The invention relates to means, as an elongated rod or shaft, which may be rotated manually, mechanically, or otherwise, and particularly by electrical energy utilized by means of a usual and conventional electric machine or motor, for edging or sharpening, by contact, of hypodermic needles used generally by physicians, surgeons, and the like, for injecting fluids into the veins or subcutaneous tissues of animals, human beings, and other living things, it being understood that the term vessels includes the veins which collect the blood from the peripheral tissues and return the blood to the heart, and the arteries which carry the blood from the heart to the peripheral tissues.

The invention is capable of usage in sharpening or edging needles, or the like, utilized in the profession as in the practice of hypodermoclysis or intravenous therapy which, as recognized by the medical profession, consists of the injection of a large quantity of blood or liquid, as normal saline, or the like, under the skin or into the vessels, with a view or purpose of replenishing fluid volume in the circulation.

Hence, considerable difficulty, inconvenience and trouble has been experienced by physicians, surgeons, and others, in efficiently and economically edging or sharpening a previously used hypodermic needle for an injection into vessels or subcutaneous or intramuscular tissues. Such needles usually are used for hypodermic injection of fluids into the vessels of intradermal, or subcutaneous or intramuscular tissues. The usual, conventional and commonly used hypodermic needles are formed cylindrically and with an aperture or hole running longitudinally thereof and has on one side a flat surface which is inclined outwardly of the needle forming finally a point or cutting edge which is intended to be inserted first into the flesh of a human being, animal, or other living thing. In order to properly and efficiently sharpen the point and the side walls or edges of the slanted opening of such a hypodermic needle, after once it is used, it is necessary to maintain, as far as is practical, the original angle of said flat surface with respect to the body of the needle itself and at the same time provide a relatively keen and sharp point and side walls at the outward extremity of the needle intended to be inserted into the flesh of the said human being, animal, or other living thing.

For example, similar to stropping a razor blade after usage to return the keen edge, if the point of the needle itself has lost its keen edge, or the angle of the flat surface with respect to the body of the needle is dulled, or burs such as rough ridges of metal on the sides of said flat side, or the point of the needle itself, it is quite possible, and generally probable, that when the physician, surgeon, or other experienced or inexperienced user of the hypodermic needle intends to inject, by use of the hypodermic needle, any fluid into a vein of a human being, animal, or other living thing, and the hypodermic needle is manually forced by the physician, surgeon or other user, through the skin and outer flesh and into the vein he will by excessive and ordinarily unnecessary manual force cause the point of the hypodermic needle to lacerate the vein, or the needle may by excessive force, or otherwise, proceed completely through said vein and into the inner flesh resulting in serious complications. Moreover, use of an improperly sharpened or dulled hypodermic needle usually causes unnecessary pain to the patient.

In other instances highly experienced physicians and surgeons, who are familiar and accustomed by practical usage and experience with new and sharp hypodermic needles, may not be able to render efficient and satisfactory services with improperly sharpened or so to speak blunt or dull hypodermic needles. Hence, many and varied complications may result from usage of dull hypodermic needles, particularly hypodermic needles that have been used previously, and sharpened improperly, and without regard to the original keen angle of said flat side with respect to the main body of the needle, and also without practical regard to the necessity of a hypodermic needle having a point or cutting edge sufficiently sharp to properly and under ordinary circumstances penetrate, as designed, the flesh of a human being, or other living thing.

In the past, physicians, surgeons, and the like, often have attempted to sharpen used hypodermic needles by manually holding the needle in contact with a rapidly rotatable abrasive cylindrical wheel. By this method the original angle of said flat surface, with respect to the main body of the needle, is difficult to maintain even by expert technicians. Furthermore, by this method the temper of the steel from which a hypodermic needle is originally made is importantly affected and its efficiency is reduced, burs of metal are left on the sides or edges of said flat surface, and in all instances the original angle of said flat surface, with respect to the main body of the hypodermic needle, and the point itself, is disadvantageously and certainly improperly changed in many instances. The same relative objections and inefficiencies result when anyone attempts to sharpen a hypodermic needle manually, or otherwise, by forcing said flat surface in successive or continuous manipulations with a usual and ordinarily recognized common flat sharpening device. Under such circumstances, it is quite impossible for the sharpening operator to maintain the original point and inclined flat surface of the hypodermic needle and at the same time provide a keen cutting edge.

As was pointed out by the honorable judge of the United States Court of Appeals, Seventh Circuit, in the decision of Samuel S. Otis v. National Tea Company, 218 Fed. Rep. (2d) 153, rendered under date of January 6, 1955 sharpening and maintaining a keen edge for cutting involves three distinct operations: grinding, honing and edging. The edge is sharpened by grinding and honing. When this is done a microscope will show that the edge actually consists of many tiny "teeth." It is these teeth that do the actual cutting, and to cut most efficiently they must be aligned in the same plane as the cutting element and be pointed toward the tip of the element. Edging is usually done on a steel which is harder than the element being edged. It does not remove any of the metal of the blade; it simply "sets up" the edge so that it cuts more efficiently and stays sharp longer. This court said: "Edging cannot sharpen a dull blade; it only tends to prevent a sharp blade from becoming dull."

Hence, if a hypodermic needle has been seriously dulled it may be ground and then honed after which operations it can be edged; or if the needle's original keen edge is only slightly dulled its cutting edge can be honed and then edged; or if the needle's keen edge merely needs "setting up" it can be immediately edged.

Therefore, an important object of the invention is to provide simple, efficient and practical means whereby operators may quickly and economically edge, or make
3 keen, the cutting edges or surfaces of hypodermic needles without unusual wide experience. Such experienced personnel is rarely found in the hospitals, or elsewhere.

Other objects of the invention are to provide means whereby used hypodermic needles may be edged quickly and efficiently by persons inexperienced in the ordinary art of mechanics and the operation of mechanical devices; to provide simple, satisfactory and desirable means whereby operators and others with little or no practical experience in mechanics can quickly learn how to efficiently edge or put keen cutting edges on hypodermic needles; and to provide simple and efficient means to assist the operator to guide the hypodermic needle in a proper position on the sharpening bar, rod or shaft.

Further objects and details of the invention will be apparent from a consideration of the accompanying specification, claims, and drawings.

The invention consists in the combination of the elements, arrangement of parts and in the details of the construction, as hereinafter claimed.

In the drawings:

Fig. 1 is a perspective view of the invention, with parts broken away, and showing the invention in operation;

Fig. 2 is a front elevational view of the invention, with parts removed and parts broken away;

Fig. 3 is a section taken on line 3—3 in Fig. 2;

Fig. 4 is a side elevational view of a conventional hypodermic needle, and a vertical sectional view of the roller partly broken away; and

Fig. 5 is a plan view of a hypodermic needle with parts broken away.

In the preferred construction of the invention, I provide the horizontal cylindrical roller or bar 1. Suitably fixed in the hole 15 in the roller 1 is the horizontal cylindrical shaft 2. The ends 3 and 4 of the shaft are rotatably received in suitable bearings in the vertical supports 5 and 6, respectively, having their lower ends suitably fixed to the upper surface 7 of the horizontal bottom 8 of the container or casing 9.

The roller 1 is formed from relatively hard steel and has a relatively smooth or polished outer surface. The lower edges of the vertical sides 10 and 11, and front panel and rear panel 12 and 13 are fixed, as by the nails 14, to the bottom 8 of the casing.

The outermost end 3, of the shaft 2, is reduced in diameter to form the spindle 15 on which is mounted the pulley 16. The pulley 16 is supported by the outer end of the spindle 15, is manually screwed in contact with the pulley 16 thereby forcing the pulley in close contact with the shoulder 18, whereby the pulley is fixed with respect to the shaft 2, and rotatable movement of the pulley imparts rotary movement to the shaft 2 which in turn rotates the roller 1.

The base 19, of the usual and conventional electric motor 20, is fixed as by the bolts 21 to the rear panel 12 and has suitably fixed to its rotatable shaft 22 the pulley 23 which is aligned with the pulley 16. A conventional belt 24 is received by the pulleys 16 and 23 to rotate the shaft 2 and the roller 1 when the pulley 23 is rotated by operation of the electric motor, and a conventional plug 25 is connected with suitable outside source of electric current supply. The plug 25 has connected therewith the usual electric current conductors, 26 and 27 connected with the electric motor.

Fixed to the tops 28 and 29, of the vertical supports 5 and 6, respectively, as by the screws 30, is the longitudinal or elongated tube 31 which is positioned horizontally above and in vertical alignment with the roller 1. Suitably fixed inside the tube 31 and spaced from the inner surface of the tube is the conventional electric light or bulb 32 which extends horizontally. The bulb is elongated and has therein a filament 33 having considerable length and which extends horizontally and is aligned vertically with the top convex surface 34 of the cylindrical roller 1, for purposes hereinafter fully explained.

The filament 33 of the bulb extends the full length of the roller 1.

The base 35, of the bulb 32, is screwed into the socket 36 which is suitably fixed to the end 37 of the tube 31. The electric conductors respectively, are connected with suitable outside source of electric current supply.

In the bottom curved surface of the tube 31 is the slot 40 whose side walls extend longitudinally of the tube whereby rays of light from the filament 33, of the electric bulb 32, pass through the slot 40 and onto the full length of the top convex surface 34 of the cylindrical roller 1 thereby providing a relatively straight light reflecting line 41 which extends longitudinally of said roller.

The position of the light reflecting line 41, on the roller 1, depends upon the position of the knife edge in Figs. 1 and 3 of the operator, with respect to the roller, because as the operator changes the relative position of an eye 42 the angle of the light rays, represented by dotted lines 43 and 44 in Fig. 3, is varied. Nevertheless, normally the light reflecting line 41 remains at or near the uppermost convex surface 34 of the roller; because operator by experience learns to keep his eye 42 practically stationary.

Fixed to the top of the casing, and upper edges of the sides 10 and 11 and front panel 13, as by the screws 45, is the horizontal platform 46 whose side edges 47 and 48, and front edge 49, respectively, are aligned in the outer surfaces of the sides 10 and 11, and front panel 13. The rear edge 49, of the platform 46, is cut-away to form the tongue 50 which extends between the vertical supports 5 and 6 and has its rear edge 51 in close proximity with the roller 1 but spaced therefrom, as shown in Fig. 3. The tongue is below a horizontal plane taken through the top surface of said roller for purposes hereinafter explained.

The operations of the invention are as follows: First, the electric motor 21 is caused to operate as by connecting the plug 25 with suitable outside source of electric supply whereby through rotatable movement of the pulley 23, the belt 24 imparts rotary movement to the pulley 16 which rotates the shaft 2 thereby causing the roller 1 to rotate. Then, the flat surface 52 of the hub 53, of the hypodermic needle 54, is placed upon and in suitable contact with the top of the platform or support 46. Then the hand 55, of the operator, manually slides the hypodermic needle to the position shown in Fig. 1 and with the inclined edge or ground surface 56, of the stem 56', in contact with the roller 1. Then the hand 55 manually slides the hypodermic needle along the platform 46, keeping the inclined edge or hollow ground surface 56 and the point or cutting edge 57 in contact with the roller, substantially as shown in Fig. 3. Rotatable movement of the roller edges, or sharpen, the point or cutting edge 57, and the sides edges 57' and 57", of the hypodermic needle.

It is immaterial, and not important, whether the hypodermic needle 54 to be sharpened has a straight inclined surface, or hollow ground surface 56, or other shape surface leading to or extending from the cutting edge 57 of the needle. Irrespective of the shape, contour, outline or profile of the surface which leads to or extends from the point or cutting edge 57 of the hypodermic needle, the point or cutting edge 57 and the side edges 57' and 57" will be sharpened or edged by contact with the rotatable roller 1.

In order that the operator can efficiently sharpen or edge the point or cutting surface 57 and the side edges 57' and 57" of the hypodermic needle, normally he uses the light reflecting line 34 on the roller as a guide to keep the point or cutting surface 57, of the hypodermic needle at the same relative position with respect to the upper convex surface 39, of the roller, when he manually moves the point or cutting edge 57 successively from the vertical support 5 to or toward the vertical support 6,
and from the vertical support 5 to or toward the vertical support 5.

In Figs. 4 and 5 is shown a conventional hypodermic needle 54 comprising the base or hub 53 adapted to be connected with a syringe (not shown) containing a fluid to be injected into a vein of a human being or other living thing. The channel in the hub connects with the hole 58 in the stem 56' suitably connected with the hub 53. Normally when a hypodermic needle, having a point or cutting edge 57 which requires sharpening or edging, is to be sharpened or edged the operator simply places the flat side 52 of the hub in contact with the top of the support 46 and then manually slides the needle, with its point or cutting edge 57, toward and finally in contact with the inclined surface or hollow-ground surface 56 in contact with the roller 1 as shown in Figs. 1 and 3. The operator then manually slides the base 53 back and forth on the platform 46 and substantially parallel with the edge 51 of the tongue 59, using the light reflecting line 34 as a guide.

When the roller 1 is rotated at relatively high speed, or otherwise it has been my experience that it is advantageous to apply kerosene, or some similar lubricant to the roller 1.

Also, after the operator has sharpened or edged the cutting edge 57, and side edges 57' and 57", the hypodermic needle, it is advantageous to slightly with relatively light pressure contact the upper surface of the cutting edge 57 with the roller 1, whereby both sides or edges of the cutting edge 57 are sharpened or edged.

It, also, is advantageous to form the roller 1 from steel, or other suitable material, harder than the material from which the stem of the hypodermic needle is formed.

While in the above descriptive matter I have, in some instances, used the word "sharpen" with reference to edging the cutting edges of the hypodermic needle 54, it is understood that I do not mean, in a strict sense, that contact of the edge 57, and side edges 57' and 57" with the rotating roller 1 will sharpen the dull cutting edges of needles. Actually the relatively sharp edges 57, 57' and 57" will be edged to provide keenly sharp cutting edges. If either or all of the edges 57, 57' and 57", of a needle, are dull and require ordinary sharpening, strictly speaking, these edges must first be ground or honed, or both, and then edged to provide keenly sharp cutting edges as by contact with the rotating roller 1. Quite obviously, an edged cutting edge is sharp. In fact it is extremely sharp. But a dull or blunt edge cannot ordinarily be sharpened by an edging process.

3. A hypodermic needle sharpening device consisting of a casing, spaced apart vertical supports fixed to the bottom of said casing and having bearings in their upper ends, respectively, a rotatable horizontal shaft having its ends mounted in said bearings, a horizontal roller fixed to said shaft and formed from relatively hard steel and having a smooth light reflecting outer surface, means to rotate said shaft and roller, a horizontal platform fixed to the top of said casing and to slidably receive the base of a hypodermic needle and having a horizontal tongue which extends between said vertical supports and in close proximity to said roller whereby the point of said needle may be slid on the top of said rotatable roller when said base is manually slid on said platform.