins are attached to a cylindrical, comparatively thin-walled, sheet metal case 54 closed at its upper end by a perforated ceramic disc 56. The lower end of this case is attached to the upper end of the upper casting, and in a position somewhat above the point of attachment it is equipped with a second perforated ceramic disc 58, the space between these two discs being loosely filled with small pieces 60 of ceramic material.

The space below the lower disc 58 forms a generally cylindrical combustion chamber 62 which communicates through an opening 64 formed in the upper casting with the upper end of the pipe 20, thus, air entering the venturi at the lower end of the bomb can pass upwardly through the pipe 20, through the passage 64, through the combustion chamber 62, and thence through the perforated plate 58, the loose ceramic material 60, and the upper ceramic plate 56. At the point where the air enters the combustion chamber, that is, the upper end of the passage 64, a cylindrical cap 66 having a plurality of radially extending ports 68 formed by striking out vanes from the cylindrical side wall of the cap is provided. These vanes extend outwardly at an angle and, therefore, give the air entering the chamber 62 a swirling motion.

At one side the combustion chamber 62 is connected to an igniter 70 which extends outwardly and is equipped at its outer end with a firing pin 72, having a ring 74 adapted to be connected to an arming wire within the airplane. Although not shown in detail, this igniting mechanism comprises a firing pin and primer of conventional design which ignites a comparatively slow-burning powder charge, thus causing flame from this charge to pass into the chamber 62 for a considerable period after the firing pin 72 has been pulled. No detailed description of this igniting

mechanism need be given since the construction and use of percussion ignited, slow-burning powder charges are well-known.

In operation, a bomb embodying the present invention functions as follows:

Preferably, it is shipped to a reception center fully constructed, as shown, but without the gasoline charge. It, therefore, when in this condition, is extremely light in weight. Bombs in this condition can be quickly and economically ferried to wherever they are needed, either by overland travel or by airplane. That is, one airplane can carry a cargo of empty bombs sufficient to equip several airplanes after the bombs have been loaded. The distribution of the bombs is, therefore, greatly simplified. After the bombs have arrived at the airport where they are to be loaded for use, each bomb is turned upon its side with the filling plug 50 uppermost. The plug is removed and the bomb is filled with gasoline or other liquid fuel through the opening thus provided. Ordinarily, any airport to which the bomb may be taken for loading will have a large supply of gasoline on hand for use in airplanes and other automotive vehicles. It is not necessary, therefore, to ship gasoline along with the bombs.

After the bombs have been filled and the plugs 50 replaced, they can be placed in the airplane that is to freight them to the objective either on their sides or with the nose end uppermost so that gasoline will not leak through the passages 34. When the airplane has arrived over the objective, the firing pin 72 is pulled and the bomb is released. Immediately, as the bomb starts its flight, flame from the igniter 70 will pour into the combustion chamber 62. Simultaneously, gasoline will pour from the tank through the passage 34 into the float bowl 30 until the rising float 42 closes the lower end of the passage 34. Air rushing through the venturi 32 causes gasoline to flow from the jets 48, thus causing a combustible mixture to pass upwardly through the central pipe 20.

This combustible mixture enters the combustion chamber 62 where it is immediately ignited by the flame by the igniter 70, thereby producing an extremely hot fire which, together with hot products of combustion thus formed, is passed upwardly through the openings in the ceramic disc 58 through the loose ceramic material 60 and through the openings in the upper ceramic disc 56. The ceramic discs 58 and 56, and the loose ceramic material 60 are therefore quickly heated to incandescence.

When the bomb strikes, the plastic cylinder 18 will be immediately fractured, thus splashing and spraying gasoline over a wide area. Substantially simultaneously, the plates 58 and 56, and the cylinder 16 will be fractured, thus throwing incandescent particles of ceramic material throughout a large portion of the area covered by the gasoline. Some of these particles will therefore pass through a zone containing a combustible mixture, thus immediately starting a gasoline fire which kindles all of the remaining gasoline spread by the bomb.

Since the gasoline will be splashed over a considerable area, the fire will be wide-spread and extremely hot. Further, it will be appreciated that the heat provided by a bomb of the above type of any particular caliber will be greater than that provided by bombs of the thermite type, in which both the fuel and the oxygen to support combustion must be carried within the bomb. On the other hand, the gasoline will

spread over a greater area and will start a fire in more places simultaneously than is possible with a magnesium bomb which usually starts fires only within a matter of a few feet from the point of impact, inasmuch as the magnesium does not spread widely. For this reason, a bomb incorporating the present invention may strike within an area containing no combustible material where a similar magnesium bomb would burn itself out without starting a fire. Under these conditions, however, a bomb incorporating the present invention will spread fire through a much wider area than the magnesium bomb and, therefore, may reach combustible material located a considerable distance from the point of impact.

Although I have described one form of my invention it will be appreciated that modifications may be made therein without departing from the scope of the invention. For instance, a similar bomb can be constructed without the igniter 70 and without the carbureting mechanism in the nose cap, under which conditions the passage 34 would be plugged and the distributor cap 66 would be removed. In place of these elements, a comparatively slow-burning powder flare can be located within the tube 20 so that the flame from this flare will heat the ceramic particles 60 directly.

Another alternative is to fill the cylinder 57 with ceramic material intimately mixed with a slow-burning powder. A primer for igniting this powder should also be provided. The primer is actuated as the bomb starts its flight with the result that the slow-burning powder continuously burns and heats the ceramic particles during the flight of the bomb. In any of these alternative forms, impact of the bomb will fracture the gasoline tank and will cause the incandescent ceramic particles to be scattered through a large portion of the gasoline-spattered area.

Having described my invention, what I claim as new and useful and desire to patent under United States Letters Patent is:

1. An incendiary bomb comprising means forming a liquid fuel tank adapted to be fractured upon impact, a quantity of ceramic material adapted to ignite said liquid fuel when heated to a predetermined temperature and when brought into intimate association with said liquid fuel or the vapors thereof, container means adjacent said fuel tank and adapted to isolate said ceramic material from said liquid fuel when the bomb is in intact condition, means supplied with liquid fuel from said tank for forming a combustible mixture during the flight of the bomb, igniter means, and means including a combustion chamber for burning the combustible mixture and for passing the hot products thereof through said ceramic material to heat the latter to said predetermined temperature.

2. An incendiary bomb comprising a liquid fuel tank, means forming a container secured in a position adjacent said tank, a quantity of ceramic material in said container adapted to be heated to incandescence by a flame, igniting and burning means for producing such a flame, and means for passing said flame through said quantity of material during the flight of the bomb.

3. An incendiary bomb comprising a fractureable liquid fuel tank, a quantity of ceramic ma-

terial adapted to ignite said liquid fuel or the vapors thereof when hot and when brought into intimate association therewith, a combustion chamber, means supplied with liquid fuel from said tank for forming a combustible mixture and for supplying the combustible mixture to said combustion chamber, igniter means in said combustion chamber and means associated with said combustion chamber for passing the hot products of combustion through said ceramic material during the flight of the bomb to cause said ceramic material to be hot at the moment of impact of said bomb.

4. An incendiary bomb comprising a liquid fuel tank, means forming a container secured in a position adjacent said tank, a quantity of ceramic material in said container adapted to be heated to incandescence by a flame, means forming a combustion chamber in association with said ceramic material, means operative while the bomb is in flight for producing a combustible mixture and for introducing said combustible mixture into said combustion chamber, means for igniting said combustible mixture in said combustion chamber, and means for passing the hot products of combustion thus produced through said ceramic material.

5. An incendiary bomb comprising means forming a liquid fuel tank adapted to be fractured upon impact, a quantity of material adapted to ignite said liquid fuel when heated to a predetermined temperature and when brought into intimate association with said liquid fuel or the vapors thereof, container means to isolate said material from said liquid fuel when the bomb is in intact condition, said container being located at the upper end of the bomb in a position above said tank, means forming a combustion chamber positioned between said container and said tank, means forming a passage extending from said combustion chamber to the opposite end of said bomb, means for introducing a combustible mixture into said passage, and means for igniting said mixture in said combustion chamber.

6. An incendiary bomb comprising a liquid fuel tank, means forming a container secured in a position adjacent said tank, a quantity of loose ceramic material in said container adapted to be heated to incandescence by a flame, igniting and burning means for producing such a flame, means actuated by the flight of the bomb for passing said flame through said quantity of material as long as the bomb is in flight, and means operated by impact of the bomb for bringing said ceramic material into intimate association with said liquid fuel or the vapor thereof.

7. An incendiary bomb comprising a fractureable liquid fuel tank, a quantity of ceramic material adapted to ignite said liquid fuel or the vapors thereof when hot and when brought into intimate association therewith, fuel burning means, means supplied with liquid fuel from said tank for forming a combustible mixture and for supplying the combustible mixture to said fuel burning means, and means for passing the hot products from said fuel burning means through said ceramic material during the flight of the bomb.

HENRY J. DE N. McCOLLUM.