United States Patent

Brown

[15] **3,680,548**

[45] **Aug. 1, 1972**

[54] METHOD OF USING PLASTIC CAST

[72] Inventor: **John D. Brown,** 21046 Cloverland Dr., Covina, Calif. 91724

[22] Filed: **May 26, 1969**

[21] Appl. No.: **865,540**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 555,790, June 7, 1966, abandoned.

[52] **U.S. Cl.**.....**128/69,** 128/90
[51] **Int. Cl.**.....**A61f 5/00**
[58] **Field of Search**.....128/68, 68.1, 69, 77, 78, 87, 128/89, 90, 91

[56] **References Cited**

UNITED STATES PATENTS

2,103,942	12/1937	Gillin	128/91
2,947,307	8/1960	Hoppe	128/90
3,032,033	5/1962	Ramirez	128/90

OTHER PUBLICATIONS

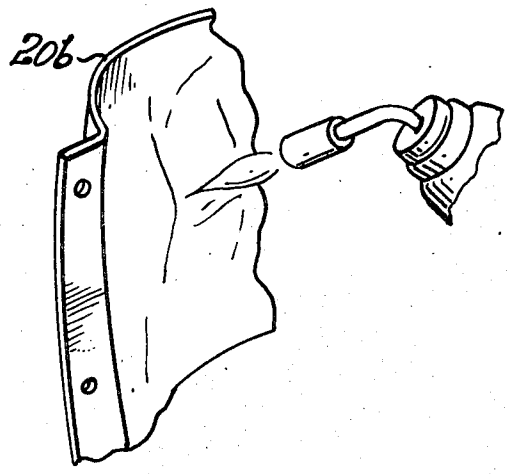
J. B. Brennan, Lancet, Apr. 23, 1955, pp. 841- 844.
W. Herschell et al., Journal of Bone & Joint Surgery, May, 1948, pp. 298- 308.

Primary Examiner—L. W. Trapp
Attorney—Boniard I. Brown

[57] **ABSTRACT**

An orthopedic correctional cast and the method of providing the same primarily for correction of orthopedic abnormalities, and to promote healing of damaged bone structure. The cast comprises shells or sections which are joined in such manner as to accommodate removal of the cast from and replacement of the cast on the patient. The cast is constructed of thermoplastic material, whereby its sections may be replaced by application of heat and pressure to modify the correctional pressures applied to selected areas of a patient's body to effect orthopedic correction of abnormalities of bone structure or promote correct healing of damaged structure. The cast is fabricated by forming a pair of mating, relatively rigid matrices each having an open cavity generally conforming to approximately one-half of the body portion, then forming a shell of thermoplastic material within the conforming to each matrix cavity. After the abnormal portion of the patient's body has been encased in the cast for a period of time during which the abnormality has been partially corrected, the plastic shells are detached and the cast removed, then heat and pressure are applied to reshape selected localized areas of one or both plastic shells to apply modified correctional pressures to the partially corrected abnormality when the cast is replaced on the patient.

8 Claims, 17 Drawing Figures



PATENTED AUG 1 1972

3,680,548

SHEET 1 OF 3

FIG. 1.

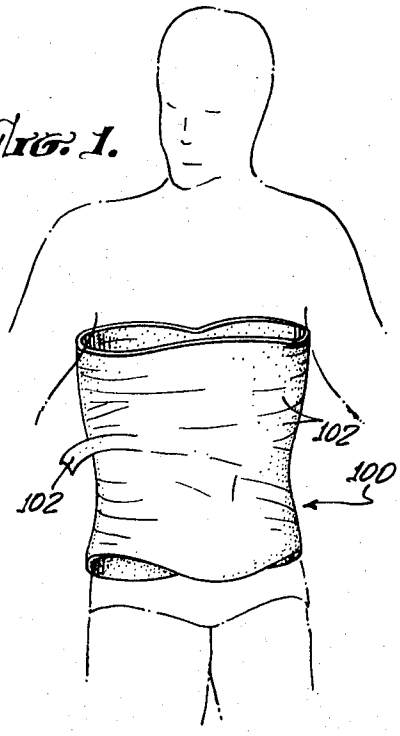


FIG. 2.

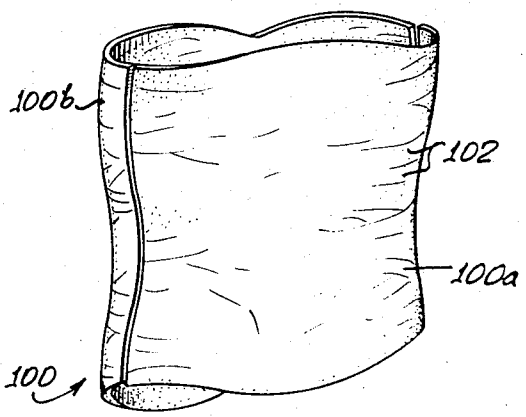


FIG. 4.

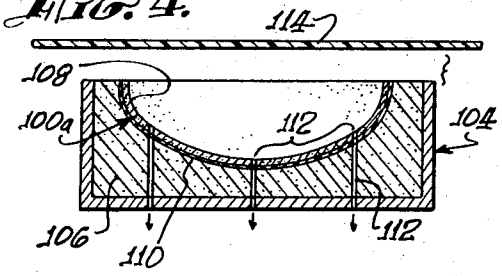


FIG. 5.

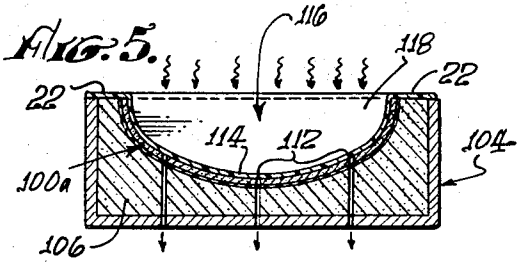


FIG. 3.

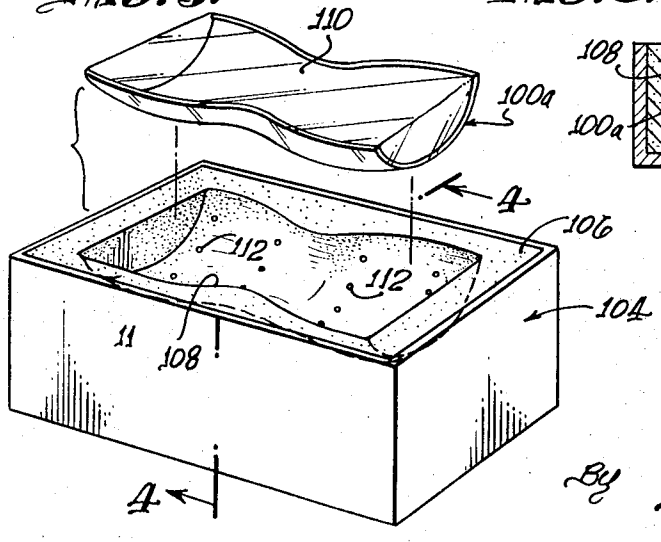
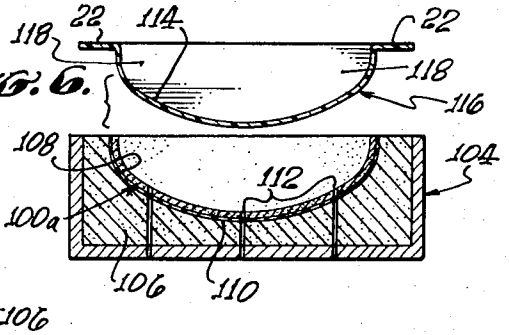


FIG. 6.



INVENTOR.
JOHN D. BROWN,

By Bernard S. Brown

ATTORNEY.

FIG. 7.

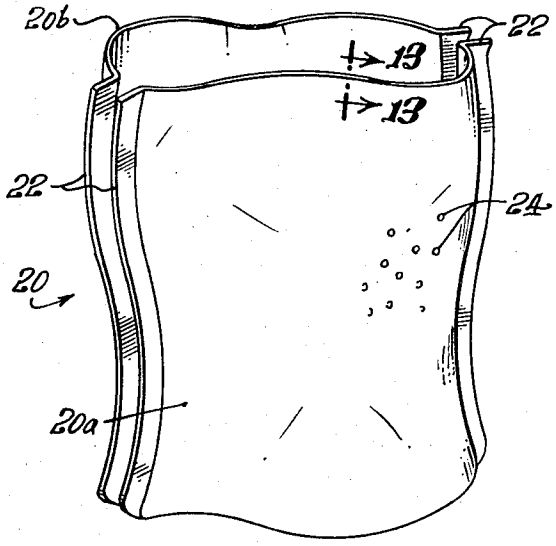


FIG. 8.

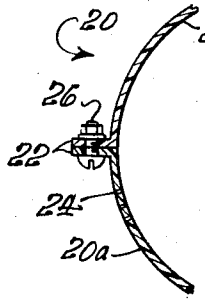


FIG. 9.

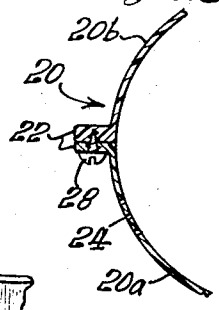


FIG. 11.

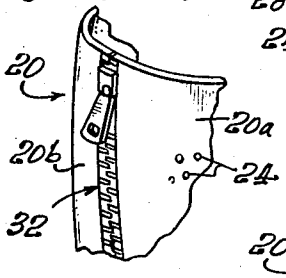


FIG. 12.

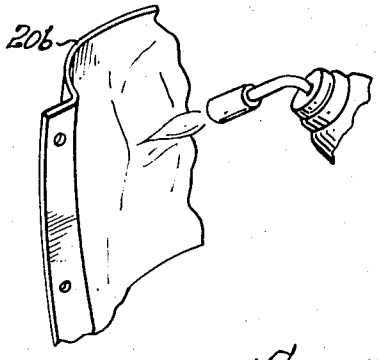


FIG. 10.

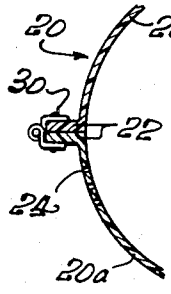
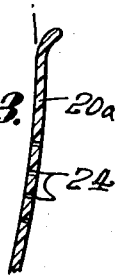


FIG. 13.



INVENTOR.
JOHN D. BROWN,

By

Bernard S. Brown

ATTORNEY.

FIG. 14.

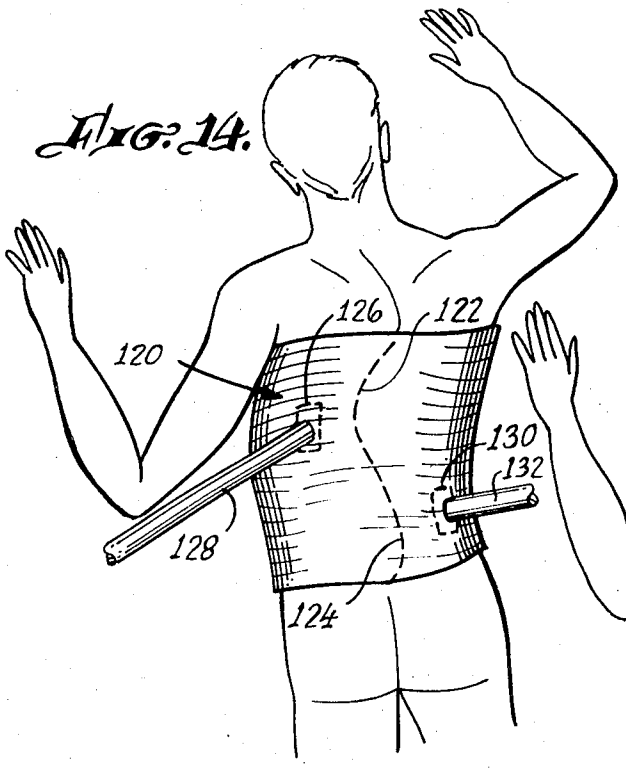


FIG. 15.

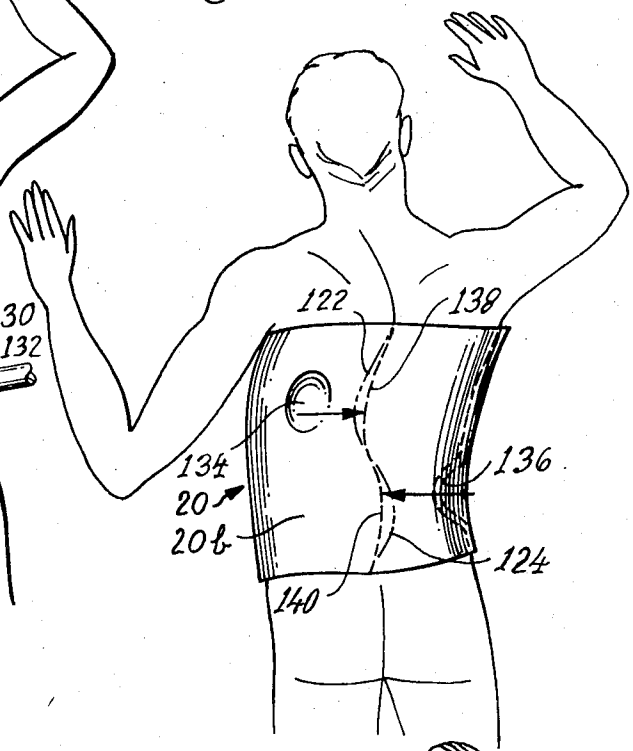


FIG. 16.

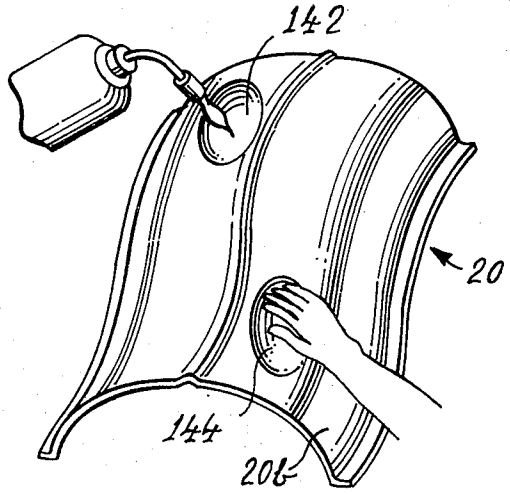
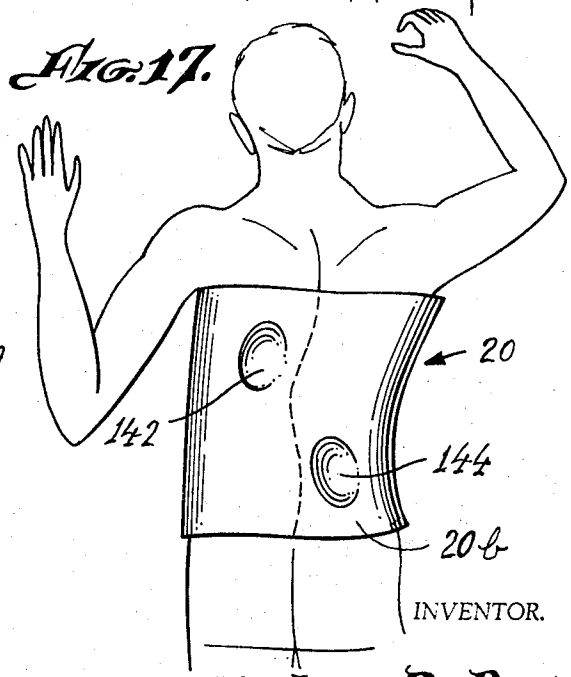


FIG. 17.



INVENTOR.

BY JOHN D. BROWN,

ATTORNEY.

METHOD OF USING PLASTIC CAST

This application is a continuation-in-part of application Ser. No. 555,790, filed June 7, 1966, and entitled "Cast and Method of Fabricating Same" now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates generally to orthopedic casts and methods of fabricating the same; more particularly, the invention relates to a novel orthopedic correctional cast which is removable, replaceable and reshapable to apply successively modified correctional pressures to the abnormal body portion of a patient, and which is fabricated of thermoplastic material of plastic shells formed in cavities of a pair of mating matrices each conforming to approximately half of the abnormal body portion of a patient.

2. Prior Art and Background:

The treatment of many orthopedic abnormalities and disorders, such as scoliosis, hunch back, and orthopedic injuries, such as broken necks, bones, and the like generally involves the application of a cast to the portion of the body to be treated, the cast serving to apply correctional pressures and to brace the body portion during the treatment period which may last many months or even years. At the present time, such a cast is commonly formed or applied by wrapping the afflicted portion of the body with a strip of gauze, or the like, soaked in plaster. In the correction of abnormalities and in other treatments, during the forming or application of the plaster cast, the patient is supported in a mechanical arrangement which exerts appropriate forces to maintain the abnormal body portion in a corrected position, such arrangement typically including rods for applying corrected pressures at selected areas to apply orthodontic correctional forces. After wrapping, the plaster is allowed to set and thus form a rigid body cast. Such plaster casts, while perhaps satisfactory from the standpoint of their ability to apply correctional forces and brace the afflicted body portion, have many disadvantages. A plaster cast, for example, absorbs and is damaged or destroyed by water. As a consequence, it is very difficult for a patient wearing a plaster cast to bathe, while swimming is virtually prohibited. A plaster cast also has relatively low comprehensive and tensile strength and is thus prone to cracking, chipping, or other damage in the event of percussive contact of the cast with another object. Moreover, a plaster cast, even when treated with extreme care, tends to rapidly crumble, soil, and otherwise deteriorate. Because of the manner in which a plaster cast is formed, it is difficult or impossible to provide clearance between the cast and a selected area of the patient's body as is often desirable or necessary, for example, to permit unrestricted breathing, or other essential body motions, or to avoid contact of the cast with a skin sore, rash or other abnormality.

A further disadvantage of plaster casts resides in the fact that these casts absorb and retain perspiration from the skin and are difficult or impossible to properly ventilate. Such lack of proper ventilation and retention of perspiration by the cast induce rapid deterioration and extremely poor tone of the skin in contact with the cast, promote the formation of offensive or unpleasing odor, and generally adversely effect the patient's comfort and morale. Another characteristic of plaster casts which adversely effects the patient's comfort as well as his mobility or use of an afflicted limb is relatively great weight. A typical leg cast, for example, may weigh on the order of nine pounds. Obviously, a weight of this magnitude is uncomfortable and tiring to support or move, particularly for children, elderly persons, and the infirm.

A particularly serious disadvantage of plaster casts is encountered when it becomes necessary to replace such a cast. Thus, replacement of a plaster cast involves slitting of the old cast to permit its removal and subsequent application of an entirely new cast to the afflicted body portion. Such cast replacement is obviously laborious and time consuming. Moreover, replacement of a plaster cast requires the services of a physician or other highly trained personnel as well as the use of special facilities, tools, and equipment which are often available only in a hospital. As a consequence, cast replacement may involve substantial cost. The cost of replacing a typical plaster cast, for example, may be on the order of $150.00 to $200.00. In addition, owing to the lengthy time and many motions involved in removing the original cast and applying the new cast, the patient often experiences extreme discomfort or pain.

It is often necessary during the course of treatment of a patient, to remove and replace a cast for any of several reasons. A most important reason is to modify the correctional forces applied by the cast to the abnormal body portion of the patient after partial corrections have been effected at successive stages. Replacement may be required by normal deterioration, excessive soiling, or accidental damage of a cast may necessitate its replacement. Moreover, it is often necessary to periodically remove, and hence replace, a cast to permit observation, airing, bathing, or other treatment of the afflicted body portion. Occasionally, a cast must be removed, and hence replaced, to retrieve a foreign object which becomes lodged in the cast. In addition, certain types of patients and the treatment of certain types of orthopedic disorders require periodic cast removal and replacement. Spastic patients, for example , can tolerate a cast for only a short period of time. The cast must then be removed until the patient's tolerance for the cast is restored. Thus, the treatment of even a minor orthopedic disorder or injury occasioned by a spastic patient may require removal and replacement of a surgical cast a great number of times.

In the treatment of orthopedic disorders, such as scoliosis and hunch back, the treatment may extend from a number of months to two years or more, during which treatment periodic replacement of the cast is required in order to provide reshaped cast areas to apply modified correctional pressures to the partially corrected abnormality in bone structure. Refitting or reshaping of plaster casts requires the formation of an entirely new cast, rather than modification of the existing cast, with the resultant high costs, patient discomfort, and other problems attendant to the formation of a plaster cast. In this connection, it should be noted that most patients who are treated for scoliosis are children under sixteen years of age, who are thus in their growing stage. After this age, curvature of the spine can

be corrected only by a major fusion operation. Periodic removal of a cast during the treatment of scoliosis is also required for the reasons stated earlier, to wit, exposure of the air, observation, bathing, or other treatment of the afflicted body portion. In all of these cases, replacement of a plaster cast involves destruction of the original cast during its removal and subsequent application of an entirely new cast to the patient.

It is evident that the existing plaster casts and the methods of forming these casts are ill suited to such cast replacement, particularly periodic cast replacement as required in the correction of orthopedic abnormalities such as scoliosis and hunch back. It is evident that there are many and varied reasons which make necessary the removal and replacement of an orthopedic correctional cast.

SUMMARY OF THE INVENTION

The present invention avoids the foregoing and other problems associated with conventional casts, particularly orthopedic correctional casts, and the methods of forming and applying such casts, by providing an improved cast fabricated of shells of thermoplastic material, and improved method of fabricating the same. The thermoplastic cast shells are secured together to encase the afflicted body portions of the patient, and are readily removable and replaceable on the patient. The cast may be readily and easily removed and replaced with minimum discomfort to the patient and without damage to the cast. It is thus removable and replaceable without the assistance of a physician or other highly trained personnel. The cast is fabricated of thermoplastic material which is readily reshaped by the application of heat and pressure to modify selected cast areas to modify the orthopedic correctional pressures applied to the afflicted body portion of the patient, such as modified correctional pressures applied by the cast after partial correction of the abnormality has been effected by the prior correctional forces applied by the cast before such reshaping. The cast may thus be readily removed from the patient, reshaped, and refitted on the patient to provide modified correctional pressures.

The method of forming and reshaping the cast according to the invention eliminates the aforementioned and other problems associated with conventional methods of providing orthopedic casts, particularly the conventional method of providing successive new casts during the period of treatment of a patient for the reasons hereinbefore outlined. According to the method of the invention, plastic cast shells are formed, typically by vacuum forming, over the interior of mating matrices each of which has an open cavity conforming generally to one-half of the afflicted body portion of the patient, these matrices typically being halves of a plaster cast formed in conventional manner on the afflicted body portion. The plastic shells are secured together to encase the patient's afflicted body portion. The cast may readily be removed and replaced at any time during the period of treatment. After the cast has effected partial correction of the orthopedic abnormality by application of corrective pressures, the cast is removed, and selected areas thereof are reshaped by application of heat and pressure to reshape localized areas of one or both plastic shells to apply modified correctional pressures to the afflicted body portion to further correct the abnormality.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1** through **6** illustrate the successive steps involved in the present method of forming the cast of the invention;

FIG. **7** is a perspective view illustrating a finished cast according to the invention;

FIG. **8** illustrates one possible means for joining the two halves of the cast of FIG. **7**;

FIG. **9** illustrates an alternative means for joining the halves of the cast;

FIG. **10** illustrates a hinge arrangement for joining the two halves of the cast;

FIG. **11** illustrates a zipper arrangement for joining the two halves of the cast;

FIG. **12** illustrates one method of applying heat to a selected portion of the cast for the purpose of reshaping the cast;

FIG. **13** is an enlarged sectional view taken on line **13—13** in FIG. **7**;

FIG. **14** shows a conventional orthopedic plaster cast applied to a patient with rods applying rotational forces to the patient during forming of the cast;

FIG. **15** shows a cast according to the invention applied to the patient to apply correctional forces;

FIG. **16** shows the reshaping of selected areas of a plastic shell of the cast of FIG. **15**, by application of heat and pressure; and

FIG. **17** is a view similar to that of FIG. **15**, showing the cast of FIG. **15** applied to the patient after reshaping of areas of the cast.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, and particularly to FIG. **7**, there is illustrated a cast **20** according to the invention. Cast **20** is constructed of a suitable thermoplastic material, such as high impact Styron. The cast includes a pair of mating halves or half sections **20***a* and **20***b* which are formed in the manner hereinafter explained. Along opposite sides of the cast sections **20***a*, **20***b* are integral confronting flanges **22** which are adapted to be joined to retain these sections in assembled relation. The cast sections are shaped to define, when thus assembled, a cast which conforms to the afflicted body portion to be encased. The cast **20** illustrated in FIG. **7**, for example, is shaped to conform to the torso of a patient and is intended for use in the orthopedic treatment of scoliosis.

The cast sections **20***a* and **20***b* are preferably perforated to define a multiplicity of ventilation openings **24** through which air may circulate for ventilating the skin area in contact with a cast. The ventilation of the skin area and the imperviousness of the cast material to moisture in general and perspiration in particular promote a healthy tone and sanitary condition of the skin area in contact with the cast and virtually eliminate the formation of offensive or unpleasing odor. The patient's comfort, morale, and general well being are thus enhanced. Ventilation openings **24** may be formed in the cast in any convenient way, as by drilling.

The confronting flanges **22** on the cast sections **20a**, **20b** may be joined in various ways. In FIG. **8**, for example, the flanges are joined by bolts **26**. FIG. **9** illustrates the use of screws **28** to join the flanges. In this case, the flanges in which the screws are threaded are preferably made sufficiently thick to receive the entire threaded shank of the screws. When either of the flange joining means of FIGS. **8** and **9** are employed, the cast is removed by completely separating the flange sections. If desired, one pair of the confronting flanges may be joined by one or more hinges **30** to permit hinging of the case sections toward and away from one another. In this case, the cast sections remain connected when the cast is removed from the patient. The confronting flanges (not shown) along the sides of the cast sections remote from the hinges may be joined by screws, bolts, or the like when the cast is placed on the patient.

It is evident that numerous other fastening means may be employed to join the cast sections **20a**, **20b**. For example, the cast sections may be joined along one or both sides by a slide fastener or zipper **32**, as shown in FIG. **11**. In the event that the cast sections are joined along one side only by a slide fastener, the remaining sides of the sections may be joined in any convenient way, as by means of the hinge shown in FIG. **10**. Such a slide fastener and hinge arrangement obviously provides a cast which may be removed and replaced with maximum ease and speed and minimum discomfort of a patient. In order to further enhance a patient's comfort, the end edges of the cast are preferably rounder or flared in the manner illustrated in FIG. **13**.

It is evident at this point that the illustrated cast **20** of the invention possesses many advantages. One of these advantages has already been noted, to wit the imperviousness of the cast material to water and perspiration, thus permitting a patient to bathe and even swim while wearing the cast. The ventilation openings **24** in the cast sections promote drying of the interior of the cast after bathing and swimming. If desired, of course, the cast may be removed during such activities. As also noted earlier, the imperviousness of the cast material to perspiration and the ventilation of the interior of the cast permitted fear the ventilation openings **24** promote a healthy tone and otherwise generally sanitary condition of the skin in contact with the cast and virtually eliminate the formation of unpleasing or offensive odor. Another advantage of the present surgical cast resides in its relatively great strength and light weight which permit greater freedom of movement of the patient and enhance the patient's comfort. Moreover, the increased strength of the surgical cast eliminates the possibility of cracking, chipping, or other damage to the cast in the event of impact of the cast against some other object. This, in turn, eliminates the feat in the mind of a patient that such damage might occur, thus easing the patient's mind and improving his morale. Moreover, the present cast is not prone to soiling, crumbling, or other deterioration with age, as is a plaster cast. As a result, the present surgical cast has a substantially longer useful life than a plaster cast.

An advantage of the present cast resides in its ability to be removed and replaced, an indefinite number of times, without damage to the cast and without the assistance of a physician or other highly trained personnel or the aid of special facilities, tools, and equipment which may be available only in a hospital. As a consequence, removal and replacement of the present cast involves only minimal cost. In this regard, it will be recalled that the cost of replacing a plaster cast is on the order of $150.00 to $200.00. Some of the many reasons which require removal and replacement of a surgical cast were noted earlier, to wit reshaping or refitting of the cast, removal of foreign objects from the interior of the cast, observation, bathing, or other treatment of the afflicted body portion encased by the cast, airing of the skin in contact with the cast, and restoring the tolerance to the cast of patients, such as those afflicted with spastic disorders, who can tolerate a surgical cast for only short periods of time.

In some cases, it may be desirable or necessary to expose a portion of the afflicted body area encased by the cast without removing the entire cast from the patient. For example, such localized exposure may be necessary to permit observation, bathing, or other treatment of the exposed area, remove a foreign object, accelerate healing of a sore, or for other orthopedic reasons. This localized exposure of a selected area of the afflicted body portion encased by the cast is accomplished by simply cutting out the corresponding portion of the cast. The removed portion of the cast may be subsequently replaced by the application of heat and rosin the the cut edges of the removed portion and the main body of the cast, thus to seal these edges to one another.

A particularly important advantage of the present cast and the method of forming the cast, is that it may readily be reshaped, as by the application of heat and pressure to selected areas of the thermoplastic shells which form the cast. This important advantage and its utility are explained hereinafter in more detail.

Reference is now made to FIGS. **1** through **6** which illustrate the present method of forming the plastic cast of the invention. The initial step of this method involves the formation of a plaster shape or form **100** which conforms to the portion of the patient's body to be encased by the finished cast. This plaster form is made in the same way as a conventional plaster cast, that is by wrapping about the body portion to be encased a strip **102** of gauze or other fabric material soaked in a suitable plaster compound. This method step is depicted in FIG. **1**. The plaster form is then allowed to set or harden while on the patient. In the event that a space or void is desired between the finished cast and a particular area of the patient's body, to accommodate a degree of body movement as required for unrestricted breathing, for example, or to avoid contact of the cast with a skin sore, rash, or other abnormality, a spacer of sufficient surface area and thickness to provide the desired clearance may be placed on the particular area prior to application of the plaster form to the patient. After setting, the plaster form is removed from the patient by cutting or slitting the form into two mating halves, or half sections, **100*a***, **100*b*** as shown in FIG. **2**. The spacer, if one is used, is removed from the form, thus leaving a depression in the corresponding form section.

The next step of the present cast forming method involves the utilization of the two sections **100*a***, **100*b*** of the plaster form **100** as molds or matrices in a plastic molding or forming operation to form the two sections

20*a*, 20*b* of the finished cast **20**. To this end, each section **100***a*, **100***b* of the plaster form **100** is reinforced and sealed at its ends to define a rigid matrix having a mold cavity. According to the preferred practice of the invention, each section or matrix **100***a*, **100***b* of the plaster form is reinforced and sealed at its ends by placing the matrix in a mold box **104** and filling the box, about the matrix, with a suitable matrix reinforcing composition, such as plaster, in the manner illustrated in FIG. **3**. The reinforcing composition is then allowed to set and thereby form a rigid backing or support **106** for the matrix. This matrix support also seals the ends of the matrix. When filling the mold box with the reinforcing composition, it is necessary to close the open ends, and preferably also the open top, of the matrix, to preclude the entrance of the composition into the matrix cavity **108**. This may be accomplished by wrapping a plastic sheet or film **110** about the matrix prior to its replacement in the mold box **104**. The portion of this plastic film which extends across the top and ends of the matrix cavity is cut away after setting of the matrix support **106**.

The following step of the method involves the forming of a plastic shell within and conforming to each matrix cavity **108**. According to the preferred practice of the invention, this is accomplished by vacuum forming a plastic sheet into the matrix cavity. To permit such vacuum forming, it is necessary to drill or otherwise provide a number of passages **112** through each matrix **100***a*, **100***b* and its respective support **106** for communication to a vacuum source (not shown), thus to permit the matrix cavity **108** to be evacuated. In the course of the actual vacuum forming operation, a sheet **114** of suitable thermoplastic material, such as high strength styron, is placed across the open top of each matrix **100***a*, **100***b* and is heated to the proper vacuum forming temperature. The matrix cavity **108** is then evacuated to draw the sheet into the cavity, as shown in FIG. **5**, thus to form a plastic shell **116** conforming to the cavity.

The final step of the present cast forming method involves extraction of the vacuum formed plastic shell **116** from the cavity **108** of each matrix and removal of the end portions or walls **118** of the shell to form the finished cast section **20***a* or **20***b*, as the case may be. These end walls may be severed from the shell by a cutting or slitting operation. The dimensions of the plastic sheets **114** which are used to vacuum form the plastic shells **116** are such that the edge portions of each sheet which extend along the sides of the respective matrix **100***a*, **100***b* overlap these edges sufficiently to form the flanges **22** on the corresponding section **20***a* or **20***b* of the finished cast. As noted earlier, a spacer may be placed on a selected area of the patient's body prior to application of the plaster form **100** to the body, thus creating a depression in the corresponding matrix **100***a* or **100***b*. This depression will produce in the cast section **20***a* or **20***b* which is vacuum formed in the matrix an outward bulge for providing clearance between the cast and the selected body area.

Reference is made to FIGS. **14** through **17** of the drawings, which illustrate the reshaping of the cast of the invention after it has been applied to a patient for a period of treatment. The advantage and utility of the reshaping of the cast of the invention has been mentioned earlier at different points. As hereinbefore mentioned, reshaping of selected areas of the plastic shells of the cast may be required for several reasons, these including: reshaping of selected cast areas to apply modified correctional forces to the abnormal portion of the patient's body after partial correction has been effected, correction of an original malformation of the cast, combination of growth and/or weight change of the patient, etc. In the treatment of orthopedic abnormalities, such as scoliosis and hunch back, it is necessary periodically to reshape and to refit the cast, in order to apply modified correctional forces to the afflicted body portion of the patient, and to compensate for growth and weight change of the patient, inasmuch as the scoliosis or hunch back patient is generally a child or youth in his growing years up to age seventeen during which the spinal structure is relatively flexible and can be governed by correctional pressures.

It should be emphasized, as earlier mentioned, that the cast of the invention is adapted to exert orthopedic correctional pressures, as distinguished from holding casts, which conventionally only hold a fractured or broken bone in position during healing. The correctional pressures are applied to a localized area or areas of the abnormal body portion to correct abnormalities of bone structure or to promote healing of damaged bone structure. Typical abnormalities include scoliosis or hunch back, as earlier mentioned. Different types of damage to bone structure, such as broken neck complications, also require application of correctional forces by an appropriate cast during knitting in order to promote proper handling and to prevent damage to nerves.

Referring to FIG. **14**, in conventional orthopedic methods, a plaster cast **120** is formed by wrapping about the afflicted portion of the patient's body a strip of fabric soaked in a material such as plaster, and allowing the plaster compound to harden, thus to provide a rigid form conforming to the afflicted body portion. During the application of the plaster-soaked fabric and the forming of the cast, the patient is supported in a mechanical arrangement (not shown) which exerts appropriate forces to maintain the body portion in a corrected position, such a mechanical arrangement typically including rods, such as rods **128**, **132** which apply corrective pressures at selected areas to apply orthopedic correctional forces to the abnormal bone structure, such as the abnormal spinal curvatures **122**, **124**. The correctional forces are applied by rods **128**, **132** via pads **126**, **130**. After the hardening of the cast, the rods are removed, leaving pads **126**, **130** in the cast and positioned against the afflicted body portion of the patient. The pads conventionally remain in the plaster cast to apply correctional forces to the afflicted body portion, until such time as the plaster cast is removed and replaced by a new cast for any of the reasons hereinbefore mentioned, including the application of modified correctional forces.

According to the method of the invention, the plastic cast shell is formed over the interior of the plaster cast, including pads **126**, **130**. The plastic shell is thus configurated in conformity with the pads positioned in the plaster cast to form the indentations **134**, **136** which later serve to apply appropriate correctional pressures to the afflicted body portion of the patient.

Plastic shells **20a** and **20b**, are applied to encase the afflicted body portion of the patient. Indentations **134, 136** apply orthopedic correctional forces in the directions indicated by the arrows in FIG. **15** to the abnormal spinal bone structures indicated at **122, 124**.

The cast is removed from the patient, after sufficient time has elapsed that partial correction of the original abnormalities, indicated at **122, 124** in FIG. **14**, has been effected.

After professional analysis, and as indicated in FIG. **16**, selected areas of one or both of the plastic shells **20*a*** and **20*b*** of the cast are reshaped, as by the application of heat and pressure. The heat necessary to such reshaping may be applied in any convenient way, as by the blow torch shown in FIGS. **12** and **16**.

Heat and pressure are applied to the selected areas of one of the plastic shells of the cast, as by application of the torch flame and manual pressure to plastic shell **20*b*** as shown in FIG. **16**, to reshape areas of the cast to provide indentations or depressions, such as indentations **142, 144**, which are adapted to apply correctional pressures to the abnormal spinal or bone structure areas, such pressures being modified with respect to the original correctional pressures applied in order to further correct the orthopedic abnormality partially corrected by the original cast.

In the correction of such abnormalities as scoliosis or hunch back, a correctional cast must ordinarily be worn for two years or more by the patient. Modification and reshaping of areas of the correctional cast are required over the extended period of treatment. Utilizing the cast and method of the invention, no new cast or plurality of new casts need be applied or provided, but reshaping and modification of the plastic cast shells may be accomplished simply by removing the cast, reshaping areas thereof by the application of heat and pressure, and remounting the plastic shells on the afflicted body portion of the patient.

As hereinbefore noted, conventionally a new cast must be applied to the afflicted body portion of the patient each time modification of correctional pressures is needed. Further, a conventional plaster cast must be removed every two or three months during extended course of treatment of two years or more, in order to permit recovery of tone and healing of the skin of the patient, necessitated by deterioration, sores, suffering and unpleasantness. Utilizing the cast and method of the invention, no new cast need be provided, but the reshaping and modification of the original cast is accomplished by providing removal of the plastic cast shells, the application of heat and pressure, and the remounting of the plastic shells on the patient, all of which may be accomplished as often as necessary during the course of treatment.

The inventor claims:

1. The method of providing a reshapable orthopedic correctional cast for applying successively modified correctional pressures to correct an abnormality of a portion of a patient's body, which comprises the steps of:

forming a pair of mating, relatively rigid matrices each having an open cavity generally conforming to approximately one-half of said body portion,

forming a plastic shell within and conforming to each matrix cavity, said plastic shell being formed of thermoplastic material and having areas shaped to exert corrective pressures on said body portion to correct said abnormality,

encasing said portion of the patient's body by securing the plastic shells about the body portion to exert correctional pressures at localized body portion areas until said abnormality has been partially corrected,

later removing said plastic shells from the body portion,

applying heat and pressure to selected areas of at least one plastic shell to reshape such areas to apply modified correctional pressures to the partially corrected body portion, and

replacing the plastic shells to encase the body portion to exert the modified correctional pressures on the partially corrected abnormal body portion to further correct said abnormality.

2. The method according to claim **1** wherein:

said step of forming a pair of matrices involves wrapping about said body portion a strip of fabric material soaked in plaster and allowing said plaster to harden, thus to yield a plaster form conforming to said body portion, and slitting said plaster form along opposite sides thereof into a pair of mating half sections defining said matrices, respectively.

3. The method according to claim **2** wherein:

said step of forming a plastic shell involves placing a thermoplastic sheet across each matrix cavity, heating said sheet to a pliable plastic forming state, evacuating the respective cavity to deform said sheet into conforming relation with the respective cavity, and cooling the formed plastic sheet to the rigid state while in said cavity to provide said plastic shell.

4. The method according to claim **1** wherein:

said step of forming a plastic shell involves placing a thermoplastic sheet across each matrix cavity, heating said sheet to a pliable plastic forming state, evacuating the respective cavity to deform said sheet into conforming relation with the respective cavity, and cooling the formed plastic sheet to the rigid state while in said cavity to provide said plastic shell.

5. The method of providing a reshapable orthopedic correctional cast for applying successively modified correctional pressures to correct an abnormality of a portion of a patient's body, which comprises the steps of:

forming a pair of mating, relatively rigid matrices each having an open cavity generally conforming to approximately one-half of said body portion,

forming a plastic shell within and conforming to each matrix cavity, said plastic shell being formed of thermoplastic material and having areas shaped to exert corrective pressures on said body portion to correct said abnormality,

encasing said portion of the patient's body by securing the plastic shells about the body portion to exert correctional pressures at localized body portion areas until said abnormality has been partially corrected, and

later reshaping areas of the plastic cast shells by application of heat and pressure after said partial correction of the abnormality to apply modified correctional pressures to said body portion.

6. The method according to claim 5 including the additional step of:

embedding each said matrix in a reinforcing composition to form a rigid support for the respective matrix in such manner that the matrix cavity is exposed.

7. The method of providing a reshapable orthopedic correctional cast for applying successively modified correctional pressures to correct an abnormality of a portion of a patient's body, which comprises the steps of:

forming a pair of mating relatively rigid thermoplastic shells conforming to said body portion and having areas shaped to exert correctional pressures on said body portion,

encasing said portion of the patient's body by securing the plastic shells about the body portion to exert correctional pressures at localized body portion areas until said abnormality has been partially corrected, and

later reshaping areas of the plastic cast shells by application of heat and pressure after said partial correction of the abnormality to apply modified correctional pressures to said body portion.

8. The method of providing a reshapable orthopedic correctional cast for applying successively modified correctional pressures to correct an abnormality of a portion of a patient's body, which comprises the steps of:

forming a pair of mating, relatively rigid matrices each having an open cavity generally conforming to approximately one-half of said body portion,

forming a plastic shell within and conforming to each matrix cavity, said plastic shell being formed of thermoplastic material and having areas shaped to exert corrective pressures on said body portion to correct said abnormality,

later reshaping areas of the plastic cast shells by application of heat and pressure after partial correction of the abnormality by encasement of said body portion in said shells to apply modified correctional pressures to said body portion.

* * * * *