April 30, 1935. L. TENGEL 1,999,601

ARROW

Filed March 11, 1932

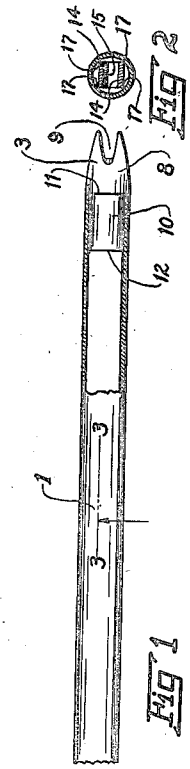


Fig 1

Fig 2

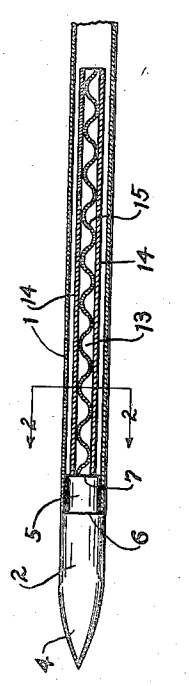


Fig 4

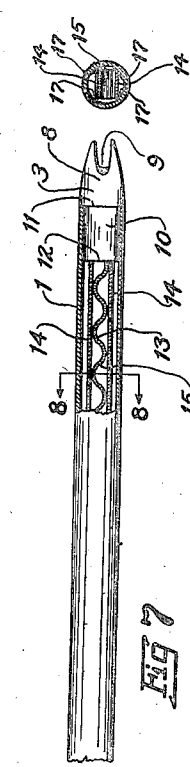


Fig 7

Fig 8

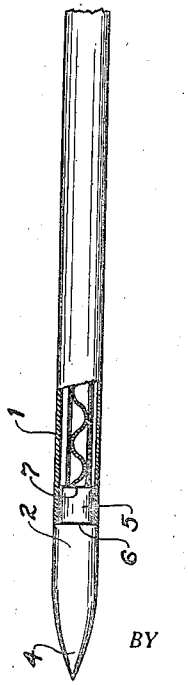


Fig 5

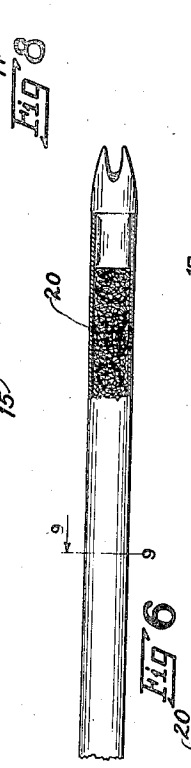


Fig 6

Fig 3

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ARROW

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Application March 11, 1932, Serial No. 598,238

8 Claims. (Cl. 273—106.5)

This invention relates to arrows and relates more particularly to arrows the shafts of which are composed of tubular metal.

As illustrative of the construction of arrow to which my invention is particularly applicable, reference may be had to the patent of Robert H. Cowdery, No. 1,842,540, January 26, 1932.

The shaft of an arrow tends to vibrate during flight and upon impact with the target, and when the shaft is constructed from tubular metal, this vibration emits a harsh and metallic sound which is most objectionable to the archer, accustomed to the use of wood arrows.

Various attempts have been made to subdue the sound vibrations. Although the hollow tubular steel shaft may be loosely filled with a sound deadening or absorbing material such as cork, asbestos wool, or the like, after continued use of an arrow having such sound deadening construction, the repeated violent impact of the arrow often effects a forward movement of the sound deadening material in the shaft, and tends to cause it to accumulate at or adjacent the pile end thereof, and to temporarily unbalance the shaft, and destroy its sound subduing function.

It is therefore an object of this invention to provide a tubular shaft arrow having improved means for absorbing sound vibrations thereof incidental to flight and impact.

Another object is to provide an arrow having a metallic tubular shaft and an improved means within the shaft to deaden or absorb sound vibrations thereof incidental to flight and impact.

Another object is to provide, in an arrow having a metallic tubular shaft, an improved sound absorbing filler for the shaft.

Another object of my invention is to provide, in an arrow having a tubular metallic shaft, and a sound absorbing material within the shaft, an improved means for maintaining the sound absorbing property of the material throughout continuous use of the arrow.

Another object is to provide, in an arrow having a metallic tubular shaft, a sound deadening or absorbing material within the shaft, improved means for preventing compacting of the material in the shaft when the arrow is subjected to impact at the pile end.

Another object is to provide an improved arrow of the metallic tubular shaft type.

Other objects will be apparent to those skilled in the art to which my invention appertains.

My invention is fully disclosed in the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a side elevational view partly in cross-section of an arrow embodying my invention in one form thereof;

Fig. 2 is a cross-sectional view taken from the plane 2—2 of Fig. 1;

Fig. 3 is a longitudinal cross-sectional view taken approximately from the plane 3—3 of Fig. 1;

Fig. 4 is a view similar to Fig. 1 illustrating another embodiment of my invention;

Fig. 5 is a cross-sectional view of the embodiment of Fig. 4 taken from the plane 5 of Fig. 4; and

Fig. 6 is a view like that of Fig. 4 taken at right angles thereto;

Figs. 7 and 8 are views similar to Fig. 1 showing another embodiment of my invention.

Referring to the drawing, Fig. 1, I have shown at 1 the shaft of the arrow, formed from a thin-walled metal tube and having secured thereto at one end a pile 2 and at the other end a nock element 3. The pile 2 may be of any suitable construction but preferably is formed from metal, is pointed at one end as at 4, and at the other end has a shank 5 of reduced diameter to provide a shoulder 6 and the shank 5 is telescoped into the corresponding end of the shaft 1, with the end of the shaft abutting against the shoulder 6. The inner end of the shank 5 terminates in a transverse face 7.

The nock element 3 is likewise preferably formed from metal and has an external portion 8 provided with a bow-receiving notch 9 and an internal shank 10 of reduced diameter which provides a shoulder 11 against which the corresponding end of the shaft 1 may abut when the shank 10 is telescoped within the shaft. And the shank 10 terminates inwardly in a transverse face 12. Indicated generally at 13 is a filler, which is provided to deaden or absorb the sound which the arrow tends to give off during flight or at impact. The filler 13 has in general the construction of the well known corrugated paper board used as a packing material, and for the construction of packing boxes and like uses, and comprises a pair of planular strips 14—14 and wave-like or corrugated strip 15 therebetween, the three strips being secured to each other by adhesive.

The filler 13 may be provided by cutting strips from a sheet of corrugated paper or paper board material such as that referred to above and which is well known today as an article of commerce.

The filler 13 is preferably constructed or provided of such dimension that when viewed in cross-section as in Fig. 1, the planular strips 14—14 are spaced apart a lesser distance than the

internal diameter of the shaft 1. And in the opposite direction, that is, as viewed in Fig. 3, the strips 14—14 and the strips 15 are preferably of such width as to substantially engage the opposite inner walls of the tubular shaft 1.

The filler 13 is preferably cut off square at its opposite ends and is preferably of a length sufficient to extend from the rear end 7 of the pile, only a part of the way toward the rear end of the shaft which is preferably left unfilled. The filler is very light and if uncemented to the interior walls of the shaft will in use be impelled against the end 7 of the pile by its momentum, whenever the arrow is used, and the point 4 strikes an objective.

I find that best results are secured by incompletely filling the tube and by employing the cellular construction provided by the corrugated board, or in any suitable way. The filler 13, as will be understood, is made up as a complete unit and telescopically inserted into the metal shaft 1, preferably through the open end opposite the pile 2 before the nock element 3 is assembled with the shaft, and before so inserting the filler 13, adhesive may be applied to the forward end of the filler 13 to cause it to adhere to the rear end surface of the pile, at 7, although this is not imperative.

When the filler is telescopically inserted into the shaft, and when the adhesive is employed, its forward end engages the face 7. By suitably proportioning the width of the filler 13, it will engage the opposite inner wall surfaces of the shaft 1 on four or approximately four lines of contact therewith as indicated by the reference numeral 17 in Fig. 2; and vibration of the shaft wall will be absorbed or prevented by the filler 13 thereby eliminating or deadening the sound of the arrow above referred to.

Obviously, the pressure of the filler 13 upon the inner wall of the shaft 1 is a resilient pressure and may be varied, as desired, by preselecting a suitable width for the filler 13.

In some instances, it may be desirable to additionally adhesively attach the filler 13 to the inner wall of the shaft 1, and this may be done by applying adhesive at spaced points longitudinally of the inner wall of the shaft 1 or longitudinally of the filler 13 in any suitable manner.

In this connection, also, it will be understood that in assembling the arrow, the nock element 3 may first be assembled with the shaft 1 and the adhesive connection between the filler 13 and the nock element 3, or between the filler 13 and the inner wall of the shaft 1, or both, may be effected only at or substantially only at the nock end of the arrow, and the adhesive connection at the pile end may, if desired, be omitted.

In the modification of my invention shown in Figs. 4, 5, and 6, the filler 20 is made from a strip of felt which in width is wide enough to engage the opposite inner walls of the shaft 1 and in thickness is less than the internal diameter of the shaft. The filler 20 may be adhesively secured to the inner wall of the shaft 1 and/or to the nock element 3, not shown, in any or all of the ways described in connection with Figs. 1, 2 and 3, and this will be understood from the more complete description of the latter figures, the operation of the form of Figs. 4 and 5 being substantially the same as that of Figs. 1, 2 and 3 for the filler 13. Instead of felt, leather or other analogous material may be employed for the filler 20.

Although Fig. 6 illustrates the filler 20 as extending the entire length of the tubular space within the arrow, it will be understood that I contemplate sometimes employing relatively shorter lengths of said filler extending preferably from the forward or pile end of the interior space and rearwardly therefrom.

In the embodiments of Figs. 1 to 3 inclusive, and 4 to 6 inclusive, where a short length of filler is used, as is preferable, since this gives the most efficient results so far as sound deadening is concerned, especially for the weight of filler used, I preferably extend the filler for a distance of about eight inches from the rear end of the pile for a standardized target arrow 28 inches in length, although fillers of varying lengths may be employed. Both the felt 20 or the corrugated board filler 13 may be said to be of cellular construction, i. e. provided with a form sustaining material, with air spaces within the outer confines of the material, and wherein the appended claims I employ the term cellular material, it will be understood that I employ it in the meaning as above defined.

In any of the arrows with fillers, above described, it will be seen that I provide an arrow having an efficient sound absorbing or deadening filler in the tubular shaft secured therein in a manner to prevent shifting longitudinally, and which filler therefore will continue throughout the life of the arrow to perform its sound deadening or absorbing function without deterioration; also that my improved filler being of very light cellular construction, and especially in the forms where only a short length thereof is used, is very light and does not materially add to the weight of the arrow, but for its weight exercises a very substantial sound vibration deadening effect on the tubular walls of the arrow, and I find that when this effect is exercised on a relatively short length of the tubular walls that the balance of the length of said walls is constrained thereby to have no vibrational properties, whereby a tubular metallic arrow is evolved which does not have to any objectionable degree the metallic rasping sound otherwise had by metallic arrows.

The improved filler material described above will not compact toward the forward end of the shaft causing a shifting of weight and therefore of balance of the arrow, whereby different arrows would operate differently, which would be very objectionable in target and other uses to which the arrows are subjected.

My invention is not limited to the exact details of construction shown and described. Many changes and modifications may be made therein without departing from the spirit of my invention or sacrificing its advantages.

I claim:

1. In an arrow, a tubular metallic shaft and unitary sound-vibration deadening filler means extending longitudinally therein and said filler being form sustaining and engaged at a point within the shaft to restrain longitudinal shifting therein.

2. In an arrow, a tubular metallic shaft and a cellular unitary sound-deadening means engaging the inner walls thereof, and said filler being form sustaining and comprising a pair of substantially linear side portions and an intermediate corrugated portion.

3. In an arrow, a tubular metallic shaft and a unitary sound-vibration suppressing means disposed longitudinally in the shaft and secured thereto, being of resiliently compressible material in the form of a strip having a greater

width than thickness and engaging inner walls of the shaft by only a pair of oppositely disposed longitudinal edge portions and comprising a longitudinally corrugated element.

4. In an arrow, a tubular metallic shaft and a unitary sound-vibration suppressing means disposed longitudinally in the shaft and secured thereto, being of resiliently compressible material in the form of a strip having a greater width than thickness and engaging inner walls of the shaft by only a pair of oppositely disposed longitudinal edge portions.

5. In an arrow, a tubular metallic shaft and a unitary sound-vibration suppressing means disposed longitudinally in the shaft and secured thereto, being of resiliently compressible material in the form of a strip having a greater width than thickness and engaging inner walls of the shaft by only a pair of oppositely disposed longitudinal edge portions and comprising a longitudinally corrugated element, and closure means at the two ends of the shaft comprising respectively a pile and nock elements, each of said elements having relatively short stem portions of slightly reduced diameters tightly fitted within the shaft ends.

6. In an arrow, a tubular metallic shaft and unitary sound-vibration deadening filler means adapted to be separately made and telescopically inserted into the tubular shaft and disposed longitudinally therein, said filler means being of form sustaining material and construction and secured to the inner wall of the shaft to restrain the filler means as a unit from longitudinal shifting therein.

7. In an arrow, a tubular metallic shaft and sound-vibration deadening filler means extending longitudinally therein, said filler means being form sustaining, and means disposed within the shaft to restrain longitudinal shifting of the filler means therein.

8. In an arrow, a tubular metallic shaft and a filler means extending longitudinally therein, the filler means being formed from material adapted to deaden sound vibrations of the shaft, and the material of the filler means being secured to the shaft inner wall surface in a manner to prevent longitudinal shifting thereof in the shaft at all points longitudinally of the filler means upon violent impact of the pile end of the arrow upon a target.

LOUIS TENGEL.