March 9, 1954 C. J. ZWICKEY 2,671,664

ARROWHEAD

Filed March 4, 1949

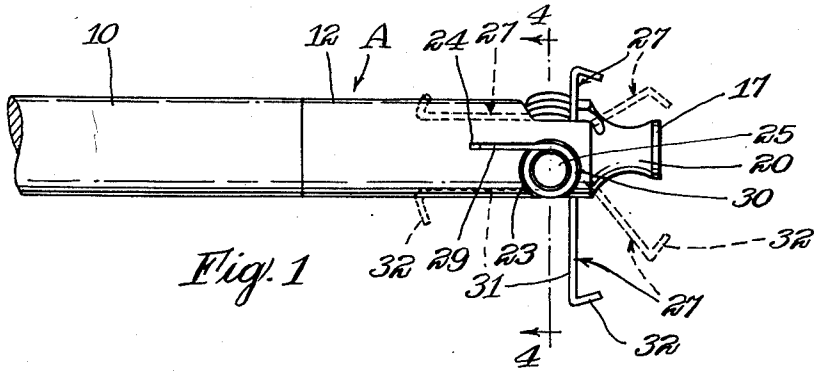


Fig. 1

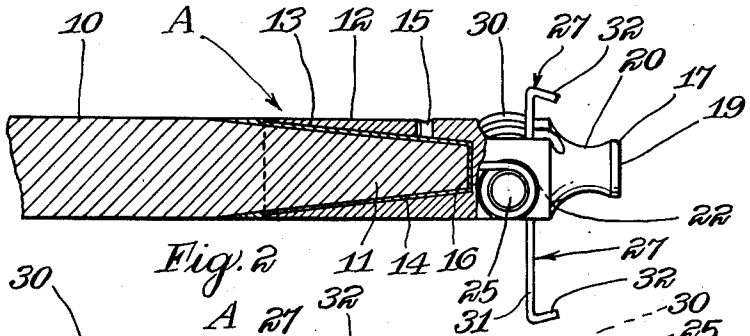


Fig. 2

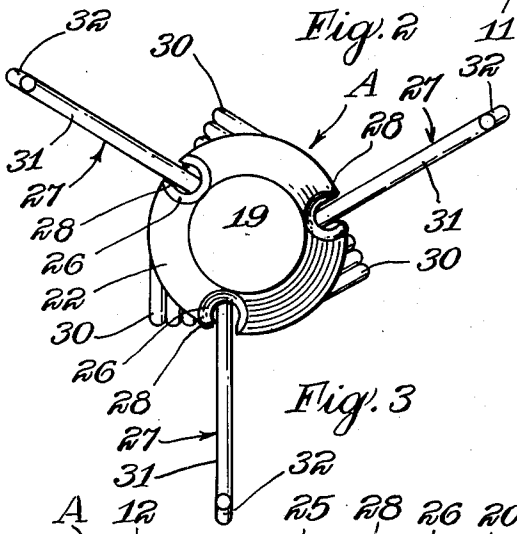


Fig. 3

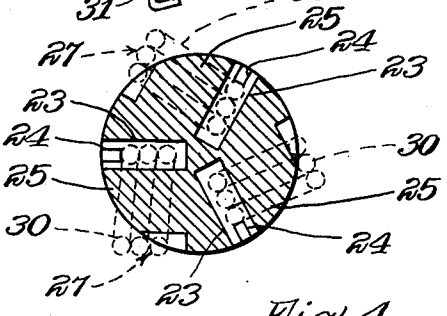


Fig. 4

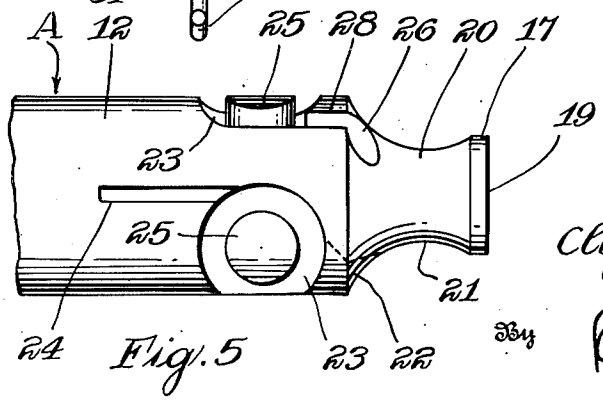


Fig. 5

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Patented Mar. 9, 1954 2,671,664

UNITED STATES PATENT OFFICE

2,671,664

ARROWHEAD

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Application March 4, 1949, Serial No. 79,710

9 Claims. (Cl. 273—106.5)

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My invention relates to an improvement in arrow head and deals with a construction usually employed on practice arrows and the like.

In my previous application, Serial No. 750,498, filed May 26, 1947, now Patent No. 2,628,837, of which this application is a continuation-in-part, I disclosed a type of arrow head including outwardly projecting spring arms designed to impede the movement of the arrow after it struck an object. The arrangement was such that if the arrow struck a glancing blow at a tree or similar object, the spring arm would tend to eliminate the whipping of the arrow shaft and consequent breakage thereof. The spring arm also tended to engage grass, leaves, or the like and to thereby decrease the speed of movement of the arrow and also provide a better indication of the location of the arrow. The arrow provided with the spring arms has a tendency to form a path through the grass or leaves which is readily noticeable by the archer.

While my previous construction serves its intended function and is successfully operable, it embodies certain slight disadvantages. For example, after one of the spring arms had been bent rearwardly by engagement with an object, the arm sprung forwardly against a fixed stop which tended to bend the arm as its return movement was halted. Furthermore, the details of construction were such as to make the arrow head costly to produce. Furthermore, the specific shape of the tip of the arrow was not felt to be as desirable as it might be. The present invention is designed to eliminate these previous difficulties.

An object of the present invention lies in the provision of an arrow head having a series of angularly spaced resilient arms projecting outwardly therefrom. These arms are preferably provided with hook ends directed forwardly. If the arrow passes through trees, grass, or similar growth, the outwardly projecting arms tend to catch the surrounding material and impede the forward progress of the arrow. In many instances a ball or wad of leaves or grass is formed which prevents the arrow from penetrating into the ground. This arrangement serves the double purpose of providing in many instances a visible path showing the direction of travel of the arrow and also provides a means for preventing the arrow from being embedded in the ground beneath grass and leaves where it is difficult to locate.

A feature of the present invention lies in the provision of spring arms which normally project outwardly from the arrow head at substantially right angles to the axis thereof. These arms are resiliently held from pivotal movement either forwardly or rearwardly. As a result when the arms are engaged by objects surrounding the arrow during the flight thereof and are bent rearwardly by such engagement the resiliency of the spring arms in returning to their normal position may swing the arms forwardly beyond right angular relation. By eliminating the shoulder preventing the arms from swinging forwardly beyond right angular relation, I prevent damage to the arms by action of the arms striking the shoulder upon their return to normal position.

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A further feature of the present invention lies in the simplicity with which my arrow head may be formed. The body of the arrow head may be turned on a lathe or other suitable mechanism of this type. Circular grooves are cut into the body of the head to form a support for the helical spring portions of the outwardly projecting arms. Slots are cut communicating with the circular groove to provide a means of anchoring one end of each arm. Holes are drilled parallel to the axis of the head communicating with the circular slots so as to provide a means of permitting the forward flexing of the arms. Thus my arrow head may be formed by conventional equipment at a relatively low cost.

An added feature of the present invention lies in the shape of the forward end of the arrow head. My arrow head is provided with a projecting forward end which is approximately ½ the diameter of the body of the head. The forward extremity of the arrow head is of slightly greater diameter than the portion of the head immediately to the rear of the forward extremity. This specific construction is of importance in an arrow head of the type in question.

A feature of the present invention lies in the operation of the arrow head in use. The blunt forward extremity of the arrow head is only approximately one-half the diameter of the arrow head body so that the movement of the arrow head is more gradually reduced when the arrow is shot against a tree or similar object which the arrow may penetrate to some extent. If the arrow head were provided with a blunt forward end, the full diameter of the head, the shock caused by striking an object such as a tree would have a strong tendency to break the shaft of the arrow. By providing a reduced diameter point forwardly of the tip, the progress of the arrow is first reduced to a considerable extent before the shoulder between the reduced

diameter portion of the head and the body of the head engages the obstruction. This cushioning action is of importance in preventing the breaking of the arrow shafts.

An added feature of the present invention lies in the provision of the reduced diameter portion rearwardly of the front extremity of the head. If the forwardly projecting front end of the arrow head is cylindrical in form, the arrow has a tendency to bounce rearwardly from the tree or other obstruction, thereupon rebounding many feet from the obstruction. I have found that by reducing the diameter of the tip rearwardly of the forward extremity, the wood has a tendency to crowd inwardly, greatly reducing the rebounding tendency. This construction also permits the arrow to tilt or deflect to some extent without breakage.

A further feature of the present invention lies in the provision of a tapered socket for accommodating the forward end of the arrow shaft and in providing a hole through the wall of the arrow head at a point spaced from the closed end of this socket. The arrow head is usually secured in place by cement which softens under heat. When the socket is entirely closed the cement forms a gas tending to blow the head from the shaft. By providing an aperture spaced from the closed end of the shaft, the pressure forcing the head from the shaft is relieved after a short distance of movement of the shaft, thereby reducing the force with which the head is forced from place.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of my specification:

Figure 1 is a side elevation view of an arrow head showing the construction thereof.

Figure 2 is a view similar to Figure 1 with a portion of the arrow head broken away to disclose the manner in which it is attached to the arrow shaft.

Figure 3 is a front elevation view of the forward end of the arrow head in enlarged form.

Figure 4 is a sectional view through the arrow head, the position of the section being indicated by the line 4—4 of Figure 1.

Figure 5 is a side elevation view of the arrow head body before the spring arms are attached thereto.

The arrow head A is preferably attached to the end of an arrow shaft 10. The shaft 10 may be of any suitable material or design and is provided with a frusto-conical tapered forward end 11.

The arrow head A includes a generally cylindrical body portion 12 having a frusto-conical tapered socket 13 extending axially into the rear end thereof. The taper of the socket 13 is similar to the taper of the forward end of the arrow shaft 11 and the shaft and head are fastened together by a suitable cement 14. This cement is usually of a type similar to that used for adhering ferrules to fish pole sections and is usually of a type which softens under heat.

An aperture 15 extends through the wall of the arrow head near the closed end 16 of the socket 13. This aperture serves two important functions in actual use. In the first place the aperture serves as a guide or indexing means to hold the arrow head in proper angular position while machining the same. Secondly the aperture forms a vent for gas which is produced by the heating of the arrow head to soften the adhesive 14.

When the cement or adhesive 14 is heated a gas is ordinarily produced which tends to drive the arrow head from the shaft. If the gas is formed quickly the head may be forced from the arrow shaft with substantial force. The spacing of the aperture from the base 16 of the sockets permits the gas to act against the arrow shaft in a manner to loosen the head upon the shaft, but at the same time the hole relieves the building up of excessive pressure after the shaft has been loosened and permits the escape of the trapped gas.

As best illustrated in Figures 1 and 5 of the drawings, the arrow head is provided with a substantially cylindrical forward extremity 17 which is provided with a substantially flat front face 19. The tip or extremity 17 is connected to the remainder of the arrow head body by a connecting neck 20. This neck tapers to a somewhat lesser diameter than the extremity 17 at a point rearwardly of the front extremity. From this point 21 of minimum diameter the neck 20 tapers outwardly to the periphery of the generally cylindrical body 12. A shoulder 22 is thus formed between the smallest diameter portion 21 of the neck and the main body of the arrow head.

While the number of resilient arms attached to the arrow head is somewhat of a matter of choice, I have found that three such arms may be mounted on an arrow head of usual diameter and produce the desired result. With reference to Figures 4 and 5 it will be noted that I provide circular ring shaped slots 23 in angularly spaced relation about the periphery of the head forwardly of the closed end 16 of the socket. These circular grooves 23 and their axes on a plane at right angles to the axis of the arrow head and the axis of each groove is spaced from, and parallel to, a radius of the arrow head body. Each groove 23 is formed substantially tangent to a longitudinally extending groove 24 in the exterior surface of the arrow head on a longitudinal plane through the axis thereof. In other words, where three resilient arms are to be supported by the arrow head these grooves are spaced 120° apart about the circumference of the arrow head and extend longitudinally of the arrow head from a point spaced rearwardly from the shoulder 22. Each ring shaped groove 23 is cut to extend substantially tangent to the groove 24 with the axis of the groove 23 parallel to the plane through the longitudinal groove 24 and the axis of the arrow head. The axis of the groove 23 as previously stated is also on a plane at right angles to the axis of the arrow head.

Each ring shaped groove 23 provides a generally cylindrical aperture into which a helical spring element may be inserted and also provides a generally cylindrical boss 25 designed to extend through the helical spring. The boss 25 forms a support for the helical spring members encircling the same and tends to hold the springs in proper position.

As best illustrated in Figures 3 and 5 of the drawings, a tapered aperture is provided in the shoulder 22 at angularly spaced points therein. One such aperture communicates with each ring shaped groove 23 in position to communicate substantially tangentially thereto. The groove 24 extends substantially tangent to the ring shaped groove on one side of the center thereof, while the aperture 26 communicates with the base of the ring shaped groove on the opposite side of center.

The resilient arms 27 include a straight end portion 29 which extends from one end of a helically wound intermediate portion 30. The straight portion 29 is designed to engage in the notch 24 while the helically wound portion 30 rests in the ring shaped notch 23 encircling the boss 25. The other end of the helically wound portion 30 extends tangentially at substantially right angles to the end 29 to produce the outwardly directed arm portion 31. Each arm portion 31 terminates in a forwardly directed hook end 32.

As will be noted in Figure 3 of the drawings the arm portion 31 of each arm 27 is aligned with an aperture 26. Furthermore, the ring shaped notch 23 is open on one side due to the curvature of the cylindrical body 12 so that there is no outer wall on the notch at the point where the arm 27 extends outwardly from the head. As a result the arm portion 31 of each arm may flex rearwardly as indicated in dotted outline in Figure 1 of the drawings, or may flex forwardly to some extent extending into a cooperable aperture 26. A slot 28 connects each aperture 26 to the periphery of the body.

In securing the arms 27 to the head, it is only necessary to put each spring in place and to rivet over the top of each groove 24 so as to hold the end 29 of each spring engaged in its notch 24. Due to the shape of the arm and its combining grooves each arm can only become disengaged if the end 29 thereof moves out of its notch 24. Such disengagement is prevented by pressing the metal on opposite sides of the notch 24 over the spring end 29. The spring ends 29 are preferably flattened before insertion into the slots 24 to prevent rotation of the embedded end of the spring.

It will be seen that the spring arms may be attached in a relatively simple operation and that the arrow head may be easily machined in the manner described. The arms 27 tend to catch grass, leaves, or the like, through which the arrow is directed, thus tending to slow down the speed of the arrow. When shot into the ground the arms tend to form a ball or wad of grass and leaves, which discourages penetration of the arrow into the ground and the action of the arms usually clears a path which indicates the direction of travel of the arrow. My arrows are easily found after being shot, whereas arrows of a more conventional type are extremely difficult to find when shot into the grass, beneath leaves, or into underbrush. Baled hay is often used as a target in archery contests. The resilient arms tend to limit penetration of the arrows into the hay. As the arrows are extracted from such baled hay the arms flex forwardly at an angle and do not greatly impair withdrawal.

The specific shape of the arrow point is also of decided advantage in the present invention. I have found that a flat blunt tip approximately ½ the diameter of the usual arrow head body acts to cushion the shock of the arrow striking a penetrable body, such as a tree trunk or the like. The smaller diameter tip usually penetrates into the tree and slows the arrow somewhat, the engagement of the shoulder 22 against the tree trunk stopping further movement.

Arrows provided with an integral tip of reduced diameter usually will rebound from a tree trunk or the like and bounce several feet from the tree. I have found that by reducing the diameter of the tip rearwardly of its extremity, the fibrous material into which the point penetrates tends to crowd about the tip and hinder this rebounding action. While the arrow will usually become disengaged from the tree trunk after striking the same, the shape of the tip greatly reduces the distance the arrow will rebound, thereby simplifying the task of finding the arrow.

The specific shape of the point illustrated is also of advantage if the arrow tends to strike a glancing blow at a tree or similar object. A tapered tip causes the direction of the arrow to suddenly change if it strikes a glancing blow against an obstruction. However, with the present construction if the reduced diameter tip misses the tree, the shoulder 22 strikes against the tree and tends to dig into the same in such a manner that the direction of travel of the arrow is not changed as quickly. As a result the breaking of arrows due to the whipping of the shafts as the direction of travel is suddenly changed is greatly reduced.

It should be noted that the length of the neck 20 connecting the body of the arrow head to the reduced diameter extremity thereof is of a length substantially equal to three-fourths of the diameter of the body 12. I have found that if the neck 20 is of a length less than one-half the diameter of the body, the progress of the arrow is often not stopped sufficiently before the shoulder 22 strikes the obstruction to prevent injury to the arrow. Furthermore, the tendency of the neck to prevent rebounding is greatly diminished. On the other hand, if the length of the neck is greater than the diameter of the arrow head, the arrow head tends to remain embedded in a tree or similar object, creating a tendency for the arrow shaft to break off or pull out of the head. Thus the specific proportions illustrated are advantageous.

The apertures 26 are flared as indicated in the drawings, being of larger diameter at their forward end than at the point of intersection with the ring shaped grooves 23. The tapering of these apertures is desirable as this arrangement assists in maintaining the apertures free of dirt and the like. If the arrow is shot into the ground, for example, dirt is forced into the apertures 26 and if the apertures were cylindrical in form the dirt would tend to remain packed in place. With the tapered construction, however, as the spring arms 31 swing forwardly they tend to eject the dirt forwardly from the apertures, thereby dislodging the dirt automatically. Thus by tapering the holes, the holes are rendered self-cleaning.

In accordance with the patent statutes, I have described the principles of construction and operation of my arrow head and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. An arrow head including an elongated body having a generally cylindrical outer surface, a socket in one end of said body, a series of angularly spaced ring shaped grooves extending into said body, the axes of said grooves being arranged on a common plane at right angles to the axis of the cylindrical surface, a groove in said body substantially tangent to each of said ring shaped grooves, and a spring seated in each ring shaped groove and having one end thereof lying in said tangentially extending groove and having another end extending at substantially right angles to the axis of the arrow head.

2. The construction described in claim 1 in which the head is provided with an aperture forwardly of the ring shaped groove into which the outwardly extending end of the spring may extend.

3. The structure described in claim 1 in which the tangential groove connected to each ring shaped groove extends parallel to the axis of the cylindrical surface.

4. An arrow head including a generally cylindrical body having a series of longitudinally extending angularly spaced grooves in the external surface thereof, said grooves being arranged on planes extending through the axis of the arrow head, a ring shaped groove communicating with each of said longitudinally extending grooves, said longitudinally extending groove being substantially tangent to its ring shaped groove, and a spring arm unit in each of said ring shaped grooves, said arm unit including an end engaged in the longitudinally extending groove, a helical portion engaged in said ring shaped groove, and an outwardly directed spring end extending outwardly from said body.

5. An arrow head including an elongated body having an arrow shaft socket in one end thereof, a tip on the other end thereof, said tip including a blunt ended extremity of substantially smaller diameter than said body, and a neck connecting said extremity to the remainder of said body, said neck including a reduced diameter portion of smaller diameter than said extremity.

6. An arrow head including a generally cylindrical body having an axial socket in one end thereof, a reduced diameter blunt ended tip integral with the other end of said body and connected thereto by a connecting neck, said neck having a portion therein between said extremity and said body which is of smaller diameter than said extremity.

7. An arrow head including an elongated body, a socket in one end of said body, a reduced diameter tip on the other end of said body, a shoulder in said body between said reduced diameter tip and the remainder of the body, a series of angularly

spaced ring-shaped grooves in said body rearwardly of said shoulder, a series of springs supported in said grooves and including outwardly projecting arms extending outwardly from said grooves, an aperture extending into said body generally parallel to the axis of the body through said shoulder communicating with each ring shaped groove, a groove connecting each said aperture with the outer surface of the body, said apertures being forwardly of said outwardly projecting arms so that said arms may flex into said apertures, said apertures being tapered in form and of largest diameter at the forward ends of the apertures.

8. An arrow head including an elongated body, means on one end of said body for connection with an arrow shaft, a series of angularly spaced notches in said body, a resilient arm having a coiled end portion supported in each of said notches, said coiled end portion normally holding each said arm extending outwardly from said body, and a groove extending from each notch longitudinally toward the other end of said body into which the corresponding arm may swing when flexed forwardly.

9. An arrow head including an elongated body having an arrow shaft socket in one end thereof, a tip on the other end thereof, said tip including a blunt extremity of substantially smaller surface area than the cross sectional area of said body, and a neck connecting said extremity to the remainder of said body, said neck including a reduced portion of smaller cross-sectional area than the area of said extremity.

CLIFFORD J. ZWICKEY.

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