US008584606B2

(12) **United States Patent**
Mack et al.

(10) **Patent No.: US 8,584,606 B2**
(45) **Date of Patent: Nov. 19, 2013**

(54) **HOOP RETAINING DEVICE**

(75) Inventors: **Charles H. Mack**, West Bend, WI (US); **Jesse C. Mack**, Slinger, WI (US)

(73) Assignee: **Midwest Products, Inc.**, Germantown, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 718 days.

(21) Appl. No.: **12/804,559**

(22) Filed: **Jul. 23, 2010**

(65) **Prior Publication Data**

US 2012/0017814 A1 Jan. 26, 2012

(51) **Int. Cl.**
D05C 7/04 (2006.01)

(52) **U.S. Cl.**
USPC **112/103**

(58) **Field of Classification Search**
USPC 112/102, 103, 470.6, 470.09, 470.14, 112/470.18
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,433,158	A	7/1995	Moore, III	
5,842,430	A	12/1998	Mack	
5,934,210	A	8/1999	Lucchese	
5,967,067	A	10/1999	Guenther	
5,970,895	A	10/1999	Mack	
5,992,339	A	11/1999	Mack	
6,216,617	B1	4/2001	Burt, Jr.	
7,607,399	B2	10/2009	Mack et al.	
7,918,169	B2 *	4/2011	Mack et al.	112/103
7,966,957	B2 *	6/2011	Mack et al.	112/103

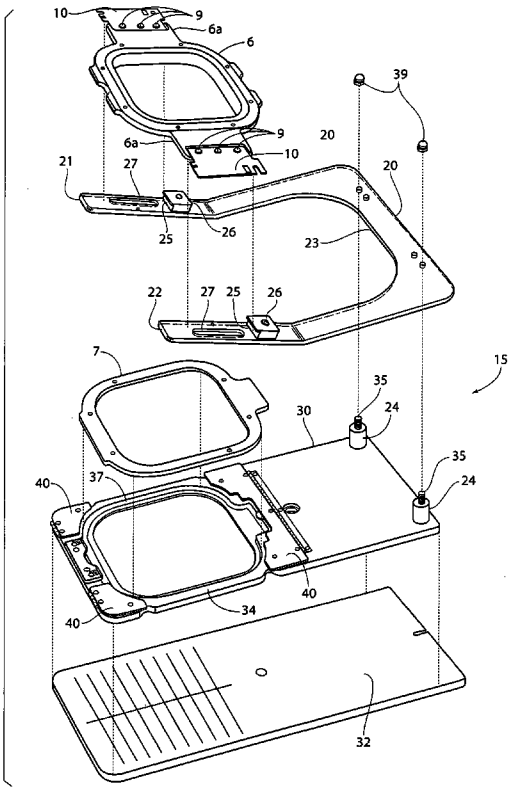
* cited by examiner

Primary Examiner — Tejash Patel
(74) *Attorney, Agent, or Firm* — Ryan Kromholz & Manion, S.C.

(57) **ABSTRACT**

A hooping device for use with an embroidery machine to hold an item or material to be embroidered between upper and lower hooping members, with the hooping members being secured to one another by use of magnetic force is disclosed. The magnets provide a solid, secure mating arrangement between the upper and lower hooping members without the need to adjust the hooping member for different thicknesses of material. The hooping device includes a retaining mechanism to prevent the hooping members from mating prematurely.

19 Claims, 10 Drawing Sheets



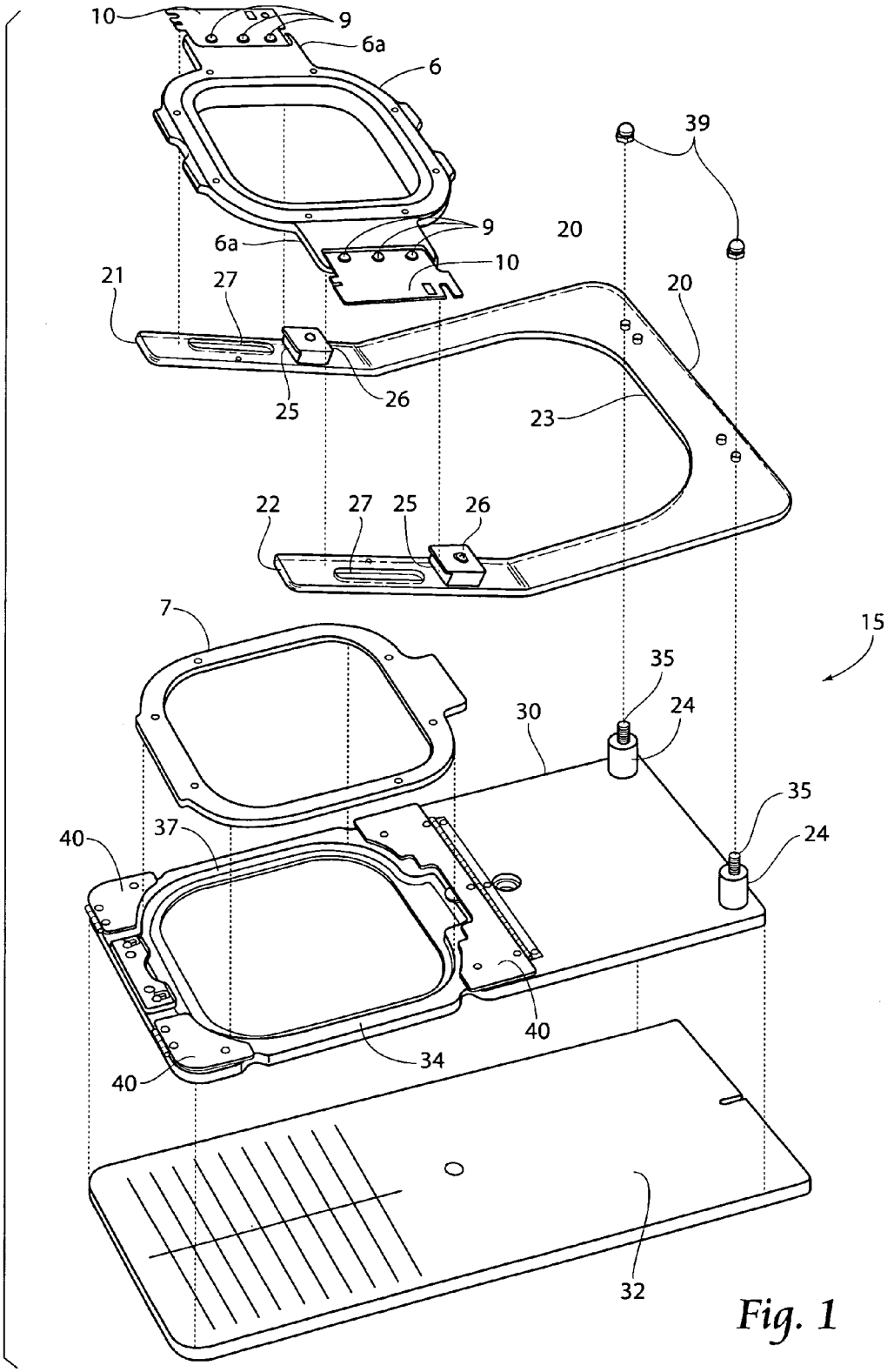

10
9
6a
6
39
9
20
6a
10
21
27
20
25
26
23
22
27
25
26
7
15
35
30
24
35
37
24
40
40
34
40
32

Fig. 1

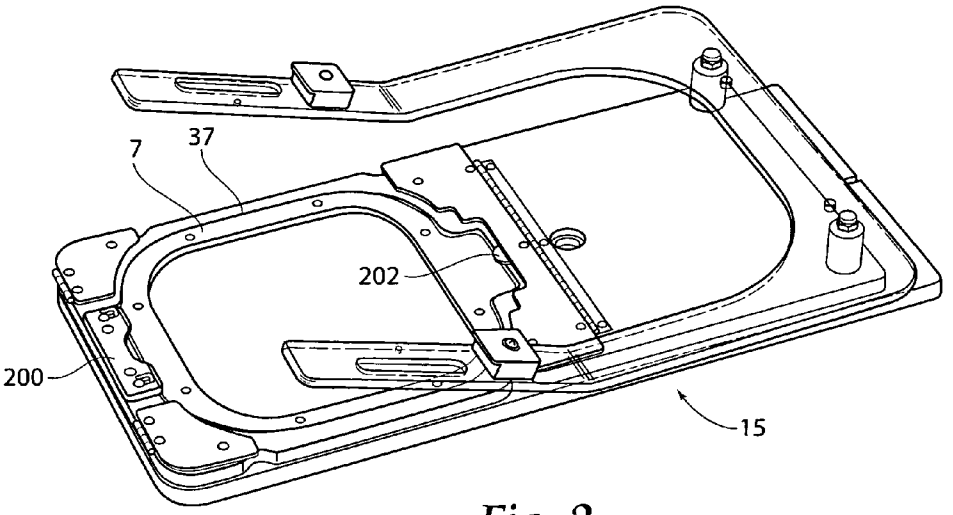


Fig. 2

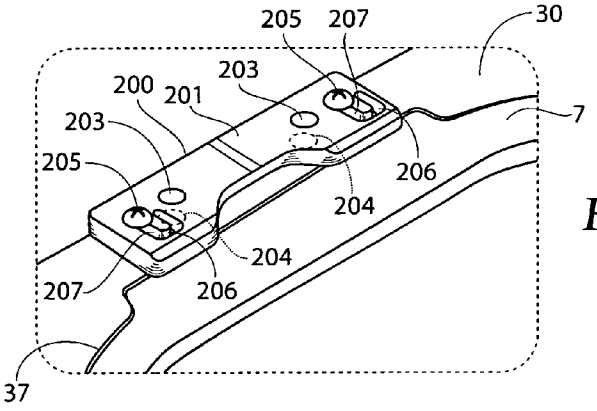


Fig. 3A

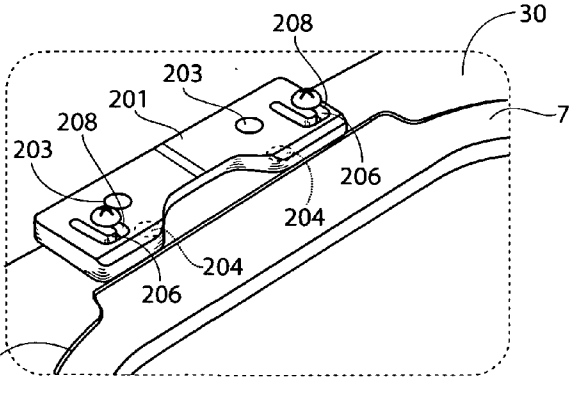


Fig. 3B

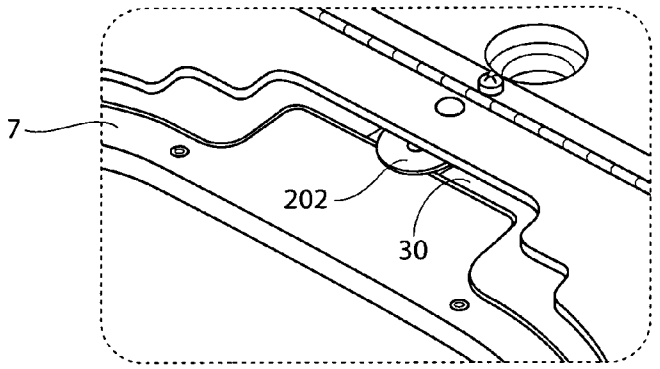


Fig. 4

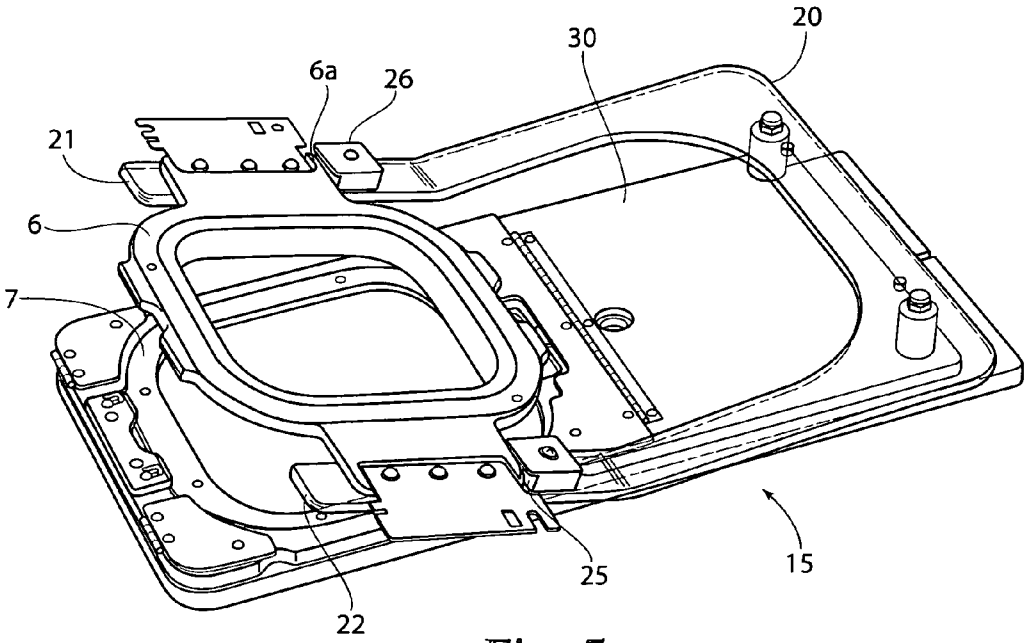


Fig. 5

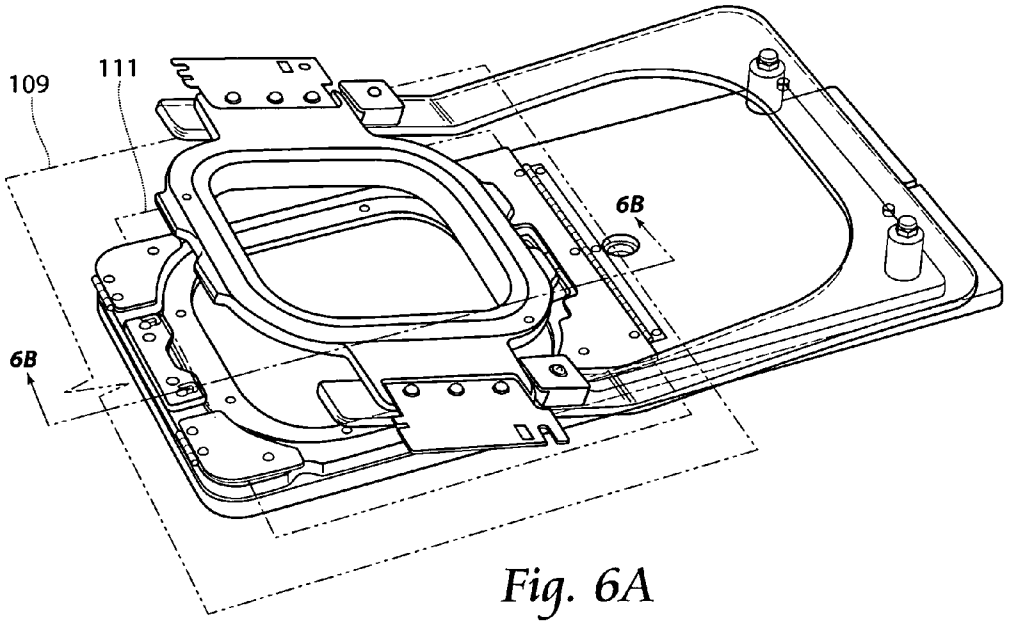


Fig. 6A

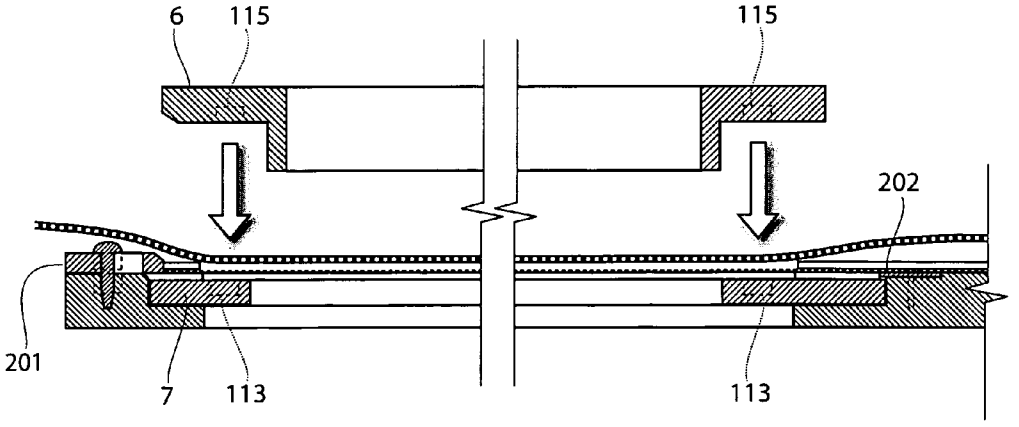


Fig. 6B

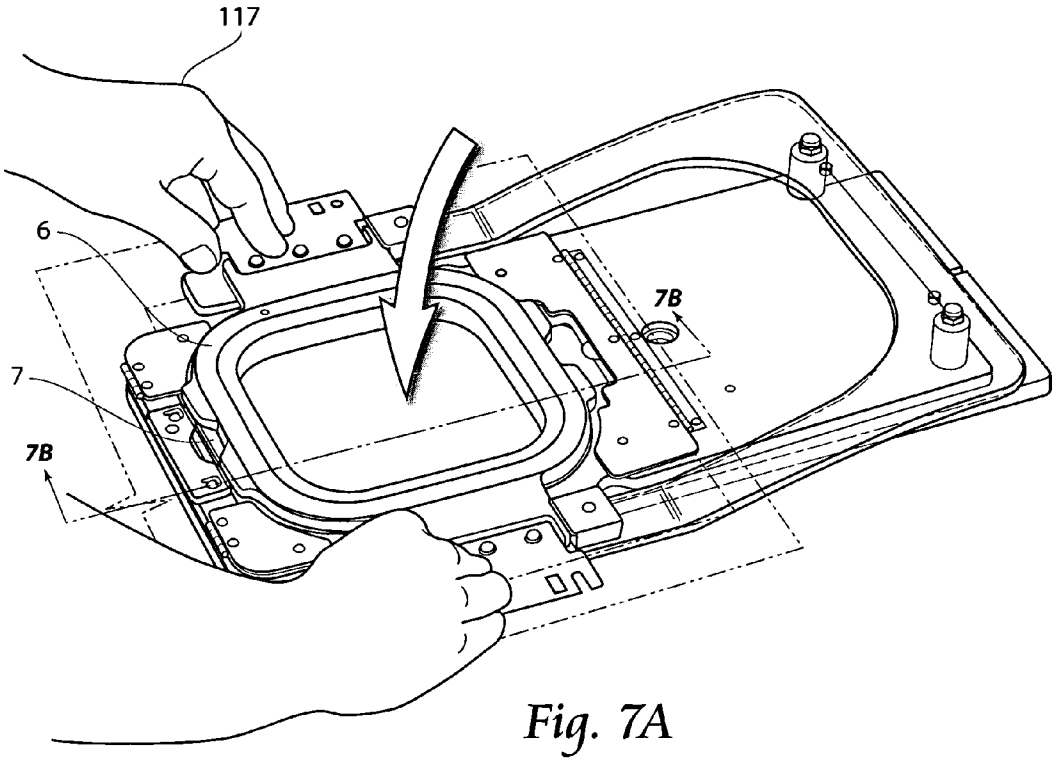


Fig. 7A

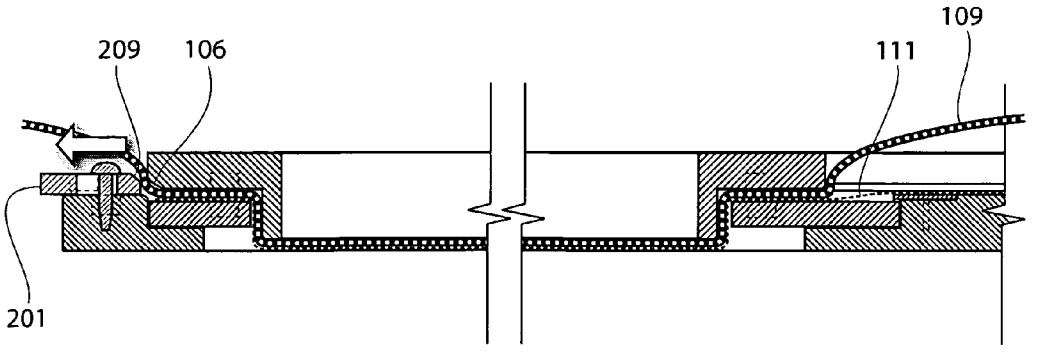


Fig. 7B

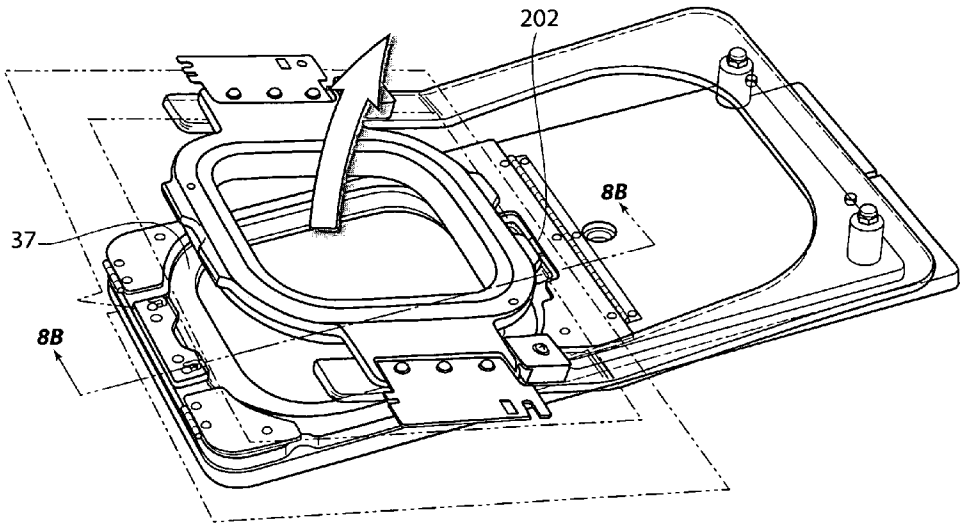


Fig. 8A

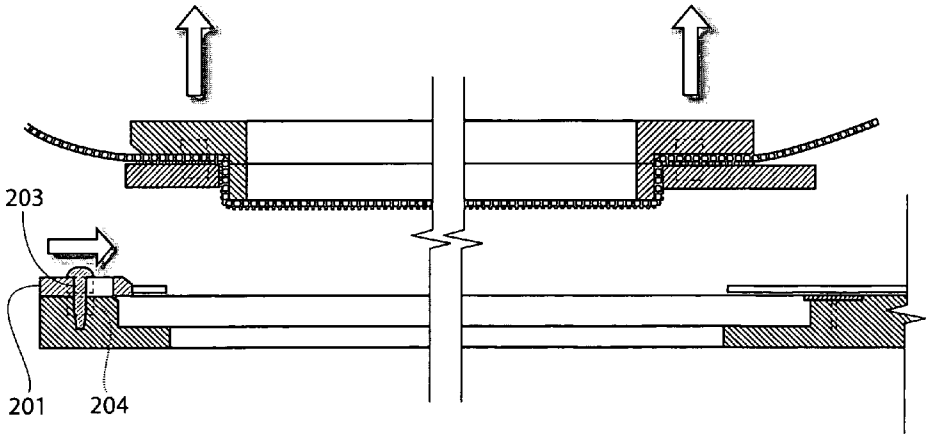


Fig. 8B

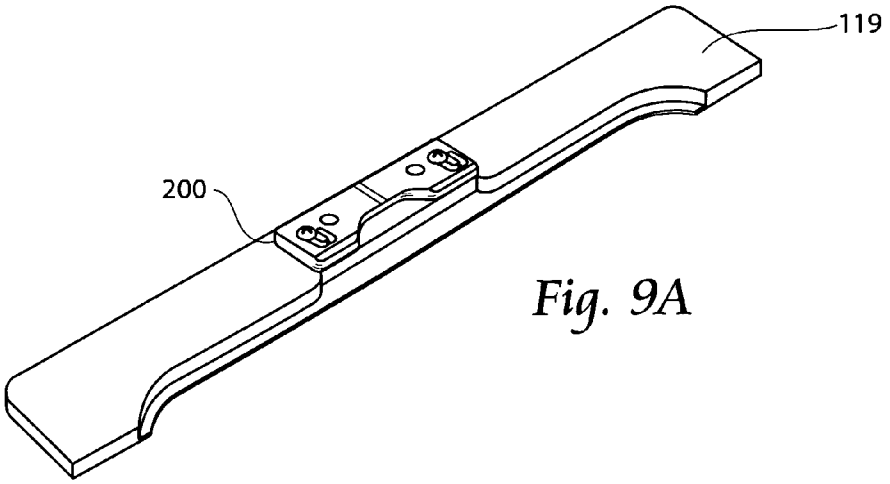


Fig. 9A

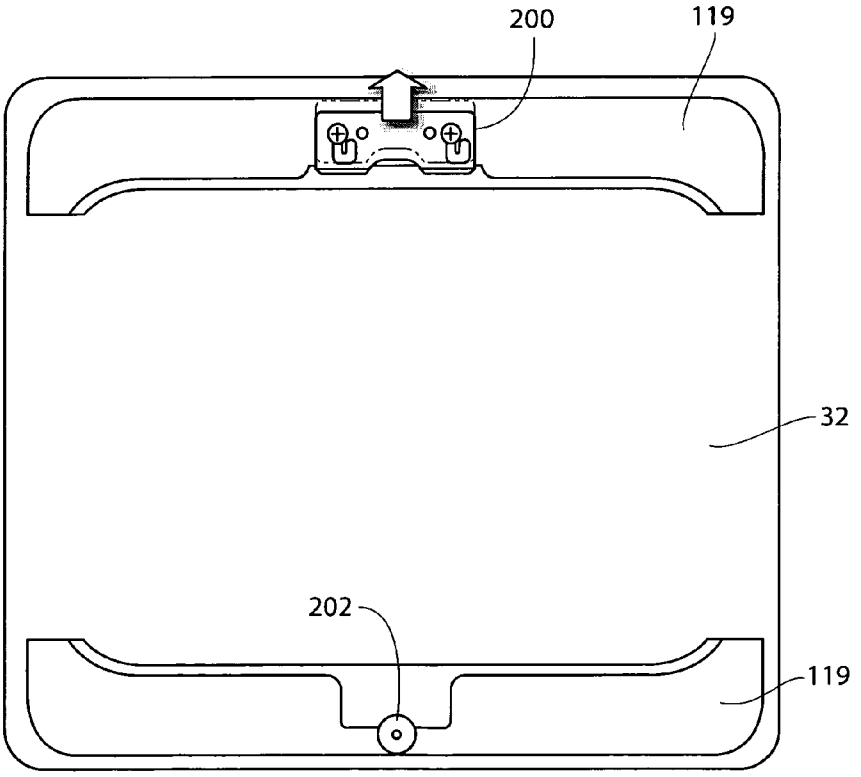


Fig. 9B

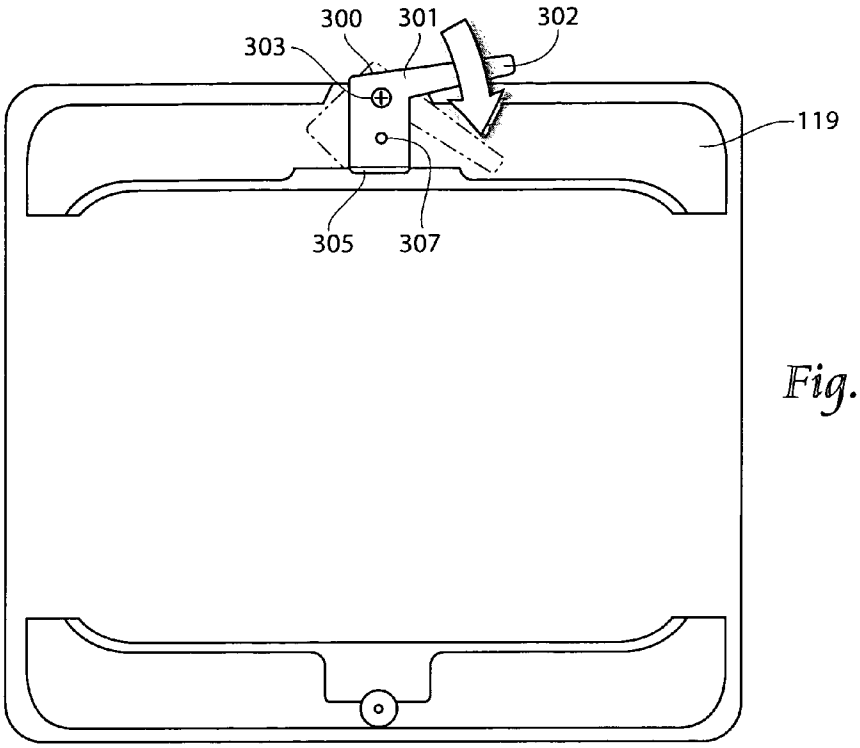


Fig. 10

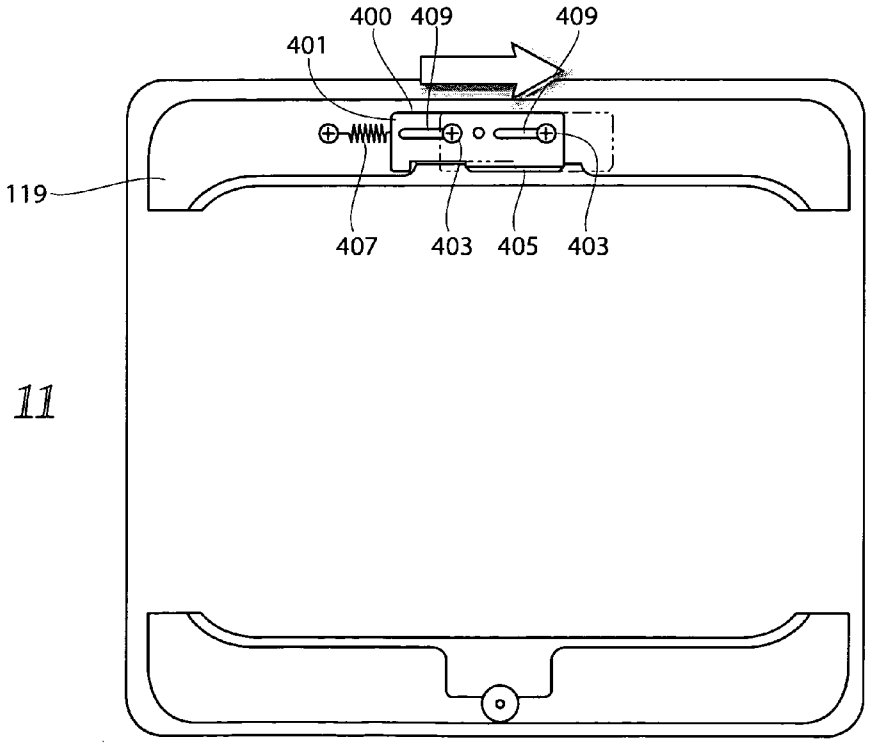


Fig. 11

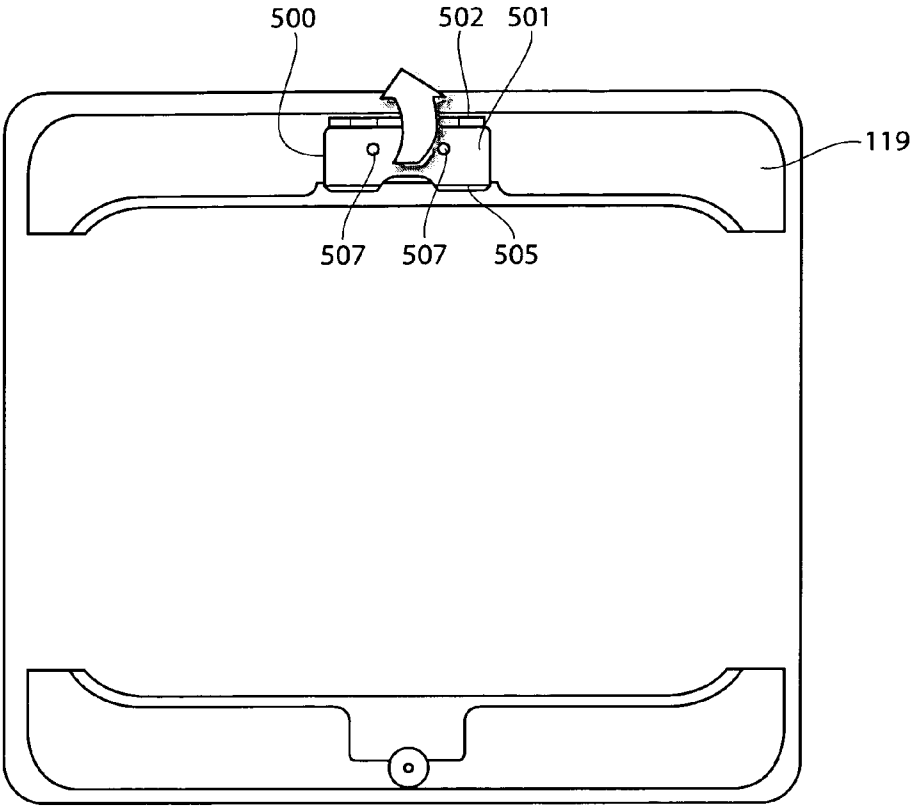


Fig. 12

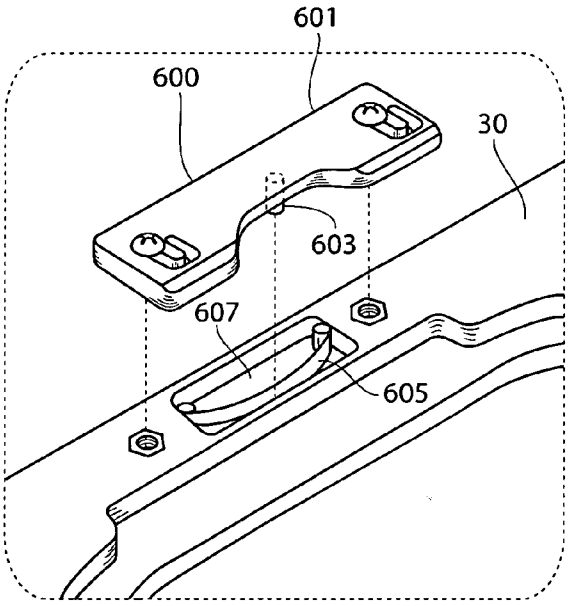


Fig. 13

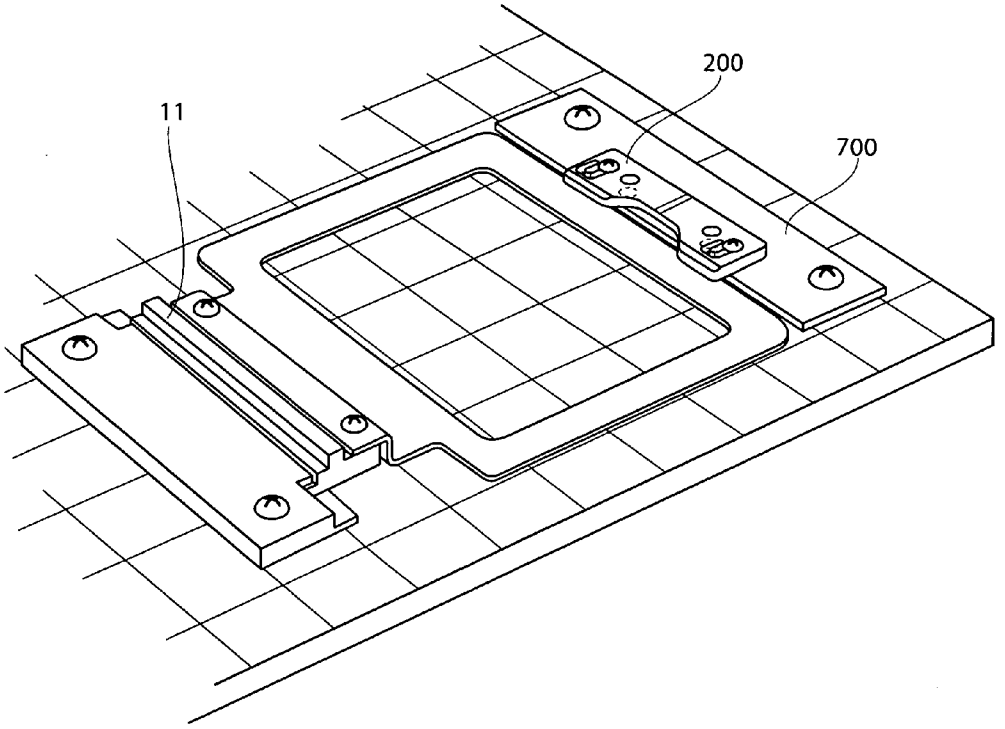


Fig. 14

HOOP RETAINING DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to the field of embroidery and monogramming and more specifically to a retaining device, which secures a lower magnetic hooping member in a hooping device during the preparation or "hooping" of an item to be embroidered.

In the embroidery industry "hoop" or "hoops" are referred to by many different terms, like frame, clamp, fabric holding device, fabric retaining device and fabric mounting frame. The definition of each of these terms is intended to apply to all of these terms to give these terms their broadest meaning individually and collectively as they are used interchangeably herein. In an instance where the term or terms have more than one meaning, all meanings will apply.

Various types of hoops and frames for holding an item to be embroidered are commonplace for both home embroidery and commercial embroidery machines. Generally, embroidery hoops comprise upper and lower hoops or clamping members that mate with one another. Cloth to be embroidered is placed between the clamping members, usually with a backing material also placed between the lower hooping member and the item to be embroidered. These types of hoops tightly pinch the material between the vertical sides of the upper and lower hooping members when the operator applies pressure to the upper hooping member to mate with the lower hooping member. Because of this, the lower hooping member needs to be adjusted for any change in thickness of the item to be hooped. There are also hoops that employ magnetic force, similar to the hoops of U.S. Pat. No. 7,607,399, to mate the upper and lower hooping members. However, these types of hoops create a potential problem during the mating of the upper hooping member to the lower hooping member. The magnetic attraction of the two hooping members will cause the lower hooping member to prematurely "jump" and mate with the upper hooping member. In other words, magnetic type hooping members can move before the two members are in contact with each other. This creates alignment and distortion problems of the item to be embroidered because the item to be embroidered can be moved when the lower hooping member "jumps."

Prior art hooping devices used to hold and align magnetic hooping members for application to an item to be embroidered do not have any way to secure the lower hooping member so that it does not "jump" and distort the item to be embroidered before the upper and lower members properly mate. Therefore, there is a need for magnetic hooping devices to include a hooping member retaining mechanism to prevent the lower hooping member from "jumping" and mating with the upper hooping member when the upper hooping member is being lowered.

The present invention provides a retaining mechanism used with hooping devices or fixtures on a base plate or a framing board to retain the lower hooping member until the upper hooping member comes in contact with it. Then the retaining mechanism will automatically release the lower hooping member from the hooping device, or the operator will manually release the lower hooping member.

These and other features of the device will become evident with respect to the drawings and the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exploded view of the hooping device.

FIG. **2** is a perspective view of the preferred embodiment of the retaining mechanism retaining the lower hooping member in the hooping device.

FIG. **3**A is a partial perspective view showing the preferred embodiment of the retaining mechanism retaining one side of the lower hooping member.

FIG. **3**B is a partial perspective view showing the preferred embodiment of the retaining mechanism in the disengaged position.

FIG. **4** shows the stationary retaining member, located opposite to the retaining mechanism, retaining one side of the lower hooping member.

FIG. **5** shows the hooping device in the pre-operation position wherein the retaining mechanism is in the engaged position and retaining the lower hooping member.

FIG. **6**A is a perspective view of the hooping device in the pre-operation position wherein the retaining mechanism is in the engaged position and retaining the lower hooping member and the embroidery backing material and the fabric to be embroidered are in position.

FIG. **6**B is a perspective cut away view of the hooping device along line **6**B in FIG. **6**A as the upper hooping member is being lowered.

FIG. **7**A is a perspective view of an operator manually lowering the upper hooping member and mating it with the lower hooping member.

FIG. **7**B is a perspective cut away view of the hooping device along line **7**B in FIG. **7**A as the upper hooping member is fully mated with the lower hooping member.

FIG. **8**A is a perspective view of the hooping device as the mated hooping members are raised with the embroidery backing material and the fabric to be embroidered positioned between them.

FIG. **8**B is a perspective cut away view of the hooping device along line **8**B in FIG. **8**A as the mated hooping members are raised.

FIG. **9**A is a perspective view of a larger hoop locating member employing the hoop retaining mechanism.

FIG. **9**B is a top view of two hoop locating members on a hooping board. One of the hoop locating members contains the hoop retaining mechanism and the other has the stationary retaining member.

FIG. **10** is a top view of another embodiment of the hoop retaining mechanism on a hoop locating member.

FIG. **11** is a top view of another embodiment of the hoop retaining mechanism on a hoop locating member.

FIG. **12** is a top view of another embodiment of the hoop retaining mechanism on a hoop locating member.

FIG. **13** is a perspective view of another embodiment of a hoop retaining mechanism on a hoop locating member.

FIG. **14** is a perspective view of another hooping device using a transferable retaining mechanism.

DETAILED DESCRIPTION OF THE DRAWINGS

Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structures. While the preferred embodiment has been described, the details may be changed without departing from the invention, which is defined by the claims.

As seen in FIG. **1**, a tubular hooping device **15** includes a flexible aligning arm **20** mounted to a base plate **30**. The base

plate **30** in turn rests upon a hooping board **32**. The aligning arm **20**, the base plate **30**, and the hooping board **32**. Furthermore, the base plate **30** has a recess **37** formed into its distal end **34**. The recess **37** is shaped so as to receive the lower hooping member **7**.

When embroidering, some garments do not provide an adequate embroidery surface so it is the industry practice to place a piece of backing material behind the particular portion of a garment that is to be embroidered. The backing material serves to strengthen and stabilize the fabric being embroidered. In order to ensure that the backing material is located behind a particular portion of a garment to be embroidered, at least one location means **40** is provided on the distal end of the base plate **30**, immediately adjacent the keyed recess **37**. In this embodiment, the location means **40** comprises a pair of plastic plates located at the distal end of the base plate and hinged therewith and a single plastic plate located at the proximal side of the base plate and hinged therewith. The location means **40** also employs magnetic attraction to ensure closure. The magnetic means may be located on the plastic plates or the base plate so long as the magnetic force generated between the plates and the base is sufficient to maintain the backing material in its desired position.

The aligning arm **20** illustrated in FIG. **1** is designed to accurately align the upper hooping member **6** with the lower hooping member **7**. The aligning arm is comprised of a first finger **21** and a second finger **22** connected at their proximate ends by a web **23**. The aligning arm **20** is supported above the base plate **30** at the web **23** upon a spacer **24**. Nuts **39** are threaded upon bolts **35** to secure the aligning arm **20**, spacer **24**, and base plate **30** together. In the embodiment of FIG. **1**, it is preferred to fabricate the aligning arm **20** from a polycarbonate material, though it is to be understood that any material possessing similar structural characteristics could be employed.

Locating and aligning mechanisms for repeatedly and accurately positioning the upper hooping member **6** upon the distal end of the fingers **21** and **22** of the aligning arm **20** are also illustrated in FIG. **1**. The mechanisms consist of a pair of positioning blocks **26**, one mounted on each of the fingers **21** and **22** and a pair of grooves **27** located distal to the positioning blocks **26**. The positioning blocks **26** form a slot **25** on each finger **21** and **22** capable of receiving an edge **6***a* of the upper hooping member **6**. The finger grooves **27** are located on the fingers **21** and **22** so as to allow a space for the attachment nuts **9**, which are used to secure the mounting arms **10** to the upper hooping member **6**.

The complementary action of the slots **25** and the upper hooping member edge **6***a* serve to positively locate the upper hooping member **6** upon the fingers **21** and **22** of the aligning arm **20**. Other upper hooping members will require different, yet equivalent, positioning structures. Another equivalent positioning structure may comprise one or more recesses formed in the bottom surface of the upper hooping member and one or more plates mounted on the aligning arms and positioned to receive the recesses. Although the general structure of all upper hooping members utilized in embroidery machines are somewhat similar, it should be noted and appreciated that different embroidery machine manufacturers have different hoop designs and that different positioning structures and different aligning arms may be utilized without deviating from the present invention.

FIG. **2** depicts the hooping device **15** wherein the lower hooping member **7** is being held in place in the recess **37** by the retaining mechanism **200** and the stationary retaining member **202**.

FIG. **3**A shows the retaining mechanism **200** in the engaged position fully retaining the lower hooping member **7**. A portion or edge of the movable retaining member **201** is located over the lower hooping member **7** thereby retaining it. The attachment screws **205** secure the movable retaining member **201** to the base plate **30** but still allow the movable retaining member **201** to move slideably along the engagement slots **206**. In FIG. **3**A the movable retaining member biasing magnets **203** interact with the base plate biasing magnets **204** to always return the movable retaining member **201** to the fully engaged position after being displaced either by the operator or after the upper hooping member **6** FIG. **5** mates with the lower hooping member **7** and they depart from the base plate **30**.

The shape of the engagement slots **206** also allows the operator to disengage the movable retaining member **201**. The engagement slots **206** are u-shaped, wherein one side of the "U" is longer than the other. The different length sides translate into more or less travel along the attachment screws **205**. When the attachment screws **205** are located within the longer side **207** of the engagement slots **206**, as in FIG. **3**A, the movable retaining member **201** will extend over the recess **37** and the lower hooping member **7**. When the attachment screws **205** are located within the shorter side **208** of the engagement slots **206**, as in FIG. **3**B, the movable retaining member biasing magnets **203** are prevented from fully aligning with the base plate biasing magnets **204** and the movable retaining member **201** will be prohibited from extending over the recess **37** and the lower hooping member **7**. This disengaged position allows for easier hooping of items that do not require the lower hooping member **7** to be retained, as with very thick items.

FIG. **4** shows the stationary retaining member **202**, attached to the base plate **30**, fully retaining the lower hooping member **7**. This retaining functionality could be attained in many different ways as it is only required to remain stationary and retain the lower hooping member **7**.

FIG. **5** shows the hooping device **15** in the pre-operative position with the upper hooping member **6** positioned on top of the first finger **21** and the second finger **22** of the aligning arm **20** with the upper hooping-member edge **6***a* located in the slot **25** of the positioning blocks **26**.

FIG. **6**A shows the embroidery backing material **111** and the item to be embroidered **109** in their respective embroidery positions. In FIG. **6**B a cut away view of FIG. **6**A is pictured showing the lowering of the upper hooping member **6** onto the lower hooping member **7**. As the upper hooping member **6** is lowered the upper hoop magnets **115** are attracted to the oppositely charged magnets of the lower hooping member **113**. In alternative embodiments, one of the hooping members may contain a material to attract the magnets of the other hooping member instead of containing oppositely charged magnets. Furthermore, as the upper hooping member **6** is lowered, the magnetic force that wants to mate the two hooping members is overcome by the engaged retaining mechanism **201** and the stationary retaining member **202**.

FIG. **7**A shows an operator **117** pushing the upper hooping member **6** downward to mate with the lower hooping member **7**. FIG. **7**B shows a cut away view of FIG. **7**A; wherein both the fabric to be embroidered **109** and the embroidery backing material **111** are positioned between the upper hooping member **6** and the lower hooping member **7**. Additionally, it is shown how the upper hoop chamfered edge **106** interacts with the movable retaining member chamfered edge **209** as the two hooping members come together. The upper hoop chamfered edge **106** applies a force onto the movable retaining member chamfered edge **209** thereby forcing the movable retaining

member **201** to slide away from the lower hooping member **7** allowing both hooping members the freedom to be raised together as seen in FIG. **8**A and FIG. **8**B.

FIG. **8**A shows the movement of the two mated hoops as they are removed together. This removal action allows the portion of the lower hooping member, located underneath the stationary retaining member **202** to be removed from the recess **37**. Furthermore, in FIG. **8**B it is shown how the movable retaining member **201** repositions itself into the original engaged position because of the biasing affect of the movable retaining member biasing magnets **203** aligning with the base plate biasing magnets **204**.

FIG. **9**A and FIG. **9**B show the preferred embodiment of the retaining mechanism **200** and stationary retaining member **202** in use on larger hoop locating members **119** and situated on a hooping board **32**.

FIG. **10** shows another embodiment of a retaining mechanism **300** installed on a larger hoop locating member **119**. In this embodiment of the retaining mechanism **300** the movable retaining member **301** is rotated around the attachment screw **303** by pushing or pulling the movable retaining member handle **302**. A biasing mechanism may be employed to return the movable retaining member back to the original engaged position. In FIG. **10** the use of a pair of magnets **307** as a biasing mechanism is shown. Additionally, the movable retaining member **301** will have a chamfered engagement edge **305** to complement the chamfered engagement edge of the upper hooping member (not pictured but similar to **106** on FIG. **7**B) which will allow the upper hooping member (not pictured here but similar to **6** FIG. **6**A) to fully mate with the lower hooping member (not pictured here but similar to **7** FIG. **2**).

FIG. **11** shows another embodiment, wherein the retaining mechanism **400** can be disengaged by sliding it to one side. The movable retaining member **401** has two slots **409** through which attachment screws **403** are placed to secure the movable retaining member **401** to the hoop locating member **119**. The design also incorporates a chamfered engagement edge **405** on the retaining mechanism **401** to complement the chamfered engagement edge of the upper hooping member (not pictured but similar to **106** on FIG. **7**B) which will allow the upper hooping member (not pictured here but similar to **6** FIG. **6**A) to fully mate with the lower hooping member (not pictured here but similar to **7** FIG. **2**).

To use the retaining mechanism of FIG. **11** the operator slides the movable retaining member **401** away from the engaged position until no part of the movable retaining member **401** over hangs the area where the lower hooping member (not pictured here but similar to **7** FIG. **2**) will be placed. The operator then installs the lower hooping member (not pictured here but similar to **7** FIG. **2**) and releases the movable retaining member **401** allowing the biasing mechanism **407** to place the movable retaining member **401** into the original engaged position wherein part of the movable retaining member **401** overhangs the lower hooping member (not pictured here but similar to **7** FIG. **2**). If no biasing mechanism is used the operator manually slides the retaining mechanism **401** back to the original engaged position.

FIG. **12** shows an additional retaining mechanism embodiment **500**. In this embodiment the movable retaining member **501** is attached to the hoop locating member **119** by a hinge **502**. In the engaged position a portion of the movable retaining member **501** will hang over the lower hooping member (not pictured here but similar to **7** FIG. **2**). Through the use of magnets **507** located in the movable retaining member **501** and the hoop locating member **119** the lower hooping member (not pictured here but similar to **7** FIG. **2**) will be securely held in place. A chamfered engagement edge **505** on the retaining mechanism **501** complements the chamfered engagement edge of the upper hooping member (not pictured but similar to **106** on FIG. **7**B) which will allow the upper hooping member (not pictured here but similar to **6** FIG. **6**A) to fully mate with the lower hooping member (not pictured here but similar to **7** FIG. **2**) prior to the lower hooping member (not pictured here but similar to **7** FIG. **2**) being released.

To use the retaining mechanism of FIG. **12** the operator lifts up on the edge, opposite the hinge, of the movable retaining member **501** radially upward from the engaged position until no part of the movable retaining member **501** hangs over the area where the lower hooping member (not pictured here but similar to **7** FIG. **2**) will be placed. The operator then installs the lower hooping member (not pictured here but similar to **7** FIG. **2**) and places the movable retaining member **501** back into the engaged position thereby securing the lower hooping member (not pictured here but similar to **7** FIG. **2**) with the magnets **507**.

FIG. **13** shows an alternative biasing means for a retaining mechanism **600**. A single leaf type spring **605** is inserted inside a pocket **607** of the base plate **30**. The leaf spring **605** interacts with a peg **603** extending downward from the moveable retaining member **601**.

Because hooping devices are used in both commercial and residential settings different types of hooping devices exist. FIG. **14** shows an alternative embodiment of the hooping device using the movable retaining mechanism **200** attached to a transferable bracket mechanism **700** as a means to secure a lower hooping member positioned on a hooping board. The hooping member in FIG. **14** has a single mounting arm **11**. The transferability of the bracket mechanism **700** allows the retaining mechanism **200** to be used on hooping members that have different mounting arm configurations. Any of the other previously mentioned movable retaining mechanisms may be used on the transferable bracket mechanism **700**.

The foregoing is considered as illustrative only of the principles of the invention. Furthermore, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described. While the preferred embodiment has been described, the details may be changed without departing from the invention.

We claim:

1. An embroidery hoop retaining mechanism for use with a hoop alignment apparatus to retain a magnetic-type first hooping member while an item to be embroidered is aligned with and secured between the first and a second hooping member, the retaining mechanism comprising:

a retaining member slidably coupled to the hoop alignment apparatus, the retaining member having an engageable edge;

whereby the retaining member further comprising a biasing member for biasing the retaining member in a first direction whereby the engageable edge retains the first hooping member in the hoop alignment apparatus; and

whereby the first hooping member is released from the hoop alignment apparatus when the retaining member is moved in a second direction such that the engageable edge no longer retains the first hooping member.

2. The embroidery hoop retaining mechanism of claim **1** further comprising a second retaining member coupled to the hoop alignment apparatus.

3. The embroidery hoop retaining mechanism of claim **2** wherein the second retaining member is stationary relative to the hoop alignment apparatus.

4. The embroidery hoop retaining mechanism of claim 2 wherein the second retaining member is slidable relative to the hoop alignment apparatus.

5. The embroidery hoop retaining mechanism of claim 1 wherein the retaining member further comprises at least one slot, at least one upstanding pin is formed on the hoop alignment apparatus and the pin is received within the slot.

6. The embroidery hoop retaining mechanism of claim 5 wherein the slot is U-shaped.

7. The embroidery hoop retaining mechanism of claim 6 wherein one side of the U-shaped slot is shorter than the other allowing the retaining member to be kept in a disengaged position.

8. The embroidery hoop retaining mechanism of claim 1 wherein the retaining member further comprises a chamfered edge and the second hooping member further comprises a chamfered edge, the respective chamfered edges engaging with one another during the mating of the first and second hooping members thereby biasing the retaining member in the second direction and releasing the first hooping member from the hoop alignment apparatus.

9. The embroidery hoop retaining mechanism of claim 1 wherein the biasing mechanism comprises first and second magnets, the first magnet coupled to the hoop alignment apparatus and the second magnet coupled to the retaining member.

10. The embroidery hoop retaining mechanism of claim 1 wherein the biasing mechanism comprises a spring, the spring extending between the hoop alignment apparatus and the retaining member.

11. The embroidery hoop retaining mechanism of claim 1 wherein the retaining member may be moved in the second direction and held in a non-retaining position.

12. The embroidery hoop retaining mechanism of claim 2 wherein the first retaining member and the second retaining member are located on substantially opposing sides of the hoop alignment apparatus.

13. An embroidery hoop retaining mechanism for use with an embroidery hooping device to retain a magnetic-type first hooping member in a hoop alignment apparatus until an item to be embroidered is aligned with and secured between the first hooping member and a second hooping member, the retaining mechanism comprising:

a movable retaining member coupled to the embroidery hooping device, the movable retaining member being moveable between a first position whereby the first hooping member is retained in the hoop alignment apparatus and a second position whereby the first hooping member is not retained in the hoop alignment apparatus.

14. The embroidery hoop retaining mechanism of claim 13 further comprising a stationary retaining member, the stationary retaining member being coupled to the embroidery hooping device and positioned to retain the first hooping member in the hoop alignment apparatus until the movable retaining member is placed in said second position and the first hooping member is removed from the hoop alignment apparatus.

15. The embroidery hoop retaining device of claim 14 whereby the movable retaining member and the stationary retaining member are coupled to substantially opposed sides of the embroidery hooping device.

16. The embroidery hoop retaining device of claim 13 further comprising a biasing mechanism for biasing the retaining member in a first direction whereby the retaining member retains the first hooping member to the embroidery hooping device.

17. The embroidery hoop retaining mechanism of claim 16 wherein the biasing mechanism comprises first and second magnets, the first magnet coupled to the embroidery hooping device and the second magnet coupled to the retaining member.

18. The embroidery hoop retaining mechanism of claim 16 wherein the biasing mechanism comprises a spring, the spring extending between the embroidery hooping device and the retaining member.

19. The embroidery hoop retaining mechanism of claim 13 wherein the retaining member may be temporarily biased in a non-retaining position.

* * * * *