Jan. 31, 1939. R. E. CRYOR 2,145,235

LOCOMOTIVE CAB CURTAIN

Filed July 23, 1938

Fig. 1.

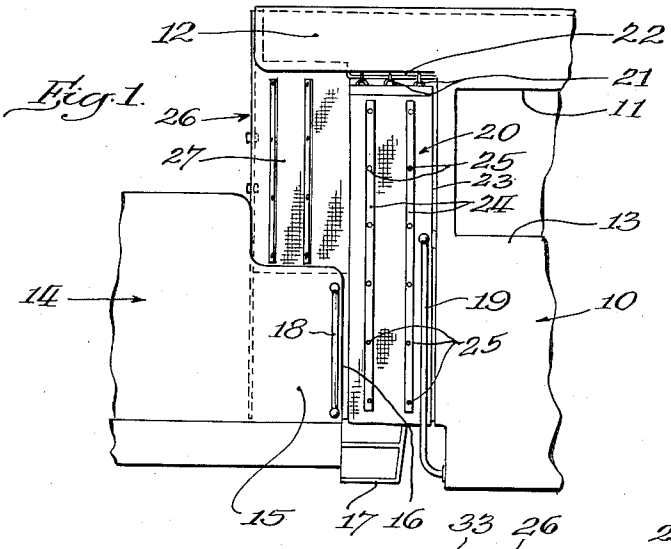


Fig. 2.

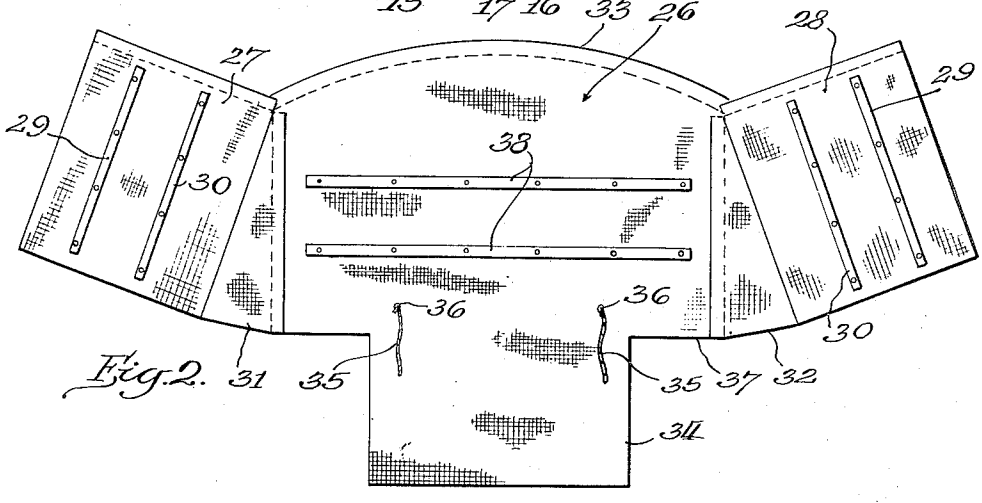
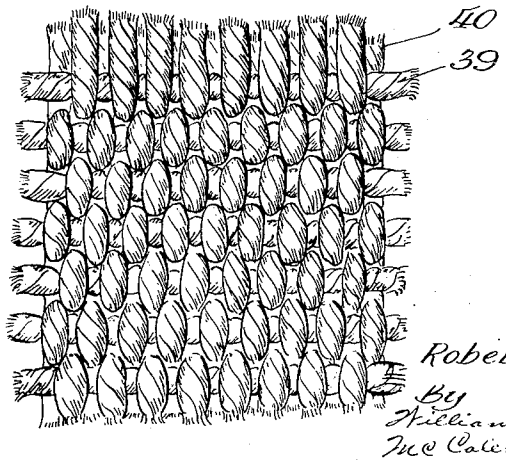


Fig. 3.



Inventor
Robert H. Cryor:
By Williams, Bradbury
Mc Calib & Hinkle
Attys.

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LOCOMOTIVE CAB CURTAIN

Robert E. Cryor, Oak Park, Ill., assignor to Union Asbestos & Rubber Company, Chicago, Ill., a corporation of Illinois

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7 Claims. (Cl. 28—1)

The present invention relates to locomotive cab curtains and is particularly concerned with the provision of a waterproof and fireproof locomotive cab curtain, an improved structure which is adapted to be used for a long period of time without deterioration.

The purpose of a curtain on the sides and rear of a locomotive cab is to provide protection from the elements for the occupants of the cab during cold or rainy weather. During seasons when no such protection is required, these curtains, being hung by hooks or rings on a slide rod, are merely shoved into a series of folds in an out-of-the-way position or rolled up from the floor and suspended from above by a tying arrangement.

Thus, the curtain, when not in use, does not interfere with the movements of the occupants of the cab; yet it is always ready for instant use should protection from sudden storms be required. It will be obvious, therefore, that a flexible fabric is ideally suited for construction of such protective curtains.

Indeed, it is essential that the fabric possess the highest degree of flexibility to permit ready rolling or folding of the fabric and also that the curtain may be easily pushed aside on entering or leaving the cab when the curtain is in use.

It has been customary heretofore to use for the curtain of a locomotive cab, various cotton fabrics which have been water-proofed and which provided the necessary flexibility, but which possess the disadvantage of being highly combustible. Due to flying sparks or coals from the locomotive fire box and other possible sources of ignition, there is a constant fire hazard wherever such combustible curtains are used.

It has been a well known fact that woven asbestos fabrics might be substituted for this purpose to eliminate fire hazards, but woven asbestos fabrics of the prior art have inherent disadvantages in this type of application in that such fabrics have relatively low tensile strength, and are highly hygroscopic when in contact with moisture, such as encountered in outdoor service.

Further, because the fabric of the prior art absorbs water, it becomes very heavy and sags out of shape, due to the inability of the fabric to support this increased weight.

It is imperative, therefore, if asbestos fabrics are to be used, that they must be properly waterproofed, and, if possible, strengthened. It is possible to use various compositions to provide a waterproof and flexible finish for asbestos fabrics, but practically all compositions suitable for this purpose are combustible when subjected to a flame, and as a result nullify the advantage of the asbestos cloth.

On the other hand, treating compositions that may be used in asbestos cloth, which combine the properties of waterproofing and fireproofing, have all heretofore been very hard and rigid, and when applied to the fabric are entirely inflexible and thus are not suited for this purpose.

One of the objects of the invention is the provision of an improved locomotive cab curtain which is constructed of fabric that is waterproofed and suitably strengthened in all directions so that it is adapted to withstand the service to which it is liable to be subjected.

Another object is the provision of an improved waterproofed cab curtain which is non-combustible and which is very flexible and perfectly adapted for the rolling up or folding of the curtain according to the usual methods of hanging such curtains.

Another object is the provision of an improved locomotive cab curtain fabric which is equally strong in both directions, that is, across the warp and across the weft threads, so that there is no possibility of ripping or tearing due to weakness in any particular direction.

It is the object of this invention, therefore, to provide a locomotive cab curtain consisting of a specially constructed asbestos fabric, impregnated with a treating composition which renders the fabric highly waterproof and fireproof without impairing its flexibility, and which also has the important advantage of strengthening the asbestos fabric.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawing, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawing,

Fig. 1 is a fragmentary side elevational view of a portion of a locomotive cab and a tender equipped with a cab curtain constructed according to the present invention;

Fig. 2 is a plan view of the rear cab curtain pattern, laid out flat;

Fig. 3 is an enlarged fragmentary view of a piece of the fabric.

Referring to the drawing, 10 indicates the locomotive cab, which is provided with a window 11 and with a roof 12, which projects backward beyond the side wall 13 of the cab. The tender 14 is lower than the cab and usually its side wall 15 is spaced from the cab, leaving an opening 16 above the step 17. Suitable railings 18 and 19 are provided.

The side curtains 20, of which there are two, are preferably hung by means of rings 21 on rods 22 in such manner that they may be pushed aside, the rings sliding on the rod 25 and the curtain folding along vertical lines.

In order to prevent the curtain from flapping around in the wind, it is preferably also secured

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at one of the edges, such as the forward edge 23, and provided with the wooden or metal slats 24, which are secured at a plurality of spaced points 25 by rivets or other convenient fastening means to the fabric of the side curtain 20. Thus the side curtains 20 are adapted only to fold along vertical lines, but they may be pulled aside sufficiently without folding, to permit the occupant to look out or to pass through the opening 16.

The rear curtain 26, which also has a pair of side flaps 27, 28, covers the opening at the rear end of the roof 12, down to the tender, and also has the side flaps 27, 28, which fill in the space between the side curtains 20 and the main part of the rear curtain 26.

The side flaps 27, 28 and the main body of the rear curtain 26 may be fixedly secured to the roof 12 by hooks, eyelets, bolts or other securing means, or the side flaps 27, 28 may be so arranged that they will slide on a rod similar to the rod 22.

In order to prevent the side flaps 27 and 28 from flapping around in the wind, they may also be provided with vertical slats 29, 30, like the slats 25, and similarly secured.

As the side walls 15 of the tender may be located slightly wider apart than the width of the roof 12, each side flap 27, 28 is joined to the main body 26 of the rear curtain by a triangular portion 31, 32, which may be an integral part of each of the side flaps 27, 28.

The main body of the rear curtain 26 has an upper boundary 33, which is curved to conform to the roof, to which it is secured, and it has a width which is substantially equal to the width of the roof from side to side. It also has a depending curtain portion 34 of less width, which is so arranged with a pair of ropes 35 secured at the points 36 and passing through rings or pulleys on the inside of the curtain, the pulleys being secured to the roof or an upper part of the curtain, so that pulling on the ropes 35 will cause the lower flap 34 to roll up.

The side flaps 27, 28 and triangular portions may be stitched to the main body 26, or they may be loose, if desired, to roll back a curtain beyond the lower edge 37. The back curtain may also be provided with a horizontally extending slat 38 of wood or metal, fixedly secured thereto.

Thus the rear curtain is adapted to be rolled or folded along horizontal lines, and the lower flap 34 is particularly adapted to be rolled up when the fireman wishes easier access to the coal in the tender.

Various types of weaves of fabric may be employed, but I prefer to utilize a simple weave, which is shown in Fig. 3, in which 39 indicates the weft threads, extending transversely of the loom during weaving, and 40 indicates the warp threads, which extend longitudinally of the fabric.

The ordinary asbestos fabric of the prior art, woven in this manner, has a very poor strength factor transversely of the weft threads 39, because the weft or filler threads do not present nearly as much thread to resist tearing as do the longitudinal or warp threads 40. Therefore, I have made special provision for strengthening the fabric in a direction transversely to the weft threads and for making it flexible in all directions, so that it may be folded in a vertical direction or rolled or folded in a horizontal direction.

To those familiar with asbestos and asbestos fabrics, the importance of the increased strength obtained with the composition of my invention will be readily apparent. In fact, without provision for increasing the strength, it would not be possible to use an asbestos fabric in this type of service.

To demonstrate the need for high tensile strength in the application of the asbestos fabric for the locomotive cab curtain service, it is well to consider one of the most serious disadvantages of all asbestos fabrics. This is the relatively great weight of asbestos fabric as compared with cotton or other types of woven fabrics.

When an asbestos fabric is compared with cotton, duck, or canvas of the same weight, it is generally found that the asbestos has approximately one-third of the tensile strength of the canvas. Or when an asbestos fabric of a given tensile strength is compared with a canvas fabric of the same tensile strength, it will be found that the asbestos fabric weighs approximately three times as much as the canvas fabric.

For an example, a typical asbestos fabric, weighing three pounds per square yard, has a tensile strength equal to a canvas fabric which weighs only one pound per square yard. A further difficulty is that asbestos fabrics, being relatively coarse, are generally quite loosely woven and readily sag because of their great weight. In order to overcome this natural weakness of asbestos fabrics, it has been a common practice in many applications to incorporate, for strengthening purposes, various fine metallic wires along with the asbestos yarn. However, for fabrics in use as locomotive cab curtains, this method of reinforcement cannot be considered, for several reasons.

In the first place, the metallic wires, such as brass, or zinc, which may be used, tend to stiffen the fabric and make it too inflexible. Further, the metallic wire readily becomes corroded and weakened in this type of service because of sulphur vapors which result from combustion of low grade coal on the locomotive and around railroad yards. The sulphur vapors in combination with a moist atmosphere are particularly corrosive.

In some applications of asbestos fabrics, various strands of cotton or other vegetable yarn may be used in the fabrics for the purpose of reinforcement. However, I have found that such yarns tend to rot and disintegrate in the type of service I describe, and therefore cannot be considered as having permanent reinforcing value.

Another of the objects of my invention is to provide the necessary reinforcement of the asbestos fabric through the use of a novel composition which also has waterproofing and fireproofing properties. The composition I use in carrying out this object consists essentially of chlorinated rubber or rubber hydrochloride and a wax or wax-like substance, and a non-combustible plasticizer such as tri-cresyl phosphate or chlorinated diphenyl.

In this composition the chlorinated rubber and the non-combustible plasticizer predominate in the percentage composition, and thus provide the fireproofing properties of the composition. The wax or wax-like substance is, however, a most important inclusion, since it is this component that gives toughness to the composition and greatly increases the tensile strength of the finished fabric.

This strengthening agent may be a combustible wax, such as carnauba wax, beeswax, or japan wax, or an incombustible synthetic wax-like substance, such as the various grades of chlorinated naphthalene.

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I have found, however, that the waxes most suited for my purpose have a melting range of approximately sixty degrees to one hundred and ten degrees C. and that usually the higher the melting point the greater the strengthening effect in the finished composition.

So far as I am aware, none of the compositions of the prior art containing chlorinated rubber are suitable for a successful application to asbestos fabrics, particularly for the type of service encountered by locomotive cab curtains.

I have found the compositions of the prior art fail to provide all of the essential requirements demanded by this service. Some of these compositions provide sufficient flexibility of the fabric after treating, but do not lend strength to the fabric, nor are they in themselves sufficiently permanent in character to withstand long service under sunlight and out-of-door service conditions.

Other compositions may provide some additional strength to the fabric and may be relatively permanent through the use of a hard, less plastic composition; but these fail to provide the necessary flexibility. Various compositions have also been suggested, in which high pigment content has been included primarily to protect some of the components of the composition from destruction through sunlight and weathering.

Pigments in such cases protect the composition, but increase the weight of the fabric tremendously without increasing the fabric's strength; and as a result, such pigmented films are definitely impractical for use on asbestos fabrics for my purpose.

Another object of the invention is to develop an entirely different type of composition for the particular conditions imposed in locomotive cab curtain service.

When chlorinated rubber, plasticized with a non-combustible plasticizer, such as chlorinated diphenyl or an aryl phosphate, such as tri-cresyl phosphate, is used, it produces a flexible film having fireproof properties; but such a film, when applied to asbestos fabrics, does not materially improve the tensile strength of the fabric, and therefore it is not practical for service in a locomotive car curtain.

However, I have discovered that the addition of a wax-like material to this composition toughens the mass and strengthens the treated fabric to a considerable degree. The following table demonstrates the improvement resulting from such an addition.

Tensile strength-asbestos cloth treated with typical compositions

	Composition	Tensile strength 1" strip	Percent increase in tensile strength
		Pounds	*Percent*
1	Asbestos cloth untreated	89	
2	Treated with chlorinated rubber and chlorinated diphenyl	124	39
3	Same as No. 2, plus Montan wax	148	66
4	Same as No. 2, plus beeswax	150	68
5	Same as No. 2, plus chlorinated naphphalene	152	70
6	Same as No. 2, plus japan wax	159	78

In carrying out the objectives of my invention I find that the proportions of each component should normally fall within the following ranges: Chlorinated rubber 25% to 40%; strengthening component 10% to 40%; non-combustible plasticizer 30% to 60%. It is to be understood that these are the basic components, but the entire mass is preferably dissolved in a suitable solvent for impregnation into the asbestos fabric.

In preparing the solution of the composition, I prefer to use about twenty parts of the composition to eighty parts of solvent, but I do not wish to be strictly limited to these proportions.

Typical examples of a preferred composition are as follows:

1. 36% chlorinated rubber, 12% chlorinated naphthalene, 52% chlorinated diphenyl.
2. 36% chlorinated rubber, 12% carnauba wax, 52% chlorinated diphenyl.
3. 40% chlorinated rubber, 12% carnauba wax, 48% tri-cresyl phosphate.
4. 40% chlorinated rubber, 12% chlorinated naphthalene, 48% chlorinated diphenyl.
5. 25% chlorinated rubber, 30% chlorinated naphthalene, 45% chlorinated diphenyl.
6. 25% chlorinated rubber, 40% carnauba wax, 35% tri-cresyl phosphate.

Where I mention chlorinated rubber, I desire to include the various commercially available forms of rubber hydrochloride wherein the basic material prior to the chlorination process has been natural rubber, as well as the various synthetic polymers having rubber-like properties and containing high percentages of chlorine. I may also use in small proportions crude natural rubber, providing other components are highly chlorinated.

Where I have described chlorinated compounds, I do not desire to be strictly limited to chlorine, but wish to include any of the group of elements known as halogens, all elements in this group having chemical properties similar to chlorine. Included in this group are bromine and iodine, either of which might be substituted for chlorine in the chlorinated compounds, imparting equal or better properties than chlorine. Both bromine and iodine are, however, at this time too expensive to consider for most commercial applications.

Where I mention non-combustible plasticizers, I prefer to use either chlorinated diphenyl or tri-cresyl phosphate, since these are both readily available at reasonable cost. However, there are other plasticizers sufficiently incombustible to serve equally as well, and therefore I do not wish to be strictly limited in the choice of plasticizers.

Where I mention natural or synthetic wax-like components, I prefer to use either carnauba wax, representing a combustible component, or chlorinated naphthalene, an incombustible synthetic wax. However, beeswax, japan wax, petroleum, or paraffine waxes, Montan wax, and others may on occasion be used.

In certain cases it is desirable to color the fabric for decorative effects, and with the composition I propose, this is readily possible by the addition of a small percentage of a suitable oil soluble dye stuff. I wish to avoid all pigments that might be used for coloring purposes, since these tend to materially increase the weight of the composition, as well as the finished fabric.

Further, since such pigments do not penetrate into the asbestos yarn, but rather are filtered out and are deposited only on the surface of the fabric, this leaves a distinct surface-coating effect, which tends to crack when the fabric is flexed.

As a means for applying the composition to the fabric, I prefer to dissolve all the components of the composition in a suitable solvent, such as toluene or xylene or a combination of one of these solvents with petroleum naphtha, using the resulting solution for impregnation of the woven

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fabric. However, it may be on occasion desirable to impregnate the yarn before weaving.

In either case, after it has been impregnated, the solvent is eliminated by evaporation, leaving the composition distributed through the yarns of the fabric. By this method it is possible for the composition to penetrate the core of each yarn, and this permits complete coating of all fibers, yet requires the least amount of composition, with consequent savings in cost, as well as providing the minimum increase in weight of the asbestos fabric.

By this method it is possible that the composition may represent as little as 15% to 20% of the finished weight of the fabric, and still provide all of the important features of waterproofing and fireproofing, strengthening and flexibility.

For the particular service conditions that locomotive cab curtains encounter, I have found it desirable to incorporate the waterproof and fireproof composition in asbestos fabrics of highly specialized and novel design. Here again it is the purpose to provide a fabric of higher tensile strength and greater resistance to tearing than has heretofore been possible with ordinary asbestos fabric, and the result is that such fabrics, in combination with the composition which so materially strengthens the fabric, are strong, resistant to tearing, and well nigh indestructible.

Since asbestos yarns are by nature coarse and bulky, and also quite weak, considering their size, an asbestos fabric made from 10-cut or 12-cut yarn, for example, is quite heavy; but it does not possess high tensile strength. Further, because a closely woven fabric always has a greater number of yarns in the warp direction than in the filler direction, the tensile strength of the filler direction is even less than that of the warp direction.

Due to the low tensile strength in the filler direction, the asbestos fabric may be torn with relative ease, and it is this undesirable characteristic that I have overcome by designing a cloth with asbestos warp yarn and filler yarn consisting of spun glass fiber. In this case the advantage of spun glass filler yarn is that this yarn has approximately two to four times the strength of asbestos yarn of corresponding size.

For example, in a typical fabric I may use twenty strands of 2-ply 10-cut asbestos yarn per inch in the warp and may have ten picks per inch of the single 10-cut glass yarn in the filler. This cloth will have very nearly the same tensile strength in either warp or filler direction. By use of glass filler yarn the cloth is also lighter in weight than with asbestos filler yarn.

In this particular cloth a strand of 2-ply 10-cut asbestos warp yarn has a tensile strength of approximately 4½ pounds, while each strand of single ply 10-cut glass filler yarn has a tensile strength of approximately 11 pounds.

Although I prefer in most cases to use glass yarn in the filler of the asbestos cloth only, I do not wish to be strictly limited in this respect. On occasions, for special purposes, I may use glass yarn in the warp direction as well as the filling direction, and in combination with asbestos warp yarn. For example, glass yarn and asbestos yarn may be used together in suitable proportions in both the warp and weft threads, or in either the warp or the weft threads.

In other embodiments of the invention, the warp threads may be composed of glass yarn threads, and while no tensile strength is required along the weft, asbestos weft threads may be used. I may also use alternate asbestos and glass yarns in the warp directions. Further, I may apply my waterproofing composition to fabrics composed entirely of glass yarns in both warp and filler direction. The waterproofing and fireproofing properties of the composition would provide the same advantages in this type of fabric as in the asbestos fabric.

Further, although I prefer in most cases to exclude other reinforcing means, such as metallic wires and vegetable fiber yarns, such as cotton, I nevertheless wish to avail myself of the possibilities of using such reinforcing means in addition to the glass yarn in asbestos fabrics for special purposes. For example, I may wish to use glass yarns in the filler direction of my fabric and asbestos yarns reinforced with brass wire in the warp direction of the fabric.

Having thus described the novel advantages and construction details of the product of my invention, what I claim is:

1. A locomotive cab curtain comprising a fabric having asbestos warp threads and having spun glass weft threads, and said fabric being impregnated with a waterproofing and fireproofing composition, including chlorinated rubber, a non-combustible plasticizer and a strengthening agent selected from a group of natural or synthetic wax-like materials having melting points in the range of 60 to 110 degrees C.

2. An article of manufacture comprising a fabric having asbestos warp threads and having spun glass weft threads, and said fabric being impregnated with a waterproofing and fireproofing composition including chlorinated rubber, a non-combustible plasticizer, and a strengthening agent selected from a group of natural or synthetic wax-like materials having melting points in the range of 60 to 110 degrees C.

3. A locomotive cab curtain comprising a fireproof fabric impregnated with a waterproofing and fireproofing composition including chlorinated rubber, a non-combustible plasticizer and a strengthening agent selected from a group of natural or synthetic wax-like materials having melting points in the range of 60 to 110 degrees C.

4. An article of manufacture comprising a fireproof fabric impregnated with a waterproofing and fireproofing composition including chlorinated rubber and a non-combustible plasticizer and a strengthening agent selected from a group of natural or synthetic wax-like materials having melting points in the range of 60 to 110 degrees C.

5. A locomotive cab curtain comprising a fireproof fabric impregnated with a waterproofing and fireproofing composition including 25 to 40 percent chlorinated rubber, 30 to 60 percent non-combustible plasticizer, and 10 to 40 percent of a strengthening agent selected from a group of natural or synthetic wax-like materials having melting points in the range of 60 to 110 degrees C., said composition being dissolved in suitable solvent for purposes of impregnation.

6. A locomotive cab curtain comprising a fireproof fabric impregnated with a waterproofing and fireproofing composition including 25 to 40 percent chlorinated rubber, 30 to 60 percent of non-combustible plasticizer, and 10 to 40 percent of a strengthening agent selected from a group of natural or synthetic wax-like materials having melting points in the range of 60 to 110 degrees C., said composition being dissolved in a suitable solvent for the purpose of impregnation.

7. A locomotive cab curtain comprising a fabric member having its filler yarns consisting mainly

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of spun glass fiber and having its warp yarns consisting mainly of asbestos fibers, whereby the fabric has balanced tensile strength in both the warp and filler direction, said curtain being impregnated with a flexible waterproofing and fireproofing composition, including chlorinated rubber, a non-combustible plasticizer and a strengthening agent comprising a synthetic wax-like material, said composition being dissolved in a suitable solvent for the purpose of impregnation.

ROBERT E. CRYOR.