March 25, 1941. C. G. MOON 2,235,842

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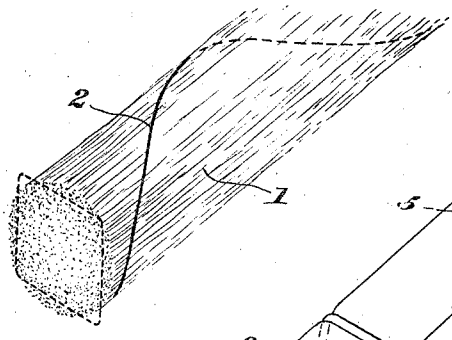
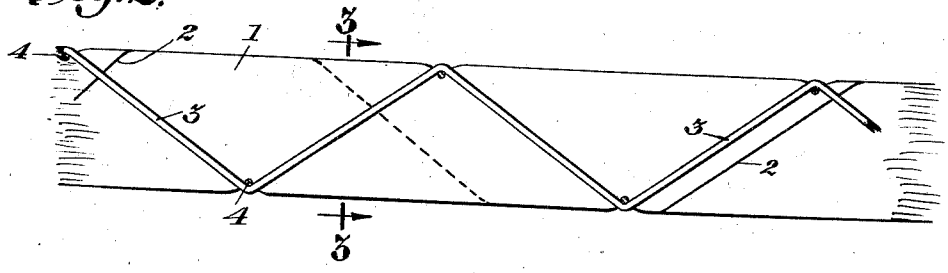


Fig. 1a

Fig. 1.

Fig. 2.



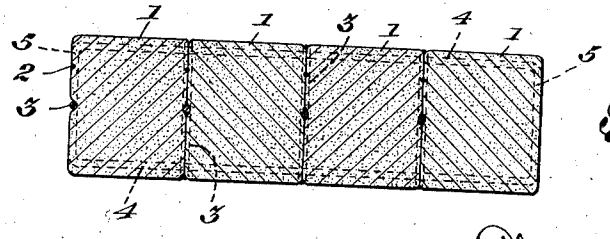


Fig. 3.

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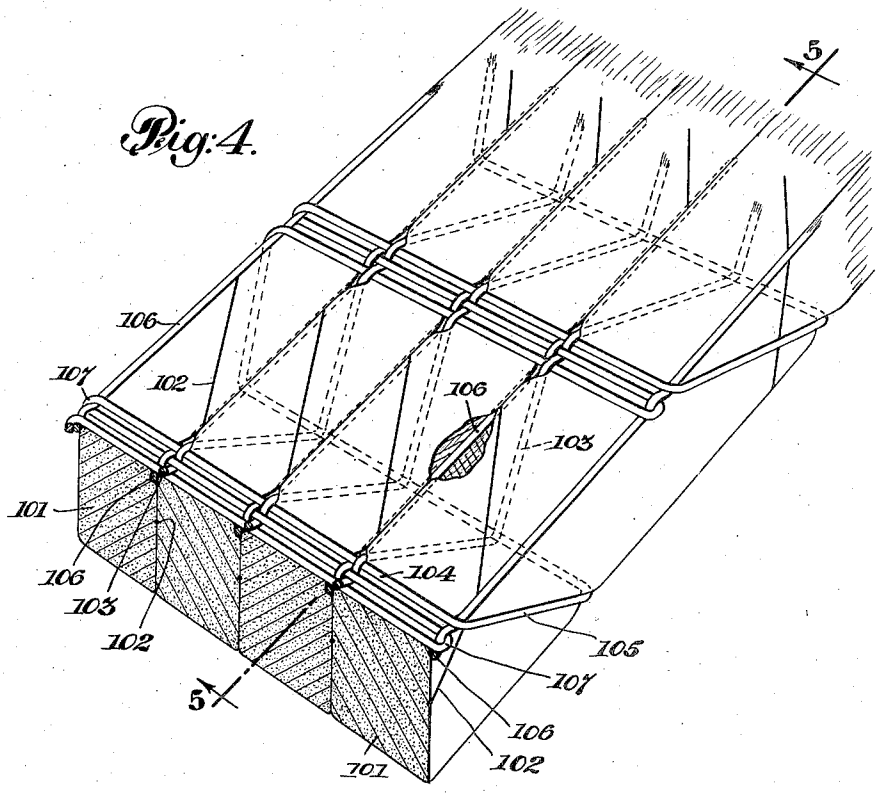
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Fig. 4.



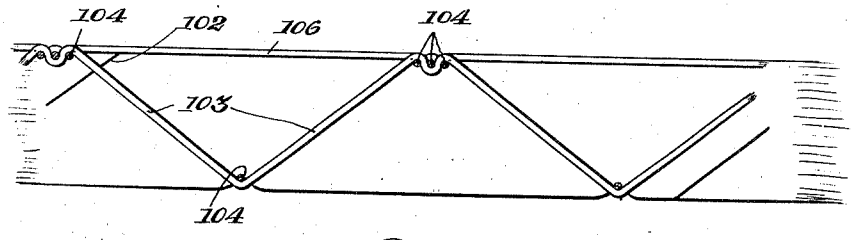


Fig. 5.

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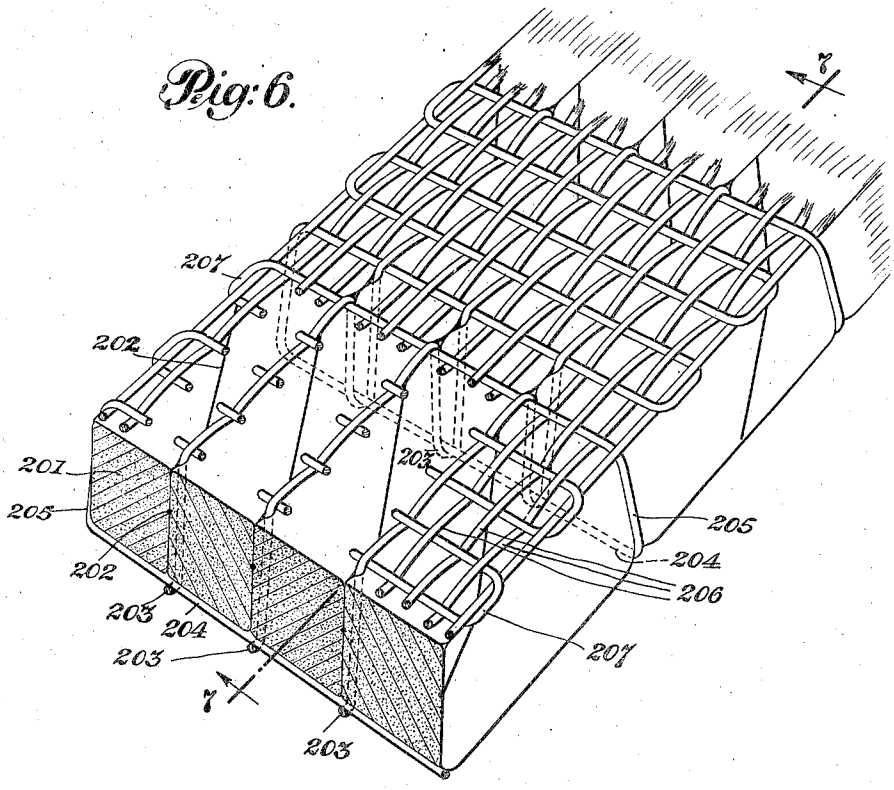
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Fig: 6.



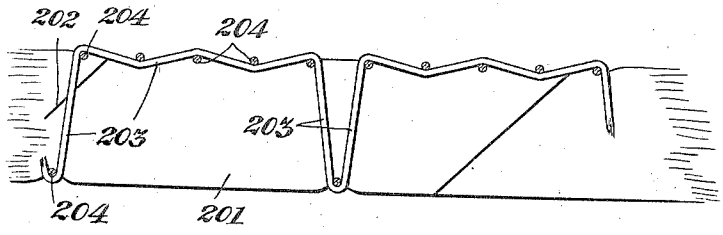


Fig: 7.

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Fig. 8.

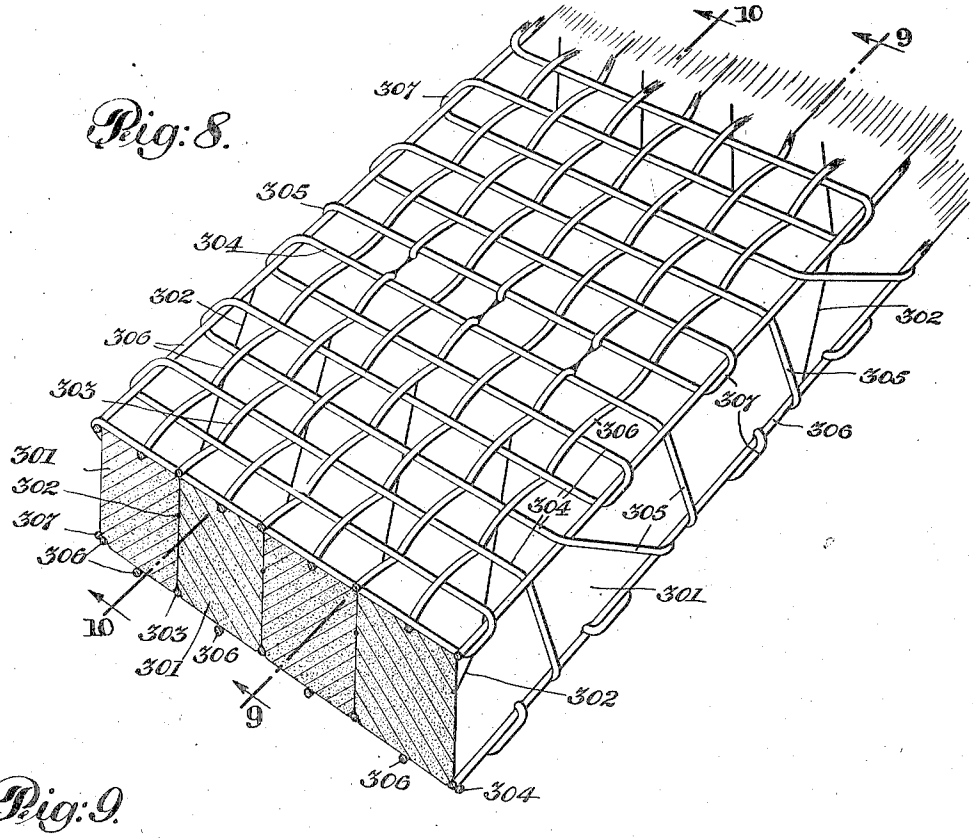


Fig. 9.

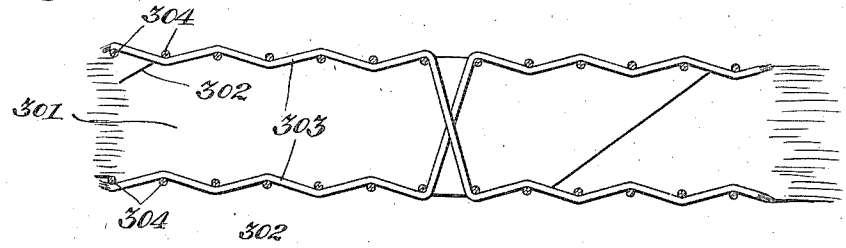
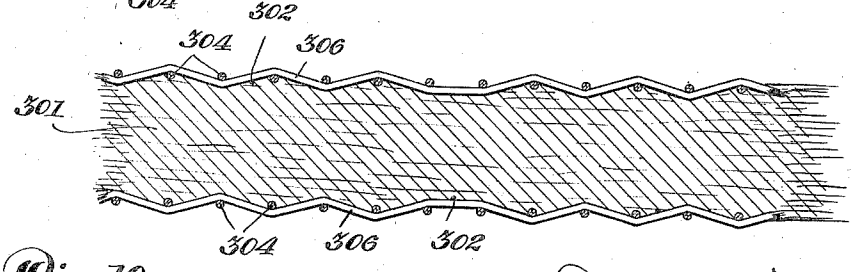


Fig. 10.



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Patented Mar. 25, 1941 2,235,842

UNITED STATES PATENT OFFICE

2,235,842

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Clifford G. Moon, Hopedale, Mass., assignor to Raybestos-Manhattan, Inc., Passaic, N. J., a corporation of New Jersey

Application November 13, 1937, Serial No. 174,405

5 Claims. (Cl. 139—420)

My invention consists in the novel features hereinafter disclosed, reference being had to the accompanying drawings which illustrate several embodiments of the same, selected by me for purposes of illustration, and the said invention is fully disclosed in the following description and claims.

My invention relates to a novel fabric, the main body of which is formed of soft twistless masses of fibrous material such as cotton, wool asbestos, silk waste, wire waste, rayon or the like, in the form of parallel slivers or rovings extending longitudinally of the fabric and held in such close contact with each other as to practically preclude the passage of air through the fabric between the slivers or rovings, the said slivers themselves forming warps of the fabric in addition to or in conjunction with other warp strands in the form of twisted threads or yarns, and which I term warp threads to distinguish them from the previously mentioned slivers or rovings and transversely disposed filler threads or yarns, hereinafter referred to as fillers, which extend transversely of the fabric on opposite sides of the slivers, without, however, at any time passing between the same.

My improved fabric finds its greatest utility as a heat insulating material, it being capable of being wrapped spirally with the coils edge to edge around a pipe or conductor for the passage of heated gas, steam or other fluid, and obviously the presence of apertures extending through the fabric will permit a circulation of air therethrough which defeats the heat insulating object of the fabric. A preferred form of the fabric therefore comprises a plurality of slivers formed largely or substantially entirely of twistless asbestos fibres, formed into a roving or sliver of any desired cross sectional area, but preferably many times the cross sectional area of an ordinary thread warp such as is used in weaving fabrics of various kinds. These asbestos fibres naturally have extremely little tensile strength and I conveniently pass around them spirally and lightly a wrapping yarn which gives them sufficient tensile strength to permit them to be carried into the loom to the point where they are formed into the fabric, or these sliver warps may be carried into the loom through tubular guides which support them until they are united into the fabric.

In the manufacture of my improved fabric the parallel slivers are treated as warps in forming sheds through which the fillings are fed by a shuttle on the upper face or the lower face of the sliver warps, in the usual manner of weaving. Certain of the thread warps being so located that they will pass between adjacent sliver warps and will become embedded therein, so that they do not separate the sliver warps when the fabric is completed, while the fillers extend crosswise of the fabric on the upper and lower faces thereof, except where certain fillers pass around the sliver warps at the edges of the fabric to form selvages, so that the fillers do not pass between the sliver warps and the latter therefore lie in the fabric with their lateral faces in close contact throughout their length, and no orifices which would permit the circulation of air through the fabric, are formed between them.

My present application is one directly related to my former application, Serial No. 661,870, filed March 21, 1933, upon which Letters Patent of the United States No. 2,036,714 were granted April 7, 1936, and covering the improved fabric disclosed therein, the said Letters Patent covering an improved loom which may be conveniently employed in the manufacture of my improved fabric, although said fabric may be made by other forms of loom.

In the production of my improved fabric I may employ any desired number of fillers and any desired number of sliver warps and thread warps. In its simplest form the fabric will consist merely of the sliver warps, a single thread warp adapted to pass between adjacent sliver warps and single fillers extending across the upper and lower faces of the fabric and around the edges of the fabric and held between the thread warps and sliver warps. The number of thread warps and fillers may be increased without increasing the number of sliver warps, to provide additional thread warps lying upon one or both sides of the sliver warps and interwoven with fillers to increase the stability of the fabric.

In some instances I may provide the necessary thread warps and fillers on one face of the fabric to form an open fabric or a close or firm fabric, as may be desired, certain only of the thread warps of said fabric passing between the sliver warps, to engage the fillers on the opposite face of the fabric, and being embedded in the adjacent faces thereof as before described, and all filler threads lying on one face or the other of the fabric except at the selvages.

In some instances I may provide sufficient thread warps to form an open fabric, or a closed or a firm fabric, on both faces of the fabric, but in such case also certain only of the thread warps will pass between the sliver warps from one face fabric to the other, preferably without

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extra binding warps, the fillers of both fabrics extending across one face or the other of the sliver warps, in both face fabrics except at the selvages.

In all forms of my fabric the sliver warps are handled by suitable tubes or harness as true warps so that in every case a unitary fabric is formed.

Referring to the accompanying drawings—

Fig. 1 represents a perspective view of a simple form of my improved fabric.

Fig. 1a represents a perspective view of a sliver or roving constituting one of the sliver warps.

Fig. 2 represents a longitudinal sectional view of a portion of the fabric on line 2—2 of Fig. 1, taken between sliver warps.

Fig. 3 is a transverse section of Fig. 2 on line 3—3 thereof.

Fig. 4 is a view similar to Fig. 1 showing a slightly modified form of fabric.

Fig. 5 is a longitudinal section, similar to Fig. 2, on line 5—5 of Fig. 4.

Fig. 6 is a view similar to Fig. 1 showing a modified form of the fabric in which a face fabric is formed on one face of the sliver warps and incorporated therewith.

Fig. 7 represents a section similar to Fig. 2 on line 7—7 of Fig. 6.

Fig. 8 is a view similar to Fig. 1 of a modification, in which an upper and lower face fabric is incorporated with the sliver warps.

Fig. 9 indicates a longitudinal section similar to Fig. 2, on line 9—9 of Fig. 8.

Fig. 10 is a longitudinal section on line 10—10 of Fig. 8.

It will be understood that the thread warps and fillers are represented as separated to an exaggerated degree for greater clearness.

In carrying my invention into effect, I prepare the slivers or rovings of the desired diameter, according to the thickness desired in the fabric, preferably by carding asbestos fibres with or without a suitable percentage of cotton fibre, and separating the carded bat into slivers of twistless fibres, in the usual manner. It is to be understood that the slivers may be formed of any other suitable fibres or fibrous material if desired. I find it convenient to wrap each sliver, indicated at 1, with a holding thread 2, wound in an elongated spiral around the sliver to hold the fibres together and give the sliver a little more tensile strength to enable the slivers to be led to and through the tubes or harness eyes of the loom. While the sliver may have any cross section, it will normally be substantially round when in separated relation, but when the sliver warps are placed side by side and bound together in the fabric, they tend to assume a substantially square or rectangular cross section, as indicated in the drawings.

In the simple fabric shown in Figs. 1, 2 and 3, the slivers 1 are arranged in association with a series of thread warps 3, so arranged as to be able to pass between adjacent sliver warps, in forming sheds alternately on the upper and lower faces of the sliver warps, and the filling thread 4 is carried across first one face of the fabric and then the other and around the selvages as indicated at 5, and interwoven between the sliver warps and thread warps to unite them into a continuous fabric or pad. It will be noted that the fillers 4 do not pass between any of the sliver warps and that the portions of the thread warps 3 which lie between the adjacent sliver warps are embedded into the adjacent faces of the sliver warps, so that the said adjacent faces are in close contact substantially throughout their entire length.

It will be noted that the sliver warps have a vastly greater cross sectional area than the thread warps, and that they form the body of the fabric, which is like an elongated pad, the sliver warps being held in close contact longitudinally of the fabric, in this instance by the portions, 5—5 of the fillers 4—4 which pass around the selvages and hold the fabric together. The fillers indent themselves also into upper and lower surfaces of the sliver warps 1, and into the selvage surfaces of the end sliver warps, so that the fabric takes substantially the width and thickness of the sliver warps. In practice, where the fabric is intended to be used as heat insulation, I prefer to employ asbestos fibres for the sliver warps, and to make the thread warps and fillers also of asbestos fibres with sufficient amount of cotton, linen or other fibres to provide them with the necessary tensional strength when twisted. The holding thread 2 is preferably a twisted thread and may be formed of asbestos fibre or of cotton, linen or other suitable fibres, as its principal object is to hold the twistless asbestos fibres of the sliver warps together prior to weaving, although it does perform the same function after the fabric is woven.

In some instances, in addition to the thread warps 3 which pass from one face of the fabric to the other between the sliver warps, and engage the filler threads, and which I term the main thread warps, I may also use additional thread warps at the opposite selvages, for example as shown in Fig. 4 on one or both faces of the fabric, and these auxiliary thread warps may also be carried along the exterior sliver warps between the edges thereof on one or both faces of the fabric, these auxiliary warps being interwoven with the fillers and forming a more or less open work surface on one or both faces of the pad, as illustrated in Figs. 6 and 8 for example, it being understood that the auxiliary thread warps remain at all times on one face of the fabric and do not pass from that face to the other at any time.

Referring now to Figs. 4 and 5, for example, in which parts corresponding to those shown and described with reference to Figs. 1 to 3 are given the same numerals with the addition of 100 to avoid repetition, it will be seen that the sliver warps, 101, are combined with main thread warps 103, 103 and auxiliary thread warps 106, the latter being located at each selvage or edge of the completed fabric and adjacent to each of the main thread warps 103. With this construction the filler thread, indicated at 104 may be passed a plurality of times across one face of the fabric to form consecutive picks, as the upper face in Fig. 4, and interwoven with the main and auxiliary thread warps 103, 106, so that these fillers lie on the upper face of the fabric in close relation to each other and portions of the filler thread, indicated at 107, pass around the marginal auxiliary thread warps 106. The filler thread then passes, as indicated at 105, to the opposite face of the fabric, then across the said face of the fabric, where it is interwoven with the main thread warps 103 only. This construction produces substantially the same fabric as illustrated in Figs. 1 to 3, but it will be somewhat stronger to resist handling. As will be seen only the main thread warps 103 pass from one face of the fabric to the other and they are embedded

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in the adjacent lateral faces of the soft filler warps, and the portions of the auxiliary thread warps between the series of fillers will likewise be impressed into the surface of the adjacent sliver warps.

In Figs. 6 and 7, in which the parts corresponding with those illustrated in Figs. 1 to 3 are given the same reference numerals with the addition of 200, I have illustrated a further modification of my invention, in which, in addition to the main thread warps **203** I employ a plurality of auxiliary thread warps **206** lying upon the upper face of each of the several sliver warps **201** between the edges thereof. **204** represents the filler thread which is interwoven on the upper face of the fabric with the main and auxiliary warps **206** to form a more or less open work surface. In this case also only the main thread warps **203** will be carried to the opposite face of the fabric where they are interwoven with the filler thread, portions **205** of which pass around the selvages of the main fabric while portions **207** pass around the marginal auxiliary thread warps to form a substantial selvage for the face fabric which, however, is an integral part of the entire fabric. Obviously the number of auxiliary thread warps **206** and fillers **204** will determine the closeness of the surface which may be either open work or firm or close as desired.

In Figs. 8, 9 and 10 I have illustrated a modification of my invention in which the parts corresponding with those shown in Figs. 1 to 3 are given the same reference numerals with the addition of 300. In this instance I provide two sets of main thread warps **303** on opposite faces of and in line with the adjacent faces of the lateral warps **301**, and I provide on both the upper and lower faces of the fabric any desired number of auxiliary thread warps **306**. In this instance the main thread warps **303** will be conveniently shifted simultaneously to opposite faces of the fabric crossing each other, as indicated in Fig. 9, the portions lying between adjacent faces of the sliver warps embedding themselves in the said adjacent faces. The filler thread, indicated at **304**, will be interwoven with the main and auxiliary thread warps on both faces of the fabric and carried around the lateral edges of the fabric to form the selvage, as indicated at **305**, while at the same time there will be formed a more or less open work surface on both the upper and the lower faces of the sliver warps, portions **307** of the filler threads interlocking with the marginal auxiliary thread warps **306** to form a selvage edge for the upper and lower face fabrics.

In all the modifications of my improved fabric shown and described herein, it will be understood that the fabric formed is a unitary fabric in which the large fluffy sliver warps perform the function of warps in the fabric and at the same time furnish substantially the body of the fabric, which is in the nature of a soft pad. In no case do the filling thread, or threads pass between adjacent sliver warps, so that a very compact fabric is obtained, the sliver warps lying with their adjacent faces in contact throughout substantially their entire length. The only threads which pass between them at any point are the main thread warps, which are of so much smaller diameter that they readily embed themselves in the adjacent faces of the sliver warps.

My improved fabric, as before stated, finds its largest use when formed substantially entirely of asbestos and wrapped spirally around a pipe or other heated article, to form heat insulation therefor, and the character of the weave is such that the fabric can adjust itself readily both longitudinally and laterally to facilitate its being wrapped spirally or otherwise with its edges contiguous, so as to form a substantially uniform insulating casing, there being no openings or spaces through which air can circulate through the fabric. It will be obvious, however, that in some instances the fabric may be formed of other than asbestos fibres and can be used for packing, or any suitable widths for pads for padding under rugs and carpets, and in packing articles, and for many other useful purposes.

What I claim and desire to secure by Letters Patent is:

1. An insulating fabric comprising a plurality of large, soft slivers of asbestos fibers, said slivers extending warpwise in close contact throughout substantially their entire length; at least one warp thread of relatively small sectional area disposed between each two adjacent slivers, and other warp threads at the outer edge portions of the fabric; and filler thread means extending transversely of said slivers and arranged alternately upon opposite faces of said fabric, the transverse portions of said filler thread means on at least one face of said fabric comprising a plurality of consecutive picks overlying said slivers and retained in place by said warp threads.

2. A unitary thick insulating fabric comprising a plurality of soft sliver warps formed of asbestos fibers, said sliver warps being of large cross sectional area and arranged parallel to each other with their adjacent portions in close contact throughout substantially their entire length; at least one warp thread of relatively small cross-sectional area disposed between each two adjacent sliver warps, and other warp threads at the outer edge portions of the fabric; and filler thread means extending transversely of said sliver warps and passing around the edge portions of said fabric, said filler thread means being interlaced with all said warp threads and forming selvages at the edge portions of the fabric, said filler thread means also being arranged alternately above and below said sliver warps and being disposed over the outer faces of said sliver warps.

3. A unitary thick insulating fabric comprising a plurality of soft sliver warps formed of asbestos fibers, said sliver warps being of large cross sectional area and arranged parallel to each other with their adjacent portions in close contact throughout substantially their entire length; a holding thread spirally wound around each of said sliver warps; at least one warp thread of relatively small cross-sectional area disposed between each two adjacent sliver warps, and other warp threads at the outer edge portions of the fabric; and filler thread means extending transversely of said sliver warps and passing around the edge portions of said fabric, said filler thread means being interlaced with the warp threads and forming selvages at the edge portions of the fabric, said filler thread means also being arranged alternately above and below said sliver warps and being disposed over the outer faces of said sliver warps.

4. A unitary thick insulating fabric comprising a plurality of soft sliver warps formed of asbestos fibers, said sliver warps being of large cross sectional area and arranged parallel to each other with their adjacent portions in close contact throughout substantially their entire length; at least one warp thread of relatively small cross

sectional area disposed between each two adjacent sliver warps, and other warp threads at the outer edge portions of the fabric; filler thread means extending transversely of said sliver warps and passing around the edge portions of said fabric, said filler thread means being interlaced with all said warp threads and forming selvages at the edge portions of the fabric, said filler thread means also being arranged alternately above and below said sliver warps and being disposed over the outer faces of said sliver warps; and a plurality of auxiliary warp threads overlying at least one face of said fabric and interlaced with the filler thread means on said face of the fabric.

5. An insulating fabric comprising a plurality of large, soft slivers of asbestos fibers, said slivers extending warpwise in close contact throughout substantially their entire length; a holding thread spirally wound about each of said slivers; at least one warp thread between each two adjacent slivers and at the edge portions of the fabric; and filler thread means extending transversely of said slivers and arranged alternately upon opposite faces of said fabric, the transverse portions of said filler thread means on both faces of said fabric comprising a plurality of consecutive picks overlying said slivers and interwoven with said warp threads.

CLIFFORD G. MOON.

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