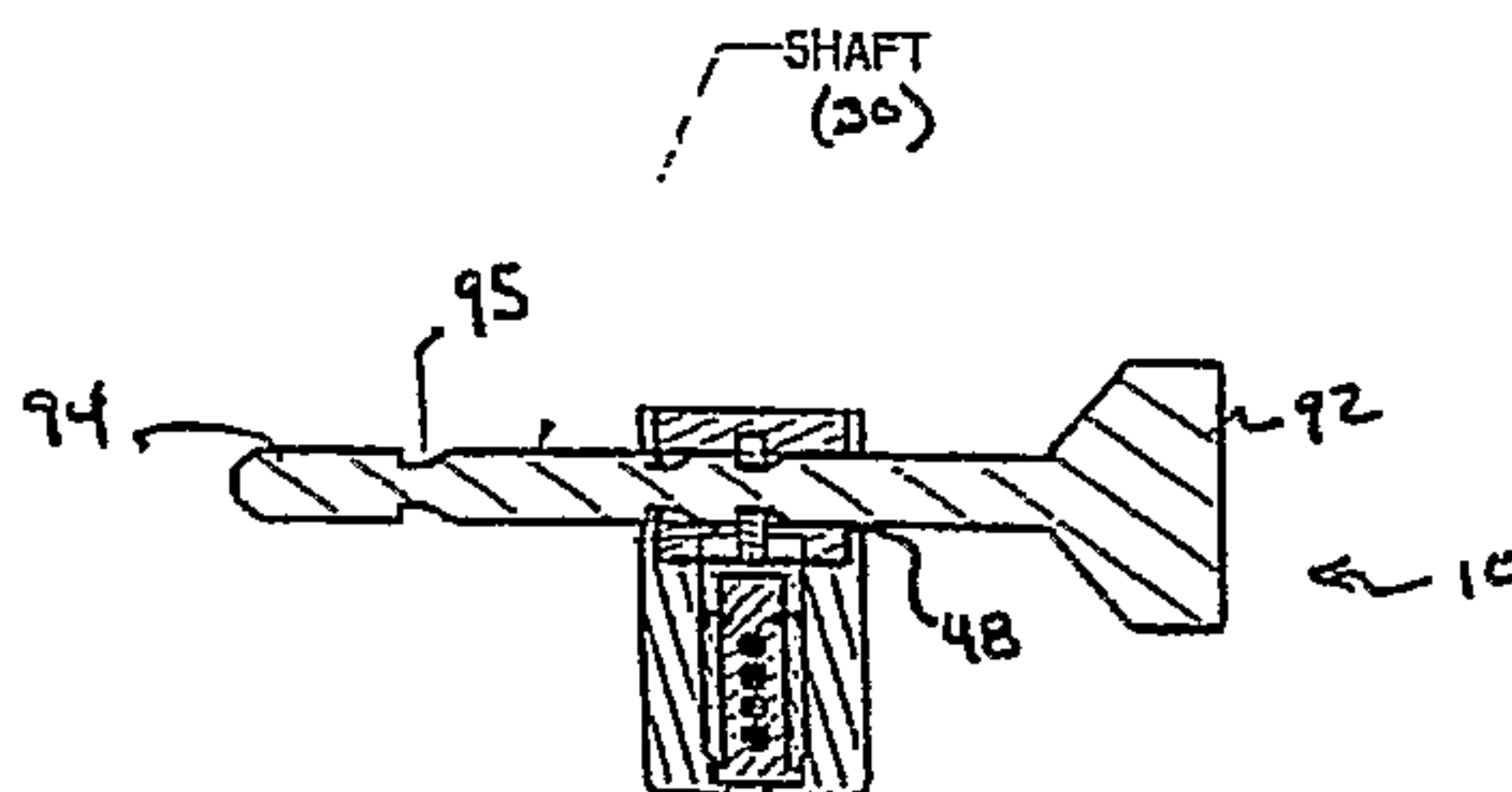




(86) Date de dépôt PCT/PCT Filing Date: 2003/12/19
 (87) Date publication PCT/PCT Publication Date: 2004/07/08
 (85) Entrée phase nationale/National Entry: 2005/06/20
 (86) N° demande PCT/PCT Application No.: US 2003/040735
 (87) N° publication PCT/PCT Publication No.: 2004/057138
 (30) Priorités/Priorities: 2002/12/19 (60/434,920) US;
 2003/09/04 (60/481,330) US

(51) Cl.Int.⁷/Int.Cl.⁷ E05B 67/24, B60D 1/60, E05B 67/06
 (71) Demandeur/Applicant:
 MASTER LOCK COMPANY, US
 (72) Inventeurs/Inventors:
 RECKNAGEL, JIM, US;
 BURMESCH, KENNETH, US;
 ZAPUSHEK, JOHN, US;
 YIP, VICTOR, CN
 (74) Agent: RIDOUT & MAYBEE LLP

(54) Titre : SERRURE D'ATTELAGE A UN PENE A LARGEUR REGLABLE
 (54) Title: ADJUSTABLE WIDTH COUPLER LATCH LOCK



(57) Abrégé/Abstract:

An adjustable coupler lock for locking a trailer hitch such that a trailer cannot be removed from a vehicle. The coupler lock comprises a lock body with a locking mechanism and a locking plate, and also comprises a shaft (30) having a narrow and a flange end (92), and also having multiple recesses (95) along the length of the shaft for engagement with the locking plate of the lock body. The recesses along the length of the shaft have a vertical edge which engages the locking plate such that the lock body cannot be removed from the shaft without unlocking the locking mechanism. The recesses also have a tapered edge that allows for slidable movement of the lock body along the shaft, without unlocking the locking mechanism, for the purpose of adjusting the lock to the size of the latch. The components of the coupler lock are made of stainless steel.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



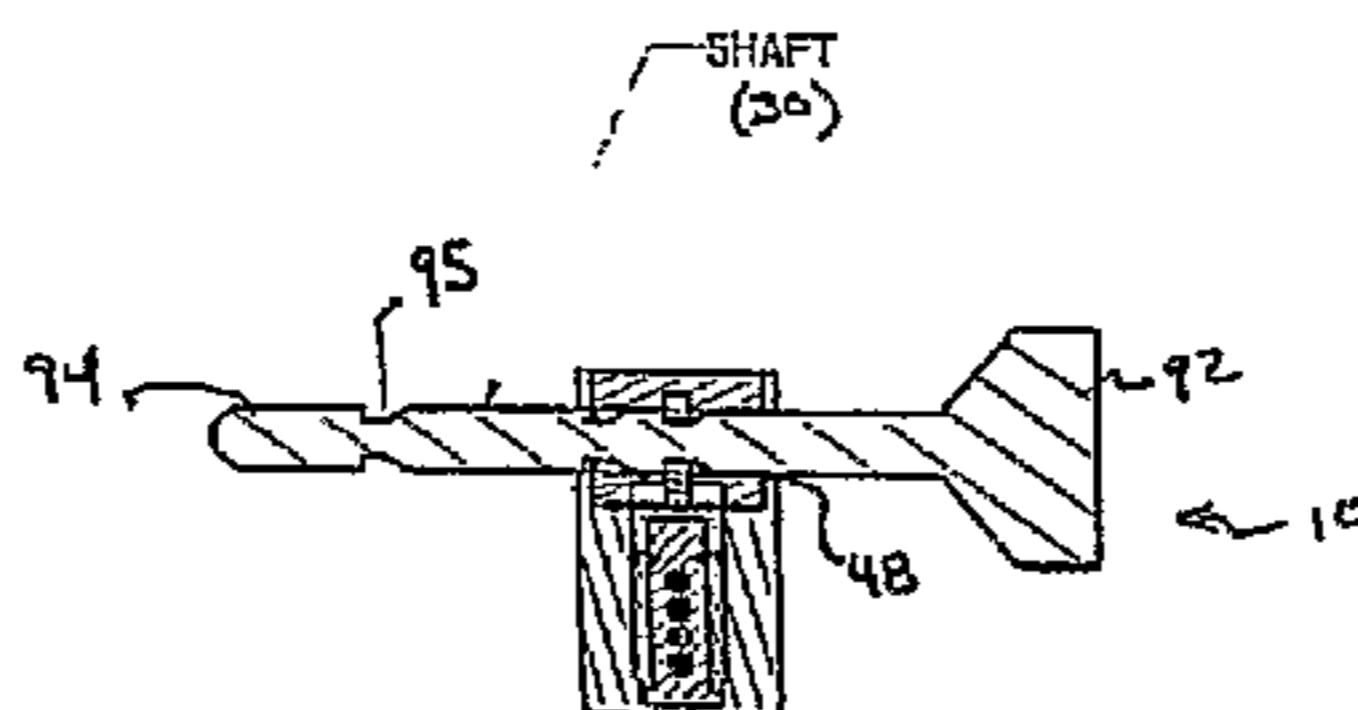
(43) International Publication Date
8 July 2004 (08.07.2004)

PCT

(10) International Publication Number
WO 2004/057138 A1

- (51) International Patent Classification⁷: **E05B 67/24**, 67/06, B60D 1/60
- (21) International Application Number: PCT/US2003/040735
- (22) International Filing Date: 19 December 2003 (19.12.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/434,920 19 December 2002 (19.12.2002) US
60/481,330 4 September 2003 (04.09.2003) US
- (71) Applicant (for all designated States except US): **MASTER LOCK COMPANY** [US/US]; 137 W. Forest Hill Avenue, P.O. Box 927, Oak Creek, WI 53154 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **RECKNAGEL, Jim** [US/US]; 2830 Peninsula Avenue, Delafield, WI 53018 (US). **BURMESCH, Kenneth** [US/US]; 624 Sauk Drive, Port Washington, WI 53074 (US). **ZAPUSHEK, John** [US/US]; 704 William Street, Racine, WI 53402 (US). **YIP, Victor** [CN/CN]; 14 Chi Fu Road, 4'H' Chi Fu Pa Yeun, Hong Kong (CN).
- (74) Agents: **MCKNIGHT, Douglas, B.** et al.; Calfee, Halter & Griswold LLP, 800 Superior Avenue, Suite 1400, Cleveland, OH 44114 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declarations under Rule 4.17:**
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations
 - of inventorship (Rule 4.17(iv)) for US only
- Published:**
- with international search report
 - before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ADJUSTABLE WIDTH COUPLER LATCH LOCK



(57) Abstract: An adjustable coupler lock for locking a trailer hitch such that a trailer cannot be removed from a vehicle. The coupler lock comprises a lock body with a locking mechanism and a locking plate, and also comprises a shaft (30) having a narrow and a flange end (92), and also having multiple recesses (95) along the length of the shaft for engagement with the locking plate of the lock body. The recesses along the length of the shaft have a vertical edge which engages the locking plate such that the lock body cannot be removed from the shaft without unlocking the locking mechanism. The recesses also have a tapered edge that allows for slidable movement of the lock body along the shaft, without unlocking the locking mechanism, for the purpose of adjusting the lock to the size of the latch. The components of the coupler lock are made of stainless steel.

WO 2004/057138 A1

ADJUSTABLE WIDTH COUPLER LATCH LOCK

FIELD OF THE INVENTION

The invention relates to a trailer hitch lock and, more specifically, to an adjustable stainless steel latch lock for securing a trailer hitch.

BACKGROUND

Coupler locks, trailer locks or hitch locks are known in the art. These locks are designed to prevent the uncoupling of a trailer that is attached to a vehicle. One method of coupling a trailer to a vehicle uses a ball connector-type trailer hitch. In such a hitch, a trailer has a receiver at the end of the trailer neck for a ball connector which is attached to the vehicle. The receiver of the trailer fits over the ball connector of the vehicle. A latch attached to the receiver is closed, securing the trailer to the vehicle so that it can be towed by the vehicle. In the absence of some type of coupler lock, the trailer receiver can often be easily and quickly unlatched and detached from the ball connector of the vehicle, by thieves for example, allowing for reattachment to another vehicle for the purpose of stealing the trailer and its contents. Coupler locks provide a way to secure the connection between trailer and vehicle such that it is not possible for the trailer to be removed from the vehicle without removing the lock.

A variety of types of coupler locks are available. However, such locks are not adjustable such that they can be used on latches of different widths. Furthermore, such locks are not always easy to install. Therefore, there is a need for new coupler locks that can be used on a variety of different sized latches and are easy to install.

SUMMARY OF THE INVENTION

The present invention provides an adjustable, stainless steel coupler lock that has a lock body and a shaft. The shaft is inserted into a closed latch of a trailer hitch and the lock body is slidably moved along the end of the shaft protruding from the latch. Positioned in this way, the latch of the trailer hitch cannot be opened. The lock body has a locking mechanism for locking and unlocking the device, and a locking plate that engages the shaft. The shaft has a narrow end and a flange end, and also has multiple recesses located along the length of the shaft. Each recess has a vertical edge, that engages the locking plate and prevents movement of the shaft out of the lock body without opening the locking mechanism. Each recess also has a tapered edge that allows movement of the shaft further into the lock body without opening of the locking mechanism. The multiple recesses on the shaft provide for the coupler lock to be used on latches of different widths.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be more readily understood by reference to the following drawings wherein:

Figure 1 is a photograph showing a perspective view of the assembled coupler lock of the present invention showing the shaft inserted into the lock body of the coupler lock and a key inserted into the keyway of the coupler lock;

Figure 2 shows an exploded view of the coupler lock of the present invention;

Figure 3 is a drawing of a side view of the coupler lock of the present invention showing the shaft inserted into the lock body of the coupler lock.

Figure 4A is a side view of the coupler lock.

Figure 4B is a cross-sectional view of the coupler lock as taken through A-A as shown in Figure 4A.

Figure 4C is a cross-sectional view of the coupler lock taken through B-B as shown in Figure 4A.

Figure 4D is an end view of the coupler lock.

Figure 4E is a cross-sectional view of the coupler lock taken through C-C as shown in Figure 4D.

Figure 5 is a drawing of the neck of a trailer, showing a latch in a closed position and a coupler lock attached to the latch such that the latch cannot be placed in an open position without removal of the coupler lock.

Figure 6 is a drawing of the neck of another trailer, showing a latch in a closed position and a coupler lock attached to the latch such that the latch cannot be placed in an open position without removal of the coupler lock.

Figure 7A is an exploded view of a second embodiment of the present invention.

Figure 7B is a perspective view of the embodiment shown in Figure 7A.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 is a photograph of the assembled coupler latch lock of the present invention, with a key inserted into the lock. Figure 2 is an exploded view of the coupler lock of the present invention. Referring to these figures, it can be seen that the coupler lock **10** comprises a lock body **20** and a shaft **30**. The lock body **20**, components that comprise the lock body, and the shaft **30** are preferably made of stainless steel, making the coupler lock resistant to corrosion.

The lock body is comprised of an outer lock housing **35**. The lock housing has a variety of openings. At one end of the lock housing **35**, there is a keyway **38**, into which a key **39** is inserted in order to open the lock. At the other end of the lock housing is an opening **42** for a housing cap **45**. On either side of the lock housing **35** are housing shaft openings **48**.

The lock housing **35** is the outer shell of the lock body **20**. Various components fit into the interior of the lock housing **35**, through the opening **42** for the housing cap **45**, to yield the assembled lock body **20**. One component that fits into the lock housing **35** is a locking mechanism **50**. The locking mechanism **50** can be any of a number of types that are known in the art and can comprise a number of individual components that are not specifically indicated herein. For example, the locking mechanism **50** can be a pin-tumbler locking mechanism. In such case, the locking mechanism comprises components such as a cylinder plug, pin tumblers and optional sidebars, for example. The locking mechanism **50** may also be a wafer-tumbler lock, a push-button lock, or other types known in the art. The locking mechanism preferably is opened or unlocked through the use of a key **39** that is inserted through the keyway **38** of the lock housing **35**. However, locking mechanisms **50** opened by other means, such as a numerical combination-type opening mechanisms, are possible. Whatever type of locking mechanism **50** is used, at one end of the mechanism is a means for engaging a cam **60**. The means for engaging a cam is preferably a projection **62**.

When fitted into the lock housing **35**, one end of the locking mechanism **50** contacts, or is proximate to the keyway **38** of the lock housing **35**. The other end of the locking mechanism **50** contacts the cam **60**. The cam **60** is generally disc-shaped and has on one of its two faces a means for engaging the locking mechanism **64**. The means for engaging the locking mechanism **64** is preferably a recess or groove in one face of the cam **60**, although other means, such as, for example, an extension, notch, projection, gap opening, or arm can also be used. When the cam **60** is fitted into the lock housing **35**, the cam groove **64** provides a space into which fits the projection **62** of the locking mechanism **50**. On the other of its two faces, the cam **60** has a means **66** for engaging a locking plate **70**. The cam means **66** for engaging the locking plate **70** is preferably a projection, although other means, such as, for example, an extension, notch, recess, gap, groove, opening or arm, can be used.

A locking plate **70** also fits into the lock housing **35**. One edge of the locking plate contacts the cam projection **66**. As shown in Figure 2, the locking plate is of a thin, rectangular shape, although other shapes and configurations may also be used. In the center of the locking plate **70** is a generally circular opening **72**, through which an inserted shaft **30** fits through the lock body **20**. Locking plate springs **74** engage an edge of the locking plate **70** and a housing cap

45. The springs 74 bias the locking plate 70 into a locking position, i.e. a position that prevents an inserted shaft 30 from being removed from the lock body 20. The edge of the locking plate 70 that contacts the cam projection 66 has a means 76 for engaging the cam. The means for engaging the cam is preferably a notch 76, although other means, such as, for example, an extension, projection, recess, gap, groove, opening or arm, can be used. The engagement of the locking plate 70 with the cam 60 allows for movement of the locking plate against the bias of the springs 74 when the correct key 39 is inserted into the lock and rotated. Such movement places the locking plate 70 in an unlocked position, i.e. a position that allows an inserted shaft 30 to be removed from the lock body 20.

A housing cap 45 is also fitted into the cap opening 42 of the lock housing 35. The housing cap 45 has a number of openings. One opening 80 is for fitting of the locking plate 70, springs 74 and cam 60. Another opening 83 is for insertion of the shaft 30 of the latch lock 10. The housing cap 45 holds in place the components of the lock body 20 which have already been described. The housing cap 45 is held in place within the lock housing by any of a variety of means known in the art. In one embodiment, the securing means 85 is a set of screws or rivets inserted through the lock housing 35 into the housing cap 45.

The shaft 30 of the coupler latch lock 10 has a flange end 92 and a narrow end 94. Between the two ends of the shaft are numerous recesses 95. The number of recesses 95 is variable. The more recesses 95 there are on the shaft, the more adjustable the lock 10 is for latches 100 of different widths. Each recess on the shaft has two edges, a vertical edge 102 and a tapered edge 104. The vertical edge 102 of each recess 95 is nearer the narrow end 94 of the shaft 30 than is the tapered edge 104. The surface of the vertical edge 102 of the recess 95 is flat or substantially flat and perpendicular to the axis of the shaft 30. The tapered edge 104 of each recess 95 is nearer the flange end 92 of the shaft 30 than is the vertical edge 102. The surface of the tapered edge 104 of the recess 95 is preferably convex and is at an angle less than 90 degrees to the axis of the shaft 30. As discussed further herein, the angle of the tapered edge 104 provides for camming of the locking plate 70 when inserting the shaft 30 from the lock 10. Figures 3 and 4 show additional views of the inventive coupler lock.

The coupler lock 10 is operated as described below. The narrow end 94 of the shaft is inserted into an opening in the device 100 (e.g., the latch of a trailer hitch) that is desired to be locked or secured. The shaft 30 is pushed through the opening until it can be pushed any further, normally at the point where the flange 92 of the shaft contacts the device 100. The device is preferably a latch 100 of a trailer hitch 105, the latch securing the trailer to a vehicle. A ball receiver 107 is attached to the trailer neck 105 and the latch 100 provides a securing mechanism.

The latch device **100** is preferably in the closed position, meaning, in the case of a trailer hitch, that the trailer cannot be disconnected from the vehicle without moving the latch to the open position. After insertion of the shaft **30** into and through the opening in the latch **100**, the lock body **20** is attached to the shaft **30**. This is done by moving the lock body **20** to a point where the narrow end **94** of the shaft enters and is inserted through the shaft opening **48** on one of the sides of the housing **35** of the lock body **20**. The lock body **20** is designed such that the shaft **30** can be inserted into the lock body on either of the two sides of the lock body that has a shaft opening **48**. When the shaft **30** is inserted into the lock body **20**, the shaft extends through the shaft openings **83** in the housing cap **45** and through the opening **72** in the locking plate **70**. The lock body **20** is slidably moved along the shaft **30** until the locking plate **70** within the lock housing **35** is aligned and engaged with one of the recesses **95** in the shaft **30**. At such a point of engagement, the springs bias **74** the locking plate **70** into a position such that the edge of the locking plate opening contacts the bottom **106** and the vertical edge **102** of the recess **95**. Preferably, the lock body **20** is slidably moved along the shaft **30** such that the locking plate **70** engages with a shaft recess **95** that is as close as possible to the flange end **92** of the shaft. The coupler lock is adjustable for latches **100** of different widths since the shaft of the lock has multiple recesses **95**, each of which can engage the locking plate **70**. However, it is preferable if the lock body **20** is positioned at a point along the shaft **30** such that the locking plate **70** engages the shaft recess **95** that is located closest to the latch **100**. The tapered edge **104** of each shaft recess **95** provides a camming surface for the locking plate **70** such that the lock body **20** can be slidably moved along the shaft **30**, in a direction toward the flange end **92**, without the use of a key **39**. The tapered edge **104** of the recesses allows biasing of the locking plate **70** against the force of the springs **74** as the shaft **30** is slidably moved the lock body **20**. It is also possible to unlock the locking mechanism **50**, using a key **39** for example, and then slidably move the lock body **20** along the shaft **30** toward the flange end **92**. When the lock body **20** is engaged in a shaft recess **95**, it is not possible to then slidably move the lock body **20** in the opposite direction along the shaft (i.e., in a direction toward the narrow end **94** of the shaft) in order to remove the lock body **20** from the shaft **30**. When the coupler lock **10** is so positioned, the latch **100** of the hitch cannot be opened and the trailer cannot be removed from the vehicle. Figures 5 and 6 show the latch **100** of a trailer hitch in the closed position and the coupler lock **10** attached, as described above, locking the latch in the closed position.

In order to remove the coupler lock **10**, attached as described above, from the latch **100**, the correct key **39** is inserted into the keyway **38** of the lock body **20**. Insertion of the correct key **39** allows the locking mechanism **50** to be rotated by rotating the key. Rotation results in

unlocking of the locking mechanism **50**. Because the projection **62** of the locking mechanism is engaged with the groove **64** of the cam **60**, rotation of the locking mechanism **50** causes rotation of the cam **60** within the lock body **20**. Rotation of the cam **60** in turn causes the cam projection **66**, which is engaged by the notch **76** of the locking plate **70**, to move the locking plate **70** in a direction opposite to the force of the springs **74**. When the locking plate **70** moves, the edge of the locking plate opening **72** disengages the recess **95** on the shaft **30**. When the locking plate **70** is positioned as such, the lock body **20** can be slidably moved along the shaft **30** in a direction opposite to that used to attach the lock **10** to the latch **100**. Continued movement of the lock body **20** along the shaft **30** results in the shaft **30** being removed from the opening **48** in the lock body **20**. Once the shaft **30** is no longer inserted into the lock body **20**, the shaft can be removed from the opening in the latch **100**. This allows the latch **100** to be moved from the closed position to an open position. In the open position, the trailer can be disconnected from the vehicle.

An advantage of the present invention is that the shaft **30** can be inserted from either direction, thereby allowing the user to insert the shaft through the housing cap shaft opening **45** from either side of the coupler. This is beneficial in that the shaft **30** can be inserted from different sides and using different hands, thereby allowing for easy application of the coupler lock **10**. The figures illustrate the variable widths available and the ability to have the shaft inserted from either side.

In another embodiment, the mechanics of the lock mechanism remain the same, including a locking mechanism **50**, cam **60** and locking plate **70** which is actuated by a portion of the cam. In this embodiment, a shaft **30** is inserted into a side opening **120** in the lock housing **35**. The shaft has a bent section **125** opposite of the side that engages the locking mechanism **50**, thereby prohibiting the movement of the shaft **30** from the lock **10** from removal once applied.

The receiver lock **10** can be made in a variety of sizes, such as, for example one half inch and 5/8 inch, and can be made with an adapter, such as, for example, a one half inch to 5/8 inch adapter.

The springs **74** in the coupler latch lock **10** are oriented perpendicular to the axis of the cylinder assembly **50** and cam protection **66**. This allows the locking lever **70**, or locking plate, to move up and down to achieve the various locking positions. The springs in the receiver lock are oriented inline with the axis. This along with the cam surface on the extension allows the

locking lever **70**, or locking plate, to be deadlocked in the locked position. The springs **74** keep the locking lever in contact with the extension so that when the cylinder assembly **50** is turned, the lever moves along the cam surface to the unlocked position and the hitch pin shaft can be removed.

Another aspect of the present invention is a seal **130** that is located on the exterior of the housing **35** of the receiver lock **10** around the shaft hole **120**. This seal is secured to the housing by band **132** encircling the body. The seal is achieved by an opening **134** in the band with additional material extending into an opening in the housing that causes an interference fit between the seal **130** and the shaft **30**. The seal **130** reduces the amount of water and debris that can enter into the lock mechanism **50**. Water and debris in the lock mechanism can effect the performance of the lock.

In another embodiment, the shaft **30** of the receiver lock **10** can be covered in a protective material **140** that prevents scratching the surface of the lock or the object to which it is applied, such as a trailer coupler. As shown in the figures, this coating can either cover only a portion of the shaft **30**, or cover the entire shaft (not shown). Optionally, a cap **145** can be used to provide protection to the lock cylinder from the surrounding elements.

CLAIMS

What is claimed is:

1. An adjustable coupler lock, comprising:
 - a) a lock body, comprising
 - i) a locking mechanism, and
 - ii) a locking plate;
 - b) a shaft having a narrow end, a flange end, and at least two recesses along the length of the shaft;
wherein the shaft is inserted into one of two openings in the lock body and moved through the lock body in a first direction,
and engagement of the locking plate with one of the shaft recesses does not allow movement of the shaft through the lock body in a second direction unless the locking mechanism is unlocked.
2. The coupler lock of claim 1, wherein components of the lock are made of stainless steel.
3. The coupler lock of claim 1, wherein the shaft recesses have a vertical edge nearer the narrow end of the shaft, and a tapered edge nearer the flange end of the shaft.
4. The coupler lock of claim 1, wherein the shaft is moved through the lock body in the first direction without unlocking the locking mechanism.
5. An adjustable coupler lock comprising:
 - a lock body;
 - a locking mechanism disposed within said lock body;
 - an adjustable means for securing the lock body to an object, wherein said adjustable means allows the lock body to move in a first direction but not in a second direction when the coupler lock is in a locked position.
6. The adjustable coupler lock of claim 5, wherein said adjustable means for securing the lock body to an object comprises a shaft with two or more recesses.

7. The coupler lock of claim 6, wherein the shaft recesses have a vertical edge and a tapered edge.

8. The adjustable coupler lock of claim 5, further comprising a cam engageable by said locking mechanism and engagable by a locking plate.

9. The adjustable coupler lock of claim 8, wherein said cam includes a groove which engages said locking mechanism and a projection which engages said locking plate.

10. The adjustable coupler lock of claim 9, wherein said locking plate includes a notch which is engaged by said projection on said cam.

11. The adjustable coupler lock of claim 6, further comprising a locking plate, wherein said locking plate includes an opening through which said shaft is inserted.

12. The adjustable coupler lock of claim 11, wherein said opening in said locking plate includes a peripheral edge which engages one of said two or more recesses when said coupler lock is in a locked position.

13. A method of locking a coupler latch comprising the steps of:

- inserting a shaft, which includes two or more recesses thereon, through an opening in said latch;
- sliding a lock body over said shaft, wherein said lock body includes a locking mechanism and a locking plate;
- spring biasing said locking plate in a direction such that the locking plate engages said shaft when said locking body is slid over said shaft; and
- sliding said lock body towards said latch;

wherein said locking plate engages said recesses in said shaft and allows continued advancement of said lock body toward said latch without unlocking said locking mechanism, but does not allow for the lock body to move in a direction opposite of the latch.

14. The method of claim 13, wherein said shaft is inserted through an opening in said locking plate and said locking plate includes a peripheral edge that engages one of said two or more recesses when said lock is in a locked position.

15. The adjustable coupler lock of claim 6, further comprising a seal located around a portion of the lock body that seals against the shaft.

16. The adjustable coupler lock of claim 6, further comprising a protective coating that is applied on a portion of said shaft.

17. An adjustable coupler lock comprising:
a lock body and locking mechanism;
a shaft with two or more recesses; and
a locking plate which engages one of said two or more recesses when said coupler lock is in a locked position;
wherein said shaft can be inserted through said lock body and said locking plate in two opposing directions.

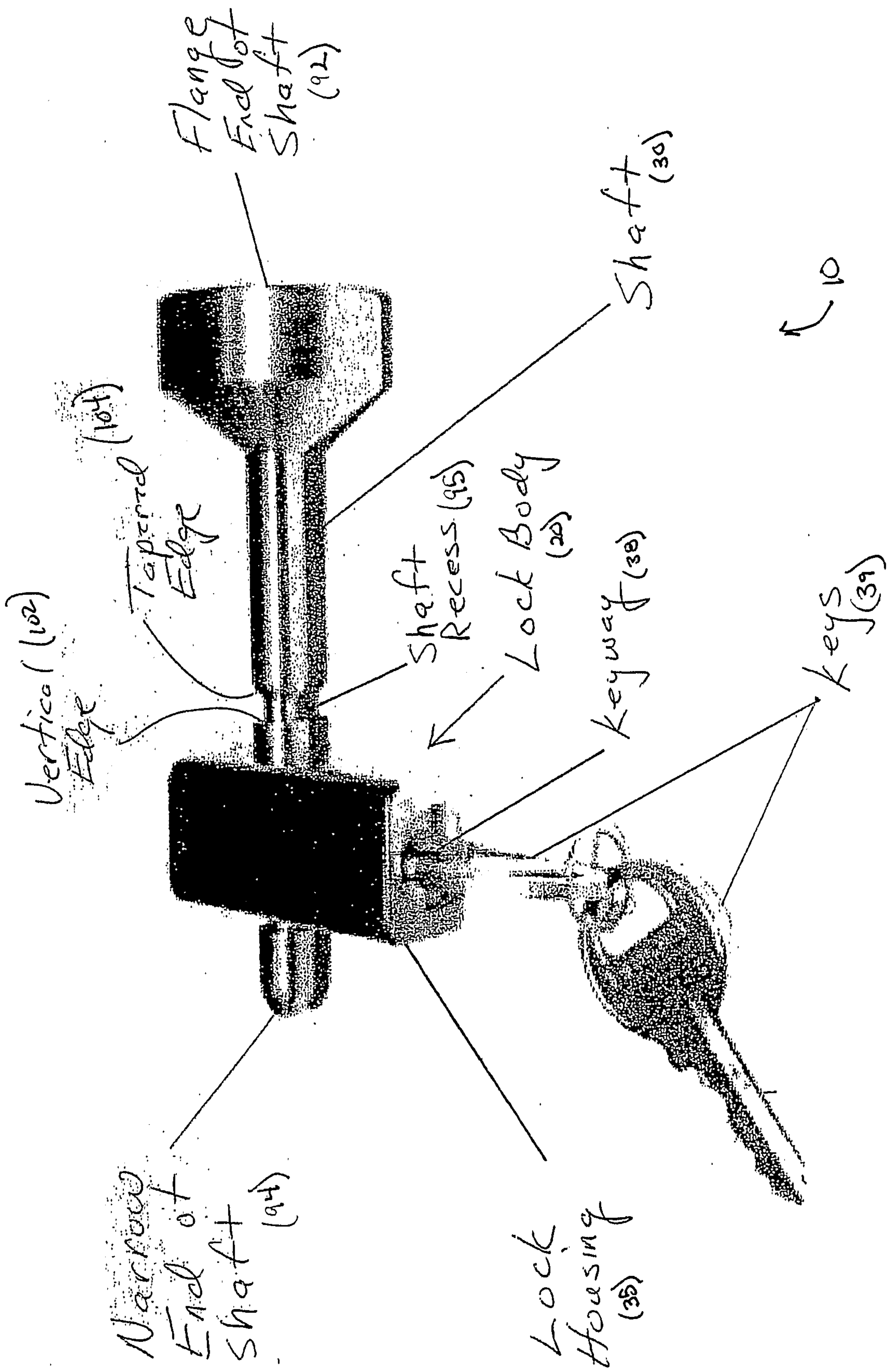


Figure 1

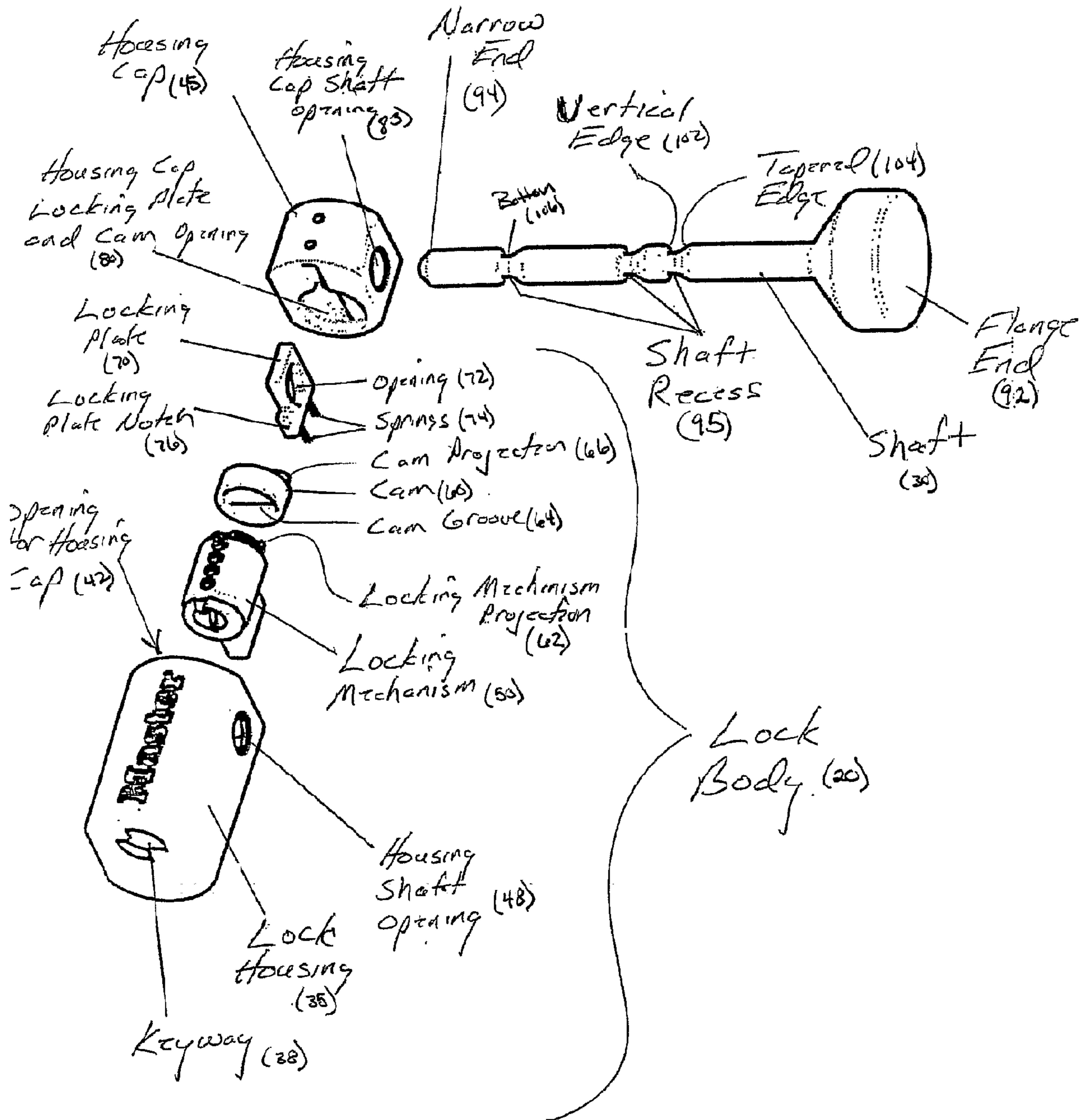


Figure 2

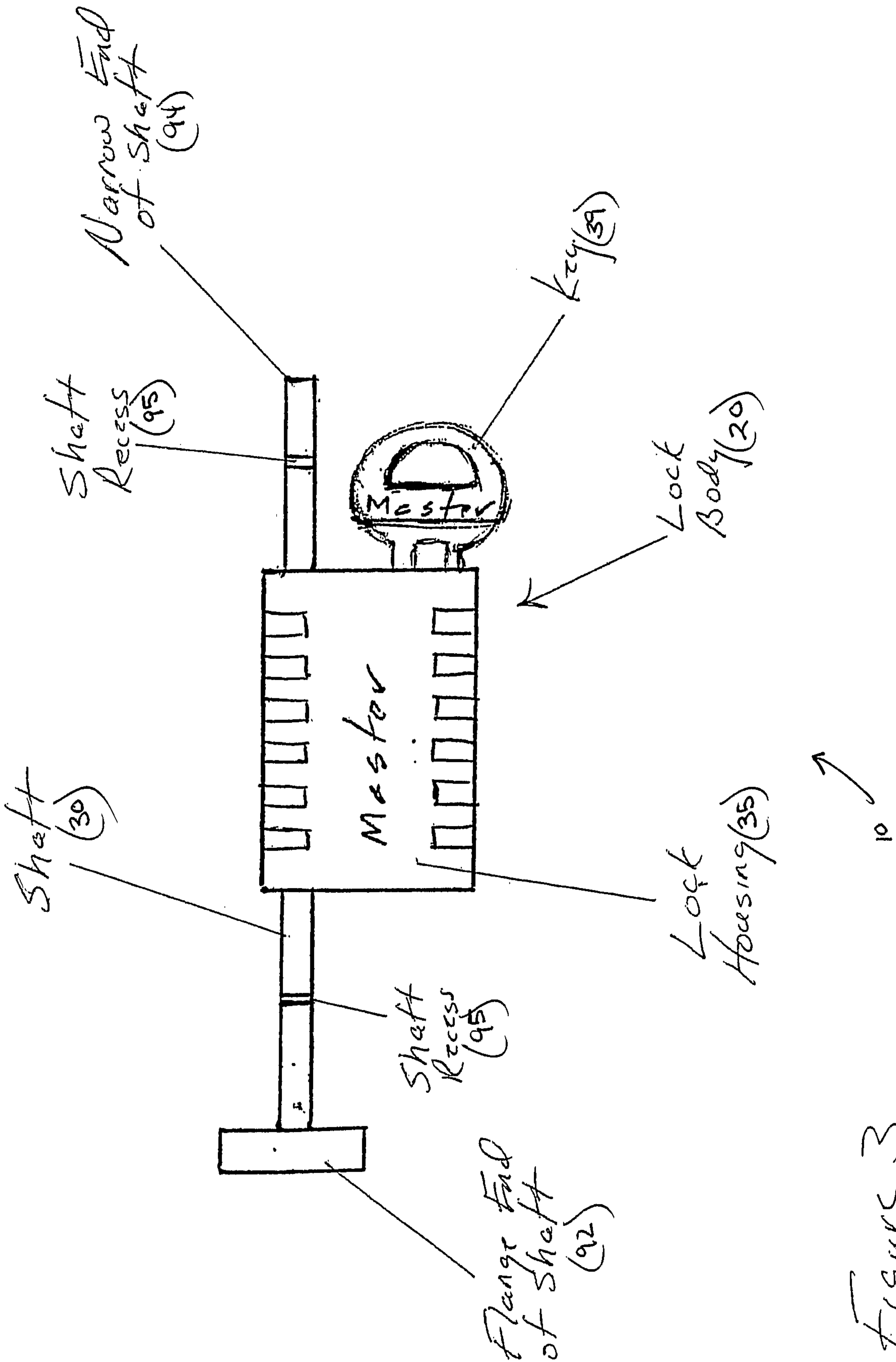


Figure 3

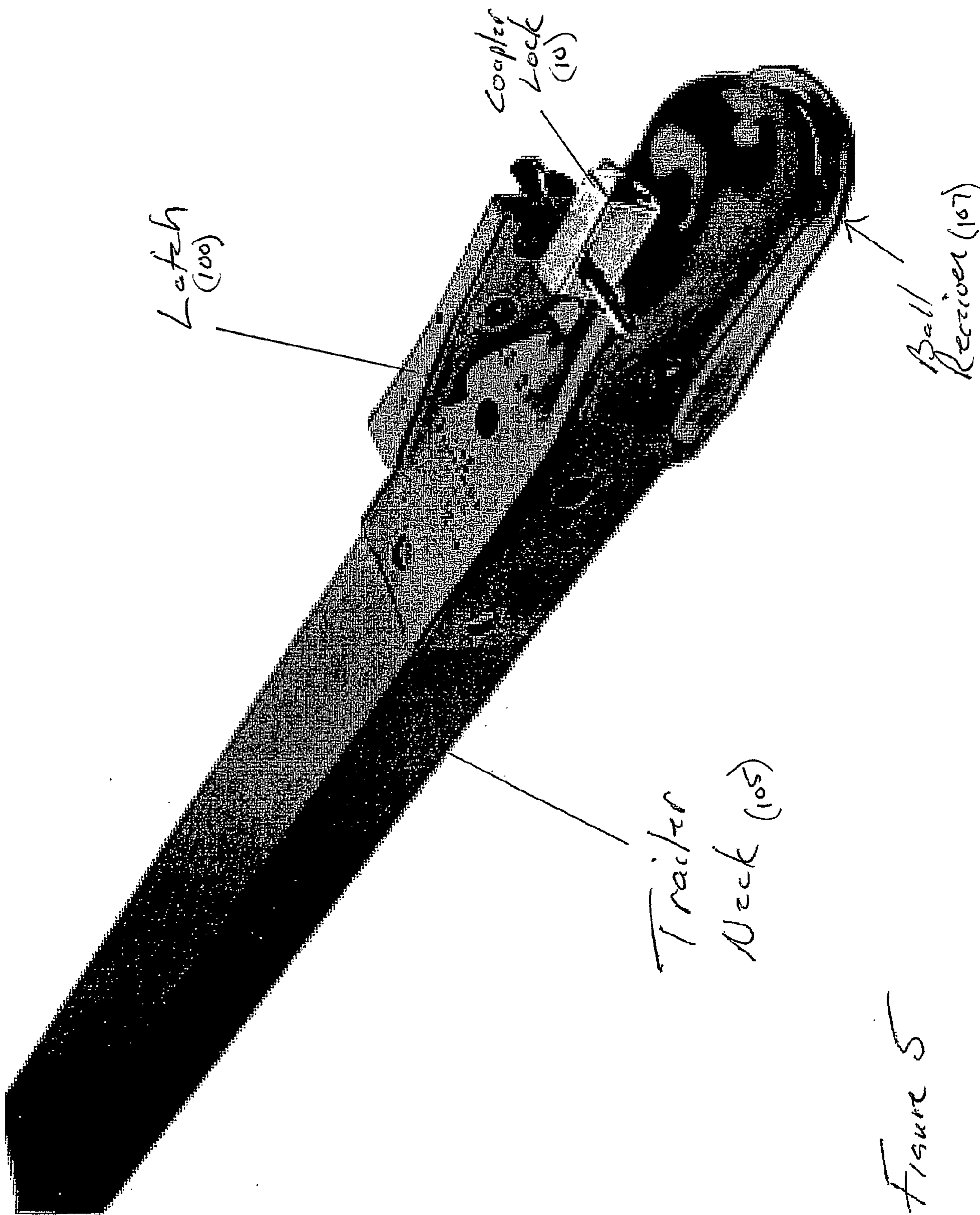


Figure 5

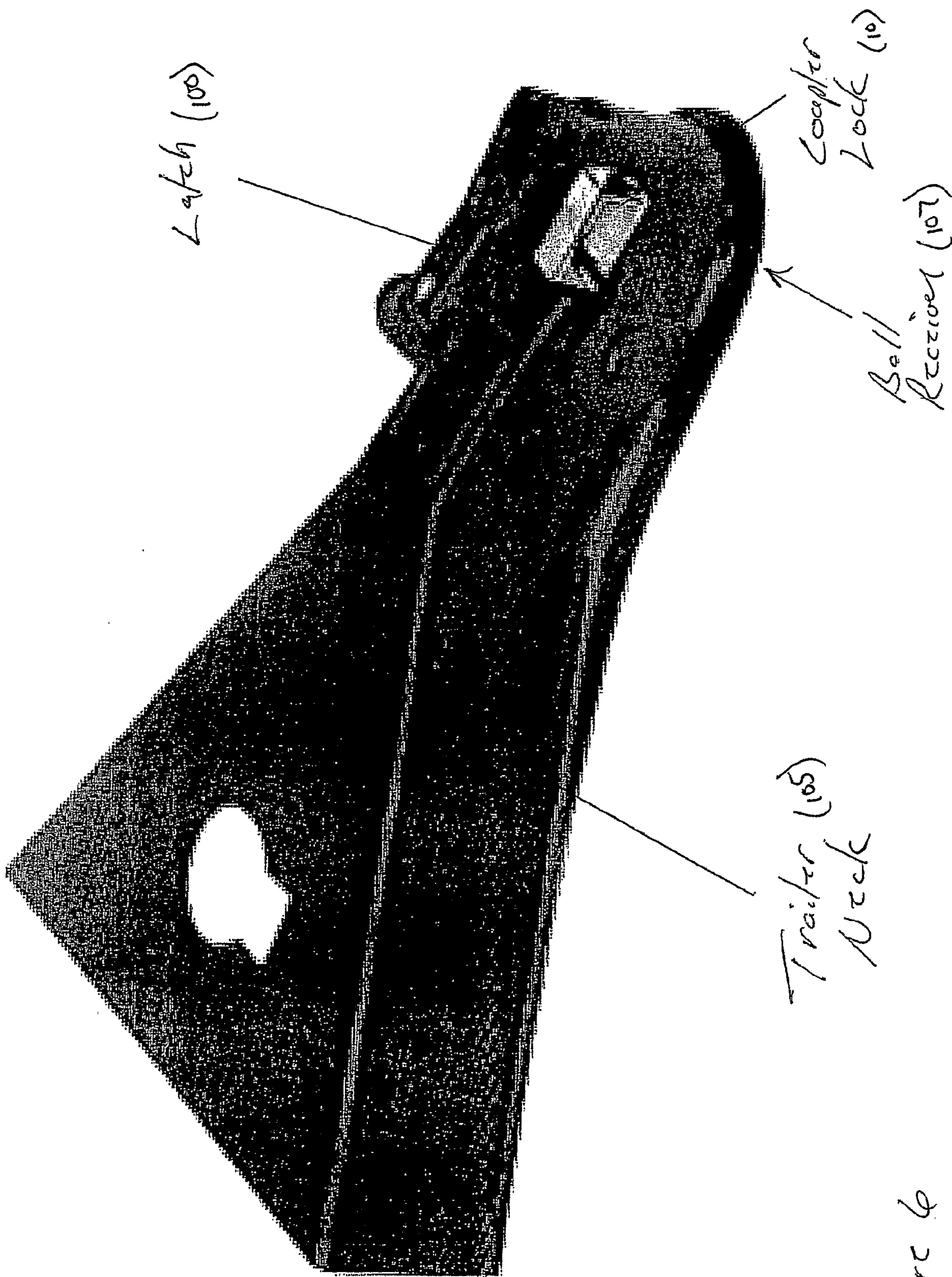


Figure 6

