

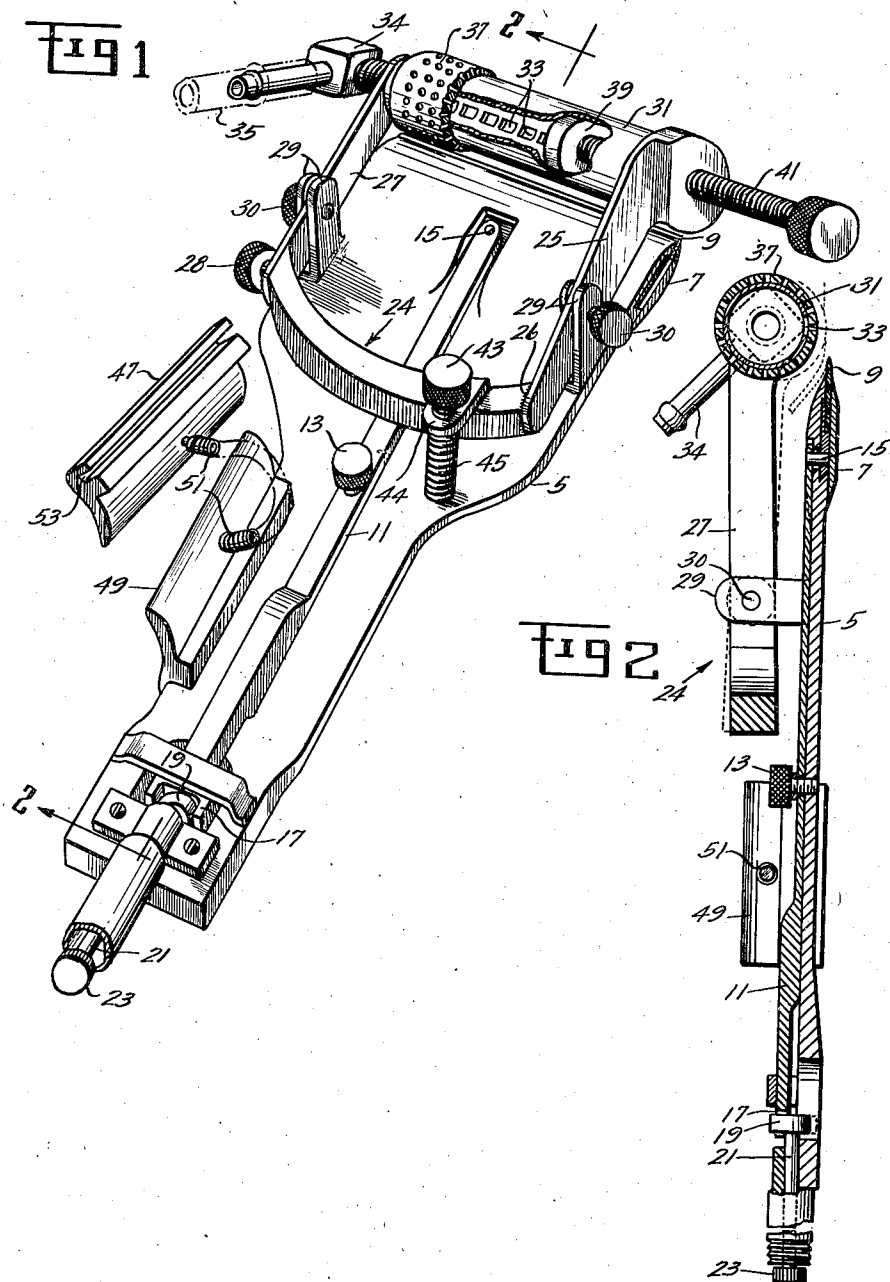
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DERMATOME

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DERMATOME

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to an instrument for cutting very thin sections of human skin for skin grafting or plastic surgery.

At the present time, several types of dermatomes are known. One of the more common is the type disclosed in U. S. Letters Patent 2,288,709, granted July 7, 1942, to G. J. Hood, which comprises a body member having a convex shaped outer surface coated with an adhesive for temporarily retaining the skin to be cut, in position, so that a cutting blade mounted for rotation and reciprocation relative to the convex surface can separate the skin from the body of the patient.

Another type of dermatome is disclosed in U. S. Letters Patent 1,736,246, granted November 19, 1929, to V. P. Blair, and contemplates the use of a suction box having an open bottom which is placed on the skin to be grafted. A suction is produced within the box by means of a suitable vacuum machine connected to the box. The knife used to sever the skin is reciprocally mounted to one side thereof in suitable spaced relation therewith. Thus, as the knife is operated, it severs the skin raised or displayed by the suction produced in the box.

Likewise, a dermatome is disclosed in U. S. Letters Patent 1,935,605, granted November 21, 1933, to J. B. Altruda, comprising a mechanism, which with the exception of the blade and manner of mounting it, is similar to the mechanism employed in certain hair clipping devices. It has a reciprocating blade mounted in spaced relation with a motor driven roller which moves ahead of said blade and forces the skin into position for severance by the blade.

It has, however, been found that there are, at present, no dermatomes capable of removing very thin skin sections which will be entirely uniform throughout. This is due primarily to the fact that none of the dermatomes can accurately position and hold the skin to be cut in the desired relationship with the cutting blade. With the use of the instrument of this invention, the skin of the person from whom the graft is to be taken is automatically drawn into proper relation to the cutting blade, and the width and thickness of the skin section to be removed are easily adjusted so that it is possible to remove a very thin skin section, as thin as 0.006 inch in thickness. This section will be entirely uniform. With this instru-

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ment, it is possible for the first time to remove only a portion of the growth layer of the skin of predetermined thickness and thus leave a portion of the growth layer of skin living on the body of the person in the area from which the graft is removed. The portion of the growth layer left in the area from which the graft is removed will heal without any scar, and as it is healed, a subsequent graft may be taken from the same area of the person's skin. This was not possible prior to the development of this instrument. Since, with the use of instruments heretofore employed, which are incapable of removing such thin layers of skin with uniformity, the entire growth layer of skin is necessarily removed in the area from which the graft is taken.

It is therefore an object of this invention to provide a dermatome capable of removing very thin sections of the growth layer of skin of a person so as to leave no scar after healing.

It is a further object of this invention to provide a dermatome having a motor operated reciprocating cutting blade and means associated with this instrument for automatically drawing the skin of the person from whom the graft is being taken into certain predetermined relation to the cutting blade.

It is a still further object of this invention to provide a dermatome capable of cutting varying widths of skin by reason of a simple adjusting mechanism provided on said dermatome.

It is a still further object of this invention to provide on a dermatome a simple adjusting mechanism for varying the thickness of skin cut by the reciprocating blade of the instrument.

It is a still further object of this invention to provide on a dermatome an adjustable, evacuated, rotating member for drawing the skin of the person from whom the graft is to be taken into a predetermined relation with a motor operated reciprocating cutting blade mounted thereon.

These and other objects of my invention will become apparent from the following detailed description taken in conjunction with the accompanying drawing in which:

Fig. 1 is a perspective view of the dermatome.

Fig. 2 is a side view taken along line 2—2 of Fig. 1.

Referring to Fig. 1, it will be seen that the dermatome comprises a main frame 5 having associated therewith blade means consisting of a suitable blade holder 7 and a cutting blade 9. Blade holder 7 with the cutting blade 9 suitably secured thereto is adapted for reciprocation trans-

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versely of the frame 5. For reciprocating the blade 9, there is provided an actuating member 11 pivotally secured to the frame 5 by means of a screw member 13. One end of the actuating member 11 is pivotally associated with the blade holder 7 by means of a pivot pin 15. The opposite end of the actuating member 11 is provided with a forked portion 17 which receives an eccentric cam 19 provided on a drive shaft 21 driven through a suitable gear drive as indicated at 23 whereby to oscillate the actuating member 11 about its pivot and reciprocating blade holder 7 and blade 9 transversely of frame 5.

Adjustable means are provided for drawing the skin of the person from whom the graft is to be taken into a certain predetermined relationship with cutting blade 9. This means comprises a yoke generally indicated as at 24, pivotally supported on brackets 29 by pivot members 30. One arm 25 of yoke 24 is welded in place as at 26, while the other arm 27 is releasably held in place by screw 28. Brackets 29 are rigidly secured to the frame 5. A hollow cylindrical casing 31, mounted at the outer end of the yoke 24 between arms 25 and 27, is provided with a plurality of selector openings 33 on the underside of the casing 31 directed downwardly towards frame 5 and cutting blade 9. The interior of casing 31 communicates with a connector 34 to which is attached a flexible vacuum line 35 (shown in phantom). The vacuum line 35 is attached to a vacuum pump (not shown) capable of applying sufficient vacuum within casing 31 to hold the skin of a person against a perforated cylinder 37 which is rotatably mounted on the casing 31. Within casing 31 a plunger or separating member 39 is provided which is associated with a screw 41 for the adjustment of member 39 axially within cylinder casing 31. The adjustment of the member 39 within the casing 31 determines through what portion of the perforated cylinder 37 the vacuum created in casing 31 will be effective, in order to draw the skin of the person against the periphery of perforated cylinder 37.

An adjusting screw 43 is provided for adjusting the position of the perforated roller 37 with respect to the cutting blade 9. The adjusting screw 43 is threaded into frame 5 and a spring 45 encircles it and is confined under compression between the cap of the screw 43 and frame 5. The upper end of spring 45 abuts the arm 44 which is welded to the yoke 24 so as to tend to lift up the portion thereof with which the spring 45 is associated and thereby tend to urge the perforated roller 37 downwardly towards the cutting blade.

Removable handles 47 and 49 interconnected by a spring 51 and provided with channels or grooves 53 within which opposite edges of the frame 5 fit when the handles 47 and 49 are applied, are provided to allow easier handling and manipulation of the dermatome.

In operation, the instrument is manipulated so that the underside of the frame 5 engages the skin of the person in the area from which the graft is to be taken. The perforated roller 37 is mounted in a position slightly forwardly of the cutting edge of the blade 9, having reference to the direction in which the instrument is moved during the cutting operation. With the blade 9 reciprocating transversely of the frame 5 and the interior of the casing 31 leftwardly of the member 39 being evacuated through the vacuum line 35, the skin will be drawn against the perforated cylinder 37 in an area defined by the openings 33

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in the casing 31 leftwardly of member 39. Thus the width of skin which is drawn into engagement with the perforated cylinder 37 will be determined by the position of the member 39 within the casing 31, so adjusted by means of the screw 41. The thickness of the skin section to be removed will be determined by the adjustment of the screw 43. Thus, the farther the perforated cylinder 37 is moved upwardly relative to the cutting blade 9, the thicker will be the skin section to be cut. As the instrument is moved over the area of skin from which the graft is to be taken, the perforated cylinder 37 will rotate and a fresh area of skin will constantly be drawn into engagement with the perforated cylinder 37 in the area thereof defined by the openings 33 in the casing 31, the skin being thus held in predetermined relation to the blade 9.

It will therefore be seen that I have provided a dermatome which is capable of removing only a portion of the growth layer of skin of predetermined thickness and which is capable of removing varying widths of said skin.

While I have described one particular embodiment of my invention, it is to be understood that I do not wish to be restricted thereto and that I intend to cover all modifications thereof which would be apparent to one skilled in the art and which come within the spirit and scope of the appended claims.

I claim:

1. In a dermatome for removing a predetermined thickness of skin, a frame, a roller rotatably mounted on the frame adapted to contact the skin to be removed, said roller having the periphery thereof permeable to the flow of air therethrough, means internal of the roller for producing a subatmospheric pressure only in that portion of the roller in contact with the skin, whereby the skin is supported in firm contact with the roller, and cutting means mounted on the frame and movable in a plane parallel to the axis of the roller.

2. In a dermatome for removing a predetermined thickness of skin, a frame, a roller rotatably mounted on the frame adapted to contact the skin to be removed, said roller having the periphery thereof perforated, means positioned internally of the roller having port means therein in register with the said perforations only in the zone in contact with the skin, means for producing a subatmospheric pressure at said port means, whereby the skin is supported in firm contact with the roller, and cutting means mounted on the frame and movable in a plane parallel to the axis of the roller.

3. In a dermatome for removing a predetermined thickness of skin, a frame, a roller rotatably mounted on the frame, said roller having the periphery thereof perforated, means positioned internally of the roller having spaced ports therein in register with the said perforations only in the zone thereof in contact with the skin, means for producing a subatmospheric pressure at said ports, adjustable separating means within said means positioned internally of said roller adapted to separate any desired number of said ports from said means for producing subatmospheric pressure, whereby only the skin beneath the portion of said roller still under subatmospheric pressure is supported in firm contact with said roller, cutting means mounted on said frame and movable in a plane parallel to the axis of the roller, adjustable means on said frame to posi-

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tion said roller in a predetermined relationship to said cutting means.

4. In a dermatome for removing a predetermined thickness of skin, a frame, a yoke adjustable vertically in relation to the axis of said dermatome mounted on said frame, a roller mounted rotatively on said adjustable yoke, said roller having the periphery thereof perforated, a cylindrical casing positioned internally of said roller having longitudinally spaced ports therein in register with said perforation only in the zone thereof in contact with the skin, means for producing a subatmospheric pressure at said ports,

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transversely adjustable separating means within said cylindrical casing adapted to separate any desired number of said ports from said means for producing subatmospheric pressure, and thereby vary the width of said casing under subatmospheric pressure whereby only the skin beneath the portion of said roller still under subatmospheric pressure is supported in firm contact with said roller, cutting means mounted on said frame and movable in a plane parallel to the axis of the roller.

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