Nov. 8, 1932. M. E. HOFFMAN ET AL 1,887,022

SURGICAL DEVICE

Filed Nov. 2, 1929 2 Sheets-Sheet 1

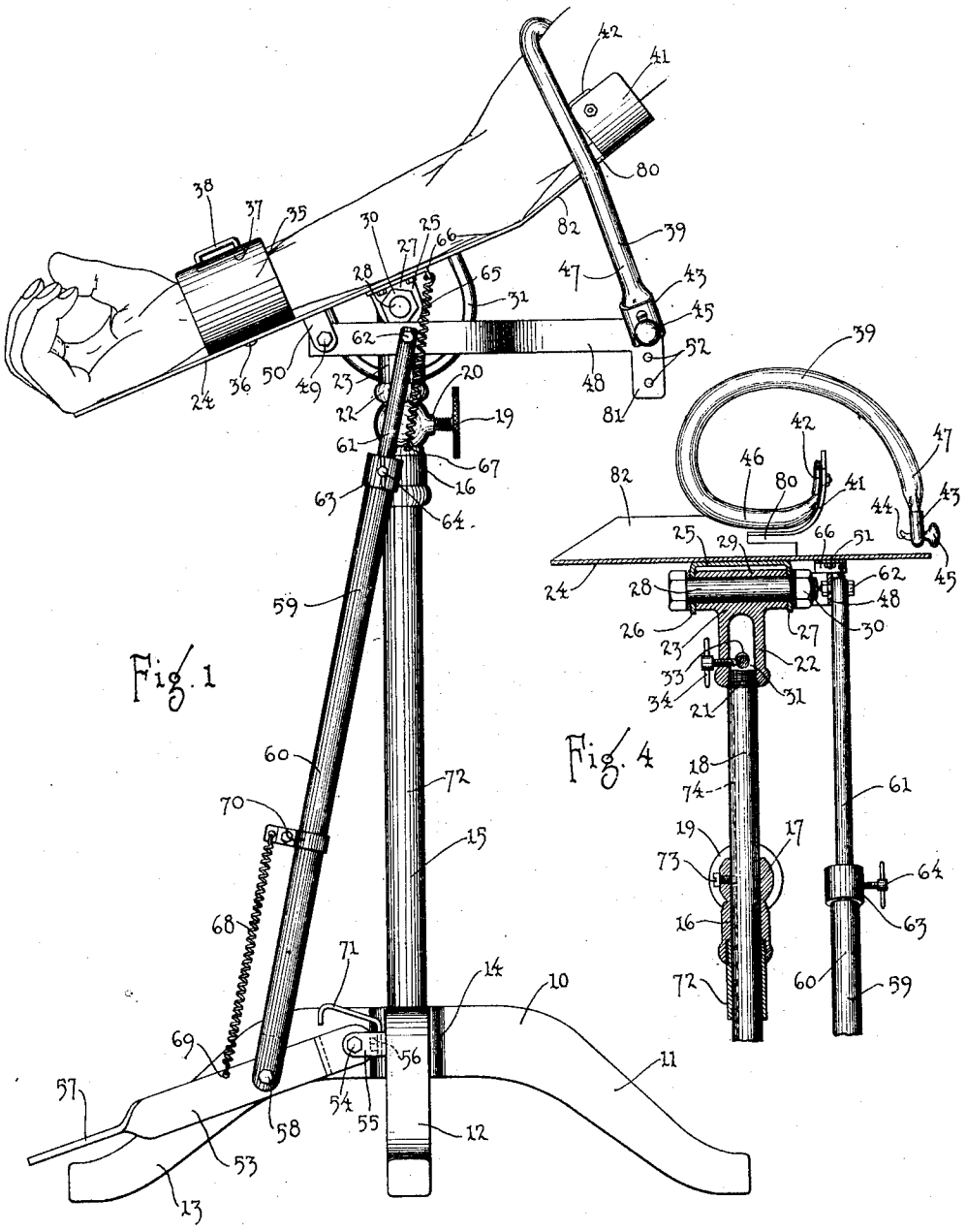


Fig. 1

Fig. 4

Inventors:
Malcolm E. Hoffman and
Ambrose L. Hoffman

By Caswell & Sagaard

Attorneys

Nov. 8, 1932. M. E. HOFFMAN ET AL 1,887,022

SURGICAL DEVICE

Filed Nov. 2, 1929 2 Sheets-Sheet 2

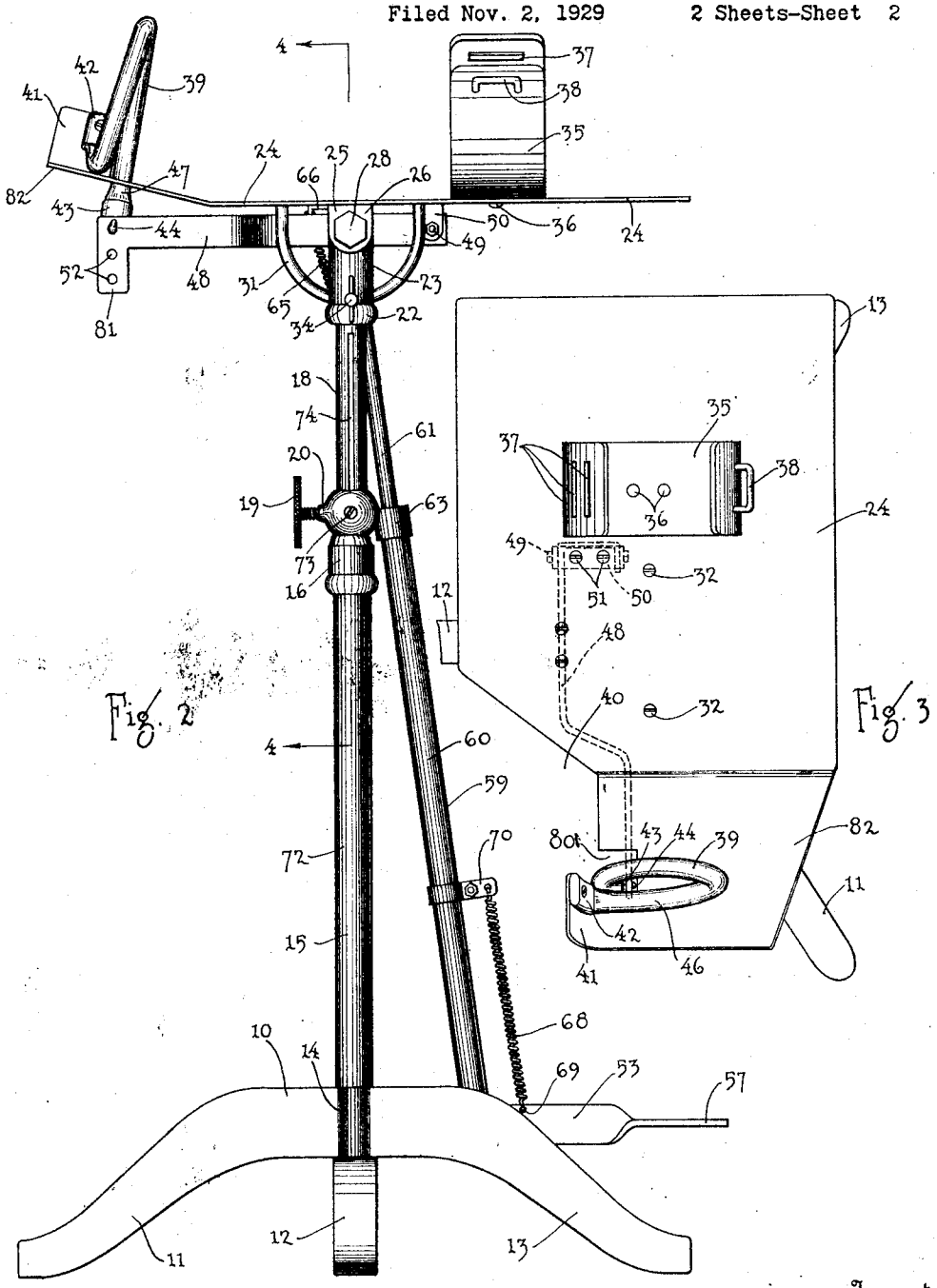


Fig. 2

Fig. 3

Inventors:
Malcolm E. Hoffman and
Ambrose L. Hoffman

By Caswell & Sagaard

Attorneys

Patented Nov. 8, 1932 1,887,022

UNITED STATES PATENT OFFICE

MALCOLM E. HOFFMAN, OF MINNEAPOLIS, AND AMBROSE L. HOFFMAN, OF ST. PAUL, MINNESOTA

SURGICAL DEVICE

Application filed November 2, 1929. Serial No. 404,286.

Our invention relates to surgical devices for use in administering medicines and other liquid preparations in the veins of patients, as well as for removing blood therefrom, and has for its object to provide a device whereby such operations may be safely and conveniently performed.

Another object of the invention resides in providing a device for retarding the circulation of blood through the patient's arm or other member wherein the vein to be pierced is situated to cause the said vein to protrude outwardly and assist the surgeon in the locating of the vein.

Another object of the invention resides in providing foot operated means for actuating said retarding device.

Another object of the invention resides in employing a support for the arm of the patient, and in further constructing said retarding device in the form of a band, said band being attached at one end to said support and being adapted to encircle the patient's arm.

A still further object of the invention resides in pivoting to said support a lever attached at one end to said band for tensioning the same while encircling the patient's arm.

A feature of the invention resides in providing a base and in mounting a standard thereon for carrying said support and in pivoting to said base a treadle, and in connecting to said lever and treadle a link adapted to tension said band upon the exertion of pressure upon said treadle.

An object of the invention resides in constructing said standard and link extensible to permit of raising and lowering the support relative to the base, and in further providing means for holding said link and standard in adjusted position.

Another object of the invention resides in providing separate springs for raising said lever and treadle independently of one another, and in providing separate stops for said lever and treadle to cause said lever and treadle to occupy the same relative positions upon movement of said support to any of its adjusted positions.

An object of the invention resides in pivotally connecting said support to said standard to permit of the angular adjustment thereof, and in providing a segment for holding said support in angularly adjusted position.

A still further object of the invention resides in connecting said link to said lever at a point substantially coinciding with the axis of said pivot.

Other objects of the invention reside in the details of construction thereof, and in the novel combination and arrangement of parts hereinafter illustrated and/or described.

In the drawings:

Fig. 1 is a side elevational view of an operating table illustrating an embodiment of our invention and showing the same used upon the arm of a patient in seated posture.

Fig. 2 is a view similar to Fig. 1 taken from the opposite side of the device and illustrating the support raised for use with the arm of a patient in reclining posture.

Fig. 3 is a plan view of the structure shown in Fig. 2.

Fig. 4 is a fragmentary elevational sectional view taken substantially on line 4—4 of Fig. 3.

The customary practice in medicine of injecting medicines and other preparations into the veins of patients and of removing blood therefrom is as follows: A band is first wrapped about the patient's arm directly above the elbow and sufficiently tightened to retard the circulation of blood through the patient's arm. This causes certain of the veins in the patient's arm to protrude so that their location may be readily ascertained by the surgeon. Holding the arm with the left hand in proximity to the part of the arm to be pierced and manipulating the hypodermic needle in the right hand, the surgeon pierces the skin and veins, inserting the needle into the vein proper. With the needle so held, the surgeon next removes the band with his left hand, permitting the recirculation of blood and then proceeds to inject the fluid into the veins or remove the blood therefrom, as the case may be. During the operation of releasing the band, the surgeon has but one hand available to maintain the needle properly positioned within

the vein and frequently the patient jerks or the surgeon's hand is not steady enough to hold the needle in proper position and the same pierces the vein or slips out, causing considerable difficulty for the surgeon and occasionally injuring the patient. The present invention overcomes this difficulty by providing an operating table whereby the circulation of blood through the patient's arm may be controlled independently by the foot of the surgeon so as to leave both hands free for the operation.

The invention proper comprises a base 10 which may be constructed in the form of a crow-foot having three legs 11, 12 and 13 extending outwardly from a central hub 14. The support for the arm of the patient is carried by a standard 15 which is attached to the base 10. This standard includes a tube 72 which is rigidly secured to the hub 14 and which terminates at its upper end in a sleeve 16. The sleeve 16 is bored as indicated at 17 to the same diameter as the bore of the tube 72 to receive a rod 18 forming part of said standard which rod carries the support as will be presently described. This rod is slidable within said tube and is adapted to be raised and lowered, as shown in Figs. 1 and 2. A thumb screw 19, screwed into a boss 20 formed on the sleeve 16, serves to hold the rod 18 in vertically adjusted position with respect to the tube 72. For holding the rod 18 from rotation, a screw 73 is employed which is threaded in the sleeve 22 and is adapted to engage within a key-way 74 formed in the said rod. This screw fits loosely within the said key-way so that said rod may readily slide along this screw as the standard 15 is adjusted as to length.

The upper end of the rod 18 is threaded, as indicated at 21, to screw into a depending boss 22 formed in a mounting 23. This mounting carries the support or top for the operating table which will now be described in detail.

The support for the arm of the patient or the top of the operating table is shown at 24 and is constructed of wood, metal, porcelain, enamel ware, or some other suitable material. This top is preferably shaped as shown in Fig. 3, and is preferably substantially rectangular with portions of the same cut away for purposes to be presently described. Upon the under side of the said top is rigidly secured to it through rivets or screws not shown a U-shaped clip 25 by means of which the top is pivotally connected to the mounting 23. This clip has two outstanding portions 26 and 27 which are drilled to receive a bolt 28 forming the pivot of the said support, which bolt passes through a horizontal boss 29 formed on the mounting 23. A nut 30 screwed upon the end of bolt 28 serves to hold the construction in assembled position. For adjustably supporting the top 24 relative to the standard 15, a segment 31 is employed which may be in the nature of a rod bent in the arc of a circle. The two ends of this segment are secured to the under side of the top 24 by means of two screws 32 which pass directly through said top and screw into the ends of the said segments. This segment passes through an opening 33 in the boss 22 of mounting 23 and is adapted to be engaged within said mounting by means of a thumb screw 34, the boss 22 being threaded to receive the same. By loosening the thumb screw 34, the top 24 may be tilted about the pivot formed by bolt 38 and angularly adjusted to meet with various requirements. Two common positions of the said top are shown in Figs. 1 and 2 which are used when the device is used for operating upon a patient in sitting and reclining posture.

In the use of the device, the patient's arm is preferably disposed upon the top 24 in the position shown in Fig. 1. For holding the patient's arm in place upon the said support, a wrist strap 35 is employed which is secured to the top 24 through rivets 36 or other suitable fastening means. This strap may be constructed with a number of eyes 37 which are adapted to be engaged by a hook or other suitable locking device 38 so as to encircle the wrist of the patient and hold the same firmly in place upon the said top. It is to be understood that any suitable buckle may be used in place of this construction or any suitable fastening device may be employed instead of the strap 35 without departing from the spirit of the invention.

The device for retarding the circulation of blood through the patient's arm comprises a band or similar flexible member indicated at 39 in the drawings. This band may be constructed of any suitable material, though I have found that a rubber hose or tube or any flexible cord encased within a rubber tube answers the purpose admirably. When a hose is used, as shown in the drawings, the same is constructed of a length somewhat greater than the distance around the patient's arm so that a portion of the same may be extended beyond the arm to permit of the tensioning of the said band. With the particular embodiment of the invention illustrated, the top 24 is made of sheet metal and a portion of the same cut away to provide an open space 40 extending into the said top. At such locality an ear 41 is formed from the metal of the top which is preferably bent upwardly in curved fashion, as shown in Fig. 4. One end of the band 39 is secured to this ear through a fastening member 42 which is preferably constructed so as to cap the end of the said member and conceal the raw edge thereof. The other end of the band 39 is similarly provided with a cap 43 rigidly secured thereto which is formed on one side with a hook 44, the use

of which will be presently described, and on the other side with a knob or button 45 by means of which the said band may be manipulated by the surgeon. In the use of the device, the arm of the patient is laid across the portion 46 of band 39 which lies upon the top 24 and along the ear 41 and also across the strap 35. The strap 35 is then applied and the band 39 caused to encircle the wearer's arm as shown in Fig. 1, and the free end 47 thereof inserted into a recess 80 formed in the top 24 adjacent the ear 41 and communicating with the open space 40. Upon tensioning the band while so positioned, the desired results can be obtained. To cause the patient's arm to lie in the proper position the end of the top 24 nearest the elbow and indicated at 82 in the drawings is bent out of the plane of the top, as best shown in Figs. 1 and 2.

For tensioning the band 39, a lever 48 is employed which is pivoted at one end through a bolt 49 to a bracket 50 secured to the underside of the said top through screws 51. This lever is formed at its other end with a depending portion 81 having a number of holes 52 therein (Fig. 2) into any of which the hook 44 may be hooked. When the said lever is forced downwardly, the same tensions the band 29 which encircles the arm of the patient and retards the circulation of the blood through it to cause the veins thereof to protrude, as before mentioned.

For operating the lever 48, treadle 53 is employed which is pivoted through a bolt 54 to a bracket 55. This bracket is secured to the leg 12 of standard 15 through bolts 56 and is so disposed as to permit of the vertical swinging of the said treadle. Upon the end of this treadle is formed a pedal 57 which may be readily engaged by the surgeon and operated to tension band 39, as will presently appear. The lever 48 and treadle 53 are connected together through an extensible link indicated in its entirety at 59 which comprises a tubular lower section 60 and an upper section 61 slidable within the section 60. The section 60 is pivoted to the treadle 53 intermediate its ends through a bolt 58 while the upper section 61 is similarly pivoted to the lever 58 intermediate its ends through a bolt 62. At the upper end of the tubular section 60 is secured to it a sleeve 63 which is tapped to receive a thumb screw 64 by means of which sections 60 and 61 may be held in adjusted position with respect to one another. By means of this construction, the link 59 may be adjusted as to length to permit of the raising and lowering of the support or top 24, as will be presently described.

For bringing the lever 48 into normal inoperative position, as shown in Fig. 2, a tension coil spring 65 is employed which is connected at one end to a lug 66 attached to the top 24, which lug also forms a stop for limiting the upward movement of said lever. This spring is connected at its other end to a hook 67 attached to the rod 61 forming the upper section of the link 59. The treadle 53 is independently elevated to its uppermost position shown in Fig. 2 through an independent spring 68. This spring is hooked at one end in a hole 69 formed in said treadle and is secured at its other end to a clip 70 attached to the tubular section 60 of link 59. The treadle 53 is also provided with an independent stop 71 secured to the bracket 55 through the bolts 56 which serve to limit the upward movement of the said treadle.

In the use of the device, the top 24 is first adjusted as to proper elevation to accommodate the patient in any posture. To permit of such adjustment, the screw 64 and screw 19 are first loosened. This permits of simultaneously extending or contracting both the link 59 and the standard 15, to bring the top 24 at the proper elevation. Upon reaching the proper elevation, the said screws may be tightened and the device is ready for use. This becomes possible through the use of separate stops and springs for limiting the movement of lever 48 and treadle 53 and the returning of the said parts to normal position. No matter what the position of the said top, these parts always assume the proper relative positions to permit of the proper use of the invention. The screw 34 is next loosened and the said top swung about the pivot afforded through the bolt 28 to give the said top the desired angularity. Screw 34 may then be tightened whereupon the top is firmly fixed for proper use. It will be noted from Fig. 2 that the axis of the bolt 62 substantially corresponds with the axis of hole 28 when the lever 48 is in normal position. This permits of adjusting the top 24 as to angularity without affecting the operation of lever 48 requiring the same movement of treadle 53 to tension band 29 regardless of the adjusted position of the arm support.

When the support 24 has been properly adjusted, the arm of the patient is laid upon the same and across band 39 and strap 35 as previously described. The said strap is then wrapped about the wrist of the patient and the hook 38 inserted in the proper eye 37. The free end 47 of the band 39 is next wrapped about the portion of the arm of the patient immediately above the elbow and inserted into the recess 80 and the hook 44 hooked into the proper opening 52 in lever 48 which is determined by the size of the patient's arm. By now stepping upon the treadle, the band 39 becomes tensioned about the patient's arm and the surgeon may control the circulation of blood through his arm without the use of either hand, leaving both

hands free to perform the desired operation.

Although we have specified our invention as used for operations in which fluids are injected into the veins or in which blood is removed therefrom, yet it may be readily comprehended that the device may be used for other surgical or medical purposes equally as well and with any of the limbs of the patient, the band 39 serving in other cases merely for further supporting the patient's limb upon the support.

The invention is highly advantageous in that operations may be safely and easily performed upon the limbs of patients without danger to the patient. The surgeon at all times is free to perform the operation without requiring the use of his hands for holding the patient's limb upon the device. Full control is at all times had of the tensioning device, so that the circulation of blood in the patient's limbs and the holding of the limb in place may be controlled by the surgeon at all times and at his will. The device is extremely simple in construction and positive in operation. The device can be quickly and easily adjusted for use for various postures of the patient, thereby rendering the same indispensible for the desired purpose.

Changes in the specific form of our invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of our invention.

Having described our invention, what we claim as new and desire to protect by Letters Patent is:

1. In combination, a support for the arm of a patient, means for holding said arm upon said support, a band attached at one end to said support and adapted to encircle the arm of the patient, a lever pivoted to said support and connected at one end to said band, and a link pivoted to said lever for swinging the same to tension said band and retard the circulation of blood through the patient's arm.

2. In combination, a support for the arm of a patient, means for holding said arm thereon, a member adapted to encircle the patient's arm, a frame structure for carrying said support, means for pivotally supporting said support on said frame structure, a lever pivoted to said support and connected to said member for tensioning the same, and a link pivoted to said lever at a point substantially in alignment with the pivot of said support for swinging said lever.

3. In combination, a support for the arm of a patient, means for holding said arm thereon, a member adapted to encircle the patient's arm, an extensible frame for carrying said support, a treadle pivoted to said frame, a lever pivoted to said support for tensioning said member, and an extensible link having upper and lower sections respectively pivoted to said lever and treadle, and individual springs for both of said sections independently operating to move said sections in the same direction.

4. In combination, a support for the arm of a patient, a band attached to said support and adapted to encircle said arm, a lever pivoted to said support and connected to the end of said band to tension the same, a base, a treadle pivoted to said base, an extensible standard mounted on said base and carrying said support, an extensible link connecting said lever and treadle, a spring for moving said lever upwardly, and a separate spring for independently moving said treadle upwardly.

5. In combination, a support for the arm of a patient, a band attached to said support adapted to encircle said arm, a lever pivoted to said support and connected to the end of said band to tension the same, a base, a treadle pivoted to said base, an extensible standard mounted on said base and carrying said support, an extensible link connecting said lever and treadle, a spring for moving said lever upwardly, a separate spring for independently moving said treadle upwardly, and individual stops for limiting the upward movement of said lever and treadle.

6. In combination, an elongated support for the arm of a patient, means for holding the arm upon said support, a band attached to one end of said support and adapted to encircle the arm of said patient, a lever pivoted at one end to the other end of said support, said lever being connected at its other end to the unattached end of the band and means engaging said lever intermediate its ends for tensioning the band to retard the circulation of blood through the patient's arm.

7. In combination, a support for the arm of a patient, means for holding said arm upon said support, means for swingably supporting the support, a band attached at one end to said support and adapted to encircle the arm of the patient, a lever pivoted to said support and connected at one end to said band, and means for swinging said lever to tension said band and retard the circulation of blood through the patient's arm.

8. In combination, a support for the arm of a patient, means for holding said arm thereon, a member adapted to encircle the patient's arm, a frame structure comprising upper and lower portions, means for guiding said portions for vertical movement, means for tensioning said member and a link for operating said means, said link having two sections movable relative to one another in substantially the same direction as the portions of said frame structure.

9. In combination, a support for the arm of a patient, means for holding said arm thereon, a member adapted to encircle the

patient's arm, a base, a telescoping standard mounted on said base and carrying said support, means for tensioning said member including a telescoping link operable from said base, said link and standard extending in substantially the same direction.

In testimony whereof we have affixed our signatures to this specification.

MALCOLM E. HOFFMAN.
AMBROSE L. HOFFMAN.