

[54] ORTHOPEDIC APPLIANCE HAVING
DETACHABLE FASTENING MEANS

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[56] References Cited
UNITED STATES PATENTS

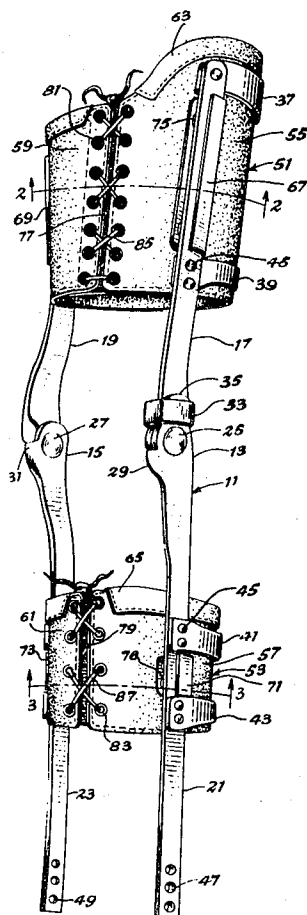
1,607,834	11/1926	Line	128/80
1,939,097	12/1933	Bauman	128/80
2,573,866	11/1951	Murphy	128/80
3,042,028	7/1962	Iller	128/80

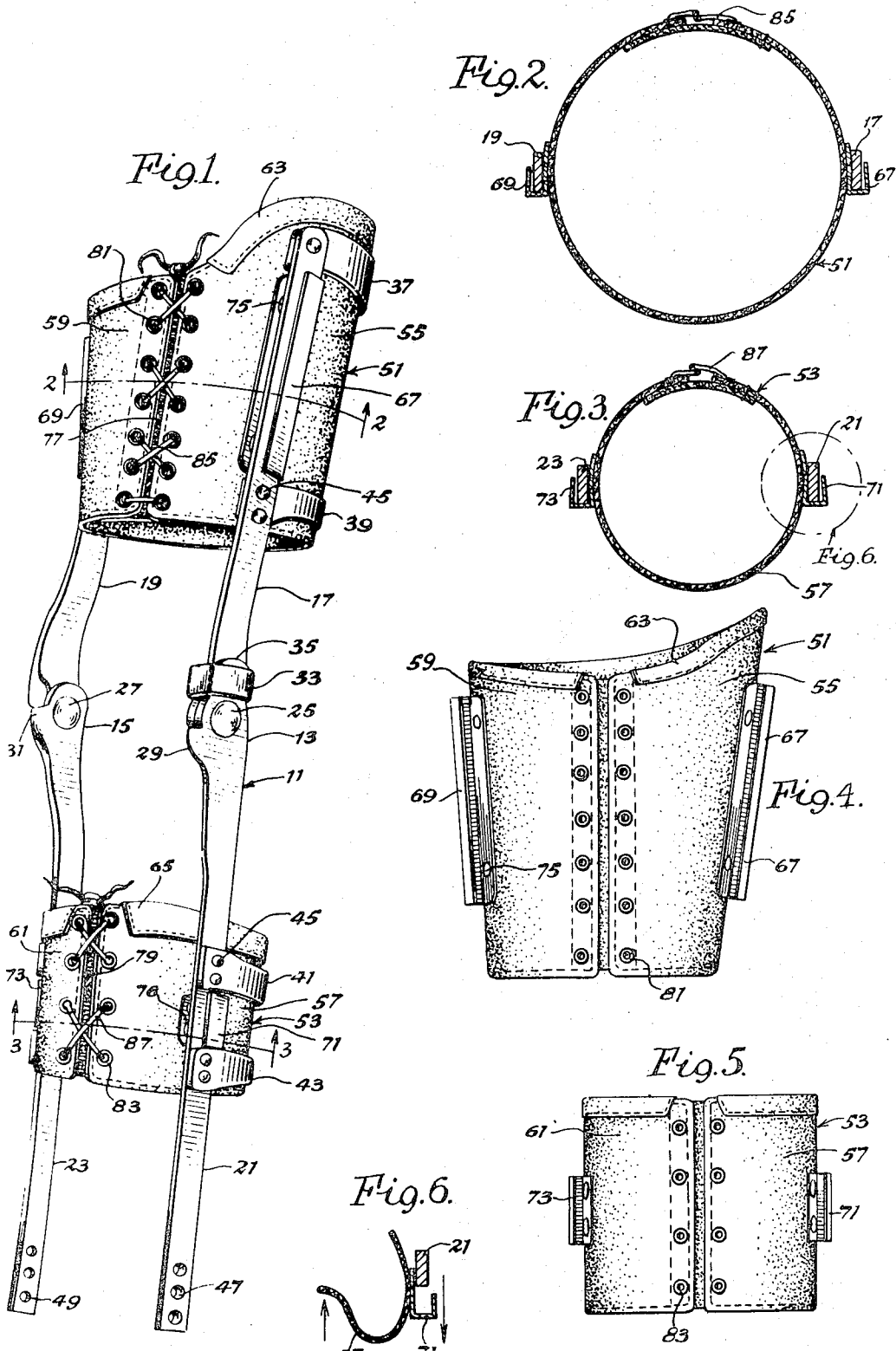
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[57] ABSTRACT

An orthopedic appliance includes a pad member adapted to hold the appliance onto a limb, such as a human leg or arm, which pad is readily removable from the appliance and easily installed on it. In a highly preferred structure the pad has fastened to it a plurality of channel or similar members adapted to hold it to brace portions of the orthopedic device in proper position when the pad is laced or otherwise fastened about the limb. Yet, although the pad can be removed readily for washing it will not fall off the appliance, even when the orthopedic device is not held to the limb. Also, it may be readily reinstalled on the appliance without the need for snapping, tying or similarly fastening it into place on the appliance parts.

10 Claims, 6 Drawing Figures





ORTHOPEDIC APPLIANCE HAVING DETACHABLE FASTENING MEANS

This invention relates to orthopedic appliances having readily removable pads to facilitate pad replacements and launderings and to make polishing of the appliance parts easier. More particularly, the invention is of pads having certain fastening or attachment means for removably holding them to appliance braces firmly enough for normal use and yet readily removable from the braces, such fastening means being easy to manufacture, of simple and economical construction, strong and readily cleaned.

Orthopedic appliances, such as braces for legs and arms, have been brought to an improved stage of development in recent years. Materials of construction, such as alloy steels and light metals, such as aluminum and magnesium alloys, have been made light in weight, yet exceedingly strong. Joints have been produced which hold positively and which support the wearer's weight without fail. However, although some pads, sleeves or other means of attachment of the braces to the limb and cushioning it have been suggested which could be removed from the braces, most commercial braces have such pads or cushions firmly held to them, usually by rivets. These permanently attached pads are difficult to clean and some sections of the pads, adjacent to the braces, cannot ever be cleaned satisfactorily. In cases wherein the orthopedic appliances are employed by incontinent users, sanitary problems may develop and malodors frequently result. The production of rust or other products of corrosion at the rivets or in snaps, sometimes used to fasten pads or sleeves to braces, is prevented by the present constructions. Thus, stains and allergic reactions to the corrosion chemicals are obviated. The means of affixation of the pads to the braces are themselves readily cleaned and are readily removable from the braces. Upon removal from the appliance the pads may be washed, daubed, brushed, dusted, sanitized or otherwise treated and the remaining brace parts, free of the pads, may be easily washed or polished. These advantages are obtained, in a preferred form of the invention, by having channels fastened to the exteriors of the pads and adapted to engage in tight relationship with the braces upon lacing or otherwise tightening of the pads or sleeves about the limb being strengthened. No special joinder of the fastening means to the braces need be effected.

In accordance with the present invention, an orthopedic appliance comprises a plurality of substantially longitudinally extending brace members, a pad adapted to hold such brace members in position adjacent and substantially parallel to a limb, said pad being interposed between the brace members and the limb to cushion the limb against irritating contact with the brace members, and passing substantially around the limb, plural fastening means on the exterior of the pad held in place on it, each of which is adapted to fit a portion of each of the respective brace members and transversely slidably to engage with such a brace member and be brought into tight contact with such a member when the pad is tightened about the limb, and means for tightening the pad about the limb, so that the orthopedic appliance is firmly held to the limb. The invention also relates to the pad for the orthopedic appliance, adapted to be removably fastened to brace members of such appliance and hold them in position adja-

cent to and substantially parallel to a limb, which pad is so shaped as to fit about a limb, with longitudinal (with respect to the limb) edges which are tightenable about the limb so that the pad is fastenable firmly to it, interposed between the limb and the brace members, and plural fastening means on the exterior of the pad and held in place on it, each of which includes means adapted to fit a portion of each of the respective brace members of the appliance and transversely slidably to engage with the brace members and be brought into tight contact with such a member when the pad is tightened about the limb.

The invention will be readily understood from reference to the following description, taken together with the drawing in which:

FIG. 1 is a front perspective of a two-section leg brace appliance hinged for folding at a central or (knee) part, equipped with upper and lower pads adapted to protect the leg from contact with the braces and to hold the appliance to the leg;

FIG. 2 is a sectional view along plane 2—2 of FIG. 1;

FIG. 3 is a sectional view along plane 3—3 of FIG. 1;

FIG. 4 is a front elevational view of the upper or thigh pad of FIG. 1, showing the fastening means thereon;

FIG. 5 is a front elevational view of the lower or shank pad of FIG. 1; and

FIG. 6 is a partial sectional view of the pad of FIG. 3, showing the pressing away of the pad from surrounding or connecting portions which hold the braces together, so that the channel fastening means may be readily disconnected from the braces to remove the pad from the appliance.

In FIG. 1 the orthopedic appliance 11 illustrated is a leg brace but similar constructions and modified versions thereof may be employed for portions of the leg or for use in strengthening and treating the arm. Braces 13 and 15 include upper portions 17 and 19 and lower portions 21 and 23, respectively, held together by hinge mechanisms 25 and 27. Stops 29 and 31 limit movements of the upper and lower brace portions. Lock 33 is a sliding member adapted to fit over projection 35 of lower brace portion 13 and maintain the brace 11 in operating position or to slide off the projection and allow bending of the brace. Brace members 13 and 15 are joined together by a plurality of connecting means 37, 39, 41 and 43. Such connecting means, as illustrated, are stainless steel or alloy metal strips curved to conform to the shape of the limb adjacent to them. They pass a substantial distance about the limb, usually about half-way around it, in smooth curves. As shown, the connecting means are riveted near ends thereof to the longitudinally extending brace members, which are also preferably of stainless steel or other metal alloy of sufficient strength. Instead of utilizing rivets 45, flat screws and threaded portions may be substituted or other sufficiently strong fastening means may be employed. At the bottom of lower brace members 21 and 23 are illustrated holes 47 and 49 for affixation of means for fastening the brace to a shoe or otherwise to or under a foot.

The brace mechanism previously described, in ordinary practice would have pad or sleeve means for fastening it to the human limb, which pad means would be permanently held to the brace members or the connecting means which hold such brace members to-

gether in desired longitudinal (with respect to the limb) relationship. Such permanent fastening means are normally rivets, which, it has been noted, being of soft and more reactive metals than the major brace parts, chemically react with perspiration, moisture and body salts to produce corrosion products which stain the skin and clothing and sometimes cause allergic reactions. It has always been a difficult job to clean such pads and rivets satisfactorily. Accordingly, in the present invention there are provided means for holding the pad to the appliance when desired, while yet allowing ready removal therefrom without the necessity of unscrewing or un-snapping fasteners or of removing rivets. Upper pad 51 and lower pad 53 each comprise sleeve-like or substantially cylindrical portions 55 and 57 which are shaped to conform with the limb being enclosed and with the connecting means, e.g., 37, 39, 41 and 43, holding the braces in position and passing about the rear portions of the limb. Pads 51 and 53 normally comprise leather outer portions 59 and 61 and may include softer fleecy, flannel or other cloth cushioning inner portions 63 and 65. Instead of such materials of construction, others may be employed such as plastics but generally care will be exercised in selecting the material of construction to avoid those which do not aid in evaporating perspiration or which are irritating to the skin. On the exteriors of the pad members there are affixed fastening means 67 and 69 on the upper or thigh pad and 71 and 73 on the lower or shank pad. As illustrated, such fastening means are held to the pad by rivets 75 and 76, which are flattened to smooth surfaces where they pierce the pad and contact the leg. Instead of rivets, other fastening means may be employed, e.g., extremely flat-headed screws, and when the affixing means are movable, as in the case of screws, an additional advantage with respect to cleaning may be obtained in that the fastening means (herein illustrated as channels) may also be removed when the pad is to be cleaned. As illustrated, the fastening means are fairly flat channels adapted to have the interior portion thereof fit around the substantially flat brace members with a total clearance between channel interior walls and brace exterior walls of about 0.020 to 0.050 inch, and preferably from 0.030 to 0.035 inch. At the ends of the fastening means, where they are prevented from making excessive longitudinal movements by contacts with the curved connecting means which hold the braces in position, the clearances are usually from 1/16 to 1/4 inch total, preferably 1/2 to 3/4 inch. Such clearances allow the fastening channel or other shaped holder to be moved in and out of position readily without undue play being allowed in the braces. The channels illustrated are of stainless steel, aluminum or suitable alloys but other materials of construction may be employed, including, in suitable cases, reinforced plastics. Also, different shaped channels or equivalent structures may be utilized, including L's and angles, portions of tubes, Z-bends or S-curves, etc., providing that they are affixable to the pad and are adapted to press against and hold to the brace when the pad is tightened about the limb to which the brace is held. Furthermore, such constructions should not require any other action to hold the pad in place on the brace than the ultimate tightening of the pad onto the limb. The fastening means should be brought against the brace by such tightening action.

The means for tightening the pad on the limb at open ends or longitudinal edges 77 and 79 may be a plurality of eyelets 81 and 83, in conjunction with laces 85 and 87. Instead of lace fastenings, other suitable fastening means may also be utilized, including snaps, zippers, elastic means, buckles, straps, ties, hooks and eyes, and Velcro or similar mini-hook fastening means.

Although FIG. 1 is an excellent illustration of an orthopedic appliance embodying the removable pad of this invention, some details of the pad are better shown in additional sectional views, FIGS. 2 and 3, and front elevations, FIGS. 4 and 5. In FIG. 3, the circled portion is that shown in FIG. 6, wherein it is illustrated how a pad is pressed away from the connecting means so as to allow enough slack for the channel or other fastening means to be moved transversely backward with respect to the brace, to remove it from the brace. Without such pressing forward of the pad, which is easily effected, difficulty could be encountered in releasing the channels from the brace. This is a useful feature of the present invention because the conforming of the pad to the connecting portions of the appliances prevents accidental release of the pad from the appliance when it is not being used. Of course, the pad is of sufficient strength and resiliency so that it maintains its shape and holds the channel in position unless additional forces are imposed. FIG. 6 illustrates the mechanism of removal of the pad from the brace.

In use, the pads may be readily positioned on the orthopedic appliance by placing one channel against its brace portion, positioning the rest of the pad, bending it in a manner such as shown in FIGS. 3 and 6 and placing the other channel about the other brace, after which the bend in the pad is smoothed out. The pad will then conform with the connecting members and the limb portion about which it is to be fastened. After placement of the other pad, the brace may be positioned on the leg and the pads may be laced tight, after which the brace may be locked in position, ready for use. Removal of the appliance from the leg is just as easy, as are removals of the pads from the braces. Such removals may be effected for washing purposes, to polish the appliance, to substitute a different or more comfortable or tighter pad, or to change to cleaner or "dressier" pads or pads of different designs. Thus, in the cases of children using these braces, some pads may be employed for play and others for more formal occasions. For bathing or swimming plastic pads may be used to save the leather from being water damaged. The easy interchangeability of the pads makes it feasible to wash them more frequently than would be the case with those riveted to the braces and time would otherwise have to be allowed for drying, during which times the braces could not be used.

The positive holding of the fastening means onto the brace members is superior to the use of snaps or other devices and the channel holds the brace tightly to the limb, the clearances given not allowing objectionable movement. The pad holds the brace members substantially parallel or exactly parallel to the limb and is interposed between them and the limb to cushion the limb against irritating contact with the brace. The pad passes substantially around the limb to hold the brace to it and although the means for fastening the pad to the brace are transversely movable or slidable with respect to the brace to engage it, they are brought into tight contact with the brace member when the pad is tightened about

the limb by the laces or other tightening means. In the embodiment of the invention illustrated, single continuous channels have been used to join the pad onto the brace but interrupted or plural channels or other fastening means of the described types may also be employed. The pads shown extend beyond the means connecting the brace members and fold back over these in part but this is not necessary so long as they cushion the brace members against contact with the skin of the limb to which the brace is held. In the drawing the uppermost connecting means is at the upper ends of the braces. While this is a preferred position, it is not required. The connecting means serve as the stops to prevent undue longitudinal movement of the channels and pads with respect to the braces but other such stops may also be provided, instead.

As shown, the orthopedic appliance is suitable for use on the human leg and is especially adaptable to strengthen the knee joint or substitute for its action. It should be clear that it is not required that a plurality of pads be employed nor is it required that the appliance be utilized on the human leg. It or modifications are also applicable to the human arm and to animal limbs. If desired, additional channels or other fasteners may be longitudinally positioned on the pads so that the pads may be utilized with different types of braces or may be "adjustable" for use on different sized limbs.

The invention has been described with respect to illustrations and descriptions thereof but it is not to be considered as limited to these because those of ordinary skill in the art will be able to utilize equivalents and substitutes for elements of the described structures without departing from the spirit of the invention.

What is claimed is:

1. An orthopedic appliance which comprises a plurality of substantially longitudinally extending brace members, a pad for holding such brace members in position adjacent and substantially parallel to a limb, said pad being interposed between the brace members and the limb to cushion the limb against irritating contact with the brace members and adapted to pass substantially around the limb, plural open ended fastening means on the exterior of the pad held in place on it, each of which fastening means fits a portion of each of the respective brace members and is transversely slidably engageable with such a brace member by relative movement of the brace members into the fastening means past the open end thereof, so as to be brought into fastening relationship with such a member when the pad is tightened about the limb, and is readily disengageable therefrom by reverse relative movement when the pad is loosened with respect to the limb, and means for tightening the pad about the limb, so that the orthopedic appliance may be firmly held to the limb.

2. An orthopedic appliance according to claim 1 in which the plurality of substantially longitudinally extending brace members is a pair of such members held together at an end thereof by connecting means, said connecting means being adapted to pass around a substantial proportion of a limb, the plural fastening means on the pad exteriors are two such means firmly fastened to the pad and stop means are provided to prevent said plural fastening means from moving longitudinally along the brace means and out of desired position.

3. An orthopedic appliance according to claim 2 wherein the plural fastening means on the exterior of the pad adapted to fit the brace members are posi-

tioned against excessive longitudinal movement between connecting means which pass around about half of the limb.

4. An orthopedic appliance according to claim 3 adapted for use over the thigh, knee and shank portions of a leg which comprises plural pads and fastening means on the exteriors of the pads, one of which such pads is adapted for being fastened onto the thigh and another of which is adapted for fastening onto the shank of a leg.

5. An orthopedic appliance according to claim 4 wherein the fastening means on the pad exteriors are metal channels riveted to the pads, the pads are of leather, the clearances between the channel interiors and the braces total 0.020 to 0.050 inch, the clearances between the channels and stops at the ends thereof are between 1/16 and 1/4 inch total and when the channels are in place against the brace when the pad is tightened about the leg, the pad conforms with the shapes of the brace-connecting means, which are shaped to conform with the curvatures of the leg against which they are positioned.

6. An orthopedic appliance according to claim 1 wherein the brace members are connected by rigid members which pass approximately half way around a limb and which are located near the ends of the pad, the plural fastening means on the exterior of the pad are restricted in longitudinal movement by said connecting members and the pad conforms to the shape of the connecting members and cushions the limb and prevents it from contacting such members so that when the fastening means are in place on the brace members the resiliency of the pad pressing against the connecting members holds the fastening means against the brace members, preventing accidental release of the pad therefrom.

7. An orthopedic appliance according to claim 1 wherein the fastening means on the pad exteriors are channels held to the pads and the pads are of leather, plastic or cloth.

8. A pad for an orthopedic appliance, removably fastenable to brace members of such appliance so as to hold them in position adjacent to and substantially parallel to a limb, so shaped as to fit about a limb and be tightenable about the limb so that the pad is fastenable firmly to it interposed between the limb and the brace members, and plural open ended fastening means on the exterior of the pad and held in place on it, each of which fits a portion of each of the respective brace members of the appliance and is transversely engageable with such brace member so as to be brought into fastening relationship with it when the pad is tightened about the limb.

9. A pad according to claim 8 wherein the fastening means on the pad exterior are metal channels riveted to the pad, the pad is of leather, the clearances between the channel interiors and the braces against which they are adapted to fit are of 0.020 to 0.050 inch total, the clearances between the channels and stop members on or joined to the braces are between 1/16 and 1/4 inch total and the pad conforms with shaped connecting means between the braces, which means are shaped to conform with the curvature of a leg against which the pad is positioned so that the resiliency of the pad pressing against the connecting members holds the fastening means against the brace members, preventing accidental release of the pad therefrom when it is not fastened tightly about the limb.

10. A pad according to claim 8 wherein the fastening means on the pad exterior are channels held to the pad and the pad is of leather, plastic or cloth.

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