United States Patent

Nissen

[15] **3,670,346**

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[54] MAT FOR FREE EXERCISE AND THE LIKE

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[52] **U.S. Cl.** **5/344,** 5/357

[51] **Int. Cl.** **A47g 9/00**

[58] **Field of Search** 5/341, 344, 352, 357, 345; 297/231

[56] **References Cited**

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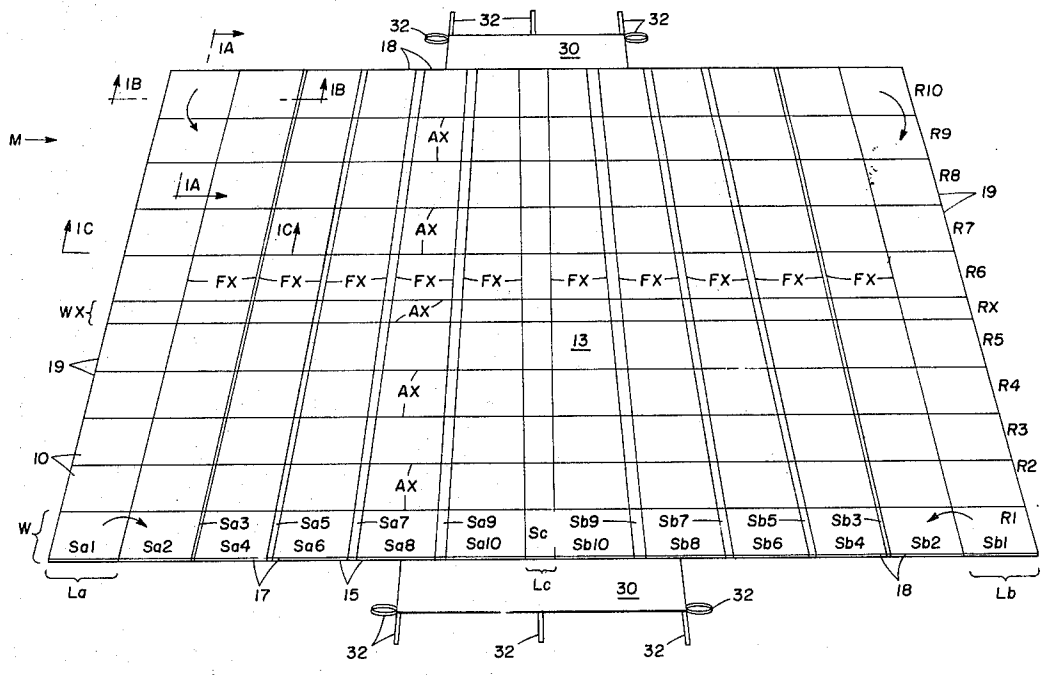
[57] **ABSTRACT**

A large rectangular floor mat having an integral cover providing a substantially smooth, unbroken top surface is constructed in the form of individual sections permanently connected together only by an overall top sheet constituting a part of the cover and arranged so that the entire mat can be readily "roll-folded"inwardly from its two ends to form a long narrow stack of mat sections on the floor which can then be moved away to one side, all without requiring any disassembly of the mat. A separate sheet or "skid" beneath the mat is also provided so that after the mat is folded the skid can serve as a handy means by which the folded mat can be dragged across the floor. Additionally, the mat is constructed so that it can also be folded inwardly from its sides in order readily to remove shock absorbing material within the mat sections without requiring any disassembly of the cover.

16 Claims, 7 Drawing Figures



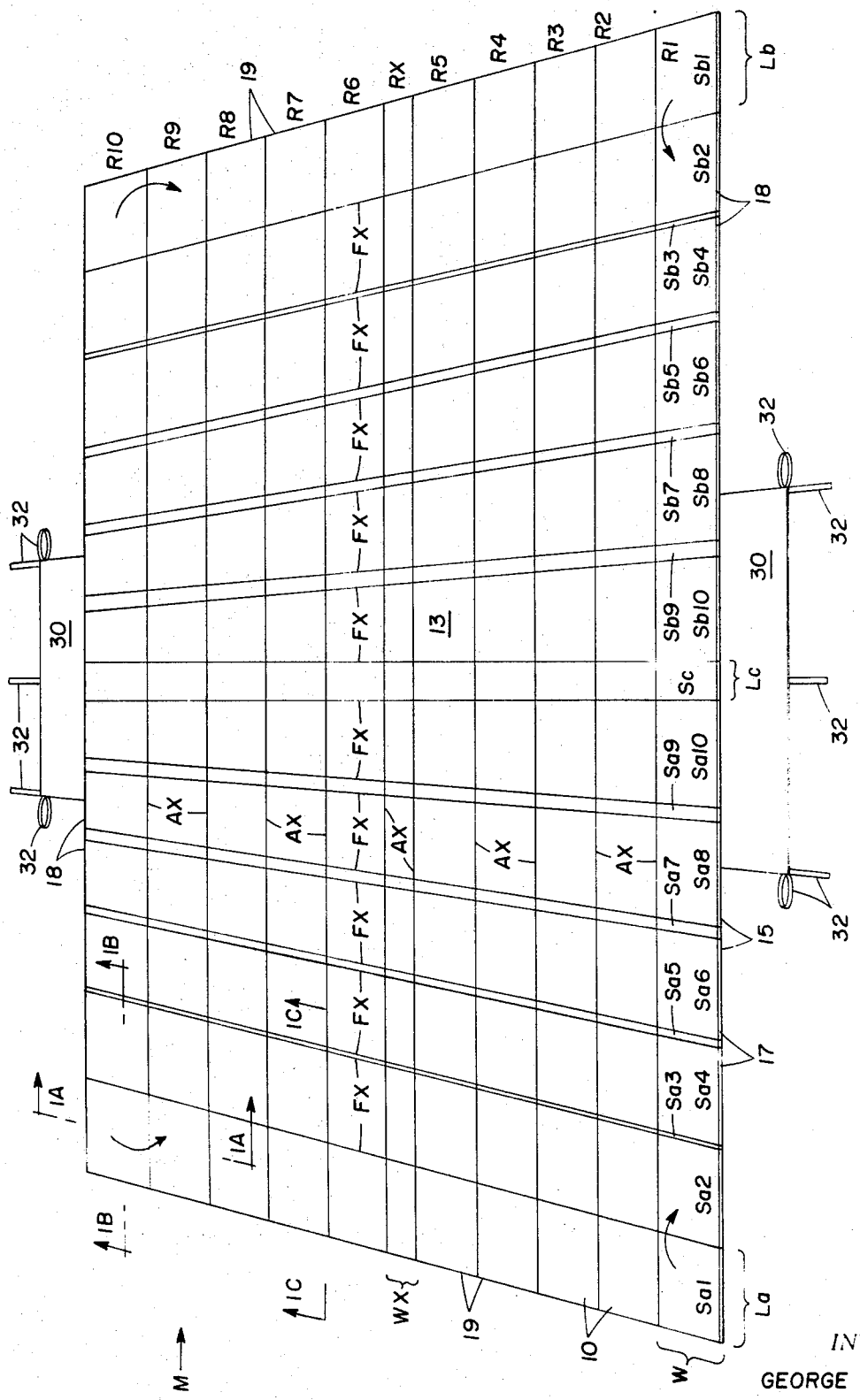


FIG 1

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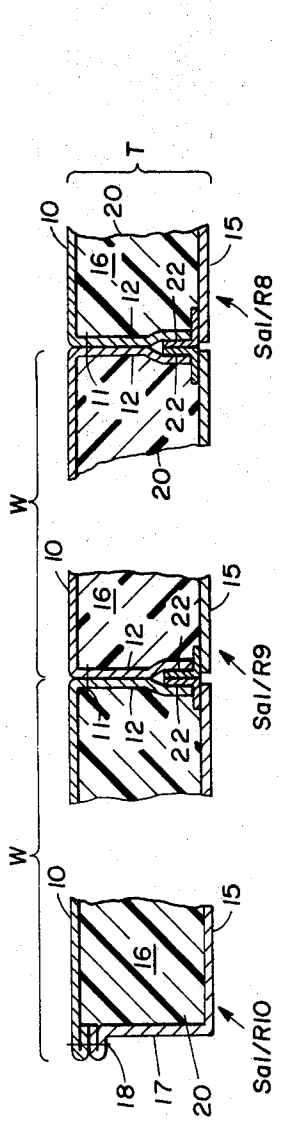

FIG 1A

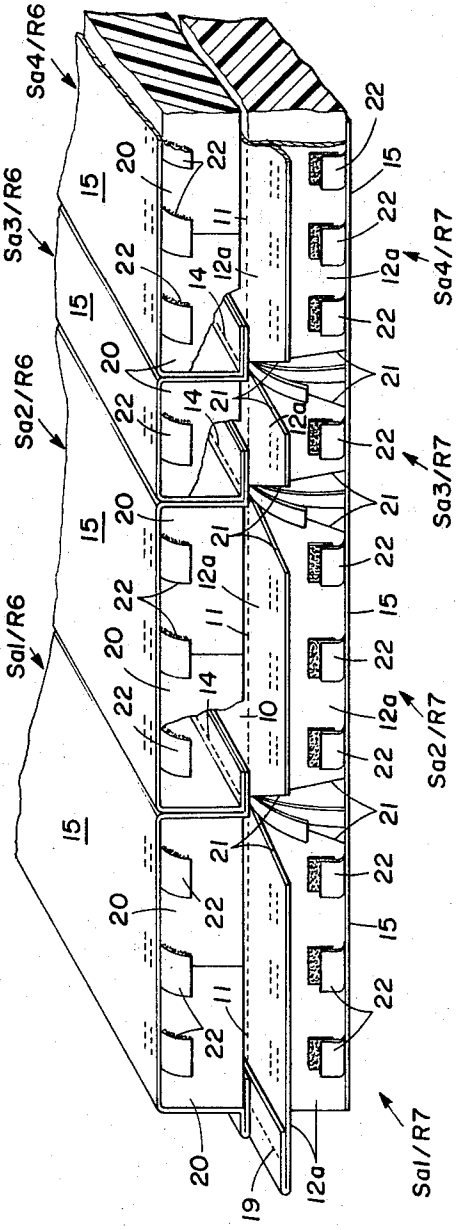

FIG 1C

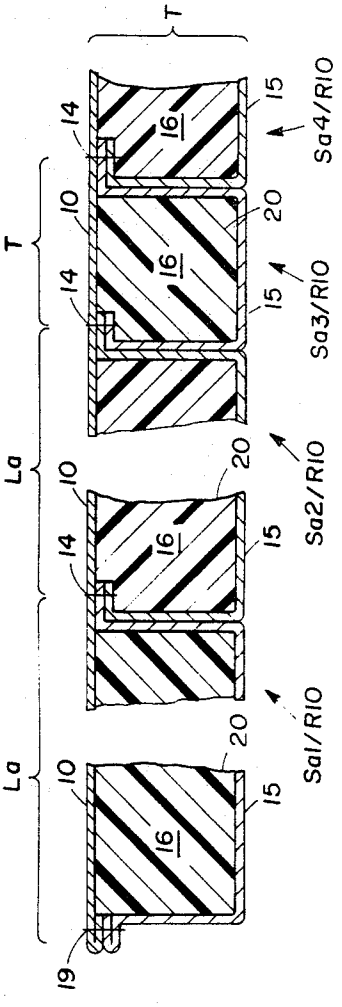

FIG 1B

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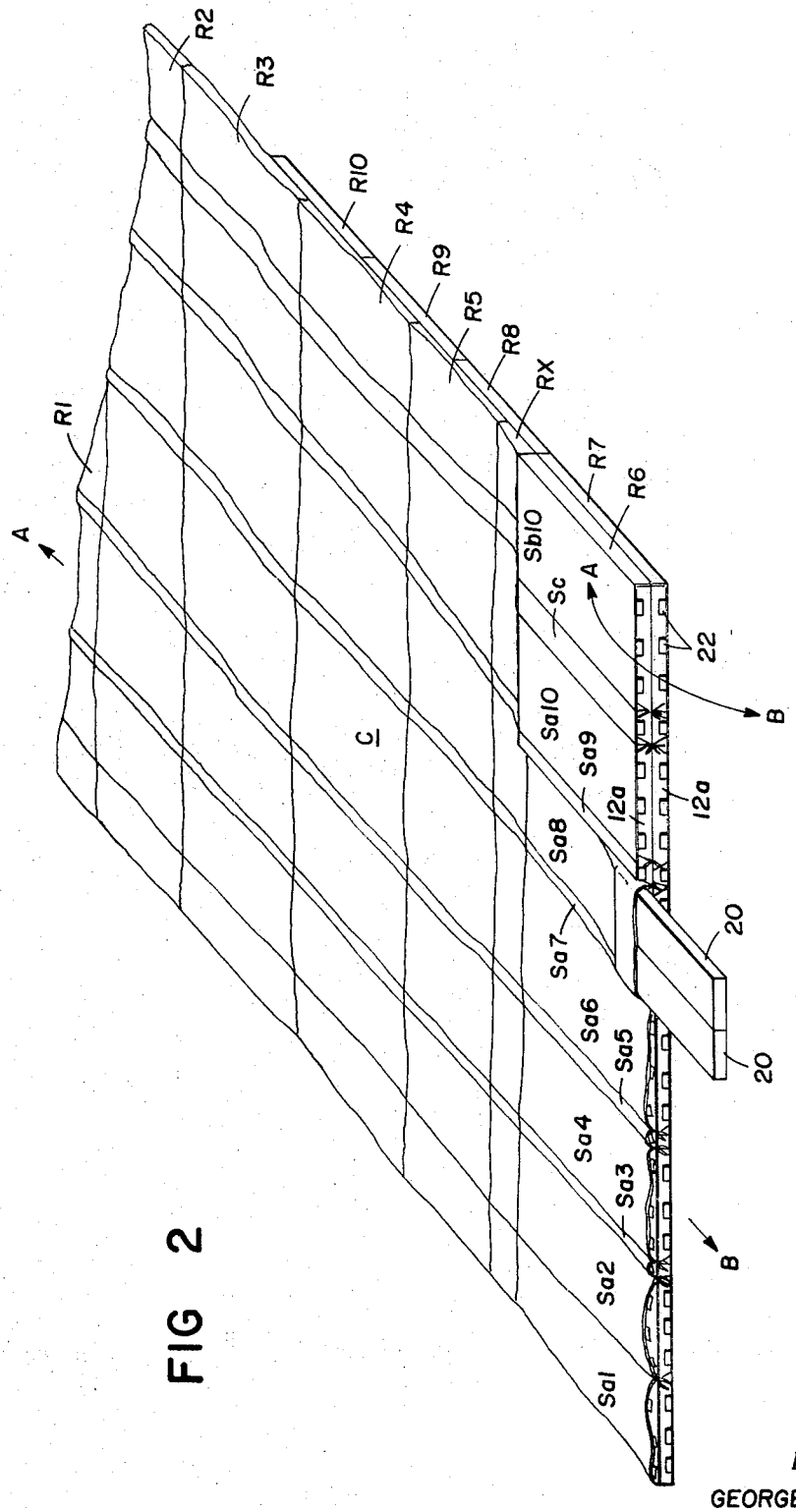

FIG 2

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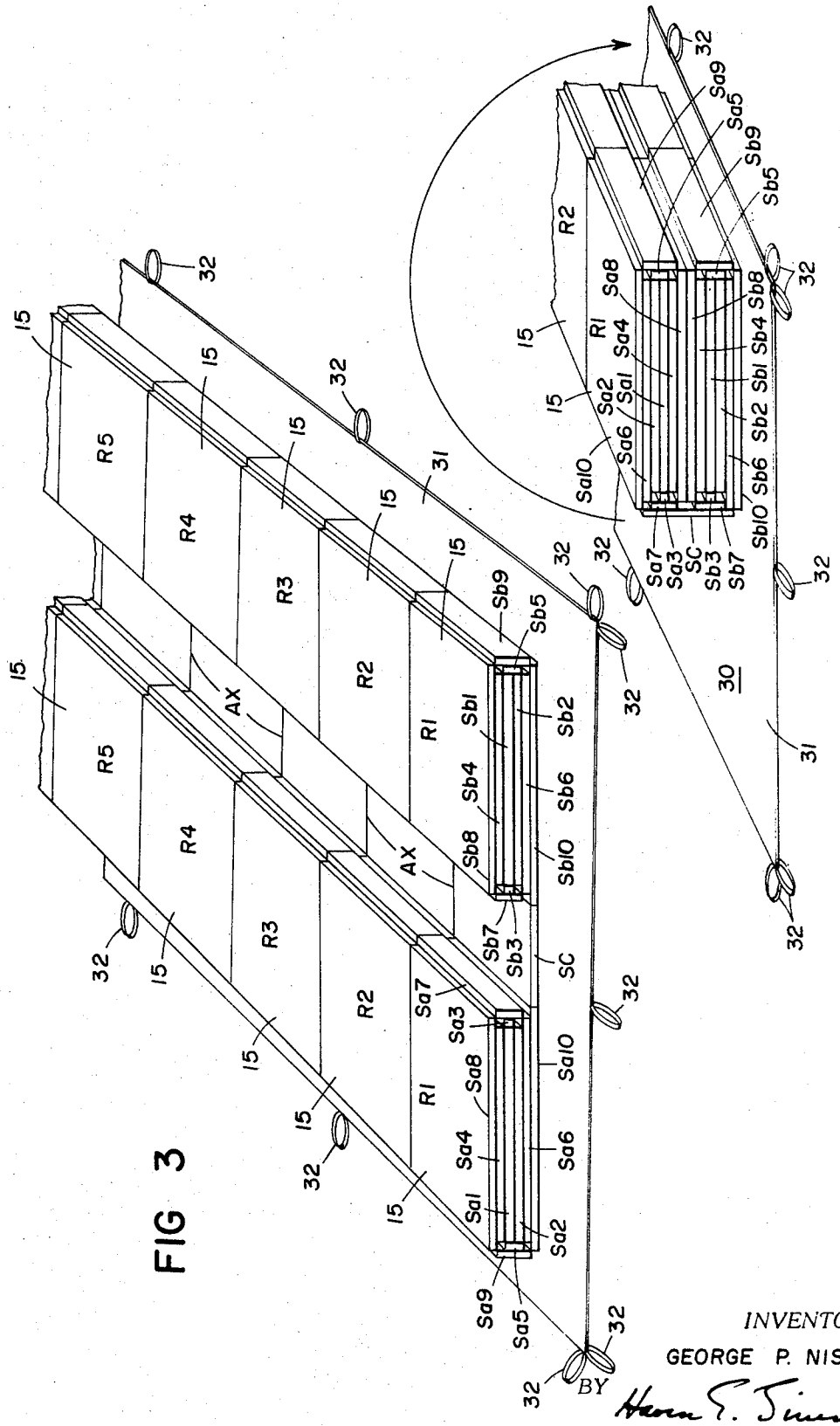

FIG 3

FIG 4

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MAT FOR FREE EXERCISE AND THE LIKE

BACKGROUND OF THE INVENTION

Large mats currently used for free exercise, wrestling, judo and the like are large, heavy and unwieldy. Typically, a free exercise mat has overall dimensions of about 42 × 42 feet, a judo mat about 26 × 26 feet, or greater, and a wrestling mat about 24 × 24 feet or more. In the cases where such mats are made up as a single overall unit from hair felt or goat's hair, they are, insofar as facilities available in most gyms are concerned, almost immovable owing to their great size and weight, although with sufficient time and effort they can be rolled up to some extent. When the mats are made up from numbers of separate mats or sections of shock absorbing material, tied, taped, or otherwise fastened together, often they must also be covered with an overall sheet to prevent as far as possible crevices in the top surface which can interfere with or injure a performer. The cover must then be stretched over the mat and itself taped or otherwise secured to the mat or the floor. Obviously, therefore, these mats are also difficult or impossible to move or to fold without first completely disassembling them, a laborious and time-consuming procedure, because of their bulk and weight. This is true even when blocks of lightweight, shock absorbing materials, such as polyethylene foam encased in covers of nylon fabric, are used. Since the foam blocks cannot be individually rolled or folded and since, despite the lightweight materials, a free exercise mat of this construction can weigh as much as 1,000 pounds, the mat must invariably be disassembled before it can be moved or stored.

As gymnastics and the like have developed in recent times, especially the United States, it has become more and more desirable, even necessary, to be able quickly and easily to move and store large mats of the types concerned in order to clear the floor area. This is because the gym floor is typically used for many events other than gymnastics so that the gymnastic equipment including the mats must be easily mobile. For instance, if during intermission time of a basketball game a gymnastic exhibition is to be given, the equipment including mats obviously must be able to be moved quickly on and off the floor. Even during a wholly gymnastic contest, floor space is often at a premium. The parallel bars, for example, must be easily movable to make way for the mats for tumbling, or free exercise, and those in turn quickly removable to make way for the ring stand, balance beam, etc. Modern parallel bars, balance beams, trampolines and the like have been redesigned to afford easy mobility for these purposes. But plainly for the reasons explained above, the typical free exercise mat or the like is simply incapable of such mobility with the result that it must be left in place, thus crowding the floor, or not used at all and the events requiring it omitted.

Accordingly, the primary object of the present invention is to provide a large mat of the types concerned, having an integral cover with a relatively unbroken top surface, which can be readily moved, shipped or stored with a minimum of time and effort.

SUMMARY OF THE INVENTION

The foregoing object is achieved essentially by forming an overall top sheet for the mat from several lengths of fabric sewn together side-by-side, the rows of stitching providing a set of spaced mat "assembly axes" parallel to the sides of the mat and extending its full length. Beneath the lengths of fabric forming the top sheet additional strips of fabric, also extending lengthwise of the mat, are sewn to the top sheet across the width of the mat at right angles to the assembly axes to provide rows of rectangular pockets or sleeves of uniform thickness, the rows of stitching forming the sleeves also providing a set of spaced mat "roll-fold" axes parallel to the ends of the mat and extending its full width. The sleeves of each row are thereby disposed side-by-side the length of the mat and adjacent rows are separated by the assembly axes, the abutting ends of adjacent sleeves being left open. Each sleeve contains one or more rectangular blocks of polyethylene foam and means are provided to retain the blocks in their sleeves. The result is a large mat having an integral cover providing a relatively unbroken top surface and composed in effect of a large number of individual, abutting mat sections permanently joined together only by the overall top sheet which itself constitutes a part of the cover.

The "roll-fold" axes serve to permit the mat to be folded up without need first to disassemble it. This is accomplished by spacing the stitching forming the sleeves so that the two ends of the mat can literally be "roll-folded" inwardly toward each other to provide two narrow stacks of mat sections on the floor extending the full width of the mat, but joined at their bottoms by a row of intermediate sections, in which some of the sections of each stack lie face-to-face one above the other while the remaining sections of the stack are disposed vertically along its two long edges. Then one stack is lifted up and folded over on top of the other to form a single narrow stack, the intermediate sections also then assuming a vertical position along one of the two long edges of the stack. Roll-folding is achieved by making the lengths of the mat sections functions of the length of the outermost sections along the ends of the mat and the thickness of the latter. Mathematical relationships have been developed to calculate the lengths of the sections necessary to achieve roll-folding in the foregoing manner and these are later set forth herein, as well as being found in U.S. Pat. No. 3,636,576 to Nissen in connection with more general applications of the roll-fold principle to other forms of gymnastic mats, and in U.S. Pat. No. 3,624,848, also to Nissen, in connection with smaller mats which are releasably connectable to form large mats.

Accordingly, the mat of the present invention can quickly and easily be folded up into a long narrow stack in the midst of the floor and then pushed or dragged to one side, all without need of any disassembly of the mat whatever and without the folded mat appreciably intruding upon the floor space or hindering other activities. By the same token, the mat can just as easily and quickly be returned to the middle of the floor and unfolded ready for use without any need to reassemble it. In order to assist movement of the roll-folded mat across the floor, beneath it is placed a rectangular sheet of material, called a "skid," having a friction reducing undersurface. The skid is large enough so that when the mat is folded, the skid can act as a sort of "sling" for dragging the folded mat in directions along its long axis, or one end or the other of the skid along the long edges of the folded mat can be folded over the latter to envelope it, whereby the folded mat can be dragged back and forth in directions transversely of its long axis.

The "assembly" axes of the mat serve for assembling the mat in place after shipping or for thereafter disassembling it for more permanent storage or other transport. In the latter event, one of the two outermost rows of sections along the sides of the mat is folded over onto the adjacent row about the assembly axis therebetween. The foam blocks of that outer row are removed through the ends of its sleeves. The cover is then pulled further to fold the next row over atop its neighbor and its foam blocks are removed. The process is repeated until all the blocks have been removed, at which time the empty cover will be spread out upside down on the floor. The reverse of the foregoing process is used to assemble the mat. When the mat is disassembled, the limp, empty cover can simply be folded or rolled up and shipped or stored in a suitable container, the foam blocks being placed in other containers for the same purposes. Accordingly, the mat of the present invention can be readily assembled or disassembled by unskilled persons without the more laborious and exacting procedures required for typical free exercise mats and the like currently in use. No ties or tapes are required; no separate cover is needed; no stretching or fastening of the cover to the floor is necessary.

Where roll-folding is unnecessary, as is the case in more permanent installations, the mat can be constructed with the

assembly axes only, each row formed by the assembly axes being divided into sections of convenient lengths. Such a mat brings out yet another feature of the present invention, namely, that the cover itself can be tailor made to fit the area concerned and then shipped separately from the foam blocks and the two thereafter assembled on the spot. This is something that is not feasible with large mats made up of separate sections removably joined or fitted together because it is difficult or impossible to tailor them in advance to the particular area. Though the sections can be assembled and the overall size of the mat checked prior to shipment, it must then be disassembled, shipped and reassembled at its permanent location. At that time, the mat must also often be refitted to the area owing to unavoidable variations in overall size stemming from the tedious disassembly and reassembly of the individual sections, the first at the factory and the second on location. In the case of the present invention, however, the integral pre-fashioned cover exactly predetermines the final size of the mat so that it need not be assembled prior to shipment to check its dimensions. When it is thereafter assembled on location the integral cover and the assembly axes make the assembly process much quicker and easier and insure a proper fit. Hence, the present invention, with or without roll-folding, also greatly simplifies the problems of fit and shipment of large mats.

Other and further features and advantages of the mats of the present invention will become apparent from the more detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an upper perspective view of a free exercise mat according to the present invention together with the "skid" in position therebeneath.

FIG. 1A is a sectional view taken along the line 1A–1A of FIG. 1 illustrating the manner in which the overall top sheet of the cover and the retaining means for the shock absorbing material are formed and disposed when the mat is in use.

FIG. 1B is a sectional view taken along the line 1B–1B of FIG. 1 illustrating the manner in which the pockets or sleeves for the shock absorbing material are formed and disposed when the mat is in use.

FIG. 1C is a partial perspective view taken along the line 1C–1C of FIG. 1, but with the mat folded along one of the "assembly axes," in order further to illustrate how the retaining means for the shock absorbing materials are formed and function.

FIG. 2 is a partial upper perspective view illustrating the manner in which the mat is manipulated to remove or insert the shock absorbing material.

FIG. 3 is an upper perspective view illustrating the mat of FIG. 1 partially "roll-folded" on the skid.

FIG. 4 is a partial perspective view like FIG. 3 but illustrating the mat fully "roll-folded" with the skid in position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The particular free exercise mat M shown in FIG. 1 is composed of 10 rows, R1–10, of mat sections S of equal width W between the fifth and sixth rows of which is an extra row R*x* of mat sections S having the width W*x*. Each row R1–10 and R*x* in turn is composed of two sets of mat sections S*a* and S*b*, each consisting of 10 mat sections S*a*1–S*a*10 and S*b*1–S*b*10, respectively, with an intermediate section S*c* therebetween. All of the sections S are of equal thickness T, while the lengths of sections S*a*1 and S*b*1 are denoted by L*a* and L*b*, respectively. The lengths of the remaining sections S*a*2–S*a*10 and S*b*2–S*b*10 and the length L*c* of sections S*c* are functions of the lengths L*a* and L*b* and the thickness T, all as hereinafter described.

Each of the rows R1–10 and R*x* comprises a strip 10 of suitable fabric, such as vinyl impregnated nylon cloth, extending the full length of the mat M. The adjacent strips 10 are sewn together lengthwise as indicated at 11 in FIG. 1A, the rows of stitching 11 forming a set of parallel mat "assembly axes" Ax running the full length of the mat M and a pair of flaps 12 extending face-to-face downwardly a distance substantially equal to the thickness T, the distance between adjacent axes A*x* being equal to W or W*x*, as the case may be. The strips 10 as so connected thus form an overall cover top sheet 13 having a substantially unbroken surface, free of crevices. Beneath and along the length of each strip 10 is sewn, as indicated at 14 in FIG. 1B, a succession of strips 15 of like material to form a succession of depending rectangular pockets or sleeves 16 of a height equal to the thickness T, the sleeves 16 having the width W or W*x*, as the case may be, and lengths respectively equal to those of sections S*a*1–S*a*10, S*c* and S*b*1–S*b*10. The rows of stitching 14 of the strips 15 to the cover sheet 13 run transversely thereacross the full width of the mat M at right angles to the axes A*x* and form a set of parallel "roll-fold axes" F*x* whose spacing is also equal to the respective lengths of the sections S*a*1–S*a*10, S*c* and S*b*1–S*b*10. The abutting ends of the sleeves 16 along the assembly axes A*x* are left open while the ends thereof forming the side margins of the mat M are closed by extending the strips 15 concerned up at 17 and stitching them at 18 to the side margins of the top sheet 13 in the manner indicated in FIG. 1A. The ends of the strips 15 forming the end margins of the mat M are also stitched at 19 to the end margins of the top sheet 13 in the same manner as indicated in FIG. 1B. Accordingly, the strips 10 and 15 together form an integral, one piece mat cover C.

In each of the sleeves 16 are disposed one or more rectangular blocks 20 of polyethylene foam to fill substantially the whole of their respective interiors and thus together with the cover C form the individual mat sections S, all of which are in effect connected together only by the rows of stitching 11 and 14 across the top sheet 13 forming the two sets of axes A*x* and F*x*. The open ends of the sleeves 16 beneath each row of stitching 11 are closed by the flaps 12 which are notched at 21 on each side of the rows of stitching 14 to provide individual flaps 12*a*, all as shown in FIG. 1C, for each sleeve 16 and to permit folding of the mat about the axes F*x*. In order to retain the foam blocks 20 in their sleeves 16, as well as to retain the stitching 11 and flaps 12*a* down between the blocks 20 and prevent billowing of the top sheet 13 and sleeves 16 when the mat is folded, the flaps 12*a* are secured in place over the ends of the blocks 20 by Velcro fasteners 22 sewn to the bottom panels of the sleeves 16 and the flaps 12*a* as shown in FIGS. 1A and 1C.

The foam blocks 20 are inserted and removed by a procedure partly illustrated in FIGS. 1 and 2. Removal is accomplished by folding the row R10 about its adjacent axis A*x* over onto the row R9 as indicated by the arrows in the upper corners of FIG. 1. Then upon releasing the Velcro fasteners 22, the foam blocks 20 can be removed from their respective sleeves 16 of both rows R10 and R9. The then empty portion of the cover C is pulled further toward the opposite side of the mat to fold row R8 over onto row R7 and the blocks 20 removed from row R8. The process is repeated until all the blocks 20 are removed in which event the limp cover C will lie upside down on the floor ready to be folded or rolled up for storage or transport. To insert the foam blocks 20 in the empty cover C, it is first spread out upside down on the floor and row R10 folded under row R9 so that row R10 is in its right side up position. Then the foam blocks 20 of both rows R10 and R9 are inserted in their respective sleeves 16 and the fasteners 22 secured. The limp portion of the cover C is pulled further until rows R10 and R9 are both right side up on the floor, whence the open ends of the sleeves 16 of row R8 will be exposed atop the row R9 so that its foam blocks 20 can be inserted. In like manner, the process is continued until all the foam blocks 20 have been inserted, at which time the mat M will lie right side up on the floor. As will be apparent, in either case one could start with row R1 instead of row R10. FIG. 2 illustrates an intermediate position in the removal or insertion operation for the foam blocks 20 depending upon whether the cover C is being pulled in direction A or folded in direction B, respectively, indicated by the arrows in that Figure. In either case, the procedure is simple and relatively quite quick, inasmuch as the cover C need not be dismantled at any time.

In order to obtain "roll-folding" of the mat M, the lengths of the individual mat sections Sa, Sb and Sc, which are defined by the spacing between the rows of stitching **14** forming the roll-fold axes Fx, are determined by the following relations involving the lengths La and Lb of the sections Sa and Sb and the thickness T: the lengths of sections Sa**1**, Sa**2**, Sa**4**, Sa**6**, Sa**8** and Sa**10** are made equal to La, La, La, La T, +T, La + 2T and La + 3T, respectively, and similarly the lengths of sections Sb**1**, Sb**2**, Sb**4**, Sb**6**, Sb**8** and Sb**10** equal to Lb, Lb, Lb, Lb + T, Lb + 2T and Lb + 3T, respectively. The lengths of the remaining sections Sa**3**, Sa**5**, Sa**7** and Sa**9**, and Sb**3**, Sb**5**, Sb**7** and Sb**9**, on the other hand, are made equal to T, 2T, 3T and 4T, respectively in each case, the length of sections Sc being simply 10T. The result is that each set of sections Sa and Sb can be roll-folded inwardly toward each other, beginning with the sections Sa**1** and Sb**1** as indicated by the arrows in the lower corners of FIG. **1**, to form two long, narrow stacks on the floor in which the sections Sa and Sb are disposed as shown in FIG. **3**. Note that the sections Sa**1**, Sa**2**, Sa**4**, Sa**6**, Sa**8** and Sa**10** lie face-to-face one above the other on the floor while the sections Sa**3**, Sa**5**, Sa**7** and Sa**9** sit vertically along the ends of the former, the sections Sa**9** lying outside of and face-to-face against the sections Sa**5** at one end and the sections Sa**7** lying outside of and face-to-face against the sections Sa**3** at the other end. The respective sections Sb are disposed similarly, while the sections Sc remain on the floor joining the two stacks. Finally, the stack of sections Sa is lifted up and folded over on top of the stack of sections Sb, as shown in FIG. **4**, to form a single, long narrow stack in which the sections Sc also sit vertically outside of and face-to-face against the sections Sa**7** and Sb**7**.

The foregoing relationships between the sections Sa, Sb and Sc can be generalized and expressed in a form from which the lengths of any number of sections Sa**1**–Sam and Sb**1**–Sbn, each having a thickness T, can be readily calculated. First it will be noted from the foregoing that the lengths of the sections Sa**2** and Sa**4** are also equal to the length of sections Sa**1**, that is, La, while the lengths of the remaining even numbered sections Sa**6**, Sa**8** and Sa**10** are equal to the length La plus progressively increasing multiples of the thickness T. The lengths of sections Sa**3**, Sa**5**, Sa**7** and Sa**9**, however, are equal to progressively increasing multiples of the thickness T only. Likewise, it will be noted that the total number of sections Sa is always even and greater than **3**. The same is also true of the sections Sb, and it will also be observed from FIG. **4** that the length Lc of the sections Sc is equal to the combined thickness of those of sections Sa and Sb stacked face-to-face on the floor, less two. The following general relations can then be derived: the lengths of the last sections Sam and Sbn are always La + ½(m −4)T and Lb + ½(n−4)T, respectively, the lengths of the sections Sa(m−2) and Sb(n−2) are always La + ½(m−6)T and Lb + ½(n−6)T, respectively, and the lengths of the sections Sa(m−a1) and Sb(n−1) are always ½(m−2)T and ½(n−2)T, respectively, while the number of sections Sa and Sb stacked on the floor in FIG. **3** is always ½(m + 2) and ½(n + 2), respectively, where m and n are each even integers greater than 3. Hence, the lengths of sections Sa **1**, Sa**2**, Sa**3**, Sa**4**, Sa**5**, Sa**6** . . . Sa(m−2), Sa(m−1), Sam are La, La, T, La, 2T, La + T . . . La + ½(m−6)T, ½(m−2)T, La + ½(m−4)T, and likewise the lengths of sections Sb**1**, Sb**2**, Sb**3**, Sb**4**, Sb**5**, Sb**6** . . . Sb(m−2), Sb(n−1), Sbn are Lb, Lb, T, Lb, 2T, Lb + T . . . Lb + ½(n−6)T, ½(n−2)T, Lb + ½(n−4)T, respectively, while the length Lc of the section Sc is equal to ½(m + 2) + ½(n +2) − 2, that is, the number of sections Sa and Sb stacked on the floor less two, multiplied by the thickness T, or simply ½(m + n)T.

The foregoing general relations, it will be clear, prevail when the number of sections Sa differs from that of the sections Sb, the length of the sections Sa differs from that of the sections Sb, and/or the widths of the respective rows **R1–10** also differ. Obviously, however, for reasons of standardization and economy in manufacture, it is desirable to have as much uniformity among the sections Sa and Sb as possible. Hence, preferably, the number of sections Sa is made equal to the number of sections Sb, the length La of sections Sa**1** is made equal to the length Lb of sections Sb**1**, and the width W of all the rows **R1–10** is also equal. Indeed this is the form in which the mat M is illustrated in the drawings. In that case, of course, all the corresponding sections Sa**1** and Sb**1**, Sa**2** and Sb**2**, S a**3** and Sb**3** and so forth also have equal lengths, and since m equals n, the length of the sections Sc is simply nT.

Examples of specific sizes of sections Sa, Sb and Sc will now be given for a free exercise mat having overall dimensions of 42 × 42 feet and for a judo mat having overall dimensions of 26 × 26 feet. In the case of the former, if the width W of the sections Sa and Sb in each row **R1–10** is 4 feet, a width of 40 feet will result. If the lengths La and Lb of the sections Sa and Sb are each 3 feet and the thickness T is 1½ inches then, according to the foregoing relationships, the respective lengths of the remaining sections Sa, Sb and Sc will be: Sa**2** and Sb**2**, 3 feet; Sa**3** and Sb**3**, 1½ inches; Sa**4** and Sb**4**, 3 feet; Sa**5** and Sb**5**, 3 inches; Sa**6** and Sb**6**, 3 feet 1½ inches; Sa**7** and Sb**7**, 4½ inches; Sa **8** and Sb**8**, 3 feet 3 inches; Sa**9** and Sb**9**, 6 inches; Sa**10** and Sb**10**, 3 feet 4½ inches; and Sc, 15 inches, for a theoretical overall total length of 41 feet 3 inches which will actually turn out to be very closely 42 feet owing to the manner in which the adjacent mat sections of each row **R1–10** are fashioned and behave in practice. To bring the overall width of the mat up to **42** feet an additional row Rx of sections Sa, Sb and Sc, whose width Wx is 2 feet, is interposed between rows **R5** and **R6**, as shown in FIG. **1**. In the case of the judo mat, it can be formed from six of sections Sb of the same dimensions as sections Sa**1**–Sa**6** and Sb**1**–Sb**6** of the free exercise mat and sections Sc having a length of 9 inches (6 times 1½ inches). These provide a theoretical overall mat length of 25 feet 9 inches, or actually very closely 26 feet for the reason explained above. Using rows **R1–6** of such sections, each also 4 feet wide, gives a width of 24 feet to which is also added a row Rx of sections 2 feet wide interposed between rows **R3** and **R4** to provide an overall width of 26 feet. Other combinations of standardized sections Sa and Sb will in like manner produce other sized mats, all from a basic minimum of different size mat sections.

In the case of smaller mats, it may prove feasible to employ only one set of roll-folding sections Sa, omitting the sections Sb and Sc. This, in turn, depends upon several considerations. First, would an uneconomical number of sections Sa of varying lengths be thereby required, inasmuch as obviously the longer a mat of sections Sa only, the larger the number of sections of unequal length to be manufactured. Second, too many sections Sa only will make the latter stages of roll-folding burdensome owing to the weight of the number of sections which must be lifted to perform the roll-folding operation. Finally, a large number of sections Sa only increases the time required for roll-folding since the latter can be performed from one end only, instead of from both ends at the same time. Of course, if as previously mentioned the roll-folding feature is omitted in cases where the mat installation is more permanent, all the sections S can be made of convenient, equal lengths.

After the mat M has been folded as illustrated in FIG. **4**, it is ready to be moved aside by the skid **30**. As shown in FIGS. **1**, **3** and **4**, this consists of a rectangular sheet of fabric **31** spread out beneath the mat M and extending beyond its side margins. The skid **30** is centrally disposed with respect to the sections Sc and its ends extend far enough toward the ends of the mat M so that when the latter is folded as shown in FIG. **4**, the left hand portion of the sheet **31** can be folded over the stacked mat and joined to the right hand portion, as indicated by the arrow in FIG. **4**, or, if instead the sections Sb are folded over onto the sections Sa, the right hand portion of the sheet **31** can be folded over the stacked mat and joined to the left hand portion. The folded mat can thus be dragged away to the right or left with respect to FIG. **3**, depending upon which stack of sections in that figure is folded over onto the other, by persons along one or the other of the long edges of the folded mat. In order to assist the dragging operation the margins of the sheet **31** are fitted with several complementary hand loops **32**.

In the case of the skid **30** shown in the drawings its material is also nylon fabric impregnated with vinyl on the top surface only, leaving the relatively slippery nylon undersurface against the floor which both aids the dragging operation as well as protects the bottom surface of the mat itself from wear against the floor. This is particularly helpful since the total weight of such a mat can be as much as 800 to 1,000 lbs., the cover C alone weighing about 500 lbs. and the foam blocks **20** accounting for the remainder. Note also that the skid **30** always remains with the mat M and when folded as aforesaid acts as a protective cover as well. By leaving the cover unfolded, as shown in FIG. **4**, persons along both long edges of the skid **30** can also drag the folded mat in either direction along its long axis, the skid **30** acting as a kind of "sling" in this case. When being dragged in the latter instance, the folded mat can also be bent back and forth so that it can be "snaked" through relatively narrow doorways and around other obstacles, all of which adds to the facility with which the mat can be handled. Of course, a skid **30** can also be employed with a mat which roll-folds from one end only, instead of both ends, as explained above.

Though the invention has been described in terms of particular embodiments, being the best mode known of carrying out the invention, it is not limited to those embodiments alone. Instead, the following claims are to be read as encompassing all adaptations and modifications of the invention falling within its spirit and scope.

I claim:

1. A mat for free exercise or the like comprising an cover having a top and bottom of flexible sheet material, said top providing a substantially unbroken mat top surface and said bottom including a plurality of adjacent strips of said material in substantially abutting side-by-side relation extending lengthwise of said mat to each of two end edges thereof, said strips being secured transversely thereacross to said top to provide a plurality of open-ended sleeves of substantially uniform thickness and a first set of mat fold axes disposed between adjacent ones of said strips, each of said first set of axes extending substantially the full length of said mat between said end edges, and shock absorbing material disposed in said sleeves, said material being insertable into or removable from said sleeves through said open ends thereof upon folding of said mat about successive ones of said first set of fold axes.

2. The mat of claim **1** wherein said top also comprises strips of said material disposed between said end edges in abutting side-by-side relation above and parallel to respective ones of said bottom strips, adjacent ones of said top strips being secured to each other to form said first set of fold axes.

3. The mat of claim **2** wherein adjacent ones of said top strips include a pair of flaps formed from said top strips, said flaps being disposed in generally face-to-face relation below said first set of fold axes and closing said sleeve open ends.

4. The mat of claim **3** including means releasably connecting said flaps and said bottom strips.

5. The mat of claim **3** wherein said shock absorbing material in each of said sleeves constitutes one or more integral blocks of said material.

6. The mat of claim **1** wherein said strips when secured to said top as aforesaid provide a second set of mat fold axes parallel to each other between adjacent ones of said sleeves, said second set of axes extending to each of two side edges of said mat transversely of said first set of axes to divide said mat into a plurality of discrete mat sections of substantially equal thickness formed by said sleeves and shock absorbing material and disposed in adjacent rows formed by said first set of fold axes, the respective lengths of said mat sections being defined by respective ones of said second set of fold axes, each of said rows comprising at least one set, *Sa*, of said mat sections extending lengthwise of said mat from one of said end edges, said set *Sa* comprising m successive mat sections **Sa1** . . . *Sam* inwardly from said mat end edge in which **Sa3**, **Sa5**, **Sa7** . . . *Sa*(*m*−*a*1) have lengths respectively substantially equal to T, 2T, 3T . . . ½(*m*−2)T and the remainder **Sa1**, **Sa2**, **Sa4**, **Sa6** . . . *Sa*(*m*−*a*2), Sam have lengths respectively substantially equal to *La*, *La*, *La*, *La*+T . . . *La*+½(*m*−6)T, *La*+½(*m*−4)T, where *La* is substantially the length of *Sa*, T is substantially the thickness of said sections, and *m* is an even integer greater than 3.

7. The mat of claim **6** wherein each of said rows includes a second set, *Sb*, of said mat sections extending lengthwise of said mat from the other of said end edges, said sets *Sa* and *Sb* extending inwardly toward each other from said end edges and having an inter section *Sc* therebetween, said set *Sb* comprising *n* successive mat sections **Sb1** . . . Sbn inwardly from said other end edge in which **Sb3**, **Sb5**, **Sb7** . . . Sb(*n*−1) have lengths respectively substantially equal to T, 2T, 3T . . . ½(*n*−2)T and the remainder of **Sb1**, **Sb2**, **Sb4**, **Sb6** . . . Sb(*n*−2), *Sbn* have lengths respectively substantially equal to *Lb*, *Lb*, *Lb*, *Lb* + T . . . L *b* + ½(*n*−6)T, *Lb* + ½(*n*−4)T, and *Sc* has a length substantially equal to ½(*m* + *n*)T, where *Lb* is substantially the length of *Sb*, and *n* is an even integer greater than 3.

8. The mat of claim **7** in which *m* equals *n*.

9. The mat of claim **7** in which *La* equals *Lb*.

10. The mat of claim **9** in which *m* equals *n*.

11. The mat of claim **9** in which *m* and *n* each equals **10**.

12. The mat of claim **9** in which *m* and *n* each equals **6**.

13. The mat of claim **7** wherein said shock absorbing material in each of said sleeves constitutes one or more integral blocks of said material each having a thickness substantially equal to T.

14. The mat of claim **13** including releasable means retaining said blocks in said sleeves, said means being disposed at said sleeve open ends and connecting said bottom strips to said top.

15. The mat of claim **6** on a floor in its fully folded condition about said second set of fold axes in which all of said sections **Sa1**, **Sa2**, **Sa4**, **Sa6** . . . Sa(*m*−2), Sam are disposed one above the other in face-to-face stacked relation substantially parallel to the floor with said sections **Sa3**, **Sa5**, **Sa7** . . . Sa(*m*−1) disposed generally vertically at the ends thereof, in combination with a drag sheet of flexible material disposed between said folded mat and the floor and having a friction reducing undersurface, the width of said sheet extending widthwise of said mat and having a length sufficient to permit one end thereof to be folded over said folded mat and joined to the other end of said sheet to envelope said folded mat, and manual pull means along said sheet.

16. The mat of claim **7** on a floor in its fully folded condition about said second set of fold axes in which all of said sections **Sa1**, **Sa2**, **Sa4**, **Sa6** . . . Sa(*m*−2), *Sam* and **Sb1**, **Sb2**, **Sb4**, **Sb6** . . . Sb(*n*−2), *Sbn* are disposed one above the other in face-to-face stacked relation substantially parallel to the floor with said sections **Sa3**, **Sa5**, **Sa7** . . . Sa(*m*−1), **Sb3**, **Sb5**, **Sb7** . . . Sb(*n*−*a*1) and *Sc* disposed generally vertically at the ends thereof, in combination with a drag sheet of flexible material disposed between said folded mat and the floor and having a friction reducing undersurface, said sheet extending widthwise of said mat and having a length sufficient to permit one end thereof to be folded over said folded mat and joined to the other end of said sheet to envelope said folded mat, and manual pull means along said sheet.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,670,346 Dated June 20, 1972

Inventor(s) George P. Nissen

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 7, should read --and Sa10 are made equal to La, La, La, La + T, La + 2T--; line 54, "Sa(m-a1)" should read --Sa(m-1)--; line 61, "Sb(m-" should read --Sb(n- --.

Column 8, line 7, "Sa(m-a1)"should read --Sa(m-1)--; line 9, "Sa(m-a2)" should read --Sa(m-2)--; line 59, "Sb(n-a1)" should read --Sb(n-1)--.

Signed and sealed this 19th day of September 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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