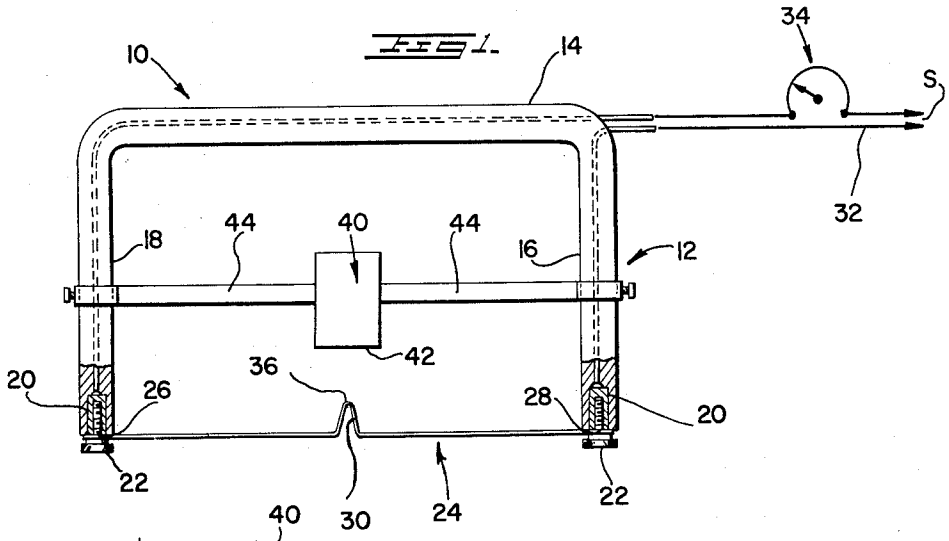
April 30, 1963 J. A. SOLTIS 3,087,846

METHOD OF TRIMMING AND EDGE SEALING TEXTILE FABRICS

Filed Sept. 10, 1959

Fig 1.



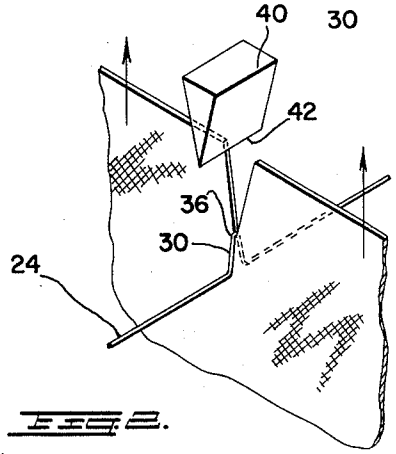


Fig 2.

Fig 3

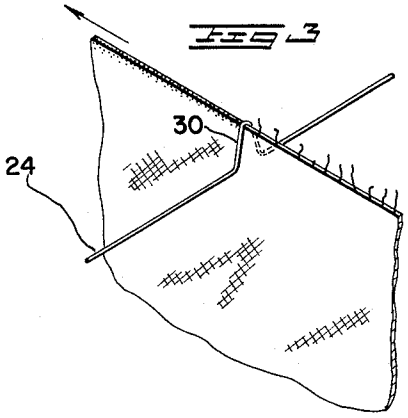
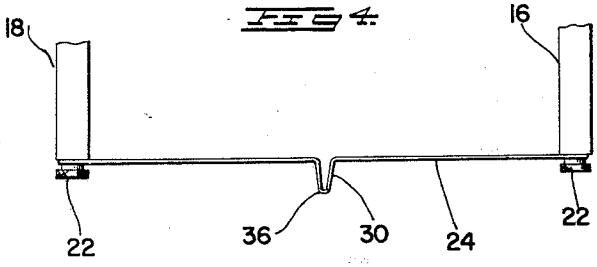


Fig 4.



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United States Patent Office 3,087,846 Patented Apr. 30, 1963

3,087,846

METHOD OF TRIMMING AND EDGE SEALING TEXTILE FABRICS

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Filed Sept. 10, 1959, Ser. No. 839,091
1 Claim. (Cl. 156—88)

This invention relates to a device for cutting, trimming and edge sealing textile fabrics and, more particularly, to such a device for trimming and edge sealing textile fabrics consisting predominantly of synthetic fibers.

The invention has particular utility as a trimmer and edge sealer for fabrics, such as papermakers' felts composed predominantly of synthetic fibers.

Papermakers' felts are employed in the manufacture of paper to pick up freshly laid web of wet paper or pulp from the forming wires; to conduct the web through the paper finishing presses; and to remove water from the paper in pressed sections or the like. Papermakers' felts are generally supplied to paper mills, custom-made to fit particular machines. If the finished woven synthetic papermakers' felt as manufactured or when wetted upon the paper machine is wider than the specifications permit, the felt must be trimmed to the proper size and the cut edge sealed to prevent edge raveling.

Conventional type felts made of wool or wool plus low percentages of synthetic fiber, can be trimmed on the felt drier or the paper machines by merely holding a knife at the desired distance from the finished edge while the felt is running. Raveling of the cut edge of such conventional felts is minimized by the fulled nature of papermakers' felts composed substantially entirely of natural wool.

In United States patent application Serial No. 767,109, L. R. Mizell, filed October 14, 1958, a method is disclosed for making improved papermakers' felts consisting substantially entirely of synthetic thermoplastic fibers whereby finished felts having better dimensional stability, improved wear resistance, better water removal properties, and improved chemical and bacterial resistance over conventional wool-containing woven felts. With the discovery of a method of making papermakers' felts predominantly of synthetic thermoplastic fibers, the papermaking industry was provided with felts having improved physical properties; however, such felts have presented substantial problems in providing means for edge-trimming and sealing during manufacture and during use on the paper machines. When a papermakers' felt composed predominantly of synthetic fibers is trimmed at the felt plant, the cut edge can be sewn, stitched, or crocheted, but this is a costly, time-consuming operation. It has also been found that sewing, stitching or crocheting the edge can cause uneven warp tension across the width of the felt which, in turn, cause uneven operation of the felt or papermaking machines.

When papermakers' felts composed substantially or predominantly of synthetic fibers are trimmed on the paper machines, they cannot be stitched or crocheted and it has been found that such trimmed felts ravel badly.

It is, therefore, a primary object of the present invention to provide a device for trimming and sealing the edges of fabrics consisting predominantly of synthetic fibers.

It is a further object to provide such a device that will both trim and edge-seal the fabric in one operation while the felt is running on felt mill driers or on papermaker machines and the like.

It is a further object of the present invention to provide such a device that will neatly seal the edge of textile fabrics consisting predominantly of synthetic fibers and wherein the finished edge is uniform, flexible and durable.

A further object is to provide such a device that may be employed for nipping or cutting the loose ends of splices where felts are not woven endless, and for cutting and heat sealing thread and/or yarn ends.

These and other objects and advantages are provided by a device for trimming and sealing fabrics consisting predominantly of synthetic fibers comprising an elongate electrical resistance element shaped to provide a generally V-shaped recess therein intermediate the ends thereof and electrical conductor means connecting the ends of said electrical resistant elements to a source of electric current.

The invention may be employed for trimming and edge-sealing textile fabrics woven from Dacron, nylon, Dynel, Orlon and the like. These synthetic fibers enumerated are supplied by the manufacturer in the form of staple fibers to resemble natural wool fiber, and such fibers may be straight length fibers or crimped, curled or spiraled to more nearly approximate the natural wool fibers they replace. Also, Dacron, nylon, polypropylene, and other synthetic materials are supplied in multiple-filament yarn form. These materials may be employed in making fabrics in the supplied form or they can be texturized or bulked prior to weaving into felts and satisfactory edge trimming and sealing thereof is provided by the device of the present invention.

The invention will be more particularly described with reference to the drawings wherein:

FIG. 1 is a diagrammatic view of a device for trimming and sealing the edges of fabrics incorporating the principles of the present invention;

FIG. 2 is a diagrammatic perspective view of the use of the device of the invention in trimming and edge sealing a textile fabric;

FIG. 3 is a fragmentary, diagrammatic view of the device shown in FIG. 1 employed in sealing the edge of a trimmed fabric; and

FIG. 4 is a fragmentary view of the device shown in FIG. 1 with the resistance element positioned in the opposite direction.

Referring to the drawings, **10** generally designates an edge trimmer and sealing device incorporating the principles of the invention adapted for hand operation. The trimmer and sealing device **10** includes a handle portion **12** composed of a bridge portion **14** and a pair of leg portions **16** and **18**. The extended end of each of the leg portions **16** and **18** receives a bushing **20** adapted to threadedly receive a binding post member **22** of conventional design. The handle portion **12** is constructed of heat and electrical insulating material. Between the extended ends of the leg portions **16** and **18** is maintained an electrical resistance element generally designated **24** and the electrical resistance element **24** is maintained in fixed relationship to the handle portion **12** by the electrical binding posts **22**. Intermediate the ends **26** and **28** of the electrical resistance element is provided a generally V-shaped slot or recess **30**.

In order to energize the electrical resistance element **24**, each of the binding posts **22** is connected to a source of electric current generally designated S. Conductors **32** connect the source S of electric current to the binding posts **22** and as shown in the illustrated form of the invention, a portion of the conductors may be provided in channels or bores within the legs **16** and **18** and the bridge

member **14** of the handle portion **12**. Also as illustrated in FIG. 1 of the drawings, a voltage control means such as rheostat **34** may be provided in the electrical conductors **32** whereby the operator of the device may, within limits, control the cutting and sealing temperature of the resistance element **24**.

The V-shaped bend or recess in the resistance element **24** aids in increasing the cutting or trimming rate of the device and insures a sealed edge following trimming. In normal operation, the V-shaped recess **30** is held with the vertex **36** of the V pointing in the direction of travel of the fabric as illustrated in FIG. 2, thus allowing the heat from the resistance element to be transferred to the felt from both sides and along the entire surface of the V-shaped configuration.

On some synthetic felts, it is desirable to fuse together the warp and filling yarns a distance of several yarns from the edge, that is, fuse a width of ¼ to ½ inch around the felt edge to insure no edge raveling. This generally requires a second pass of the felt through the heated V-shaped wire. On the second pass the wire is held with the legs of the V practically parallel to the filling yarns and in such a manner as to allow the edge of the felt to pass through the vertex **36** of the V as illustrated in FIG. 3 of the drawings.

In general, the resistance element **24** is constructed of, for example, Chromel resistance wire having a width normal to the direction of travel of from about .02 inch to about .07 inch. Preferably, however, where a round Chromel resistant wire is employed, a wire having a diameter of .04 inch has been found to be most satisfactory. A resistance wire having a diameter of .02 inch trimmed synthetic Dacron felts well and at a fast rate when the wire temperature was maintained above the melting temperature of the Dacron felt. However, it was found that this fine wire did not simultaneously produce as good a sealed edge as the larger diameter wires. It was also found that a .07 diameter wire, in some cases, formed large beads at the ends of the melted filling yarns particularly when cutting and sealing dry felts.

Where wet felts on the paper machines are to be trimmed and sealed with the device of the invention, the water on the felts rapidly cools the heated resistance element and the resistance element must evaporate the water in its path before it can melt through the synthetic fibers. Thus, a larger diameter wire may be satisfactorily employed at higher wire temperatures and/or slower rates of felt travel.

The exact configuration of the V-shaped recess **36** in the wire is not particularly critical. However, the distance between the open ends of the V is preferably adjusted to be slightly greater than the thickness of the textile fabric being trimmed and satisfactory results are obtained when the length of the V is from about ¼ inch to as much as 1½ to 2 inches in length.

Example 1

A dry pulp felt composed of Dacron fibers was cut and sealed simultaneously at a rate of about 18 felt feet per minute employing a .99 inch long V provided in a .04 diameter resistance Chromel wire having a length of 5.59 inches when the wire was heated by passing 14 amperes of current through the wire. In cutting and sealing the felt, the legs of the V-shaped recess in the resistance element were parallel to the warp yarns and pointing in the direction of travel of the felt so that the felt moved into the V-shaped recess.

Example 2

A 5.9 inch B. & S. No. 18 Chromel-A resistance wire having a diameter of .04 inch and a V-shaped recess having a depth of 0.25 inch was heated with 15 amperes of current and was found to satisfactorily trim and seal the edges of a dry synthetic pulp felt at the rate of 10 feet per minute.

Example 3

The resistance element of Example 2 was heated with 20 amperes of electric current and a cut and firm seal was produced at the rate of 15 feet per minute on a dry Dacron pulp felt.

Example 4

A resistance element having a length 5.19 inches and a diameter of 0.04 inch with the depth of the V-shaped recess being .09 inch was heated using 12 amperes of current was found to thermally seal a dry papermakers' felt at the rate of about 14 feet per minute.

Example 5

The resistance element of Example 4 was heated by 14 amperes of current and was found to satisfactorily trim and seal a dry pulp felt at the rate of about 17 feet per minute.

Example 6

The resistance element of Example 4 was heated by 17 amperes of current and a dry Dacron pulp felt was trimmed and edge sealed at the rate of 23 feet per minute. The felt flamed up sporadically causing some non-damaging charring on both sides of the felt to a depth of about ¾ inch from the cut edge.

Referring to FIG. 4 of the drawings, it has been found that by reversing the direction of the apex **36** of the resistance element **24** in relation to the bridge **14** and the legs **16** and **18** of the device of the invention, a very satisfactory means for singeing or cutting fibers from synthetic felts and sealing surface fibers of synthetic felts is provided. Such a device is also very satisfactorily employed for trimming the spliced ends of yarns of felts consisting predominantly of synthetic thermoplastic fibers. By touching each of the fibers or yarns of the splice with the vertex **36** of the V-shaped element **30**, the yarn ends of the splice are fused to the body of the woven fabric, improving the holding qualities of the splice.

While preferred and modified forms of the present invention have been disclosed herein, it will be apparent to those skilled in the art that various modifications may be made in the form of the device and its operation without departing from the scope of the present invention. For example, while round wire has been illustrated in the drawings, it will be apparent that the resistance element may have other forms. For example, the heating element can be round or flat wire or of ribbon configuration. It will also be apparent the handle element **12** besides mounting the electrical resistance element **24** may removably and adjustably mount a wedge-shaped metal or the like element **40** with the vertex **42** of the wedge positioned immediately following the vertex **36** of the resistance element **30**. The wedge **40** may be supported from the legs **16** and **18** of the handle member **12** by spider elements **44**. The wedge-shaped element **40**, when employed with the device of the present invention, deflects the cut pieces of the fabric away from each other, thus preventing the molten edges from rejoining.

It will also be apparent that the device of the present invention may be employed in conjunction with heated rollers, spring-urged toward one another between which the trimmed edge of the textile fabric would pass, causing the edge to become fused and further sealed, thus further insuring that the fabric would not ravel.

I claim:

A method of fusing together the warp and filling yarns of a fabric consisting predominantly of synthetic fibers comprising heating a resistance wire having a width of from about .02 to about .07 inch and bent to provide a V-shaped recess therein by subjecting said resistance wire to a source of electric current and drawing said heated resistance wire along an edge of a fabric to be treated with the legs of the V-shaped recess positioned generally parallel to the filling yarns and perpendicular to a longitudinal edge of the fabric with the edge of the fabric passing

through the vertex of the V-shaped recess to provide an extended fused zone having a width substantially coextensive with the depth of the V-shaped recess.

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