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(54) Handcuffs

(57) A handcuff includes:
a base;
an arm configured to move with respect to the base, the arm defining at least part of a bracelet and having one or more ratchet teeth;
a lock mechanism located within the base, the lock mechanism including a pawl having forward and rearward ends, wherein the pawl has one or more teeth located at or towards the forward end and configured to engage the or each ratchet teeth;
a first keyhole in communication with the lock mechanism, the first keyhole being provided on one side of the base at an end associated with the forward end of the pawl; and
a second keyhole in communication with the lock mechanism, the second keyhole being provided on the obverse side of the base at an end associated with the rearward end of the pawl,

wherein the base defines a channel for receiving the arm and wherein the handcuff includes a shield which extends across the channel adjacent to the second keyhole for preventing access to the lock mechanism.

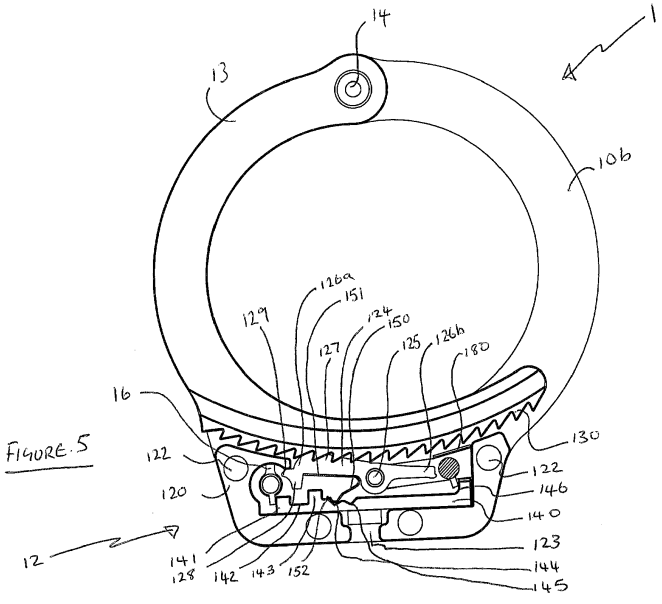

FIGURE 5

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Description

Description of Invention

[0001] This invention relates to a handcuff and, more particularly, embodiments relate to a handcuff having keyholes on both faces of the handcuff body to make use thereof easier, safer and/or more secure.

[0002] Handcuff pairs are commonly used for the restraint of detainees, primarily with the intention of limiting the possibility of escape, and also of limiting the possibility of a detainee's harming him/herself or others. A widely used type of handcuff pair comprises two handcuffs (in the form of bracelets) which are joined either rigidly, by one or more chains, or by a hinged linkage. Each handcuff comprises a first arm having two generally part-circular parts which are parallel to and spaced from each other, and curve from a base part to form approximately half of the handcuff, while a second arm of the handcuff is pivotally mounted between the two parts of the first arm at the end remote from the base part. The second arm, in a region at or adjacent its end furthest from its pivot point, is co-operable with a lock mechanism at the base part for holding the second arm in a closed position.

[0003] Known handcuffs of this type are provided with a single keyhole on one side of the base part which provides access to the lock mechanism. When used by an enforcement officer it is therefore preferable that the handcuffs are fitted to a detainee with the keyhole facing the enforcement officer, so that the enforcement officer may lock and unlock the handcuff without being hindered. It will be appreciated that if the keyhole is facing away from the enforcement officer (*i.e.* towards the detainee), it is not easy for the enforcement officer to obtain access to the keyhole, which may result in injury to the detainee or the enforcement officer, particularly if the detainee is not cooperating with the enforcement officer.

[0004] It is an object of the invention to seek to provide a handcuff which overcomes, or at least substantially reduces, the disadvantages associated with known handcuffs.

[0005] It is a further object of the invention to seek to provide a handcuff having improved security.

[0006] In one aspect of the invention, we provide a handcuff including:

a base;
an arm configured to move with respect to the base, the arm defining at least part of a bracelet and having one or more ratchet teeth;
a lock mechanism located within the base, the lock mechanism including a pawl having forward and rearward ends, wherein the pawl has one or more teeth located at or towards the forward end and configured to engage the or each ratchet teeth;
a first keyhole in communication with the lock mechanism, the first keyhole being provided on one side of the base at an end associated with the forward end of the pawl; and
a second keyhole in communication with the lock mechanism, the second keyhole being provided on the obverse side of the base at an end associated with the rearward end of the pawl,
wherein the base defines a channel for receiving the arm and wherein the handcuff includes a shield which extends across the channel adjacent to the second keyhole for preventing access to the lock mechanism.

[0007] Preferably, the handcuff includes a second arm having two generally part-circular parts which are parallel to and spaced from each other, and curved from the base to form the remainder of the bracelet.

[0008] Preferably, the arm is pivotally mounted to the second arm.

[0009] Preferably, the pawl is pivotally mounted to the base at a point between the forward end and the rearward end thereof.

[0010] Preferably, the pawl comprises plural teeth.

[0011] Preferably, the teeth of the pawl extend along an outer surface thereof between the forward end and the point at which the pawl is pivotally mounted to the base.

[0012] Preferably, the forward end of the pawl includes a bearing surface for receiving the tip of a key.

[0013] Preferably, the forward end of the pawl includes a foot depending therefrom.

[0014] Preferably, the lock mechanism includes a lock bar and, preferably, a spring operable to permit or prevent actuation of the pawl.

[0015] Preferably, the shield is positioned substantially flush with respect to the pawl when the or each teeth of the pawl are disengaged from the or each ratchet teeth.

[0016] Preferably, the shield is positioned to be contactable with the rearward end of the pawl.

[0017] Preferably, the shield resiliently biases the rearward end of the pawl to cause an increased bite between the or each teeth of the pawl and the or each ratchet teeth.

[0018] In a further aspect of the invention, we provide a pair of handcuffs including at least one handcuff according to the first aspect of the invention.

[0019] The invention will now be described, by way of example only, with reference to the accompanying drawings, of which:

Figure 1 shows a perspective view of a handcuff according to one embodiment of the invention;
Figure 2 shows a plan view of the handcuff of Figure 1;
Figure 3 shows an underside view of the handcuff of Figure 1;
Figure 4 shows the same view as Figure 1 with a part of the handcuff removed to show the lock mechanism;
Figure 5 shows the same view as Figure 2 with a

part of the handcuff removed and where the handcuff is unlocked;

Figure 6 shows the same view as Figure 5, where the handcuff is unlocked and the ratchet teeth and pawl teeth are disengaged;

Figure 7 shows the same view as Figure 5, where the handcuff is locked;

Figure 8 shows a plan view of a part of a handcuff according to a second embodiment, where the handcuff is unlocked and the ratchet teeth and pawl teeth are disengaged; and

Figure 9 shows the same view as Figure 8, where the handcuff is locked.

[0020] Figures 1 to 3 show a handcuff, indicated generally at 1, having a first arm 10 which includes two generally part-circular parts 10a, 10b which are parallel to and spaced from one another, with the channel between them indicated at 11. The first arm 10 extends from a base, indicated generally at 12. The parts 10a, 10b also make up the sides of the base 12 and therefore it is to be understood that the channel 11 extends through the base 12. At the end of the first arm 10 remote from the base 12, a second arm 13 is disposed between the two part-circular parts 10a, 10b, and is pivotally mounted, *e.g.* by a rivet 14. The second arm 13 generally is part-circular in configuration, and, in an end region remote from its end at which it is pivotally mounted, has teeth 130 on its outer surface. The second arm 11 is configured to move with respect to the base 12 by rotation about rivet 14 and is receivable by the channel 11.

[0021] The base 12 includes a pair of plate members 120, 121 which are sandwiched between the part-circular parts 10a, 10b and held together, *e.g.* by rivets 122. An aperture 160 is provided in the base 12, e.g. through an edge of each of the plate members 120, 121. A further aperture 123 is also provided in the base 12 for enabling the handcuff 1 to be attached to a second handcuff to form a pair of handcuffs (not shown). In some examples (not shown), the plate members 120, 121 may be replaced by a single plate member or more than two plate members, without departing from the scope of the invention.

[0022] The base 12 contains a lock mechanism. The lock mechanism is confined within a cavity defined by the plate members 120, 121 and the part-circular parts 10a, 10b. Access to the lock mechanism is provided by first and second 15, 16 keyholes, the first keyhole 15 providing access to the lock mechanism from one side of the base 12 and the second keyhole 16 providing access to the lock mechanism from the obverse side of the base 12. The first and second keyholes 15, 16 are provided on the base 12 at opposite ends to one another.

[0023] Figures 4 to 7 show views of the handcuff 1 having the part-circular part 10a removed so that components of the lock mechanism are visible. Referring in particular to Figure 5, the lock mechanism includes a pawl 124 which is pivotably mounted to the base 12, *e.g.* by a rivet 125. The pawl 124 is substantially elongate and is mounted to the base 12 at around its centre point. The pawl 124 includes a forward end 126a and a rearward end 126b. The pawl 124 includes teeth 127 which extend along the outer surface of the pawl 124 from the forward end 126a to about the centre point, as shown most clearly in Figure 6. In some embodiments, the pawl 124 may only include one tooth 127. The pawl 124 comprises a foot 128 located at the forward end 126a and which depends from the side of the pawl 124 opposite to the teeth 127. The pawl 124 also comprises a projection 129 at the forward end 126a. The lock mechanism may include a lock bar 140 and a spring 150, *e.g.* a leaf spring, operable to permit or prevent actuation of the pawl 124. The spring 150 comprises a flat portion 151 for engaging a surface of the pawl 124, and a lip 152 for engaging the lock bar 140. At one end the lock bar 140 there may comprise a key bearing surface 141 associated with the second keyhole 16. Adjacent to the key bearing surface 141, the lock bar 140 may comprise a rebate 142. The lock bar 140 may also comprise, successively, a seat 143 and first and second detents 144, 145. At the end remote from the key bearing surface 141, the lock bar 140 may include a second key bearing surface 146 associated with the first keyhole 15. Adjacent to the second key bearing surface 146 the lock bar 140 may include an elongate member 147 (shown best in Figure 7). The elongate member 147 extends into the aperture 160 formed in the plate members 120, 121.

[0024] Operation of the lock mechanism will now be described with reference to Figures 5 to 7.

[0025] Figure 5 shows the handcuff 1 in an unlocked state. The second arm 13 has been rotated counter clockwise (as viewed in the Figures) about rivet 14 to cause the teeth 130 of the second arm 13 to engage the teeth 127 of the pawl 124. A biasing force of the spring 150 causes the teeth 127 of the pawl 124 and the teeth 130 of the second arm 13 to bite and therefore clockwise rotation of the second arm 13 is prevented. Further counter clockwise rotation of the second arm 13 is, however, permissible because the lock bar 140 is positioned such that the lip 152 of the spring 150 engages detent 144. With the lock bar 140 held in this position the foot 128 of the pawl 124 is free to move into the rebate 142 formed in the lock bar 140. Therefore, as the second arm 13 continues to rotate counter clockwise (to tighten the handcuff 1) the force of the rotation overcomes the biasing force of the spring 150 and causes the teeth 127 of the pawl 124 and the teeth 130 of the second arm 13 to partially disengage. In other words, the pawl 124 and the second arm 13 are arranged in the manner of a linear ratchet. Rotation of the second arm 13 to loosen or open the handcuff 1 is prevented. However, rotation of the second arm 13 to tighten the handcuff 1, e.g. around the wrist of a detainee, is permitted.

[0026] If an enforcement officer is required to loosen or open the handcuff 1, a key 200 must be inserted into either one of the keyholes 15, 16 to cause the teeth 127,

130 to disengage, as shown in Figure 6. As will be appreciated, when the teeth 127, 130 are disengaged the second arm 13 is free to rotate either clockwise or counter clockwise. For simplicity of explanation, Figure 6 shows keys 200 inserted into both keyholes 15, 16. However, the key 200 need only be inserted into one or the other of the keyholes 15, 16 to cause the teeth 127, 130 to disengage.

[0027] A key 200 that is inserted into keyhole 15 may be rotated so that the tip of the key 200 bears against the underside of the rearward end 126b of the pawl 124. Continued rotation of the key 200 causes the pawl 124 to rotate about rivet 125 against the biasing force of the spring 150. It is possible to rotate the pawl 124 in this manner because the lock bar 140 is positioned such that the lip 152 of the spring 150 engages detent 144 and with the lock bar 140 held in this position the foot 128 of the pawl 124 is free to move into the rebate 142 formed in the lock bar 140 to enable the teeth 127, 130 to disengage.

[0028] Similarly, a key 200 that is inserted into keyhole 16 may be rotated so that the tip of the key 200 bears against the projection 129 at the forward end 126a of the pawl 124. Continued rotation of the key 200 causes the pawl 124 to rotate about rivet 125 against the biasing force of the spring 150. Again, it is possible to rotate the pawl 124 in this manner because the lock bar 140 is positioned such that the lip 152 of the spring 150 engages detent 144 and with the lock bar 140 held in this position the foot 128 of the pawl 124 is free to move into the rebate 142 formed in the lock bar 140 to enable the teeth 127, 130 to disengage.

[0029] Once the first and second arms 10, 13 of the handcuff 1 have been adjusted accordingly, i.e. tight enough to detain the detainee but not too tight to cause injury to the detainee, the enforcement officer then locks the lock mechanism. This is achieved by inserting a pin 170 into the aperture 160 (shown in Figure 1) which contacts the elongate member 147 to urge the lock bar 140 to the position shown in Figure 7. Typically, the pin 170 is formed at one end of the key 200 for convenience. However, any suitable pin or item having a projection able to be received by the aperture 160 may be used instead.

[0030] In Figure 7, the lock bar 140 is shown to be positioned so that the lip 152 of the spring 150 engages detent 145. With the lock bar 140 held in this position the foot 128 of the pawl 124 is no longer free to move into the rebate 142 formed in the lock bar 140. Instead, the foot 128 of the pawl 124 is in engagement with the seat 143 of the lock bar 140 so that the teeth 127, 130 are locked together. Thus, rotation of the first arm 10 is now not permissible in either direction.

[0031] In order to unlock the handcuff 1 the enforcement officer must use a key 200. Again, it does not matter which of the keyholes 15, 16 is used to unlock the handcuff 1. A key 200 that is inserted into keyhole 15 may be rotated so that the tip of the key 200 bears against the second key bearing surface 146 of the bar 140. Continued rotation of the key 200 causes the lock bar 140 to slide to the position shown in Figure 5, thereby causing the handcuff 1 to unlock. Similarly, a key 200 that is inserted into keyhole 16 may be rotated so that the tip of the key 200 bears against the first key bearing surface 141 of the lock bar 140. Continued rotation of the key 200 causes the lock bar 140 to slide to the position shown in Figure 5, thereby causing the handcuff 1 to unlock.

[0032] The handcuff 1 also includes a shield 180 which extends across the channel 11 adjacent to the second keyhole 15 for preventing access to the lock mechanism. The shield 180 is typically formed of a thin gauge material, such as a piece of metal, although any suitable material may be used. The shield 180 is positioned in the channel 11 between the lock mechanism and the second arm 13. Typically, the shield 180 is positioned substantially flush with the pawl 124 when the pawl 124 is rotated to disengage the teeth 127, 130 (as shown in Figure 6).

[0033] Without the shield 180 there would be a gap in the channel 11 providing access to the lock mechanism and, whilst the handcuff 1 is being used to detain a detainee, the detainee may be able to "pick the lock" by inserting an object into the gap and free himself or herself from the handcuff 1. Clearly, if the wrists of the detainee are fairly slim the second arm 13 of the handcuff 1 may at least partially cover such a gap. However, if the detainee has larger wrists then the second arm 13 may not sufficiently cover the gap and so it may be possible for the detainee to free himself or herself. Accordingly, the presence of the shield 180 is essential in order to improve the security of the handcuff 1.

[0034] A handcuff, indicated generally at 1', according to a second embodiment of the invention will now be described with reference to Figures 8 and 9. Handcuff 1' includes all features described above with reference to handcuff 1 of the first embodiment, and so those features will not be described again in detail. The handcuff 1' of the second embodiment differs from the handcuff 1 of the first embodiment in that the shield 180' is resiliently biasing, *i.e.* the shield 180' functions in the manner of a spring. Moreover, the shield 180' is arranged to overlap the pawl 124'.

[0035] Figure 8 shows the handcuff 1' unlocked with the teeth 127', 130' disengaged and Figure 9 shows the handcuff 1 locked. When the handcuff 1' is locked the shield 180' is arranged such that the tip thereof contacts the rearward end 126b' of the pawl 124'. It is to be appreciated that since the shield 180' is resiliently biasing the shield 180' applies a force to the rearward end 126b' of the pawl 124' which has the effect of increasing the bite between the teeth 127', 130'. The resiliently biased shield 180' therefore has a two-fold benefit in increasing the security of the handcuff 1'. Firstly, the shield 180' prevents access to the lock mechanism and therefore prevents the lock mechanism from being "picked". Secondly, the shield 180' has the effect of increasing the bite between the teeth 127', 130' which means that the hand-

cuff 1' will be more difficult to prise open.

[0036] The handcuff 1' may be loosened or opened in the same manner as that described above with respect to the handcuff 1 of the first embodiment. The only difference is that when the key 200' (which may be inserted into either of keyholes 15', 16') is turned the enforcement officer must overcome the force of the resiliently biasing shield 180' in order to disengage the teeth 127', 130', as shown in Figure 8.

[0037] When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

[0038] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A handcuff including:

a base;
an arm configured to move with respect to the base, the arm defining at least part of a bracelet and having one or more ratchet teeth;
a lock mechanism located within the base, the lock mechanism including a pawl having forward and rearward ends, wherein the pawl has one or more teeth located at or towards the forward end and configured to engage the or each ratchet teeth;
a first keyhole in communication with the lock mechanism, the first keyhole being provided on one side of the base at an end associated with the forward end of the pawl; and
a second keyhole in communication with the lock mechanism, the second keyhole being provided on the obverse side of the base at an end associated with the rearward end of the pawl,
wherein the base defines a channel for receiving the arm and wherein the handcuff includes a shield which extends across the channel adjacent to the second keyhole for preventing access to the lock mechanism.

2. A handcuff according to claim 1, including a second arm having two generally part-circular parts which are parallel to and spaced from each other, and curved from the base to form the remainder of the bracelet.

3. A handcuff according to claim 2, wherein the arm is pivotally mounted to the second arm.

4. A handcuff according to any one of the preceding claims, wherein the pawl is pivotally mounted to the base at a point between the forward end and the rearward end thereof.

5. A handcuff according to any one of the preceding claims, wherein the pawl comprises plural teeth.

6. A handcuff according to claim 5, where the teeth of the pawl extend along an outer surface thereof between the forward end and the point at which the pawl is pivotally mounted to the base.

7. A handcuff according to any one of the preceding claims, wherein the forward end of the pawl includes a bearing surface for receiving the tip of a key.

8. A handcuff according to any one of the preceding claims, wherein the forward end of the pawl includes a foot depending therefrom.

9. A handcuff according to any one of the preceding claims, wherein the lock mechanism includes a lock bar and, preferably, a spring operable to permit or prevent actuation of the pawl.

10. A handcuff according to any one of the preceding claims, wherein the shield is positioned substantially flush with respect to the pawl when the or each teeth of the pawl are disengaged from the or each ratchet teeth.

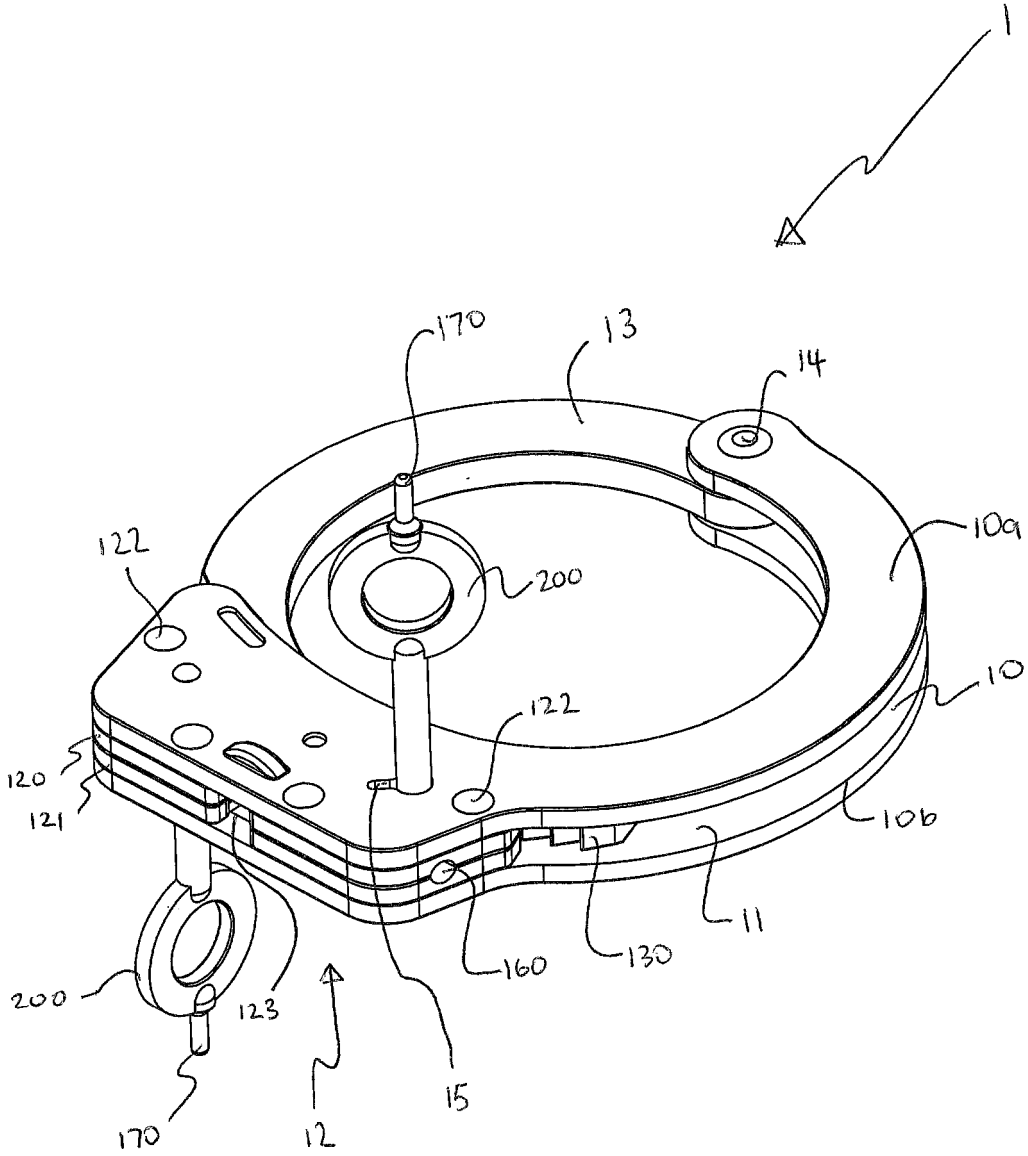
11. A handcuff according to any one of claims 1 to 9, wherein the shield is positioned to be contactable with the rearward end of the pawl.

12. A handcuff according to any one of claims 1 to 9 or claim 11, wherein the shield resiliently biases the rearward end of the pawl to cause an increased bite between the or each teeth of the pawl and the or each ratchet teeth.

13. A pair of handcuffs including at least one handcuff according to any one of the preceding claims.

14. A handcuff substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

15. Any novel feature or novel combination of features described herein and/or shown in the accompanying drawings.


1
170
13
14
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120
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106
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12

FIGURE 1

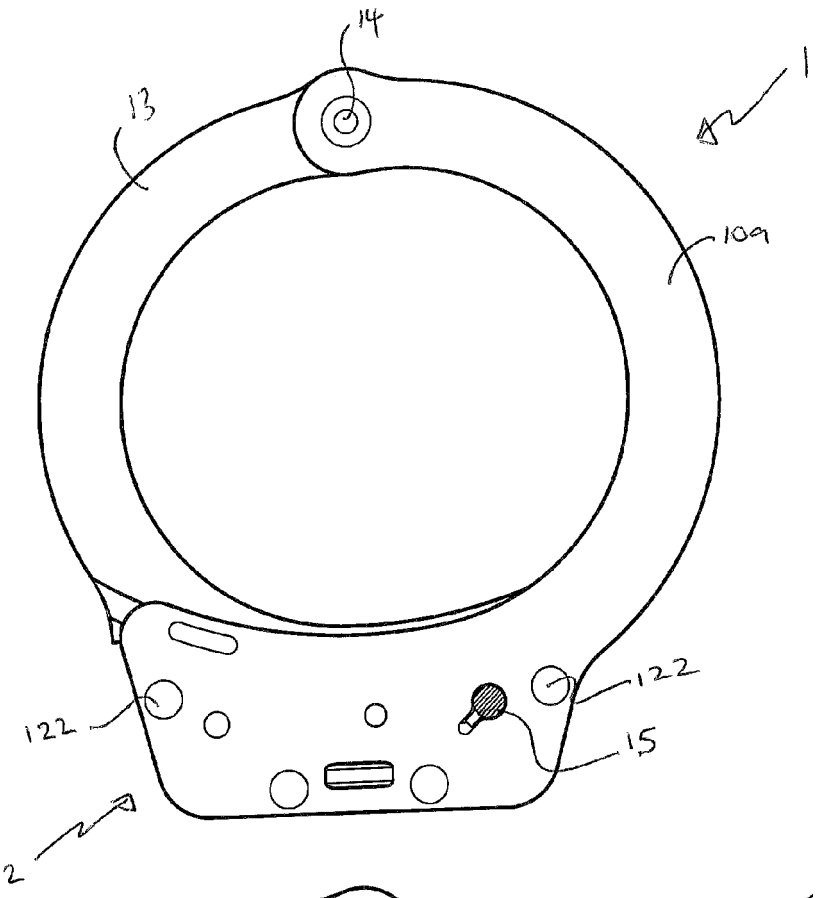

FIGURE 2

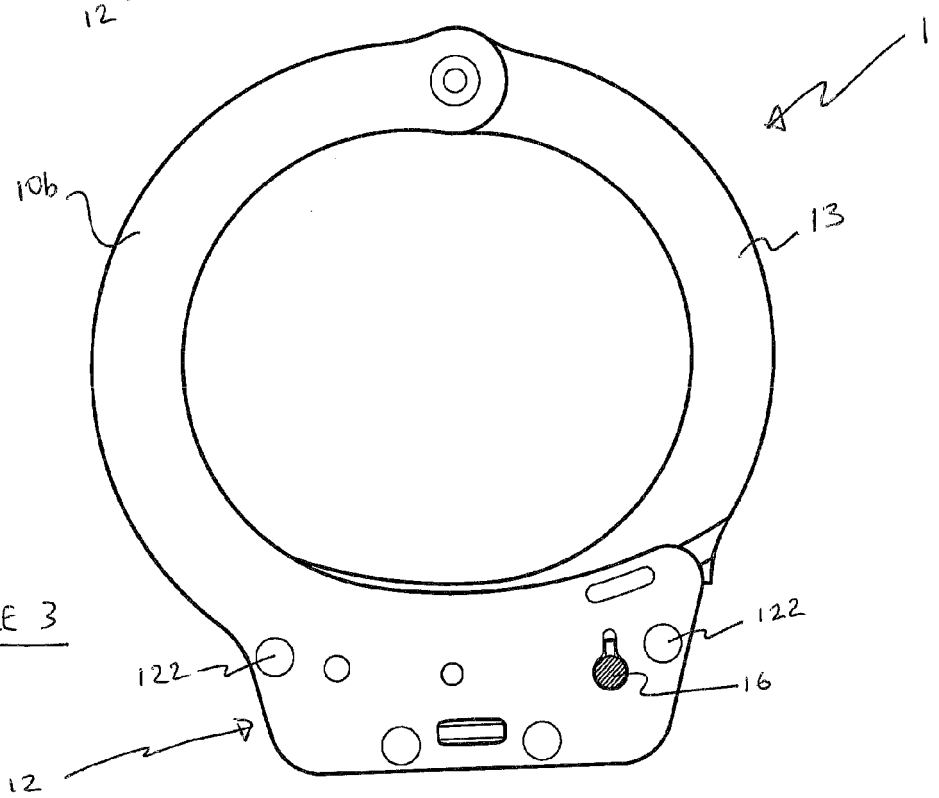

FIGURE 3

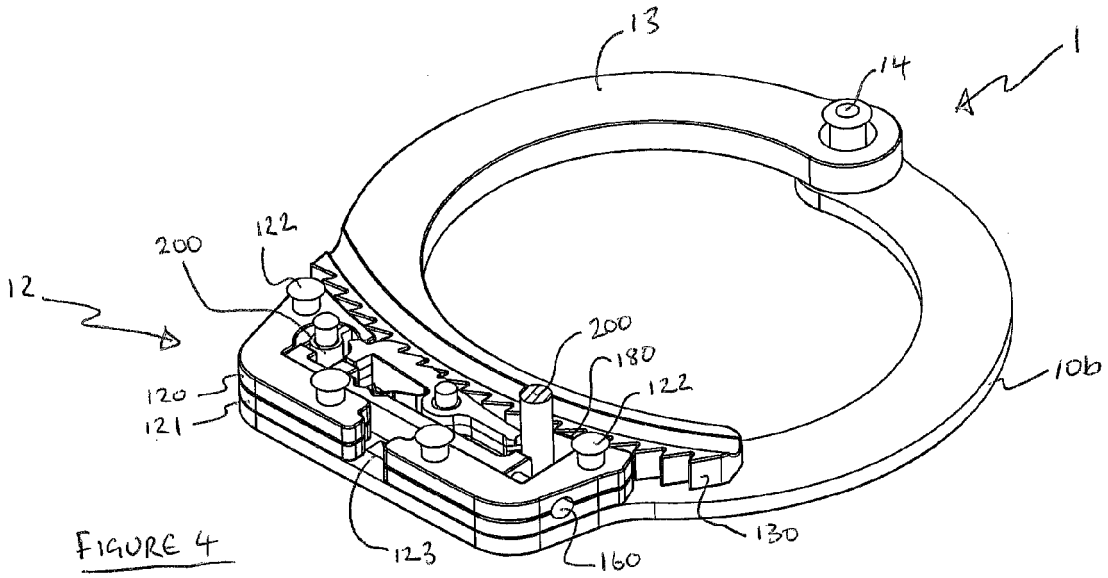

FIGURE 4

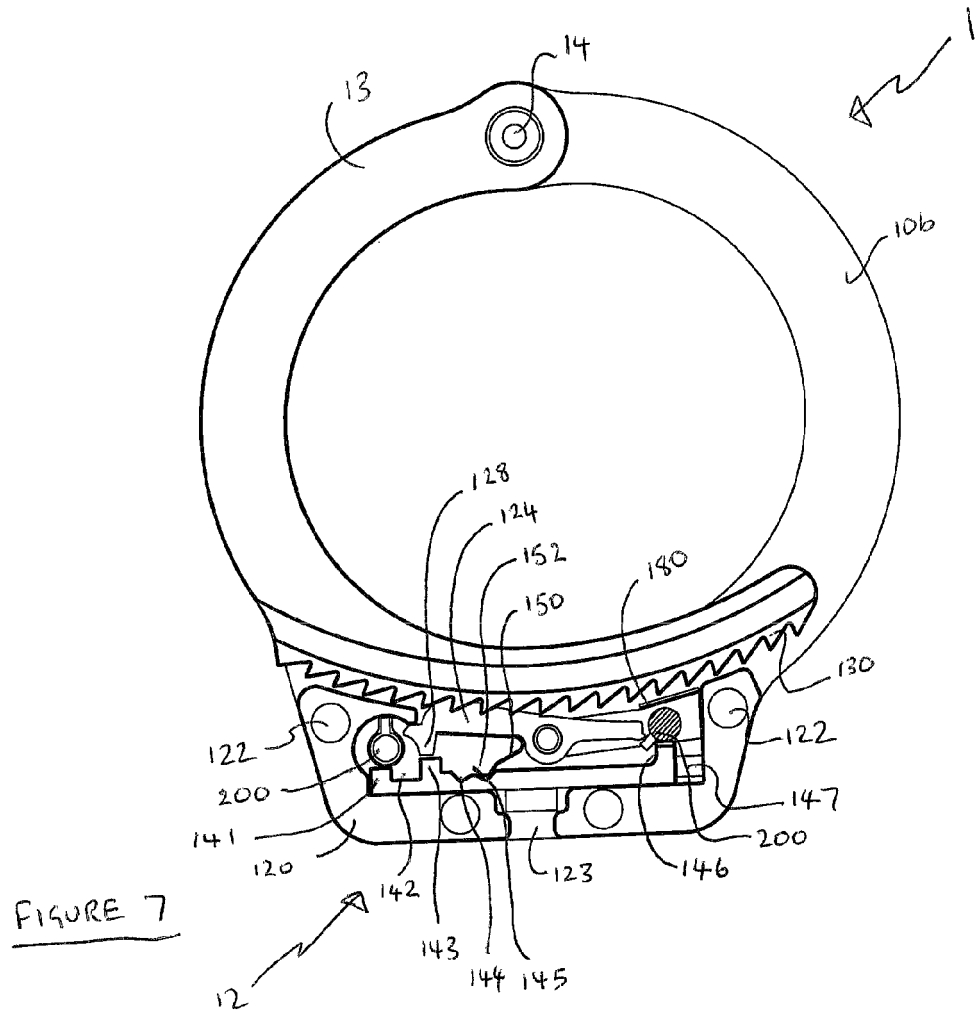

FIGURE 7

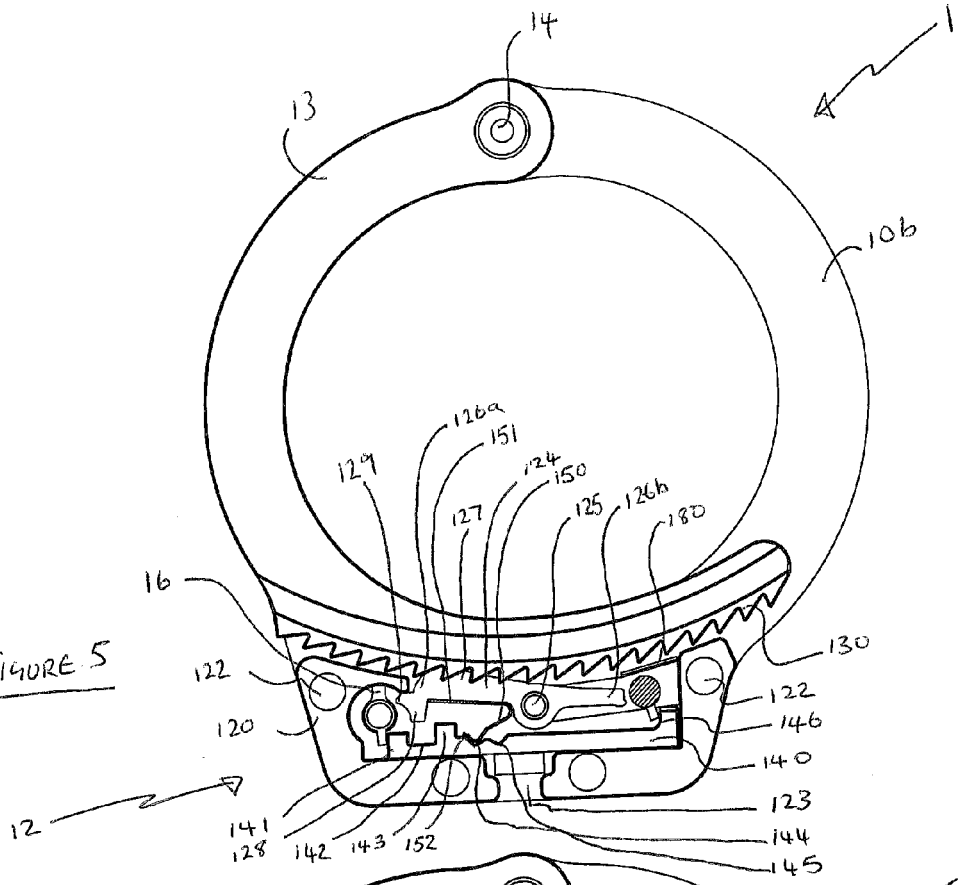

FIGURE 5

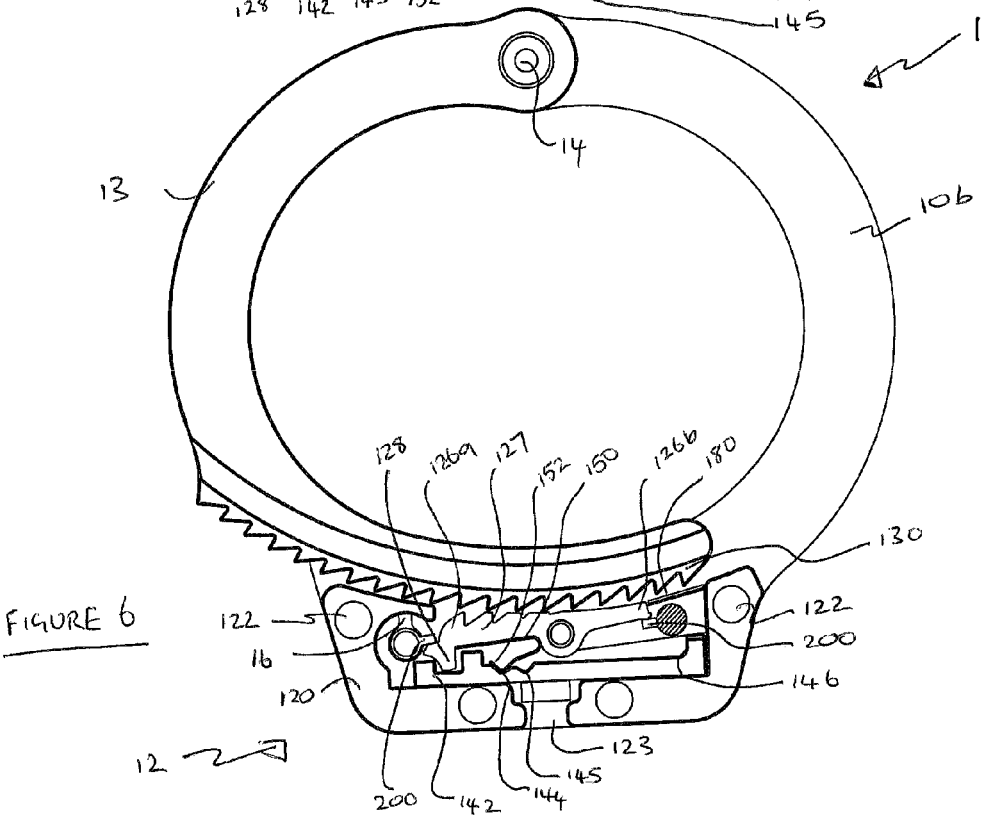

FIGURE 6

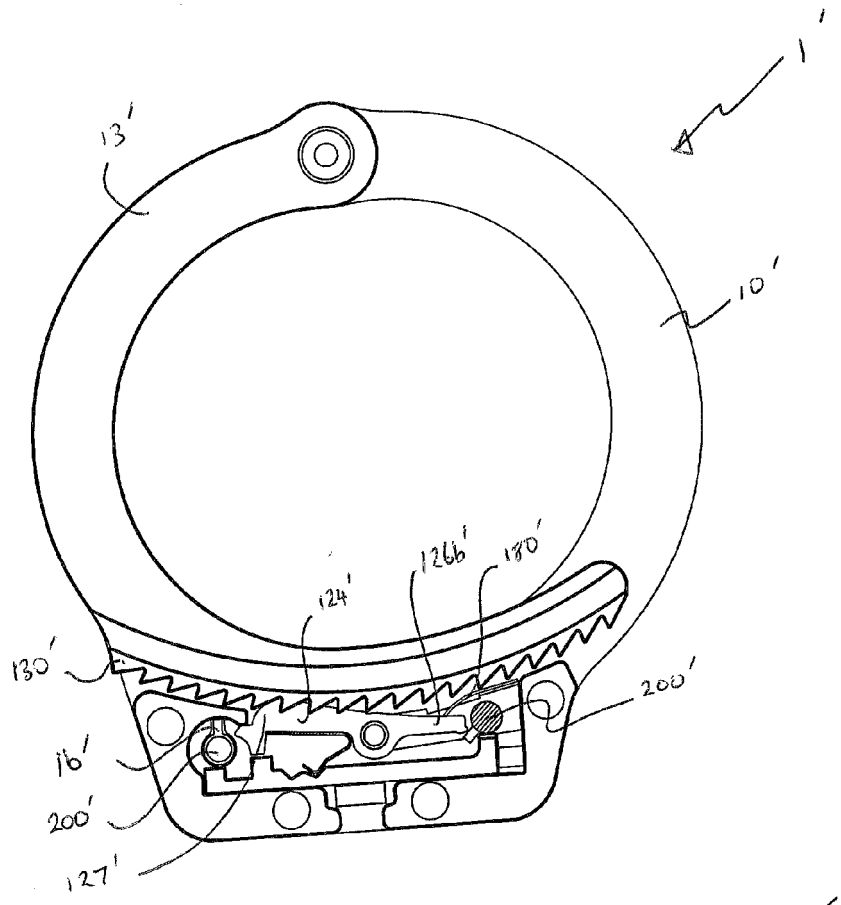

FIGURE 9

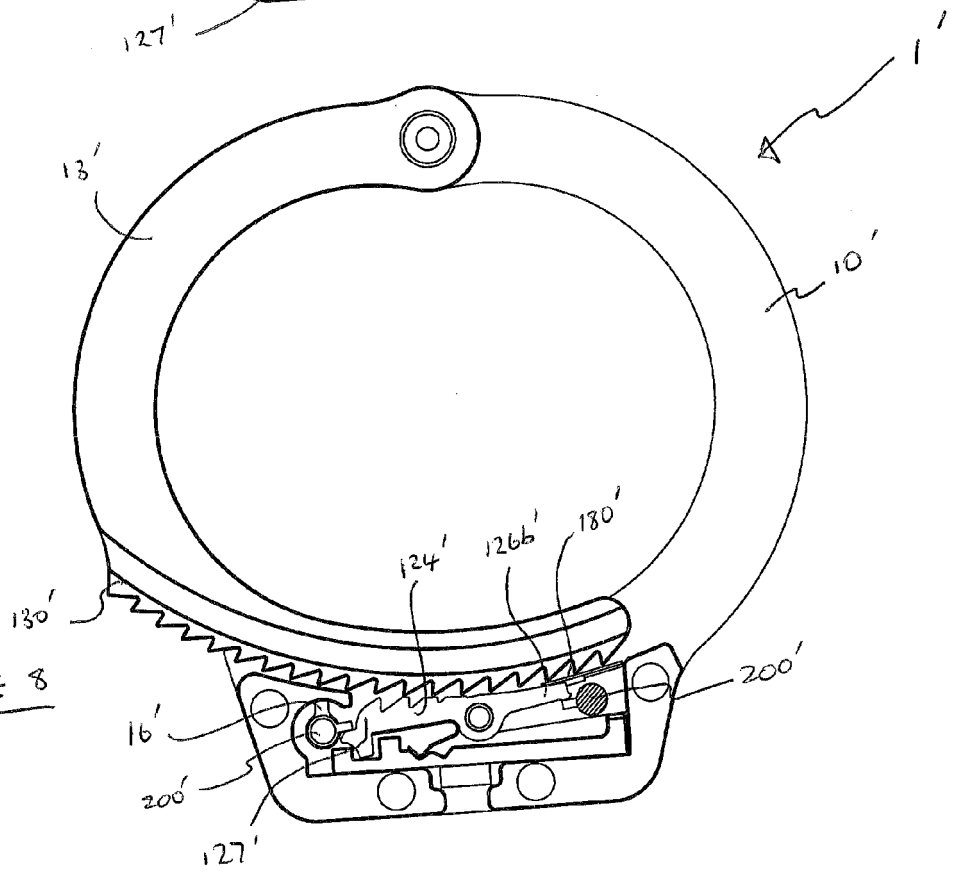

FIGURE 8