

Feb. 6, 1951

A. E. SMITH
SLICING APPARATUS

2,540,462

Filed March 24, 1949

2 Sheets-Sheet 1

Fig. 1.

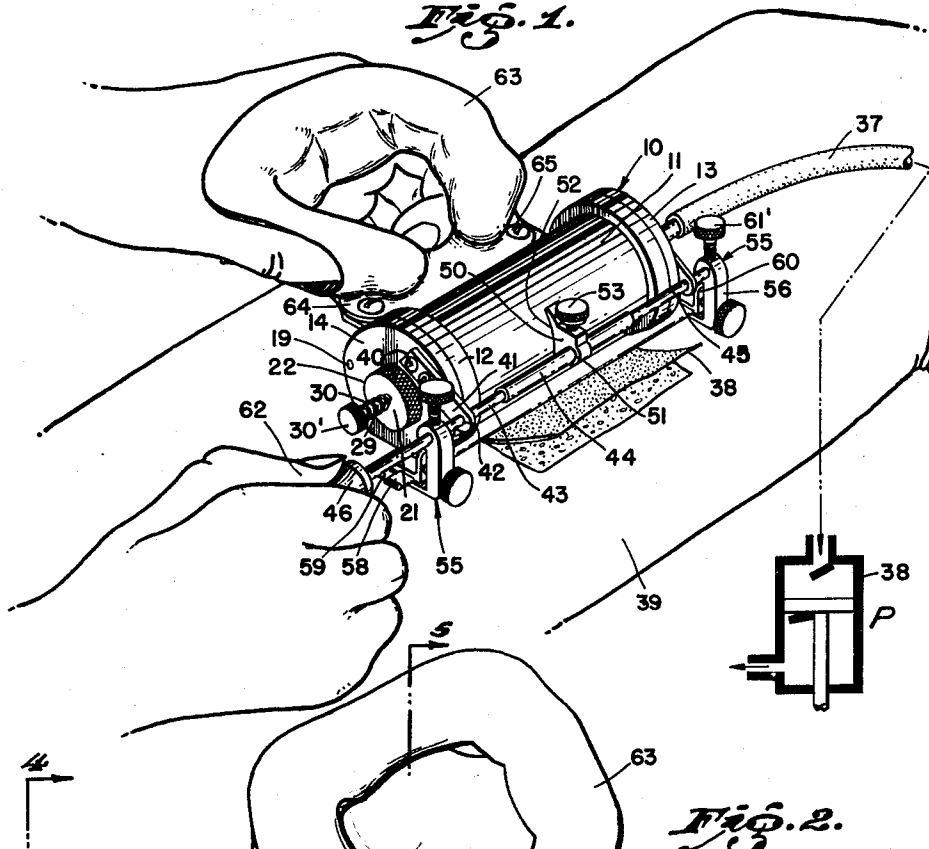
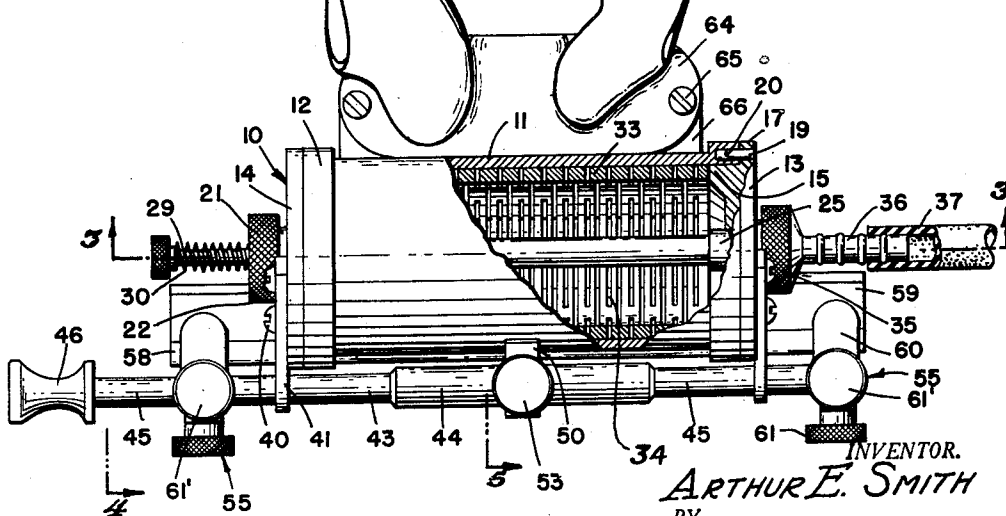


Fig. 2.



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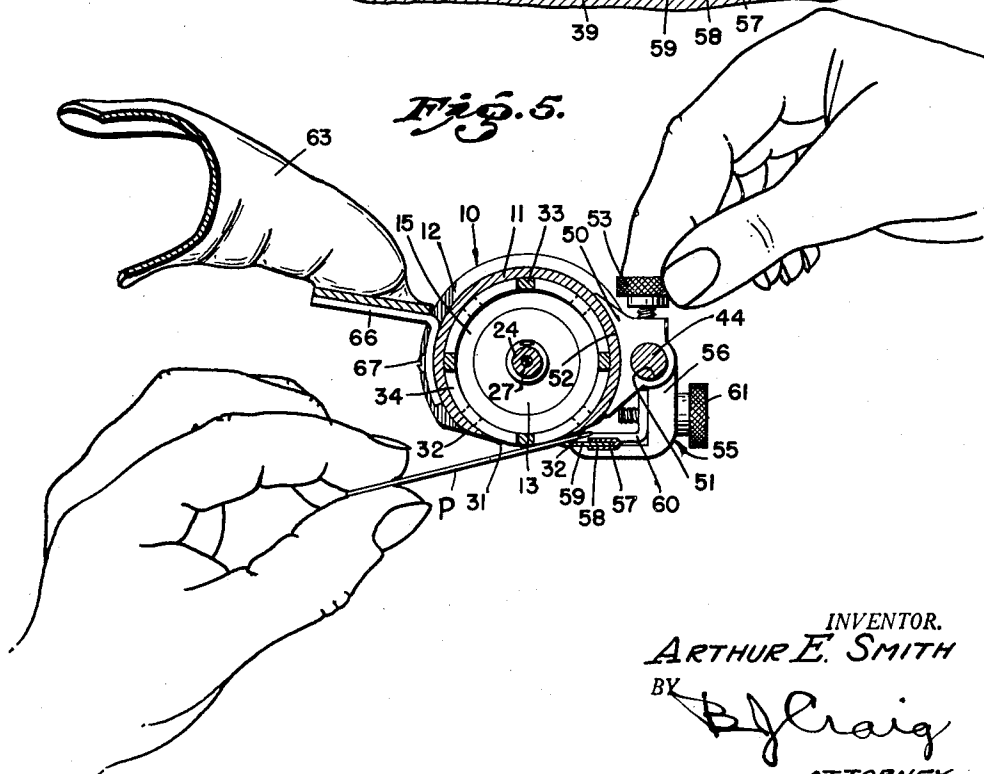
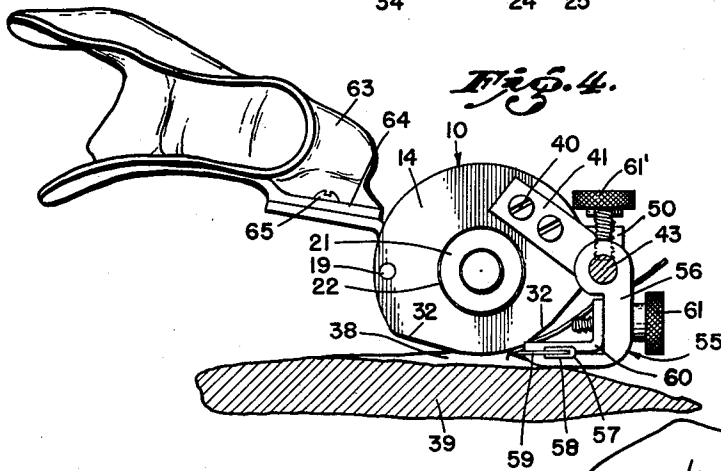
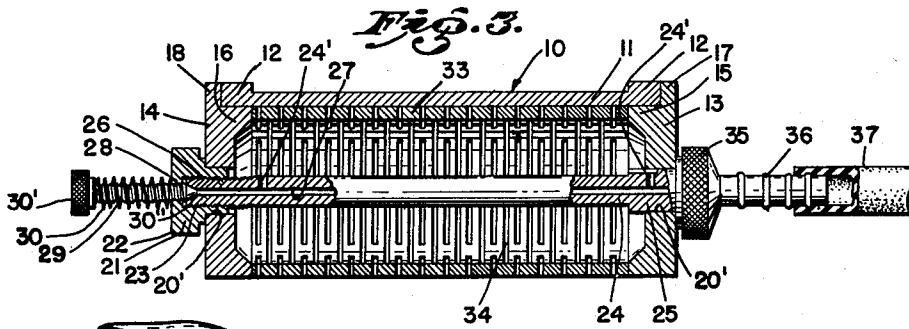
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SLICING APPARATUS

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10 Claims. (Cl. 128—305)

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This invention relates to an apparatus for removing sheets of split skin from the human body so that skin grafting operations may be performed readily.

The general object of the invention is to provide an apparatus for slicing thin layers of flexible material.

A more specific object of the invention is to provide a slicing apparatus in which novel means is provided for holding a knife member.

A further object of the invention is to provide a slicing apparatus including novel means for holding the material to be sliced in readily accessible position.

Another object of the invention is to provide a novel vacuum actuated means for holding material to be sliced adjacent to the knife of a slicing apparatus.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a perspective view showing my apparatus in use;

Fig. 2 is a top plan view, with parts broken away, showing my apparatus;

Fig. 3 is a section taken on line 3—3, Fig. 2, showing the cylinder;

Fig. 4 is a section taken on line 4—4, Fig. 2, and Fig. 5 is a section taken on line 5—5, Fig. 2.

Referring to the drawing by reference characters, I have shown my invention as embodied in a split skin slicing apparatus which is indicated generally at 10. As shown the apparatus includes a cylindrical body member 11 which has end flanges 12 thereon. Mounted upon each end of the body member, I show end plates 13 and 14. These end plates include inwardly directed portions 15 and 16, which fit within the body member, and end flanges 17 and 18, which engage the flanges 12.

The flanges 17 and 18 include pins 19 which fit in holes 20 in the body member to prevent rotation of the end plates relative to the body member.

The end plates 13 and 14 have axial bores 20' and in the bore 20' in the end plate 14 I arrange a closure 21. The closure 21 has an enlarged end flange 22 and has a threaded axial bore 23 which receives the threaded end 26 of a conduit member 24. The conduit member includes an enlarged portion 25, disposed in the bore 20' in the end plate 13. The closure 21, coaxial with the bore 23, has a threaded bore 28 which communicates with the bore 23. A threaded valve member 29 engages

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the threads of the bore 28. The valve member 29 is engaged by a spring 30 and has a knurled manipulating head 30' thereon. The end of the conduit member 24 has a valve seat 30'', which is engaged by the valve 29. The conduit 24 has a bore 27. Holes 24' in the conduit wall lead from the bore 27 to the exterior of the conduit.

The body member is provided with a slot 31 on the lower face thereof and the surface of the body member at 32 at each side of the slot extends substantially tangentially to the outer surface of a sleeve 33 which is cylindrical and fits within the body member with the outer surface of the sleeve disposed close to the inner surface of the body member. The sleeve is free to rotate by the engagement of the portion thereof which is exposed through the slot 31 with the material to be sliced. The sleeve 33 is provided with circumferentially arranged slots 34 which are arranged in parallel series along the length of the sleeve.

The conduit member 24 is provided with a headed, knurled portion 35 and with a ribbed portion 36 which is adapted to be secured to a tube 37 which extends to a source of vacuum, indicated diagrammatically at 38 in Fig. 1. The construction is such that when there is a partial vacuum in the tube 37 and in the conduit member 33, there will be a suction produced in the slots 34 so that the skin, as at 38, of the body 39 of the patient will be drawn against the sleeve 33 and as the apparatus is moved the sleeve 33 will rotate.

Mounted on each end of the plates 13 and 14 by screws 40, I show brackets 41. These brackets 41 are provided with holes 42 through which a shaft member 43 extends. The shaft member includes an enlarged central portion 44 and reduced end portions 45, with one of the ends having an enlarged finger grip portion 46 thereon.

To prevent rotation of the shaft 43 about its own axis while allowing the shaft to move axially, I provide a clamping member 50 which has a hole 51 receiving the enlarged portion 44 of the shaft 42. The member 50 includes an arcuate portion 52 which lightly engages and is slidable along the outer surface of the body member 11. The member 50 also includes a threaded clamping screw 53 which fits in a threaded hole in the member 50. The clamping screw 53 extends into engagement with the enlarged portion 44 of the shaft, and the construction is such that when the screw 53 is tightened against the shaft, the arcuate portion 52 will engage the body member 11 and will hold the shaft 43 against lateral, or turning, movement, but will not prevent the shaft from moving axially.

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The shaft 43 has a bracket member 55 adjacent each end thereof. Each bracket includes a body 56 which is general L-shape, with one side of the L notched as at 57 to receive the guard 58 on the knife 59. A clamping member 60 on each bracket 55 also engages the knife and is held against its associated bracket member by means of a clamping screw 61, and the construction is such that when the screw is tightened the knife will be held firmly in place. A second set of clamping screws 61', arranged on the top of the members 55, serve to retain the members 55 against rotation about the shaft ends 45.

The construction is such that the knife, as shown in Fig. 5, is substantially tangent to the outer surface of the sleeve 33 so that the knife may correctly perform the slicing operation. A thickness plate P, whose thickness is that of the split skin to be sliced, is inserted between the knife and sleeve, as shown in Fig. 5, to adjust the knife for the proper thickness to be sliced.

The width of the slice taken depends upon the length of the blade 59 of the knife. During the slicing operation the knife is reciprocated by the fingers 62 of the operator grasping the grip portion 46 on the shaft 43 and sliding the shaft axially.

The body member 11 is provided with a hand engaging member 63 which is shaped to receive the thumb and forefinger and which is preferably cast integral with the clamping plate 64, the latter being held by screws 65 upon brackets 66 which are in turn held on the body member by screws 67.

In using my slicing apparatus, the operator first selects a knife blade of the proper length, then secures this selected blade in the brackets 55. The thickness gage P is then inserted, as shown in Fig. 5, between the knife and the sleeve and the screws 53 and 61' are then tightened and the thickness gage is removed. The tube 37 is then connected to the source of vacuum 38 and the apparatus is placed against the material, such as the skin of a patient, to be sliced. The suction causes the skin to be lifted against the sleeve 33 and the apparatus is moved as shown in Fig. 1 while the finger grip member 46 is reciprocated axially.

From the foregoing description it will be apparent that I have invented a novel slicing apparatus which is particularly adapted for removing sheets of skin from the body and that the apparatus is simple in construction and highly efficient in operation.

Having thus described my invention, I claim:

1. In a slicing apparatus, a body member, a sleeve rotatable within said body member, means closing the ends of said sleeve, means to produce a partial vacuum in the sleeve, said sleeve having spaced slots therein, said body member having an opening exposing the sleeve member for contact with a surface to be sliced, a knife support, a knife on said support, and means adjustably mounted on said body member for holding the knife adjacent to said opening.

2. In a slicing apparatus, a body member, a sleeve rotatable within said body member, means closing the ends of said sleeve, means to produce a partial vacuum in the sleeve, said sleeve having spaced slots therein, said body member having an opening exposing the sleeve member for contact with a surface to be sliced, a knife support, a knife on said support, means adjustably mounted on said body member for holding the knife sup-

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port for axial movement on said body member and adjacent to said opening, and means slidable along the outer surface of the body member and engaging said knife support and said body member to hold said support against turning movement while permitting axial movement thereof.

3. In a slicing apparatus, a cylindrical body member, a sleeve rotatable within said cylindrical body member and having its outer wall closely adjacent to the inner wall of said body member, means closing the ends of said sleeve, a conduit member communicating with the interior of said sleeve, said sleeve having spaced slots therein, said conduit member being adapted to be coupled to a source of vacuum, said body member having an opening exposing the sleeve member for contact with a surface to be sliced, a shaft, means to mount said shaft for sliding movement adjacent to said body member, a knife member, means adjustably mounted on said shaft for holding the knife member adjacent to said opening, and means engaging said shaft and holding said shaft against rotation about its axis.

4. In a slicing apparatus, a body member, a sleeve rotatable within said body member, means closing the ends of said sleeve, a conduit member communicating with the interior of said sleeve, said sleeve having spaced slots therein, said body member having an opening exposing the sleeve member for contact with a surface to be sliced, a shaft, means to mount said shaft for sliding movement adjacent to said body member, a knife member, means adjustably mounted on said shaft for holding the knife member adjacent to said opening, and means engaging said shaft and slidable along the outer surface of the body member to hold said shaft against rotation about its axis.

5. In a slicing apparatus, a cylindrical body member, a sleeve rotatable within said cylindrical body member and having its outer wall closely adjacent to the inner wall of said body member, means closing the ends of said sleeve, a conduit member extending into, and communicating with, the interior of said sleeve, said sleeve having spaced slots therein, said conduit member being adapted to being coupled to a source of vacuum, said body member having an opening exposing the sleeve member for contact with a surface to be sliced, a shaft, means to mount said shaft for sliding movement adjacent to said body member, a knife member, means adjustably mounted on said shaft for holding the knife member adjacent to said opening, means engaging said shaft and slidable along the outer surface of the body member to hold said shaft against rotation about its axis while permitting the shaft to slide along the body member, said conduit being an outlet to the atmosphere, and valve means controlling passage through said outlet.

6. In a slicing apparatus, a cylindrical body member, a conduit member in said body member, a sleeve rotatable within said cylindrical body member and having its outer wall closely adjacent to the inner wall of said body member, means closing the ends of said sleeve, said sleeve having spaced slots therein, said conduit member being adapted to being coupled to a source of vacuum, said body member having an opening exposing the sleeve member for contact with a surface to be sliced, a shaft, means to mount said shaft for sliding movement adjacent to said body member, a knife member, means adjustably mounted on said shaft for holding the knife mem-

ber adjacent to said opening, means on said shaft and slidable along the outer surface of the body member to hold said shaft against rotation about its axis while permitting the shaft to slide along the body member, means to afford communication between the conduit member and the interior of the sleeve, said conduit being an outlet to the atmosphere, and valve means controlling passage through said outlet.

7. In a slicing apparatus, a cylindrical, closed end body member, a conduit member extending through said body member, a sleeve within said cylindrical body and rotatable about the conduit member, said sleeve having its outer wall closely adjacent to the inner wall of said body member, said sleeve having spaced slots therein, said conduit member being adapted to being coupled to a source of vacuum, said body member having an opening exposing the sleeve member for contact with a surface to be sliced, a shaft, means to slidably mount said shaft adjacent to said body member, a pair of brackets adjustably mounted on said shaft, means to hold a knife member on said brackets, means on said shaft and slidable along the outer surface of the body member to hold said shaft against rotation about its axis while permitting the shaft to slide along the body member, means to afford communication between the hole in the conduit member and the interior of the sleeve, said conduit being an outlet to the atmosphere, and valve means controlling passage through said outlet.

8. In a slicing apparatus, a cylindrical body member having end closures, a conduit slidable in said closures, a sleeve rotatably fitted within said cylindrical body and having its outer wall closely adjacent to the inner wall of said body member, said sleeve having spaced slots therein, said conduit member having a hole therethrough and being adapted to being coupled to a source of vacuum, said body member having a longitudinal slot to expose the sleeve member for contact with a surface to be sliced, a shaft, means to slidably mount said shaft adjacent to said body member, a pair of brackets adjustably carried by said shaft, means to hold said brackets in adjusted position on said shaft, said brackets having ends disposed adjacent to one edge of said slot, a knife member on said bracket ends, means for holding said knife in position on said brackets, means on the shaft and slidable along the outer surface of the body member to hold said shaft against rotation about its axis while permitting the shaft to slide along the body member, means to afford communication between the hole in the conduit member and the interior of the sleeve, said hole in the conduit being an outlet to the atmosphere, and valve means controlling passage through said outlet.

9. In a slicing apparatus, a cylindrical body member, end plates on said cylindrical member, said end plates having axial bores, an internally threaded closure in one end plate bore, a conduit member mounted in the other end plate bore and the closure bore, said conduit having threads engaging the closure threads, a sleeve rotatably fitted within said cylindrical member and having its outer wall closely adjacent to the inner wall of said body member, said sleeve having

longitudinally disposed series of circumferentially extending spaced slots, said conduit member having a hole therethrough and being adapted to being coupled to a source of vacuum, said conduit having a valve seat in its threaded end, a valve threadedly engaging said closure and adapted to engage said valve seat, said body member having a slot through which said sleeve projects, the surface of the body member at each side of the slot thereon extending substantially tangentially to the sleeve to expose the sleeve member for contact with the surface to be sliced, an arm on each end member, a shaft slidably and rotatably mounted on said arms, said shaft being disposed adjacent to said body member, a pair of brackets pivotally and slidably carried by said shafts, means to hold said brackets in adjusted position, said brackets being of general L-shape with the extreme ends disposed adjacent to one edge of said slot, a knife member on said bracket extreme ends, a clamping bar on each bracket for holding said knife in position, means on said shaft and slidable along the outer surface of the body member to hold said shaft against rotation about its axis while permitting the shaft to slide along the body member, means to afford communication between the hole in the conduit member and the interior of the sleeve and means to afford communication between the hole in the conduit and the atmosphere.

10. In a slicing apparatus, a cylindrical body member including end plates, said end plates having axial bores, a conduit slidable in said bores, a sleeve rotatably fitted within said cylindrical member and having its outer wall closely adjacent to the inner wall of said body member, said sleeve having spaced slots therein, said conduit member having a hole therethrough and being adapted to being coupled to a source of vacuum, means to bleed said conduit to the atmosphere, said body member having a slot through which said sleeve projects, the surface of the body member at each side of the slot thereon extending substantially tangentially to the sleeve to expose the sleeve member for contact with the surface to be sliced, spaced arms on said body member, a shaft slidably mounted on said arms, said shaft being disposed adjacent to said body member, a pair of brackets adjustably carried by said shafts, means to hold said brackets in adjusted position, said brackets being of general L-shape with the extreme ends disposed adjacent to one edge of said slot, a knife member on said bracket extreme ends, means for holding said knife in position, means secured on said shaft and slidable along the outer surface of the body member to hold said shaft against rotation about its axis, and means to afford communication between the hole in the conduit member and the interior of the sleeve.

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The following references are of record in the file of this patent:

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