Nov. 10, 1970 B. E. WILLIAMS 3,539,435

FABRIC CONSTRUCTION FOR MEAT-PACKING SHROUD

Filed June 29, 1967

FIG. 1.

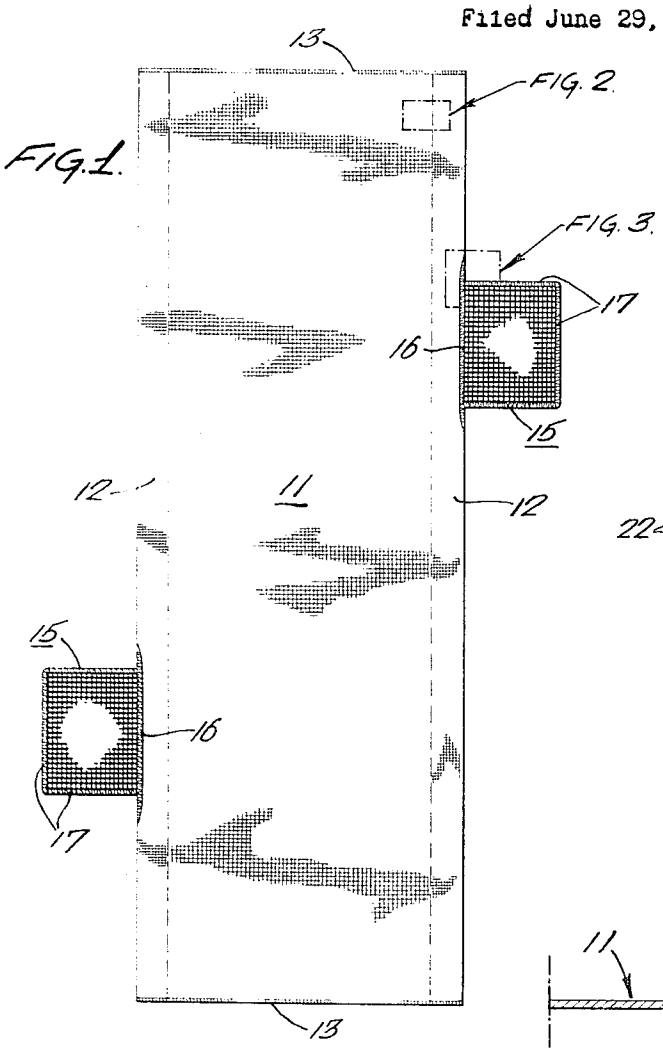


FIG. 2.

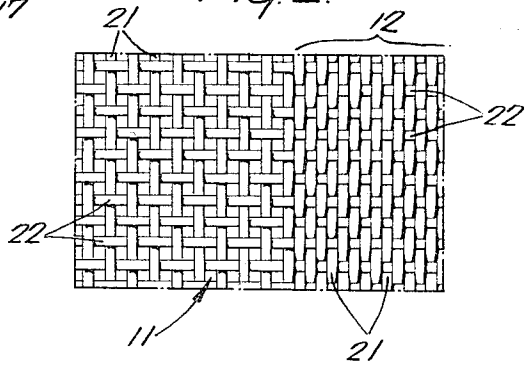
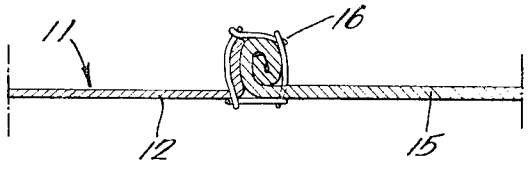


FIG. 4.



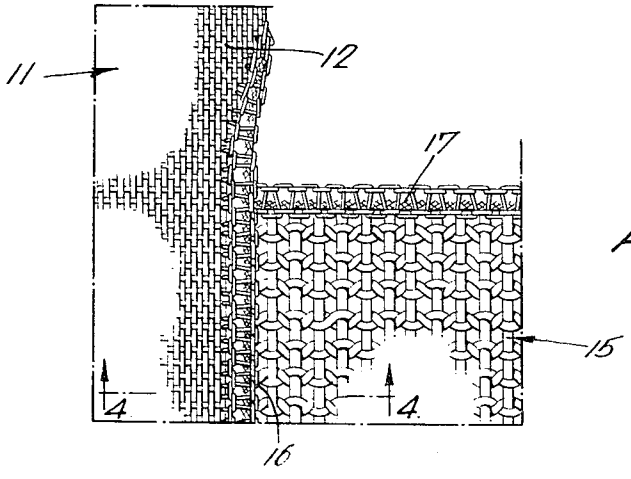


FIG. 3.

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FABRIC CONSTRUCTION FOR MEAT-PACKING SHROUD

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U.S. Cl. 161—86 11 Claims

ABSTRACT OF THE DISCLOSURE

A shroud for wrapping meat carcasses, especially sides of beef, comprising an elongated rectangular sheet of fabric which is woven with selvages along the long sides and is hemed or otherwise finished along the short sides. The longitudinal yarns of the shroud are composed of ramie fiber whereas the yarns extending widthwise of the fabric are composed of cotton fiber. Supplementary flaps may be secured to the selvages, either adjacent diagonally-opposite corners of the shroud or along their entire length. The flaps may comprise rectangular sheets of fabric having a weave construction with a crisscross arrangement of the warps at intersections with the wefts, such as a leno-weave, and having warp and weft counts which are less than the warp and weft counts of the relatively open plain weave of the body of the shroud. Such flaps provide large interstices through which skewers may pass without destroying the yarns of the flap. The warp of the flap is preferably parallel to the weft of the body of the shroud.

The present invention relates to fabric construction for use in the meat packing industry, and has particular application to fabrics for use as shrouds for wrapping meat carcasses, such as sides of the beef during chilling.

When processing meat, it is the practice in the meat packing industry to wrap the carcasses during one stage or another of the processing operation. When processing beef, the freshly killed carcass after evisceration, skinning, and splitting into sides, is wrapped with a shroud which has been soaked in water containing small amounts of salt and/or other chemicals, and is chilled while wrapped in order to condition the exposed fatty layer of fell on the outer surface of the side of beef. The shrouded sides of warm beef are chilled to cooler-room temperatures of 35° to 40° F. and, after chilling, the shroud is removed. Normally, during chilling, a substantial portion of the moisture in the shroud is evaporated, but it is preferred to remove the shroud while it is still somewhat damp to prevent undue adherence and damage to the fat or fell. After removal, the shrouds are normally laundered and reused.

In order to wrap the shrouds on the sides of beef, and at the same time maintain the size of the shroud to one that is easily handled, the shroud is normally skewered to the carcass, covering only the outer fatty surface of the beef side. The skewering is accomplished by driving the skewers through or adjacent one selvage of the shroud into the chine bone or backbone and then pulling the shroud around the carcass and skewering the other selvage or adjacent cloth of the shroud into the flank and brisket at the edge of the visceral cavity. At the top of the beef side, the shroud is fitted around the round by folding the shroud over on itself, making a self-binding tuck at the shank and the more expert operators in the packing house can fold the shroud in a manner to avoid the necessity for using more than one skewer to hold the shroud in place. The bottom of the shroud is generally brought around under the neck and skewered near the first rib in the chest cavity.

It is apparent that since the shrouds are used solely during the chilling operation within the packing plant, they are not subject to wear and abrasion except during the wrapping and unwrapping operations and during the laundering. Obviously, the greatest wear occurs along the edges of the shroud where it is handled during the wrapping operation and through which the skewers are driven in order to anchor the shroud to the carcass.

When wrapping beef sides, it is desirable to cause the shroud to enclose the fatty tissue in the crotch area of the beef side and to accommodate this, a greater shroud width is required in this area than is required in the remaining area of the beef side. Many packers use shrouds of extra width in order to accommodate this factor whereas other packers accommodate this by attaching a tab or flap to the selvage adjacent one corner of the shroud in the area where it overlies this fatty tissue. For ease of application of the shrouds, the selvage adjacent the diagonally-opposite corner of the shroud is likewise supplied with a tab. To anchor the tab onto the fatty tisue, skewers are driven through the tab in a number of places and, frequently, the tab is destroyed by the skewering well in advance of the time when the remaining portions of the shroud would normally be rendered useless.

Until recently, the bulk of the shrouds used in the packing industry were cotton throughout. In order to provide greater wear and longer life to the shrouds, the practice was to produce a wide selvage along the side edges of the shroud through which the skewers were driven. The selvage was normally formed by substantially increasing the warp count in the selvage area for a distance of 4 to 8 inches inwardly along the sides of the shroud which normally have a width in the neighborhood of 40 to 46 inches.

The skewering operation inherently punctured and ruptured the cottonyarns of the shroud in the selvage area, but because of the increased density of yarns and the extended width of the selvage area through which the skewering occurred, sufficient yarns remained intact to maintain the integrity of the shroud for a satisfactory period. However, inevitably, the weakened areas caused by the skewering operations initiated tears or splits which were enlarged as the shrouds were pulled around the meat carcasses. Such tearing of the shrouds terminates their useful life.

The wide selvages on the conventional cotton shrouds tend to leave undesirable surface markings on the fat. The greater density of the shroud in the selvage area creates a different moisture and color effect upon the fatty tissue underlying the shroud than does the less dense shrouding in the central area of the shroud. As a result, a visible line may be apparent on the carcass, indicating the selvage area of the shroud, after the shroud has been removed from the carcass.

Furthermore, since the shrouds are continually damp, they are subject to damp rotting and mildew if held for any prolonged period.

In recent years, shrouds have been used which are woven entirely of ramie, as disclosed and claimed in U.S. Pat. No. 2,824,011. Because of the increased strength of ramie, the weave may be looser than cotton with the result that the skewering operation results in fewer fractures of the thread and reduced tearing. Ramie is also less subject to damp rotting and mildew and has greater strength when wet than when dry. Thus, the reduction in tearing and the increased strength of the ramie fabric has substantially increased the useful life of the shrouds made in this manner, which in turn has helped offset the increased initial cost of such shrouds.

In another way, the strength of shrouds has been increased. As disclosed in U.S. Pat. No. 3,155,123, the

shrouds have been woven with a limited amount of ramie yarns interspersed with cotton yarns in the warp and fill. Such shrouds have overcome certain disadvantages of shrouds woven entirely of ramie, particularly the "boardiness" which is caused by the less flexible character of the ramie threads. Shrouds woven entirely of ramie tend to exhibit a stiffness which detracts from the ease of wrapping the shrouds on the carcasses and the ability to do a good job of clothing, that is, smoothing and bleaching the fat surface. The minor proportion of ramie threads in shrouds made in accordance with U.S. Pat. No. 3,155,-123 has produced in the shrouds a "hand" which is quite close to the "hand" of shrouds made entirely of cotton. Reinforcing yarns of ramie interspersed in the cotton shrouds reduce to a large extent the tearing of the shrouds or, at least, limit the extent of the tears which appear. However, it has been found difficult to obtain shrouds woven in accordance with the disclosure of Pat. No. 3,155,123 because of the differences exhibited by the cotton and ramie yarns in the weaving operation and the increased cost of these ramie-reinforced cotton shrouds over the cost of cotton shrouds has approached that of shrouds made entirely of ramie, but without a corresponding increase in useful life. As a result, such shrouds have not been entirely satisfactory.

Another serious drawback to interspersing ramie and cotton in either warp or fill is the d ifference in the shrinkage of the two yarns. Ramie yarns shrink much less than cotton yarns; hence there soon develops a puckering which results from the uneven shrinking effect.

With the foregoing in mind, the present invention provides an improved shroud fabric construction which enables the shrouds to have a prolonged useful life with a moderate cost differential between the conventional cotton shroud and the shroud of the present invention.

The present invention also provides an improved shroud which has a "hand" corresponding closely to the "hand" of a cotton shroud in the important selvage to selvage respects, and in which the shrinkage of the yarns does not result in a rough, uneven or puckered shroud. Since shrouds, to perform a creditable job, must fit the contour of the side of beef, fill the indentations and crevices and since this is better accomplished in the sidewise rather than the lengthwise direction, it is most important that the shroud, from selvage to selvage be soft, supple and pliable.

The present invention also provides an improved shroud having supplemental flaps secured to the selvage and woven of a fabric different from the fabric of the body portion so as to provide greater resistance to damages by the skewering.

In accordance with the invention, the body of the novel shroud is woven with a warp composed of ramie yarns throughout and a filling composed of cotton yarns throughout. In this manner, the shroud obtains the benefit of the superior strength of the ramie yarns in the warp which prevents tearing when the shroud is subjected to stress weftwise or filling-wise of the fabric as wheen the shroud is skewered around the beef side. The shroud also obtains the benefit of the cotton yarns which have a softer hand and which are more susceptible or stretching than the ramie yarns so that the shroud can conform closely to the contour of the beef side as it is stretched laterally around the beef carcass. The shroud of the invention is also more economical to produce than prior shrouds because of the operational characteristics of conventional looms which accommodate ramie warps with little difficulty and operate efficiently and effectively with cotton filling in the shuttle, or other weft-inserting mechanism.

Because of the superior strength of the ramie warp, the weave of the shroud may be relatively open in comparison to the weave of a cotton shroud, thereby further reducing the tendency of the shroud to deteriorate as it is repeatedly applied to the beef carcasses.

All of the objects of the invention are more fully set forth hereinafter with reference to the accompanying drawing wherein:

FIG. 1 is a face view of a shroud made in accordance with the present invention;

FIGS. 2 and 3 are enlarged views of the portions of the shroud enclosed in broken lines at **2** and **3** respectively in FIG. 1; and

FIG. 4 is a sectional view taken on the line **4—4** of FIG. 3.

Referring now to the drawing, the shroud illustrated in FIG. 1 comprises an elongated rectangular sheet of woven fabric having a body portion **11** with selvages **12** extending along the longitudinal edges of the body portion. At the opposite ends, the shroud is hemmed as indicated at **13** to retard raveling of the fabric. Preferably, the shroud is hemmed with a conventional over-stitch or serging to provide a serged seam to avoid the waste inherent in a folded hem. As an alternative, the free edges may be coated with a suitable plastic binder which assumes a set to prevent raveling.

In the illustrated embodiment of the invention, on each side of the shroud, flaps **15** are provided. In the present instance, the flaps are rectangular sheets having a length approximately ⅕ of the length of the shroud and a width approximately ¼ the width of the shroud, and are attached along the selvage **12** at points spaced from diagonally-opposite corners a distance substantially corresponding to the length of the flaps. It is to be understood, however, that the presence or absence of the flaps and their length and spacing from the diagonally-opposite corners, have been at the option of the packing plant in which the shrouds are used. For example, certain plants did not require flaps on the shroud and merely use a shroud of greater width to encompass the carcass as desired. When using a shroud made in accordance with the invention in other installations, it may be desired to utilize a flap which extends throughout the length of the selvage on each side thereof, or only on one side thereof. In the present instance, the selvages **12** have twice the warp density of the body **11** and the same weft density as the body **11**, and are about four inches in width. Where the flaps **15** are omitted, it is usually preferred to extend the selvages to about eight inches in order to accommodate the skewers over a wider area of the shroud. By the same token, if the flaps **15** are extended so as to be coextensive in length with the selvage edge of the shroud, the selvage along the extended flaps may be reduced in width to as little as one inch or less. In some instances, the selvage may be omitted and the extended flap may be secured along a cut edge of the shroud material.

In the present instance, as set forth hereinafter, the flaps **15** are of a substantially more open weave than the weave of the body portion **11** and the selvages **12** and the flaps are secured to the selvages **12** along their outer marginal portions by a serged seam or binding as indicated at **16** in FIGS. 1, 3, and 4. Additionally, the entire exposed periphery of the flap **15** is hemmed or bound with a serged seam as indicated at **17** in FIGS. 1 and 3. The serged seam, of course may be omitted in those instances where the edeg of the flap is constituted by a selvage of the material forming the flap.

In accordance with the invention, the shroud is composed in the body and selvage with warp yarns **21** composed of ramie. In the present instance, the warp yarns are spun entirely of ramie without fibers of other character. If desired, however, for the purpose of identification of the shrouds, it may be desired to incorporate into the warp selected yarns of a different character. For example, it may be desired to incorporate cotton or linen yarns as a stripe of contrasting color between one of the selvages **12** and the body portion of the fabric so as to identify the shroud, for example as a trade mark or as to its date of purchase, its location of manufacture, or its use, composition, or the like. Fibers, natural or man-made, equivalent to ramie in strength, water absorption, shrinkage, tenacity, extensability, resistance to mildew and flexibility, may be substituted for the ramie warp; however, it has been found that ramie fibers provide the opti-

mum combination of characteristics for use to provide the desired resistance to tearing or splitting by the skewering operations and the continual moistness present in the usual meat processing operations.

In combination with the ramie warp, a natural or synthetic weft yarn or yarns are used. In the present instance, the weft yarns **22** of the fabric are composed of cotton which exhibits the desired softness and stretchability to permit the shrouds to be wrapped around the carcasses. A natural cellulosic fiber is preferred in the weft in combination with the ramie warp to provide sufficient absorbency in the shroud to maintain the moistness desired through the chilling operation in the meat processing plant. While other natural cellulosic fibers than cotton are presently available, and synthetic yarns may be made with corresponding characteristics, considering the cost and the other characteristics desired in the shroud, it has been found that cotton yarns produce the best shrouds.

In order to provide the maximum durability without detracting from the effectiveness of the shrouding operation, it has been found that the weave construction in the body **11** should be relatively open with a warp and a weft count falling within the range of 20 to 40 yarns per inch. When the count falls below the minimum 20 yarns per inch, the shroud tends to leave shroud marks on the chilled fat of the carcass which detracts from its salability; and when the count rises about 40 yarns per inch, when the shroud is skewered onto the carcass the skewers tend to puncture and rupture the yarns themselves rather than passing through the interstices between the threads. When the skewers puncture or otherwise disrupt the yarns, the shroud has a greater tendency to tear after repeated use. The yarn counts of the warp and the weft must also be selected to provide the desired strength without sacrificing economy in production. The yarn count of the cotton weft should be in the range of 30 to 40 and the yarn count of the ramie warp should be in the range of 20 to 30. As shown, the weave is a plain weave to provide the optimum dimensional stability in the shroud.

The construction of the flaps has been selected to provide the greatest durability to withstand the concentrated skewering operation which occurs through the flaps. To this end, it has been found that a coarse leno weave is especially satisfactory. Inasmuch as the stress on the flaps during the skewering operation is for the most part in a direction weftwise of the body portion, it is preferred to attach leno-woven flaps to the selvage with the warp of the flap extending parallel to the weft of the body portion. The criss-cross arrangement of the warps at their intersections with the weft provides substantially improved strength against tearing when the flaps are stretched across the pelvic cavity and anchored around the aitch bone. The leno weave of the flaps provides large interstices through which the skewers may pass without destroying the yarns forming the flaps, and since the flaps do not engage the fell of the carcass, but are confined to the aitch bone or pelvic cavity and/or the chine bone, the yarn characteristics of the flaps are not as critical as the yarn characteristics in the body and selvage. Furthermore, the coarse weave of the flaps has been found to avoid the ill effect of puckering which would normally occur when uniting two different fabrics having different shrink characteristics. To prevent premature destruction of the flaps, it is preferred to use yarns which do not readily slip when the flaps is subjected to the stress of the skewering operations. It has been found that synthetic yarns such as processed nylon and rayon may be used effectively for the flaps, these yarns providing greater strength than the cellulosic yarns embodied in the shroud weft. In the present instance, the leno fabric has a warp density of 20 yarns per inch and a weft density of 10 yarns per inch, the yarns being heavy, in the order of $\frac{1}{32}$ inch or $\frac{1}{16}$ inch in diameter.

In order to enhance the durability of the shroud, it may be desired to incorporate strength-imparting resins in the shroud. For example, the shroud after weaving, may have a porous plastic film bonded thereto which is thereafter subjected to radiation treatment to impart greater durability to the plastic. The irradiated film serves to bind the warps and the wefts together to provide further resistance against tearing during the skewering operation. The porosity of the film enables the shroud to evaporate excess moisture from the carcass while, at the same time, retards excessive evaporation. Where it is not desired to retard evaporation, the shroud may be treated with a suitable strength-imparting resin which impregnates the yarns of the shroud and which, when cured, imparts additional strength to the shroud against tearing. Radiation treatment of the impregnated shroud further enhances the strength thereof. Inasmuch as the ramie yarns of the warp in the body and selvage of the shroud have sufficient strength without such treatment, it may be desired in some instances to impregnate only the weft yarns of the shroud with a suitable strength-imparting resin so as to increase the resistance to tearing in those limited areas in which the skewering operation exerts a force warpwise of the shroud as opposed to the majority of cases in which the skewering operation exerts its tearing force weftwise. It has been found that radiation treatment of the resin-impregnated wefts of the shroud increases the strength without adversely affecting the absorbency and flexibility desired.

While a particular embodiment of the present invention has been herein illustrated and described, it is not intended to limit the invention to such disclosure, but changes and modifications may be made therein and thereto within the scope of the following claims:

1. In a shroud for wrapping meat carcasses comprising a body of an elongated rectangular sheet of woven fabric having a warp and weft density within the range of 20 to 40 yarns per inch, the weave of said fabric being a relatively open plain weave, the improvement wherein the warp of said sheet extends parallel to the long sides of the rectangle and the weft of said sheet extends parallel to the short sides of the rectangle, and including at least one flap attached to said sheet along one of its long sides, said flap comprising a rectangular sheet of fabric having a weave construction with a crisscross arrangement of the warps at intersections with the wefts, the warp and weft densities of said flap being less than the warp and weft densities of said body sheet so as to provide large interstices therein through which skewers may pass without destroying the yarns forming said flap weave construction.

2. A shroud according to claim **1** wherein said flap comprises a leno-weave fabric having the warp thereof extending parallel to the weft of the shroud sheet and the weft thereof extending parallel to the warp of the shroud sheet.

3. A shroud according to claim **1** wherein in the body the yarn count of the weft yarns is in the range of 30 to 40 and the yarn count of the warp yarns is in the range of 20 to 30.

4. A shroud according to claim **1** wherein said sheet includes a selvage having a warp density approximately twice the warp density of the remaining portion of said sheet and a weft density corresponding to the weft density of said sheet.

5. A shroud according to claim **1** wherein said weft yarns of the body comprise cotton fibers.

6. A shroud according to claim **1** including a second flap attached to said sheet along the other of its long sides, said flaps being positioned intermediate the transverse center-line and the diagonally opposite corners respectively of said sheet.

7. A shroud according to claim **1** wherein the weft of said sheet consists of yarn of natural cellulosic fibers other than ramie and the warp consists of yarns composed entirely of ramie.

8. A shroud according to claim 1 including an irradiated plastic resin reinforcing the body thereof.

9. A shroud acording to claim 8 wherein said plastic comprises a porous film bonded to the woven fabric.

10. A shroud according to claim 8 wherein said plastic is impregnated into the yarns of said fabric.

11. A shroud according to claim 8 wherein the weft yarns of said body are impregnated with said irradiated plastic resin.

References Cited

UNITED STATES PATENTS

2,564,454	8/1951	Stohlman	99—174 X
2,697,664	12/1954	Goeser et al.	99—174
2,699,396	1/1955	Francis	99—174
2,824,011	2/1958	Williams	99—174
2,999,056	9/1961	Tanner.	
3,124,468	3/1964	Williams	99—174
3,155,123	11/1964	Williams	99—174 X
3,188,265	6/1965	Charbonneau	161—412 X

FOREIGN PATENTS

401,818	12/1941	Canada.
5,138,870	6/1955	Canada.

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99—174; 139—383; 161—91, 159, 412