

SPECIFICATION

Helical corkscrews

This invention relates to helical corkscrews.

It would be desirable to provide a helical

- 5 corkscrew whose use entailed only a minimum risk of causing small cork fragments to break off the cork being extracted even when the corkscrew is driven completely through the cork.

- 10 In accordance with the present invention there is provided a helical corkscrew including a main portion and a pointed tip portion, said tip portion having its downwardly facing surfaces (as hereinafter defined) substantially on lead with the helix of the downwardly facing surfaces of said
- 15 main portion, but having its thickness reduced along non-downwardly facing surfaces to form said pointed tip portion.

The present invention also provides a method of forming a corkscrew comprising:

- 20 a. forming a helix from a wire;
- b. removing material from one end portion of said wire to form a pointed tip portion, said material being removed from surfaces of said tip portion which are non-downwardly facing (as
- 25 hereinafter defined) when said helix is disposed vertically with said tip portion lowermost.

- As used herein, a surface is considered "downwardly" facing if a vector extending away from the surface and normal thereto has a
- 30 vertically downwardly directed vector component.

- The tip portion of the present corkscrew is formed in such a way that it substantially eliminates the tendency for small cork fragments to be broken away, even when the corkscrew is
- 35 driven completely through the cork. This effect may be further enhanced by the provision of an outer layer of friction reducing material on at least the downward facing surfaces of at least the tip portion, so that the possibility of contamination of
- 40 wine by cork fragments can be virtually eliminated.

- Furthermore, the provision of a friction reducing layer on at least the downward facing surfaces of the tip portion greatly enhances the
- 45 ease with which the corkscrew may be driven into the cork. This friction reducing expedient not only virtually eliminates any problem in easily penetrating a tight cork, but also permits the use of design features in the main portion of the corkscrew, which could not be used without the
- 50 friction reducing layer, and which themselves enhance the ease of insertion and otherwise improve the corkscrew. Accordingly, the provision of such a friction reducing layer on the corkscrew
- 55 is much preferred.

- In some instances, it may be preferable to provide the friction reducing layer not only on the tip portion but also along substantially the entire length of the main portion as well. However, in
- 60 other instances it is possible to coat only the lowermost portion of the main portion.

The present invention will now be described in more detail in conjunction with the accompanying drawings, in which:

- 65 Fig. 1 is an elevational view of one embodiment of a corkscrew in accordance with this invention;

Fig. 2 is an enlarged detailed elevational view taken on line 2-2 of Fig. 1;

- 70 Fig. 3 is a further enlarged view taken on line 3-3 in Fig. 2;

Fig. 4 is a further enlarged cross-sectional view taken on line 4-4 of Fig. 2; and

- 75 Fig. 5 is a rectified longitudinal sectional view through the tip portion of the corkscrew.

- The embodiment of corkscrew 18' illustrated in the drawings is formed from a length of high tensile metal wire wound into a helix. This wire forms the main portion or body 19 of the corkscrew. The end of the wire destined to be
- 80 disposed lowermost of distal handle 20 in the finished product is formed into a pointed tip portion 23. As best shown in Figs. 2 and 3, no metal is removed from the downwardly facing surfaces 23a of tip portion 23 whereby they remain on lead with the helix of the downwardly facing surface, 18a of the main portion of the corkscrew thereabove, i.e. surfaces 18a and 23a define a continuous helix of constant lead or pitch.
- 90 However, the thickness of tip 23 is reduced along non-downwardly facing surfaces, and preferably substantially upwardly facing surfaces 23b to form the pointed tip. As already defined, a surface is considered "downwardly" facing if a vector extending away from the surface and normal thereto has a vertically downwardly directed vector component. The reduction in thickness to form surfaces 23b may be performed by any
- 95 suitable metal removing technique, Fig. 5 is a rectified longitudinal sectional view of the lower part of corkscrew 18', i.e. as if the helical wire were straightforward. The surface 23b preferably extends along a length of said wire sufficient to form a full turn of the helix, although shorter ground surfaces may also be satisfactory.

- The main body 19 is coated with a layer 25 of friction reducing material. For the sake of clarity of illustration, layer 25 is shown only in Figs. 4 and 5. The friction-reducing material of layer 25 may be a polytetrafluoroethylene or any other suitable material bonded to main body 19 by techniques known in the art. As used herein, the term "friction-reducing" will be construed to cover any material which reduces the friction between the corkscrew and cork to a significantly greater
- 110 degree than could be achieved by merely polishing the central body. Although the polytetrafluoroethylenes, and similar plastics produce particularly striking results, other materials such as molybdenum disulfide or silicone coatings could also be used.

- The primary purpose of layer 25 is to increase the ease with which the corkscrew may be driven into the cork. In some embodiments, the layer 25
- 125 is provided only on the lower portion of the corkscrew, this portion including the part of the corkscrew which is driven into the cork. Thus, while leaving the upper portion of the corkscrew uncoated does not substantially detract from the

performance of the apparatus, it may decrease the cost of production. In other embodiments, however, especially those in which the corkscrew is to be used as a simple corkscrew and handle without a holder, it may be preferable to coat a greater portion of the main body of the corkscrew. The drawings disclose such an embodiment, designed to be used either alone as a simple corkscrew or with a holder of the type shown in Figs. 1—3 of the parent Application No. 7923805, and in which the corkscrew 18' has its main body 19 coated along its entire length, exclusive of the end portion received in handle 20, with the friction reducing layer 25.

To reduce the possibility of wear of such layer 25 from the upper portion of main body 19 when it is to be used with such a holder, the wire of said body is ground to form a radially outwardly facing flat 21 to provide a greater surface for contact with the guide means of the holder.

In any event, it has been found that, where a plastics friction reducing material such as polytetrafluoroethylene is used, even if such material does appear to wear away from the main body (including its lower portion) in use, a certain amount of the plastics material remains on the surface of the body. Thus, such wear does not substantially change the ability of the corkscrew to penetrate a cork. On the contrary, any differences in the ease of penetration due to normal wear is negligible.

In the illustrated embodiment, the friction reducing layer extends about the entire circumference of the underlying wire. However, good results can still be obtained by coating only the downwardly facing surfaces, such as 18a and 23a. Likewise, while the coating preferably extends over the lower portion of the corkscrew for a length at least approximately equal to the length of an average cork, i.e. about 5 cm, a substantial increase in the ease of insertion may be obtained by coating only the tip portion 23 or the lower surfaces 23a thereof.

Friction reducing coatings as described above have been found to dramatically increase the ease with which a corkscrew such as illustrated may be driven into a cork. Indeed, the reduction in friction is so greater as to permit the use, in main body 19, of design features and parameters which would not be practicable without layer 25. For example, the wire of which body 19 is formed may be thinner than in conventional screws, and a wider range of helix leads is available. Such design features in turn may even further enhance the ease of insertion. Thus, for example, the use of layer 25, especially in cooperation with other friction reducing features made possible thereby substantially ensures the capability of driving the corkscrew to a sufficient depth in a cork, even where the latter is relatively hard and/or tightly engaged in the bottle neck, and even though the main body 19 of the corkscrew might be so flexible that it would, in the absence of layer 25, be unwound or otherwise distorted in an attempt to drive it into a cork.

The manner in which a tip portion 23 is formed, together with the use of friction reducing layer 25, substantially eliminates the tendency for small fragments of cork to be broken off and fall into the bottle even though the tip portion 23 is driven completely through the lower end of the cork.

As noted hereinabove, the removal of the material from tip portion 23 to reduce its thickness and form a point is from non-downwardly facing surfaces 23b. The surfaces 23a, which do have at least some downward component of orientation, remain on lead with the helix defined by the downwardly facing surfaces 18a of the main upper portion of the corkscrew, i.e. surfaces 18a and 23a define a helix of constant lead or pitch. Thus, surface 23a is also on lead with or parallel to the helical path of movement of the corkscrew through the cork. Accordingly, as tip portion 23 is driven through the cork, the wedging action thereof will exert a compressive force perpendicular to surfaces 23a since they are not on lead with or parallel to the path of movement. It can be seen that a vector perpendicular to non-downwardly facing surfaces 23a will either face directly vertically upwardly, or will at least have a substantial upward component and no downward component, depending on its precise position on surfaces 23b. On the other hand, any vector perpendicular to any portion of surfaces 23a will have a vertically downward component, but no force will be exerted in the directions of these latter vectors for reasons mentioned hereinabove. Accordingly, as tip portion 23 breaks through the lower end of a cork, there will be no downward compressive force on the cork and thus no tendency to break away any small fragments. On the contrary, the compressive force on the cork by the wedging action of tip portion 23 will be directed substantially vertically upwardly and will thus tend to help pull the cork itself in an upward direction.

This effect is further enhanced by the friction reducing coating 25 along at least surfaces 23a, and preferably along a greater portion of main body 19. This is due not only to the reduction in friction *per se* but also to the fact that such reduction in turn permits a smaller diameter wire to be used for the central body. Of course, the smaller the diameter of the wire passing through the cork, the less likely is the chance of a piece of cork chipping off. A cork extracting apparatus of the type shown in Figs. 1—3 of the parent Application *supra*, and having a corkscrew with a tip portion formed in accord with Figs. 2 and 3 of the present specification and also having a small diameter central body fully coated with a layer of a polytetrafluoroethylene has been used in tests with corks of various ages, densities, etc. These preliminary tests have indicated that there is little or no possibility of a chip or fragment of cork breaking away and falling into the bottle as the lower end of the tip portion of the corkscrew breaks through the lower end of the cork.

As mentioned above, the major improvements possessed by the illustrated corkscrew 18', while extremely advantageous in a cork extracting apparatus such as that shown in Figs. 1—3, of the parent Application, *supra*, are useful in virtually any type of cork extractor. For example, the corkscrew 18' with handle 20 can itself be used as a simple corkscrew wherein the friction reducing layer 25 will still operate to substantially facilitate insertion of the screw into the cork, and wherein the formation of tip portion 23, especially when combined with such friction reducing layer, will further operate to prevent the chipping away of cork fragments from the lower end of the cork. Likewise, the teachings of the present invention can be embodied in other forms of corkscrews, regardless of whether these corkscrews are intended for independent use or are incorporated into some type of mechanical cork extracting machine.

The reader's attention is directed to my co-pending Application No. 82018167, also divided out of Application No. 7923805, and which claims apparatus for extracting a cork from a bottle comprising a holder including—

guide means having a guide passageway extending generally longitudinally therethrough and having a generally radially facing guide surface means;

stop means engageable with the bottle to limit downward (as hereinbefore defined) movement of said holder with respect to the bottle; and

grip means engageable with the bottle to generally coaxially align said guide means with the bottle and comprising a plurality of longitudinally extending, circumferentially spaced, radially deflectable gripping elements connected to and spaced downwardly (as hereinbefore defined) from said guide means and approximately equally resiliently biased to a normal unflexed radial position; and

a cork-engaging member including a corkscrew longitudinally movable in said guide passage selectively with or without simultaneous rotation and having a diameter sized to lie closely adjacent said guide surface means.

Claims

1. A helical corkscrew including a main portion and a pointed tip portion, said tip portion having its downwardly facing surfaces (as hereinbefore defined) substantially on lead with the helix of the downwardly facing surfaces of said main portion, but having its thickness reduced along non-downwardly facing surfaces to form said pointed tip portion.
2. A corkscrew according to Claim 1, wherein there is an outer layer of friction reducing material

on at least the downward facing surfaces of said tip portion.

3. A corkscrew according to Claim 2, wherein there is also an outer layer of friction reducing material on at least the downward facing surfaces of said main portion at least over a proportion of the length thereof adjacent said tip portion.

4. A corkscrew according to Claim 2 or Claim 3, wherein the friction reducing layer extends about the entire circumference of the tip portion and, optionally, said main portion, at least over a proportion of the length thereof adjacent said tip portion.

5. A corkscrew according to Claim 4, wherein the friction reducing layer extends over substantially the entire surface area of both said tip portion and said main portion.

6. A corkscrew according to any one of Claims 2—5, wherein said friction reducing material is a plastics coating bonded to said corkscrew.

7. A corkscrew according to Claim 6, wherein said friction reducing material is a polytetrafluoroethylene.

8. A corkscrew according to any preceding claim, wherein said main portion is formed of a wire wound into a helical configuration.

9. A corkscrew according to any preceding claim, having a handle affixed to the end of the main portion remote from said tip portion.

10. A method of forming a corkscrew comprising:

- a. forming a helix from a wire;
- b. removing material from one end portion of said wire to form a pointed tip portion, said material being removed from surfaces of said tip portion which are non-downwardly facing (as hereinbefore defined) when said helix is disposed vertically with said tip portion lowermost.

11. A method according to Claim 9, wherein said helix is formed prior to the removal of material from said tip portion.

12. A method according to Claim 10 or Claim 11, wherein said wire is comprised of a metal.

13. A method according to any one of Claims 10—12, comprising the further step of bonding a friction reducing coating of plastics material to at least the downward facing surfaces of said tip portion.

14. A method according to Claim 13, wherein said friction reducing plastic is a polytetrafluoroethylene.

15. A helical corkscrew, according to Claim 1 and substantially as hereinbefore described with reference to the accompanying drawings.

16. A method of forming a corkscrew, according to Claim 10 and substantially as hereinbefore described with reference to the accompanying drawings.



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15. A helical corkscrew, according to Claim 1 and substantially as hereinbefore described with reference to the accompanying drawings.

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