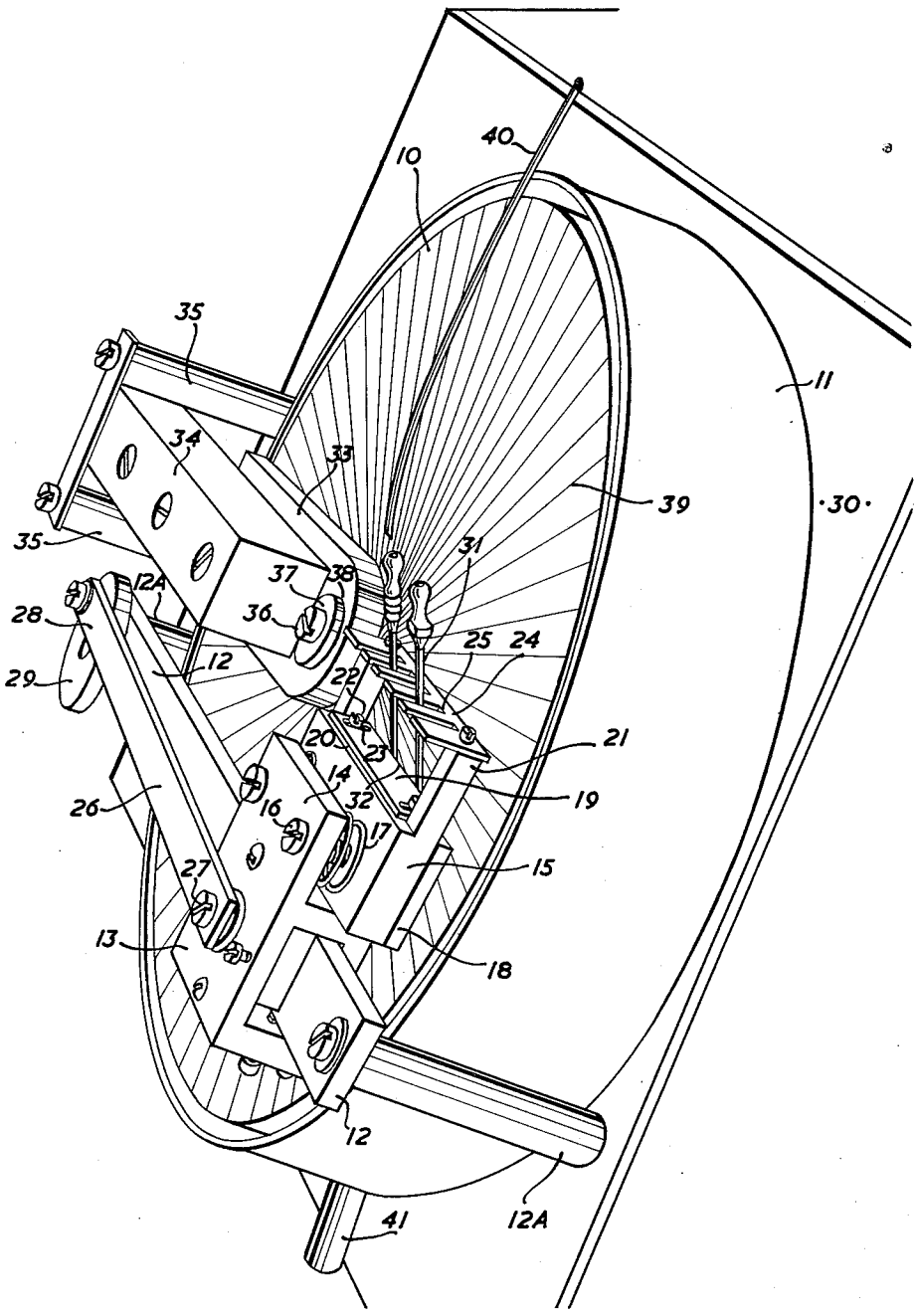
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NEEDLE SHARPENING APPARATUS

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# NEEDLE SHARPENING APPARATUS

George Anketell Bell, West Pymble, New South Wales, and James Lobb, Caringbah, New South Wales, Australia, assignors to Commonwealth Scientific and Industrial Research Organization, East Melbourne, Victoria, Australia, a body corporate of Australia

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This invention relates to apparatus for sharpening or resharpening hypodermic needles and similar hollow needles which will be referred to collectively hereinafter as needles.

Such a needle has a point formed on it primarily by producing on one end a flat or curved bevel surface oblique to the needle axis.

The present invention relates to the surfacing or resurfacing of flat or concave bevels.

The object of sharpening a hypodermic needle is to produce a sharp durable point on the end of the needle flanked by two sharp edges so that when the point of the needle penetrates the epidermis the edges will cut the skin and underlying tissue and permit the entry of the cannula without tearing of the tissue.

A sharp edge is formed by the intersection at an appropriate angle of two smooth surfaces. If the surfaces are flat, the edge formed by their intersection will be straight and if the surfaces are smooth the edge formed by their intersection will be free from serrations and similar imperfections. The point may be formed by the intersection at an appropriate angle of three or more smooth surfaces. The point will be sharp and free from burrs if the intersections and surfaces forming it are smooth.

A sharp point may also be formed by the intersection of a plane with a convex cylindrical surface.

A needle of one or all of these types may be sharpened or resharpened by producing on it a new bevel surface which is very smooth all over and is free from burrs, "turned edges" or crumbled edges.

It is desirable also that any method of resharpening needles should reproduce accurately the form and angle of the original bevel angle if this is the optimum or that the bevel angle shall be adjustable at will.

A finish of this type is conveniently achieved by lapping the surface on a suitable metal lap in which is embedded abrasive powder of a suitable hardness and particle size.

The object of the present invention is to provide apparatus for sharpening or resharpening flat bevels more satisfactorily than is the case with existing apparatus for the purpose.

Another object of this invention is to provide apparatus for the sharpening of needles which incorporates all of the above desirable features.

In a general form the invention is needle sharpening apparatus including a rotatable lap having a working surface, a block supported on the said lap surface at spaced locations and spaced from the surface between said locations and having an associated abutment edge substantially parallel to a generator of the said surface of the lap and spaced from the said surface, the lap and abutment edge being adapted to receive between them a needle end to be bevelled and sharpened with the needle end bevel surface contacting the said lap surface and the needle outer surface adjacent to the end to be sharpened contacting the abutment edge, and means for guiding the needle, the disposition of the guide means in relation to the lap being such that the bevel produced on the needle



end by contact between the needle end and the rotating lap surface has substantially the required angle with the needle axis.

Means are provided for moving the engaging surfaces of the needle bevel and lap relatively so as to abrade the bevel surface.

A preferred form of the invention is shown in the accompanying drawing.

A lap disc **10** is located within and spaced from a shallow cylindrical wall **11**. Conventional means (not shown) are provided for rotating the disc **10** about its centre. A guide bar **12** extends across parallel to and spaced from the disc **10** and supported at its ends on posts **12A**. On the bar is slidably mounted a block carrier **13** with an extension **14** from which a block **15** is suspended by screws **16**. The block is biased away from the carrier and against the disc **10** by springs **17** surrounding the respective screws **16**. The block is supported on the disc by tungsten carbide underflats **18**, one at each end, the part of the block between the underflats being spaced from the disc **10**.

A bar **19** is adjustably secured to the face **20** of the block, between parallel wings **21** extending from the block, by screws **22** extending into the block through slots **23** in the bar **19**. A comb plate **24** with spaced slots **25** is secured to and between the wing outer ends. Elongated holes may be substituted for the slots **25**. The carrier **13** is reciprocated on the bar **12** by means of a connecting rod **26** pivoted at one end **27** to the carrier and at the other end **28**, off-centre, to a disc **29** secured on the upper end of a rotatable shaft which may pass through a hole in the bar **12**.

The objects of the reciprocation of the carrier **13** and with it the block **15** is to distribute wear as much as possible.

The components so far described are supported on a table or platform **30** at an angle to the vertical approximately equal to the angle between the required bevel plane and the needle axis. The needles **31** to be sharpened are disposed vertically in the respective comb slots **25** with the bevel plane to be lapped engaging the disc and the outside of the needle near its point against the abutment edge **32** of the bar **19**. The edge **32** is parallel to the disc surface.

A pressing plate **33** is secured to an arm **34** passing at its outer end between posts **35**.

An extension **36** of the rotatable shaft carrying the disc **10** is located off-centre in and secured to a disc **37**, fitting closely in a hole **38** in the inner end of the plate **33**. As the disc **37** rotates with the shaft it imparts a small approximately radial reciprocating movement to the pressing plate **33**.

The disc is of conventional construction and of relatively soft metal such as cast iron or bronze. It has formed in its surface shallow approximately radial grooves **39**. A suspension of abrasive powder in a liquid is fed onto the disc along the surface of a rod **40** at a point adjacent to the disc surface as shown. Surplus abrasive falls into the space between the disc **10** and the wall **11** and is removed through a pipe **41**.

The function of the plate **33** is to distribute abrasive powder over the disc surface and to press it into the disc. The purpose of the grooves is to remove debris from the surface of the disc and to remove burrs from the edges of the needle bevel.

In a further form of the invention, for producing cylindrical instead of flat bevel surfaces, a cylindrical lap disposed with its axis horizontal is employed.

As before a block is provided with an abutment edge spaced from and substantially parallel to a generator of the cylindrical lap surface. Each needle is disposed and

guided vertically, point downwards, with its pointed end between the lap and the abutment edge, the bevel engaging the lap surface and the opposite outer surface engaging the abutment edge.

Where it is required to sharpen or resharpen needles, some with flat bevels and others with cylindrical bevels, a composite lap may be employed having both a cylindrical lap surface and a flat circular end lap surface. Either lap surface may then be used according to the bevel required. For both flat and cylindrical laps rotation may be in either direction.

What we claim is:

1. Apparatus for sharpening a needle comprising a rotable lap having a working surface, a block contacting said working surface at spaced locations, the block being spaced from said working surface between said locations, said block having an abutment edge substantially parallel to said working surface and spaced therefrom, said working surface and abutment edge defining a support for said needle, the needle having a surface adapted for contacting the working surface so that the surface of the needle is beveled at a determinable angle, the needle having an outer surface adjacent the first said surface thereof and adapted to contact the abutment edge, and spaced guides above the abutment edge, each guide adapted for supporting said needle and cooperating with the abutment edge and the working surface of the lap to maintain the needle in a substantially upright position, the surface of the lap which is adjacent to the first said needle surface being inclined with respect to the vertical at an angle substantially equal to the angle of the beveled surface of the needle.

2. Apparatus as in claim 1, including also means for feeding abrasive material onto the lap surface.

3. Apparatus as in claim 1, wherein the lap surface has grooves formed in it.

4. Apparatus as in claim 1, including means for biasing the block towards the lap surface.

5. Apparatus as in claim 1, including means for reciprocating the block over the lap surface.

6. Apparatus as in claim 1, wherein the lap is a disc.

7. Apparatus as in claim 6, wherein the grooves are approximately radial.

8. Apparatus as in claim 1, wherein the lap is a disc, and comprising a guide bar extending across and spaced from the lap surface, a block carrier mounted on the guide bar, the block being attached to the block carrier



and spaced from the lap surface for at least part of its length, spaced underflats on said carrier and supported on the lap surface, the abutment edge of the block being spaced from the lap surface.

9. Apparatus as in claim 8, including means for urging the block underflats against the lap surface.

10. Apparatus as in claim 8, wherein the block carrier is slidably mounted on the guide bar and comprising means for reciprocating the carrier along the guide bar.

11. Apparatus as in claim 8, including means for feeding abrasive material onto the lap surface.

12. Apparatus as in claim 11, wherein the lap surface has grooves formed in it.

13. Apparatus as in claim 12, wherein the grooves are approximately radial.

14. Apparatus as in claim 11, including pressing means for pressing into the lap surface abrasive material fed thereon.

15. Apparatus as in claim 14, wherein the pressing means comprises a pressing plate pressing against the lap surface.

16. Apparatus as in claim 15, including means for reciprocating the pressing plate over the lap surface.

17. Apparatus as in claim 8, comprising spaced wings extending from the block adjacent to the respective ends of the abutment edge, the needle guiding means comprising a comb plate secured to the outer ends of the wings and extending therebetween, the comb plate having spaced slots, each adapted to support and guide said needle.

18. Apparatus as in claim 1, the abutment edge being on an abutment bar adjustably secured to the block.

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