

June 2, 1964

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CERVICAL COLLAR

3,135,256

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2 Sheets-Sheet 1

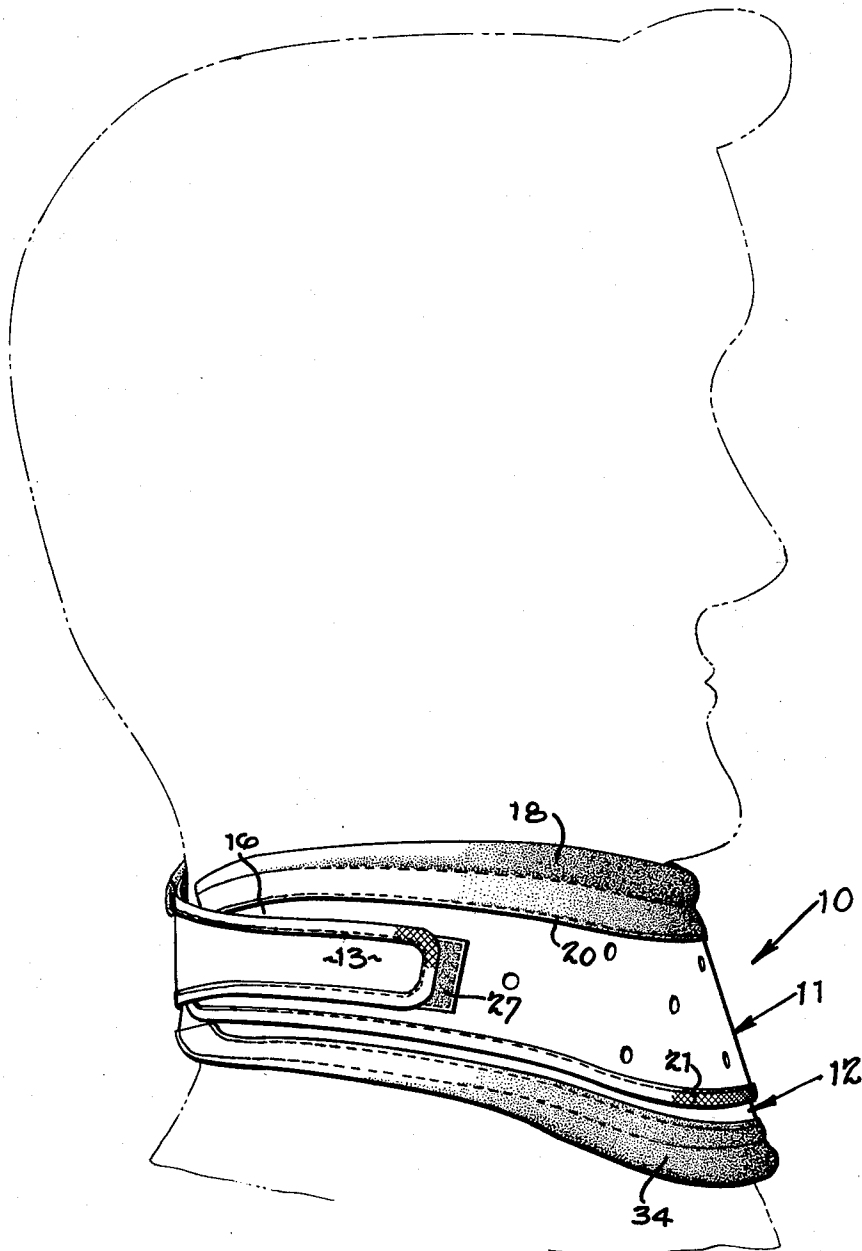


Fig. 1

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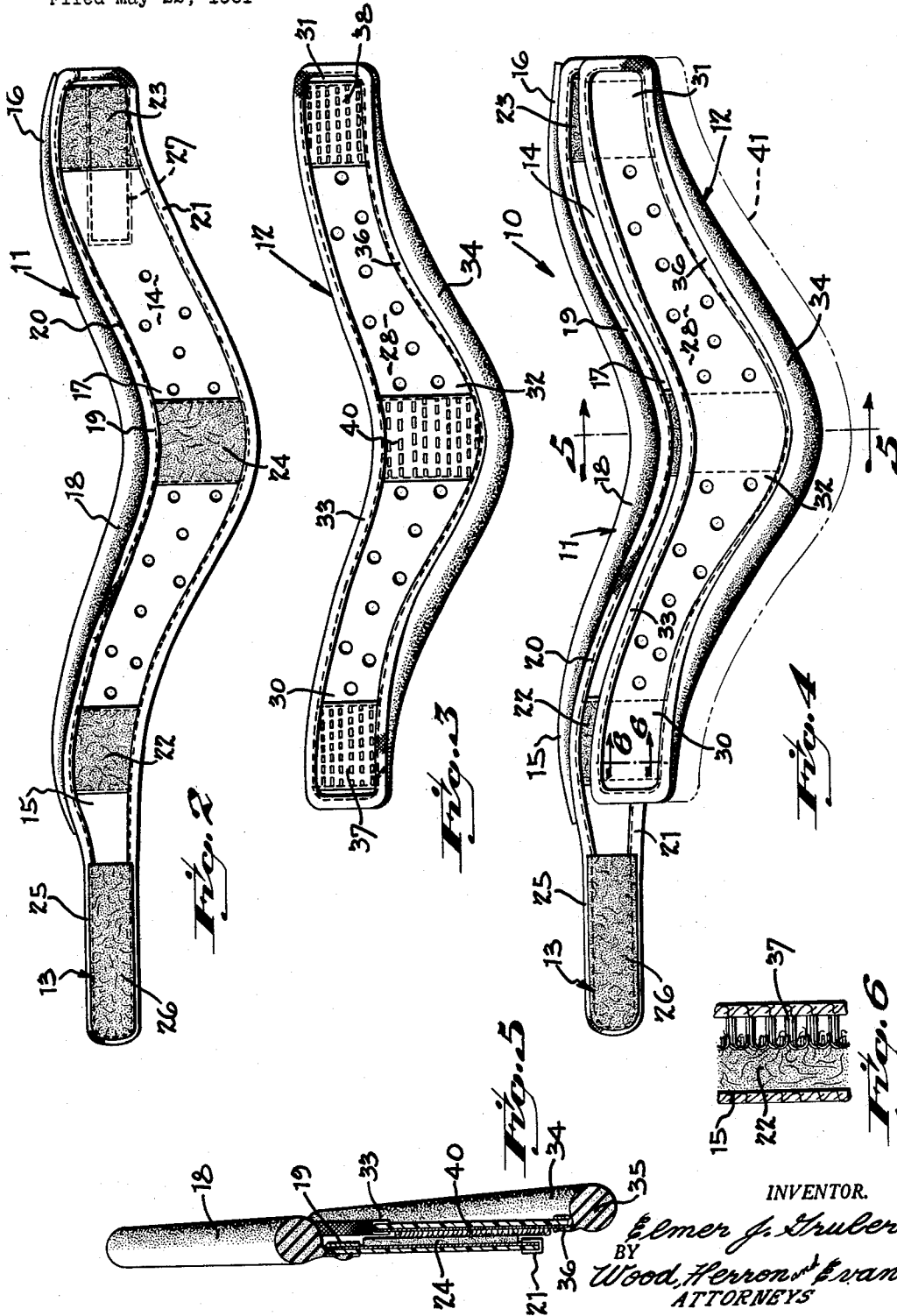
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CERVICAL COLLAR

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This invention relates to orthopedic appliances and is particularly directed to a novel cervical collar.

Cervical collars are commonly employed for treating neck injuries, such as "Whiplash" injuries and other dislocations which result in muscular strain or nerve pressure in the cervical area. These collars are also used in the treatment of certain pathological conditions, such as "wryneck" or torticollis. In the treatment of these conditions a cervical collar performs two functions. In the first place, the collar partially immobilizes the wearer's head, while at the same time providing means for supporting the wearer's head upon his chest so as to relieve strain upon his neck muscles.

One of the principal objects of the present invention is to provide a novel two-piece cervical collar which can be selectively assembled to provide a wide range of adjustment so that the collar can be adjusted to provide an accurate, conforming fit for people of widely different sizes and shapes. Moreover, a cervical collar constructed in accordance with the present invention provides such a wide range of adjustment that a single collar can be used to support the wearer's head in any of a large number of positions in accordance with the nature of his injury. Thus, the present cervical collar is equally adapted to support a wearer's head in varying degrees of flexion, or hyperextension or in a sideways twist or tilt.

The present invention is predicated upon the concept of providing a two-piece cervical collar which includes an upper chin engaging member and a lower chest engaging member, which members at least partially overlap one another. In accordance with the present invention, these members are held together in any desired relationship by means of a plurality of cooperating pairs of strips of Velcro tape. As is explained in detail below, each of these pairs of strips includes a pile strip which is attached to the inner surface of the upper member; and a male, or hook, strip attached to the outer surface of the lower member. The male strip includes a large number of tiny hooks which engage loops on the female pile strip when the two strips are pressed together. This locking engagement is effective to hold the two strips of tape together against either a direct pulling or sliding movement, but permits the tapes to be separated by a peeling action.

One of the principal advantages of the present invention is that the collar is exceedingly simple to adjust to fit the individual wearer. No tools of any kind are required. Rather, the present cervical collar merely requires that the upper and lower sections be overlapped so as to provide a collar of the desired overall shape and size and then be pressed together to cause the cooperating Velcro strips to become interlocked. Thereafter, the collar members are held together against all normal strains, but can be separated by peeling the two members apart.

Another advantage of the present invention is that the present collar provides a simple means for obtaining a wider range of adjustment than was heretofore available in cervical collars. The present collar provides from 200 to 300 percent greater vertical adjustment than was possible with previously proposed collars. This wide range of adjustment is due to the fact that the Velcro strips on the upper and lower overlapped members continue to hold together even when a small fraction, e.g.,

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1/4 of the total surface of the strips are interengaged. I have determined that this firm secureance of the Velcro strips with only a surprisingly small area of overlap is due to the fact that in the present collar construction the strips are interposed between the two arcuately bent collar sections. When the collar is being worn, this construction results in a radial or abutment pressure which tends to force the Velcro strips against one another.

This wide range of vertical adjustment not only is advantageous in that it enables a collar to support a person's chin in any desired position from a flexion position to a hyperextension position, but also because of the high range of adjustment of the collar the appliance fitter, or dealer, need carry only one or two sizes in stock and these can be adjusted accurately to fit all of his customers.

Still another advantage of the present collar is that it provides for other adjustments than a mere vertical height adjustment. Specifically, the Velcro strips facilitate the lateral shifting and/or angulation of one collar member relative to the other so that the collar can comfortably accommodate a patient having "wryneck" or other condition requiring a neck to be supported in a twisted or tilted position.

A still further advantage of the present invention is that the present collar, even after long periods of use, remains in the selected position without relative slippage between the parts such as frequently occurs when set screws or other frictional elements are relied upon.

Another advantage of the present collar is that it is extremely lightweight and comfortable for the wearer. There are no metal parts to contact the wearer's skin. Also, the stiff hooks face outwardly and never contact the patient's skin even when the collar sections are overlapped to a minimum degree. The absence of metal fasteners is also highly advantageous since it gives the collar an attractive "cosmetic" look.

These and other objects and advantages of the present invention will be more readily apparent from a consideration of the following detailed description of the drawings illustrating a preferred embodiment of the invention.

In the drawings:

FIGURE 1 is a side elevational view of a cervical collar embodying the present invention, the collar being shown in the curved position in which it is worn by a wearer.

FIGURE 2 is a plan view of the inner face of the upper member, the member being laid out in a flat position.

FIGURE 3 is a top plan view of the outer surface of the lower member, the member being laid out in a flat position.

FIGURE 4 is a top plan view of the upper and lower collar members in assembled position, the members being laid out in a flat position.

FIGURE 5 is a cross sectional view taken along line 5-5 of FIGURE 4.

FIGURE 6 is an enlarged cross sectional view taken along line 6-6 of FIGURE 4.

As is best shown in FIGURES 1 and 4, a cervical collar 10 constructed in accordance with the principles of the present invention comprises two laterally flexible neck embracing members 11 and 12. Upper neck embracing member 11 is disposed outwardly of lower member 12 and extends upwardly beyond lower member 12. Upper member 11 is configured to engage and support the neck, chin and jaw areas of the wearer. Lower member 12 extends downwardly below upper member 11 and is configured to engage the lower areas of the neck and chest of the wearer.

In accordance with the present invention, these members are selectively assembled to closely conform to the body of the individual wearer by means of a plurality of

cooperating strips of Velcro tape. The members are held in position about the wearer's neck by means of a strap portion 13 formed on one end of the upper member 11. This strap member also carries a piece of Velcro tape adapted to cooperatively engage a second piece of Velcro tape secured to the exterior surface of the opposite end of the upper member.

The Velcro tape utilized in the present cervical collar consists essentially of two strips of nylon tape. One strip hereinafter referred to as the "hook," or "male," strip is covered with a myriad of stiff little hooks. The other strip, referred to as the "pile," or "female," strip is covered with thousands of tiny, soft loops. When a male and female strip of tape are pressed together, the hooks and loops interengage to create a secure closure. This closure is effective to resist both a direct pulling apart of the surfaces and also a shearing or sliding separation of the surfaces. The two strips may be readily separated when desired, however, by peeling them apart.

More particularly, the female tape comprises an unshered nylon pile fabric having a tape backing. The male, or hook, tape comprises a nylon tape backing having a plurality of outwardly extending nylon hooks. In a preferred embodiment, the hooks are disposed in transverse rows along the tape and are closely spaced together so that there are of the order of 537 hooks per square inch. One form of hook structure is shown in G. De Mestral Patent No. 2,717,437 for "Velvet Type Fabric And Method Of Producing The Same." This patent also shows the manner in which the hooks engage loops formed on a female strip. The disclosure of this patent is expressly incorporated into the present application.

More particularly, as is shown in FIGURE 2, upper member 11 comprises a sheet 14 of suitable semi-rigid plastic material, such as 060 gage polyethylene sheet. This sheet material may be bent laterally to encircle and conform to the shape of a wearer's neck, and yet is semi-rigid in that it tends to resist buckling in a vertical plane. Sheet 14 of upper member 11 is configured to provide two end portions 15 and 16 joined by a center portion 17 which curves downwardly below the two end portions. A cushion 18 of plastic covered foam rubber, or the like, is secured as by means of stitching 20 to the upper edge of member 11. This cushion includes a round bead portion which extends above the member 11 and a depending flange 19 which abuts the outer face of the upper member. The marginal portions of sheet 14 are covered by a suitable cloth binding 21 which is folded over the edge of the sheet secured to the sheet in any suitable manner, such as by stitching.

Attached to each of the end portions 15 and 16 of member 11 is a vertically disposed female strip of Velcro pile material 22 and 23. A similar vertically disposed strip of Velcro pile 24 is secured to the center portion 17. Each of these strips in the preferred embodiment is two inches wide and is secured to the sheet 14 by means of stitches. The upper and lower ends of each of the Velcro strips are stitched under the binding 21.

Upper member 11 is also configured to form an integral strap, or tab, 25. This tab carries an elongated strip of Velcro pile material 26 similar to the material comprising strips 24. In one preferred embodiment, strip 26 is one inch wide and is stitched about its periphery to the margins of strap 25.

The Velcro strip 26 is adapted to cooperate with an elongated strip of Velcro hook tape 27 which is stitched to the outer face of sheet 14 at the end portion 15 thereof opposite to strap 25. As explained above, when the female and male tape sections, i.e., the pile tape 24 and hook tape 27, are placed together, the myriad of stiff little hooks formed on the male member engage thousands of tiny soft loops formed on the female member, thereby forming a secure joint to hold the collar firmly about the wearer's neck.

The lower member 12 comprises a sheet of plastic ma-

terial 28 preferably identical with the sheet of polyethylene material 14 in upper member 11. Lower member 12 comprises two end portions 30 and 31 and a downwardly curved center portion 32. Preferably, lower member 12 is substantially the same length as upper member 11. The edges of lower member 12 are covered by a suitable cloth binding 33 which is stitched to the periphery of sheet 28. Additionally, a rubber cushion member, or bead, 34 is secured beneath the lower edge of sheet 28. Bead 34 comprises a section of foam rubber of generally circular cross section 35 and a securing flange 36 which is stitched to the outer lower margin of sheet 28.

Lower member 12 has three strips of hook, or male, Velcro tape 37, 38 and 40 secured thereto. Strips 37 and 38 are secured to the inner face of sheet 28 at the outer portions 30 and 31 of this sheet, while strip 40 is secured to the inner face of sheet 28 at the center portion 32 thereof. In the preferred embodiment, each of the male tape strips 28 is two inches wide and is vertically disposed. The male tape strips are of the same type as the male strip shown in Patent No. 2,717,437.

In use, the lower and upper sections are selectively assembled by firmly pressing together the cooperating male and female tapes mounted respectively on the lower and upper members. The amount of overlap between the upper and lower sections 11 and 12 is selected so that when the lower rubber bead 28 engages the wearer's chest and upper bead 34 engages the wearer's chin, the wearer's head is held in the desired degree of extension. If a hyperextension is desired, a minimum amount of overlap (approximately one-half inch) is provided between the lower and upper members. This arrangement is indicated by the dotted lines 41 in FIGURE 4.

Alternatively, if a normal amount of extension is desired, the upper and lower sections are substantially, but not completely, overlapped. If, alternatively, a flexion type of support is desired, the upper and lower sections are completely overlapped so that the distance between the upper and lower beads 18 and 34 is minimized. When the correct amount of overlap between the upper and lower members has been determined, the members are firmly secured in position by pressing the cooperating strips of Velcro tape together. The collar is then secured in place around the wearer's neck, as is shown in FIGURE 1, and the Velcro strip 26 formed on tab 25 is pressed firmly against the Velcro tape 27.

The present cervical collar when worn is effective to transfer the weight of the patient's head to his chest and shoulders so that substantially all of the strain is removed from the patient's neck muscles. Moreover, the movement of the patient's neck is at least substantially restricted.

I have determined that by disposing the Velcro strips in the manner disclosed, a maximum degree of adjustment, i.e., a vertical adjustment of the order of two inches can be obtained without impairing the security of the Velcro joints. The reason for this is that when the collar is in position the lateral flexure of the collar tends to hold the two strips of Velcro tape tightly against one another so that the tapes effectively resist relative sliding movement, even though only a small fraction of the tape faces are in engagement with one another. It is important to note that when the upper member 11 is extended, the smooth Velcro pile is exposed to the patient's neck. This pile causes no irritation.

In addition to the vertical adjustment for hyperextension and flexion described above, upper and lower sections 11 and 12 can be shifted horizontally relative to one another or can be angulated relative to one another by overlapping one end of the sections to a greater or lesser degree than the opposite section. Thus, the collar can readily be fitted to provide optimum support for a wry-neck condition in which the head is tilted, or for a condition in which the head must be supported in a position in which it is twisted to one side.

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From the above disclosure of the general principles of the present invention and the preceding disclosure of a preferred embodiment, those skilled in the art will readily comprehend various modifications to which the invention is susceptible. Therefore, I desire to be limited only by the scope of the following claims.

Having described my invention, I claim:

1. A cervical collar comprising an upper sheet of flexible plastic material, a lower sheet of flexible plastic material, said sheets being at least partially overlapped, a plurality of cooperating pairs of male and female Velcro strips respectively secured to the adjacent surfaces of said upper and lower sections, said male and female Velcro strips being in interlocking engagement and being effective to hold said sheets in assembled relationship in various and relatively angular adjusted positions.

2. A cervical collar comprising an upper sheet of flexible plastic material, a lower sheet of flexible plastic material, said sheets being at least partially overlapped with said upper sheet being disposed outwardly of said lower sheet, a plurality of strips of female Velcro tape secured to the inner surface of said upper sheet and a like plurality of strips of male Velcro tape secured to the outer surface of said lower section, said male and female Velcro strips being in interlocking engagement and being effective to hold said sheets in assembled relationship in various vertical and relatively angular adjusted positions.

3. A cervical collar comprising an upper sheet of flexible plastic material, a lower sheet of flexible plastic material, said sheets being at least partially overlapped with said upper sheet being disposed outwardly of said lower sheet, a plurality of strips of female Velcro tape secured adjacent to the ends and center portion of the inner surface of the upper sheet, and a like plurality of male Velcro tape strips secured to the ends and center portion of the outer surface of said lower member, said male and female Velcro strips being in interlocking engagement and being effective to hold said sections in assembled relationship in various vertical and relatively angular adjusted positions.

4. A cervical collar comprising an upper member comprising a sheet of semi-rigid plastic material including two end portions and a center portion adapted to embrace the neck of a wearer, a lower member comprising a sheet of semi-rigid plastic material having two end portions and a downwardly curved center portion configured to engage the wearer's chest, at least a portion of said upper member surrounding and embracing the lower member, a plurality of cooperating Velcro strips respectively secured to the inner surface of said upper member and the outer surface of said lower member and being in interlocking engagement effective to hold said members in assembled relationship in various vertical and relatively angular adjusted positions.

5. A cervical collar comprising an upper member comprising a sheet of semi-rigid plastic material including two end portions and a center portion adapted to embrace the neck of a wearer, a lower member comprising a sheet of semi-rigid plastic material having two end portions and a downwardly curved center portion configured to engage the wearer's chest, at least a portion of said upper member surrounding and embracing the lower member, a plurality of strips of female Velcro tape secured to the inner surface of said upper member at each end portion

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and at the center portion thereof, and a like plurality of strips of male Velcro tape secured to the outer surface of said lower member at each end portion and at the center portion thereof, said male and female strips being in interlocking engagement and being effective to hold said members in assembled relationship in various vertical and relatively angular adjusted positions.

6. A cervical collar comprising an upper member comprising a sheet of semi-rigid plastic material including two end portions and a center portion adapted to embrace the neck of a wearer, a lower member comprising a sheet of semi-rigid plastic material having two end portions and a downwardly curved center portion configured to engage the wearer's chest, said upper and lower members being of substantially the same length, at least a portion of said upper member surrounding and embracing the lower member, a plurality of strips of female Velcro tape secured to the inner surface of said upper member at each end portion and at the center portion thereof, and a like plurality of strips of male Velcro tape secured to the outer surface of said lower member at each end portion and at the center portion thereof, said male and female strips being in interlocking engagement and being effective to hold said members in assembled relationship in various vertical and relatively angular adjusted positions, and a tab formed on one end of said upper member, a first piece of Velcro tape secured to the inner surface of said tab and a cooperating piece of Velcro tape secured to the outer surface of said upper member at the outer end thereof.

7. A cervical collar comprising an upper member comprising a sheet of semi-rigid plastic material including two end portions and a center portion adapted to embrace the neck of a wearer, a lower member comprising a sheet of semi-rigid plastic material having two end portions and a downwardly curved center portion configured to engage the wearer's chest, said upper and lower members being of substantially the same length, at least a portion of said upper member surrounding and embracing the lower member, a plurality of strips of female Velcro tape secured to the inner surface of said upper member at each end portion and at the center portion thereof, and a like plurality of strips of male Velcro tape secured to the outer surface of said lower member at each end portion and at the center portion thereof, said male and female strips being in interlocking engagement and being effective to hold said members in assembled relationship in various vertical and relatively angular adjusted positions.

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