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AERIAL SOWN GRENADE

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Fig. 1.

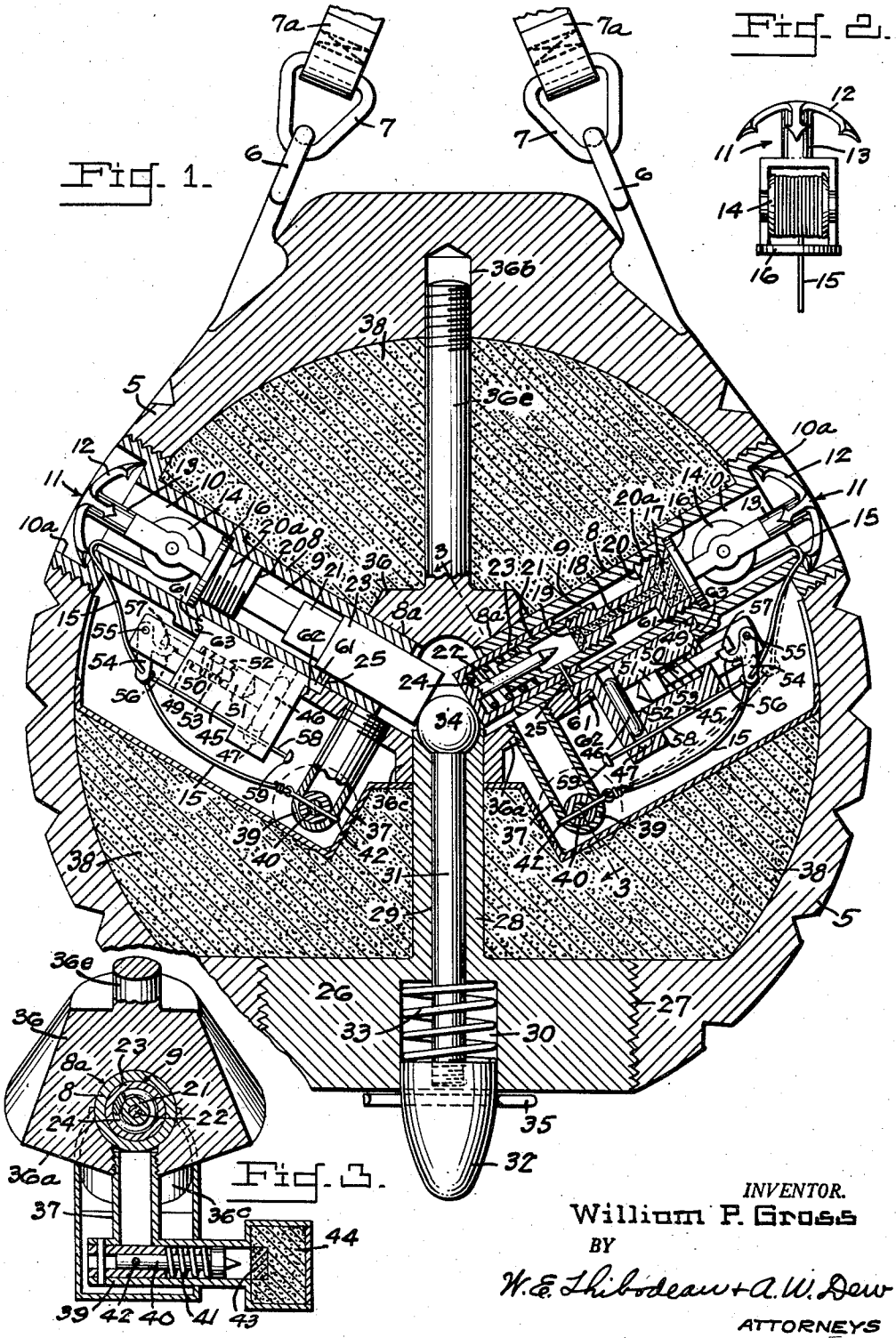


Fig. 2.

Fig. 3.

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AERIAL SOWN GRENADE

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5 Claims. (Cl. 102—8)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to a grenade.

An object of the invention is to provide a grenade which can be dropped from aircraft, into the path of advancing troops or infiltrators.

Another object of the invention is to provide a grenade with time delay mechanisms which, at a predetermined interval after the grenade has contacted the ground surface, eject grapnels and connected trip wires.

Another object of the invention is to provide a grenade with a delay mechanism for its bursting charge which will limit the flight of the grapnels and trip wires and after a predetermined time delay, arm the bursting charge fuze.

A further object of the invention is to provide a grenade with a multiplicity of trip wires and associated fuze mechanisms so as to increase the chances of the grenade being tripped.

A still further object of the invention is to provide a time delay device in the grapnel ejecting mechanism so as to delay the ejection of the grapnels in the event that the grenade first strikes an object such as the limb of a tree before it finally reaches the ground.

A still further object is to provide an aerial sown grenade wherein landing of the grenade initiates propelling charges for each of a plurality of trip wires housed therein, each with a grapnel secured to its outer end, and each with its inner end operably secured to arming means for detonating the main explosive charge in response to tension therein, but releasably held against arming by delay action means initiated by the outward propulsion of the wires.

Other objects and advantages will be apparent from the following detailed description and the accompanying drawings, in which:

Figure 1 is a sectional view of a grenade constructed according to the invention,

Figure 2 is a detail view of the grapnel and reel for the trip wire, and

Figure 3 is a sectional view on the line 3—3 of Figure 1 showing the fuze mechanism for the bursting charge.

In the drawings, wherein for the purpose of illustration, is shown one form of the invention, the reference character 5 indicates a hollow body or casing scored or grooved for fragmentation. Eyes 6 are secured to the body 5 by spot welding or otherwise as desired and receive the loops 7 and supporting straps 7a of parachute rigging (not shown). It should be here stated that it is desirable to use a parachute having long shrouds to insure the grenade reaching the ground in case the device lands in brush or shrubbery.

Radially disposed within the hollow body 5 and circumferentially spaced about the vertical axis thereof is any number of barrels 8, each barrel having a bore 9. Any convenient number of barrels may be used and as

they are all alike it is thought that a description of one will suffice. The bore 9 is counterbored at 10 and 10a and houses a grapnel 11 and its flukes 12.

The grapnel is formed with a stock 13 which is shaped to pivotally support a reel 14. (See Fig. 2.) A flexible wire or cord 15 is wound on the reel and has its inner end secured to a firing mechanism to be hereinafter described. At its inner end the stock 13 terminates in a disk 16 which is of a size to slidably fit the bore 10 of barrel 8.

Inwardly of the grapnel 11 and its disk 16, the barrel houses a propellant charge 17, a time delay fuze 18 and a primer 19 all contained in a suitable cup 20 threadedly engaging the barrel 8 as indicated at 20a, Figure 1. A hollow cylindrical guide 21 is screw threadedly secured to the inner end of cup 20 to slide within a cap 23 which cap has an internal axially and radially outwardly disposed firing pin 22 positioned to initiate primer 19 in response to radially outward movement of the cap within bore 9.

A helical expansion spring 24 surrounds the firing pin 22 to urge it away from the primer 19, said spring being restrained by a shoulder on the guide 21 and the inner surface of the closed end of cap 23. The firing pin is thus normally held out of contact with the primer 19 and any inward movement of the cap 23 is arrested by ball cam 34 fixed on the inner end of a plunger 31. A shear pin 25, inserted before the barrel 8 is positioned in the body 5, retains the cap 23 and its firing pin 22 against radial movement along the axis of the bore 9.

A plug 26 is screw threadedly secured in an opening 27 in the base of the body 5 and has formed thereon an inwardly directed hollow tube 28 which extends to a point near the center of the body. A bore 29 extends throughout the length of the tube 28 and into the plug 26, where it is counter-bored as at 30. Plunger 31 is slidably guided within bore 29 and carries an enlarged projecting head 32 threaded onto its outer end. The plunger is held in the position shown at Figure 1 by a helical spring 33 in the counter-bore 30. A safety pin 35 holds the plunger against radially inward movement until removed. By this construction, on impact, plunger 31 is forced inward and its cam 34 expels all caps 23 radially outwardly to shear pins 25 and detonate primers 19. Then, after a time determined by delay trains 18 the grapnels are propelled outwardly in different directions.

The expected total weight of the grenade is about 16 pounds and therefor if desired a shear pin may be used to replace the safety pin 35 to resist the force of contact with tree branches or limbs in descent but to shear off on impact with terrain.

It is highly desirous of delaying the ejection of the grapnels 11 until the grenade has contacted the ground surface. In the event that the plunger 31 is fully depressed by contact with a heavy tree limb, or other solid object, the time delay train of fuze 18 will delay detonation of the propellant 17 long enough for the grenade to reach terrain.

Referring to Figures 1 and 3 it will be noted that the inner end of the barrel 8 is rotatably received in a cylindrical bore 8a in a centrally located frusto-conical block 36. The block 36 is composed of two integral frusto-conical forms with abutting bases. The frusto-conical part 36a of the block 36 is bored and screw threaded to receive a bracket or tube 37 which carries a firing mechanism for the bursting charge 38. An anchoring rod 36e formed integral with the block 36 and extends outwardly therefrom in axial alignment with the plunger 31 to be received in screw threaded engagement within a bore 36b in the body 5. A collar 36c extends from the frusto-conical part 36a and embraces the inner end of the tube 28. A housing 39 is formed integral with

the bracket 37 and slidably receives a firing pin 40 and a firing pin spring 41. The firing pin 40 is held in a retracted position by a safety pin 42 (see also Fig. 1) to which the inner end of the trip wire 15 is secured. One end of the housing 39 is enlarged to receive a primer 43 and a booster charge 44 to detonate the bursting charge 38.

A housing 45 for the main charge delay mechanism is insertable transversely of the barrel 8 to a position shown in Figure 1. Ears 61 on opposite ends of the housing engage ears 62 on the periphery of the block 36 and ears 63 on the barrels 8. An ampoule 46 containing a corrosive acid is received in an elongated socket 47 in the housing 45.

A bore 49 in the housing, slidably receives a shank 50 which is secured to a striker head 51, slidable in a counter-bore 52. The counter-bore intersects the elongated socket 47 and exposes a portion of the ampoule 46. A helical spring 53 surrounds the shank 50 of the striker head 51 and tends to urge the striker head toward the ampoule. A trigger 54 is movable on a pivot element 55 which is mounted on a reduced bifurcated portion of the housing 45 adjacent the outer end of the shank 50. The trigger carries a sear 56 which is normally seated in a notch 57, cut in the shank 50 to hold the same in the position shown. A short rod 58 is secured at one end to the free end of the trigger at the point where the trip wire 15 is attached and extends inwardly through a portion of the seat 47 beyond the ampoule and with a loose fit through a hole in the housing. The rod 58 has a head or stop 59 secured to its inner end. As this head is larger than the hole in the housing it acts to limit the movement of the trigger during ejection of the grapnel and the trip wire, and to prevent withdrawal of safety pin 42.

The operation of the invention is as follows:

As herein before stated the grenade is intended to be dropped or sown in quantity from an aeroplane in a manner to cover an area over which enemy forces might travel.

Before dropping the grenades the safety cotter pins 35 are removed, thus arming the grapnel ejecting devices. If the grenade descends without interference the grapnel detonator plunger head 32 will strike the ground surface first move plunger 31 and ball 34 inwardly to thereby cause simultaneous ignition of all time delay fuze trains 18. Eventually the propellant charge 17 will be detonated and the grapnels 12 and their trip wires 15 will be ejected radially to a distance determined by the lengths of the respective wires 15.

In the event that the grenade falls through brush or trees having limbs strong enough to depress the plunger head 32, the fuze train 18 will delay detonation of the propellant charge 17 until the grenade has reached the ground surface. As each grapnel and its trip wire is hurled outwardly the wire unwinds from its reel 14 where it is secured at its outer end. At its inner end the wire 15 is secured to the safety pin 42 and at a point near its end to the trigger 54. As the grapnel nears the end of its flight it is checked by engagement of the head of rod 58 with the end wall of housing 45 so that firing pin 42 is not pulled and the firing pins 40 for the main or bursting charge remain in position to hold the firing pins 40 in safe or retracted positions. As this longitudinal movement of each of the rods 58 permits its trigger 54 to move to the dotted line position shown in Figure 1, the sear is moved out of the notch 57 in the shank 50, and the spring 53 causes striker 51 to crush the ampoule 46 and release its acids.

The time delay period before the bursting charge fuze is armed will be determined by the length of time required for a corrosive acid to eat through the rod 58. The rod passes through the elongated socket 47 near the bottom thereof where it will be immersed in the acid. As soon as the acid eats through the rod, the main charge fuze is armed. Detonation will occur when enemy troops inadvertently stumble on or against the radially extending wires whose inner ends may now act to withdraw pins 42 in response to a pull in any one of these wires.

It will be thus seen that I have provided a grenade which, when sown in large quantities will effectively retard the passage of enemy forces across any area so sown. The wires 15 extend radially in all directions, are inconspicuous even by daylight and have their outer ends held by the catching of grapnels 11 on bushes, twigs, grass, stones or in the earth so that a very slight pull on any one of the wires will detonate the main explosive charge and disperse lethal fragments over a wide area.

While I have disclosed a form of the invention presently preferred by me, various changes and modifications will occur to those skilled in the art after a study of the present disclosure. Hence the disclosure is to be taken in an illustrative rather than a limiting sense; and it is my desire and intention to reserve all modifications falling within the scope of the subjoined claims.

Having now fully disclosed the invention, what I claim and desire to secure by Letters Patent is:

1. In an aerial sown grenade, a casing, a bursting charge in said casing, a first fuze adapted on initiation to detonate said bursting charge, a grapnel, a first means carried in said casing and rendering said first fuze safe, said first means being operable to effect initiation of said fuze, a trip line connected at its ends with said grapnel and first means respectively, second means normally operable to prevent operation of said first means by an initial pull on said line, means rendered operable by an initial pull in said line to render said second means inoperable, and means responsive to landing of said casing to project said grapnel and the connected end of said line to a position remote therefrom.

2. In a grenade of the type described, a hollow body, discrete main and auxiliary explosive charges confined in said body, a first fuze for said main explosive charge, a second fuze for said auxiliary charge, first means normally holding said first fuze safe, and operable to effect initiation of the same, a grapnel carried by said body, a trip line connecting said grapnel and first means, second means preventing operation of said first means by said line, means responsive to impact of said body to initiate said second fuze and project said grapnel and the end of said line connected therewith outwardly from said body, and means responsive to initial tension in said line resulting from said projection to render said second means ineffective, whereby further tension in said line initiates said first fuze.

3. An aerial sown grenade comprising a hollow body containing a bursting charge, a grapnel housed within the hollow body, a trip wire secured at one end to the grapnel, an expelling charge in the hollow body for ejecting the grapnel and trip wire, time-delay fuze means for the said expelling charge, means responsive to impact for initiating said time-delay fuze means, fuze means for detonating the said bursting charge connected with the other end of the said trip wire, arming means connected with said wire intermediate the ends thereof, said arming means comprising a second wire connected to the trip wire and having stop means to limit longitudinal movement of said trip wire, an ampoule containing a corrosive acid in close proximity to the second wire, and means for crushing the ampoule when the grapnel has reached the end of its flight, said corrosive acid severing the said stop means from the said second wire and rendering the said fuze means for the bursting charge responsive to tension in the said trip wire.

4. The combination with a hollow body containing a bursting charge of a grapnel housed within the hollow body; a trip wire secured at one end to the grapnel; means responsive to impact for ejecting the grapnel and

trip wire; fuze means for detonating the said bursting charge; arming means for the said fuze means connected to the other end of the trip wire and comprising an acid containing ampoule, a spring pressed striker head, a trigger having a sear for normally holding the spring pressed striker head retracted; and a stop wire connected to the trigger and to the said trip wire, the said trigger being responsive to tension in the said trip wire to release the spring pressed striker head said stop wire resisting further pull on the trip wire until after the acid in the said ampoule has severed the said stop wire.

5. In an aerial sown grenade having a hollow body scored for fragmentation and containing a bursting charge, the combination comprising a barrel radially disposed within said body and terminating at the outer periphery thereof, a grapnel slidable in said barrel; an expelling charge in said barrel for ejecting said grapnel, a first time-delay fuze in said barrel for igniting said expelling charge, a firing pin normally held out of contact with said fuze, normally extended plunger means slidable in said hollow body to force said firing pin outwardly into said first time-delay fuze when said plunger is retracted, a second fuze for said bursting charge normally held inoperative by a safety pin, a trip wire connected at its ends to said safety pin and said grapnel, stop means comprising an abutment, a rod slidable in said abutment and having a head on its free end and being connected at its other end to said trip wire to limit outward movement of said trip wire and grapnel when said head contacts said abutment, and time-delay means comprising a trigger mechanism connected to said trip wire, a spring pressed striker normally held retracted by said trigger mechanism and releasable on ejection of said grapnel and trip wire, and a frangible acid filled ampoule in close proximity to said rod to effect delayed severance of said rod and arming of said second fuze when said striker is released to render said second fuze responsive to increased tension on said trip wire.

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