The present invention pertains to a novel spring unit construction of the Marshall type for use in mattresses, cushion seats and the like. In the usual Marshall construction, each row of coil springs is contained in a sack consisting of a folded or doubled sheet of muslin stitched transversely to provide individual pockets for the springs and also stitched lengthwise at the open longitudinal edge. The top and bottom coils are finally strung together lengthwise and transversely of the unit to hold adjacent sacks together and to prevent undue separation of the coils.

The formation of the pockets by stitching presents certain objections from the standpoint of both manufacture and use. Among the manufacturing difficulties may be mentioned the pulling of the thread in sewing and the care and expense required for the maintenance of sewing machines. In use, it is well known that the life of the stitched seams is not long. In fact many of them give way during the fabrication of the spring structure. The most common cause of breakdown in use is the severing of the thread by friction with adjacent coils, whereupon the thread ravels, opening communication between the adjacent pockets and permitting the adjacent springs to tangle and clash.

The object of the present invention is to overcome these difficulties and is accomplished essentially by replacing the stitched seams with adhesive seams. The adhesive is preferably applied in the form of a latex solution and is pressed into the folded muslin from outside by means of pressure rolls in a suitable apparatus. This is merely a preferred method, and it will be understood that other means may be employed to form the seams. It will be shown in the detailed description how the adhesive seam overcomes the numerous difficulties mentioned above.

Another object of the invention is to simplify and improve upon the string tying of the coils. The usual strings running in two directions are replaced by parallel strips running in only one direction and secured by similar adhesive. It will be shown that, according to the invention, tying members in the other direction are not necessary.

The invention is fully disclosed by way of example in the following description and in the accompanying drawing in which:

Figure 1 is a schematic side elevation of the apparatus for forming the seams;

Figure 2 is a plan view of the upper pressure roller;

Figure 3 is an elevation of one of the sacks with the springs inserted therein;

Figure 4 is a fragmentary plan view of the assembled unit, and

Figure 5 is the section on the line 5—5 of Figure 4.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

In Figures 1 and 2 is shown, more or less schematically, a machine by which the adhesive is applied to the fabric. The machine includes a pair of sprocket wheels over which are trained two chains in parallel relation. The chains carry outwardly extending pins for a purpose that will presently appear. One of the wheels is driven from a motor and speed reducer through a chain or other drive.

At a suitable intermediate point along the chains are spaced upper pressure disks engaged by lower pressure disks carried on shafts. The disks are preferably knurled and adjustable on their respective shafts, for varying the distance between seams. The bottoms of the lower disks are received in a pan containing the fluid adhesive which is preferably a milky solution of latex of proper concentration and consistency. A steel spreader roll engages the upper disks and in turn is engaged by a steel supply roll which also dips in a pan containing adhesive. The several rolls and disks turn as if geared together, as indicated by the arrows. The chains are also adjustable along the shafts for various widths of fabric carried thereby.

The distance between the chains is slightly less than the length of the folded fabric sheet which is to be seamed transversely to provide individual pockets for a row of coil springs. The folded sheet is retained at its ends by pins and is carried by the chains between the pressure disks in the direction of their rotation. Each pair of contacting disks forms an adhesive seam about ⅛ inch wide by pressing the material into the fabric from the outside or, in other words, applying the adhesive initially under pressure and simultaneously forming the seams. From the discharge end of the chains the sacks are delivered to the next operation either manually or mechanically, or to a drying apparatus, although the timing of the chains and the concentration of the adhesive may be so determined that the adhesive dries in the air in the time it
travels from the pressure rollers to the next operation. One of the shafts, preferably the upper one, is mounted in an adjustable bearing 14, as shown in Figure 1, so that the pressure between contacting disks 6 and 7 may be accurately adjusted.

The sack at this stage of the operation is illustrated in Figure 3. The fabric 13 is divided by the seams 15 into pockets 16. The coils springs 17 are inserted flatwise in compressed condition as well known in the art, and the open edge of the sack is then closed by a longitudinal adhesive seam 18 formed in a suitable apparatus similar to that discussed in 20. In cases where the sack is made of two separate sheets, a longitudinal seam is of course required along each edge.

After the seam 18 has been completed, the enclosed springs 17 are turned around to their normal or upright position wherein their axes lie parallel to the transverse seams 15. The pockets assume a cylindrical form with the springs fitting rather snugly therein. Each sack 13 contains a row of springs, and a number of such rows are assembled in lateral juxtaposition in the usual manner as illustrated in Figure 4. For convenience, the seams 18 may be regarded as being top seams.

Ordinarily the end coils of the springs are tied together at the points of tangency by strings running lengthwise and crosswise of the assembled unit. This is an expensive operation and is considerably simplified by the present invention.

The seams 18 are first tacked in at the transverse seams 15 between adjacent springs, as indicated by the numeral 20. Fabric binding strips 21 are laid across the top and bottom of the unit at the ends of the seams 15 in parallel relation to each other so as to fasten the adjacent sacks together. At the top of the unit they overlie the tucks 23. The strips are of such width as to extend to the area of overlap of coils in adjacent rows or sacks, as shown in Figure 4. For example, a 1½ inch strip is sufficient for a 2½ inch top coil.

The strips are secured to the fabric by adhesive similar to that previously described and by a suitable apparatus.

In addition to uniting adjacent rows or coils, another purpose of the ties is to reduce the intermeshing of adjacent pocketed springs. This action is more likely to occur at the transverse seams 15, where the fabric is somewhat slackier than between springs of adjacent rows. In the present case, however, the excess slack is taken up by tucking in the material at 20 as previously mentioned, and the set of strips 21 running in only one direction is consequently sufficient since they join the adjacent sacks and hold the tucks in.

The structural advantages of the invention result from the fact that the adhesive seams reinforce the fabric, while the usual stitched seam is definitely a point of weakness because of the breaking and ravelling of the thread in use. Since the adhesive seam has an appreciable width and body, it serves as a cushion between adjacent springs. If it should be subjected to excessive wear at one side because of a tight spring, it does not necessarily break through and bring the two adjacent pockets into communication with each other, as would be the case with a thread stitch. Another factor contributing to greater endurance is that an adhesive seam, especially if made with latex, is considerably more resilient than a thread seam and correspondingly less likely to break under lateral pressure by the coils. The cushioning effect of the adhesive seam also reduces the noise in the compression and expansion of the unit.

Finally, there are no cramped or tight seams and likewise no loose or irregular seams as in the case of stitched seams. In fact the invention eliminates all the difficulties due to stitched seams and to sewing machine maintenance.

What I claim is:

1. For a Marshall spring unit, two superimposed plies of fabric united along certain edges to form an open sack, transverse adhesive seams of a rubbery material uniting the plies at intervals and forming pockets, and coil springs adapted to receive coil springs, said seams forming reinforcing buffers and sound insulators between springs subsequently to be inserted in said pockets.

2. In a Marshall spring unit, two superimposed plies of fabric united along the edges to form a sack, transverse adhesive seams of a rubbery material uniting the plies at intervals and forming pockets, and coil springs fitted respectively in said pockets, said seams forming reinforcing buffers and sound insulators between adjacent springs.

3. In a Marshall spring unit, a plurality of juxtaposed spring assemblies, each assembly comprising a fabric sheet folded to form a two-ply sack, adhesive seams transverse of the fold and uniting the plies at intervals, a sack, transverse adhesive seams of a rubbery material uniting the plies at intervals and forming pockets, and coil springs fitted respectively in said pockets, and a longitudinal adhesive seam along the free edges parallel to the fold, and fabric strips traversing and adhesively secured to said assemblies at the ends of said transverse seams, the longitudinal seam being tacked inward between adjacent springs to tighten the fabric at the transverse seams.

4. In a Marshall spring unit, a plurality of juxtaposed spring assemblies, each assembly comprising two superimposed plies of fabric united along the edges to form a sack, transverse adhesive seams of a rubbery material uniting the plies at intervals and forming pockets, coil springs fitted respectively in said pockets, said seams forming reinforcing buffers and sound insulators between adjacent springs, and means interconnecting said assemblies.

5. In a Marshall spring unit, a plurality of juxtaposed spring assemblies, each assembly comprising two superimposed plies of fabric united along the edges to form a sack, transverse adhesive seams of a rubbery material uniting the plies at intervals and forming pockets, coil springs fitted respectively in said pockets, said seams forming reinforcing buffers and sound insulators between adjacent springs, and fabric strips traversing and secured to said assemblies to unite the same into a unit.

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