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Bradford West Yorkshire, BD1 1OB(GB)(54) **Embroidery framing system.**

(57) An embroidery frame for holding a textile panel between two circular plates each having a central opening covered by the panel. The panel is held in place by being sandwiched between the plates. A compressible strip around the opening of one of the plates presses the panel firmly against the opposite panel. A clearance gap between the rims of the two plates allows the panel to extend out of the frame without creasing the panel. The circular shape of the frame permits it to be used in a standard frame holder in an automatic embroidery machine.

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FIELD OF THE INVENTION

The present invention relates to an embroidery frame for holding textile material while the material is being embroidered by a machine.

BACKGROUND AND SUMMARY OF THE INVENTION

There is a wide variety of textile products which are embroidered by machine. For example, baseball caps have team, company or novelty logos embroidered on their fronts; the pockets, fronts and sleeves of shirts have embroidered initials and designs, and baby clothes have decorative embroidery. Often the embroidery is done on textile piece goods, such as baseball cap panels and shirt panels, which are later sewn with other pieces to form a completed garment or other product.

Large automatic embroidery machines simultaneously embroider a row of a dozen or more pieces of fabric. There are several stationary embroidery heads on each machine. Each head may have several reciprocating sewing needles. The embroidery frames with the textile are loaded into a movable frame holder underneath the heads. The frame holder moves the frame while the head embroiders the textile to create the embroidery design.

The frame holder is mechanically moved in coordination with the reciprocal movement of the needles of the embroidery head. As the holder and frame moves, the head embroiders a pattern on the textile with the various colored thread held in the embroidery head.

An embroidery frame must securely hold the textile while it is being embroidered without damaging it. The frame should allow the textile to be quickly inserted and removed from the frame and the frame holder in the embroidery machine. In addition, the frame should fit into standard frame holders used with automatic embroidery machines and not require a special holder or modifications to the existing holder. Finally, the frame should be durable and inexpensive.

Prior embroidery frames include a double hoop frame as shown in U.S. Patent No. 3,596,385 entitled "Embroidery Frame" and issued to Shizue Tachibana. These hoop frames have two concentric annular rings which snap together one hoop inside the other. A cloth panel is placed between the two hoops as they are snapped together. The cloth panel is held taut between the two hoops. The assembled hoops are placed in the frame holder of the embroidery machine so that the cloth can be embroidered.

Hoop frames are often the standard frame offered by the manufacturer of the embroidery ma-

chine. Similarly, the frame holder sold with the machine is specifically designed to accept only the circular shaped hoop frames. Moreover, hoop frames are simple and have few working parts. In addition, hoop frames can be inexpensively made of plastic using an injection molding process.

However, hoop frames large enough to accommodate the full embroidery field of a cap panel often do not bind the textile cap panel completely around the perimeter of the embroidery field because the hoop extends beyond the panel. Where the hoops do bind the panel, they crease the cloth. This crease cannot be easily removed from some textiles. Thus, a hoop frame cannot be used with every textile or other embroiderable materials. Similarly, the rigid backing, e.g., Buckram-type backings, fused to some types of cap panels cannot be used in hoop frames because the hoop would crease and break the backing.

Moreover, hoop frames leave a circular portion of the cloth open to the embroidery head. This circular portion is not optimal for embroidering the rectangular design fields on a baseball cap and/or non-circular patterns. In addition, the hoop frames have no alignment markings to assist the operator in positioning the cloth panel on the frame. Finally, the hoop frames require a forceful push to close and separate them when a thick or heavy textile material is used. The operator's hands and fingers are sore and bruised after several hours of repeatedly using the hoop frames.

Specialty frames are available for embroidering baseball cap panels, neckties and other products. For example, a rectangular frame for cap panels holds the panels with clips along three of the four sides of the frame. However, this frame does not grip the panel completely around the perimeter of the area to be embroidered. Moreover, this panel is likely relatively expensive to manufacture because it includes metal clips which are fastened to the frame.

Other cap panel frames have been formed by cutting a series of rectangular openings in a long piece of plywood. The plywood frame is attached to the frame holder in the embroidery machine and the holes line up with the embroidery heads. Double sided sticky carpet tape is placed around each hole to hold the cloth panels in place. These holders are cumbersome to handle and do not easily adapt to the embroidery machine. Moreover, the carpet tape does not adequately hold the panel, must be frequently replaced and can leave a residue on the panel.

Another example of a specialty frame is shown in U.S. Patent No. 3,664,288, entitled "Fabric-Holding Clamp for Embroidery Machines" and issued to Von Boden et al (Von Boden patent). The Von Boden patent discloses a hinged frame for embroi-

dering neckties. The frame sandwiches the necktie between upper and lower triangular plates. The plates have sponge rubber strips which press against the necktie and hold it in place. This frame requires a special mount to attach to the frame holder. The frame is complex and has several moving parts and a variety of hinges, bolts and other components.

In view of the disadvantages of these other embroidery frames, a new frame for cap panels and other flat textile products and piece goods was invented. Accordingly, it is an object of this invention to embroider these products without creasing the product. In addition, an object of the invention is to create an embroidery frame having a rectangular embroidery opening but still able to fit into a standard frame holder. This new embroidery frame is simple and inexpensive to make using injection molded plastic.

Another object of the invention is to hold the textile to be embroidered by grasping the textile in the plane of the textile and completely around its perimeter. Moreover, it is an object of the invention to use a material to hold the textile taut that does not have to be frequently replaced or that leaves a residue on the cloth.

In addition, it is an object of the invention to have alignment markings on the frame to assist the operator in properly aligning the cloth panel in the frame. Another object is to have a finger hole in one plate of the frame to allow the plates to be easily separated. Similarly, it is an object of the invention to have a simple finger operated latch which provides both leverage for removing the frame from the holder and a torque arm for disengaging the latch. Finally, it is an object of the invention to have a thin frame with few protruding parts to catch the embroidery head or other components of the embroidery machine.

These objectives and others are satisfied in the novel embroidery frame disclosed here. The embroidery frame has an outer plate and an inner plate which rests concentrically inside the outer plate. The outside shape of the frame is similar to that of a hoop frame so as to fit many standard frame holders. A rectangular opening in the center of each plate provides an embroidery area. The cloth panel is held between the two plates and covers the rectangular opening. The cloth is held taut by compressible strips around the opening of one of the plates. Similarly, around the opening of the other plate is an adhesive for holding the cloth while the plates are latched together. When the cloth is between the two plates and the plates are fastened together, the strip compresses the cloth against the other plate around the perimeter of the opening.

The shape of the opening in the plate can be

made to suit the particular textile product to be embroidered. These products may have various shapes and sizes of embroidery fields.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a drawing of an exemplary embodiment of the inventive frame mounted in an automatic embroidery machine;

FIGURE 2 is a top plane view of the assembled frame;

FIGURE 3 is a cross-sectional view of the assembled frame cut along line 3-3;

FIGURE 4 is a top plane view of the outer plate of the frame;

FIGURE 5 is a cross-sectional view of the outer plate cut along line 5-5;

FIGURE 6 is a bottom plane view of the inner plate;

FIGURE 7 is a cross-sectional view of the inner plate cut along line 7-7; and

FIGURE 8 is a cross-sectional view of another embodiment of the latch.

DETAILED DESCRIPTION OF THE DRAWINGS

Figures 1 and 2 show the assembled embroidery frame 1 having an outer plate 10 and an inner plate 20. The inner plate nests snugly top-to-bottom in the outer plate while yet leaving ample side clearances for fabric piece edges to protrude without being crushed. Sandwiched between the two plates is a cloth cap panel 2. The flat planar portion of both plates have overlapping rectangular openings 11, 21.

As shown in Figure 1, the cloth panel is held taut across the opening in the frame while a sewing head 3 from the embroidery machine 4 embroiders the cloth. The assembled frame with cloth is loaded into the movable frame holder 5 of the embroidery machine. When loaded in the frame and the frame holder, the cloth panel is held in position underneath the embroidery head 3. There is a row of sewing needles 6 at the bottom of the head which reciprocate through the cloth panel and into the flat bed 7 below the frame holder. The embroidery head is stationary. The frame holder moves the frame and cloth in cooperation with the embroidery needles to create a desired embroidery pattern on the cloth panel.

The cap panel 2 lays flat between the outer and inner plates. However, there are two peaks 8 on the cap panel which extend out from the frame. As shown in Figure 3, there is a side clearance 9 between the rims of the plates through which the peaks of the panel extend. This clearance ensures that the panel is not creased by being pinched between the rims of the plates. The clearance 9

extends only partially around the perimeter of the plates. There is a snug fit (rather than a clearance) between the rims at the two areas where the plates are held together. These snug areas are not at the locations where the cloth panel extends from the frame in the embodiment shown in Figures 1 to 7. Accordingly, no portion of the cloth is pinched by the rims of the frame.

As shown in Figure 4, the outer plate 10 has a flat bottom 12 and an annular rim 13. The rectangular opening 11 in the bottom is sized so that the entire area of the cloth panel available to be embroidered can be reached by the embroidery needles 6. The area of the opening 11 depends on the area on the panel to be embroidered and the embroidery head 3. Moreover, the openings can have a non-rectangular shape to suit textile pieces other than cap panels.

The rectangular opening in the plates must be slightly larger than the area to be embroidered on the panel. Each needle 6 on the embroidery head 7 has a metal foot at the bottom of the head. The foot protects the needle and rides on the cloth to smooth out the area being embroidered.

The foot cannot ride over the edge of the rectangular opening in the frame. Thus, the frame must be stopped before the foot butts into the edge of the opening. Because of the foot, the needle cannot embroider a thin strip of the panel, (approximately 1/8 to 3/16 of an inch), adjacent to the frame opening. Accordingly, the opening in the frame must be slightly larger than the area to be embroidered.

The rectangular opening 11 in the outer plate 10 is bordered by a rectangular ledge 14. As shown in Figure 5, the ledge is thinner than the other portions of the bottom 12 of the plate. When the plates are assembled, the cloth panel 2 is pressed against the ledge by the top plate 20. Only the thickness of the ledge separates the panel from the underside of the frame. When the frame is in the frame holder 5, the panel is separated from the bed 7 on the embroidery machine by only the thickness of the ledge 14 and a small clearance (e.g. about one sixteenth of an inch) between the bottom of the frame and the bed 7.

The thin ledge brings the panel as close as is practical to the bed 7. The panel is pushed down only a short distance to the bed by the foot of the embroidery head 3 to hold the panel against the bed while the needle embroiders the cloth.

The ledge 14 must be thick enough to provide structural rigidity, strength against chipping and to allow the ledge to be formed by plastic injection molding. A ledge of one sixteenth of an inch has been found adequate for a frame 1 of injection molded polycarbonate.

On the outer plate 10, an adhesive strip 15 is

applied to the ledge 14 and surrounding area of the bottom plate. The adhesive sticks to the cap panel 2 to hold the panel in place on the bottom plate. Examples of adhesives include tapes with sticky glue on both sides, e.g., "Scotch 3M 924 Adhesive Transfer Tape", and spray adhesives which remain sticky after being applied, e.g., "Sprayway 22 spray adhesive". The strength of the adhesive is significantly lower than the tear strength of the panel so that the cloth is not torn or damaged when being removed from the frame. Since the adhesive is not the principal means for holding the panel in the frame, its stickiness can be relatively weak. Moreover, the adhesive should not leave any noticeable residue on the panel.

The adhesive is optional. The frame is fully functional without the adhesive. The adhesive eases the assembly of the frame by holding the panel in place while the inner plate 20 is being attached to the outer plate. The adhesive reduces the tendency of the cloth panel to slide about the bottom 12 of the plate while the frame is being assembled.

There are alignment marks 16 on the bottom of the outer plate. The operator uses these marks to position the panel in the outer plate 10. Cap panels have small notches (not shown) in their sides. These notches are cut in the same position in every panel. The alignment marks are arranged such that the panel is properly positioned on the plate when the notches in the panel line up with the alignment marks 16.

The rectangular ledge 14 can also be used as an alignment guide for a backing that is to be embroidered to the cloth panel. A backing material may be used to provide support for the embroidery. The backing can be held in place by the embroidery thread. If the backing is cut to match the area encompassed by the ledge 14, then the ledge can be used as a guide to align the backing in the outer plate.

There are four flanges 17 located symmetrically about the rim of the outer plate. These flanges extend outwardly from the top of the rim 13. The flanges rest on the edges of the frame holder 5 when the assembled frame 1 is loaded into the embroidery machine. The flanges hold the frame a short distance above the bed. The flanges also prevent the frame from slipping through the frame holder and dropping onto the bed of the embroidery machine. The height of the flange is selected so that there is a small clearance (about one sixteenth of an inch) between the bottom of the outer plate 20 and the bed 7 when the frame is in the holder. This clearance is desirable so that the frame does not rub against the bed as the frame is moved during embroidering.

As shown in Figure 6, the inner plate has a

circular flat bottom having a rectangular opening 21 identical to the opening 11 in the outer plate. Around the periphery of the bottom is a rim 22 which has an outward slope as is shown in Figure 3.

The clearance 9 for the cloth to extend out of the frame is formed between the sloping rim 22 of the inner plate and the rim 13 of the outer plate. A fillet 18 on the inside of the rim 13 to the outer plate provides a sloping surface to face the sloping rim of the inner plate as is shown in Figure 3. The sloping sides of both rims allow the peaks 8 of the cloth panel to gently curve out of the frame without being pinched.

There is a snug fit between the rims of the plates at the matching lip 23 and overhang 30 and in a region adjacent either side of the latch 35. This snug fits keeps the inner plate from sliding around in the outer plate. The rim of the inner plate has two thick shoulders 24 to provide a snug fit with the outer plate. These thick regions are at opposite sides of the plate.

The inner plate 20 has Velcro-type compressible strips 25 glued around the periphery of the rectangular opening 21 in the inner plate 20. The strip is the hook portion of Velcro material. The Velcro loop material to which the Velcro hook material attaches is not used in the exemplary embodiment. The purpose of the Velcro hook strips is to press the textile panel firmly against the ledge 14 on the outer plate. The Velcro hooks have short, stiff bristles. The hooks provide a cushion for the panel which will not harm the cloth. The Velcro strips 25 are also relatively inexpensive. Other compressible materials, e.g., sponge rubber, having similar properties as the Velcro hook material may serve the same purpose.

The plates are held together by a latch 35 and, at the opposite side of the frame, a lip 23 on the inner plate and matching overhang 30 on the outer plate. The lip and overhang work together with the latch to fasten the plates together. As shown in Figures 4 and 5, the overhang 30 is formed in a nub 31 which extends outwardly from the rim of the outer plate. There are sidewalls 32 on either side of the overhang.

The lip 23 from the inner plate 20 slides underneath the overhang 30 to hinge the plates together. The side walls 32 to the overhang bracket the lip and keep the lip and the inner plate from rotating within the outer plate. In the alternative, a hinge between the plates could be used instead of the lip and overhang.

The latch 35 has a stationary mount 36 and a rotating lever 37 on the outer plate. A bolt 38 holds the lever in place over the mount. The bolt is recessed in the lever. The top of the lever 37 is the highest point on the frame and, thus, the point

most exposed to the embroidery head 3 and other parts of the embroidery machine. By recessing the bolt in the lever, the height of the frame is reduced and the likelihood that any part of the frame will hit or catch on the embroidery machine is minimized.

The extended tongue of the lever 37 serves two purposes. The first purpose is to provide a relatively large handle for the operator to lift up on with his/her finger while removing the assembled frame from the frame holder 5 in the embroidery machine. The other purpose is to provide a relatively long torque lever for the operator to use in applying torque to rotate the latch between the open and closed positions.

When the operator has opened the latch, she can easily push the inner plate out of the outer plate by pressing her finger through the finger hole 40 in the bottom of the outer plate. The finger hole is offset from the latch so that the index finger of the operator can be easily extended through the hole while the hand is holding the frame near the latch. The finger hole can be offset either to the left or right of the latch depending on whether the operator is right- or left-handed.

On the outside of the outer plate, the nub 31 has a shape which fits snugly into the frame holder 5. The nub shape matches the shape of a similar nub on the standard hoop frame (not shown) offered by the manufacturer of the embroidery machine. The outside shape of the outer plate 10 with nub fits snugly in the manufacturer's the frame holder. Thus, the shape of the frame 1 with nub allows the frame to fit the frame holder without any modification to the frame holder.

Using an alternative embodiment of the frame shown in Figure 8, relatively large textile work pieces such as shirts can be embroidered. Large work pieces completely cover the outer plate 10 and extend from the entire circumference of the frame when both plates are clamped together. To accommodate large work pieces, the latch 35a and lip 23a have been modified to ensure that the work piece is not creased by the frame. In this modified embodiment, the lever 37a of latch 35a engages a post 26a extending from the bottom of the inner plate 20 to hold the plates together. The lever does not engage the rim of the inner plate as does the lever 37 in the embodiment shown in Figures 4 and 5. Accordingly, the fabric is not pinched between the lever and the sharp edge of the rim of the inner plate. Rather, the fabric comes between the post and the lever. However, the post has a rounded top so that the fabric is not creased or damaged.

Similarly, for large work pieces, the lip 23a and shoulders 24a on the inner plate have been modified to allow the fabric to come between the mating lip and overhang without damaging or creasing the fabric. The lip 23a is substantially narrower and

shorter than the overhang so that the fabric can easily fit between the lip and overhang. Because the lip is narrower than the overhang, some rotation between the inner and outer plates may occur before the lip is stopped by the sidewalls 32 of the overhang. This rotation is prevented by widening the shoulders 24a so that they fit snugly between the ends of the sloped fillets 18 on the rim of the outer plate.

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

Claims

1. An embroidery frame comprising:
 - a first member having an embroidery aperture within a flat area;
 - a second member having an embroidery aperture within a flat area;
 - said first and second members being formed to nest one within the other with said flat areas being selectively retained in proximate adjacency while substantially loose fit is maintained between said members about a substantial portion of their periphery.
2. An embroidery frame as in Claim 1 further comprising adhesive disposed about the embroidery aperture of said first member.
3. An embroidery frame as in Claim 1 further comprising compressible material disposed about the embroidery aperture of said second member.
4. An embroidery frame as in Claim 1 further comprising:
 - a further aperture disposed in the flat area of said first member sized to accept a human fingertip therethrough.
5. An embroidery frame as in Claim 1 further comprising latching means for holding said first and second members together with material to be embroidered sandwiched between said members.
6. An embroidery frame as in Claim 1 further including compressible strip means between said first and second members and around the periphery of said embroidery apertures, said compressible strip means holding material to

be embroidered in place across said apertures when said members are joined together.

7. An embroidery frame as in Claim 1 wherein at least one of said frame members has visible alignment indicia to facilitate alignment of the material to be embroidered.
8. An embroidery frame as in Claim 1 wherein said first member includes a recess formed in its outer portion, said second member includes a projection which matingly fits within said recess and said first member includes a rotatable arm on its outer periphery opposite said recess to selectively retain said second member nested within said first member.
9. An embroidery frame as in Claim 5 wherein said latching means comprises a rotatable lever having an elongated arm and being mounted on said first member and further comprises a post extending from said second member which said lever engages to hold said member together.
10. A method for embroidering a textile piece with a backing for use in automatic embroidery machines which use an embroidery frame comprising a first member having an embroidery aperture within a flat area and a depressed area surrounding the aperture, a second member having an embroidery aperture and a latch, said method comprising the steps of:
 - inserting the backing into the depressed area of the first member so that the backing covers the aperture;
 - placing the textile piece on the first member such that the portion of the piece to be embroidered overlays the backing and aperture, the piece lays flat against the flat area and a portion of the piece extends beyond the first member;
 - nesting the second member into the first member such that the textile piece is sandwiched between the members, the apertures are aligned one over the other and a portion of the piece extends through a clearance gap between the sides of the members;
 - operating the latch to fasten the members together with the panel held securely between the members; and
 - inserting the assembled frame into the embroidery machine to embroider the textile piece and backing together.

FIG. 1

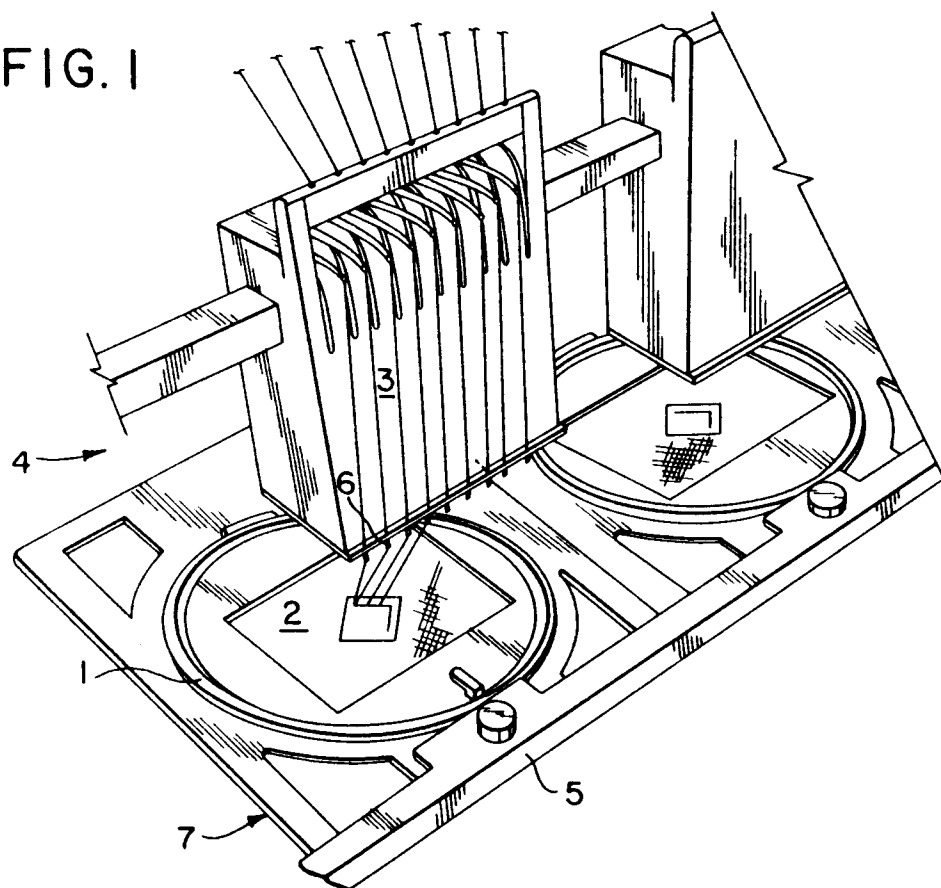


FIG. 2

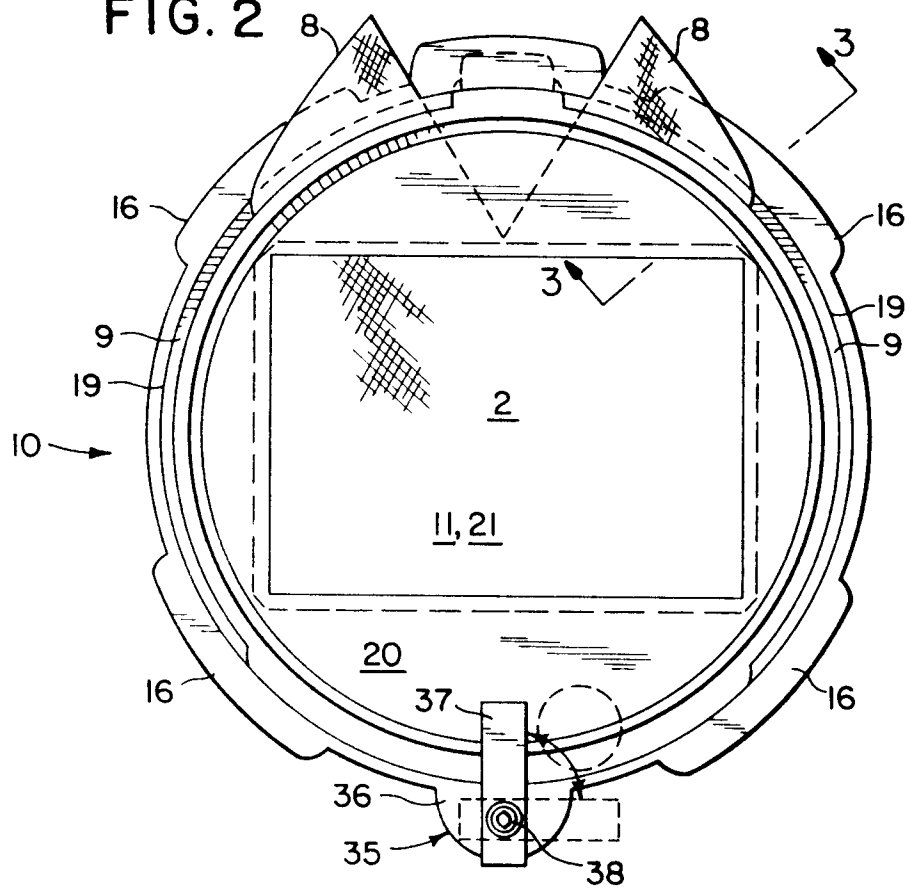


FIG. 3

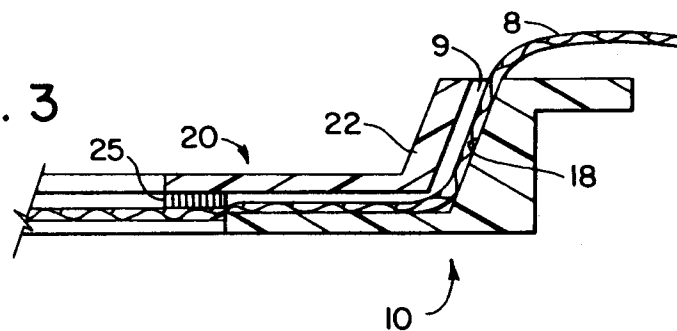


FIG. 4

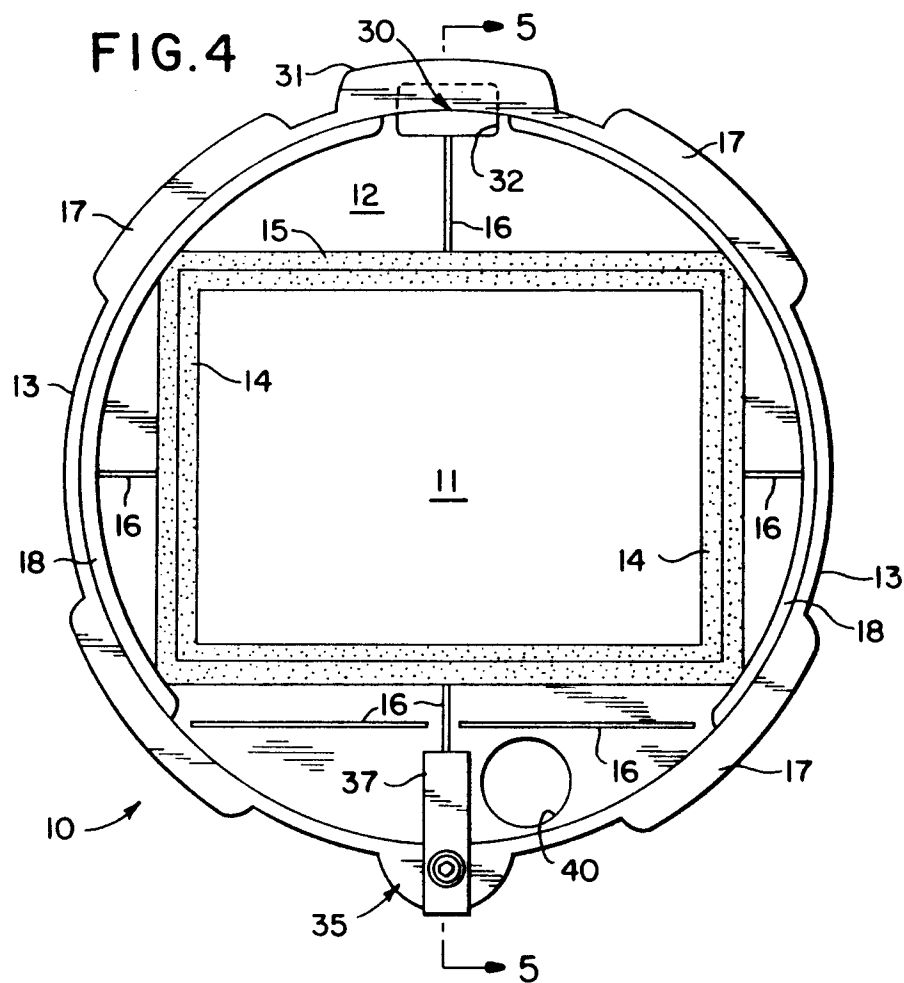


FIG. 5

