

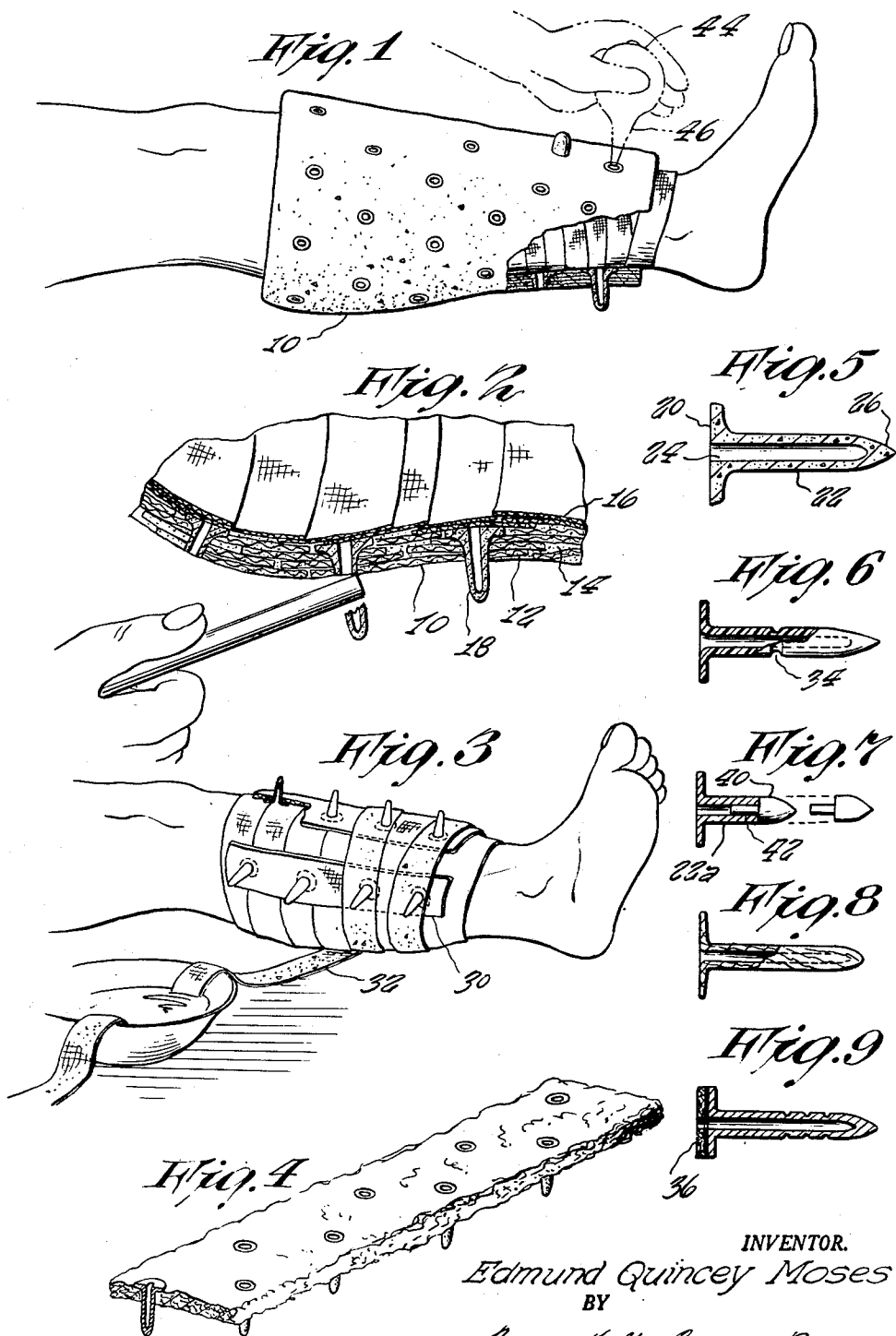
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VENTILATING OF SURGICAL CASTS

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## VENTILATING OF SURGICAL CASTS

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This invention relates to improvements in the ventilation of surgical casts. Surgical casts frequently cover substantial portions of the body, and often cannot be removed for weeks or even months. They are accordingly hot and uncomfortable and, owing to lack of access of air, the skin may become seriously irritated.

The primary object of the present invention is to provide an effective system for the ventilation of the body regions enclosed within a cast.

Casts are ordinarily made by winding bandages impregnated with plaster of Paris around the body part. It has not been practicable heretofore to provide vent openings wherever needed in such casts at the time that the bandages, which are in a wet and plastic condition, are applied. It is also very difficult, if not impossible, to form vent openings in the cast after it has once set, because holes cannot be formed in the cast after it has become hard without danger of injury to the underlying skin.

In accordance with the present invention, these difficulties are overcome by providing venting means which are incorporated in the cast at the time that it is applied. These venting means preferably take the form of small nipples or tubes, which are placed against the body surface and incorporated in the layers of bandage as applied, so as to leave holes through the cast. Preferably the nipple members are so formed that they have flat head portions adapted to rest against the skin or against the layer of cotton batting or other porous material placed thereover, the nipples having pointed ends which may pierce the layers of bandage, if it is more convenient to wrap the bandages over the nipples than between the same. In this case the holes in the nipples preferably do not extend through the pointed ends thereof, but do extend far enough so that, when the pointed ends projecting beyond the layers of bandage are broken off, ventilating holes will be provided. The nipples are preferably of small diameter so as not to interfere with the winding of the bandage or to break up the essential continuity of the cast and the holes are also relatively small to avoid "pouting" of the skin into the holes.

In the accompanying drawings illustrating certain preferred embodiments of the invention:

Figure 1 is a side elevation with parts broken away showing a cast applied to a leg;

Figure 2 is a longitudinal sectional view of a portion of the cast on a larger scale;

Figure 3 is an elevation showing the application of a cast to a leg illustrating a modified form of the invention;

Figure 4 is a perspective view of a strip carrying a plurality of nipples;

Figure 5 is a view on a larger scale showing a plaster or ceramic nipple in longitudinal section;

Figure 6 is a view similar to Fig. 5 showing a nipple made of synthetic plastic;

Figure 7 is a view similar to Figs. 5 and 6 showing a nipple made of wood with a removable pointed end plug;

Figure 8 is a side elevation of a nipple made of metal; and

Figure 9 is a view similar to Fig. 5 showing a modified form of the nipple.

Referring to the drawings in detail, the cast 10 may be of any well-known type such as plaster of Paris or other plastic. Most casts are made by winding plaster impregnated bandages about the body part to be en-

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cased, so that the cast as shown in Fig. 2 comprises a plurality of layers of fabric 12 embedded in plaster 14. Usually a lining of soft and porous material is first applied to the skin, such material being indicated at 16 in Fig. 2 as a cotton batting or felt bandage. In accordance with my invention ventilating nipples 18 are incorporated in the cast at the time it is applied. Any number of these nipples may be utilized as the surgeon may deem appropriate, and they may be located wherever they will provide for the best ventilation.

In the preferred embodiments of my invention the nipple 18 is provided with a head 20 preferably of flat shape and with a stem 22, through which extends a central hole or bore 24. It is desirable, but not necessary to make the nipple with a pointed end 26, the bore 24 terminating short of the point. With such construction it is possible to wind the bandage directly over the nipple as the point will pass through the fabric of the bandage without difficulty. After the cast has been fully applied and sufficiently set, the projecting point may be broken off, thereby opening the outer end of the bore 24 to the atmosphere. The outer point portion before being broken off closes the outer end of the bore and thereby prevents plaster from getting in during the process of applying the cast, which might leave the bore blocked.

The heads of the nipples may be placed directly against the skin prior to the application of the bandages, but in many cases it will be preferable to first apply the porous bandage of felt or the like, and then place the heads of the nipples against such felt while applying the plaster bandages. The porosity of the felt layer is generally sufficient to permit the air to circulate through the nipples and over the surface of the skin. The plaster bandages may be wound between the nipples or may be passed right over the pointed ends thereof and pulled closely into position with the ends piercing the loose fabric of the bandage. This will permit the utmost freedom in the manipulation of the bandages so as not to interfere with the movements of the surgeon in applying the bandages. The hollow stems of the nipples are made sufficiently long so that the bore will extend beyond the maximum thickness which it is necessary to give to the cast. After the cast has set, it is then merely necessary to break, cut or saw off the projecting pointed ends of the nipples even with the surface of the cast, whereupon there will be ventilation holes provided completely through the nipples which will enable the air to circulate to the interior of the cast.

Fig. 2 shows at the right hand end a nipple embedded in the cast with the pointed end projecting. At the center of Fig. 2 the operation of breaking off the projecting point of the nipple is illustrated. At the left of Fig. 2 the nipple is shown with the point broken off and the vent hole open through the cast.

Instead of utilizing separate nipples applied at intervals, as the cast is formed, it may be more convenient, particularly when a number of vents are required, to mount a series of nipples in some more or less permanent manner as by cementing them to strips of fabric 30, as shown in Fig. 3. These strips of fabric with nipples extending through the same and projecting therefrom are then laid in position upon the body part, or upon the preliminary layer of felt or cotton batting, after which the plaster bandage 32 is wound thereover, as also shown in Fig. 3. If desired the nipples may be mounted upon the felt bandage itself, as illustrated in Fig. 4.

The nipple may be formed of any suitable material such as plaster of Paris, chalk, pipe clay or ceramic material (Fig. 5), synthetic plastic such as polystyrene or the like (Fig. 6), wood (Fig. 7), drawn or die cast metal such as aluminum or magnesium (Fig. 8), or any other suitable material. If desired the inner face of the nipple head may be covered with a layer or pad 36 of felt or other soft material as shown in Fig. 9.

Plaster of Paris possesses certain advantages in that it is very inexpensive; brittle, so that the tip of the nipple may be easily broken off; and also of homogeneous character with the plaster of Paris of the casts that it will be incorporated in the cast, and will eventually become an integral part thereof so that the cast is not weakened by

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the introduction of the nipple. A porous ceramic material would have many of the same properties.

If the nipple is formed of a material which will not crack off readily it may have a weakening groove therein as indicated at 34 in Fig. 6, or a series of such grooves as indicated in Fig. 9. Nipples made by injection molding of synthetic plastic or of metal may be made very thin. Nipples made of wood would be exceedingly cheap and would also tend to bond effectively with the plaster of the cast.

In Fig. 7 a modified construction of nipple is shown in which the nipple has a tubular stem 22a which is not formed with an integral pointed end. In this construction I have shown a removable plug 40 having a pointed outer end and a stem 42 adapted to fit the end of the hole in the stem 22a. This form of nipple may be used exactly as the other forms of nipples except that after the cast is formed, the removable plug may be pulled out, thereby opening the vent hole.

Where a series of nipples is mounted in a line, as for example where they are mounted in line on a strip of material, as shown in Fig. 3, the series of nipples may be used as an aid in opening the cast for removal, or as indicating a definite line upon which the cast may be cut.

Ordinarily the perforated nipples will provide adequate ventilation due to slight movements of the body within the cast which will expel and draw air through the holes. If desired, however, means may be provided for effecting forced circulation through the holes, as by the use of a bulb or syringe 44 having a pointed nose 46 which may be inserted in the perforation in the nipple (Fig. 1). By squeezing the bulb air may be drawn out and forced in. Such an arrangement may also be utilized for the application of therapeutic agents in proper cases.

While certain preferred embodiments of the invention have been illustrated and described in detail, it is to be understood that changes may be made therein and the invention embodied in other structures. It is not therefore the intention to limit the patent to the specific constructions illustrated, but to cover the invention broadly in whatever form its principles may be utilized.

I claim:

1. A surgical cast having a nipple molded therein, said nipple having a ventilating hole extending from the inside to the outside of the cast the diameter of said hole being small enough to prevent objectionable pouting of the flesh into the entrance to the hole.

2. A surgical cast having a nipple molded therein, said nipple having a ventilating hole extending from the inside to the outside of the cast, the diameter of said hole being small enough to prevent objectionable pouting of the flesh into the entrance to the hole, said nipple having an enlarged head at the inside of the cast.

3. A surgical cast having a nipple molded therein, said nipple having a ventilating hole extending from the inside to the outside of the cast, the diameter of said hole being small enough to prevent objectionable pouting of the flesh into the entrance to the hole, and a liner of soft porous material inside of the cast covering the inner end of the nipple.

4. Ventilating means for incorporation into surgical casts comprising a strip of material having a plurality of nipples affixed thereto in spaced relationship, each of said nipples having a head affixed to the strip and lying

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substantially in the plane of the strip and a hollow ventilating stem of small bore projecting from the head substantially perpendicularly to the plane of the strip..

5. Ventilating means for incorporation into surgical casts comprising a strip of flexible material having a plurality of nipples affixed thereto in spaced relationship, each of said nipples having a flat shaped head affixed to the flexible strip lying substantially in the plane of the strip and having a hollow stem of small bore terminating in a closed pointed end said stem projecting from the head substantially perpendicularly to the plane of the strip.

6. A ventilating nipple for surgical casts comprising a hollow stem having an enlarged head at one end thereof and a point at the other end thereof, the diameter of the hole in the stem being small enough to prevent objectionable pouting of the flesh into the entrance to the hole, and a covering of flexible material affixed to the exposed surface of the head.

7. The method of forming a ventilated plaster cast which consists in molding the plaster cast upon the body surface and simultaneously incorporating in the cast one or more inserts having ventilating holes extending from a position inside of the cast to a position outside of the cast, the inserts having portions closing the outer ends of the ventilating holes, the outer ends of the inserts projecting beyond the surface of the finished cast, and then removing the projecting hole closing portions of the inserts so as to open ventilating holes from the inside to the outside of the cast.

8. The method of forming a surgical cast which consists in wrapping the body member with a layer of porous material, placing one or more nipples thereon, each having a head for resting on the porous material and a hollow stem, and wrapping wet plaster of Paris impregnated bandages over the porous material and around the nipple members so as to build up the body of the cast with the nipple members projecting therefrom, said nipple members having ventilating holes extending through the same from the inside to the outside of the cast the diameters of the holes being small enough to prevent objectionable pouting of the flesh into the entrance to the holes.

9. The method of forming a ventilated plaster cast which consists in molding the plaster cast upon the body surface and simultaneously incorporating in the cast one or more inserts having pointed outer ends and ventilating holes extending from the inner ends of the inserts towards the pointed ends, but terminating short of such pointed ends, said inserts being made of frangible material, and breaking off the projecting pointed ends of the inserts after the cast has sufficiently set, so as to provide ventilating holes extending through the cast.

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