COVER FOR SEED AND PLANT BEDS

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Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

INVENTOR.
R. C. WHITMAN
BY
McFull, Inc.
ATTORNEY
The present invention relates to an improvement in articles such as seed bed covers which are constructed from open-mesh fabric.

Seed bed covers of the general type employed by tobacco growers and others who find it necessary to protect their seed beds and growing plants against rain and attacks by insects or frosts are constructed generally of open-mesh woven material or netting with fastening means such as nails or spikes driven through the fabric along the edges for supporting the cover in a stretched-out position over the seed bed. Seed bed covers of this character are commonly used in widths of 6, 12, 15 and 30 feet, and in lengths of 100 feet.

Important among the characteristics which a seed bed cover must have, are strength and durability to withstand rough usage, continuous exposure to the weather, and the relatively severe stresses and strains incidental to the supporting of a large sheet of filmy material in a stretched-out position on the seed bed. As might well be expected, the point of greatest weakness and the point at which the cover usually first gives way, is along the line of fasteners provided for supporting the cover.

In the manufacture of seed bed covers, considerable attention has been given to the provision of adequate fastening means for supporting such covers at spaced intervals along the fabric, usually at the edges. Experience has shown the desirability of providing some means for protecting the hole edges of the fabric against which the supporting strains are finally centered, when the fabric is tensioned against fastening elements such as nails or spikes driven through the fabric. In a seed bed cover of this description, the fastening means must be inexpensive in order to keep the cost of the seed bed cover within practical limits, and must be adapted for hard usage and continued exposure to the weather.

Attempts to provide a strengthened fabric area for fastener support in filmy open-mesh materials of the class described, as by increasing the number of lengthwise yarns at the selvage, by stitching along the selvage, or by securing a welt strip thereto, have not provided satisfactory results, because of the tendency of the fabric to be distorted and to fail, when subjected to relatively small strains, by breaking one or two threads at a time along the line of strain from the point of engagement of the fastener in the fabric. The form of fastener most widely and most successfully used to the present time, is the conventional metal grommet, the two halves of which are clinched together to form a narrow ring of metal which protects and strengthens the fabric forming the edges of the hole through which a fastening nail or spike is inserted. The performance of metal grommets as applied to seed bed covers, however, has been disappointing as compared with the efficiency of these fasteners applied, for example, to canvas and other heavy or closely woven materials. Tests have shown that metal grommets will invariably pull out of the seed bed covers under strains amounting to a small fraction of the combined tensile strengths of the included inwardly extending yarns of the fabric. Quite unexpectedly, and as hereinafter more fully set forth, applicant has found that his novel fabric patch fastener is far superior in such essential qualities as strength and durability to the fabric supporting and strengthening devices of the prior art, including the metal grommet referred to.

It is a principal object of the present invention to provide a novel and improved cover for seed and plant beds embodying therein a novel and improved fastening means which contributes to the production of a substantially stronger, more durable, and at the same time more economically constructed seed bed cover than has been developed heretofore.

It is a further object of the invention to provide a novel and improved article of the class described, embodying therein a fastening means which is particularly adapted to take up and to distribute most efficiently over a substantial width of the fabric the supporting strains which are finally centered, for example, in fastening elements such as nails or spikes which may be driven through the fabric.

It is another object of the invention to provide a novel and improved combination of a fastening means with an open-mesh fabric of the general class described, which may include such fabrics as tobacco cloth, low count gauges, mosquito nettings and the like, which will provide a better and more efficient means of support for articles made from such fabrics.

With these and other objects in view as may hereinafter appear, a feature of the invention consists in the provision of a cover for seed and plant beds constructed of an open-mesh woven material or netting and having associated therewith fastening means in the form of a series of fabric patch fasteners extending around the edges of the cover, each fastener comprising a relatively heavy, closely woven fabric patch constructed and arranged to include a relatively large number
of yarns extending inwardly of the fabric from the edge, a suitable water-resistant adhesive adapted for firmly securing the included yarns to the patch, and the included yarns of the cover. The patch fastener is adapted to have nails or spikes driven through it, or preferably is held to receive the cooperating fastening element, which is thus automatically centered with relation to the patch fastener.

In carrying out the invention, a patch fastener is employed in the form of two pieces of closely woven, tough patch material, which are applied to opposite sides of the cover adjacent its edges, the layers of the patch and the included portion of the woven material being bonded together into a stiffer flexible homogeneous mass by means of a suitable water-resistant adhesive. The patch fastener thus formed is characterized by a substantial non-yieldability to strains of the order met in normal use tending to distort or skew the fabric of which the patch is made, and also is at least somewhat resistant to strains tending to bend the patch fastener. Further in accordance with a preferred form of the invention, the patch fastener is constructed and arranged so that it will have the capability of resisting the tendency of the nail, spike or other fastening element to tear through the patch, which is at least equal to the combined tensile strengths of all the yarns extending inwardly from the edge of the fabric included within or covered by the patch fastener.

The several features of the invention consist also in the devices, combinations and arrangement of parts hereinafter described and claimed, which together with the advantages to be obtained thereby will be readily understood by one skilled in the art from the following description taken in connection with the accompanying drawings, in which Fig. 1 is a somewhat fragmentary view illustrating a representative portion of a seed bed cover embodying in a preferred form the several features of the invention, the cover being shown stretched on a supporting frame for actual use; Fig. 2 is a full size detail view of one of applicant's improved fabric patch fasteners in the seed bed cover shown in Fig. 1; Fig. 3 is a sectional view taken on a line 3-3 of Fig. 2; Fig. 4 is a view similar to Fig. 2, but illustrating the manner in which the fabric patch fastener acts to equalize the strain upon all of the included yarns when the fabric is placed under tension; and Fig. 5 is a view similar to Figs. 2 and 4, but showing the manner in which the included yarns are broken in a substantial distance inwardly of the fabric from the fastener when subjected to breaking strains.

The seed bed cover of which a representative embodiment generally is shown in Fig. 1 of the drawing, comprises an open-mesh woven fabric, for example, a tobacco cloth having 36 ends to the inch in the warp and 32 picks to the inch in the fill. In accordance with the present invention, the seed bed cover 8 provided along the edges thereof with fabric patch fasteners 10, is stretched on a supporting frame 12 generally consisting of logs laid end-to-end, and is secured thereto by means of spikes 14 driven through the patch fasteners or holes therein. In the illustration, the fasteners 10 are shown as spaced on twenty inch centers along the edge of the cover 8.

Seed bed covers of this general description are constructed generally of tobacco cloth. Weaves other than that above noted, may be employed as, for example, a 32 x 28 or 28 x 24, 24 x 20 or 22 x 18, and having any adequate yarn size, for example, 30's in the warp and 40's in the fill. It will be understood, however, that the invention is not limited in its application to the particular fabrics mentioned, or to fabrics made from cotton yarns.

In accordance with the present invention, the seed bed cover 8 is provided with a novel and improved type of fastener which has been found to substantially increase the strength and wearing qualities of the seed bed cover. The fabric patch fastener 10 illustrated as embodying in a preferred form features of applicant's construction, comprises two layers of heavy, closely woven cloth roughly one inch square, coated on one side with a thermoplastic adhesive 16 (see Fig. 3). These are pressed together on opposite sides of the fabric with an application of heat to cause the supposed layers of the fastener and the included yarns of the cover fabric to adhere permanently to form a firm, thoroughly integrated mass. The adhesive comes into intimate contact with the individual yarns of the cover fabric. In this process, as the adhesive material passes freely through the interstices of the fabric, the two layers of the patch are firmly welded in place, and, therefore, that is a strength capable of withstanding considerable strain without tearing.

In practicing the invention, a wide variety of materials are available for use as patch materials. In the production of low cost fabrics for seed bed covers, mosquito nettings and the like, where economy is an important factor, it is desirable that the quality of the patch material employed and the overall strength of the completed patch should bear a definite relation to the strength of the fabric in which it is placed and to the strains which it is expected to bear. In this connection, it will be observed that the magnitude of the strains which can be supported by applicant's patch fastener is limited to the tear strength of the assembled patch or the tensile strength of the yarns included by the patch and extending inwardly from the cover.

In the preferred form of the invention, it is proposed to employ a patch material of such quality that the completed patch fastener will have a tear strength, that is, an ability of the fastener to resist the tendency of a nail, spike or other fastening element to tear out of the patch, which is substantially equal to the sum of the tensile strengths of the included yarns covered by the patch and extending inwardly from the edge of the cover. Satisfactory results have been achieved with 30 yard sheeting having a 48 x 48 thread count and with thread sizes of 17's in the warp and 17's in the fill. Tests have shown that a fabric patch fastener made from this material and having a dimension lengthwise of the selvage of one yard, is satisfactory for a 32 x 28 cloth having a 32 x 28 count. Other tests have shown that for use with the weaker materials suggested having 24 x 20 and 22 x 18 count, a cheaper patch material may if desired be employed as, for example, a 45 yard sheeting having a thread count of 44 yarns to the inch in the warp and 40 yarns to the inch in the fill, and with thread sizes of 17's in the warp and 21's in the filling.

A variety of pressure sensitive, thermosetting or thermoplastic adhesives may be used. Among these may be mentioned pressure sensitive adhesives of the type commonly used on surgical adhesive tape such as a rubber-resin pressure sensitive adhesive, thermoplastic esters and ethers of cellulose, thermoplastic resins such as vinyl chloride, vinyl acetate, copolymers of the
same, and thermosetting resins, for example, a partially polymerized urea formaldehyde or phenol formaldehyde which by their nature may be applied as thermoplastics, but are set by the application of heat.

The preferred adhesive agent for the fabric patch fastener is plasticized cellulose acetate. This particular material has the advantage that it has a low water regain. In applying the patch with the application of heat, a very dry condition of the included yarns of the fabric is obtained. As previously mentioned, the adhesive adheres firmly to the several layers of patch and included cover material, acting as a stiffening agent so that the fabric patch fastener in its finished form is set against strains tending to distort or skew the patch, and is also highly resistant to strains tending to bend the patch. An excellent form of the product would include thorough impregnation of the threads themselves.

While the fabric patch fastener in the preferred form of the invention is constructed of two layers of patch material with the seed bed cover material included therewith, the invention in its broader aspects contemplates that the fabric patch fastener may be constructed with one layer only of fabric patch material cemented to the cover fabric as above described, by means of a waterproof adhesive. In this form of the invention, the yarns of the patch and of the seed bed cover in contact therewith will be strongly bonded together by the permeation of the adhesive on the patch through the interstices of the cover fabric. The alternative construction while obviously of less strength than the preferred construction above described, may be found satisfactory under certain conditions as, for example, in the construction of small covers from lightweight or less sturdy material.

While metal grommets are generally accepted in the art as the strongest available fastening devices for supporting woven textile fabrics along their edges, applicant has found, contrary to expectations, that the fabric patch fasteners above described when used with a loosely woven fabric or netting in the manufacture of seed bed covers, provide substantially stronger and more serviceable covers than such covers previously produced using the usual metal grommets.

Tests conducted under laboratory conditions upon portions of a seed bed cover made from gauze having 36 ends to the inch in the warp and 32 picks to the inch in the fill, have disclosed a surprising degree of superiority of the fabric patch fastener for use with seed bed covers. The filling-wise breaking tensile strength of the fabric was found to be 11 or 12 lbs, when tested by pulling with a pair of gripping jaws one inch in width. A metal grommet having an external diameter of one inch and supported adjacent the selvage edge of the material in the usual manner, was found to tear out of the fabric when subjected to a pull of about 4 lbs. The use of a wide tape selvage edge was found to provide but little additional support for the metal grommet. The preferred adhesive agent, as described, adhered to the plain selvage illustrated in the drawing, was found to successfully resist substantially heavier tensioning strains, in fact, failure of the fabric occurred as shown in Fig. 5, only when a pull of 11 or 12 lbs, was applied.

The reason for the improved performance of seed bed covers having applicant's fabric patch fasteners over that of similar seed bed covers provided with conventional metal grommets, is to be found in the particularly efficient combination of the fabric patch fastener with the relatively loose and separated yarns of an open-mesh cover fabric or netting from which such covers are made. By way of comparison, it may be noted that metal grommets have been found to combine most efficiently with heavier, more closely woven fabrics such as canvas, when the greater strength of the metal grommet becomes a most important factor. Metal grommets do not, however, function with the same efficiency when applied to open-mesh seed bed cover fabrics. When an open-mesh fabric such as a seed bed cover having metal grommets, is subjected to a strain sufficient to tear out the grommet, failure of the yarns takes place in a characteristic manner with the breaking of two or three middle yarns at the edge of the grommet, followed by the tearing out or breaking of additional yarns in succession around the edge of the grommet as the tear is extended. This undesirable condition is not substantially affected by the use of a wide tape selvage edge.

The manner in which a tensioning strain upon the open-mesh cover fabric against the fabric patch fastener above described, is distributed over adjacent portions of the fabric, and the manner in which the cover fails when subjected to an excessive tensioning strain, is indicated somewhat diagrammatically in Figs. 4 and 5 of the drawing. From an inspection of Fig. 4, it will be noted that the strain is taken almost entirely by the filling threads extending within the patch fastener, little if any of the strain being taken by the warp threads passing within the patch fastener or adjacent thereto. When failure does occur, it has been found that it takes place generally at a point somewhat removed from the patch, all of the included yarns breaking simultaneously in the manner shown in Fig. 5.

Characteristic qualities of applicant's fabric patch fastener which render it particularly adapted for use in covers for seed and plant beds and other articles made from intrinsically weak open-mesh woven fabrics or nettings, will include the more efficient bond between the included yarns and the fastener provided by the thermoplastic adhesive which prevents pulling out of individual yarns, and of the same time serves to distribute the strain lengthwise of the yarns from the edge of the patch inwardly thereof. Applicant's improved fastener is stiffly flexible in character, being substantially unyielding to strains tending to distort or skew the material of the patch, and resistant to bending strains so that strains centering upon the nail or other fastening means are spread out along the edge of the fabric over the full width of the patch. There is no tendency toward tearing, that is, the breaking of the filling yarns one at a time as has been found to be the case with the metal grommet. While a fabric patch fastener illustrating the several features of the invention has been shown in the drawing provided with a quarter inch hole to receive a spike or similar fastening element, it will be understood that the invention is not limited to the provision of a fastener having formed therein a hole of any particular size or indeed of any hole at all. The invention, for example, contemplates that nails may be driven directly through material of a solid patch, or alternatively, that a hole as large as three quarters of an inch in diameter may be provided to receive wooden sticks or dow-
els such as are frequently employed for pinning seed bed covers of the general type illustrated against earthen banks. Satisfactory results have been obtained also with patch fasteners of larger size having a width of 1½ inches and a hole of one inch formed therein to receive wooden dowels or stakes. Tests have shown that a fabric patch fastener of the one inch size illustrated, and having cut therein a three quarter inch hole as indicated in dot-and-dash lines in Figs. 2, 4 and 5, to receive a wooden dowel of appropriate size, will provide substantially the same support for the cover, and will tear out of the fabric only when subjected to about the same breaking stresses as, for example, the patch illustrated having the quarter inch hole 18 formed therein.

The improved seed bed cover above described, has the further advantage that it provides a more satisfactory and durable construction which is better adapted than seed bed covers now commercially available having metal grommets, to withstand continued exposure to the weather. Where metal grommets have been employed, difficulty has been encountered with mildew, which results from the tendency of moisture to be collected and retained by the yarns beneath the edges of the metal grommet. Applicant's improved fasteners, in contrast, are held together with a waterproof adhesive which acts in effect as a waterproofing agent. The adhesive on the patch at one side of the fabric attaches to the adhesive on the patch at the other side of the fabric through the interstices of the cloth to form an effective water-resistant coating for the threads included within the patch.

It will be understood that the invention is not limited to the specific embodiment shown, and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A cover for seed and plant beds comprising a sheet of open-mesh woven material having along edges thereof a series of spaced fabric patch fasteners of relatively closely-woven patch material, each of said patch fasteners being of a size to include a substantial number of yarns extending inwardly from an edge of said sheet of open-mesh material, and a water-resistant adhesive firmly securing each of said patch fasteners to said open-mesh material to distribute over said included yarns the supporting strain of a cooperating fastening element upon the sheet at each said patch fastener.

2. A cover for seed and plant beds as claimed in claim 1 in which each said patch fastener includes opposing layers of said patch material adhesively secured to and bonding said open-mesh material therebetween.

ROSS C. WHITMAN.