The present invention relates generally to embroidery machines, and in particular to an attachment for the selective appliqueing of a decorating material onto the cloth concurrent with the embroidery of such cloth by a shuttle embroidery machine.

The well known shuttle embroidery machine includes a common garter frame upon which is mounted two wagons arranged in tandem, one above the other. Each of the wagons includes a supply tube upon which there is wound a supply of material to be embroidered and a rewind tube upon which the embroidered material is wound, the material being stretched between the tubes during the embroidering operation. The garter frame is shiftable both vertically and horizontally so that the material may be displaced in a complex path determined by the automatic control for the machine. The embroidery mechanisms are arranged at relatively stationary locations in relation to the respective wagons and each includes a needle rail at the needle side of the material having a series of needles fixed at spaced locations along the length thereof each of which is fed from a supply of needle thread. A shuttle box rail is provided at the shuttle side of the material which carries a series of longitudinally spaced shuttle boxes corresponding to the needles. The shuttle boxes contain shuttles having bobbins therein providing the supply of shuttle thread for the respective needle threads. Further, at the needle side of the material there is provided a boring point rail which is provided at spaced locations along its length with a number of boring points which, at prescribed intervals during the machine operation, are effective to cut holes in the cloth. Mechanisms are provided for driving the needle rail through a stitch-forming stroke such that the needle threads are passed through the material and form loops through which the respective shuttles are passed causing the shuttle thread to loop through the needle threads, as is generally understood. For certain patterns the boring point rail is operated during the machine cycle to cut the material, and in such instances the holes so cut are bound by the action of the cooperating needles and shuttles.

The needle thread is fed to the respective needles over a yarn tensioning and controlling system which includes, in succession from the supply of the needle thread, a short stroke thread carrier and a long stroke thread carrier. The short and long stroke thread carriers are effective as the needles move through the forward or stitch-forming strokes to initially deliver the needle threads substantially free of tension, to then form a loop through which the shuttle pass as the needles begin to retract, and finally to pull back on the needle thread to complete the stitches. It is generally known to coordinate the various actuating and controlling mechanisms of the shuttle embroidery machine from a common control of typical Jacquard construction. The automat is generally characterized as including a continuous roll of paper or similar material, known as a punching or control tape, which is punched at longitudinal spaced locations and in a number of side by side rows in accordance with the several control functions which are to be sensed and directed to the actuating mechanisms of the embroidery machine. The control functions are sensed through the holes in the punching and mechanically establish the control functions in the order in which they are read out of the punching. The punching or control tape indexes for each stitch thereby providing a continuous read-out of control information to the embroidery machine.

The present invention provides a practical and convenient means for applying a pattern of decorating material to the cloth incident to the embroidery thereof with a machine of the foreground type. Specifically, it is within the contemplation of the present invention to provide an appliqueing attachment for stitching a pattern of sequin-like decorations to a web of material incident to the embroidery thereof.

This is a further object of the present invention to provide an appliqueing or decorating mechanism for use in a shuttle embroidery machine which is operable from an automat of typical Jacquard construction and is capable of applying a wide variety of designs to the embroidered material or fabric. Advantageously, products in accordance with the present invention will have somewhat the appearance of a hand-sewn, sequin-decorated fabric yet may be manufactured on a mass production basis at relatively low unit cost.

In accordance with an illustrative embodiment demonstrating objects and features of the present invention, there is provided a shuttle embroidery machine which includes at least one cloth-supporting frame, a support, a stitching tool mounted on the support for movement along a stitching path through a work cycle including a cloth-penetrating stroke and a main actuating control mechanism for moving the stitching tool through the work cycle. The present invention contemplates the provision of an attachment for the selective application of a decorating material to the cloth which attachment includes supply means for the decorative material. A feed mechanism including a guide is disposed contiguous to the cloth-supporting frame for intermittently presenting the decorative material along the stitch path for penetration by the stitching tool to the cloth incident to the embroidery thereof. Auxiliary actuating and control mechanism programmed by the main actuating and control mechanisms and in controlling relation to the feed mechanisms intermittently presenting the decorative material along the stitch path. A cutter is operable in timed relation to the stitching tool for cutting off successive leading segments of the decorative material after penetration thereof by the stitching tool. In a typical device, the decorating material is in the form of a continuous strip of plastic or the like which is suitable to provide decorative sequins. The strip is generally blanked out into an end to end series of interconnected circular segments each in the general configuration of a sequin and having a central hole. The cutter clips successive elemental sequins after the central hole thereof has been penetrated by the stitching tool, with the clipping action being such as to complete the sequence of the sequin.

The above brief description as well as further objects, features and advantages of the present invention will be more fully appreciated by reference to the following detailed description of a typical but nonetheless illustrative embodiment of decorating device embodying features of the present invention, when taken in conjunction with the accompanying drawings, wherein:
FIG. 1 is a fragmentary elevational view, with parts broken away and in section showing an appliqueing attachment feature of the present invention mounted on a shuttle embroidery machine of conventional construction;

FIG. 2 is a diagrammatic showing, with parts in perspective and shown schematically, of a typical actuating and reciprocating mechanism operable from the punching or control tape of an automat of Jacquard construction for intermittently indexing the feeding mechanisms of the present appliquing device;

FIG. 3 is a front elevational view, looking in the direction of the axis of the shafts of the embroidery machine with parts removed and shown in exploded perspective and progressively showing, from left to right, a typical assembly of the essential components of an appliqueing attachment embodying features of the present invention;

FIG. 4 is a sectional view, taken substantially along the line 4—4 of FIG. 3 and looking in the direction of the arrows, showing an elemental segment in position for pick-up by the stitching tool; and

FIG. 5 is an elevational view similar to FIG. 4 showing the elemental segments having been picked up from the needle board by the shuttle mechanism.

Referring now specifically to the drawings, brief reference will be made to the details of a typical automatic shuttle embroidery machine of the type generally known in the prior art to facilitate an understanding of the environment for the present invention. The shuttle embroidery machine, generally designated by the reference numeral 10, may be of a type shown in U.S. Patent Nos. 2,030,495 of Feb. 11, 1936 to Breitschneider or U.S. Patent No. 3,062,163 of Nov. 6, 1962, to Siegel et al. and includes a machine frame for mounting the several components thereof. A gusset frame (not shown) carrying upper and lower cloth wadons is mounted on the machine frame 12 for adjustments both horizontally and vertically to position the cloth C in a complex path in accordance with the concurrent vertical and horizontal shift of such gusset frame. The complex movement of the material or cloth C is determined by an automat of the Jacquard type.

The cloth C passes vertically in front of a shuttle box rail 14 which extends longitudinally of the machine. The shuttle box rail 14 usually remains in a fixed position, except when it is displaced relative to the gusset frame to facilitate the threading of the cloth C into the machine. The shuttle box rail 14 carries a series of spaced shuttle boxes 16, with one shuttle box being provided at each stitching location in the machine. The several shuttle boxes 16 contain shuttles having bobbins therein which provide the supply of shuttle material for the respective stitching tools or needles 18, with the shuttle boxes 16 being reciprocated at an angle of approximately 15° to the vertical as required during the machine cycle by a reciprocating shuttle drive rail (not shown). Each of the shuttle boxes 16 carries a plate 20 which lies behind the cloth C and is formed with appropriate needle and bore point holes which receive the needle 18 and the bore point 22 respectively.

The several needles 18 are mounted for reciprocating movement through a work or stitch-forming cycle including a cloth-penetrating stroke at right angles to the cloth C. Specifically, the needles 18 are carried on a needle rail 24 extending longitudinally of the machine frame 12 which is mounted for reciprocating movement by a series of rail-mounting shafts 26 received in appropriate transversely extending bores formed in a main casting to support the rail-mounting shafts 26 which are secured at their inner ends to mounting brackets 30 which in turn are secured to the needle rail 24 at spaced locations therealong, with the rail-mounting shafts 26 guiding the needle rail 24 for its requisite transverse reciprocating movement. In a similar fashion, the boring points 22 are secured to a boring-point rail 32 mounted for transverse reciprocation by rail-mounting 34 disposed in spaced parallel relation to the rail-mounting shafts 26 and likewise accommodated within appropriate guiding bores formed in the casting 28. The inner ends of the respective rail-mounting shafts 34 are fixed to brackets 36 which in turn are secured to the bore point rail 32 at spaced locations therealong. Thus, both the needles or stitching tools 18 and the bore points 22 are mounted for transverse reciprocation by their respective mounting shafts 26, 34 on the casting 28 which, in part, comprise the respective means for mounting these stitching tools on the machine support 12.

The needle thread T is threaded along a sinusoidal path including first and second thread tension carriers 38, 40, known respectively as the short stroke tension carrier and the long stroke tension carrier. The thread T first passes about the short stroke tension carrier 38, 40 and leaves the long stroke tension carrier 40 whereupon the thread passes to the needle 18. As is generally understood, the respective thread tension carriers 38, 40 are mounted by appropriate shafts 42, 44 on the support 12 for movement through their respective operating cycles and are moved in rotation in relation to each other during the embroidery cycle to initially produce loops in the thread T and thereafter to allow the needle to carry the threads into the cloth C. After the shuttles are looped through the thread, the needle carriers are advanced to complete the stitch. Since the coaction and timing of the shuttles, needles, boring points and tension carriers are generally understood to those skilled in the art and indeed are subject to a latitude of variation and change, further discussion will be dispensed with in the interest of brevity.

Further, although the typical mechanisms have been illustrated at only one location along the length of the embroidery machine 10, it will be appreciated that substantially identical stitching and boring mechanisms are provided at successive locations along the length of the machine, including both the upper and lower sections thereof. All such mechanisms are operated from the control tape or punching of the Jacquard automat to embroider a pattern corresponding to that punched or coded onto the control tape.

In accordance with the present invention, there is provided an attachment or device, generally designated by the reference numeral 50, for the selective appliquing of a decorative material M to the cloth C incident to the embroidery thereof. The material M is seen best in FIG. 3 and is in strip form including a series of elemental circular segments S, each of which has a central hole H for passage therethrough of the stitching tool or needle 18 and the thread T. Successive segments or segments of the material M are joined together at reduced necks N to facilitate the cutting off of the leading of one of the segments in succession of the embroidery machine 10 by the instant attachment 50.

The material M is wound on a supply reel R which is mounted on a reel-supporting shaft 52 carried on upwardly extending brackets 54, with a corresponding reel R of material M being provided at each stitching location along the length of the embroidery machine. A single supply shaft 52 may be employed for supporting several reels R, with appropriate spacers interposed therebetween.

Contiguous to the plane of the cloth C and above the needle 18 and its stitching path, there is provided a feeding mechanism, generally designated by the reference numeral 56, the details of which are seen best in FIGS. 3 to 5 inclusive. The feeding mechanism 56 includes upwardly extending mounting brackets 58 which extend upwardly at the side of the cloth C remote from the shuttle box rail 14 and are secured to the machine support and positioned to in no way interfere with the required reciprocating movement of the needle 18 and the bore point 22. Contiguous to their upper ends, the mounting brackets 58 carry an upwardly extending base plate 60 which is of right angle construction and includes a vertically extending mounting section 62. To facilitate an understanding of the several components which make up the feeding mechanism 56, the illustrative drawing in FIG. 3 shows, from left to right, the
build-up of the several components making up the feeding mechanism and associated cutter at each stitching location of the embroidery machine. A typical build-up will have section 78c to enable the threading of the components at each stitching locations are identical when the assembly is completed. The mounting section 62 of the face plate 60 is provided with a vertically extending guide 64 which terminates at its lower end in a stationary cutter blade 66 disposed directly above the stitching path of the needle 18. The guide 64 is a member to receive the strip of decorative material M, with the material being indexed by increments corresponding to the diameter of successive segments S such that interconnecting necks N are brought into alignment with the stationary cutter blade 66 at the appropriate time during the embroidering and appliqueing cycle.

Overlying the guide 64 adjacent the lower end thereof is a resilient clamp member 68 which is T-shaped and includes a mounting section 68a straddling the guide 64 and a depending pressure section 68b which lies within the guide to retain the strip or material M in successive indexed positions beneath the needles and subsequent cutting. The pressure exerted by the clamp member 68 is such as to obtain the requisite indexed positions for the material, yet not preclude the controlled advance thereof during the appliqueing cycle. Contiguous to its upper portion disposed in trailing of the cutting section is cut away as indicated at 68c to accommodate the feed path therebelow of the decorative material M.

Overlapping the clamp member 68 is the movable cutter 70 which is seen to include a mounting section 70a, a pivot section 70b, and a clipper-section 70c. The mounting section 70a is of a width comparable to the mounting section of the clamp member 68 and the two mounting sections together are secured by rivets, bolts or the like to the face plate 60, as seen at the fourth location from the left of FIG. 3. The pivot section 70b overlies the clamp section 68b, but normally extends at an acute angle relative thereto (see FIG. 4) such that the clipper section 70c is in a retracted position on a arc directed toward the stationary cutter blade 66. The resilience and configuration of the arm section 70a of the movable cutter 70 is such that it will pivot about its line of junction with the mounting section 70a. Accordingly, the clipper section 70c will sweep beneath the lower edge of the pressure section 68b of the clamp member 68 and coact with the stationary cutter blade 66 to sever the leading segment S at the neck N, as may be appreciated by progressively inspecting FIGS. 4 and 5. As seen in FIG. 5 alone, if the indexing mechanism 56 has not advanced a segment below the level of the stationary blade 66 at the lower end of the guide 64, the cutter-actuating mechanism 82 will merely move the movable cutter into its operative position during the corresponding cloth-penetrating strokes of the needle 18 without cutting off a corresponding segment.

Reference will now be made to FIG. 2 for a description of typical, but nonetheless illustrative auxiliary actuating and control mechanism which is programmed by the main actuating and control mechanism of the embroidery machine 10 and achieves the coordinated operation of the embroidering and appliqueing mechanisms. The auxiliary actuating and control mechanism includes an indexing motor M which is connected via clutch CL and brake BR to a Geneva indexing device 64 which includes the usual Geneva drive sector 86 and Geneva drive 88. The Geneva drive sector 86 is connected to the drive shaft 90 while the driven Geneva wheel 88 is connected to the drive-index shaft 72 carrying the several feed wheels 74. As is generally understood in indexing mechanisms of this kind, upon activation of the electric clutch CL and deactivation of the brake BR, the motor via the output shaft 90 is effective to rotate the Geneva drive sector in the counterclockwise direction, as indicated by the directional arrow, which is effective to Index the driven Geneva wheel 88 through one step corresponding to the requisite feeding motion to be imparted to the feed wheels 74.

The motor M is energized from an appropriate power source over lines 92, 94, with a main switch 96 being provided for completing the motor-energization circuit.

The control further includes switch 98 controlled from the Jacquard punching P, switch 100 which is controlled by the Geneva drive sector 86 and switch 102 which is controlled by the needle rail 32 in response to the movement of the stitching tool between its full forward position (illustrated by the full lines in FIG. 2) and its full back position (illustrated by the broken lines in FIG. 2).

Switch 100 is closed against contact 100a at the end indexing interval while switch 102 is normally biased against contact 102a and moves to a position against contact 102b as the needle returns to its retracted posi-
tion relative to the cloth C. Accordingly, it will be appreciated that there is provided an energization circuit for the coil of the brake BR, which is completed from line 94 over line 104, switch 100, line 106, switch 102 via contact 102a, line 108, switch 98 and line 110 to line 92. The control circuit further includes line 112 which is connected to the coil of the clutch to establish an energization circuit including switch contact 102b, switch 102, line 108, switch 98 and line 110.

A typical sequence of operations with the control of FIG. 2 will now be described.

The punching P is provided with a series of elongated holes along one linear path thereof for the purposes of the timed activation of the present appliqueing attachment in accordance with the desired pattern effect to be obtained from such punching. A typical punching P is shown in position to close switch 98, with the timing being such that the switch 98 is closed for an interval corresponding to the movement of the needle from a location approximately at the middle of its return stroke to the middle of its forward or cloth-penetrating stroke. Thus, the control will be conditioned for operation when the necessary control of the cloth is achieved at the desired location at such time that the needle moves to a location where it could pickup a sequin prior to penetration of the cloth. Upon closing of switch 98, the energization circuit for the brake BR is completed over lines 94, 104, switch 100, line 106, switch 102, contact 102a, switch 98, line 110 and line 92. As the needle bar 32 moves into its full back position, as illustrated by the dotted lines in FIG. 2, switch 102 moves from contact 102a onto contact 102b which deenergizes the brake BR and energizes the clutch CL from line 94 over line 112, contact 102b, switch 102, line 108, switch 98, line 110 and line 92. Thereupon, the Geneva drive sector 86 is effective to index the feed wheels 74 through a sequin-feeding interval. As the needle moves out of the full-back position, switch 102 restores itself onto contact 102a, deenergizing the clutch CL and reenergizing the brake BR for energization upon closing of the switch 100 after the indexing interval has been completed. Upon completion of the indexing interval switch 100 closes against contact 100a to complete the energization circuit for the brake BR. It will be appreciated that only a elementary version of the control has been illustrated and a typical sequence of operation off a single punching P of the controlled tape P has been described. However, since the overall operation of an automat of this type is generally understood to those skilled in this art, this brief description will sufficiently describe the fundamental operation of the auxiliary actuating and control mechanism in coordination with the conventional Schiiller embroidery machine.

From the foregoing, it will be apparent that there has been provided in accordance with the present invention an appliqueing device which is basically compatible with an embroidery machine and the usual controls associated therewith. The programing of the appliqueing device in coordination with the embroidery machine merely involves an extension of the general techniques employed in programing such embroidery machine. The device is virtually self-contained and requires no substantial modification of the conventional Schiiller embroidery machine.

A latitude of modification and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be used without a corresponding use of other features. Accordingly, it is appropriate to describe the fundamental novelty of the invention and to claim the invention in a manner consistent with the scope of the appended claims.

What I claim is:

1. A shuttle embroidery machine comprising at least one cloth-supporting frame adapted to receive cloth to be embroidered, a support, a stitching tool mounted on said support for movement along a stitching path through a work cycle including a cloth-penetrating stroke, main actuating and controlling mechanisms including a control tape for moving said stitching tool through said work cycle to form an embroidered pattern on said cloth, supply means for a decorative material to be applied to said cloth, a feeding mechanism for intermittently presenting said decorative material along said stitching path for penetration by said stitching tool and joiner to said cloth incident to the embroidery thereof and as part of the embroidered pattern, auxiliary actuating and controlling mechanisms programmed by said control tape of said main actuating and controlling mechanisms and in controlling relation to said feeding mechanism for intermittently presenting said decorative material along said stitching path and a cutter operable in timed relation to said stitching tool for cutting off successive leading segments of said decorative material after penetration thereof by said stitching tool.

2. A shuttle embroidery machine according to claim 1 wherein said auxiliary actuating and controlling mechanisms include means responsive both to movement of said stitching tool through said cloth-penetrating stroke and to said control tape for actuating said feeding mechanism to advance a leading segment of said decorative material in the form of said cut-off segment.

3. A shuttle embroidery machine according to claim 1 wherein actuating means are mounted on said stitching tool in trailing relation thereto and are effective after penetration of said decorative material by said stitching tool for cutting off successive leading segments of said decorative material.

4. A shuttle embroidery machine according to claim 1 wherein said feeding mechanism includes a guide disposed contiguous to said cloth-supporting frame and directed toward said stitching path, said guide terminating in a lead edge serving as a stationary blade for said cutter, said cutter further including a movable blade overlying said guide.

5. In a shuttle embroidery machine, at least one cloth-supporting frame adapted to receive cloth to be embroidered, a support, a stitching tool mounted on said support for movement along a stitching path through a work cycle including a cloth-penetrating stroke and main actuating and controlling mechanisms having a programmed control for moving said stitching tool through said work cycle to form an embroidered pattern on said cloth, the improvement comprising an attachment for the selective appliqueing of a decorative material to said cloth, said attachment including supply means for said decorative material, feeding mechanisms including a guide disposed contiguous to said cloth-supporting frame for selectively delivering a selected segment of said decorative material along said stitching path for penetration by said stitching tool and joiner to said cloth incident to the embroidery thereof and as part of the embroidered pattern, auxiliary actuating and controlling mechanisms and in controlling relation to said feeding mechanism for intermittently presenting said decorative material along said stitching path and a cutter operable in timed relation to said stitching tool for cutting off successive leading segments of said decorative material after penetration thereof by said stitching tool.

6. A shuttle embroidery machine according to claim 5 wherein said guide terminates in a lead edge serving as a stationary blade for said cutter, said cutter further including a movable blade overlying said guide and actuating means for moving said movable blade to cut off successive leading segments of said decorative material.

7. A shuttle embroidery machine according to claim 5 wherein said actuating and controlling mechanisms include means responsive to movement of said stitching tool through said cloth-penetrating stroke for
periodically actuating said feeding mechanism to advance a leading segment of said decorative material into said stitching path.

8. A shuttle embroidery machine according to claim 5 including means responsive to movement of said stitching tool to a retracted position relative to said cloth-supporting frame to permit the operation of said auxiliary actuating and control mechanisms.

9. A shuttle embroidery machine according to claim 5 wherein said auxiliary actuating and controlling mechanisms include a drive motor for said feeding mechanism, said drive motor being selectively actuated by said programmed control.

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