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PATENT SPECIFICATION

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(54) HAND TOOL FOR BREAKING THE NECKS OF GLASS AMPULES

(71) We, IMS LIMITED, a Corporation organized and existing under the laws of the State of Delaware, United States of America, of 1886 Santa Anita Avenue, South El Monte, California 91733, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a hand tool for breaking the necks of glass ampules.

Liquid and powdered medications are commonly packaged in glass ampules at the factory. The glass completely encapsulates the medication and is ideal in that glass is substantially inert, non-reactive, and non-absorptive. The seal effectively preserves the medication in a sterile or aseptic condition. At the time of use, the ampule, which has a necked-down area, viz, an area of reduced cross section in proximity to its upper end located above the fill level of the medication, is manually broken by the digital application of flexing force which separates the upper and lower portions of the ampule along a jagged, glassy edge at the necked-down area. The physician or nurse subsequently withdraws the medicinal contents of the ampule, for example with a hypodermic syringe.

The problem in the art has been that the breaking of the glass ampules to permit the withdrawal of the medicinal contents has exposed medical personnel to the risk of cut fingers on the jagged glassy edge. More seriously, due to imperfections in the glass, or abuse in transit and handling, the ampule not infrequently contains a hair line crack which parts when the digital flexing pressure is applied to open the ampule, with the consequence that the ampule comes apart in the hands and inflicts serious lacerations and cuts to the fingers and hands.

According to the present invention there is provided a hand tool for the manual or digital breaking of glass ampules of

medication and other liquid or dry materials, the tool comprising two oppositely facing cylindrical members having a common longitudinal axis, each open at its outer end, each having a closed end, said closed ends being joined and separated by an intervening web of material, the walls of each said cylindrical member being composed of a suitable material and having a thickness such that said walls are inwardly elliptically digitally deformable and are recoverable to their original cylindrical form upon release of digital pressure, said cylindrical members being of different internal diameters, the arrangement being such that in use of the device one of said cylindrical members loosely receives the upper portion only of an ampule to be broken with the lower portion of said ampule projecting beyond the end of said cylinder, said walls being externally elliptically digitally deformable against the upper portion of the ampule in use of the tool to hold said upper portion while said lower portion of said ampule is digitally held by the other hand so that said upper and lower portions can be broken and separated by flexing digital force.

This invention will be further described, by way of example, with reference to the accompanying drawings, wherein:

Figure 1 is a plan view of a hand tool embodying this invention;

Figure 2 is a longitudinal sectional view taken along the line 2—2 in Figure 1;

Figure 3 is a sectional view taken along the line 3—3 in Figure 2;

Figure 4 is a sectional view taken along the line 4—4 in Figure 1;

Figure 5 is a sectional view taken along the line 5—5 in Figure 1; and

Figure 6 is a perspective series of views illustrating the use or operation of the hand tool in the opening of a typical glass ampule of medication.

Considering now the drawings in greater detail, a hand tool 10 has two oppositely facing cylindrical members 12 and 14 having a common longitudinal axis. Each

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cylinder is open at its outer end, 16 and 18. Each cylinder has a closed end 20 and 22. The closed ends are joined and separated by an intervening web of material 23. The walls of each cylinder 12 and 14 are composed of and have a thickness such that the walls 24 in proximity to the open ends are inwardly elliptically digitally deformable and are recoverable to their original cylindrical form upon release of digital pressure. The cylinders 12 and 14 are of differing diameters. Each of the cylinders have a length adapted to receive the upper portion 26 only of an ampule 28 to be broken whereby the lower portion 30 of the ampule 28 projects beyond the end of the cylinder. Each of the cylinders 12 and 14 has a diameter adapted to loosely receive the upper portion 26 of the ampule 28 whereby the walls 24 can be externally elliptically digitally deformed against the upper portion 26 of the ampule 28 to hold the upper portion 26 while the lower portion 30 of the ampule 28 is digitally held by the other hand so that the upper and lower portions 26 and 30 can be separated by flexing digital force.

The walls 24 are normally composed of high density polyethylene or polypropylene. The thickness of these walls is such that they are digitally deformable and can be readily determined for any given plastics or other construction material.

As can be seen, cylinders 12 and 14 differ in diameter. The larger diameter cylinder 12 is adapted to receive the upper end of a standard 2 cc glass medicinal ampule. The smaller diameter cylinder 14 is adapted to receive the upper end of a standard 1 cc glass medicinal ampule. The depth or length of the cylinder 12 is essentially equal to the length of the upper portion of a 2 cc ampule (not illustrated). The upper portion constitutes the portion above the normal "breakline" or necked-down portion of the ampule which is intended to be broken for withdrawal of the medicinal contents.

Similarly, the depth of cylinder 14 is essentially equal to the length of the upper portion 26 of the 1 cc ampule 28. The term upper portion here has the same meaning as stated in the previous paragraph.

As can be best seen in Figure 2, the cylinder 14 receives the upper portion 26 of 1 cc ampule 28 with some lateral play and hence the upper portion 26 is said to be loosely received in the cylinder 14. The terminal bulb portion 32 of the upper portion 26 is received in a smaller cylindrical bore in a portion 34 of the tool at the closed end of cylinder 14 the bore having a common centre line with the cylinder 14. The purpose of the bore in portion 34 is to restrict lateral sliding or excessive sideways movement of the

terminal portion 32 of the ampule when the flexing pressure is applied to break the ampule 28 at the breakline 36. The walls of the bore in the portion 34 need not be digitally deformable since no such deformation is required at that point. The walls here can be deformable, at the option of the plastics material moulder, but preferable they are not deformable.

In operation, the upper portion 26 of the ampule is fully inserted to the bottom of cylinder 14, which aligns the breakline 36 with the open end 18. The left hand fingers grasp the exposed lower end 30 of the ampule 28 while the right hand fingers grasp the external surface of cylinder 14 containing the upper end 26 of the ampule and squeeze the walls 24 against the upper end 26. By a flexing action or force between the hands, the ampule 28 is broken open along line 36.

As will be apparent, the other end of the tool 10 can be used to break open a 2 cc ampule.

A primary virtue of the tool 10 is that the tool protects the fingers of a user from the consequences of broken glass in the event the ampule comes apart due to hair-like cracks. These cracks normally occur only at the upper or narrower portions of the ampule.

It will also be understood that the free or unused length of the tool 10 in any opening operation affords leverage which better enables medical personnel to apply the necessary flexing force to the relatively short or stubby upper portion of the ampule.

WHAT WE CLAIM IS:—

1. A protective hand tool for the manual or digital breaking of glass ampules of medication and other liquid or dry materials, the tool comprising two oppositely facing cylindrical members having a common longitudinal axis, each open at its outer end, each having a closed end, said closed ends being joined and separated by an intervening web of material, the walls of each said cylindrical member being composed of a suitable material and having a thickness such that said walls are inwardly elliptically digitally deformable and are recoverable to their original cylindrical form upon release of digital pressure, said cylindrical members being of different internal diameters, the arrangement being such that in use of the device one of said cylindrical members loosely receives the upper portion only of an ampule to be broken with the lower portion of said ampule projecting beyond the end of said cylinder, said walls being externally elliptically digitally deformable against the upper portion of the ampule in

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5 cylinder is open at its outer end, 16 and 18. Each cylinder has a closed end 20 and 22. The closed ends are joined and separated by an intervening web of material 23. The walls of each cylinder 12 and 14 are composed of and have a thickness such that the walls 24 in proximity to the open ends are inwardly elliptically digitally deformable and are recoverable to their original cylindrical form upon release of digital pressure. The cylinders 12 and 14 are of differing diameters. Each of the cylinders have a length adapted to receive the upper portion 26 only of an ampule 28 to be broken whereby the lower portion 30 of the ampule 28 projects beyond the end of the cylinder. Each of the cylinders 12 and 14 has a diameter adapted to loosely receive the upper portion 26 of the ampule 28 whereby the walls 24 can be externally elliptically digitally deformed against the upper portion 26 of the ampule 28 to hold the upper portion 26 while the lower portion 30 of the ampule 28 is digitally held by the other hand so that the upper and lower portions 26 and 30 can be separated by flexing digital force.

30 The walls 24 are normally composed of high density polyethylene or polypropylene. The thickness of these walls is such that they are digitally deformable and can be readily determined for any given plastics or other construction material.

35 As can be seen, cylinders 12 and 14 differ in diameter. The larger diameter cylinder 12 is adapted to receive the upper end of a standard 2 cc glass medicinal ampule. The smaller diameter cylinder 14 is adapted to receive the upper end of a standard 1 cc glass medicinal ampule. The depth or length of the cylinder 12 is essentially equal to the length of the upper portion of a 2 cc ampule (not illustrated). The upper portion constitutes the portion above the normal "breakline" or necked-down portion of the ampule which is intended to be broken for withdrawal of the medicinal contents.

40 Similarly, the depth of cylinder 14 is essentially equal to the length of the upper portion 26 of the 1 cc ampule 28. The term upper portion here has the same meaning as stated in the previous paragraph.

45 As can be best seen in Figure 2, the cylinder 14 receives the upper portion 26 of 1 cc ampule 28 with some lateral play and hence the upper portion 26 is said to be loosely received in the cylinder 14. The terminal bulb portion 32 of the upper portion 26 is received in a smaller cylindrical bore in a portion 34 of the tool at the closed end of cylinder 14 the bore having a common centre line with the cylinder 14. The purpose of the bore in portion 34 is to restrict lateral sliding or excessive sideways movement of the

terminal portion 32 of the ampule when the flexing pressure is applied to break the ampule 28 at the breakline 36. The walls of the bore in the portion 34 need not be digitally deformable since no such deformation is required at that point. The walls here can be deformable, at the option of the plastics material moulder, but preferable they are not deformable.

70 In operation, the upper portion 26 of the ampule is fully inserted to the bottom of cylinder 14, which aligns the breakline 36 with the open end 18. The left hand fingers grasp the exposed lower end 30 of the ampule 28 while the right hand fingers grasp the external surface of cylinder 14 containing the upper end 26 of the ampule and squeeze the walls 24 against the upper end 26. By a flexing action or force between the hands, the ampule 28 is broken open along line 36.

75 As will be apparent, the other end of the tool 10 can be used to break open a 2 cc ampule.

80 A primary virtue of the tool 10 is that the tool protects the fingers of a user from the consequences of broken glass in the event the ampule comes apart due to hair-like cracks. These cracks normally occur only at the upper or narrower portions of the ampule.

85 It will also be understood that the free or unused length of the tool 10 in any opening operation affords leverage which better enables medical personnel to apply the necessary flexing force to the relatively short or stubby upper portion of the ampule.

WHAT WE CLAIM IS:—

105 1. A protective hand tool for the manual or digital breaking of glass ampules of medication and other liquid or dry materials, the tool comprising two oppositely facing cylindrical members having a common longitudinal axis, each open at its outer end, each having a closed end, said closed ends being joined and separated by an intervening web of material, the walls of each said cylindrical member being composed of a suitable material and having a thickness such that said walls are inwardly elliptically digitally deformable and are recoverable to their original cylindrical form upon release of digital pressure, said cylindrical members being of different internal diameters, the arrangement being such that in use of the device one of said cylindrical members loosely receives the upper portion only of an ampule to be broken with the lower portion of said ampule projecting beyond the end of said cylinder, said walls being externally elliptically digitally deformable against the upper portion of the ampule in



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use of the tool to hold said upper portion while said lower portion of said ampule is digitally held by the other hand so that said upper and lower portions can be broken and separated by flexing digital force.

2. A tool according to claim 1, wherein the said walls are of high density polyethylene or polypropylene.

3. A tool according to claim 1 or 2, wherein one of said cylindrical members has a length and diameter adapted to receive only the upper portion of a standard 1 cc medicinal ampule whereby the upper portion can be broken-off the ampule at a line aligned with said open outer end.

4. A tool according to claim 3, wherein the other of said cylindrical members has a length and diameter adapted to receive only the upper portion of a standard 2 cc medicinal ampule whereby the upper portion of the ampule can be broken-off at a line aligned with said open outer end.

5. A tool according to any preceding claim, wherein a bore of reduced diameter is provided at the closed end of each said cylindrical member, such bore being adapted to receive the terminal bulk portion of a standard medicinal ampule and to restrict lateral movement thereof.

6. A tool according to claim 5, wherein said walls of said reduced diameter bore are not digitally deformable.

7. A hand tool for the manual or digital breaking of glass ampules, such tool being constructed and arranged substantially as herein described with reference to and as illustrated in the accompanying drawings.

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