Sept. 25, 1945. T. M. FINLEY 2,385,502

INCENDIARY BOMB

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FIG. 1

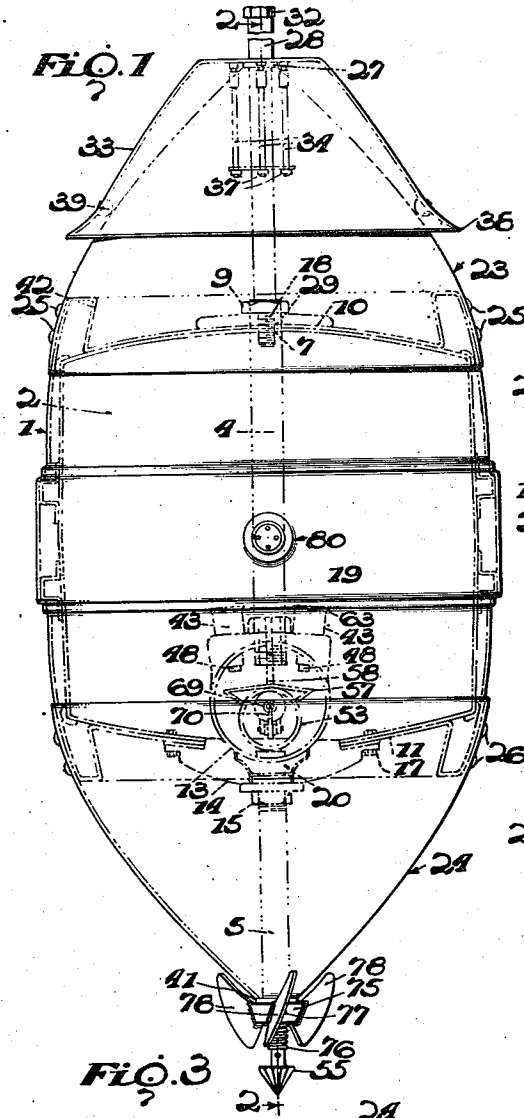

FIG. 2

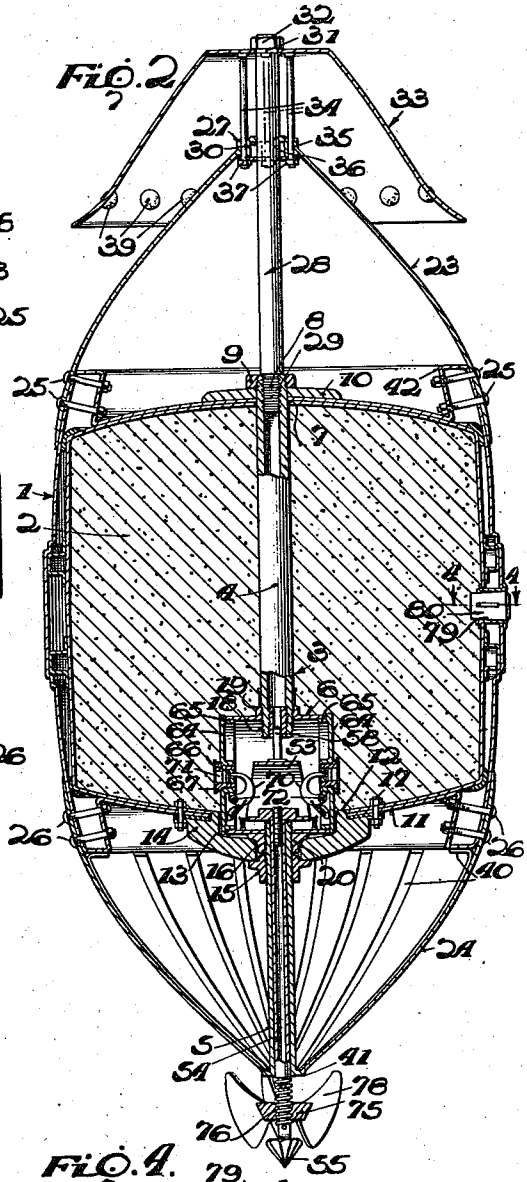

FIG. 3

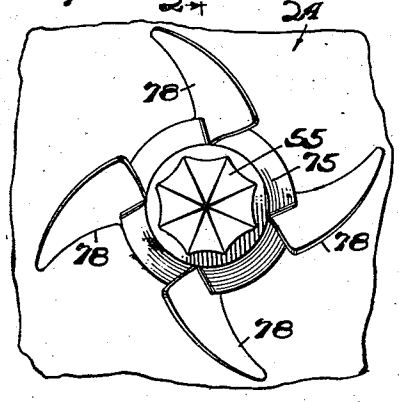

FIG. 4

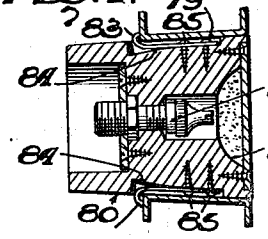

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FIG. 5.

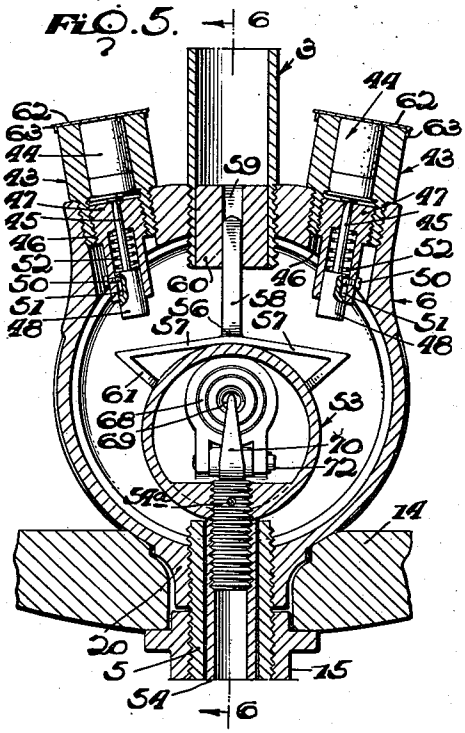


FIG. 6.

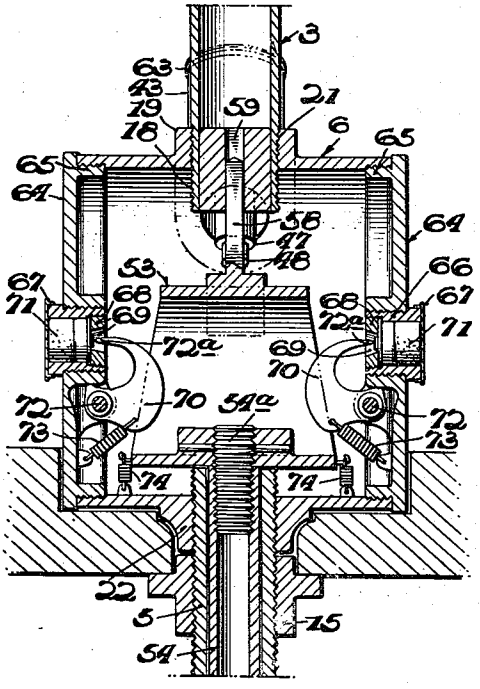
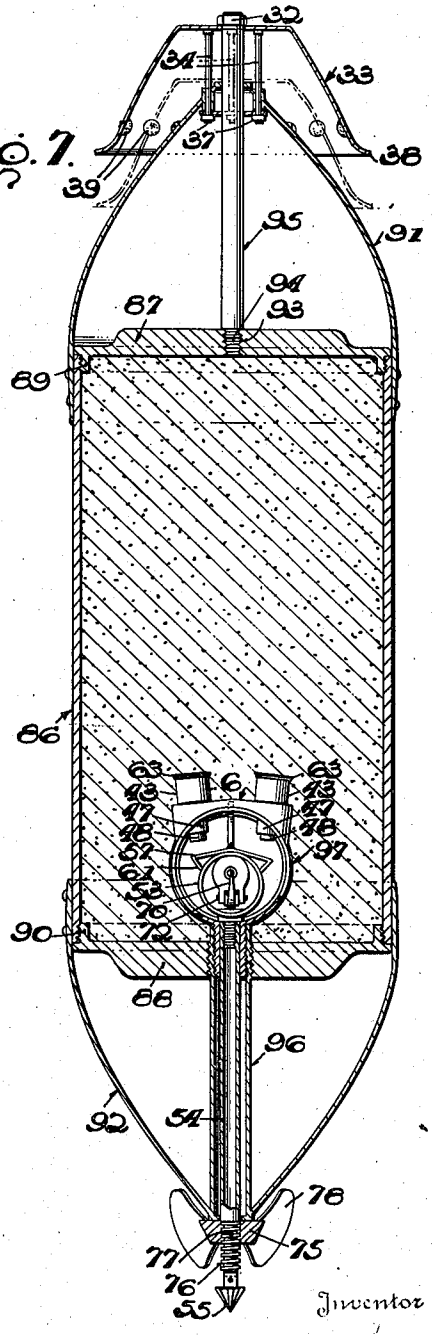


FIG. 7.



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UNITED STATES PATENT OFFICE

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INCENDIARY BOMB

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Application June 11, 1941, Serial No. 397,616

10 Claims. (Cl. 102—6)

The invention relates to an incendiary bomb.

An object of the present invention is to provide for aerial work an incendiary bomb designed to be dropped from aircraft and adapted for use on land and sea and equipped with detonating mechanism having means for preventing premature explosion and capable of enabling the bomb to be handled with safety and of preventing the bomb from igniting an incendiary explosive charge until the bomb contacts with an objective so that the bomb will be effective to produce the destructive effect at the desired place.

Another object of the invention is to equip the bomb with means for locking the detonating mechanism out of operation until it is desired to load the bomb on an aircraft and to provide means for automatically releasing the detonating mechanism and of arranging the same for operation within a short time after the bomb is dropped and is a safe distance from an airplane or other aircraft thereby affording complete protection against accidental premature explosion.

Another object of the invention is to provide an incendiary bomb adapted to be easily and cheaply manufactured in small machine shops and similar small automobile repair garages and the like and of inexpensive material easily obtainable in large quantities at a low cost in practically all portions of the country.

Another object of the invention is to provide an incendiary bomb especially designed and adapted for containing or holding as an incendiary and explosive charge a mixture of gasoline and air and the pressure and of enabling such explosive mixture to be handled as safely as ordinary gasoline.

It is also an object of the invention to provide an incendiary bomb adapted to employ for such inflammable explosive gasoline mixture various kinds of ordinary containers such as metal and wooden barrels and drums and similar containers of any size having sufficient strength to carry a load of said explosive mixture and capable of withstanding the internal pressure of the same.

A further object of the invention is to provide an incendiary bomb adapted to be readily constructed of ordinary iron and comparatively little steel and without necessitating the employment of expensive metals and alloys such as copper, brass, bronze, aluminum and the like ordinarily required in the construction of explosive bombs.

With these and other objects in view the invention consists in the novel construction, combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, construction and details of construction, within the scope of the claims may be resorted to without departing from the spirit or sacrificing any advantages of the invention.

In the drawings:

Figure 1 is a side elevation of an incendiary bomb constructed in accordance with this invention, the parachute element or member being nested close to the upper cap of the bomb.

Figure 2 is a central longitudinal sectional view of the same, the parachute element or member being moved outwardly to its operative position and the section being taken on the line 2—2 of Figure 1.

Figure 3 is an enlarged detail view of the lower end of the incendiary bomb.

Figure 4 is an enlarged detail sectional view on the line 4—4 of Figure 2.

Figure 5 is an enlarged detail sectional view of the detonating mechanism, the section being taken at right angles to Figure 2.

Figure 6 is a similar view taken on the line 6—6 of Figure 5.

Figure 7 is a vertical longitudinal sectional view illustrating another form of the invention.

Referring particularly to Figures 1 to 6, inclusive, of the accompanying drawings, the incendiary bomb comprises in its construction a container 1 designed primarily for holding an explosive inflammable liquid 2 preferably consisting of high-test gasoline and air under pressure but any other explosive material may of course be employed and in practice other ingredients may be introduced into the liquid mixture for increasing the intensity of the heat and the duration of the burning thereof as will be readily understood. The container 1 may consist of metal barrels and drums, wooden barrels and various other types of containers either used or new and unused and having sufficient strength for holding a charge of the inflammable explosive mixture and withstanding the internal pressure resulting from introducing compressed air into the container.

The containers 1 may be of any desired capacity and the barrel illustrated in Figures 1 and 2 of the drawings is a barrel of the ordinary construction and as any type of barrel or container of this character may be employed a detailed description of the particular construction of the barrel is deemed unnecessary. The container forms a liquid tight chamber for holding an inflammable explosive liquid material. Ex-

tending through the container 1 centrally thereof is a tubular member 3 composed preferably of an upper tube 4, a lower tube 5 and an intermediate enlarged transversely disposed tube 6 forming a housing for detonating mechanism. The upper tube 3 extends through an opening 7 in the upper end of the barrel and is preferably exteriorly threaded at its upper end at 8 to receive a nut 9 for clamping a sealing member 10 exteriorly against the upper end of the barrel as clearly shown in Figure 2 of the drawings. The sealing member 10 may be of wood, metal or any other suitable material and in practice suitable packing will be employed for rendering the top or upper end of the container 1 liquid tight.

The upper tube 4 may be of any desired diameter and the lower end or head 11 of the barrel is provided with an enlarged opening 12 to receive the transversely disposed tubular housing member 6 and to enable the tubular member 3 to be readily introduced into the barrel from the bottom thereof in assembling the mechanism of the bomb. The transverse housing tube 6 is seated in a recess 13 of a sealing member 14 bolted or otherwise secured to the lower end 11 of the barrel at its periphery and also clamped by a nut 15 which is screwed on the threaded upper portion 16 of the lower tube 5. The sealing member which is pierced at its periphery by suitable fastening devices 17 may be constructed of wood or metal and in practice is designed to be provided with suitable packing material for rendering the barrel liquid tight at the bottom.

The lower end of the upper tube 4 is threaded at 18 and is screwed into the housing section of the tubular member at the top thereof and the upper end of the lower tube 5 is threaded into the housing member 6 at the bottom of the same. The housing member 6 is provided at the top and bottom with thickened portions 19 and 20 which may be formed by welding bosses or pieces to the transverse tubular section 6 or in any other suitable manner and the thickened portions are provided with interiorly threaded openings 21 and 22 to receive the threaded ends of the tubes 4 and 5.

In order to streamline the bomb at the top and bottom of the barrel upper and lower substantially conical caps 23 and 24 are provided. The caps 23 and 24 which may be constructed of sheet metal or any other suitable material are bolted or otherwise secured to the barrel at the top and bottom thereof at 25 and 26 and the upper cap is supported at its apex 27 by a rod 28 forming a continuation of the tubular member 3 and having a lower threaded end 29 which is screwed into the upper end of the tube 4. The central vertical rod 28 extends through an opening 30 in the apex of the upper cap 23 and projects beyond the same and has its upper terminal 31 threaded for the reception of a nut 32 which forms a stop for a parachute member 33.

The parachute member 33 which may be constructed of sheet metal or any other suitable material is substantially in the form of a truncated cone and is slidable upwardly and downwardly on the extended portions of the rod 28 and is guided by the same and also by guide rods 34 preferably four in number but the number of the guide rods may of course be varied as will be readily understood. The guide rods 34 are secured at their upper ends to the hood-shaped parachute member at the top thereof and are slidable through openings 35 in the top of the upper cap 23. The upper cap 23 is preferably thickened around the opening 36 through which the rod passes and the guide rods 34 are provided at their lower ends with suitable stops 37 preferably consisting of nuts and arranged to engage the thickened portion of the cap for limiting the upward movement of the parachute member.

The parachute member is adapted to be nested close to the upper cap 23 as clearly illustrated in Figure 1 of the drawings until the bomb is dropped. The lower peripheral portion 38 of the parachute member is spaced from and projects outwardly beyond the adjacent surface of the upper cap when the same is nested as shown in Figure 1. Suitable spacing means 39 which may be conveniently formed by semi-spherical protuberances space the lower peripheral portion of the parachute member 33 from the upper cap 23 so that when the bomb is dropped the air will enter the parachute member beneath the peripheral flange or edge 38 and will cause the parachute member to move upwardly to the position illustrated in Figure 2 of the drawings so that the downward movement of the bomb will be retarded and the bomb caused to drop in a vertical position but other means may be employed for causing the bomb dropping to assume a true vertical position right side up. Also the retarding of the bomb will insure sufficient time for the automatic releasing of the detonating mechanism hereinafter described.

The lower cap 24 which is constructed substantially the same as the upper cap may be reinforced by metal strips 40 and it is supported at its apex in an annular flange 41 preferably L-shaped in cross section to provide a groove to receive the apex portion of the lower cap. The upper cap may also be braced at its base as shown at 42 in Figure 2 of the drawings. While it is desirable and advantageous to provide streamline upper and lower caps for the container these are of course not absolutely necessary and containers may be employed without the upper and lower caps.

The housing 6 for the detonating mechanism is provided at opposite sides of the lower end of the upper tube 4 with short gun barrels 43 threaded into the upper thickened portion of the housing 6 and designed particularly for the reception of a shotgun shell 44 without shot secured in position by a breech block 47 having a firing pin 45 and threaded into the inner end of the gun barrel as illustrated at 46. The firing pin is adapted to engage the percussion cap of the shotgun shell and explode or fire the shell in the usual manner but a blank cartridge or similar ammunition may of course be provided as will be readily understood. The firing pin 45 is provided with a head 48 which is slidably mounted in a chamber 49 of the breech block and which is limited in its outward sliding movement by a screw 50. The screw 50 pierces the wall of the chamber 49 and engages a groove 51 in the head of the firing pin which is maintained normally out of engagement with the percussion cap of the shell by a coiled spring 52 interposed between the outerwall of the chamber and the head of the firing pin. Any number of gun barrels may of course be provided and the pair of gun barrels illustrated in Figure 5 of the drawings have their shells simultaneously fired by the head 53 of a plunger 54 slidably mounted in the lower tube 5 and extending downwardly below the outer end of the tube and having a tapered or spiked head 55 at its lower end for contacting with an

object when the bomb is dropped whereby the plunger will be forced inwardly or upwardly to carry its head 53 into engagement with the firing pins of the gun barrels 43.

The head 53 of the plunger may be conveniently formed by a short tube secured by a threaded stem or screw 54a. The plunger 54 is tubular and the screw 54a is threaded into the tubular head of the plunger and into the upper end of the plunger tube 54. Any other suitable means may be of course employed for securing the head 53 of the plunger to the stem or tubular portion of the plunger. The tubular head is disposed transversely with respect to the tubular member 3 and it is provided at the top with a firing pin engaging member 56 consisting preferably of a metal strip centrally secured to the tubular head at the top thereof and having side portions 57 arranged at a slight inclination and diverging downwardly slightly to arrange the upper faces of such portions in substantial parallelism with the end faces of the heads 48 of the firing pins. The firing pin engaging member is adapted to contact squarely with the lower ends of the firing pins when the plunger is moved upwardly and the plunger head is also guided in its upward movement by a short square non-rotary stem 58 extending upwardly from the said firing pin engaging member 56 at the center thereof and having its upper portion arranged in a central opening 59 in a plug 60 suitably secured within the lower end of the upper tube 4. The ends 61 of the member 56 are extended downwardly and inwardly as clearly shown in Figure 5 of the drawings and suitably secured to the plunger head 53 at opposite sides thereof to brace and support the side portions 57 which engage the lower ends of the firing pins.

The outer ends of the gun barrel 43 are sealed by closure caps 62 of thin metal preferably with rims 63 threaded or otherwise secured to the outer ends of the gun barrels. The closure caps 62 are preferably coated with shellac or other suitable material for rendering the outer ends of the gun barrels liquid-tight so that there will be no danger of the liquid contained in the barrel of the bomb seeping into or otherwise penetrating the gun barrels and affecting the shells 44.

The housing 6 is provided at its ends with heads 64 having flanges 65 which are threaded into the ends of the transverse tube constituting the body portion of the housing and the said heads 64 are provided with short gun barrels 66 sealed at their outer ends by closure caps 67 and provided with breech blocks 68 threaded into the inner ends of the gun barrel and provided with openings 69 for enabling firing hammers 70 to be forced into engagement with the percussion caps of the shells 71. The firing hammers are pivoted at 72 to the closure heads of the housing at points beneath the gun barrel and they are curved inwardly and upwardly and taper at their upper portions to a firing portion 72a. The firing hammers are normally held in a retracted position by coiled springs 73 and they extend inwardly into the tubular plunger head and into the path of the lower portion thereof so that when the plunger head is forced upwardly it will swing the firing hammers into engagement with the shotgun shells 71 and also drive the firing pins 52 of the shotgun barrels 43 into engagement with the shotgun shells 44 so that all of the shotgun shells will be simultaneously fired into the explosive inflammable gasoline mixture.

The plunger is maintained in its lowered position out of engagement with the firing hammers and the firing pins by coiled springs 74 and it is locked positively against inward or upward movement by a nut 75 mounted on a threaded portion 76 of the plunger 54 and adapted to be screwed upwardly on said threaded portion and into engagement with the lower end of the bomb. This will prevent accidental inward or upward movement of the plunger. Also the nut is positively held against rotation when in engagement with the lower end of the bomb. The locking means for the nut may consist of a cotter pin 77 or other suitable fastening device which will enable a loaded bomb to be handled as safely as handling ordinary gasoline. The nut is provided at its periphery with vanes 78 and when the bomb is loaded on an aircraft the cotter pin is removed for releasing the nut so that when the bomb is dropped the vanes 78 which form a propeller will rotate the nut and unscrew the same from the upper end of the threaded portion 76 so that the plunger will be free to move upwardly when it comes in contact with an object or a resisting surface. The blades are of sufficient size and pitch so that should the bomb in dropping come in contact with the surface of water the resistance of the water will be sufficient to force the plunger upwardly with sufficient force to fire the shotgun shells and explode the inflammable liquid. The parachute member will retard the dropping of the bomb sufficient to enable the vanes of the nut to unscrew the same sufficiently to release the plunger and only a short interval will be required to place the detonating mechanism in condition for operation.

The barrel is provided with a bung hole 79 and the bung 80 which is driven into the bung hole in the usual manner is provided with an air valve 81 similar to the air valve of a pneumatic tire of an automobile and adapted to permit air under pressure to be introduced into the barrel and confined therein by a pump or any other suitable means such as a storage tank. As the valve 81 is of the ordinary construction detailed illustration and description thereof are unnecessary. The bomb is provided at its outer end with a recess 82 for the reception of suitable sealing material for concealing and preventing tampering with the air valve. The bung is securely locked in the bung hole by means of springs 83 preferably four in number and mounted in grooves 84 in the sides of the bung and secured at their outer portions to the bung by suitable fastening devices 85 and provided at their inner ends with hooks adapted to be moved inwardly into the grooves when the bung is forced into the bung hole and capable of springing outwardly as soon as the hook-shaped ends 83 are carried inwardly beyond the walls of the barrel. The hook-shaped terminals of the springs engage the interior surface of the barrel and effectually lock the bung in the bung hole and while four of the locking springs are preferably employed the number may vary.

In Figure 7 of the drawings is illustrated a modification of the invention in which the container 86 is made by suitable lengths of tubular material which may be of any desired diameter and which may be constructed of any suitable metal. The container 86 is provided with upper and lower heads 87 and 88 having annular flanges 89 and 90 screwed into the ends of the tubular body portion 86 of the container. The container 86 is preferably provided with streamline upper and lower caps 91 and 92 suitably secured to the

tubular body portion **86** at the exterior thereof as clearly illustrated in Figure 7 of the drawings. The heads are reinforced or thickened as shown and the upper head is provided with a central threaded opening **93** for the reception of the lower threaded end **94** of a vertical rod **95** extending upwardly from the upper end of the container and supporting the upper end of the upper cap similar to the rod **28**. The bomb shown in Figure 7 is preferably provided with a parachute member **33** constructed and arranged as heretofore described. The container is also provided at the bottom with a tubular member **96** screwed into the lower head of the container **86** at the center thereof and extending into the container and provided with a housing **97** similar to that heretofore described.

The housing is provided with the gun barrels heretofore described and with the detonating mechanism illustrated in Figures 5 and 6 and heretofore fully described. Also the plunger is controlled by a nut **75** having wings **78** adapted to be locked by a cotter pin **77**. Also the container **86** is designed to be provided with the bung and bung hole heretofore described and to be filled with gasoline and air mixture under pressure. As the operation of the bung illustrated in Figure 7 of the drawings is the same as that heretofore described further description of the same is deemed unnecessary. The heads of the tubular container may be secured to the body portion in any other manner, such as by bolts, screws, welding or any other well known means.

What is claimed is:

1. A bomb of the character described, including a container for holding an inflammable explosive material, central vertical tubular member extending through the bottom of the container and having a housing arranged interiorly of the container, a plurality of gun barrels mounted on the housing and extending into the container, a plunger slidable in the tubular member and having a head located with the housing, said plunger projecting at the bottom of the bomb and movable upwardly when the bomb in falling contacts with a surface, and means located at the inner end of each gun barrel and arranged to be simultaneously engaged and actuated by the plunger head for firing explosive charges from the gun barrels into the container.

2. A bomb of the class described, including a container for holding an inflammable material, a central vertical tubular member extending through the bottom of the container and having a housing located within the container, short gun barrels mounted on the housing at opposite sides thereof, firing hammers pivotally mounted within the housing adjacent the gun barrels and having terminal portions for engaging an explosive charge within the gun barrels and a plunger slidable in the tubular member and having a head operating within the housing and arranged to engage and actuate the firing hammers simultaneously.

3. A bomb of the class described, including a container for holding an inflammable explosive material, a tubular member extending through the bottom of the container and provided with a housing arranged within the container, a plurality of gun barrels mounted on the housing at the top thereof and provided with firing pins, side gun barrels mounted on the housing at opposite sides thereof, firing hammers pivotally mounted within the housing adjacent the side gun barrels, and a plunger slidable in the tubular member and provided with a head operating within the housing and arranged to engage and actuate simultaneously the firing pins and the firing hammers.

4. A bomb of the class described, including a container for holding an inflammable explosive liquid material, a tubular member extending through the bottom of the container and provided with a housing arranged in the container and provided at the top with guiding means, gun barrels mounted on the housing at the top thereof and spaced from the guiding means and projecting into the liquid in the container, a plunger slidable in the tubular member and having a head operating in the housing and provided at the top with a stem guided by said guiding means, and means arranged to be engaged by a plurality of portions of said plunger for firing an explosive charge in the gun barrels.

5. A bomb of the class described, including a container for holding an inflammable explosive material, a tubular member extending through the bottom of the container and having a housing arranged in the container, a gun barrel mounted on the housing and arranged to discharge into the container, a plunger slidable in the tubular member and provided with a lower threaded portion, means arranged within the housing and located in the path of the plunger for firing an explosive charge within the gun barrel when actuated by the plunger, a nut arranged on the threaded portion of the plunger and arranged to engage a fixed portion of the plunger to hold the plunger against upward sliding movement, and vanes carried by the nut and arranged to be acted on by the air to retract the nut and release the plunger when the bomb is dropped.

6. A bomb of the class described, including a container for holding an inflammable explosive material, a tubular member extending through the bottom of the container and having a housing arranged in the container, a gun barrel mounted on the housing and arranged to discharge into the container, a plunger slidable in the tubular member and provided with a lower threaded portion, means arranged within the housing and located in the path of the plunger for firing an explosive charge within the gun barrel when actuated by the plunger, a nut arranged on the threaded portion of the plunger and arranged to engage a fixed portion of the plunger to hold the plunger against upward sliding movement, vanes carried by the nut and arranged to be acted on by the air to retract the nut and release the plunger when the bomb is dropped, and normally releasable means for locking the nut against rotation.

7. A bomb of the class described, including a container for holding an inflammable explosive material, a tubular member extending through the bottom of the container and having a housing arranged in the container, a gun barrel mounted on the housing and arranged to discharge into the container, a plunger slidable in the tubular member and provided with a lower threaded portion, means arranged within the housing and located in the path of the plunger for firing an explosive charge within the gun barrel when actuated by the plunger, a nut arranged on the threaded portion of the plunger and arranged to engage a fixed portion of the plunger to hold the plunger against upward sliding movement, vanes carried by the nut and arranged to be acted on by the air to retract the nut and release the plunger when the bomb is

dropped, said vanes being of sufficient size to actuate the plunger upon contact of said vanes with the surface of water.

8. A bomb of the class described, including a container for holding an inflammable explosive material, a tubular member extending through the bottom of the container and having a housing arranged in the container, a gun barrel mounted on the housing and arranged to discharge into the container, a plunger slidable in the tubular member and provided with a lower threaded portion, means arranged within the housing and located in the path of the plunger for firing an explosive charge within the gun barrel when actuated by the plunger, a nut arranged on the threaded portion of the plunger and arranged to engage a fixed portion of the plunger to hold the plunger against upward sliding movement, vanes carried by the nut and arranged to be acted on by the air to retract the nut and release the plunger when the bomb is drapped, and a parachute member located at the top of the bomb and arranged to retard the downward movement of the bomb to afford time for the retraction of the nut and the release of the plunger and at the same time cause the bomb to descend in a proper vertical position.

9. A bomb of the class described, including a container forming a liquid tight chamber for holding inflammable explosive liquid material, a liquid tight casing located in said chamber at the bottom thereof below the surface of inflammable liquid contained in said chamber, a central vertical tubular member connected with the casing intermediate of the ends thereof, with the ends of the casing projecting laterally beyond the tubular member, a plunger slidable in the tubular member and extending downwardly from the interior of the casing and projecting beyond the container, and means operable by the upward movement of the plunger for firing explosive charges simultaneously from the ends of the casing directly into a body of inflammable liquid contained in said chamber.

10. A bomb of the class described, including a container forming a liquid tight chamber for holding inflammable explosive liquid material, a liquid tight casing located in said chamber at the bottom thereof below the surface of inflammable liquid contained in said chamber, a central vertical tubular member connected with the casing intermediate of the ends thereof, with the ends of the casing projecting laterally beyond the tubular member, a plunger slidable in the tubular member and extending downwardly from the interior of the casing and projecting beyond the container, a vertical guide located at the top of the casing, a head carried by the plunger and located within said casing and provided at the top with a stem slidable in said guide, and means actuated by said head for simultaneously firing a plurality of explosive charges directly into a body of liquid inflammable explosive material contained within said chamber.

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