

[72] Inventor **Michael Duffy**
 2424 Foxhall Road N.W., Washington,
 D.C. 20007
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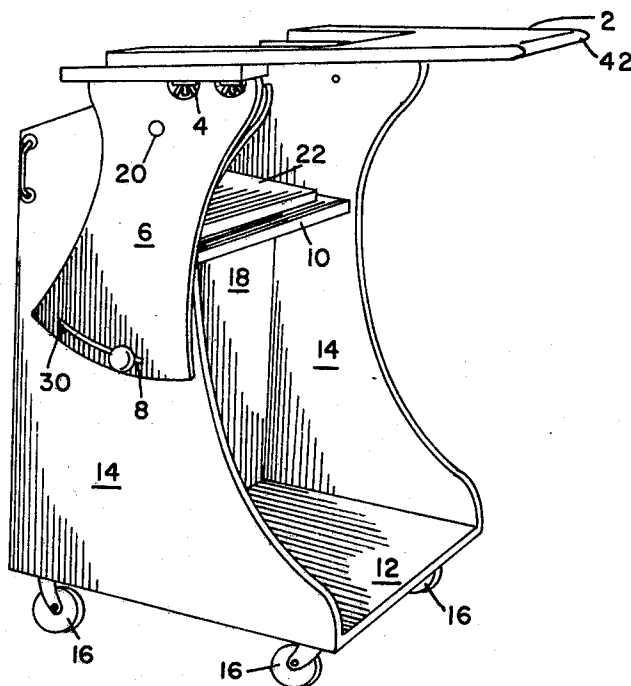
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Attorney—Sherman and Shalloway

[54] **SURGICAL SUPPORT**
 6 Claims, 5 Drawing Figs.

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 297/115, 128/1
 [51] Int. Cl. **A61b 17/00**
 [50] Field of Search..... 128/303,
 303.1; 248/118, 118.1, 118.3, 118.5; 297/411,
 417, 150, 154

ABSTRACT: A support for use in surgical procedure, especially microsurgical procedures, comprising a body support and an attached forearm support wherein the forearm support is adjustable in at least two directions.



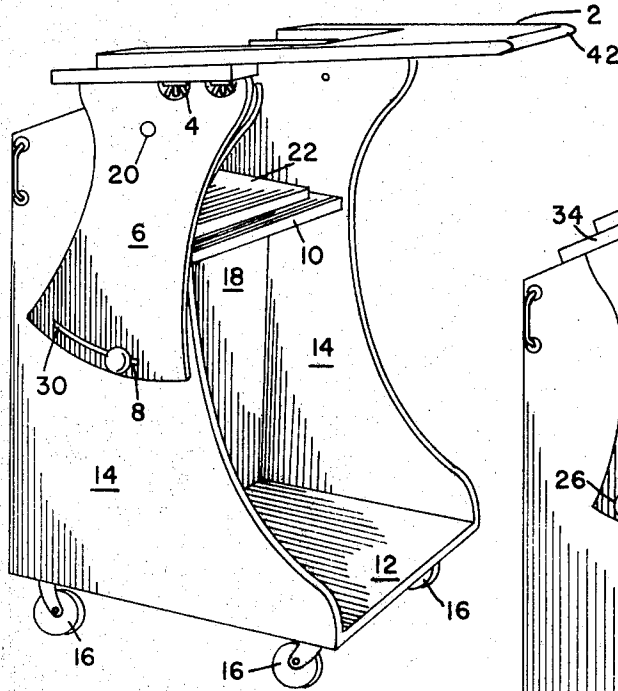


FIG. 1

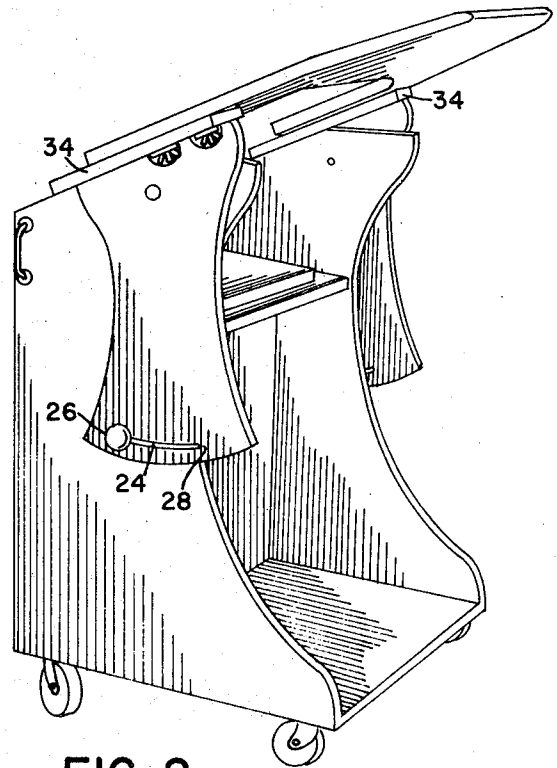


FIG. 2

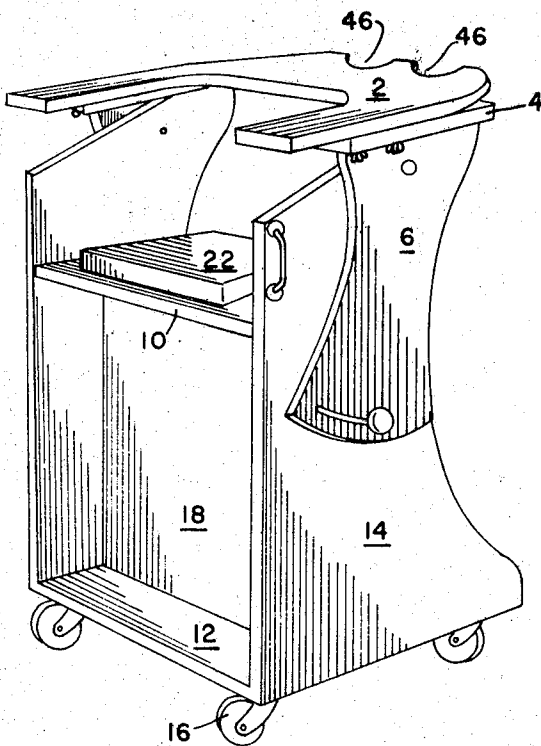


FIG. 3

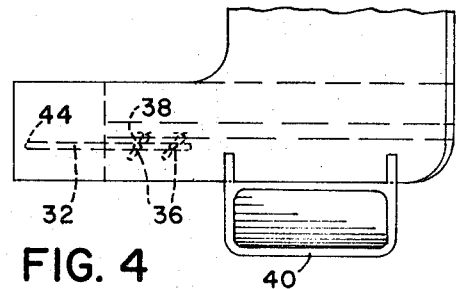


FIG. 4

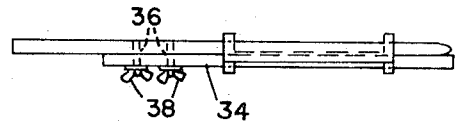


FIG. 5

INVENTOR

MICHAEL DUFFY

BY

Sherman & Shalloway
ATTORNEY

SURGICAL SUPPORT

This invention broadly relates to surgical supports; more specifically the invention relates to a support for a surgeon engaged in microsurgery.

In view of the recent developments in surgical techniques; including the development of microsurgical techniques, it has been found the surgeons must stand in position for long periods of time to perform the complex functions demanded of modern practitioners. In addition to the lengthy surgical procedures the complexity of the procedures has greatly increased in recent years.

One surgical area which has particularly felt the increased demands in terms of time and complexity is microsurgery. Broadly, microsurgery may be defined as surgery wherein the surgeon views the affected area of the patient through a microscope. Specific applications of microsurgery now being developed include plastic surgery and transplants of body organs.

By way of defining the applicable field of the invention it is desirable to review conventional surgical practices. In plastic surgery the basic idea is the transplant tissue from one part of the body to another. When the two affected areas of the body are remote as when a transplant from the abdomen to the face is contemplated it is conventionally necessary to undergo an intermediate transplant in order to keep the transplanted tissue "alive." For example, a graft of tissue may be taken from the abdomen leaving some of the blood vessels intact which graft is attached to a patient's arm where the severed vessels are allowed to naturally graft to blood vessels in the arm, when this is accomplished, the graft is then completely severed from the abdomen and the severed blood vessels are allowed to naturally graft to exposed blood vessels on the face. This is a time consuming process since each natural graft of blood vessels requires about six weeks. The development of microsurgery enables the surgeon to skip the intermediate arm graft and to avoid the six weeks natural graft period by artificially welding the severed blood vessels of the graft to the blood vessels of the facial area. This artificial weld is achieved by the use of a laser, an adhesive, or a synthetic splice by a surgeon who must view his works through a microscope. The microscope is required since the blood vessels being treated are only about 1 millimeter in diameter and not readily visible to the naked eye. This process can also be used to transfer the positions of fingers and thumbs on a hand without the six week period. The artificial welding process is tedious and complex requiring the surgeon to maintain a rigid hand for long periods of time.

Other areas where microsurgery is used include middle ear surgery where the delicate components of the middle ear can be replaced or treated only by viewing through a microscope; again a rigid hand is required for the complex and tedious operation. Further areas of microsurgery include neurosurgery, and eye transplants both of which require the use of microscopes for the developing technique.

Obviously the microsurgeon has different requirements than the surgeon performing conventional or "gross" surgery. One requirement is that the microsurgeon maintain a steady hand for relatively long periods of time. This is extremely difficult as is evident from the experience of anyone who has undertaken delicate work with the hands. One of the obstacles encountered is the natural rhythm of the body produced by the heart. This rhythm produces body motion which must be damped to achieve a steady hand. The rifleman experiences this rhythm and overcomes it by holding a half-breath to temporarily stop the heart beat until he fires; while this technique is adequate for short periods it is not adequate for surgeons who work for long periods of time.

Additionally natural body motions are produced when the muscles suffer fatigue and begin to twitch. These motions must be damped and if possible the fatigue causing the motions should be eliminated.

Thus it is clear that a surgeon, particularly a microsurgeon must overcome natural body motions and maintain a steady hand to accomplish his function.

In the past surgeons have utilized such make-shift supports as a pile of towels or a portion of the patient to lean on. This served to damp some body motions but did not prevent the muscle fatigue or stabilize the surgeon. So far as can be determined there has never been developed a mechanical support adapted for use by the microsurgeon.

It has been discovered that the body may be supported in such a manner as to damp the natural body motion, to eliminate nervous twitching of the hands, and to steady the hand. The device for achieving these purposes according to the present invention briefly comprises a body support and an attached forearm support wherein the forearm support is adjustable in at least two directions.

Accordingly, it is a primary object of this invention to provide a surgeon's support which enables the surgeon to maintain the requisite steadiness in long and complex operations.

It is another object to provide the described support which is adapted for use in microsurgery.

A further object is to provide the described support which is easy to use and which is adjustable to accommodate the series of positions required by the surgeon.

Still another object is to provide a surgeon's support which may be safely used under the sterile requirements of operating rooms.

These and other objects and advantages of the present invention will become apparent from reference to the drawing wherein one embodiment of a support according to this invention is illustrated. In the drawings like numerals represent like elements and;

FIG. 1 is a perspective view showing the novel surgical support of this invention in a first position.

FIG. 2 is a perspective view of the novel surgical support of this invention in a second position.

FIG. 3 is a perspective view showing the rear of the novel surgical support of FIGS. 1 and 2.

FIG. 4 is an enlarged partial top view showing one mechanism for adjusting the forearm support in a horizontal direction and illustrating an attached utensil-tray; and

FIG. 5 is a side view of the forearm support of FIG. 4.

Referring to the drawing and particularly to FIG. 1, the main components of the surgical support are as follows:

- 2- forearm support
- 4- horizontal adjustment device
- 6- damping link
- 8- vertical adjustment device
- 10- body support
- 12- foot support
- 14- sidewalls
- 16- casters
- 18- rear wall
- 20- pivot pin

As seen in the FIGS., particularly FIG. 1 the surgical support of this invention comprises a base which serves as a foot support 12 which is provided with casters 16 adapting it for motion. Casters 16 are conventional casters which may be locked to avoid undesired movement by conventional frictional locking means. Sidewalls 14 extend upwardly as does rear wall 18. A rigid body support 10 is provided between sidewalls 14 and rear wall 18 by conventional means. A cushion 22 may be provided on body support 10. The damping links 6 are attached to sidewalls 14 by means of pivot pin 20 and by vertical adjustment device 8. The structure illustrated in the drawing is merely one suitable vertical adjusting device and is seen to include an arcuate slot 24 having an adjustable head 26 and an attached shaft (not shown) extending through said slot. The head 26 is rigidly fixed to a shaft that is in turn rigidly fixed to sidewall 14 thereby serving to allow the damping link 6 to be adjusted by allowing the slot 24 to move relative to shaft and head 26. An identical shaft, head 26, and slot 24 are provided on the opposite sidewall 14 but these elements are not shown in the drawings. It is noted that the arcuate shape of slot 24 allows vertical adjustment of forearm support 2 carried on damping links 6. When the slot 24 is positioned with a first extremity 28 engaging head 26 the forearm

support 2 is almost in a horizontal plane (level). When the slot 24 is engaged by head 26 at its opposite extremity 30 FIG. 2 the forearm support is in its uppermost position. Obviously the angle between the lowermost position of forearm support 2 FIG. 1 and the uppermost position of forearm support 2 FIG. 2 can be varied by varying the curvature and length of arcuate slot 24. Such obvious modifications and variations are contemplated within the scope of this invention. Head 26 is adapted to be tightened by turning it until it engages tightly against damping link 6 where it supports said link and attached forearm support 2. When it is desired to adjust the position of forearm support 2, head 26 is turned in the opposite direction until it does not engage damping link 6.

To adjust the position of forearm support 2 in a horizontal plane a similar slot and adjustable head system is provided as generally indicated by horizontal adjustment device 4. Turning to FIG. 4 the adjustment device is illustrated in enlarged form. A slot 32 is provided which extends through the intermediate members 34. Shafts or pins 36 are rigidly secured in the rear portion of forearm support 2 which shafts extend through slot 32 and are engaged by adjustable tighteners such as wing nuts 38. The wing nuts 38 serve the same purpose as head 26 in that they can be tightened to provide a secured forearm support at the desired angle of adjustment. Further, by extending forearm support 2 to its outermost position; i.e. where pin abuts end 44 of slot 32 the surgeon may step into the support. Alternatively, other means of moving support 2 may be used to facilitate entry.

By review of the structure described it is seen that the entire body is rigidly supported and specifically the forearms are rigidly supported by forearm support 2 which absorbs any inherent motions of the surgeon's trunk and arms. These motions are transmitted by means of damping links 6 which are rigidly attached to the body of the surgical support. Thus any movements not damped by damping links 6 are transmitted to sidewalls 14 where the mass of the support itself and the surgeon's lower torso absorb and damp any remaining movements. Thus the primary advantage of this support is seen to reside in the provision of a support which minimizes necessary body movements and absorbs and damps those inevitable body motions experienced by a surgeon.

It may thus be appreciated that the horizontal adjustment device 4 and the vertical adjustment device 8 are intended to orient the forearm support 2 in the required angle. It should be appreciated that the illustrated adjustment means are in no way critical to this invention and other devices may be substituted without altering the inventive concept. For example, it may be desirable to provide a series of hydraulic or motor driven adjustment means in which case a control console could be mounted at an appropriate position on the surgical support. Alternatively hand cranks connected by appropriate gearing may be used to vary the positions of the forearm support.

The same or a different motor or hydraulic system could also be utilized to drive the entire surgical support by suitable conventional connections to the casters 16. It is noted that these devices for supplying powered movements to the surgical support are not critical and may be eliminated for reasons of economy. However, if they are used the operative elements should conform to standard surgical requirements such as being explosion and spark proof. The requirements for operating room conditions are available and any elements used in the surgical support should conform to the accepted standards. In this respect it should be pointed out that the entire support should desirably be formed of stainless steel for ease in cleaning and for durability; any cushions used should be conductive rubber as well as the casters 16 in order to eliminate static discharges. The components should further be made from nonreactive metals to avoid rusting and staining. Furthermore, there should be no sharp projections or corners on the support; all surfaces may be rounded by conventional techniques such as grinding and polishing. All of the above requirements are merely dictated by accepted medical standards and are not essential to the functioning of the invention.

In addition to the basic support shown and described, it may be desirable in some cases to provide appurtenant items on the support. For example FIG. 4 shows a tray 40 which may serve to support surgical instruments in a readily accessible position. Additionally, when used in microsurgery it is possible to physically attach the microscope or a part thereof to the surgical support. In practice, however, it is often more desirable to support the scope by separate means in order to give the required stability.

Returning to the structure of forearm support 2 it must be pointed out that the forward edge 42 of this member is beveled to enable a surgeon's forearm to comfortably rest on the support while avoiding supporting and thus hindering the hands. With such a structure the discomfort experienced in resting the arm in a stationary position for long periods of time is minimized. It is conceivable to cut out an area along the forward edge 42 to accommodate the surgeon's forearm. In such a case two U-shaped areas 46 would be cut out having a size to receive the surgeon's forearms (See FIG. 3). It is further possible to make casts of surgeon's forearms and attach these to the cut out U-shaped areas thereby providing maximum comfort. In any or all of these embodiments it is possible to line the beveled edge and cut out areas with resilient padding which conforms to surgical standards. Again economical and practical considerations may preclude the fitting of the forearm support to an individual surgeon.

In accordance with operating room procedure a drape is required to preserve sterile conditions adjacent the patient. Therefore it is usually desirable to provide a drape which is adapted to cover the surgeon and one which will cover the surgical support. In some cases it may be possible to utilize a single drape which will be worn by the surgeon and which has an area adapted to fit over the surgical support.

In use the surgeon is seated in the support by sliding forearm support 2 forward and stepping over body rest 10. The support is then moved by suitable means, manual or power, to the operating table and the forearm support 2 is adjusted horizontally and vertically as described above until the surgeon is comfortably supported with the beveled edge 42 just above the area of the patient to be treated. Thus, the surgeon may be comfortably and rigidly supported during an extended operation.

While certain illustrative examples and embodiments have been described herein it is to be understood that the illustrations are given by way of example and not by way of limitation. Having described this invention in full clear and concise terms what is claimed is:

I claim:

Claim 1. A surgical support adapted for use in microsurgery comprising a body support, means to move said body support, a forearm support adapted to support the forearms but not the hands, means to adjust the position of said forearm support horizontally and vertically and damping links attached to said body support and to said forearm support.

Claim 2. A surgical support adapted for use in microsurgery comprising a body support, means to move said body support, a forearm support adapted to support the forearms but not the hands, said forearm support having a beveled forward edge, means to adjust the position of said forearm support horizontally and vertically and damping links attached to said body support and to said forearm support.

Claim 3. The support of claim 2 where in the surface of the forearm support is substantially planar and without obstructions to free movement of the forearms across the surface of said support.

Claim 4. The support of claim 3 wherein an instrument tray is supported on said forearm support.

Claim 5. The support of claim 2 wherein cut out areas are provided for engaging a portion of the forearms of a user.

Claim 6. A surgical method which comprises providing an adjustable forearm support for a surgeon, adjusting the vertical position of said support and the horizontal position of said support and the horizontal position of said support until the forearms but not the hands of the surgeon are supported at a point adjacent and above the area to be treated.