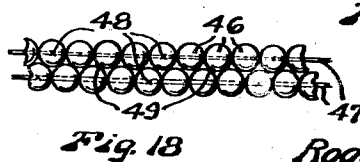
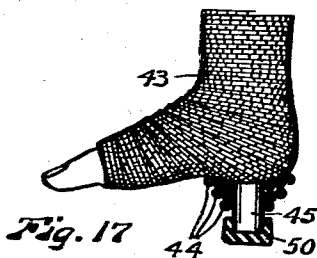
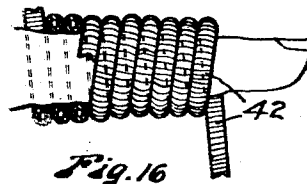
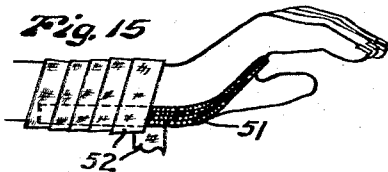
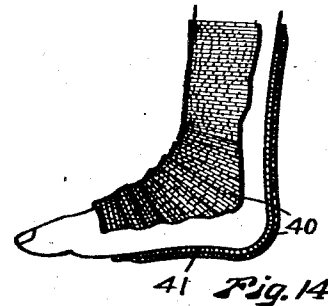
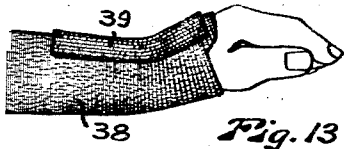
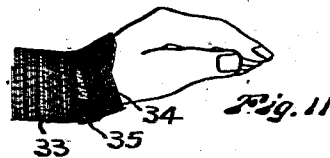
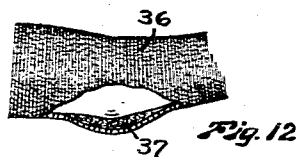
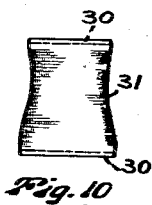
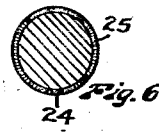
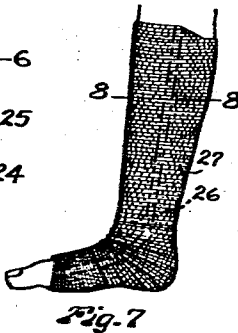
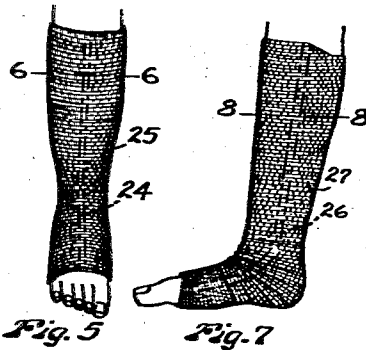
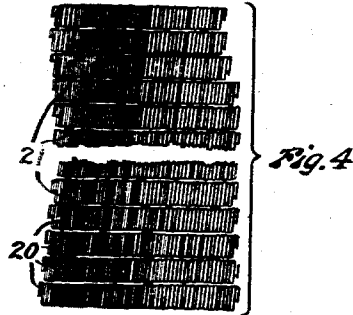
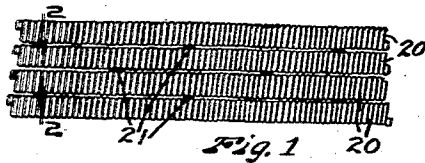


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SURGICAL CAST OR SPLINT MATERIAL, METHOD
OF APPLICATION, AND PRODUCT THEREOF
Filed Dec. 22, 1942

2,384,804



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SURGICAL CAST OR SPLINT MATERIAL,
METHOD OF APPLICATION, AND PRODUCT
THEREOF

Roger Anderson, Seattle, Wash.

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8 Claims. (Cl. 128—90)

This invention relates to a prepared cast or splint material ready for use, the method of applying such a material, and a completed cast or splint. This invention is in the nature of an improvement on the inventions disclosed in my co-pending applications for Letters Patent Serial No. 315,390, filed January 24, 1940, now Letters Patent No. 2,308,483 and Serial No. 449,890, filed July 6, 1942.

More particularly this invention is particularly applicable to casts or splints of the surgical and medical field. In describing this invention with this field of utility, it is to be understood that the invention is not limited to such field but is co-extensive to all fields where like problems exist in whole or in part. In my said co-pending applications, I have set forth the disadvantages of plaster of Paris casts and splints and the advantages to be gained from a cast or splint embodying my inventions wherein a plurality of pieces of helices of a plastic material are employed. An important territorial use of devices embodying my invention is where the humidity is such as to make plaster of Paris casts too slow setting or where water is at such a premium that it cannot be practically used. In the present invention I have shown a cast or splint material ready for application which is: more readily conformable about objects of irregular shape and therefore lessens the skill or technique necessary for applying the same about an injured member; of a character facilitating speedy application about an injured member—thus lessening the period of application, and the necessary anaesthetic period; and of a character providing for maximum strength in the completed cast or splint and with a minimum use of material therein.

An object of my invention is to provide a surgical cast or splint material providing two parallel helices of plastic material positioned in side by side relation and adhered together at longitudinally spaced locations.

An object of my invention is to provide parallel helices of plastic material positioned in side by side relation and adhered together at longitudinally spaced locations with the location of adherence of the opposite sides of any helix offset as respect each other.

Another object of my invention is to provide a method of forming a relatively small surgical cast or splint, such as one which may be used about a finger or the like, comprising wrapping a helical member formed of a plastic material about the injured member with the laps of the

helix in side by side contacting relation and of adhering each lap to adjacent laps at the contacting portions.

Another object of my invention is to provide a cast or splint body comprising a plurality of contacting members and of covering predetermined areas of the cast body with a material excluding the adhesive to be used and of adhering together the contacting members forming the cast body except in those covered areas. The covered areas may constitute a portion to cover a bone, such as an ankle bone, elbow, or the like, or the same may constitute strips so that a hinge-like joint or hinge-like joints may be provided in a cast. Also, the said covered portion may constitute the edges of a cast such as a body cast, arm cast, or the like, so that at such edge portions I provide for relative flexibility and softness and thus limit the tendency of sores and the like from developing adjacent the edges of the cast.

Another object of my invention is to provide a cast member wherein any opening may be readily filled and at the same time the strength of the cast member maintained. Thus any opening may be closed and a true conforming cast made even though the cast is positively not "tailor made" and thus limit the tendency of window edema and at the same time provide means permitting the greatest speed of application of the cast and with a minimum requirement of skill or technique.

Another object of my invention is to provide a plurality of plastic members which may be placed about an injured member with the members contacting and then adhered together to form a splint or cast, and over which a bandage may be applied externally of the injured member and the cast or splint.

The above mentioned objects of this invention together with others inherent in the same are attained by the devices illustrated in the accompanying drawing, throughout which like reference numerals indicate like parts:

Figure 1 is a fragmentary plan of a prepared cast or splint material of this invention;

Fig. 2 is a sectional view taken substantially on broken line 2—2 of Fig. 1;

Fig. 3 is a sectional view similar to Fig. 2 except that the helical members are shown in section as somewhat flattened instead of in true circles;

Fig. 4 is a fragmentary plan, with the central portion broken away, of a wider strip of material

embodying the cast and strip material ready for application of this invention;

Fig. 5 is a front view showing a cast of this invention applied to a leg and further showing by dot and dash lines a front central portion which has not been adhered together;

Fig. 6 is a sectional view taken substantially on broken line 6—6 of Fig. 5;

Fig. 7 is a view similar to Fig. 5 except it is a side view rather than a front view and also there are shown by dot and dash lines two strip portions one on each side over which no adhesive has been applied;

Fig. 8 is a sectional view taken substantially on broken line 8—8 of Fig. 7;

Fig. 9 shows a cast of my invention applied about the foot and ankle—the view being in side elevation and indicating by a dot and dash circular line an unsecured together portion of the cast body which is directly over an ankle bone;

Fig. 10 is a view on a somewhat reduced scale showing a body cast and showing by dot and dash lines that the upper and lower edge portions of the body cast have not been secured together;

Fig. 11 is a view in side elevation of a cast embodying my invention wherein a triangular portion left in the wrapping of the cast has been filled in part by a material extending into the triangular portion and is covered by a member extending over the triangular portion;

Fig. 12 is a fragmentary view, with a portion broken away, showing a cast of my invention applied about an elbow and with a pad like member applied over the elbow bone to protect the same against chafing.

Fig. 13 is a view in side elevation of a cast embodying my invention applied to a wrist and showing an external reinforcing strip on the upper side of the wrist;

Fig. 14 is a view, partly in side elevation and partly in section and with parts broken away, illustrating a cast of my invention applied to an ankle and showing particularly the use of an inner reinforcing strip and with the cast body wrapped about said reinforcing strip;

Fig. 15 is a view in side elevation of a splint or cast member of my invention applied to the lower side of a wrist and under the palm of a hand and with an external covering member;

Fig. 16 is a fragmentary view partly in section and partly in side elevation and with portions broken away showing a single helical member wrapped to provide a relatively small cast as that employed about a finger;

Fig. 17 is a view in side elevation and with portions broken away illustrating my invention as applied to a cast cane splint; and

Fig. 18 is a fragmentary plan view of a modified form of cast or splint material of my invention.

Referring to Fig. 1 and 2 of the drawing, I provide a plurality of helical members 20, as 4, which are positioned in side by side relation and are adhered at longitudinally spaced locations 21. In the event that three or more helical members 20 are employed, the locations of the adhering portions 21 on the opposite sides of any helix 20 are offset as respects each other. The exact number of helical members 20 to be employed will depend upon the size of the cast that is to be made from the helical members 20. Thus for many smaller casts two helical members 20 will be satisfactory and in forming larger casts, as body casts, or in forming reinforcing strips, a great number of

helical members 20 may be employed such as indicated in Fig. 4. Obviously, the greater the number of helices 20 employed the more rapidly the cast may be applied and the lesser the number that is employed the better conformity of the cast to the injured member. By providing the adhering locations 21 offset as respects each other so that no two on opposite sides of a helix are in line, I provide great flexibility and ease of use of the material. Also, the particular form and shape of the members 20 may be varied in accordance with those shapes shown in my said co-pending applications—the particular improvement shown in Figs. 1, 2, 3 and 4 residing in the spot-like weld 21 between members 20 so they may be handled as a unit and yet without interfering with the resiliency or conformable characteristics of the members 20. As illustrative thereof I have shown in Fig. 3 helices 22 adhered together at locations 23. The spot-like welds 21 and 23 need only be of a strength to maintain the several members 20 or 22 as a unit until application. Also if they should loosen during application, this often aids in providing better conformation. In further illustration thereof, I have shown in Fig. 18 a plurality of members 46 threaded on elastic or stretchable members 47 thereby forming longitudinally extending plastic members. Spaced members 46 are secured to the members 47 at 48 and also members 46 of one longitudinal member are secured to members 46 of another plastic member at laterally spaced intervals 49.

The plastic material used in forming the helices 20 or 22 and the material used for adhering the same together at the locations 21 and 23 may be that disclosed in my said co-pending applications, however a very practical plastic material is cellulose acetate and the material used for providing the welds or the locations of adhesion 21 and 23 is acetone.

Referring to Figs. 5 and 6, I have shown the front view of a cast applied about a leg wherein the cast is formed of a plurality of contacting plastic members, such as from the material shown in Fig. 1, and where an area 24 (bounded by dot and dash lines) of the cast 25 has been covered with a material excluding the adhesive to be used from contacting such covered area. If the cast body 25 has been formed of cellulose acetate and the adhesive material to be used is acetone, then I may employ a grease over the area 24, which may comprise oil or petroleum jelly (Vaseline), or medicated or not medicated salve of a greasy character, or I may employ non-greasy substances such as clays or the like in a putty-like form, or I may employ a covering material, as tape. There are many characters of predetermined areas which I may desire to coat, such as the front central strip 24 of Fig. 5; the two side strips 26 of Figs. 7 and 8 of the leg cast 27 of said Figs. 7 and 8; an area over a bone or sore spot as the area 28 of the cast 29 of Fig. 9; the edge portions 30 of the body cast 31 of Fig. 10; or a drainage opening.

After a cast has been applied about an injured member, it is common for swelling to occur. Thus when plaster casts are used, the doctor was very hesitant in cutting the cast longitudinally of the cast to relieve the pain and suffering of the patient as once the cast was cut so much strength was lost that there was danger that the cast would not properly function as a cast and hold the bone properly in place. Regardless of the hesitancy of the doctor to not cut the cast and relieve the

patient, still the pain and suffering in many instances and as a common procedure required the cutting of cast to relieve pressure. In other words, it often became necessary to make one or more cuts in the cast to relieve pain of the patient so that a front opening similar to an area marked 24 in Fig. 5 or the two side areas 26 of Figs. 7 and 8 were often made. However, this practice of cutting the cast longitudinally brought about two difficulties. First, the cast was so weakened that there was danger to the bone fracture, and second, if a cut were made, the flesh of the patient tended to push against and at times protrude through the opening and complications or soreness or window edema resulted. In other words, with a solid plaster of Paris cast there was very little give or resiliency in the cast and a great tendency of the cast to break when cut. With such inherent characteristics in a cut plaster of Paris cast, the swelling often caused the flesh to become sore by contact with the sharp and unyielding edges of the cut, often caused the flesh to protrude outwardly through a so-called window or opening, and often the cast broke. By the use of a cast of my invention where a plurality of contacting plastic members are wrapped about the injured member to form the cast body; then a covered area is provided and then the adhesive is used to adhere together the various contacting members at their contacting portions and a spring-like joint, as 24 or 26 is provided so that a cast may be applied and then as swelling occurs there will be expansion possible and with full strength remaining in the cast.

After the adhesive has been applied, obviously, the covering material may be removed by a suitable solvent depending upon the character of the covering material employed. In other words, if a greasy substance is employed the usual and common solvents therefor such as petroleum ether, soap and water, etc., may be employed and if a non-greasy putty-like coating material is employed usually soap and water will be sufficient.

In the event that the two strips 26 of Figs. 7 and 8 are provided, preferably a bandage material 32 is applied about the cast (see Fig. 8). This bandage material 32 may be of a non-elastic character such as gauze or may be of an elastic character such as rubber. Thus as swelling occurs it will only be necessary for the nurse or other attendant to unwrap the bandage 32 and reapply the same and accommodation will be made for swelling or decrease thereof. Another advantage of the strips 24 and 26 is the ease in removing the cast when the same is desired. The cast may be cut along such strips with a pair of ordinary bandage shears which is to be compared to the cutting of a plaster of Paris cast which is almost a hammer and chisel job. Furthermore the cutting of a plaster of Paris cast is a job requiring skilled technique where the cutting of a cast having the areas 24 or 26 is a job which may be well taken care of by assistants, such as nurses or the like.

Another feature of a cast providing a longitudinal strip, as 24 or 26, is that after the swelling has receded I may spray such areas 24 or 26, or otherwise apply an adhesive in accordance with the teaching of my said co-pending applications and the spring feature of the cast eliminated when such is desired. This is of importance in providing a cast which will fit during the later days of use—when a cast is applied there is usually some swelling, then usually further swelling occurs, and finally the injured member, after the injury is healed assumes its normal size. The

cast of Figs. 5 and 7 will fit throughout the healing period instead of just part of the time as was inherent in plaster of Paris casts.

The technique for applying the area 28 of Fig. 9 or the areas 30 of Fig. 10 is similar to the technique previously described in providing the areas 24 or 26. The resilience and softened character of the area 28 of Fig. 9 makes the same exceptionally useful where casts are to be provided about sore spots or protruding bones. The softened and flexible area 30 of Fig. 10 is exceptionally useful in arm casts running up under the armpits or in body casts or the like, as the edges of such a cast will not provide a hard and unflexible edge chafing the skin of a patient. The present practice is to use plaster of Paris casts which are extremely hard and unyieldable at the edges and patients generally get sores from such edge portions. In order to relieve the pressure and somewhat cure the sore, it is now common practice to cut the cast back and remove a portion of the cast which was contacting the sore portion. Then as sores progressively develop the cast is progressively cut back for similar purposes. Obviously, by eliminating the cause of the sores in the first place instead of progressively causing and healing sores, I have provided a structure of manifest value to patients required to wear casts.

Referring to Fig. 11 I have shown a cast member of my invention applied about a wrist. In applying a cast material such as that shown in Fig. 1 to provide the cast 33 of Fig. 11, obviously skill, time, patience, and technique will be required to make a perfect tailor-made cast. However, I have found that if the cast material of Fig. 1 is wrapped about an injured member, such as the wrist, shown in Fig. 11, and spaces are left in the speedy application of the cast, that such spaces may be repaired by a material 34 placed within the opening or repaired by a material 35 placed over the opening. If the cast 33 is first applied and then the individual members adhered together at their contacting portions, it is a matter of very short moment before the cast has attained full strength. Thereafter, fibrous material such as fibrous cellulose acetate may be made into a thick paste or putty 34 and the same placed in an opening. Also, if the opening is rather large, a material 35 (which may be of the material shown in either Figs. 1, 2, 3, or 4) may be placed over the opening and adhered in place. Due to the fact that the cast has already attained its full strength and in a very short period of time, it is possible to place a paste-like material 34 in an opening even though the paste-like material 34 will obviously be very slow setting and drying. Thus while the paste-like material 34 will not be suitable for making a cast because of slow drying characteristics, it may be used to repair a cast of my invention. So far as the strength of the cast is concerned this has already been attained, and so far as any possibility of any window edema, the putty-like material 34 will set up before the swelling is of sufficient magnitude to cause window edema.

Referring to Fig. 12 of the drawing I have shown a fragment of a cast member extending over an elbow. Before the cast 36 of said Fig. 12 is wrapped, a fibrous material 37 is preferably placed over the elbow protruding bone. Then the cast 36 is made up by applying a cast material such as that shown in Fig. 1 about the elbow. Then the adhesive is applied either over all contacting portions (including the portion of the cast directly over the fibrous material 37), or is

applied over all of the cast 36 and over the portion of the cast 36 adjacent the fibrous material 37 to a greater or lesser degree. In other words, if the material 37 is of the same character as the material forming the cast 36, then the adhesive material may be applied to a degree to merely partially set up the cast material over the portion 37, completely set up the material 36 over the pad portion 37, or completely or in part set up the cast and the material forming the pad 37. Thus if the material 37 is not set up at all it will function as a pad, if the exterior surface thereof is set up it will have a partial pad-like action, or if the material 37 is completely set up it may be used as a substance to provide better conformation of the cast about the injured member. While I have shown material 37 over a somewhat limited area, it may be used in many instances over large areas to advantage.

In Fig. 13 I have shown a cast member 38 applied about a wrist with a reinforcing strip 39 secured at a desirable location to the cast 38. In the particular instance of Fig. 13 reinforcement is provided for the upper surface of the wrist joint where it is commonly required. The reinforcing strip 39 of Fig. 13 may be of suitable width as indicated by the material of either Fig. 1 or Fig. 4.

In order to indicate that the reinforcing strip may be external or internal of the cast member I have shown in Fig. 14 a cast 40 which has been wrapped about an internal reinforcing strip 41. Also to indicate that the cast or splint member need not completely encircle an injured member, I have shown in Fig. 15 a splint 51 formed of plastic members (such as that of Fig. 4). The material is shaped to conform, then the adhesive is applied to set-up the splint. Then a bandage 52 is applied to hold the splint in place. In the event that the material employed in making either the cast 40 and reinforcing strip 41 of Fig. 14 or the cast 38 and the reinforcing strip 39 of Fig. 13 follow any of the open structures set forth in this or in my said copending applications, then the cast member and the reinforcing member may be both applied with adhesive at the same time.

In Fig. 16 of the drawing I have indicated a single helix 42 which is spirally wrapped about an injured member as a finger to provide a cast. In the event of small casts, where wider strips are not necessary for speed of application of the cast, a single helix 42 may be wrapped in this manner and then the adhesive applied to adhere the contacting portions of the helix together and a suitable cast is provided. The free ends of the helix 42 as shown in Fig. 16, will be cut before completion of the cast body, but are shown as free ends in said Fig. 16 for better purposes of illustration.

In Fig. 17 I have shown a fragment of a leg cast, which cast 43 may be constructed in accordance with any of the teachings of this application or my said co-pending applications. The character of the present invention resides in the fact that by provide a plastic cast 43 that it is possible to adhere to said cast a cast cane support embodying the members 44, 45, and tip 50. In the prior art plaster of Paris casts it was necessary on a leg cast to provide a metal reinforcing member extending almost completely longitudinally of the cast and build the cast member thereover in order that sufficient strength would be provided so that the patient could rest weight on said metal member. In my invention due to the fact that

I have provided a plastic cast I am able to adhere the supporting members 44 and 45 to the cast body 43 and it is not necessary to build the cast over a metal reinforcing-supporting member. This construction provides for ultimate ease of repair or replacement. It is not at all uncommon to be required to replace a complete plaster of Paris cast merely because the metal reinforcing-supporting member has become loosened from the cast. The members 44 are preferably helical members as shown to provide for maximum strength and minimum setting periods. The member 45 is preferably wood or plastic and preferably carries a rubber-like tip 50. The member 44 may be secured in the same manner as used in setting-up my cast.

For sake of illustration I have somewhat exaggerated in the drawing the spaces between the members 20 or 22 in Figs. 1 to 4 inclusive and have indicated somewhat diagrammatically by black spots the locations of adherence numbered 21 and 23.

Obviously, changes may be made in the forms, dimensions, and arrangement of the parts of my invention, without departing from the principle thereof, the above setting forth only preferred forms of embodiment.

I claim:

1. The method of forming a surgical cast or splint comprising the steps of applying about an injured member a plurality of parallel helices formed of plastic material in side by side contacting relation; of covering predetermined areas of said helices with a material excluding the adhesive to be used from contacting such covered areas of the helices; and of adhering the helices together at their contacting portions except those in said covered areas.

2. The method of forming a surgical cast or splint comprising the steps of applying about an injured member a plurality of parallel helices formed of plastic material in side by side contacting relation; of covering predetermined areas of said helices with a grease film; and of adhering the helices together at their contacting portions except those in said covered areas.

3. The method of forming a surgical cast or splint comprising the steps of applying about an injured member a plurality of parallel helices formed of plastic material in side by side contacting relation to form a cast body; of covering an edge portion of the cast body so formed with a material excluding the adhesive to be used from contacting such covered edge portion; and of adhering the helices together at their contacting portions except said covered edge portion, whereby the natural resiliency of the helices will obtain at said edge portion and the adhered together character of the helices will obtain at other portions.

4. The method of forming a surgical cast or splint comprising the steps of applying about an injured member a plurality of parallel helices formed of plastic material in side by side contacting relation; of covering a strip extending substantially at right angles to said helices with a material excluding the adhesive to be used from contacting such covered area; and of adhering the helices together at their contacting portions except those in said covered area, whereby the natural resiliency of the helices will obtain at said covered strip area and the adhered together character of the helices will obtain at other portions.

5. The method of forming a surgical cast or

splint comprising the steps of applying about an injured member a plurality of interconnected plastic members to form a cast or splint body; of covering predetermined areas of said splint body with a material excluding the adhesive to be employed from contacting said areas; and of adhering together the plastic members at their contacting portions except those in said covered areas.

6. The method of forming a surgical cast or splint comprising the step of applying a flexible and expansible unit comprising a plurality of plastic members about an injured member with the plastic members contacting; of covering predetermined areas of said plastic members with a material excluding the adhesive to be used from contacting such covered areas; of adhering the plastic members together at their contacting portions except those in said covered areas; and of wrapping a bandage about the said covered areas to support the same, whereby upon expansion or contraction of said covered flexible areas the bandage may be removed and reapplied to provide conformation.

7. In the method of forming a surgical cast or splint the steps of applying a flexible unit comprising a plurality of plastic members about an

injured member with a multiplicity of contacting portions; of covering predetermined areas of said plastic members with a material excluding the setting up treating solution to be used from contacting such covered areas; and of applying a setting up treating solution to the plastic members and thereby securing the plastic members together at their contacting portions except those in said covered areas, whereby a set up cast having predetermined flexible unset areas is provided.

8. A surgical cast or splint forming material comprising at least two longitudinally extending flexible helices of plastic material positioned in side by side relation with adjacent portions of convolutions of said helices provided with spot-like adherence at spaced intervals, whereby said helices will be formed into a unit and the flexibility of the helices unimpaired and the unit so formed may be flexingly applied about an injured member with the helices positioned to provide a multiplicity of contacting portions and the helices adhered together at said multiplicity of contacting portions to form a completed cast or splint.

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