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N. R. KRAUSE

2,356,936

BALE TIE

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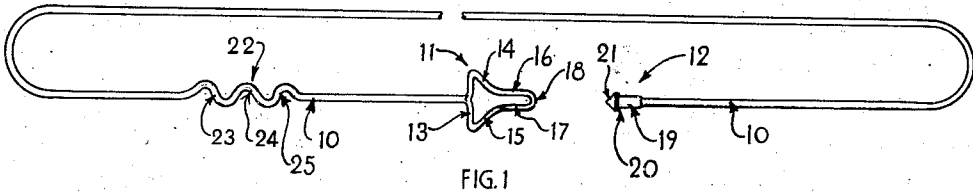


FIG. 1

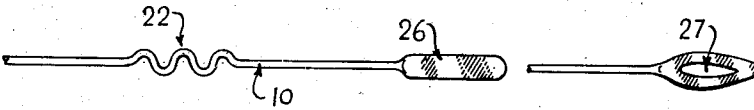


FIG. 2

FIG. 3

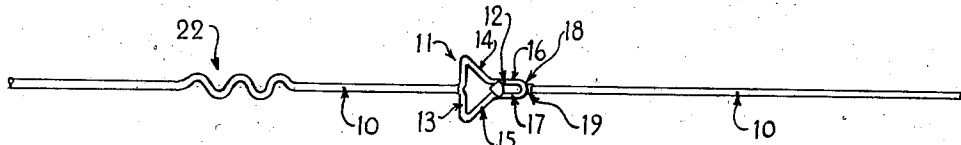


FIG. 4

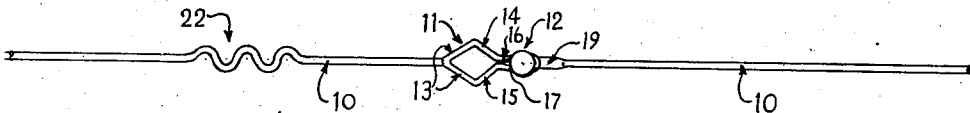


FIG. 5

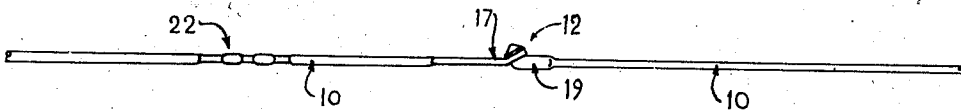


FIG. 6

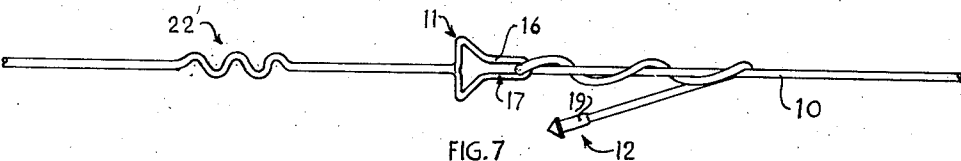


FIG. 7

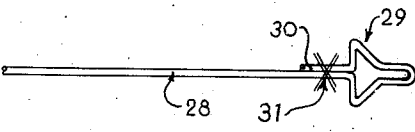


FIG. 8

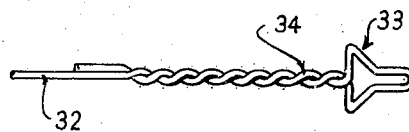


FIG. 9

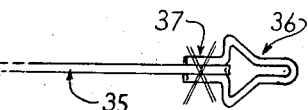


FIG. 10

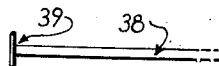


FIG. 11

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BALE TIE

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6 Claims. (Cl. 24—27)

The present invention relates to bale ties and methods of manufacture thereof. An object of the invention is to generally improve the construction, operation and methods of manufacturing of such bale ties.

A further object is to provide a bale tie which may be manufactured with a minimum amount of waste.

A further object is to provide a bale tie which may be rapidly and easily connected together about a bale.

More particularly, an object is to provide a bale tie which, while it may be connected or hooked expeditiously under trying conditions, will not inadvertently become disconnected.

Further objects are to provide such a tie which will have a shock absorbing effect to relieve excessive tension which might otherwise cause the tie to break and which may be fastened in an alternative manner if conditions so require.

Further objects and advantages will appear from the following description and accompanying drawing in which:

Figure 1 is a view in perspective, with parts broken away, of a bale tie illustrative of the invention.

Fig. 2 is a view of one end of a tie such as that shown in Fig. 1, with a preliminary operation performed.

Fig. 3 is a similar view showing the result of a following operation.

Fig. 4 is a view of a portion of Fig. 1 with the ends united.

Fig. 5 is a view of the same showing the conditions after a preliminary pull has been exerted on the wire.

Fig. 6 is a plan view of the same.

Fig. 7 is a side elevation showing an alternative manner of fastening the tie.

Fig. 8 is a view of a modified construction of loop.

Fig. 9 is a view of a further modified construction of loop.

Fig. 10 is a further modified construction of loop.

Fig. 11 is a view of a modified head construction.

Similar reference characters have been applied to the same parts throughout the specification and drawing.

As seen in Fig. 1, the preferred embodiment of the invention includes a length of wire 10, which in use encircles a bale of compressed material not necessary to be shown since it forms no part of the present invention, the ends of the wire

being so constituted that they can be readily and substantially instantaneously united, for example, by operators riding on a baling machine in well-known manner, although the specification is not to be taken as limited to uniting the ends of these bale ties in any specific manner. For this purpose, one end of wire 10 has a loop generally designated as 11 and the other end has a head generally designated as 12 which can be readily hooked together when it is desired to unite the ends of the bale tie.

Loop 11, in the present instance comprises a transverse portion 13 extending in the present instance approximately at right angles to the main body of wire 10. Portion 13 has extending forwardly at an acute angle thereto, portions 14 and 15. Portions 14 and 15 approach each other for a predetermined distance and then change direction and extend forwardly and substantially in the same direction as wire 10, forming portions 16 and 17 which may be considered as united at 18, although it is contemplated that wire 10, portions 13, 14, 15, etc., may all be formed of a single piece of material of uniform cross section within the scope of the invention and it is to be understood that the proportions of the parts are expected to be varied within reasonable limits.

Head 12, in the present instance, includes an upset portion 19 and a shoulder portion 20 for engagement with above mentioned portions 16 and 17 approximately at 18.

Shoulder portion 20 may have a conical or convex end 21 which will tend to avoid catching baled material or portions of loop 11 as the bale tie is used. In use, the tie is placed around a bale of compressed material in well-known manner and head 12 is inserted in loop 11 and pulled back until upset portion 19 fits into the space between portions 16 and 17, the spacing preferably being such that upset portion 19 may do this without appreciable resistance.

It will be apparent that head 12 cannot be disengaged from loop 11 under these conditions at least so long as there is a pull exerted in wire 10. As is well-known, however, the pull is usually not exerted on wire 10 until the bale of material is released from the baling machine. To prevent inadvertent disengagement of head 12, from loop 11, the operator exerts a substantial pull momentarily on wire 10 sufficient to slightly distort loop 11 as seen in Fig. 5. The proportions of loop 11 are so chosen that a pull sufficient to distort the loop will cause portion 13 to fold or break down and move portions 14 and 15 inwardly, whereupon portions 16 and 17 close

in about upset portion 19 so that portion 19 can no longer escape into the space between portions 14 and 15. Because of the difference in angles between portions 13 and portions 14 and 15, a relatively light pull will cause such folding of portion 13, but after the loop 11 takes the form shown in Fig. 5, the pull may be tremendously increased without causing substantial further distortion. Under extreme tension, portions 16 and 17 will normally bend somewhat out of the plane of wire 10 as indicated in Fig. 6, and upset portion 19 may likewise bend somewhat out of the plane of wire 10.

In the past, it has been fairly common that bales tied with wire would break the wire and burst open in the event of unusual excessive strain, such for example, as if the bale were to be dropped out of a barn loft. In the present instance, a shock absorbing portion 22 comprising in the present instance a series of return bends or offset portions 23, 24 and 25, is interposed in wire 10, preferably in the neighborhood of loop 11 although any convenient point in the length of wire 10 is contemplated as equivalent. Bends 23, 24 and 25 are so proportioned as normally not to be affected by the tension in wire 10, but in the event of excessive tension, such as would occur if the bale were dropped, the tension may be relieved by a slight straightening of the offset or bend portions 23, 24 and 25. Thus a bale tied with the ties of the present invention might be dropped a number of times without danger of breaking a tie.

Loop 11 may be formed in several ways within the contemplation of the invention, the preferred manner being indicated in Figs. 2 and 3. In this instance, wire 10 is flattened somewhat at 26, as a first operation, and the flattened portion is then pierced as shown in Fig. 3 to form a loop, these operations being performed by well-known mechanism not necessary to disclose as forming no part of the present invention. The piercing operation forms an opening 27 which may be readily enlarged to provide the form of loop fully disclosed in Fig. 1. It will be noted that such a loop has no joint of any kind and that there is no waste of material, only so much of wire 10 being used as necessary to supply the needed amount of material in loop 11. The length of flattened portion 26 can be so chosen that the full equivalent cross section of wire 10 is present in loop 11, whereby there will be no material sacrifice of the strength of the wire as a whole in forming the fastening.

Obviously, the full advantage of a tie of this nature can be best realized when it is used with bales of uniform length. However, occasionally a bale comes through a machine, as is well-known, of a shorter length than those intended. Under these conditions, the bale tie of the present invention can be used as indicated in Fig. 7. The head 12 is passed through loop 11 and pulled through as far as necessary, upset portion 19 and wire 10 sliding freely as above described between portions 16 and 17. When the desired position is reached, wire 10 may be bent back upon itself and wrapped, if desired, as indicated, to form a secure connection. Of course, it is understood that this does not take full advantage of the easy fastening characteristics of the loop and head, but on the other hand, a short bale comes through only occasionally and the bale tie of the present invention can be used nevertheless on such occasional bale without inconvenience.

Loop 11 may be formed in other ways within the contemplation of the invention, as for example, in Fig. 8, a wire as 28 is formed into a loop 29 corresponding to loop 11, as for example by bending in a die, the loop having a portion 30 which is laid against portion 28 and united therewith as for example by welding at 31. This loop has the same or equivalent operating characteristics as the above described loop 11 and accordingly need not be further described.

A further modification is shown in Fig. 9 in which a wire 32 may be formed as by bending into a loop 33 of similar characteristics to above mentioned loops 11 and 29, loop 33 terminating in a portion 34 which may be twisted in well-known manner about wire 32 for closing loop 33.

A still further modification is shown in Fig. 10 in which a wire 35 has a separately formed loop generally designated as 36, of similar characteristics to above mentioned loops 11, 29 and 33, fixed thereto as for example by welding at 37. An advantage of this construction is the convenience of using a different cross section of material in the loop from that in the wire itself.

A modified form of head is shown in Fig. 11 in which a wire 38 has a shoulder 39 formed thereon, the conical head and upset portions, such as shown in Fig. 1, for example, being omitted in this embodiment.

The operation of the invention is thought to be clear from the above description, it being understood that the bale tie is placed about a bale of compressed material in well-known manner, and head 12 hooked within loop 11 by an operator or otherwise. When head 12 is secured in loop 11, a moderate momentary pull collapses or distorts loop 11 somewhat, which prevents inadvertent removal or unhooking of head 12 from loop 11. In the event that a short bale is formed occasionally, the tie may be used by drawing wire 10 through loop 11 the required distance and bending and wrapping it after the manner of bale ties of known form. It is not necessary to provide a supply of ties of a different type for this contingency. In the event that a bale is dropped or otherwise subjected to excessive strain, a tie may yield slightly at shock absorbing portion 22 and prevent breaking of the wire.

The above being a complete description of an embodiment of the invention, what is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A bale tie including a length of baling wire having an upset portion adjacent one end, a head on said upset portion and having a conical configuration to facilitate insertion of the tie into baled material, a loop including a portion extending transverse to the wire, portions extending forwardly and inwardly from said transverse portion, portions extending from the last named portions spaced from each other a distance to freely accommodate said upset portion and extending substantially in the same direction as the wire, and said last named portions possessing the characteristics of portions that have been united for retaining said upset portion and said head when said head is engaged with said loop for fastening said tie, and said wire having an offset portion between the ends thereof which may yield upon application of excessive pull to the wire.

2. In a bale tie comprising a wire, a head including an upset portion of the wire, a shoulder transverse to the upset portion and a conical end

beyond the shoulder to form a point on the head to facilitate insertion of the tie.

3. In a bale tie including a length of wire having a loop at one end and a head at the other, a loop for said tie including a portion extending transversely of the wire substantially at right angles thereto, portions extending from the extremities of said transverse portion forwardly and inwardly at a lesser angle to the direction of the wire, portions extending forwardly from the last named portions spaced from each other sufficiently to freely accommodate the wire and joining with each other at a distance spaced from the second mentioned portions comparable to the length of said second mentioned portions, whereby pull on said loop while the head is engaged by the last mentioned portions of the loop will cause said transverse portion to bend, thereby reducing the spacing between the second mentioned portions and bending the wire at the point where the last mentioned portions join to close the spacing between the last mentioned portions, and thereby prevent the displacement of the wire and head from the loop.

4. A bale tie including a length of baling wire having an upset portion adjacent one end, a head on said upset portion and having a conical configuration to facilitate insertion of the tie into baled material, a loop including a portion extending transverse to the wire, portions extending forwardly and inwardly from said transverse portion, portions extending from the last named portions spaced from each other a distance to freely accommodate said upset portion and extending substantially in the same direction as the wire, and said last named portions possessing the characteristics of portions that have been united for retaining said upset portion and said

head when said head is engaged with said loop for fastening said tie.

5. A bale tie including a length of baling wire having an upset portion adjacent one end, a head on said upset portion, a loop including a portion extending transverse to the wire substantially at right angles thereto, portions extending forwardly and inwardly from said transverse portion, portions extending from the last named portions spaced from each other a distance to freely accommodate said upset portion and extending substantially in the same direction as the wire, and said last named portions possessing the characteristics of portions that have been united for retaining said upset portion and said head when said head is engaged with said loop for fastening said tie.

6. A loop for a bale tie including a length of wire, said loop comprising a portion extending substantially at right angles to the wire, portions extending from the extremities of the right angled portion forwardly and inwardly at an angle of substantially 45° to the direction of the wire, portions extending forwardly from the second named portions spaced from each other sufficiently to freely accommodate the wire, the last named portions joining with each other at a distance spaced from the second mentioned portions comparable to the length of said second mentioned portions, whereby a pull on said loop in the region of the last mentioned portions will cause said right angle portion to bend, thereby reducing the spacing between the second mentioned portions and bending the wire at the point where said last mentioned portions join, to reduce the spacing between said last mentioned portions.

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