

Aug. 13, 1957

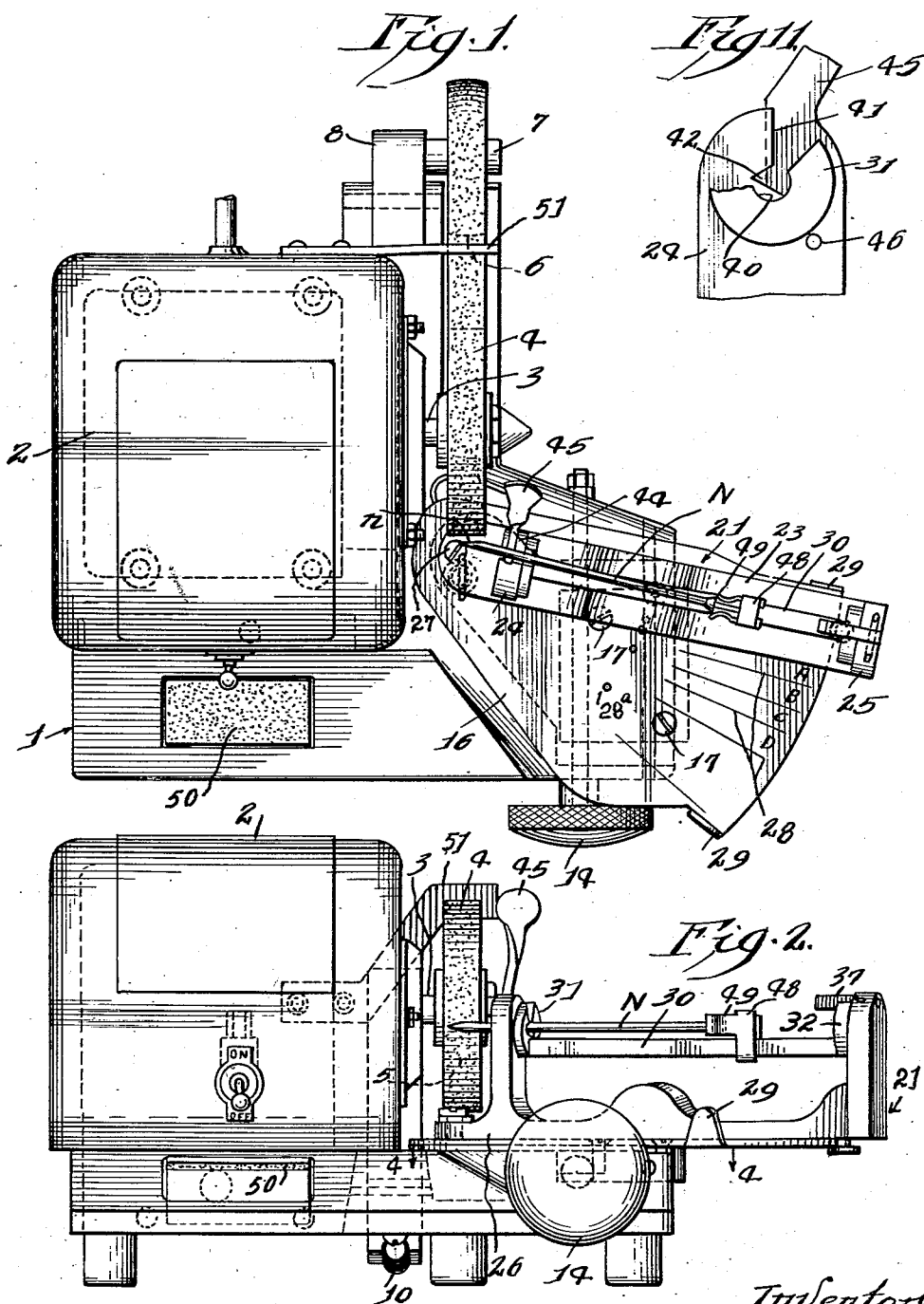
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2,802,310

HYPODERMIC NEEDLE SHARPENER

Filed July 13, 1955

2 Sheets-Sheet 1



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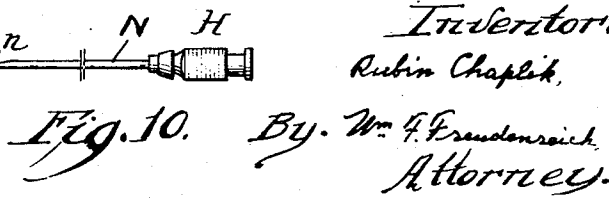
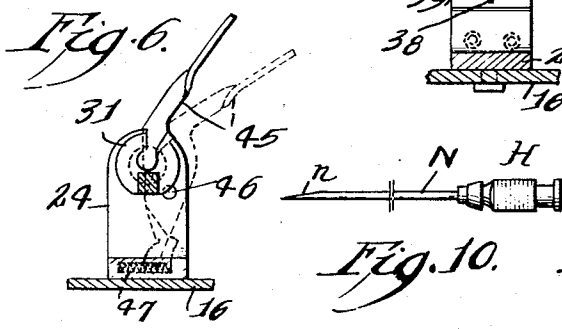
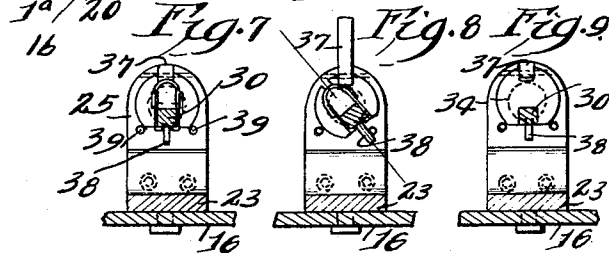
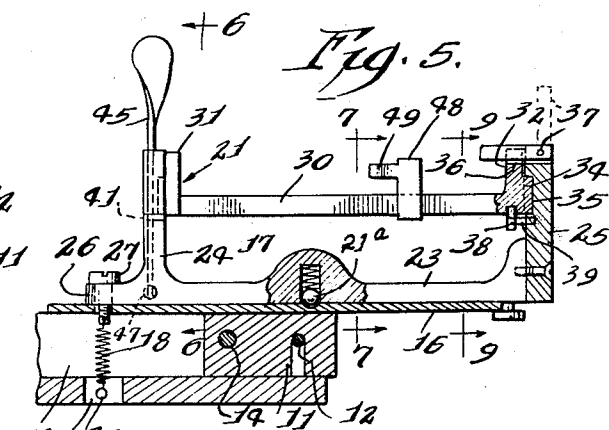
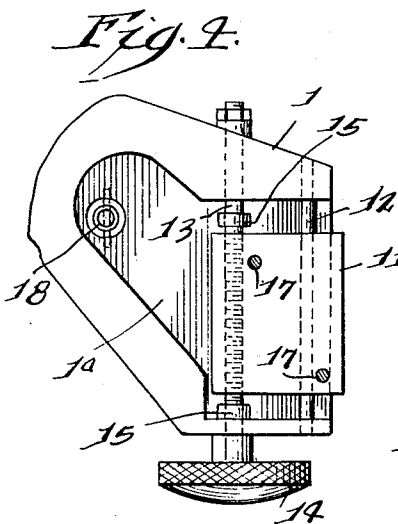
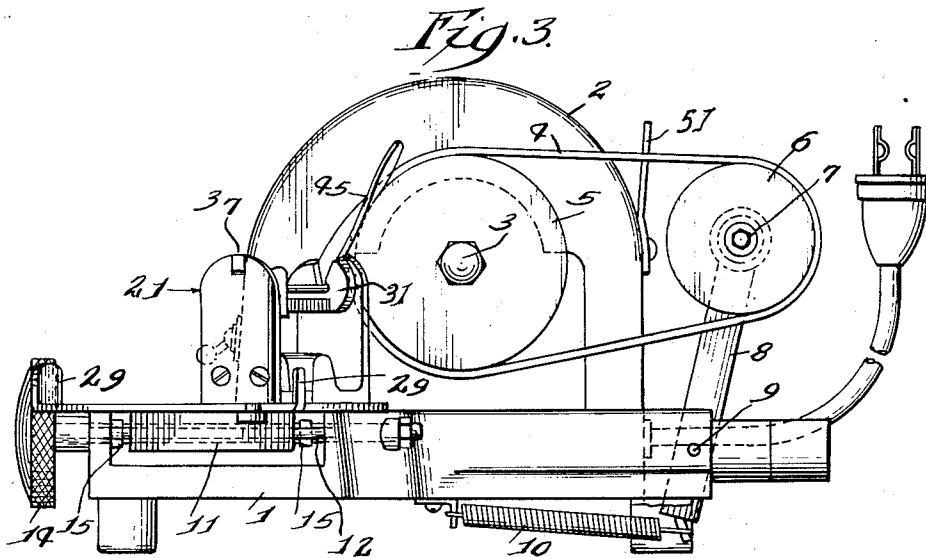
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HYPODERMIC NEEDLE SHARPENER

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Application July 13, 1955, Serial No. 521,798

3 Claims. (Cl. 51-135)

The present invention has for its object the creation of a machine in which hypodermic needles of all sizes may be sharpened quickly and easily, and which is so simple in construction and operation that no special skills are needed to enable any one to do satisfactory sharpening.

The conventional hypodermic needle is a tube sharpened by cutting away the metal on one side to produce at one end a flat area extending across the entire diameter at the desired angle to the axis of the tube; this angle varying among needles.

In accordance with the present invention I employ a power driven abrasive element which may be either a cylinder of considerable diameter or a belt running over a cylinder so as to present a needle-engaging surface that is a segment of a cylinder. Beside the abrasive member is a table that may be moved bodily from and toward the axis of such cylinder. On the table is a carrier for positioning a needle in a plane containing such axis. This carrier is mounted to swing across the table to determine the angle between the needle and the axis of the cylinder; which angle corresponds with that made by the flat face on the needle with the axis of the needle to be sharpened. The table top has thereon markings designating various angular settings for the needle.

Unless a needle has the characteristics of a sharp, double-edged blade at the pointed end, it will punch a hole instead of cutting a clean slit, and I therefore provide means to accomplish this desired end, by making it possible to grind a flat face and then rock the needle about its own axis to create bevel edges.

The various features of novelty whereby the present invention is characterized will hereinafter be pointed out in the claims; but, for a full understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a top plan view of a machine embodying the invention, with a needle ready to be moved into grinding position;

Fig. 2 is a side view of the machine;

Fig. 3 is a front view of the machine;

Fig. 4 is a plan view of a fragment of the base of the machine, showing the movable support for the table member thereof, namely, a section on line 4-4 of Fig. 2;

Fig. 5 is a vertical section through the front part of the machine, showing a fragment of the base, of the table and of the needle supporting means partly broken away, the needle being omitted;

Fig. 6 is a section on line 6-6 of Fig. 5;

Fig. 7 is a section on line 7-7 of Fig. 5;

Fig. 8 is a view similar to Fig. 7, but showing the immediate support for the needle at a different angle angularly of an axis corresponding with the axis of the needle;

Fig. 9 is a section on line 9-9 of Fig. 5;

Fig. 10 is a side view of a conventional hypodermic needle; and

Fig. 11 is a fragmentary view, on a larger scale, illus-

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trating the parts that engage the needle near the pointed end, and yieldingly grip the same.

Referring to the drawing, 1 represents a small flat base on which is mounted an electric motor concealed within a housing 2. A shaft 3, which may be the motor shaft or one driven by the latter, protrudes from one side of the housing. This shaft drives a suitable abrasive member which may be a cylinder on and coaxial therewith or an endless belt 4, as shown; the belt extending over a large pulley 5 on the shaft and over a second, idle pulley 6. I have found that with pulley 5 having a diameter of about three inches, very good results are obtained. Pulley 6 is mounted on a short shaft 7 which is in turn mounted on the upper end of a more or less upright rocker member 8. Member 8 extends down through the base and is pivotally connected at 9, toward the lower end, to the base for swinging movements in a plane at right angles to the axes of shafts 3 and 7. A tension spring 10, on the under side of the base, is connected at one end to the base and at its other end to the lower end of rocker member 8. The spring, being under an initial tension, keeps the belt taut.

Means are provided to hold a needle to be sharpened in a plane containing the axis of shaft 3, with the needle at the same angle to such axis as the angle desired between the flat surface on the needle and the needle axis. Such means are mounted on a bed 11, best shown in Fig. 4, set within a recess 1^a in the top of the front portion of the base. This bed is supported on two parallel elements 12 and 13, the first of which is simply a stationary guide rod or shaft while the other is a rotary shaft. Shaft 13 extends through and in screw threaded relation to the bed, and, being held against endwise movement relatively to the base, causes the bed to move bodily upon turning the knob 14 on the outer end of the shaft. The axis of shaft 13 is at right angles to a vertical plane containing the axis of the abrasive cylindrical surface, namely the axis of shaft 3. Loose on shaft 13, beyond the ends of bed 11, are short sleeves 15, which serve as spacers to limit the lengthwise movements of the bed.

Overlying the recessed portion of the base, containing the movable bed 11, is a table 16 in the form of a flat plate. The table rests on the bed, is secured thereto by two screws 17, 17, and extends at one end underneath pulley 5. Because this end extends far beyond the corresponding edge of the bed, it is yieldingly anchored to the base, as best shown in Figs. 4 and 5, by a tension spring 18. The upper end of this spring is connected to a screw or pin 19 on the under side of the table, while its lower end is anchored to the base by a pin 20 extending through a hole 1^b in the part of the base at the bottom of recess 1^a.

Lying on top of the table is a needle carrier 21 in the form of a long bar 23 having at its ends two vertical arms 24 and 25; arm 24 being disposed a short distance inwardly from the adjacent end of the bar to form an ear 26. A screw 27 extends through this ear and into the table in a plane intersecting the belt and at right angles to the axis of belt pulley 5; thereby permitting the carrier to swing across the table about an axis not far from a vertical tangent to this pulley. The table has thereon several lines 28 radial to the pivotal axis of the carrier. At opposite edges of the table are ears 29 that serve as stops for engaging bar 23 and limiting its swinging movements.

A series of small depressions, 28^a associated with lines 28, together with a little spring-pressed ball 21^a in the under side of carrier 21 and adapted to drop into these depressions, serve yieldingly to hold the carrier in positions corresponding to those lines.

On carrier 21 is mounted a needle holder 30. This

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consists of a bar 30 that is non-circular in cross section, preferably square, mounted between the upper ends of arms 24 and 25 so as to be movable bodily angularly of an axis in a plane containing the axis of pulley 5. In the arrangement shown the ends of this bar are fixed eccentrically to a pair of discs 31 and 32. The discs, as best shown in Fig. 5, are provided with trunnions 34, eccentrically located with respect to the bar, and rotatably fitted into bearing seats 35 in arms 24 and 25 between which the needle holder extends. Disc 32 contains a peripheral notch 36, into which may swing a locking dog 37 hinged to the upper end of arm 25. On the under side of bar 30, close to arm 25, is a pin 38 extending down into the space between two pins 39 projecting inwardly from arm 25. When the locking dog is swung into release position the needle holder may be rocked back and forth within the limits determined by the distance between pins 39.

Disc 31, as best shown in Figs. 6 and 11, contains an opening 40 beginning with a round section that merges into a section that gradually widens until the periphery is reached. A portion of arm 24 is cut away at the top to provide a large opening behind opening 40. The important feature of this opening in arm 24 is that it is bounded by a more or less vertical edge 41 containing a V notch 42 that is intersected by the axis of rotation of the needle holder, extended. Arm 24 also is slotted deeply through one edge, 44 (in Fig. 1) being the slot. A more or less vertical lever 45 is engaged in this slot and is held in place by a pivot pin 46, as shown in Fig. 6, so as to be capable of rocking movements. A compression spring 47, arranged in a socket in the lower end of arm 24, tends constantly to hold the lever in the upright position as shown in full lines in Fig. 6, closing the open side of the V notch and approaching so near the apex of the latter that any needle engaged in the notch will be yieldingly gripped.

Slidable along bar 30 is a clip 48 provided with a pair of spring fingers 49 to grip the hub H of a needle N and hold it at the proper elevation and against rotation about its own axis.

The parts are so proportioned that when a needle has its hub fitted into the clip, and is being yieldingly gripped toward its pointed end in notch 42, its axis coincides with the axis about which the holder may rock.

In using the machine, the dog 37 is swung into its locking position, lever 45 is shifted into the broken line position shown in Fig. 6, and a needle is held parallel to and above bar element 30 of the needle holder, pointed end nearest arm 24. The needle is then moved lengthwise until it passes through notch 42 and such end overlaps the abrasive member. Before this is done, however, the knob 14 should be turned, to shift the table bodily, if necessary, into such a position that the needle will not touch the abrasive member as it is being inserted. The needle is turned on its axis until the flat side N at the tip faces the abrasive member; whereupon lever 45 is released and presses against the needle. The clip 48 is then slid along bar 30 until it grips the hub H on the needle. The carrier is then shifted on the table until the flat face on the needle is parallel to the plane tangent to the cylindrical part of the abrasive member with which that face is to engage. The parts are now in the position illustrated in Figs. 1 and 2. It therefore requires only the turning of knob 14 to shift the table bodily toward the abrasive member until the face *n* of the needle bears lightly against the abrasive member, to bring about overall grinding of that face—assuming that the motor is running.

Upon the completion of this overall grinding step the marginal portions of flat face *n* must be ground further to create the double-edged blade effect. Therefore locking dog 37 is now swung up into its idle position as shown in Fig. 8 and in broken lines in Fig. 5, to release the needle holder unless the needle that is being sharpened

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is a large one. After the unlocking of the needle holder it is rocked back and forth several times within the limits permitted by pins 39, to bevel the previous flat face along the margins thereof.

In the case of large needles the carrier 21 should be shifted, before unlocking the needle holder, so as to increase the angle between the needle and the axis of shaft 3. Then, when the needle point is touched against the abrading member, the holder may be unlocked and rocked back and forth as previously described. The calibrations on the table are utilized to set the needle for this final grinding step. For example, if the carriage was located at line A for grinding a regular bevel needle, it should be shifted to C for carrying out the final sharpening step.

In order to clean the needles after they are sharpened a block of soft rubber, 50, is set into the top of the base of the machine. The sharpened needle is simply stabbed into this block several times and the interior is cleaned out by pushing a wire through the needle.

It will be seen that during a grinding operation the needle is in a plane containing the axis of the cylinder of which the abrasive area in contact with the needle is a part, and lies at an acute angle with such axis, whereas the face *n* parallels such axis for the whole length of that face. It therefore follows that face *n* is straight through its length, but is slightly concave in transverse section after the first grinding step. However, by using an abrasive surface that is a section of a large cylinder, with the axis of the needle being in a plane containing the axis of that cylinder, great accuracy and uniformity in the sharpening of needles is achieved. This is due to the fact that during actual grinding operations the axis of the needle remains stationary, the entire needle being stationary during the first of the two grinding procedures.

In addition to sharpening needles, the machine may also be used to sharpen scissors. For this purpose there is secured to the rear of the motor housing a flat bar 51 that extends, standing on edge, across the abrasive belt. The side of the bar stands at the same angle to the belt as the angle desired between the side of a scissor blade and an edge face meeting that side and forming therewith a shearing edge. To sharpen the blade it need only be held flat against a side of the bar with the edge face at the cutting edge resting on the belt in order to grind the blade at the proper angle.

I claim:

1. A needle sharpener comprising a base, a revoluble abrasive member mounted on the base, a table mounted on the base for bodily movements transversely of the axis of rotation of said abrasive member, a carrier mounted on the table and pivoted thereto at one end for lateral swinging movements about a point below and near the abrasive member, graduations on the table at the other end of said carrier for setting purposes, a needle holder extending lengthwise of the carrier and radially of the axis of the pivot extended to support the needle at an acute angle to and in a plane containing the axis of rotation of the abrasive member, means to support said holder for rocking movements about the axis of the needle, stops for limiting such movements to a small angle and a releasable means to lock said holder in an intermediate position; and said holder comprising a bar, a spring clip rising above and slidable along the bar and adapted to grip the hub end of a needle, together with a seat on the bar to receive the opposite end of the needle.

2. A needle sharpener comprising a base, a revoluble abrasive member on the base, a table mounted on the base for bodily movements transversely of the axis of rotation of said abrasive member, a carriage mounted on the table and pivoted thereto at one end for lateral swinging movements about a point near and below the abrasive member, a needle holder extending lengthwise of the carrier and radially of the pivot to support a needle at an acute angle to said axis and with one side

of its tip contacting the abrasive member, means to drive the abrasive member; said holder comprising a bar mounted at its ends for swinging movements about an axis parallel to and spaced apart therefrom, together with a clip slidable along the bar and adapted to engage the hub of a needle the axis of which corresponds to the latter axis, said bar having at the end nearest the abrasive member a seat for a needle engaged by the clip, said seat being open on one side, and a movable element mounted on the table and adapted to be shifted from an idle position to a position in which it closes the open side of the seat.

3. A needle sharpener as set forth in claim 2 having, in addition, means to limit the swinging movements of the holder to a small angle and means to lock the holder at will in a position intermediate the limits thereof.

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