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(54) Ligature.

(57) The ligature is made from a wire filament 12 formed into a ring 16 at one end and describes a planar curve to the other terminal portion 14 which describes a spiral. The spiral lies in a plane substantially perpendicular to the plane of the curve of the filament. The spiral portion 14 can slidably engage the filament 12 adjacent the ring 16 to form a closed loop about an article 24. Pulling the ring 16 along the line of the filament 12 causes the ligature to tighten. An elbow 22 in the filament enables the ligature to be applied with one hand, leaving the applicant's other hand free to hold the article 24.

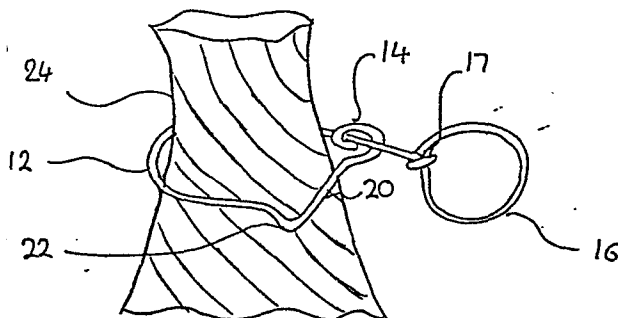


Fig. 3

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LIGATURE

The present invention relates to a ligature (or tie) for tying articles, comprising a filament having first and second terminal portions. The ligature may be used, for example, for tying the top of a bag or sack.

5 It is well known to close the top of a full bag or sack by tightening a ligature about a neck formed in the bag. The neck is formed by holding and twisting a portion of the bag adjacent the opening. The ligature may simply be a length of wire, the ends of which are twisted together after the wire has been passed around
10 the neck.

 A second known ligature comprises a filament of flexible material having an eye at a first end through which the second end can pass. The inner surface of the eye and the outer surface of the filament cooperate to prevent the loop formed by the ligature
15 from loosening. For this reason, the cooperating surfaces may be roughened or shaped to provide increased friction between the eye and the filament.

 Successful application of a ligature, particularly to a full bag, can be hard to achieve. The bag may be difficult to support
20 in a convenient position, and there is a tendency for the neck of the bag to untwist while the ends of the ligature are being connected, or the ligature is being tightened.

 A ligature according to the present invention is characterised in that the filament is resilient and flexible and describes
25 a pre-determined curve in a first plane and in that the first terminal portion is adapted so as to be capable of being hooked onto the filament adjacent the second terminal portion, to be slidably engageable with the filament.

While the known ligatures described above require two hands to connect the ends of the ligature, a ligature according to the invention may be passed around a bag with one hand. The user's first hand can also connect the ends of the ligature and tighten it about the neck. The user's second hand is therefore free to provide support for the bag and to prevent the neck from untwisting throughout the operation, until the ligature has been successfully applied and tightened.

Two embodiments of the invention will be described with reference to the drawings, in which:-

Figs. 1 to 4 show one embodiment of the ligature according to the invention and indicates its method of use, and

Fig. 5 shows a second embodiment.

Referring to Fig. 1, the first embodiment of the ligature 10 comprises a flexible filament 12 which may be, for instance, of 1 mm diameter copper wire, or another malleable metal. The filament describes a curve in a first plane, which is the plane of the paper in Fig. 1. The first terminal portion 14 forms a portion of a spiral in a second plane, which is perpendicular to the paper in Fig. 1. The first terminal portion 14 may be hooked onto the filament 12 adjacent the second terminal portion 16. When hooked onto the filament 12, the second terminal portion 14 is slidable along the filament 12, and the ligature 10 forms a closed loop. For ease of use, the ligature 10 should be formed so that before use, the spiral portion 14 and the filament 12 adjacent the second terminal portion 16 are only separated by a narrow gap 18.

The second terminal portion 16 is formed into a ring by tightly wrapping the end 17 around the filament 12. The ring 16 so formed has dimensions which enable a finger to be inserted therein.

5 The curve of the filament 12 incorporates a straight portion 20, substantially perpendicular to the filament 12 adjacent the ring, between the spiral portion 14 and an elbow 22 in the filament 12.

The spiral portion 14 defines a sufficient portion of a spiral to enable the portion 14 to be securely hooked onto the filament 12. In the case of copper wire, it has been found that the ligature is
10 satisfactory when the spiral portion 14 defines one complete revolution of a spiral. The form of the spiral portion 14 can be varied according to the properties of the filament material.

Referring also to Figs. 2, 3 and 4, the method by which the ligature 10 may be used to secure the opening of a bag will now be
15 described. The ligature 10 is held in one hand, with a finger through the ring 16. A neck 24 is formed in the bag in the manner described above and the ligature 10 is passed around the neck, so that the neck passes through the gap 18. The filament 12 is then around the neck 24. The thumb of the hand holding the ligature is
20 applied to the elbow 22 and, by pushing against the resilience of the wire, guides the spiral portion 14 under and past the filament 12 (the term "under" being used to indicate the position relative to the ligature which appears as "under" in the drawings).

Upon release of the elbow 22 by the thumb, the filament springs
25 back until the spiral portion 14 surrounds the filament (see Fig.3). The spiral portion 14 is thereby in slidable engagement with the

filament adjacent the ring 16 and the ligature forms a closed loop around the neck 24 of the bag.

By pulling with the finger in the ring 16, the closed loop formed by the ligature 10 tightens as the spiral portion 14 slides
5 along the filament 12 to the position shown in Fig. 4. The ring is pulled until the neck 24 is held satisfactorily tightly. During application of the ligature 10, the spiral portion 14 may partially uncoil, but the bag can be secured except when it has a very narrow neck, before the spiral portion 14 disengages the filament 12.
10 Indeed, the end of the spiral has been observed to engage a plastic bag and to be driven into the neck of the bag as the ligature is tightened, thus securely tying the bag.

A second embodiment of the ligature is shown in Fig. 5. Where applicable, numerals used in Figs. 1 to 4 are used in Fig. 5 to
15 indicate corresponding parts of the two embodiments of the ligature. The ligature 10 shown in Fig. 5 is made from a flexible synthetic plastics material, for instance nylon. The plastic filament 12 has an integrally formed ring 16 at one end. At the other end, the filament widens into a spiral band 14. The filament may conveniently
20 have a circular cross-section, but other cross-sections may of course, be used.

The ligature 10 of Fig. 5 is applied to the neck of a bag in the same way as is the first embodiment. The inner-facing surface of the spiral band 14 and the outer surface of the filament 12 along a
25 portion of the length of the filament 12, are formed to cooperate to prevent the spiral band 14 from moving along the filament towards the

ring 16, and thereby to prevent the ligature 10 from loosening once it has been tightened. To this end the surface of the filament 12 is roughened and the inside of the spiral band 14 is provided with ridges.

5 It will be seen that the ligatures described above are more convenient to use than known devices. The present ligature can be applied with one hand, in the manner described, whilst the user's second hand prevents the neck from untwisting. The ligature can be tightened sufficiently for the ring 16 to be used as a carrying
10 handle for the closed bag.

 The ring 16 forms a useful carrying handle by which the bag can be carried. The ring can in an alternative be replaced by a T-bar at the end of the filament.

 While the ligature has been described for use in tying a bag,
15 it can be used for a multitude of other purposes, for example for holding a bundle of cables together.

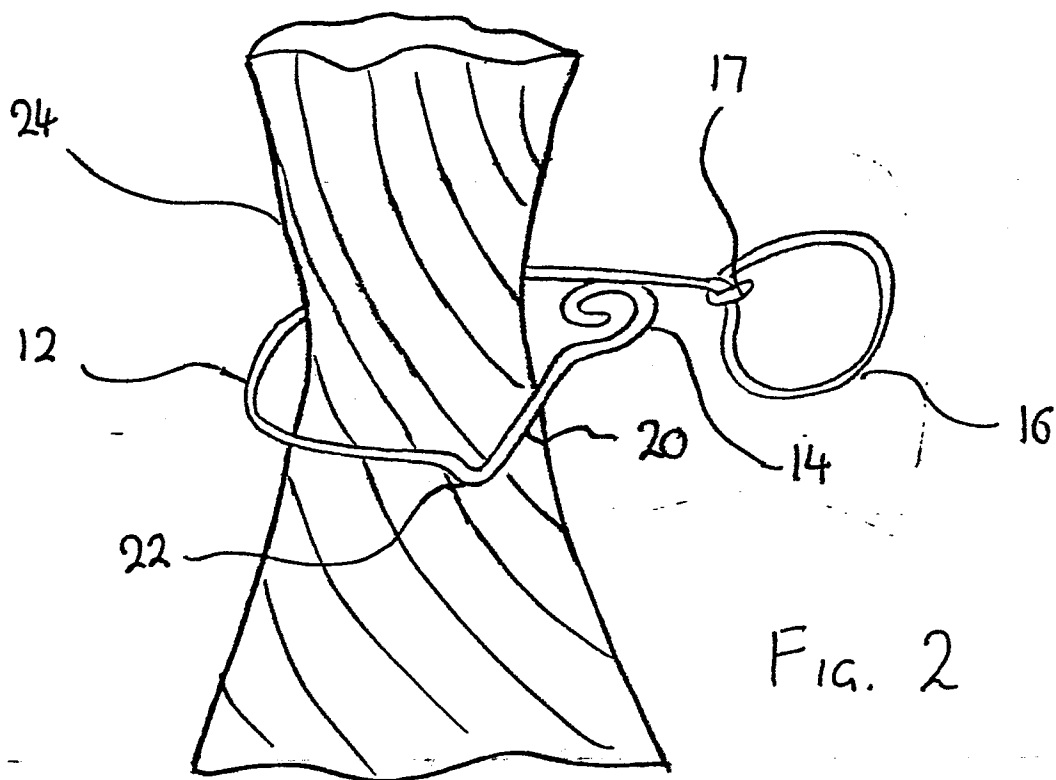
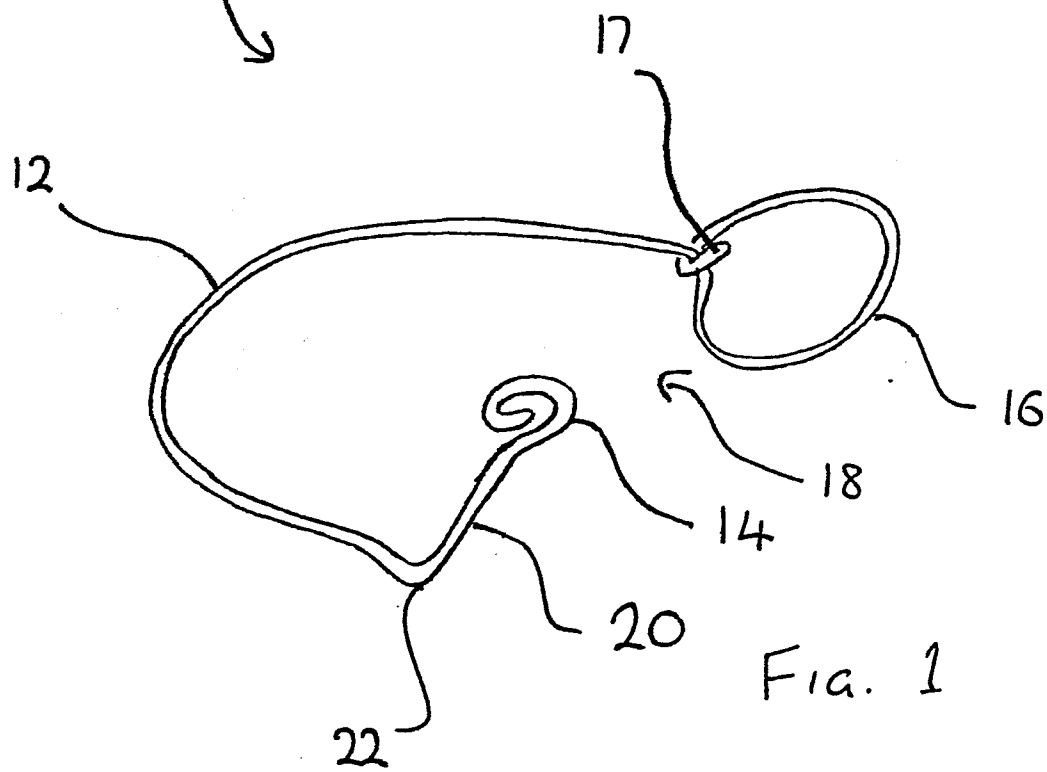
 It will be apparent that the ligatures described may be made in a variety of materials, sizes and shapes according to the application for which they are intended, whilst remaining within the
20 scope of the invention. It is thought that glass fibre might form a suitable basis as an alternative material.

CLAIMS:

1. A ligature (10) for tying articles, comprising a filament (12) having first and second terminal portions (14, 16), characterised in that the filament (12) is resilient and flexible and describes a pre-determined curve in a first plane, and in that
5 the first terminal portion (14) is adapted so as to be capable of being hooked onto the filament (12) adjacent the second terminal portion (16), to be slidably engageable with the filament (12).
2. A ligature according to claim 1, characterised in that the
10 first terminal portion (14) forms a portion of a spiral in a second plane.
3. A ligature according to either of the above claims, characterised in that there is an elbow (22) at an intermediate point in the filament (14), and in that the portion of the curve
15 between the first terminal portion (14) and the elbow (22) is straight and substantially perpendicular to the portion of the curve adjacent the second terminal portion (16).
4. A ligature according to any of the above claims, characterised in that the second terminal portion (16) forms a ring to
20 facilitate pulling the filament (12) to tighten the ligature (10).
5. A ligature according to any of the above claims, characterised in that the filament (12) is deformable to prevent the ligature (10) loosening when it has been tightened.
6. A ligature according to claim 5, characterised in that the
25 filament (12) is made from copper.

7. A ligature according to any of claims 1 to 4, characterised
in that the filament (12) is made from a synthetic plastics material
and in that the filament (12) along at least part of its length
and the first terminal portion (14) cooperate to prevent the
5 ligature (12) loosening when it has been tightened.

8. A ligature according to claim 7, characterised in that the
synthetic plastics material is nylon.



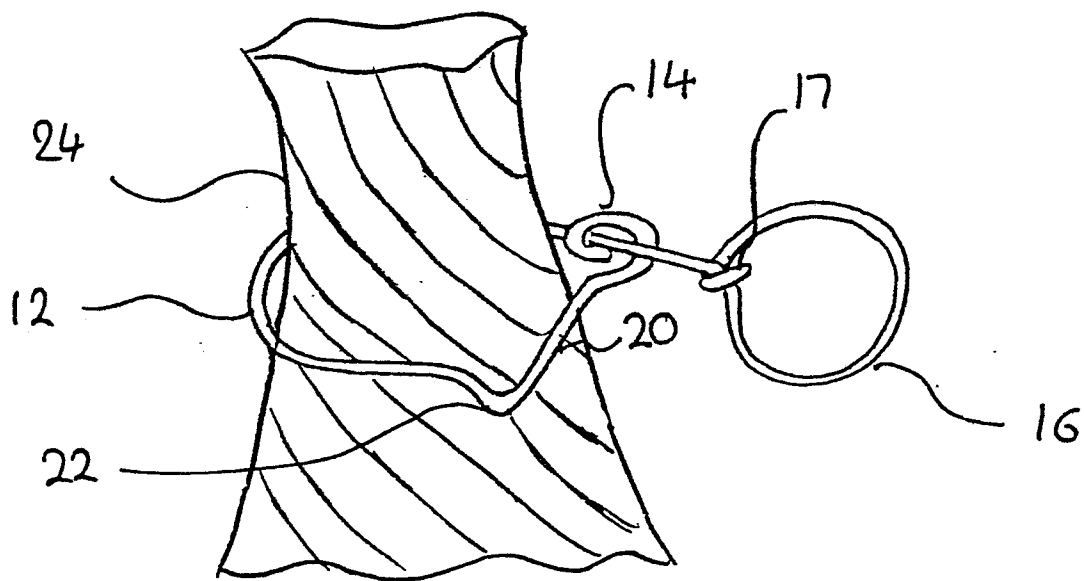


FIG. 3

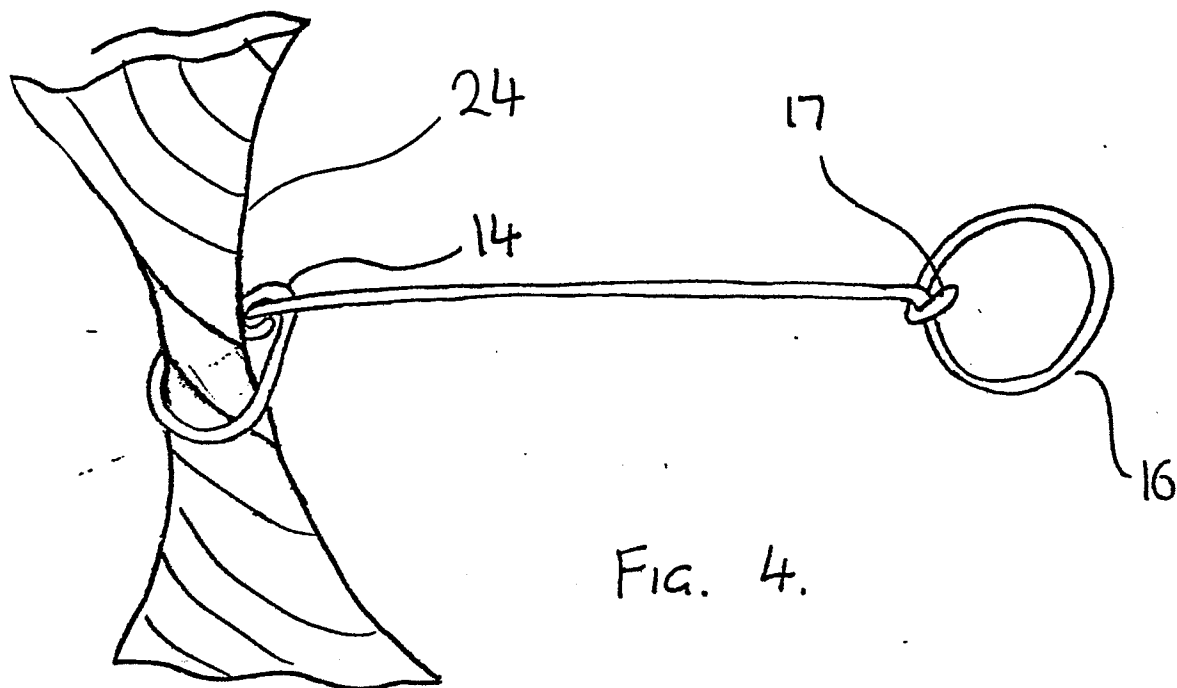


FIG. 4.

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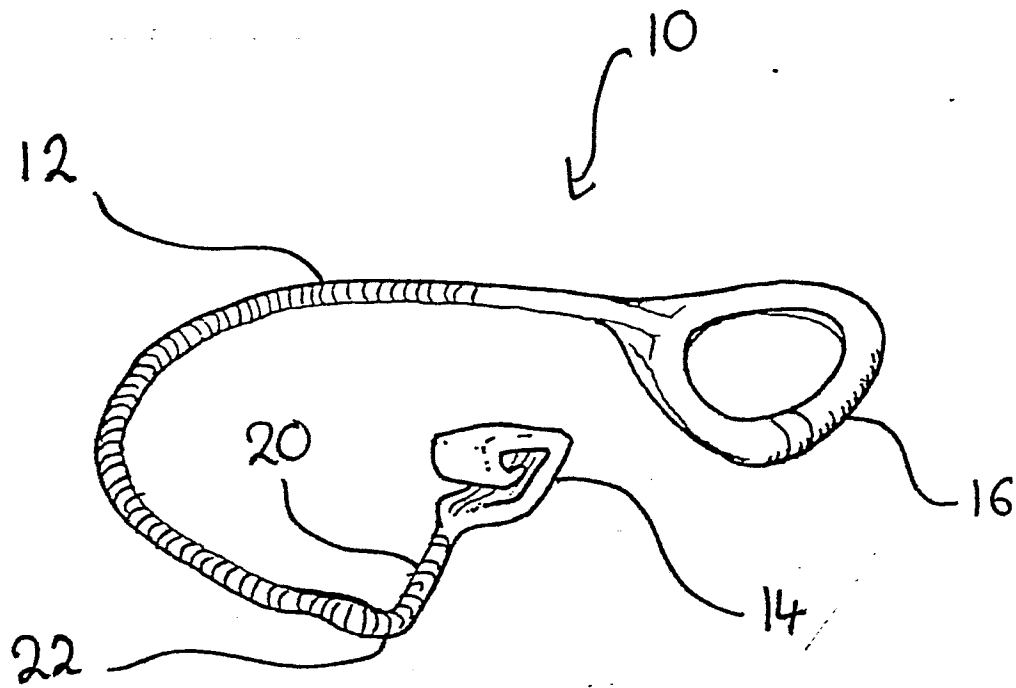


FIG. 5



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EUROPEAN SEARCH REPORT

0153514

Application number

EP 84 30 1053

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	DE-A-2 750 588 (GENOUD) * page 4, paragraphs 1,3,5; figures 1-3 *	1,5,7	B 65 D 77/18
A	--- US-A-2 314 252 (SPRINGBORN) * page 1, column 2, lines 14-43; figures 1-3 *	1,5	
A	--- US-A-2 628 396 (GRIMES)		
A	--- US-A-3 882 573 (THOMAS)		
A	--- CH-A- 529 019 (INJECTA) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15-10-1984	Examiner VANTOMME M.A.
CATEGORY OF CITED DOCUMENTS			
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