March 24, 1925. 1,530,674

B. B. JACKSON

FILTER CLOTH

Filed May 16, 1923

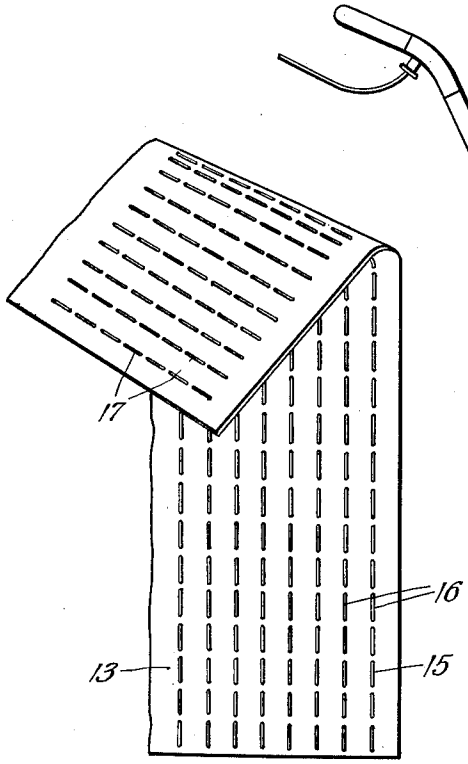


Fig. 2

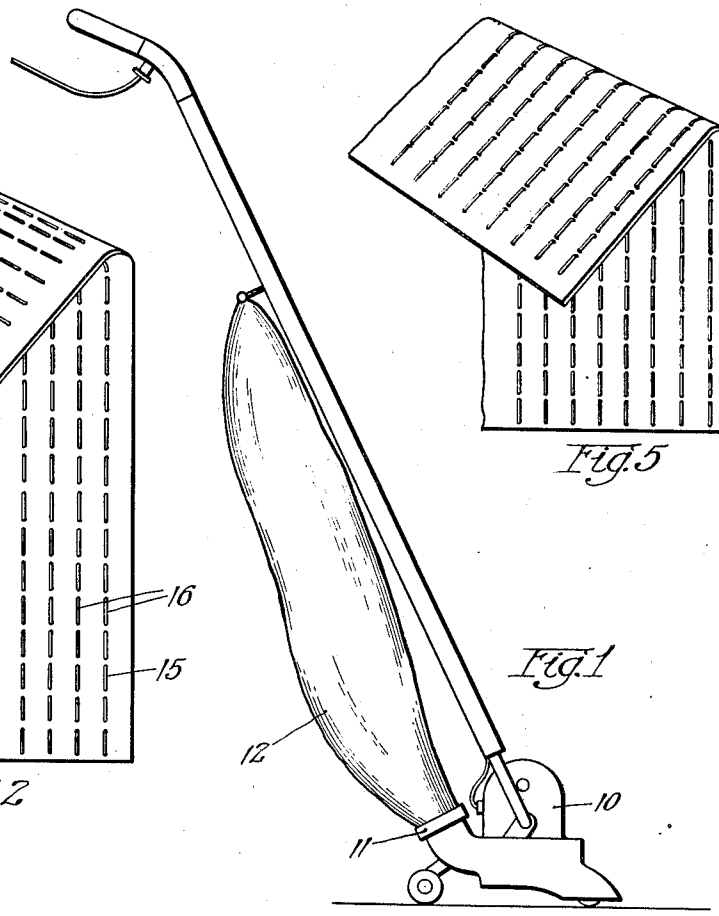


Fig. 1

Fig. 5

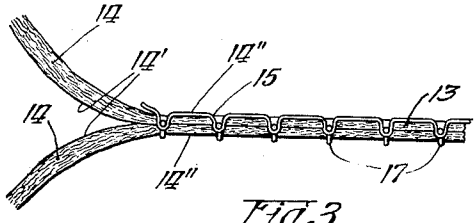


Fig. 3

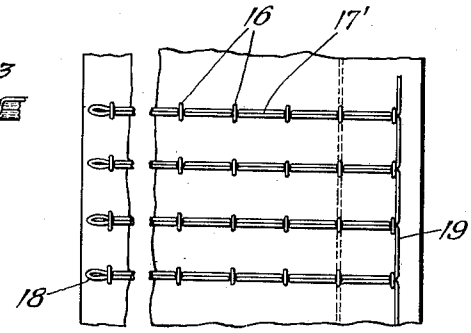


Fig. 4

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UNITED STATES PATENT OFFICE.

BENJAMIN B. JACKSON, OF DELPHI, INDIANA.

FILTER CLOTH.

Application filed May 16, 1923. Serial No. 639,254.

To all whom it may concern:

Be it known that I, BENJAMIN B. JACKSON, a citizen of the United States, and resident of Delphi, in the county of Carroll and State of Indiana, have invented a certain new and useful Improvement in Filter Cloths, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an improved cloth which is especially adapted for use as the filter cloth in the making of dust bags for vacuum cleaners. My cloth, however, need not be restricted to such use but is advantageous for use as interlining in women's cloaks, in lieu of the ordinary batting employed in comforters, and for many other purposes.

One of the chief features of my invention resides in the peculiar novel system of stitching used for compressing and re-enforcing one or more layers of batting or other non-woven fabric in sheet form. I employ what might be termed a two-way stitch, that is, the threads on one side all run in one direction while those on the opposite side run in another direction. This form of stitching as compared with other forms of stitching which have heretofore been used, provides a cloth of re-enforced batting which takes but a minimum amount of thread per square inch, the stitching operation can be entirely completed by passing the batting through the machine only once and the fibers of the batting are held together in a truly even compactness.

The last mentioned feature of maintaining an even compactness of the fibers of the batting, while advantageous in practically all uses to which the cloth may be put, is especially valuable when the cloth is used as a dust filter. In the ordinary machine stitching the under thread follows parallel with the upper thread and directly opposite the under thread so that for the whole line of the stitching the goods is pinched tightly between the opposed threads, thereby subjecting certain regions of the goods to excessive compactness while the regions therebetween are left excessively loose. By the use of my "two-way" stitching there is no longitudinal thread on the one side interlocked with a longitudinal thread on the other side so that this pinching relation could be present, but on the contrary the threads on the one side are longitudinal and on the other side are transverse and are interstitched through the goods at their intersections, with the result that there is no thread parallel with, and directly opposite the goods from, any given thread.

By the use of my improved stitching, the minute interstices in the batting over the whole area of the cloth are maintained at equal sizes so that the filter material at all points in its area is of the maximum efficiency with substantially no points of increased or diminished compression. I contemplate also that when my cloth is used in a dust bag it will have a smooth inner surface so that the dust may readily be shaken from the bag without any considerable portion lodging in crevices or folds.

A further object of the invention is the provision of a re-enforced stitching for a cloth made from one or more sheets of unwoven fabric which will afford a wear-resisting backing for the cloth.

Another object is the provision of a cloth which in addition to its other utility, presents a novel appearance pleasing to the eye and which has the "feel" of an expensive cloth.

In the accompanying drawings, I have illustrated a filter material embodying the principles of my invention and applied to a vacuum cleaner.

Figure 1 of the drawings illustrates a vacuum cleaner of the sweeper type provided with a dust bag of the material of my invention.

Figure 2 is an enlarged fragmentary plan of the filter material bent back to display the reverse side thereof;

Figure 3 is an enlarged transverse section of the filter material showing the stitchings;

Figure 4 is a fragmentary plan showing a modification of the stitching, and

Figure 5 is a view similar to Figure 2, illustrating another modification of the stitching.

Similar characters of reference are used to indicate similar parts throughout the several views.

The vacuum sweeper 10 shown in Figure 1 is provided with a neck 11 which surrounds the exhaust port of the cleaner, to which is secured the lower and open end of the elongated dust bag 12, the upper end of which is secured to the handle of the sweeper, in any suitable manner. As shown in Figure

3, the filter material 13, from which the dust bag 12 is made, comprises two layers 14 of an unwoven fabric, preferably cotton batting, in thin sheets. I prefer for this material to use a batting in quite thin sheets which is passed through rollers while moist to provide a relatively strong and hard surface to give firmness to the layers while they are being stitched together by the sewing machine.

The stitching 15 with which I provide the filter material comprises, on the obverse side, rows of closely spaced parallel threads 16, and, on the reverse side, similar closely spaced parallel threads 17 which extend in a direction transverse to that of the threads 16. Figures 2 and 3 show these threads as interlocked in a stitch relation forming what might be termed a two-way stitch, the threads 16 being the needle threads, and the threads 17 being the bobbin threads.

Although not necessarily formed that way, I prefer to make the stitches 15 by a sewing machine having a multiplicity of closely spaced needles with a single bobbin acting transversely to co-operate with the whole line of needles to form the two-way stitch shown. Any other means of providing a stitch similar to this would be suitable for my purpose, and in Figure 4 I have illustrated a modified form of this two-way stitch wherein the transverse thread 17′, instead of being positioned by a bobbin, is positioned in doubled relation by a rod pushed through aligned loops in the threads 16, leaving loops 18 at the one edge of the material and longitudinally extending portions 19 of the thread at the other edge of the material. As shown in Figure 4, this method of forming a two-way stitch leaves a double transverse thread which is advantageous when the transverse strains to which the material is to be subjected are greater than the longitudinal strains.

In Figure 5, I have shown a modification of the filter material wherein the layers are sewed together by closely spaced parallel stitching which extends in the same direction on both sides, and consequently does not so efficiently reinforce the material against transverse strains. It is to be understood also that some objects of my invention could be effected by spaced parallel stitches extending longitudinally on both sides of the material and spaced parallel stitches extending transversely on both sides of the material, the objection to this being that it would require running the material through a multiple needle sewing machine two times, and in addition would use more thread than the style of stitchings illustrated in Figures 2, 3 and 4.

As shown in Figure 3, by tightly stitching the two layers 14 together, they become, to all intents, an integral sheet and the stitches are sufficiently close together so that there is no opportunity for the batting to fray and work loose from the material. It is also to be observed that this material is comparatively smooth on both sides, so that dust may be easily and thoroughly shaken from the material.

I prefer to build up the filter material from a plurality of layers of batting rather than from a single sheet because the before-described semi-calendered surfaces tend to make effective dust screens to withhold the finer particles, and this dust screen between adjacent layers will remain intact although the calendered surface may lose its smoothness and hardness on the inner and outer sides of the material because of external wear. In other words, referring to Figure 3, there will at all times be a hardened and calendered surface in the center of the material, as indicated at 14′, although the exposed surfaces 14″ may lose this quality.

Even though the material were made from a single sheet rather than a plurality of layers of fabric, the stitching of my invention would still be necessary to properly reinforce the fabric, for such an unwoven fabric as is suitable for filter purposes does not have sufficient tensile strength to withstand the stresses to which a dust filter in a vacuum cleaner is subjected. Any pull in either direction is borne directly by the stitching, with the result that it is impossible for the filter fabric to tear open in places or to become excessively thin at certain regions, or for the bag to lose its shape by a stretching of the material.

Not only does the stitching function to reinforce the material as just outlined, but the stitching also serves to hold the fibres of the material together in sufficiently matted or compressed relation that the interstices of the fibres will not allow dust particles to pass through the material. At the same time, the stitching itself does not materially interfere with the passage of air through the filter.

It will be noted from Figure 3 (in which the compression of the sheets of batting has been greatly diminished for the sake of a clearer disclosure of the stitch) that the spaced stitchings on each side pull the batting down in parallel lines which will leave ridges or ribs of batting therebetween. This gives the cloth a pleasing appearance to the eye and feel to the fingers. In spite of the formation of these parallel ribs, however, the batting is held in a state of substantially even compactness at all points because the thickness of the batting is at no point confined between two parallel threads on opposite sides of the batting as would be the case with the ordinary sewing machine stitch.

Although I have shown and described but

certain constructions for the filter material of my invention, and have illustrated it as applied to but one particular use, it is to be understood that many modifications in the construction and use of the material could be made without departing from the spirit and scope of my invention, which is to be limited only by the state of the art and the following claims.

I claim:

1. A cloth comprising a sheet of batting having closely spaced parallel threads on one side of said batting and closely spaced parallel threads on the opposite side of said batting, said threads on said opposite side being double and being interstitched with said threads on the one side whereby said double threads form a substantial wear-resisting backing for said batting.

2. A cloth comprising a sheet of fabric material reenforced by a system of stitching where all of the threads on one side extend in one direction and all of the threads on the other side extend in the opposite direction and are interstitched with the threads on the first side.

3. A vacuum cleaning bag made of fabric that permits the escape of air but not dust through its meshes, the interior side of which is ridged with a cord or other suitable device woven into it.

4. A vacuum cleaner dust bag having walls of a filter material which material comprises only a plurality of sheets of batting held together and reenforced by longitudinal and transverse stitching.

5. A dust filter for vacuum cleaner bags comprising layers of batting stitched through by parallel stitches, the threads of which on opposite sides run only in opposite directions.

6. A dust filter comprising a sheet of unwoven fabric the area of which is covered by stitching formed by parallel threads on one side of the sheet in stitch relation only to transversely extending parallel threads on the opposite sides of said sheet.

7. A filter comprising a plurality of sheets of unwoven fabric and bound together and re-enforced by stitching therethrough which covers the area of the filter, the threads of the stitching on one side of the sheets extending in spaced relation and the threads on the other side also extending in spaced relation but only transversely to the threads on the one side.

8. A cloth comprising a sheet of batting re-enforced by a plurality of closely spaced longitudinal threads on the one side of said batting and closely spaced transverse threads on the other side of said batting, said transverse threads being in stitch relation only with said longitudinal threads.

9. A dust filter material comprising a pair of sheets of batting having calendered surfaces providing surface structures more compact than the remainder of the sheets which prevent the passage of fine dust particles, said sheets being disposed as layers with their calendered surfaces juxtaposed, and means for permanently holding the sheets together with their calendered surfaces in contact whereby the surfaces are protected from abrasion, comprising spaced stitchings through the sheet covering the area thereof.

10. A cloth formed from matted fibrous material having threads extending in parallel rows on the opposite sides thereof, the threads on the one side being at substantially right angles to the threads on the other side, the threads on the opposite sides being looped over one another through the material at each point of intersection of the opposed threads.

11. A dust filter formed of matted unwoven fibrous material in sheet form with closely spaced stitches covering the area thereof and passing only through said material, for retaining the fibers thereof closely compacted.

12. A cloth permeable to air comprising a sheet of batting provided with closely spaced parallel threads on the upper side thereof and closely spaced parallel threads on the under side thereof extending transversely to said upper threads, said upper threads being in stitch relation only with said under threads.

13. A dust filter permeable to air formed from a sheet of matted fibrous material, the fibers of which are retained in dust filtering compactness by parallel rows of threads on the upper side of said material and parallel rows of threads on the under side of the material which extend transversely of and in a stitch relation to the upper threads so that any thread directly opposite the sheet from a given thread extends transversely thereof.

14. A cloth formed from a normally thick sheet of unwoven fibrous material which has been re-enforced and compressed by stitching covering its area wherein the threads on the obverse side all extend in the same direction and are arranged in spaced relation, whereby they pull the material down in parallel lines leaving ribs therebetween while the threads on the reverse side extend in the opposite direction for re-enforcing the material transversely of the ribs, and the threads on the obverse side are in interlocking stitch relation to the transverse threads on the reverse side.

15. A cloth formed from a sheet of batting re-enforced and compressed by a system of stitching covering its area which comprises spaced longitudinal threads on one side of the batting and spaced transverse threads on the other side, the longitudinal threads and the transverse threads

being interlocked through the batting by being brought over one another at their points of intersection.

16. A cloth formed from a sheet of textile material re-enforced by a system of stitching covering its area and comprising spaced longitudinal threads on one side of the sheet and a continuous thread on the other side extending along one edge of the cloth and parallel with the longitudinal threads, this continuous thread at spaced intervals extending transversely across the sheet in doubled relation as an elongated loop and these elongated loops being interlocked through the sheet with the longitudinal threads at their intersections therewith.

In witness whereof, I hereunto subscribe my name this 25th day of April, 1923.

BENJAMIN B. JACKSON.

Witnesses:

JOHN L. HANNA,
JAMES O. OBEAR.