May 5, 1953 J. S. KAHN 2,637,142

DETONATING TOY DART

Filed Dec. 12, 1949

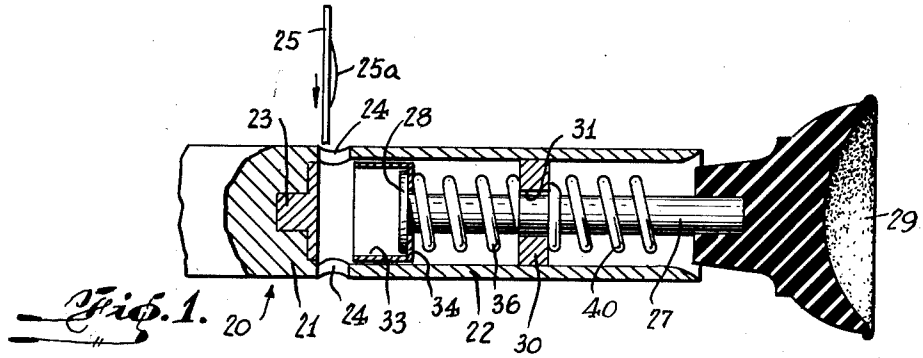

Fig. 1.

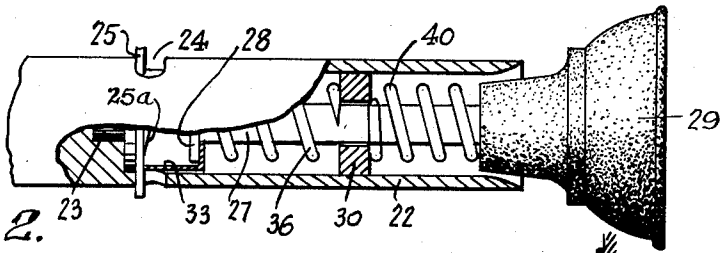

Fig. 2.

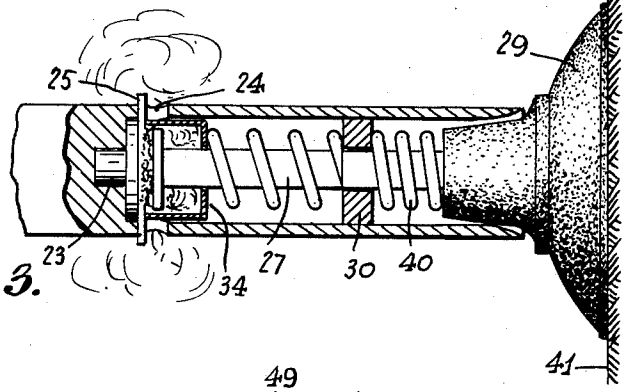

Fig. 3.

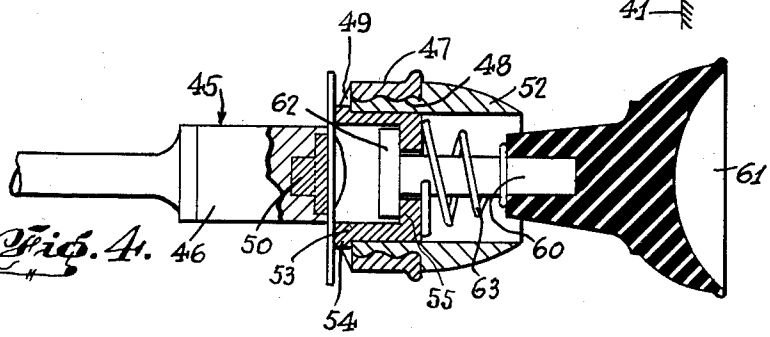

Fig. 4.

INVENTOR.
JULIAN SETH KAHN.
BY Bereit Freeman
ATTORNEY.

Patented May 5, 1953

2,637,142

UNITED STATES PATENT OFFICE

2,637,142

DETONATING TOY DART

Julian Seth Kahn, New York, N. Y.

Application December 12, 1949, Serial No. 132,452

5 Claims. (Cl. 46—200)

1

This invention relates to a detonating toy dart.

The principal object of this invention is the provision of a toy dart which embodies an improved firing mechanism for detonating explosive caps. A firing mechanism is actuated when the dart strikes a target and the explosive cap is thereby detonated.

More specifically, a dart made in accordance with the present invention includes a body portion to which fins or the like are attached, and a forwardly projecting head portion which is movably connected to the body portion for movement forwardly and backwardly relative to said body portion. A detonating or firing chamber is provided in the body of the dart and a firing pin or hammer is provided in the head of the dart. An explosive cap of the type used in cap pistols may be inserted into the firing chamber and there held in place against an anvil directly opposite the firing pin. When the dart is thrown or otherwise caused to travel through the air and its head strikes a target, the forward movement of the head will abruptly stop but the body will continue to travel forwardly until the firing pin strikes the cap and detonates it.

Although darts of this general character are known to the prior art, the present dart affords very substantial advantages over the darts which have heretofore been designed. One of the principal features of the present dart which the darts of the prior art do not have is a self-cocking firing pin which is maintained in spaced relation to the explosive cap until the very moment that the dart strikes a target. The effect is to produce sharp engagement between the firing pin and the explosive charge in the cap to insure positive detonation of said explosive charge. In the darts of the prior art, the firing pin generally rests against the explosive cap during its flight through the air and all that happens when the dart strikes a target is to increase the pressure of the firing pin against the explosive charge. If there is sufficient pressure, the explosive charge will detonate. Frequently, a shock accompanies the increased pressure and detonation of the explosive charge is thereby facilitated. But there is no definite assurance that such shock will always accompany the pressure and frequently the charge does not explode.

It is accordingly a principal object of this invention to provide a dart of the character described in which the firing pin is automatically held in cocked relation to the explosive cap at all times prior to the moment of impact against the target. The self-cocking firing pin includes a

2

compression spring which acts to urge the firing pin to move in the direction away from the explosive cap. In the preferred form of this invention, the firing pin is connected to the head of the dart and hence the spring acts to urge the firing pin forwardly. When the dart strikes a target, the body of the dart moves forwardly against the action of the spring until the firing pin and the explosive cap are brought into engagement with each other. Were it not for this spring, the resistance of the air to the forward movement of the dart would force the head of the dart backwardly and cause the firing pin to rest against the explosive cap.

Another advantage of the cocking spring is the fact that it tends to cushion the impact of the dart against the target. This is an important feature because the dart is a toy and it may inadvertently be thrown against a frangible object such as a thin pane of glass, or a vase. There is also the possibility that a child will throw the dart against the person of another child, and again the cushioning effect of the cocking spring will materially reduce the likelihood that injury will result.

Another important object of the present invention is the provision of spring-urged means for holding the explosive cap upon the anvil of the firing mechanism. The spring-urged means for holding the explosive cap in place includes a firing chamber which is spring-urged in the direction of the anvil. It may be retracted against the action of the spring so that an explosive cap will be placed upon the anvil and it may then be released to hold the explosive cap in spring-urged engagement with the anvil. The explosive cap will thereby be held in position to receive the thrust of the firing pin when the dart strikes a target.

The spring-urged firing chamber performs an additional function which constitutes an important feature of the present invention. It is well known that a confined explosion is much more effective in toys of the general character described than an unconfined explosion. The spring-urged firing chamber fully encloses the explosive charge in the cap prior to and at the moment of detonation. When the pressure generated within the firing chamber exceeds a predetermined level, the spring which urges the chamber against the explosive cap and the anvil on which it rests yield to allow the gases to escape.

Still another important object of the present invention is the provision of a dart of the character described, in which adjustable means are

provided for holding the explosive cap against the anvil. In this form of the invention there is no spring-urged firing chamber which engages the cap and holds it against the anvil, but instead there is an adjustable chamber which may be fixed in any selected position relative to the anvil to accommodate thicker or thinner explosive caps. This adjustable firing chamber, like the spring-urged firing chamber above mentioned, prevents displacement of the explosive cap during the flight of the dart through the air. One of the disadvantages of the darts of the prior art is the fact that the explosive caps in said darts very frequently become dislodged before the dart strikes its target.

The present invention is applicable to many types of darts and to many variations in construction and application. For example, the present invention may be applied to the simplest form of dart, namely the type which is thrown by hand against a target.

Preferred forms of this invention are shown in the accompanying drawings, in which:

Fig. 1 is a sectional view through a dart made in accordance with one form of the invention, the firing chamber being shown in retracted position so as to provide access for an explosive cap.

Fig. 2 is a somewhat similar view showing the cap in firing position and the firing chamber in engagement therewith.

Fig. 3 is a similar view showing the dart at the moment of impact against a target, the firing pin being shown in engagement with the explosive charge of the cap and said explosive charge being shown in process of exploding.

Fig. 4 is a sectional view through a dart made in accordance with a second form of this invention.

Turning now to the first form of this invention, and to Figs. 1, 2, and 3, it will be seen that the dart 20 shown therein includes a body portion 21 which projects forwardly in the form of a hollow, tubular portion 22. The back of the body portion is broken away in the drawing, but it may be provided with the fins or feathers which darts generally have. At the base or rear end of tubular portion 22 is an anvil 23 and openings 24. An explosive cap 25 may be inserted into the tubular portion 22 through openings 24 and it may be placed upon anvil 23. Openings 24 also serve as exhaust vents to allow the hot gases to escape following an explosion.

Slidably mounted within tubular portion 22 of the body of the dart is the firing pin 27 having a striking head 28 at its back end and suction cup 29 at its forward end. A bridge 30 having a centrally disposed hole 31 is fixed within said tubular portion 22 to slidingly support said firing pin in said tubular portion and to allow the firing pin to move longitudinally, either forwardly or rearwardly, in the direction away from or toward anvil 23. Slidably mounted on said firing pin and enclosing its striking head 28 is a cylindrical member 33 which constitutes the firing or detonating chamber of the mechanism. This cylinder 33 is open at that end which faces the anvil and it is provided with an inwardly extending annular flange 34 at its opposite end. A compression spring 36 is mounted on the firing pin between said flange 34 of cylinder 33 and bridge 30. This spring tends to push cylinder 33 backwardly and in the direction of anvil 23. The cylinder may be pulled forwardly and away from anvil 23 by simply pulling on the suction cup 29 to pull the firing pin forwardly. The striking head on said firing pin will engage the flange on the cylinder and hence the cylinder will itself be moved forwardly. Its forward position is shown in Fig. 1. Holes 24 are cleared so that cap 25 may be inserted therethrough and placed upon anvil 23. When the suction cup is released, as shown in Fig. 2, spring 36 will act upon cylinder 33 and move it backwardly into engagement with the explosive cap 25. (See Fig. 2.) The tension of the spring, acting through the flange of cylinder 33, will hold the cylinder tightly against the cap to prevent dislodgement thereof. The explosive charge 25a of said cap will, of course, be fully enclosed by cylinder 33.

A second compression spring 40 is provided on firing pin 27, and it will be seen in Fig. 2 that said spring bears at one end against bridge 30 and at its opposite end against the suction cup 29. The action of spring 40 is to push the suction cup forwardly, and with it the firing pin and its striking head. This forward position of the firing pin and its striking head is shown in Fig. 2. When the dart, and more particularly its suction cup 29, strikes a target 41, said suction cup and its firing pin will come to a relatively abrupt stop. The body of the dart will, however, continue to move forwardly by reason of its momentum and the explosive cap will be brought into engagement with the striking head of the firing pin. This may be seen in Fig. 3. The explosive charge will explode and the action is at an end. It will be noted that compression spring 40 not only tends to hold the suction cup and firing pin in their forward positions during the course of flight, but it also functions in the manner of a cushion during the moment of impact to lessen the shock as the dart strikes a target. For purposes of convenience, compression spring 40 may be termed the cocking spring of the firing mechanism, since its principal function is to space the firing pin, and more particularly its striking head, from the charge of the explosive cap prior to the moment the dart strikes its target. Compression spring 36 may be termed the cap holding spring, since it is by reason of the force which said spring exerts upon the flange of cylinder 33 that said cylinder holds the cap in place against the anvil.

The materials of which the dart above described may be made are matters of preference and selection and they are certainly not critical insofar as the present invention is concerned. Suction cup 29 should, of course, be made preferably of flexible, resilient rubber. The body of the dart and its bridge should preferably be made of molded plastics, and this, of course, includes its fins as well. The anvil, the firing chamber, the firing pin, and the springs should, of course, preferably be made of suitable metals.

The dart 45 shown in Fig. 4 differs slightly from dart 20 above described. It includes a body portion 46 which projects forwardly in the form of a bell-shaped tubular portion 47 having internal screw threads 48. There are openings 49 in said bell-shaped portion and these openings perform the same functions as do openings 24 above described. Imbedded in the body of dart 45 is an anvil 50. A cowling 52 having external screw threads is screwed into bell portion 47. Press fitted in said cowling is a cylindrical member 53 which constitutes the firing chamber of the mechanism, similar in function to cylinder 33 which constitutes the firing chamber of the dart first above described. Cylindrical member 53 has an outwardly extending annular flange 54 formed at its back end and an inwardly extending annular flange 55 formed at its forward end. Flange 54 provides a shoulder which abuts against

cowling 52. It also serves as the holding means which engages the explosive cap and holds it against the anvil.

Cylinder 33 above described is brought into tensioned engagement with the explosive cap to hold said cap in place against anvil 23. Cylindrical member 53, on the other hand, remains fixed relative to the anvil, once it is set. Its engagement with the explosive cap is, therefore, frictional and the frictional co-efficient is determined by the spacing of cylindrical member 53 from the anvil or that portion of the body of the dart in which the anvil is imbedded. The distance of cylindrical member 53 from anvil 50 may be altered by simply turning cowling 52 in bell-shaped portion 47. Since the cowling is in screw-threaded engagement with the bell-shaped portion, turning it in one direction will move it farther away from the anvil and turning it in the opposite direction will move it nearer the anvil. Since cylindrical member 53 is press fitted in cowling 52, the movement of the cowling toward or away from the anvil will cause a corresponding movement of the cylindrical member toward or away from the anvil.

Annular flange 55 of cylindrical member 53 accommodates firing pin 60. In the forward end of the firing pin is a suction cup 61 and at its back end is the striking head 62. A compression spring 63 is mounted on the firing pin 60 between flange 55 and suction cup 61, and said compression spring serves as the cocking spring of the firing mechanism. It tends to hold the striking head away from the explosive charge in the cap during the course of flight of the dart, and it yields only when the head of the dart, that is its suction cup 61, strikes the target. The action is similar to the action above described with respect to the first form of this invention.

As has above been indicated, the foregoing is merely descriptive of preferred forms of this invention and other forms may be had and modifications of these forms may also be had within the broad coverage of the present invention.

For example, although the firing pin is shown in the drawing to be connected to the head of the dart and the anvil or seat for the explosive cap is shown to be carried by the body of the dart, it will be clearly appreciated that these parts may be reversed without departing one iota from the basic principles of the invention. Thus, the firing pin may be carried by the body of the dart, and the seat for the explosive cap may be mounted on the head of the dart. In both cases there is relative movement between the firing pin and the explosive cap when the dart strikes a target.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A detonating toy dart of the character described, comprising a body member, a head mounted for movement relative to the body member, a seat for an explosive cap carried by the body member, a firing pin carried by the head and pointed in the direction of the seat, a cocking spring connected to the firing pin and yieldingly maintaining it in spaced relation to the seat, a firing chamber movably mounted on the firing pin, and a second spring which engages the firing chamber and yieldingly holds it against the seat.

2. A detonating toy dart in accordance with claim 1, wherein the firing pin is provided with a striking head and the firing chamber is provided with a flange which engages the striking head on the side opposite the seat for the explosive cap, whereby the firing chamber may be drawn away from said seat against the action of the second spring by pulling the head of the dart and the firing pin which is carried thereby, forwardly of the body of the dart.

3. A detonating toy dart in accordance with claim 2, wherein the body member of the dart is provided with a forwardly extending, tubular portion, and the firing pin and firing chamber are both mounted within said tubular portion.

4. A detonating toy dart in accordance with claim 3, wherein a fixed bearing for the firing pin is mounted within the tubular portion of the body of the dart, both springs being mounted on the firing pin, the cocking spring on the forward side of the bearing and the second spring on the rear side of the bearing, said cocking spring bearing at its forward end against the head of the dart and at its back end against the fixed bearing, and said second spring bearing at its forward end against said fixed bearing and at its back end against the firing chamber.

5. A detonating toy dart of the character described, comprising a body member, a head mounted for movement relative to the body member, a seat for an explosive cap carried by the body member, a firing pin carried by the head and pointed in the direction of the seat, a cocking spring connected to the firing pin and yieldingly maintaining it in spaced relation to the seat, a firing chamber movably mounted on the firing pin, said firing chamber having side walls with a bottom at one end and being open at the other end, said chamber being mounted with its open end adjacent the seat and being axially movable relative to the seat, the bottom of said chamber having a hole through which the firing pin is free to slide, and means for holding the firing chamber in adjusted position relative to the seat for frictionally holding an explosive cap against said seat.

JULIAN SETH KAHN.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,357,927	Clarke	Nov. 2, 1920
1,385,634	Marshall	July 26, 1921
1,669,118	Betts	May 8, 1928
1,893,787	Schroeder	Jan. 10, 1933
2,119,524	Char	June 7, 1938