

[54] KNIFE

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[51] Int. Cl. **B26b 11/00**

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[56]

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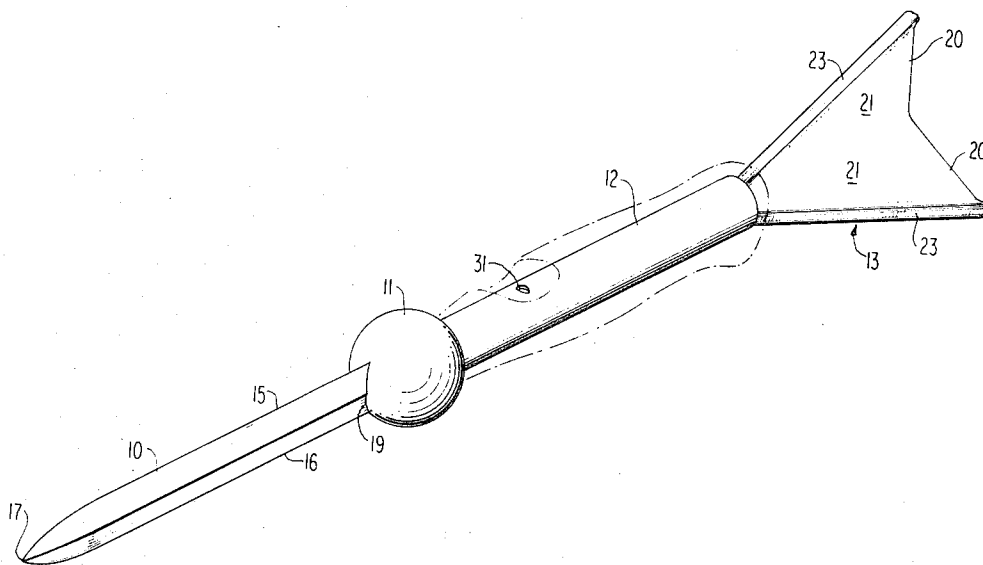
Attorney—Harold J. Birch et al.

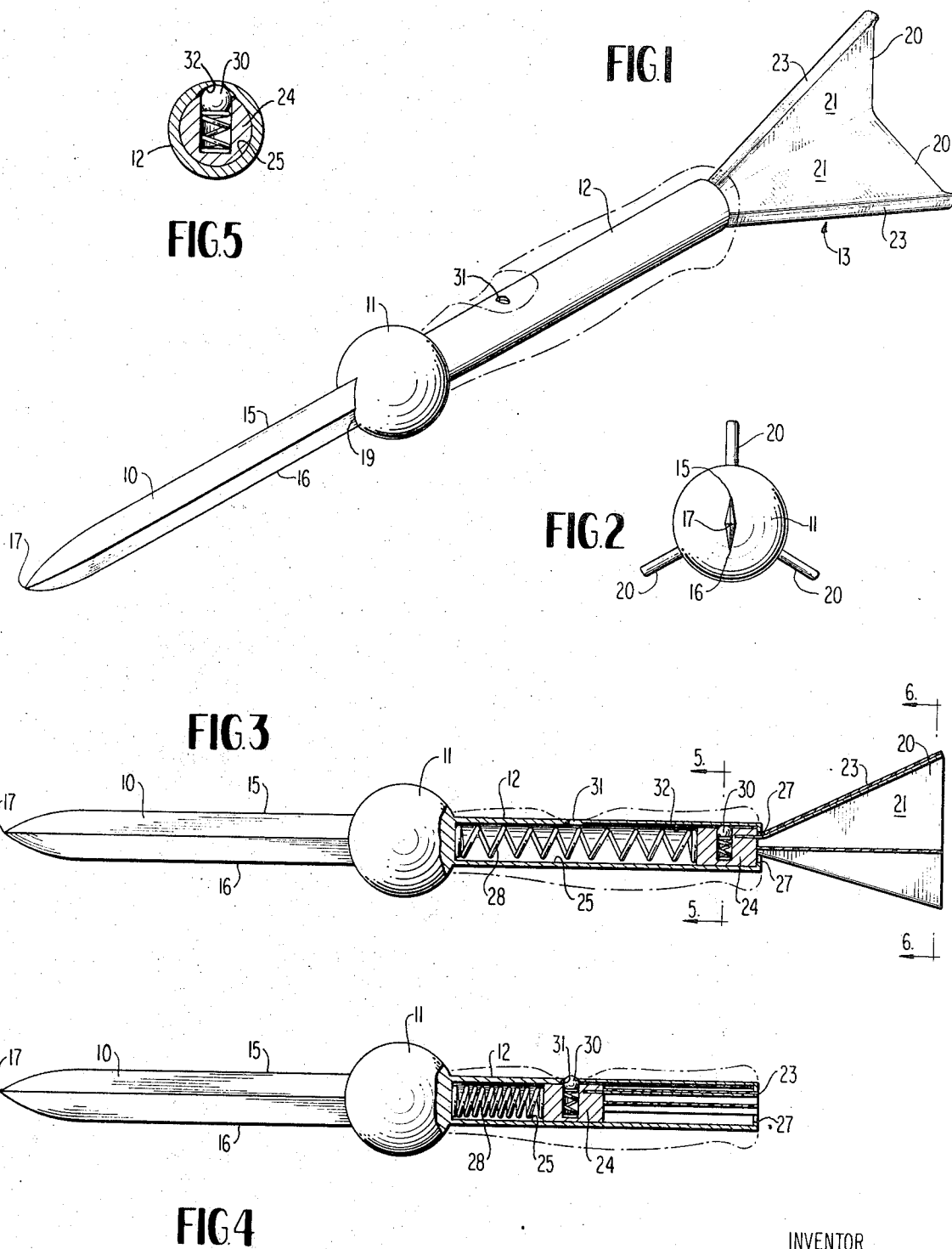
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ABSTRACT

A multi-purpose utility knife adapted for cutting, thrusting, chopping, throwing, and having a blade, a weighted impact member, a handle, and flight stabilization means. The impact member is a metal sphere interposed between the blade and the handle and comprises a substantial portion of the total weight of the knife to provide a shock force which must be absorbed by the target. The impact member also functions as a blade guard and as a means for gripping the knife for throwing. The flight stabilization means insures that the leading edge of the knife hits the target when the knife is thrown, and consists of a plurality of fins that are normally stored in the handle and which can be extended therefrom when the knife is thrown.

21 Claims, 10 Drawing Figures





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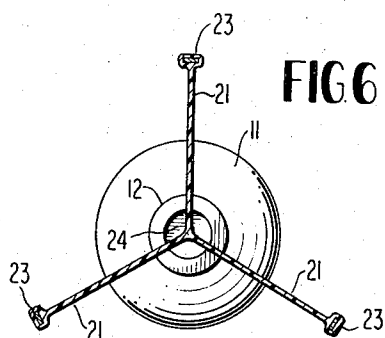


FIG 6

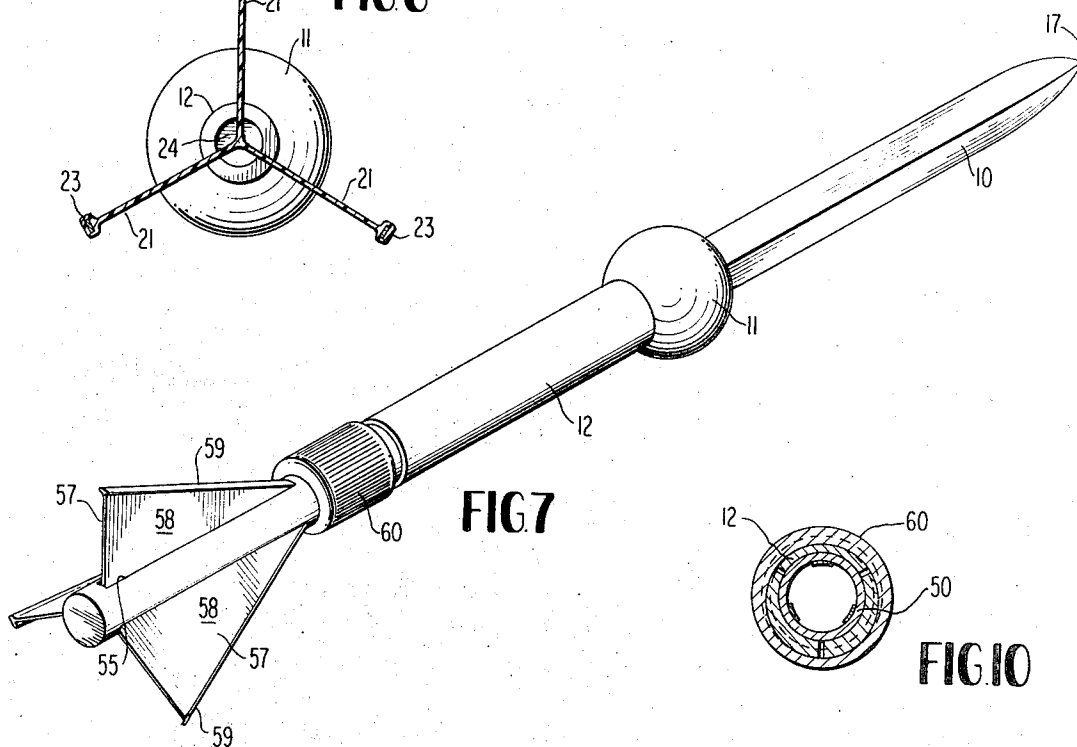


FIG 7

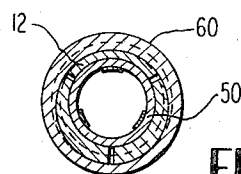


FIG 10

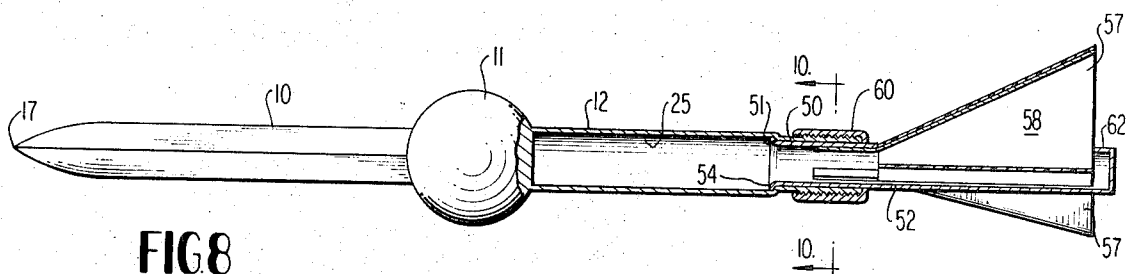


FIG 8

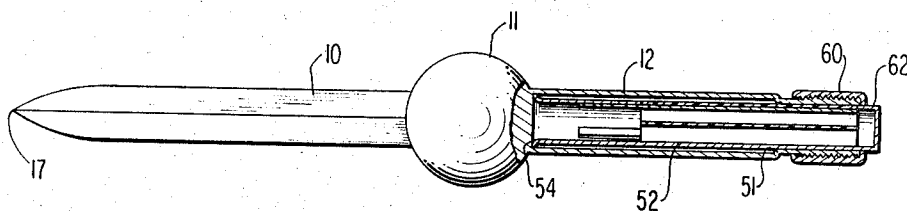


FIG 9

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KNIFE

BACKGROUND OF THE INVENTION

This invention relates generally to knives, and more particularly to a knife of unusual versatility which can be used to cut, thrust or chop with considerable impact and which, when thrown, is stabilized in flight so that the leading edge of the blade strikes the target, and the knife impacts the target with considerable force.

The knife is one of the oldest of the utility implements and weapons known to man. However, although many other utility implements and weapons have since been developed over the years and optimized to make them more useful, the knife has remained virtually unchanged from the form in which it first appeared.

The knife is still one of the most useful and most necessary tools for outdoorsmen and soldiers. However, the knife in its basic form does not offer its full potential as a utility instrument or as a weapon. Many knives have to be especially designed to perform a particular function, but no one knife has heretofore been capable of functioning in an exemplary manner over a variety of tasks. For example, the machete has a long, thin blade particularly suited for chopping brush, but it is cumbersome as a thrusting knife and is not designed for throwing with an acceptable degree of accuracy. Likewise, some knives, commonly called daggers, are primarily for thrusting and function poorly in other uses. Some attempts have been made to develop the knife for use as a thrown weapon for killing game and for warfare. However, even when stabilized for flight it lacked lethal power. As with the arrow, the prior art throwing knives penetrated the target, but unless a vital organ were struck, the blow was very seldom disabling.

By the teachings of this invention the knife is transformed into a very powerful weapon and a utility implement of unusual versatility. This knife thereby replaces a variety of knives and implements commonly carried by outdoorsmen and soldiers. The knife is provided with a weighted impact member interposed between the blade and the handle that allows considerable impact energy to be developed by the knife when cutting, thrusting or chopping, and causes the thrown knife to strike the target with a force capable of knocking game off its feet, penetrating bone structure to hit a vital organ, and inflicting broken bones and the like. The novel impact member allows the knife to be provided with a relatively thin and narrow blade, yet still function well in cutting away brush, chopping wood, skinning game, or the multitude of tasks normally accomplished by knives and hatchets. Furthermore, this knife can be used as a hammer with the impact member functioning as the hammer head, and as a truncheon. The impact member is also placed so that it functions as a blade guard to protect the hand in the usual manner, and allows a hard thrust to be made with the knife by transmitting the impact over a large portion of the user's hand.

The knife of this invention is provided with flight stabilization means stored in such a manner as not to interfere with the general utility of the knife, but which can quickly be deployed when the knife is to be thrown. This knife will strike the target blade first no matter what part of it is grasped for throwing, and whether it is thrown blade forward, handle forward, or sideways. It is accurate whether thrown overhand, underhand, or sidearm. Maximum velocity is achieved by grasping the

impact member as a ball would be grasped, and throwing the knife blade forward. The knife can be thrown as far and as accurately as a ball.

It is an object of this invention to provide a new and novel knife having great utility.

Another object of this invention is to provide a new and novel knife that develops a considerable impact force that must be absorbed by the target.

Another object of this invention is to provide a new and novel knife that can be used for cutting, thrusting, chopping and throwing.

Another object of this invention is to provide a new and novel knife which is stabilized in flight so that the leading edge of the blade strikes the target when the knife is thrown.

Another object of this invention is to provide new and novel knife which can be easily grasped and thrown powerfully.

Another object of this invention is to provide a new and novel knife that has retractable flight stabilization means.

Another object of this invention is to provide a new and novel knife having an improved blade guard.

Another object is to provide a new and novel knife that also functions as a machete, a light hatchet, a hammer, and a truncheon.

Other objects and advantages will become obvious to one skilled in the art in light of the following disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a first embodiment of the invention with the fins extended;

FIG. 2 is a front elevation of the embodiment of FIG. 1;

FIG. 3 is a side elevation, partially in section, of the embodiment of FIG. 1;

FIG. 4 is a side elevation, partially in section, of the embodiment of FIG. 1 with the fins retracted;

FIG. 5 is a section taken through line 5—5 of FIG. 3;

FIG. 6 is a section taken through line 6—6 of FIG. 3;

FIG. 7 is a perspective view of a second embodiment of the invention with the fins extended;

FIG. 8 is a side elevation, partially in section, of the embodiment of FIG. 7;

FIG. 9 is a side elevation, partially in section, of the embodiment of FIG. 7 with the fins retracted; and

FIG. 10 is a section taken through line 10—10 of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A first embodiment of the invention is shown in FIGS. 1—6. The knife consists of four basic components: a blade 10, an impact member 11, a handle 12, and flight stabilization means 13.

Blade 10 can be virtually any type of known knife blade, such as single edge, double edge, pointed, and so forth. It can be provided with a serrated edge, an edge adapted for skinning game, or rearwardly pointing spring loaded fingers which open upon penetration, so that the blade cannot be easily removed. The blade can also be provided with a small explosive charge or can contain a chemical injection system. The blade shown in FIG. 1 is a straight blade having cutting edges 15 and 16, a pointed leading edge 17, and a root portion 19. Preferably, the blade design is such that it will penetrate targets, such as game, smoothly and completely so

that the force available in the impact member can be transmitted to the target, thus adding very significantly to the potential of the knife as a weapon. The blade can advantageously be thinner, narrower, and of lighter weight than would normally be necessary for a knife that is to be used for chopping wood and clearing brush, because of the novel design of the knife, as fully explained below. While blade 10 is shown in the drawings as a fixed blade, a folding blade can also be used, as can a blade that is axially movable. In these two cases the blade would be stored in the impact member and handle.

Attached to root portion 19 and coaxial therewith is the impact member 11. Although shown in the form of the sphere, impact member 11 can be of other shapes such as a section of a cone or a cylinder, although the shape should preferably be one that contributes to the aerodynamic stability of the knife when thrown. A primary function of impact member 11 is to provide the knife with means for developing a considerable impact force potential that must be absorbed by the target when struck, in addition to the penetration of blade 10 into the target whether the knife is used for cutting, thrusting, chopping, or is thrown. This considerably enhances the effectiveness of the knife as a weapon and as a utility implement. Impact member 11 is so placed in relation to the other elements as not to disturb the aerodynamic balance and stability of the knife. It is important that impact member 11 be heavy in comparison to the other elements and it advantageously encompasses about two-thirds of the total weight of the knife. The impact member 11 also has several other important functions that contribute to the versatility of the knife. It is of such size, shape and position as to provide an optimum place for grasping the knife, as one would grasp a ball, for the act of throwing, and thus the thrower can harness all his strength to impart maximum velocity to the knife. Placement of impact member 11 is between the blade 10 and handle 12 so that it also functions as a blade guard. When the knife is thrust into a target, the impact member allows more power to be applied by cushioning the force over a larger part of the user's hand than would a conventional blade guard. Further, by its positioning and weight, the impact member fosters the use of the knife as a light hatchet or machete for chopping brush and so forth. Also, impact member 11 can function as a hammer head, adding additional versatility to the implement. Again by virtue of its weight and placement, impact member 11 allows the knife to be used as a truncheon. Should movable blades be used, the impact member is provided with a slot for receiving the folded blade, or an opening for accommodating an axially movable blade.

Handle 12 is of such design that it is easily gripped by the user when performing the variety of functions for which the knife is designed. Handle 12 can be covered by wood, leather, or plastic, and should mate smoothly with impact member 11 at the point of their attachment. Handle 12 also functions as a container for the flight stabilization means, and advantageously comprises a hollow cylinder in the interior thereof, although other hollow forms can be used. Handle 12 can be fixedly or removably attached to impact member 11.

The flight stabilization means 13 causes the knife to orient itself during flight so that leading edge 17 strikes the target. It can comprise a variety of aerodynamic shapes. In a first embodiment of the invention, as

shown in FIG. 1, the flight stabilization means comprises a plurality of fins 20 that are movable between a retracted position in the handle when not in use and an extended position extending outwardly from the knife axis when the knife is to be thrown. Each fin 20 consists of a collapsible surface 21 and a flat spring or wire 23. The surface portion can be fabric or plastic sheet. The fins 20 are mounted upon a piston 24 that fits closely inside a cylinder 25 in the hollow handle 12. Each of the springs 23 is fixedly attached to piston 24. Springs 23 are so shaped as to be biased radially outwardly of the knife axis. Of course, other methods of mounting springs 23 to the piston 24, such as pivot joints, could be used. When piston 24 is in its retracted position, as shown in FIG. 4, fins 23 are inside cylinder 25. When piston 24 is moved to the extended position, as shown in FIG. 3, fins 20 are extended beyond the end of handle 12 and are biased outwardly to their operating position by their individual springs 23. The springs 23 are so shaped as to be easily cammed inwardly by the edge 27 of handle 12 to facilitate easy retraction of the flight stabilization means. Interposed in cylinder 25 between the impact member 11 and piston 24 is a coil spring 28 which urges piston 24 toward the open end of handle 12. To lock piston 24 in the retracted position against the action of coil spring 28, piston 24 contains at least one spring loaded ball 30 which is adapted to fit into an opening 31 in handle 12. The wall of cylinder 25 is provided with an axial groove 32 which engages ball 30 when piston 24 is moved from the retracted position to guide ball 30. A lip 27 is provided at the open end of handle 12 in order to arrest piston 24 at the end of its stroke when fins 20 are extended. Although not shown, a thin rod, coaxial with piston 24, can also be provided in order to provide a means for returning flight stabilization means 13 to the retracted position. A cap, also not shown, can be provided to close the open end of handle 12.

When the knife is used for any function except as a thrown missile, the flight stabilization means 13 are in the retracted position, as shown in FIG. 4. When the knife is to be thrown, ball 31 is depressed until it clears opening 31. Piston 24, carrying fins 20, is then driven to the extended position, shown in FIG. 3 by the action of spring 28. Fins 20 extend as they clear the end of the handle, opening to provide the aerodynamic effect that causes the knife to orient itself blade forward, no matter how it is thrown, according to known principles. To retract fins 20, they are simply pushed axially back into the handle, with springs 23 camming inwardly on the edge of lip 27. Ball 30, guided by groove 32, returns to and is biased outwardly into opening 31.

Another embodiment of the invention is illustrated in FIGS. 7-10. In this second embodiment blade 10 and impact member 11 are as described in regard to the first embodiment. The handle 12 has a hollow cylinder 25 therein. Cylinder 25 has a section 50 of lesser radius establishing a shoulder 51. A telescoping section 52 is installed in cylinder 25, and has a flange 54 and a plurality of slots 55 in the periphery. A fin 57 extends through each slot 55 when the telescoping section 52 is in the extended position shown in FIG. 8. Each fin 57 has a collapsible surface 58 and a spring 59. Each spring 59 is attached to the inside of the telescoping section 52 adjacent a slot 55 and is so shaped as to be biased outwardly through slot 55. The surface 58 is attached to spring 59 and to telescoping section 52 adja-

cent its slot 55. Therefore, when the telescoping section 52 is extended, fins 57 will move outwardly. The springs 59 are designed such that they will easily be cammed back into the slots by the edge of the handle when pushed back to the retracted position. In the retracted position, surfaces 58 are stuffed through slots 55 into the interior of telescoping section 52. The end 62 of telescoping section 52 extends axially beyond the end of the fins to provide a means for grasping the section to extend it.

The end of handle 12 is provided with screw threads and a threaded locking cap 60 which engages handle 12 in such a manner as to squeeze inwardly when tightened to lock telescoping section 52 against axial movement.

To operate this embodiment as a thrown missile, cap 60 is unscrewed sufficiently to unlock telescoping section 52, which is then pulled out to its extended position by grasping end 62. Flange 54 engages shoulder 51 to limit the axial movement of telescoping section 50. The fins 57 then automatically extend radially outwardly by virtue of the action of springs 59. To return fins 57 to their retracted position, telescoping section 50 is pushed axially, and springs 59 will cam inwardly on the edge of cap 60.

This embodiment has an additional feature, in that fins 57 can be arranged to automatically retract when the knife strikes the target, to preclude possible damage to the fins or entanglement with brush that might pull the knife from the target. This is accomplished by virtue of the fact that the telescoping section is not biased toward the extended position, but, once the locking means is released, is loosely axially slidable. Thus, if the springs 59 are properly designed, when the knife strikes the target and stops abruptly, the energy built up in the telescoping section 52 will cause it to move toward the retracted position with sufficient force to overcome the bias force of springs 59 to cam the fins 57 back into the slots.

It should be realized that types of the flight stabilization means described above with regard to the two embodiments of the invention are by no means the only designs that can be used. For example, arcuate sheet metal fins that fold to a storage position wrapped around the piston or the telescoping section can be used, as can other designs that will become obvious from this disclosure. Also, the flight stabilization means can be stored within a removable handle which is removed prior to flight. The handle can also be designed with fins formed in the surface of the handle itself and folding outwardly therefrom. Flight stabilization means other than fins can also be used, such as simple or complex airfoils. The flight stabilization means shown impart no rotation to the knife, but such means could be so curved or mounted as to cause rotation in flight for further stabilization.

An exemplary knife has a blade 6 inches long, an impact member $1\frac{1}{2}$ inches in diameter, a handle 5 inches long, and fins that extend 3 inches beyond the end of the handle. The knife weighs approximately $1\frac{1}{2}$ pounds, of which the impact member comprises about 1 pound. Such a knife when thrown from a distance of 40 feet will achieve an impact velocity of about 44 feet per second. The power thus developed is about 55.6 foot pounds per second. By way of comparison, a 30 caliber rifle bullet having a weight of 0.0243 pounds will impact a target at 2000 feet per second when fired

from a distance of 50 yards, developing power of about 48.6 foot pounds per second. As a practical demonstration, a wheeled platform was ballasted with sand to a total weight of 70 pounds. On a level surface, a 30 caliber rifle bullet fired from 50 yards moved the platform 0.1224 feet. The knife described above thrown from a distance of 40 feet, moved the platform 0.2448 feet. It can thus be seen that the shock to the target when struck by the knife is considerable. Substantially all the force developed in the knife is transferred to the target because the knife will not pass through, as is possible with the bullet. The shock transmitted to the target can be likened to hitting the target with a $1\frac{1}{2}$ pound metal ball plus, of course, the destructive effect of the penetration of the knife blade itself, which is also enhanced by this invention.

Obviously, many variations and modifications of this invention will become apparent to those skilled in the art, and it should be understood that the invention is not to be limited by the foregoing description, but is limited only by the scope of the appended claims.

I claim:

1. A multi-purpose knife comprising:

a blade having a leading edge and a root portion disposed along a knife axis,

a handle disposed along said knife axis and generally coaxial therewith, and

a weighted impact member interposed between said root portion and said handle and attached thereto, said impact member comprising a substantial portion of the total weight of said knife and being generally coaxial with and generally symmetrically disposed about said knife axis and extending radially outwardly therefrom a distance materially greater than said root portion and said handle, said impact member functioning to develop an impact force during movement of said knife to enhance the striking power thereof, to maximize the transfer of energy to and from the knife by contacting the user's hand to receive thrust energy upon a relatively large surface area around the entire periphery of said knife and by contacting the target when said blade penetrates the target to transfer the impact energy to a relatively large area of the target around the entire periphery of said knife, to apply impact blows generally perpendicularly to said knife axis, and an auxiliary to the handle.

2. A knife according to claim 1 wherein said impact member is positioned at substantially the center of gravity of said knife.

3. A knife according to claim 1 wherein said impact member comprises at least one-half of the total weight of said knife.

4. A knife according to claim 1 further comprising flight stabilization means coaxial with said blade for stabilizing said knife, when thrown, along said axis so that said leading edge strikes a target.

5. A knife according to claim 4 wherein said flight stabilization means is covered by said handle when not in use.

6. A knife according to claim 4 wherein said flight stabilization means is movable between a retracted position and an extended position.

7. A knife according to claim 6 wherein said flight stabilization means is covered by said handle when not in use.

8. A knife according to claim 1 wherein said impact member is of generally spherical shape.

9. A knife according to claim 6 wherein said flight stabilization means comprises a plurality of radially outwardly extending fins.

10. A knife according to claim 6 wherein said flight stabilization means is carried by said handle.

11. A knife according to claim 10 wherein said handle includes at least one opening for accommodating said flight stabilization means when in said retracted position.

12. A knife according to claim 11 wherein said opening comprises an axial bore in said handle, and wherein said flight stabilization means is carried by a piston axially movable in said bore between a first position wherein said flight stabilization means is in said retracted position and a second position wherein said flight stabilization means is in said extended position.

13. A knife according to claim 12 wherein said flight stabilization means comprises a plurality of collapsible fins biased radially outwardly from said axis, said fins being collapsed in said retracted position and extending radially outwardly in said extended position.

14. A knife according to claim 13 wherein each of said fins comprises a radially outwardly biased spring member mounted on said piston and a surface member attached to said spring member.

15. A knife according to claim 12 further comprising spring means in said opening interposed between said impact member and said piston and biasing said piston toward said second position, releasable means for holding said piston in said first position, and stop means for precluding the movement of said piston beyond said second position.

16. A knife according to claim 12 wherein said impact member comprises at least fifty percent of the total weight of said knife.

17. A knife according to claim 11 wherein said opening comprises an axial bore in said handle, and said flight stabilization means is carried by a portion of a telescoping section slidably mounted in said bore and axially movable between a first position wherein said carrying portion is within said bore and said flight stabilization means is in said retracted position and a second position wherein said carrying portion extends beyond the end of said bore and said flight stabilization means is in said extended position.

18. A knife according to claim 17 wherein said flight stabilization means comprises a plurality of collapsible fins biased radially outwardly from said axis, said fins being collapsed in said retracted position and extending radially outwardly in said extended position.

19. A knife according to claim 18 wherein said telescoping section comprises a plurality of slots in said carrying portion, and said fins are mounted for radial movement through said slots.

20. A knife according to claim 18 wherein each of said fins comprises a radially outwardly biased spring member mounted on said telescoping section adjacent said slot and a surface member attached to said spring member.

21. A knife according to claim 18 further comprising releasable locking means engaging said handle and said telescoping section for holding said telescoping section in said first position, and stop means precluding the movement of said telescoping section beyond said second position.

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