Jan. 28, 1958 F. FRANZ 2,821,051

SHARPENER FOR HYPODERMIC NEEDLES

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Fig. 1.

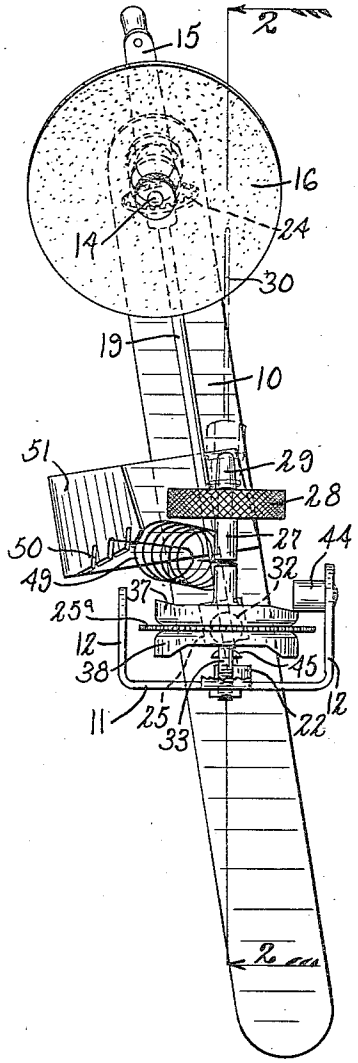
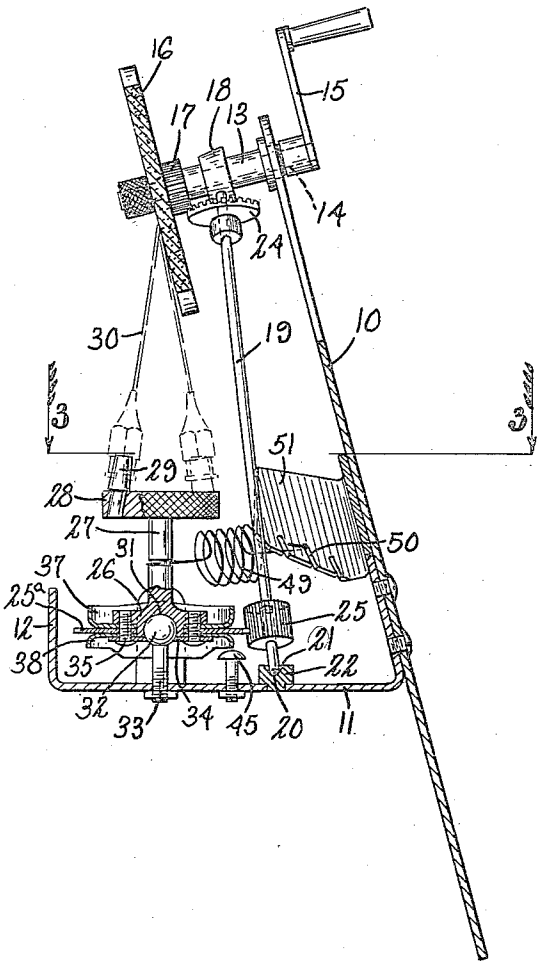


Fig. 2.



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Fig. 3.

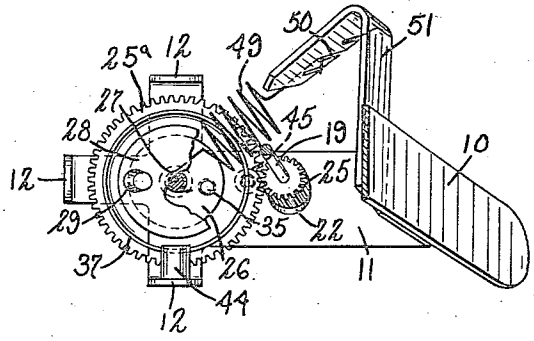


Fig. 4.

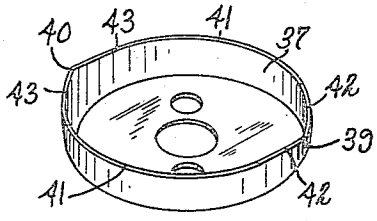


Fig. 5.

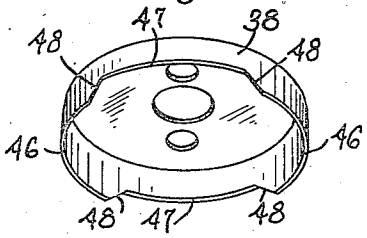


Fig. 6.

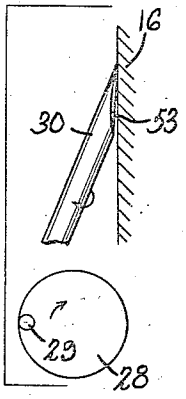


Fig. 7.

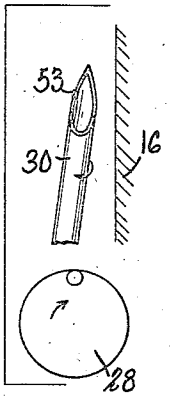


Fig. 8.

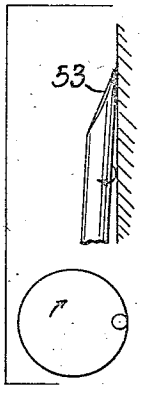


Fig. 9.

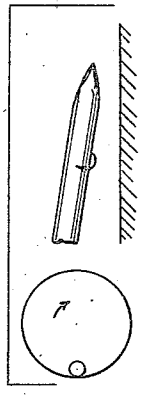
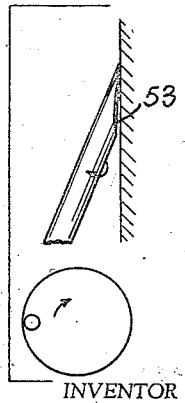


Fig. 10.



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SHARPENER FOR HYPODERMIC NEEDLES

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Application February 10, 1955, Serial No. 487,330

12 Claims. (Cl. 51—124)

This invention relates to a needle-sharpening device and more particularly to a device for sharpening the ends of the usual hypodermic needle.

In the use of needles of this type, the sharpened ends become dull for various reasons, usually because, in the handling of the needles, the end may strike against surrounding objects. As the tips of the needles are beveled and are provided at their extreme ends with a relatively sharp point, the striking of a needle against an object is apt to bring about the formation of a burr thereon which prevents the easy insertion of the needle when in use.

In order that any burr or hook which may be formed upon the needle may be removed, it is necessary to grind it upon all sides and particularly upon the beveled side or front of the needle and the back thereof, or that side which is opposite the beveled side. To this end, there is provided, by the present invention, a rotatable grinding stone and a rotatable holder for the needle itself so that the end of the needle will be held against the stone. Also, means are provided to raise the needle from the stone so as to turn it and present first one side of the needle and then the other to the grinding stone.

The rotation of the stone and also of the needle holder are effected from a common source of power which may be handpower, as shown, or which may, if desired, be furnished by an electric motor. Also, means are provided which, during the rotation of the needle holder, will raise the needle from the grinding stone and lower it thereon and also cause the needle to traverse the surface of the stone in a general direction radially of the latter so that the stone will wear evenly. The moving of the needle from and toward the stone and also the traversing of the needle over the surface of the stone are, as illustrated, effected by the use of cams which are rotated with the needle. In this way, the entire grinding operation is automatic when the needle has been placed in the holder and the grinding stone is rotated either by hand or from some other suitable source of power.

In addition, it is desired that the parts will be so arranged that the needle will not traverse the same path upon the stone so that the latter will not wear unevenly. To this end, the gearing is so related that the number of revolutions of the needle holder in a given period is incommensurable with the number of revolutions of the grinding stone so that, at the end of one revolution, for example, the needle will not rest upon the same point on the surface of the stone as at the beginning of the revolution.

One object of the present invention is to provide a sharpener for hypodermic needles which will be relatively simple in construction and efficient in operation.

A further object is to provide a sharpener for hypodermic needles which will consist of relatively few parts and susceptible of being economically manufactured and which, at the same time, will be automatic and efficient in operation.

Still another object of the invention is to provide a hypodermic needle sharpener having a rotatable grinding

stone and a rotatable needle carrier having means for turning the point of the needle upon the stone, and also moving it toward and from the grinding surface of the stone during its operation.

Another object is to so change the angular relation of the needle to the wheel that when the beveled edge is ground, a slight clearance exists between the needle and wheel beyond the point of contact, and a similar slight clearance also exists when the back of the needle is ground.

Still another object of the invention is to provide a sharpener for hypodermic needles, which sharpener is provided with a grinding stone and a needle holder for holding the needle against the surface of the stone, the needle holder being operated to move the needle toward and from the stone and to turn the needle about a longitudinal axis so as to grind both beveled and back surfaces thereof, and also cause the needle to traverse the surface of the stone in a substantially radial direction during the rotation thereof.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a front elevational view of a hypodermic needle sharpener embodying the invention;

Fig. 2 is a sectional view on line 2—2 of Fig. 1;

Fig. 3 is a sectional view on line 3—3 of Fig. 2;

Fig. 4 is a perspective view of the traversing cam for causing the needle to traverse the surface of the stone;

Fig. 5 is a perspective view of the cam employed for moving the needle toward and from the surface of the stone; and

Figs. 6, 7, 8, 9, and 10 are diagrammatic views showing the positions of the needle and of the needle holder during the operation of the device.

To illustrate a preferred embodiment of my invention, I have shown in the drawings a hypodermic needle sharpener comprising a frame consisting of an elongated strap-like member 10, to which is secured a bracket member 11 projecting forwardly from the member 10. This bracket member 11 is provided with a plurality of upstanding guard fingers 12, three in number, as shown in the drawings, one of which also serves to support a cam follower as will be later explained.

A cylindrical bearing sleeve 13 is secured at the upper end of the frame member 10 and within this bearing is mounted a shaft 14 to the outer end of which is secured a crank 15. It will be understood that if the device is to be power-operated, a pulley or other power device may be substituted for the crank 15. Upon the other end of the shaft 14 is secured a grinding disk 16 of suitable abrasive material and a pinion 17. It may be noted that the plane of the grinding disk is substantially parallel to that of the member 10, while the member 11 makes an acute angle with the frame member 10.

Rotatably mounted at its upper end in a collar 18 on the bearing sleeve 13 is a shaft 19. This shaft is provided with a rounded lower end 20 seated in a socket 21 formed in a box 22 on the frame member 11. As this shaft is not perpendicular to the plane of the frame member 11, the provision of the rounded end 20 on the shaft and the socket 21 constitutes a convenient method of providing a suitable bearing for the lower end of the shaft.

At the upper end of the shaft 19 is a crown gear 24 which meshes with the pinion 17 and at the lower end of the shaft is a pinion 25 having a relatively wide face, the teeth of this pinion being adapted to mesh with those of a gear 25^a.

The gear 25^a is secured to the hub 26 of a shaft 27, which shaft carries at its upper end a needle-supporting

table 28 of disk-like form. Upon the table 28 is a tapered pin 29 over which may be telescoped the socket of the usual hypodermic needle, shown in dotted lines at 30. It may here be noted that the axis of the pin 29 is not perpendicular to the surface of the table 28, but is inclined inwardly toward the axis of the table.

The hub 26 of the shaft 27 is provided with a socket 31, the socket being rotatably seated upon a bearing ball 32, carried at the upper end of a post 33, secured in the bracket member 11 so that the hub 26, shaft 27 and table 28 is permitted a universal movement about post 33. That is, the shaft 27 is not only rotatably mounted on the post, but is also mounted to tip in any direction. The hub 26 may be held in place by a small plate 34 engaging the lower side of the ball 32, the plate being secured to the hub by screws or the like 35.

A pair of cam members are secured to the hub 26, one above and one below the gear 25a, the upper member being designated by the number 37 and the lower by the number 38, these cams being shown in Figs. 4 and 5 of the drawings.

The cam 37 is a traverse cam, and effects the movement of the needle across the face of the grinding wheel. This cam, as shown in Fig. 4, is provided with a low point 39, a high point 40, and with dwell surfaces 41 between the high and low points. It will be noted that the low point of the cam merges into the dwell surfaces by inclined surfaces 42 and likewise the high point of the cam merges into the dwell portions 41 by inclined portions 43.

As shown in Fig. 1, a cam follower 44 is mounted at the upper end of one of the fingers 12, this cam follower being engaged by the upper edge of the cam 37 so that the shaft 27 will be tipped or swung to the right or left, as viewed in Fig. 1, about its bearing 32 as the shaft is rotated. This, as will be later explained more fully, causes the end of the needle to traverse the grinding stone in a substantially radial direction or from a point adjacent the center of the stone toward the outer edge.

The lower cam 38 which effects movement of the needle toward and away from the surface of the grinding stone is shown in Fig. 5. The lower edge of the depending rim of this cam is adapted to be engaged by the follower 45, which, as shown, may be the rounded head of a screw secured in the bracket 11 of the frame. This cam is provided, as shown in Fig. 5, with two oppositely disposed high portions 46 having between them low portions 47. As shown, the low portions merge into the high portions along relatively sharply inclined sections 48. It will be apparent from Fig. 2 of the drawings, that engagement of one of the high portions of the cam with the follower 45 will cause the shaft 27 to be tipped to the left, as shown in this figure, about its bearing 32 and therefore swing the end of the needle away from the surface of the grinding wheel 16.

It is necessary to provide some means to urge the two cam members against their followers. It will be apparent that it is necessary to urge the shaft 27 to the right, as shown in Fig. 2, in order to maintain the lower or elevating cam in engagement with the follower 45, while, in order to maintain the upper or traverse cam against the follower 44, it is necessary to urge the shaft 27 to the left, as shown in Fig. 1, or in a direction transverse to that required to maintain the lower cam against the follower 45. I provide a single spring for urging both cams toward their followers. This is being accomplished by the coil spring 49 secured at one end to the shaft 27, and secured at its other end to one of several notches 50 in a bracket 51 secured to the frame member 10. This spring, instead of acting in a direction directly toward the plane of the member 10, as would be necessary to maintain the lower cam in engagement with the follower 45, acts at an angle of substantially 45° to this plane so that it exerts a component force in a direction to tip the shaft 27 to the right in Fig. 2, and maintain the lower cam upon the follower, and also exerts a component tending to urge the shaft 27 to the left in Fig. 1, and, therefore, urge the upper cam against its follower 44, thus tending to maintain both cams against their followers. The tension of the spring may be adjusted by engaging its end in one of the notches 50 more or less remote from the shaft 27. Thus the tension of the spring can be regulated according to the degree of flexibility of the needle which is to be sharpened.

The operation of the device is shown in Figs. 6 to 10, inclusive. In Fig. 6, the parts are shown in substantially the positions shown in Fig. 2 where the supporting table 28 is in such position that the pin 29 is at a point most remote from the frame member 10. In this position, the beveled edge 53 of the needle 30 is against the surface of the stone 16. The axis of the needle is at an acute angle to the plane of the face of the stone so that the tip of the needle will be ground. It will be noted that the follower 45 is not engaged by the lower cam 38 so that the spring will hold the needle against the surface of the stone.

As the table 28 rotates through an angle of 90° to the position shown in Fig. 7, the follower 44 which, at the beginning of the operation, was at substantially the low point of the traversing cam 37, rides upwardly on this cam and effects a traverse of the needle across the face of the stone. At the same time, the needle is turned with respect to the stone as that when the parts reach the position shown in Fig. 7, the needle has been turned through an angle of substantially 90° and has been lifted away from the stone by the lifting cam 38. The traverse cam acts through approximately the first half of this 90° movement, and the needle is moved to a point farther from the center of the abrasive wheel.

During the next 90° movement of the table 28, the needle is lowered upon the stone by the lifting cam, as shown in Fig. 8, and has also been turned through an angle of substantially 180° with relation to that shown in Fig. 6 so that the back of the needle is in contact with the abrasive disk. At about this time, the follower 44 is in contact with the high point 40 of the traverse cam 37 so that the needle is at its extreme outermost position adjacent the edge of the abrasive disk.

During the next 90° rotation of the table 28, the needle has again been lifted from the abrasive disk by the lifting cam, as shown in Fig. 9, and also rotated with respect to the disk, as illustrated. Upon a further 90° rotation of the table 28, the needle is rotated to a position wherein the beveled edge again faces the abrasive disk and has been moved against the stone by the spring 49, this being the position shown in Fig. 10 which is the same as that shown in Fig. 6.

While I have shown and described a preferred embodiment of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably and tiltably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, means for continuously rotating said disk and said supporting member, and a needle-supporting chuck on said supporting member at a point eccentric to, and directed at an angle to, the axis of rotation of said member, said chuck supporting the needle with the axis thereof inclined toward the axis of the supporting member.

2. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to a plane surface of the disk,

means for continuously rotating said disk and said supporting member, said member being tiltably mounted to vary the angle of the needle axis with respect to the disk, and means, including a cam acting on the supporting member, for tilting said member in a direction to move the point of the needle toward and from the abrasive disk to grind two distinct surfaces on the needle point and produce a cutting edge where the two surfaces meet.

3. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, needle-supporting means on said member in a position eccentric to the axis of rotation thereof means for continuously rotating said disk and said supporting member, said member being tiltably mounted, and means for tilting said member, during the rotation thereof, in a direction to move the point of the needle across the surface of the abrasive disk.

4. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, needle-supporting means on said member in a position eccentric to the axis of rotation thereof, means for rotating said disk and said supporting member, said member being mounted for universal tilting movement, and spring means biasing said member in a direction to urge the point of the needle toward the abrasive disk.

5. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably and tiltably mounted on the frame to support a needle in position to present the point thereof at an angle to a plane surface of the disk, and means for rotating said disk and said supporting member, said supporting member having means at a point eccentric to its axis to engage the base of the needle and support the latter with the axis thereof inclined toward the axis of the supporting member, and means for tilting said supporting member during the rotation thereof to move the point of the needle toward and from the disk and present the point of the needle to the surface of the disk at different angles at various times during the rotation of the supporting member.

6. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, means for rotating said disk and said supporting member, said supporting member having means at a point eccentric to its axis to engage the base of the needle and support the latter with the axis thereof inclined toward the axis of the supporting member, and means for mounting the axis of the supporting member for universal tilting movement.

7. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, means for rotating said disk and said supporting member, said member being mounted on a tiltable axis member, and means, responsive to the rotation of said supporting member to tilt said axis member in two directions, one being in a plane to move the needle across the surface of the disk and the other in a plane to move the needle point toward and from the surface of the disk.

8. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, means for rotating said disk and said supporting member, said member being mounted on a universally tiltable axis member, means, responsive to the rotation of said supporting member, to tilt said axis member in two directions, one being in a plane to move the needle across the surface of the disk and the other in a plane to move the needle point toward and from the surface of the disk, said means comprising cam means carried by said axis member, and follower means carried by said frame and engaged with said cam means.

9. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, means for rotating said disk and said supporting member, said member being mounted on a tiltable axis member, means to tilt said axis member in two directions, one being in a plane to move the needle across the surface of the disk and the other in a plane to move the needle point toward and from the surface of the disk, and said tilting means comprising a pair of cams carried by said axis member, and a follower carried by the frame and adapted to engage each of said cams.

10. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, means for rotating said disk and said supporting member, said member being mounted on a tiltable axis member, means to tilt said axis member in two directions, one being in a plane to move the needle across the surface of the disk and the other in a plane to move the needle point toward and from the surface of the disk, said means comprising cam means carried by said axis member, follower means carried by said frame and engaged with said cam means, and spring means acting on said axis member to urge said cam means toward said follower means.

11. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame to support a needle in position to present the point thereof to the surface of the disk, means for rotating said disk and said supporting member, said member being mounted on a tiltable axis member, and means to tilt said axis member in two directions, one being in a plane to move the needle across the surface of the disk and the other in a plane to move the needle point toward and from the surface of the disk, said tilting means comprising a pair of cams carried by said axis member, a follower carried by the frame and adapted to engage each of said cams, and a single spring on said axis member to urge said cams toward their respective followers.

12. A sharpening device for hypodermic needles or the like comprising a frame, an abrasive disk rotatably mounted on the frame, a needle-supporting member rotatably mounted on the frame, means on said member at a point eccentric to its axis to support a needle in position to present the point thereof to the surface of the disk, means for rotating said disk and said supporting member, said member being mounted for universal tilting movement, spring means biasing said member in a direction to urge the point of the needle toward the abrasive disk, and means, responsive to the rotation of the supporting member, for tilting said member to move the point of the needle toward and from the abrasive disk and across the surface of the abrasive disk during a single revolution of the supporting member.

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