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MacDonald

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[54] **MILITARY DARTS**

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[52] **U.S. Cl.** **102/92,** 102/92.4, 102/DIG. 7

[51] **Int. Cl.** **F42b 11/30**

[58] **Field of Search** 102/2, 52, 69, 91, 102/92; 43/6; 273/1.06, 106.5; 167/19, 46, 47

[56] **References Cited**

UNITED STATES PATENTS

1,663,883	3/1928	Gunzler et al.	167/19
2,436,396	2/1948	McCaslin	102/73
1,189,382	7/1916	Peck	102/2
2,536,482	1/1951	Wood	167/47

FOREIGN PATENTS OR APPLICATIONS

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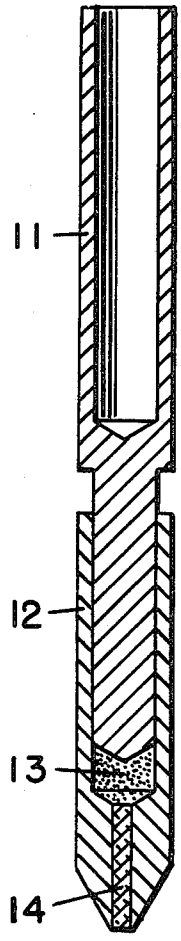
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EXEMPLARY CLAIM

1. In an antipersonnel dart, combination comprising a magnetized head adapted to deliver poison, the poison charge including a magnetic material, a stabilizing tail section telescopically carried by the said head, and a combination igniter-propellant adapted to forceably separate the head and tail sections, at impact.

10 Claims, 3 Drawing Figures



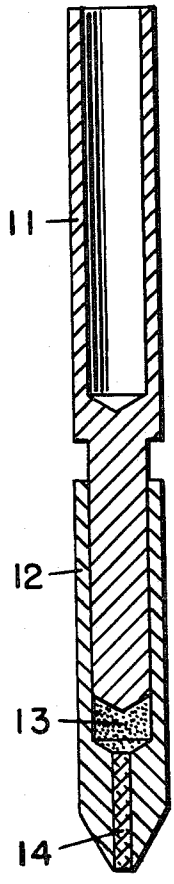


FIG. 1

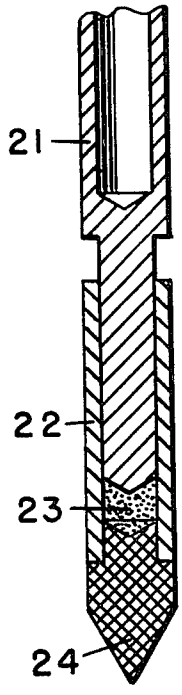


FIG. 2

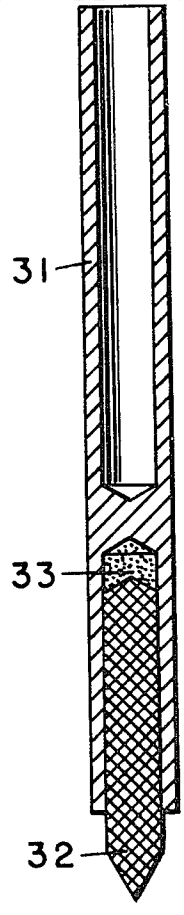


FIG. 3

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MILITARY DARTS

This invention relates to military darts which will wound and poison with biological agents, toxins, or chemical poisons or dispense antimateriel agents.

Antipersonnel poison darts, if they rely on free-fall for the necessary striking energy to penetrate a soldier's uniform, must be of a suitable configuration, and are relatively heavy. Toxic fragments of an explosive shell, for example, or an explosive aerial dart (see U.S. Pat. No. 1,189,382) also have to be quite heavy if they are to be effective. Very small rockets might be another way to deliver poison to a wound, but they, as well as the free-fall dart and the toxic explosive shell or dart fragments are much bigger and heavier than needed to carry a lethal dose of poison.

A principal object of this invention is to provide antipersonnel poison darts that make the most efficient use of the chemical or biological agent carried by the dart.

A further object is the provision of antipersonnel poison darts that are lighter and more efficient than any comparable device known heretofore.

Another object is the provision of extremely small and light weight poison darts, each potentially lethal, permitting a maximum number to be carried for a given weight load.

Still another object is the provision of new forms of antipersonnel poison darts which will allow greater military effectiveness of such weapons and increased aircraft coverage per sortie.

A further object is the provision of new forms of military darts which can be effectively used to dispense liquids, such as liquid corrosive agents, so they may be used as anti-materiel devices, particularly for destruction or immobilization of aircraft and missiles.

These objects are accomplished by forming an "injector" type of dart which is a quick and efficient killer. All of the destructive agent carried by the dart is discharged with great force, e.g., into a wound as it is created. In contrast, with poisons or other agents applied merely by force of impact, only a small fraction of the agent is effective and diffusion into a wound is slow, with attendant delay in lethality.

To be militarily useable, devices of the type to which this invention pertains, especially of very small size (1,000 to 10,000 to the pound), must be extremely simple. The preferred form of the new darts consists mainly of two metal parts. Both are screw-machine parts and the darts are ideally adapted to fully-automated manufacture as must be the case when poisons are used.

The new poison darts use free-fall to supply only a portion of the energy needed to insure penetration of the poisoned tip, the balance of the necessary energy being supplied automatically at the moment of impact. A preferred embodiment of the new darts provides means for injecting the poison into the wound in advance of the dart so that the agent is macerated into the flesh as the wound is created, thus insuring a maximum of effectiveness.

The "injector" configuration of this dart, can, in a scaled-up version, also function effectively as an antimateriel device. Liquid metals such as mercury and gallium can be dispensed by such darts to cause catastrophic intergranular corrosion of high-strength aluminum alloys. Stressed high-strength aluminum alloys when attacked by mercury and/or gallium, can very quickly deteriorate to a very small fraction of their original strength. Once a dart of this type has impacted an airplane or missile skin there is no practical way to determine the extent of the damage.

The proposed dart employs what could be called "Javelin Stabilization" wherein most of the weight is in the nose.

The free-fall darts can be dropped from any altitude. They can be salvoed directly from airplanes. They do not require bomb-type housings to be dropped to a release altitude, and hence no aneroid, time fuse, or costly VT fuse and burster to increase the munition cost. A further advantage is that there is no warning, as in the case of munitions delivered by low-altitude air burst.

By virtue of the design, the new darts are not critical as regards drop altitude. Adequate penetration is assured at all speeds above the threshold required to actuate the igniter. Further speed increases up to terminal velocity add somewhat to the penetration.

The new darts use a gun-type reaction to drive the head into the target. Hence, dispensing of poison or other agents is more or less independent of dart velocity at impact. At impact, the propellant is ignited, firing the tail section rearward and adding greatly to the head velocity. If desired, the propellant pressure can be used to inject the poison agent through a small hole in the head. The head, in following on into the target, smears the agent into the wound.

For a more complete understanding of the nature and scope of this invention, reference may be had to the following detailed description thereof taken in connection with the accompanying drawings, in which:

FIG. 1 is a longitudinal sectional view of a preferred form of the new poison darts which have means to accelerate the head at impact, and means to inject poison or other agents directly into the target in advance of the head. Provision is also made for a safety device which will prevent ignition of the propellant unless the darts have been properly released.

FIG. 2 is a longitudinal sectional view of an alternate construction wherein the poison is carried in a solid, porous, head section. This construction does not provide for injection of the agent. The annular clearance groove between the head and tail sections may be employed for a safing mechanism.

FIG. 3 is a longitudinal sectional view of still another configuration wherein the hollow tail of one dart slides over and protects the head of the dart packed ahead of it until the darts are dispensed. A porous head to carry the agent is shown, but this configuration can also employ the drilled head of FIG. 1, wherein the poison is injected into the wound at the moment of impact.

Reference is made to FIG. 1 which depicts a preferred embodiment of this invention. The stabilizing tail section **11**, of the dart, is slidable within the head section **12**. On striking the target, the tail **11** slides forward in the head **12**, impacting the igniter-propellant **13**, which, gun-fashion, fires the tail **11** rearward at high velocity and greatly increases the effective velocity of the head **12**. High-pressure combustion gases generated by the igniter-propellant **13** serve to inject the poison agent **14** into the target at a very high speed. Should aerodynamic drag loads make it desirable to insure that the tail **11**, a slidable fit within the head **12**, does not separate from the head, both the head and tail sections may be magnetized as bar magnets. If the forward portion of the tail is magnetized as the "South"

pole, and the aft or mating end of the head 12 magnetized as the "North" pole, magnetic attraction will permit the tail 11 to move slightly rearward under drag loads but will not permit the two components to separate. On impact, this will result in free travel of the tail 11 before striking the igniter-propellant 13, thus insuring positive ignition. The antipersonnel or antimateriel agent, presumably a thixotropic gel or encapsulated, can be retained in the magnetized head by adding iron powder or other solid filler material, preferably a high density magnetic material such as magnetic ferric oxide, to the poison. This may greatly assist automated loading procedures. Iron powder compliments mercury in antimateriel darts by facilitating catastrophic intergranular corrosion.

A second embodiment of my invention is depicted in FIG. 2, wherein the tail section 21 of the dart is slidable within sleeve 22 which is permanently affixed to the poison-carrying sintered head 24. Igniter-propellant 23 is fired by the impact of tail 21 and magnetic retention of the two separable components may be employed as described above. the

FIG. 3 shows an alternate configuration of my invention, wherein pre-drop carriage and handling is made safer by allowing the protruding portion of the poison-carrying sintered head 32 to protrude into the hollow central portion of the tail 31 of the dart packaged immediately ahead of it. As in the other configurations, impact of the head 32 into the igniter-propellant 33 fires the head, gun-fashion, into the target, and the tail is propelled violently rearward. Magnetic retention may be used.

Many composition exist which will serve as a frictional or percussive igniter means and those skilled in such art will be able to provide suitable igniters and propellants having benefit of the disclosure of the new darts as supplied above. One such composition is as follows:

Mercury Fulminate	37 parts
Barium Nitrate	32 parts
Antimony Sulfide	28 parts
Ground Glass	5 parts
Trinitrotoluol	5 parts

Since the function of the igniter is to initiate combustion of a propellant rather than to cause detonation and fragmentation as in a bomb or grenade, a relatively slow-burning propellant is included as a part of the combined igniter and propellant. A useable propellant is as follows:

Nitrocellulose (13.15%N)	76–79%
Dinitrotolune	21–24%
Diphenylamine	0.8–1.2%

Obviously, any suitable poison or antimateriel agent, e.g., liquid mercury or gallium, may be used in the head portions 14, 24, or 32 of the new darts. In those instances where the purpose is to wound rather than kill enemy personnel, the destructive agents carried by the darts may be vesicant agents, burning agents or the like.

From the foregoing it will be apparent to those skilled in the art that there is herein disclosed a new and extremely lethal antipersonnel poison dart. While specific examples have been given, applicant claims the benefit of a full range of equivalents within the scope of the appended claims.

I claim:

1. In an antipersonnel dart, combination comprising a magnetized head adapted to deliver poison, the poison charge including a magnetic material, a stabilizing tail section telescopically carried by the said head, and a combination igniter-propellant adapted to forceably separate the head and tail sections, at impact.

2. A military dart of such small size that there are between 1,000 and 10,000thereof to a pound, said darts, aside from an optional destructive agent, consisting of two metal parts and a propellant charge whereby the darts can be produced easily by fully-automated manufacture, said metal parts being a head and a tubular stabilizing tail, one of said metal parts comprising a cylinder portion having a central bore, the other metal part comprising a piston portion slidably carried telescopically in said cylinder portion, said propellant charge being contained in a cavity defined by the central bore of siad cylinder portion and an end of said piston portion, said propellant charge substantially completely filling said cavity with said end of said piston portion in contact with said charge.

3. A military dart of such small size that there are between 1,000 and 10,000 thereof to a pound, said darts, consisting of two metal parts, a destructive agent and a propellant charge whereby the darts can be produced easily by fully-automated manufacture, said metal parts being a head and a stabilizing tail, said head consisting of a metal tube having a longitudinal bore extending entirely therethough formed with a smaller bore section and a larger bore section, the smaller bore section being at the forward end of the metal tube and of substantially smaller diameter than at the larger bore section at the rearward end, the length of the smaller bore section being substantially less than the length of the larger bore section, said destructive agent filling the smaller bore section, a propellant charge contained in the larger bore section adjacent said smaller bore section and filling only a minor portion of said larger bore section, said stabilizing tail comprising a forward piston portion and a rearward tubular portion, said piston portion being at least as long as the length of said larger bore section, said piston portion being slidably carried telescopically in said larger bore section with the front end of said piston portion abutting said propellant charge.

4. A military dart as claimed in claim 3 in which the said two metal parts are magnetized to prevent the parts from becoming separated in flight of the military dart while permitting the two parts to slide relative to one another to a limited extent.

5. A military dart as claimed in claim 3 in which said destructive agent comprises an intergranular corrosive liquid metal selected from the group consisting of mercury and gallium.

6. A military dart as claimed in claim 3 in which said destructive agent is a non-explosive mixture comprising a lethal antipersonnel poison.

7. A military dart of such small size that there are between 1,000 and 10,000 thereof to a pound, such darts, aside from an optional destructive agent, consisting of two metal parts and a propellant charge, whereby the darts can be produced easily by fully-automated manufacture, said metal parts being a head and a tubular stabilizing tail, one of said metal parts comprising a cylinder portion having a central bore, the other metal part comprising a piston portion slidably carried telescopically in said cylinder portion, said propellant charge

being contained in a cavity defined by said central bore of said cylinder portion and an end of said piston portion, said propellant charge substantially completely filling said cavity with the end of said piston portion in contact with aid charge, said metal part comprising said cylinder portion being formed of a straight section of metal tube having a uniform longitudinal bore, and a poison-carrying sintered head fixed at one end of said metal tube closing the longitudinal bore.

8. A military dart of such small size that there are between 1,000 and 10,000 thereof to a pound, such darts, aside from an optional destructive agent, consisting of two metal parts and a propellant charge, whereby the darts can be produced easily by fully-automated manufacture, said metal parts being a head and a tubular stabilizing tail, one of said metal parts comprising a cylinder portion having a central bore, the othe metal part comprising a piston portion slidably carried telescopically in said cylinder portion, said propellant charge being contained in a cavity defined by said central bore of said cylinder portion and an end of said piston portion, said propellant charge substantially completely filling said cavity with the end of said piston portion in contact with said charge, said metal part comprising said cylinder portion consisting of a tubular metal piece having a pair of longitudinal bores therein, one of said bores extending into he metal piece from one end and the second longitudinal bore extending into the metal piece from the other end, said two bores terminating short of connection with one another, one of said bores being longer than the other, the shorter bore constituting said cylinder portion, said piston portion of the military dart being a sintered metal rod of a diameter to permit it to be slidably carried telescopically in said longitudinal shorter bore.

9. In an antipersonnel dart, the combination comprising a magnetized head adapted to deliver an antipersonnel agent, an antipersonnel agent including a magnetic material, a magnetized tail section telescopically carried by said head, and a combination igniter-propellant adapted to separate the head and tail sections at impact, high pressure gases from the combustion of said igniter-propellant serving to forceably eject said antipersonnel agent from said head.

10. A military dart of such small size that there are between 1,000 and 10,000 thereof to a pound, said darts, aside from an optional military agent, consisting of two metal parts and a propellant charge whereby the darts can be produced easily by fully-automated manufacture, said metal parts being a head and a tubular stabilizing tail, said two metal parts being magnetized to prevent the arts from becoming separated in flight of the military dart while permitting the two parts to slide relative to one another to a limited extent.

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