Sept. 6, 1960 W. J. METZGER 2,951,597

CAR COUPLER

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Fig. 1

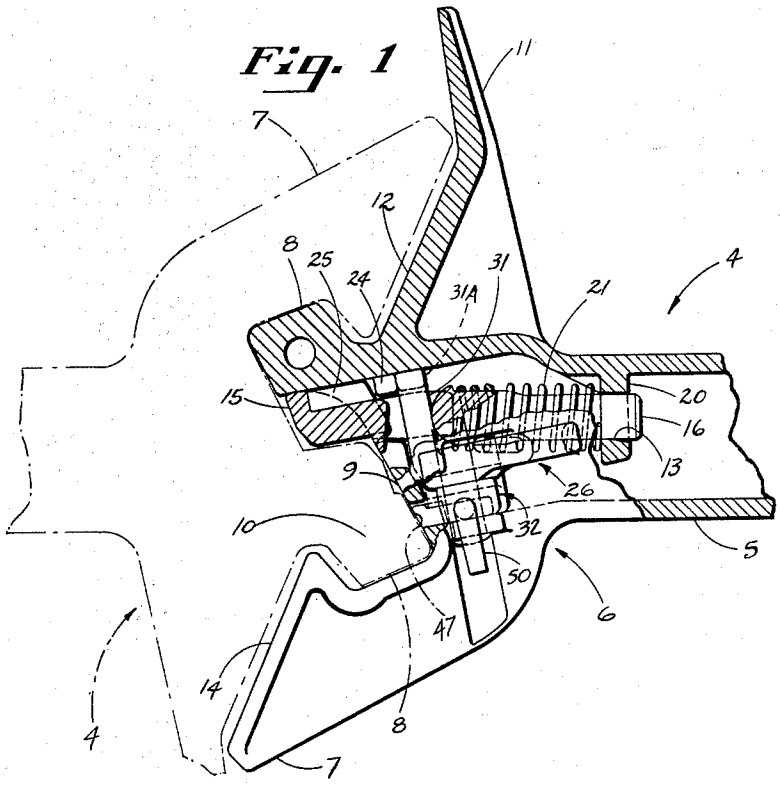
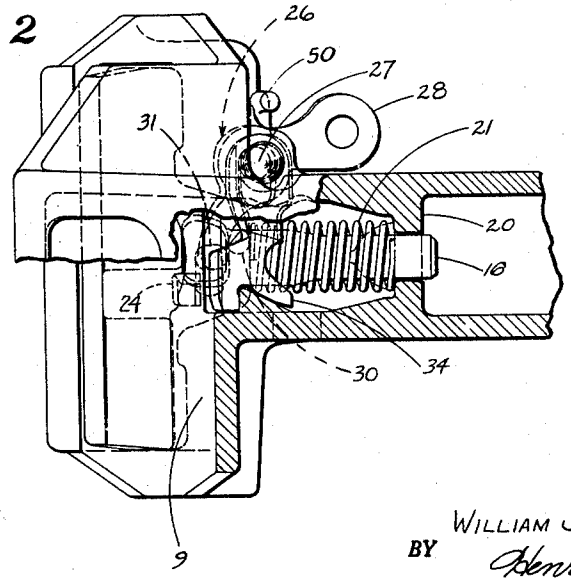


Fig. 2



INVENTOR.
WILLIAM J. METZGER
BY Henry Kozak
ATTORNEY

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Fig. 3

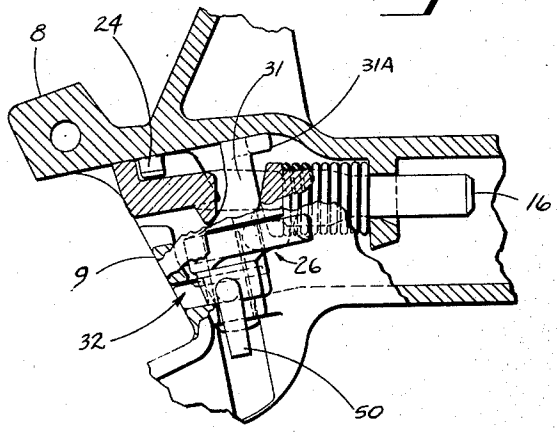


Fig. 4

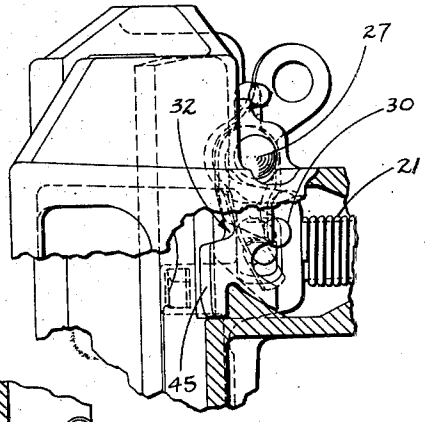
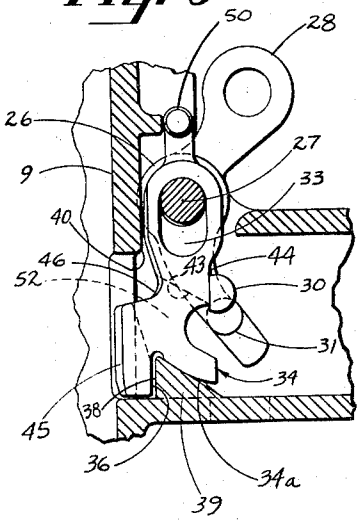


Fig. 5



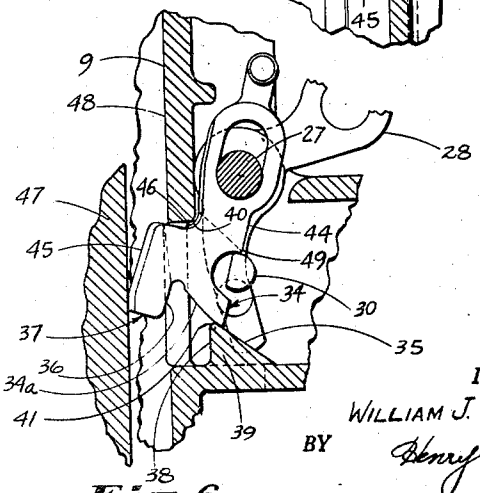


Fig. 6

INVENTOR.
WILLIAM J. METZGER
BY Henry Kozak
ATTORNEY

Sept. 6, 1960 W. J. METZGER 2,951,597

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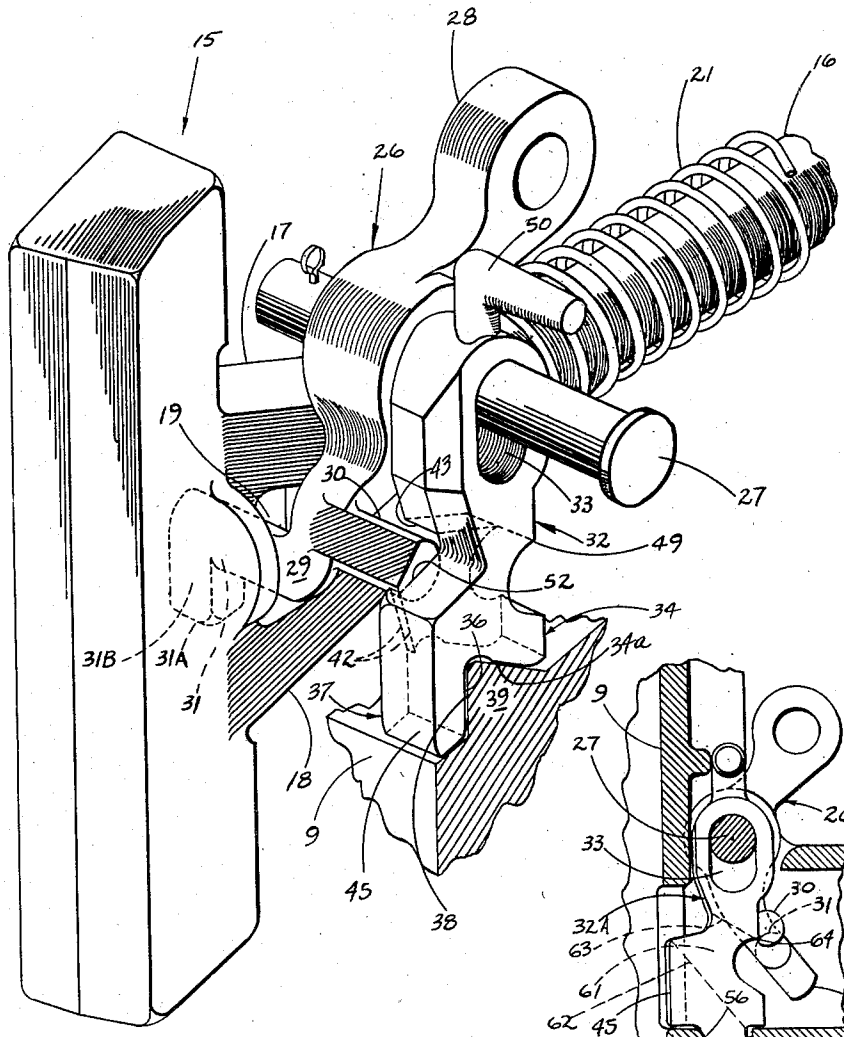

Fig. 7

Fig. 8

INVENTOR.

WILLIAM J. METZGER

BY Henry Kozak

ATTORNEY

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2,951,597

CAR COUPLER

William J. Metzger, East Cleveland, Ohio, assignor to National Malleable and Steel Castings Company, Cleveland, Ohio, a corporation of Ohio

Filed Nov. 18, 1957, Ser. No. 697,244

13 Claims. (Cl. 213—100)

This invention relates to car couplers of a rigid-jawed type, such as shown in the United States patents, Nos. 1,201,665 and 1,614,515, issued to John Willison. In particular, it relates to lock-setting mechanism in a coupler of this type having a reciprocable lock member.

A principal object of the invention is to provide a coupler of the type characterized by a pair of transversely spaced, relatively rigid jaws with a lock-setting mechanism of simple, trouble-free design, and particularly to apply lock-setting mechanism to that type of coupler utilizing a spring-loaded horizontally reciprocable lock.

A further object is to provide a lock-setting mechanism for a coupler of the above-mentioned type which may be manually tripped off of the lock-setting position without the separation of the coupled couplers in which such mechanism is embodied.

Another object is to provide lock-setting mechanism adapted for use in a conventional double-jawed type of coupler with minor modification thereof. Other objects, features, and advantages of the invention will become apparent as the invention is described hereinbelow.

The invention, in brief, resides in mechanism for setting the lock of a fixed-jaw type coupler in an uncoupling position in opposition to a spring, other resilient member, or gravity tending to urge the lock to its coupler-locking position. Such mechanism comprises, in essence, a lever or other detent means pivotally connected with the lock for reciprocation therewith, and a pawl having a rearward-facing surface for engaging the lever and holding it and, consequently, the lock in a position permitting the uncoupling of two couplers. The coupler has a transverse wall connecting the jaws and providing an opening through which the pawl may move forwardly to engage the surface of another coupler brought into proximity of the wall. In the coupler head is provided a stop limiting the rearward movement of the pawl and acting, under certain circumstances, as a guide for lateral movement of the pawl, and a surface for camming or shifting the pawl in a lateral direction out of engagement with the lever as the pawl advances forwardly following the withdrawal of another coupler from the recess between the coupler jaws. The pawl and lever are further provided with interengaging cam and cam-following surfaces adapted to displace the pawl in the above-mentioned lateral direction so that the portion of the lever which engages the rearward surface may be shifted along with the lock to their respective lock-setting positions.

In the drawing with respect to which the invention is described:

Fig. 1 is a fragmentary plan view, with portions broken away and in section, showing a coupler embodying the invention with its parts arranged as when coupled with another similar coupler;

Fig. 2 is a fragmentary elevation, partly in section and with parts broken away, of the coupler arranged as illustrated in Fig. 1;

Fig. 3 is a fragmentary plan view, partly in section,

of the coupler shown in Figs. 1 and 2 in the lock-set condition;

Fig. 4 illustrates in fragmentary partially sectioned elevation, the arrangement of the coupler as shown in Fig. 3;

Fig. 5 is a fragmentary elevation in section, omitting the lock and showing primarily a pawl and a lever of the lock-setting mechanism in lock-set position;

Fig. 6 is a fragmentary elevation, partly in section, showing the parts of Fig. 5 at one stage of operation;

Fig. 7 is an enlarged perspective view of the internal moving parts of the coupler shown in the previous figures; and

Fig. 8 is a fragmentary elevation in section, showing lock-setting mechanism embodying a modified pawl.

As is illustrated in Figs. 1–4, a coupler **4** embodying the present invention comprises a shank **5** and a head portion **6** having jaws **7** and **8** which are transversely spaced and connected by a buffing wall **9** to form a cavity **10**. The head **6** also has attached thereto a lateral guard arm **11** of which its forward surface **12** is adapted for engagement with the forward surface **14** of a similar opposed coupler to align horizontally misaligned couplers during coupling operations.

The jaw **8** and a lock **15** mounted in adjacent reciprocable sliding relationship therewith are adapted to be positioned in the cavity **10** of another similar coupler and are trapped therein when the lock **15** and the corresponding lock of the other coupler are in their forward positions.

As more clearly shown in Fig. 7, the lock **15** comprises a stem **16**, having a bifurcate portion forming the legs **17** and **18** and an opening **19** provided for a purpose hereinafter discussed. In the normal orientation of the coupler, the stem of the lock extends horizontally rearwardly within the head **6** through the guide opening **13** of a lug **20**. The lock is urged forwardly by a spring **21** confined between the forward surface of the lug **20** and a shoulder formed on the lock by the juncture of the legs **17** and **18** with the cylindrical portion of the stem. The forward portion of the lock is supported and guided in a horizontal ambit in a conventional manner by a guide lug **24** protruding from the inner surface of the jaw **8** shown in dotted outline in Fig. 2, centered at a level approximately that of the axis of the stem **16**. The surface of the lock adjacent the jaw **8** has a groove or recess **25** of which the vertical width is only slightly greater than that of the lug **24**. Thus, the forward portion of the lock is supported in horizontal movement by engagement of its grooved surface with the lug **24**. This lug also serves as a stop for limiting the forward motion of a lever or crank **26** which in turn limits the forward movement of the lock **15**.

The lever **26** is pivotally supported by axle means, such as a pin **27**, which extends through a bore in a horizontal direction formed in the upper part of the head. The lever comprises a handle **28** which protrudes upwardly out of the head sufficiently to provide accessibility for manual operation. The lower leg **29** of the lever **26** extends downwardly in a radial direction from the pin **27** and then branches in laterally opposite directions as extensions **30** and **31**. The leg extension **31** extends through the opening **19** of the lock **15** toward the guard arm side of the coupler head, and terminates outboardly of the lock in a lug **31A** projecting downwardly from the horizontal cylindrical portion of the extension.

As couplers are designed for long periods of service during a large part of which the parts may have become worn to a degree allowing a great deal of sloppiness or play, the purpose of the lug **31A** is to provide an additional surface **31B**, assuring that the lever **26** will en-

gage its forward stop **24**, regardless of wear, and that the lower end of the lever will not be likely to accidentally be withdrawn from the opening **19** with consequent loss of the lock or non-operation thereof.

The leg extension **31** and the opening **19** are interrelated in size so that the lock and the lever are in reciprocal driving and following relationship. That is to say, the lever or the lock may be driven by each other in reciprocal movements. Of course, the opening **19** is large enough to accommodate the rise and fall of the extension **31** as it travels along an arc about the axis of the pin **27**.

With the exception of the lug **31A** and the extension **30**, just discussed, the foregoing discussion relates to structure of the prior art. The essential improvement provided by the present invention is a lock-setting mechanism for a coupler, such as just described, comprising the extension **30** of the lever **26**, a pawl **32** swingably mounted on the pin **27**, and certain portions of the coupler head structure hereinafter to be described in detail.

As shown, the projection **30** extends from the main portion of the leg **29** toward the pawl **32** in a direction approximately parallel to the axis of the pin **27** and away from the lock **15**.

The pawl **32** has an operative ambit in which it is both pivotable and capable of radial movement relative to the axis of pin **27** transversely of the longitudinal direction of the coupler by provision of a slot or oblong opening **33** (upwardly elongated at the rearward position of the pawl) through which extends the pin **27**. Thus, as the pawl swings forwardly about the pin **27**, in response to the thrust exerted on its surface **44** by the extension **30**, and reaches its maximum forward position, as shown in Fig. 6, the pawl is forced upwardly by sliding contact of the pawl leg **34** on an inclined cam surface **35** of a ridge **39** of the head and thus shifted longitudinally in a direction normal to the axis of the pin **27** to the extent allowed by the length of the opening **33**. Thus, the construction just described limits the movement of the pawl **32** generally to a vertical longitudinal plane of the coupler.

Preferably, the length of this opening is less than that which will allow either the forward leg **37** or the rear leg **34** of the pawl to pass over the top of the ridge **39**. Thus, at the forwardmost position of the pawl, as seen in Fig. 6, the forward surface **34***a* of the rear leg overlaps, to a small extent, the rear surface **35** of the ridge **39**. At this position the bottom of the opening **33** has engaged the pin **27**. As optional or additional means for stopping the forward motion of the pawl **32**, a convex wall corner surface **40** and a front concave corner surface **46** may be adapted to engage at the desired forwardmost position of the pawl. The essential requirement is that the rear pawl leg **34** remains on the surface **35** so that the pawl will settle by gravity, back to the position shown in Figs. 7 and 2, and to avoid the situation in which, if the leg **34** passed over the edge **41**, the pawl would settle forwardly of the ridge **39** and require special or emergency manipulation.

The side of the pawl **32** facing toward the lever **26** is notched to provide a downwardly-facing, rearwardly inclined surface **43**, shown in Fig. 7, overhanging the lever extension **30**. The lower side of the notch is formed by a relatively narrow surface indicated by the dotted lines **42**. The lock **15**, as shown in Figs. 1, 2 and 7, occupies its normally forward position for locking the coupler in coupled relation with another similar coupler. However, to use the lock-setting mechanism, it is necessary to shift the lock to a rearward position in which it is held by the mechanism.

The lever extension **30** extends from a lateral direction, as shown, into the ambit of the pawl, particularly, that portion of the pawl overhanging the notch **52**. In setting the lock, the lever **26** is rotated in a counterclockwise direction (as viewed in the figures) to carry the extension **30** rearwardly into engagement with the overhanging cam surface **43** of the pawl. Because of the rearward inclination of this surface, and the elongation of the pawl opening **33**, the pawl is forced upwardly as the extension **30** travels along an arc at a fixed radial distance from the pin **27**. At the instant the extension **30** passes to the rear of the surface **43**, the pawl drops by gravity in front of the extension **30**, which then engages a rear surface **44** of the pawl, as shown in Fig. 5. Fig. 4 is also illustrative of this position and shows the lock in its rearwardmost position.

During the rearward movement of the lever extension **30**, the pawl tends to be forced rearwardly, causing the rear surface **36** of the forward leg of the pawl to engage the forward surface **38** of the ridge **39** which, of course, limits the rearward movement of the pawl. However, when the extension **30** becomes latched behind the pawl, i.e., in engagement with surface **44** and the manual force overcoming the spring **21** is discontinued, the pawl will swing forward if not held. It should be especially noted that the pawl, in order to render the lock-setting mechanism operative, is held in the position shown in Figs. 3, 4 and 5 by the jaw **8** of another coupler in engagement with the pawl surface **46**, as seen in Fig. 1.

In the position typified by Figs. 1, 3, 4 and 5, the pawl is held in the lock-set position by a portion **47** of another coupler (see Fig. 1) positioned in the cavity **10** against the front-facing surface **45** of the pawl. In this position, pressure exerted on the lock by the spring **21** will shift the movable parts of the coupler to the position shown in Fig. 6, if the pawl **32** is not held from swinging out of approximate abutment of its forward leg **37** with the ridge **39**.

Rearward retention of the pawl is effected by the buffing jaw **8** of the other coupler **4**, outlined in dot-dash in Fig. 1. However, as the other coupler moves away from the buffing wall **48**, as shown in Fig. 6, the pawl follows the jaw **8** and is cammed upwardly by the surface **35**, thereby causing the extension **30** to move downwardly along the surface **44** and around the corner **49** defining its lower edge. Thereafter, the extension is disposed in the notch **52** along the rear side (as observed in Fig. 7) of the pawl, and the lever and the lock are free to move to their forwardmost positions while the pawl is free to settle to its rearmost position, as shown in Figs. 1, 2 and 7.

Through inadvertent operation, it is occasionally desirable to restore the coupler to a coupling-locked position from the lock-set position without separating the cars on which the couplers have been lock-set. All that is necessary in this case is to (referring now to Figs. 4 and 5) move the pawl upwardly until its surface **44** is raised above the lever extension **30**. The lock is then thrust forwardly by the spring **21** to its locking position and the lock-setting mechanism thereupon snaps back to the position as shown in Figs. 1, 2 and 7. For operating the pawl in this manner, a handle **50** is attached to the upper end of the pawl and exposed above the top surface of the coupler head for accessibility in manual operation.

Fig. 8 illustrates a modified pawl **32A** and a modified coupler head **6A**. In modifying the pawl **32A** from the form shown in the earlier figures, the double leg construction of the pawl has been eliminated and supplanted by a downwardly extending tooth **53**. The coupler head construction of the previous embodiment illustrated in the previous figures has been modified by eliminating the cam ridge **39** and substituting in lieu thereof an opening **54** defined by a stop surface **55** and a cam surface **56** which function in place of the stop surface **38** and the inclined surface **35** of the ridge **39**, respectively. In a like manner, the forward surface **58** and the rear perpendicular surface **59** of the tooth **53** on the pawl are substituted for the inclined rear leg front surface **34***a* and the front leg rear surface **36** of the pawl **32**, respec-

tively, of the earlier described embodiment. The lower boundary **62** of the notch **61** in the side of the pawl toward the lever is spaced sufficiently from the upper boundary **63** to permit free travel of the extension **30** through the notch **61** in both forward and rearward strokes.

In operation, the pawl 32A functions in a manner entirely analogous to that of the pawl **32** of the earlier described embodiment. During coupled relationship, the pawl **32A** of one coupler is retained in its rearward lock-set position (as shown in Fig. 8) by the jaw of another coupler. If the jaw of the latter coupler then moves out of the cavity provided therefor by the coupler having the pawl **32A**, the pawl follows the jaw of the other coupler and, in so doing, is both pivoted about the pin **27** and cammed upwardly as a result of the surface **58** sliding forwardly and upwardly over the surface **56**. Meanwhile, the lever extension **30**, in response to urging of lever by the spring **21** in a clockwise movement, passes forwardly and around the corner **64** and through the notch **61**. Thus released, the pawl **32A**, impelled by gravity, settles downwardly and backwardly into the position illustrated by guidance provided by contact of the periphery of the opening **54** with the tooth **53**. In the lock-setting operation, the lever **26** is forced counter-clockwise to cam the pawl **32A** upwardly by engagement of the extension **30**, as the latter moves rearwardly, with the upper, downwardly-facing surface **63** of the notch **61**. Meanwhile, the rear tooth surface **59** slidably engages the rear surface **55** of the opening to ensure the upward movement of the pawl **67** by preventing it from swinging backwardly.

The terms and expressions which have been employed are used as terms of description and not of limitation and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

What is claimed is:

1. A car coupler comprising: a pair of relatively fixed transversely spaced jaws disposed at the forward end of the coupler; a lock movable relative to the jaws between a forward locking position between the jaws and a rearward unlocking position; means urging the lock forwardly relative to the jaws; detent means pivotally connected with said lock for reciprocation therewith; a pawl having a rearward facing abutment surface; means for movably supporting the pawl within the coupler with the movement thereof limited generally to a longitudinal vertical plane; said abutment surface being aligned with the detent means in a longitudinal direction of the coupler; said pawl being movable forwardly and rearwardly in response to movements of another coupler into and out of coupled relation with the first named coupler; at a rearward position of the pawl corresponding to coupled relationship of said couplers, said abutment surface engaging said detent means and disposing the detent means in a rearward position placing the lock in said unlocking position.

2. In a car coupler having a pair of transversely spaced jaws disposed at the forward end of the coupler and a lock supported in the coupler in forward to rearward reciprocable adjacent relation with one of the jaws for movement from a forward locking position between the jaws to a rearward unlocking position; a lock-setting mechanism comprising: resilient means urging the lock forwardly into said locking position; detent means pivotally connected with said lock for reciprocation therewith; a pawl having a rearward facing surface for engaging the detent means, and a forward facing surface; means for movably supporting the pawl within the coupler generally limiting the movement thereof to a longitudinal vertical plane; said rearward facing surface being aligned in a longitudinal direction of the coupler with a portion of the detent means for engagement therewith; said forward facing surface being engageable with an opposing surface of another coupler similar to said coupler; said pawl, when engaged with said other coupler through said forwardly-facing surface, being movable forwardly and rearwardly in response to movements of said other coupler into and out of coupled relation with the first named coupler; said pawl, at a rearward position thereof corresponding to coupled relationship of said couplers, engaging said detent means through said rearward facing surface, and disposing the detent means in a rearward position placing the lock in said unlocking position, said resilient means acting through the lock and the detent means to urge the pawl forwardly; and cam means in fixed relation with the jaws for acting on the pawl to shift it out of engagement with the detent means during forward movement of the pawl.

3. In a car coupler having a pair of transversely spaced jaws disposed at the forward end of the coupler and a lock supported in the coupler in forward to rearward reciprocable adjacent relation with one of the jaws for movement from a forward locking position between the jaws to a rearward unlocking position, and a transverse wall connecting rearward portions of said jaws; a lock-setting mechanism comprising: resilient means urging the lock into said locking position; detent means pivotally connected on said lock for reciprocation therewith; a pawl having a rearward surface for engaging the detent means and a forward facing surface for engaging the surface of another coupler in proximity with said wall; means supporting the pawl for movement within the coupler limited generally to a longitudinal vertical plane; said pawl being engageable with said other coupler through said forward facing surface for following movements of said other coupler into and out of coupled relation with the first-named coupler; said pawl, at a rearward position thereof corresponding to coupled relationship of said couplers, engaging said detent means through said rearward facing surface and disposing the detent means in a rearward position placing the lock in said unlocking position; and cam means in fixed relation with the jaws for engaging the pawl during movement forwardly from its rearward position to shift it out of engagement with said rearwardly facing surface.

4. In a car coupler having a pair of transversely spaced jaws disposed at the forward end of the coupler and a lock supported in forward to rearward reciprocable adjacent relation with one of the jaws for movement from a forward locking position between the jaws to a rearward unlocking position; the jaws having opposed facing surfaces of which the rearward ends are connected by a transverse wall; a lock-setting mechanism comprising: resilient means urging the lock into said locking position; detent means pivotally connected on said lock for reciprocation therewith; a pawl having a rearward facing surface for engaging the detent means, and a forward facing surface for engaging the surface of another coupler in proximity with said wall; means for movably supporting the pawl in the coupler with the movement thereof limited generally to an operative ambit within a longitudinal vertical plane, said ambit extending forwardly through an opening in said wall; said rearward facing surface being aligned in a longitudinal direction of the coupler with a portion of the detent means for engagement therewith; said pawl being movable forwardly and rearwardly with its forward facing surface engaged with said other coupler in response to movements of said other coupler into and out of coupled relation with the first-named coupler; said pawl, at a rearward position thereof corresponding to coupled relationship of said couplers, engaging said detent means through said rearward facing surface, and disposing the detent means in a rearward position placing the lock in said unlocking position; cam means in fixed relation with the jaws for engaging the pawl as it moves forwardly in said ambit to shift it vertically out of engagement with the detent means; stop

means in fixed relation with the jaws for limiting the rearward movement of the pawl to approximately said rearward position thereof; interengaging cam and cam following surfaces on said detent means and the pawl for shifting the pawl upwardly to an elevation permitting passage of the detent means under the lower end of said rearward facing surface as the detent means is forced rearwardly to a position of engagement with said rearward surface.

5. In a car coupler having a pair of horizontally transversely spaced jaws disposed at the forward end of the coupler of which the opposed facing surfaces are connected at their rearward ends by a transverse wall, and a lock supported for reciprocation in the longitudinal direction of the coupler adjacent one of said surfaces; a lock-setting mechanism comprising: resilient means urging the lock forwardly into a position between the jaws for interlocking the coupler with another similar coupler; a lever pivotally supported by a coupler portion in fixed relation with the jaws along a pivotal axis in horizontal transverse relation to the coupler length, said lever being connected by a portion thereof spaced from said pivotal axis in loose pivotal connection with the lock connecting said lock and lever in reciprocative driving and following relationship; a pawl in swingable and reciprocable guide relation with supporting means at the pivotal axis of the lever and having an operative ambit disposed generally within a plane normal to said axis and extending through an opening in said wall; the lever having an extension projecting into said ambit; the pawl having a rearward facing surface for engaging said extension and a forward facing surface for engaging the surface of another coupler in proximity with said wall; and cam means in fixed relation with the jaws for guiding the pawl in a generally upward direction during forward swinging movements to an elevation effecting disengagement of the rearward facing surface from said extension.

6. The car coupler of claim 5 wherein: the pawl is acted upon by gravity to return it to a lower position as occupied in locked and lock-set conditions of the coupler; and the coupler comprises stop means providing an upwardly-extending forwardly-facing guide surface for limiting the rearward movement of the pawl; said extension and the pawl have interengaging cam and cam following surfaces for shifting the pawl upwardly to an elevation allowing passage of the pawl under the lower end of said rearward facing surface as the lever is swung rearwardly to a position of engagement with said rearward facing surface; said pawl remaining in slidable engagement with said guide surface until passage of the lever under the lower end of said rearward facing surface.

7. In a car coupler having a head comprising: a pair of transversely spaced jaws of which the opposed facing surfaces are vertical and are connected at their rearward ends by a transverse wall having an opening therethrough, and a lock supported for reciprocation in the longitudinal direction of the coupler adjacent one of said surfaces; a lock-setting mechanism comprising: resilient means urging the lock forwardly to one end of its reciprocal ambit, said lock having a transverse opening; axle means having an axis fixed with respect to the head extending approximately horizontally and transversely relative to the coupler length; a pawl having an opening through which the axle means extends, said pawl opening being elongated in an upward direction normal to said axis and lengthwise of the pawl for transverse movement of the

pawl relative to the axle means, said pawl being supported on the axle means at a point rearwardly of the opening for swinging along an ambit extending through the wall opening; a lever pivotally supported by the axle means with a leg portion extending between the lock and the pawl, an extension of the leg extending in one lateral direction into said lock opening and another extension of the leg extending in an opposite lateral direction into the ambit of the pawl; the pawl having a rearward-facing surface for engaging said other extension and a forward-facing surface for engaging the surface of another coupler in proximity to said wall; stop means in fixed relation with the head providing an upwardly extending guide surface for limiting the rearward movement of the pawl; and cam means in fixed relation with the head acting on the pawl during forward swinging movements thereof about said axis for shifting the pawl in a lateral direction relative to the axle means to disengage its rearward-facing surface from said other extension.

8. The coupler of claim 7 wherein: said pawl has a downward-facing cam surface extending rearwardly and downwardly along the side of the pawl facing the lever and terminating at the lower end of said rearward-facing surface; said cam surface being spaced from said axis, at the lowest position of the pawl, for engagement with said other extension.

9. The coupler of claim 7 wherein: said pawl has a front leg and a rear leg forming an intermediate notch and the head provides a saw-tooth ridge extending upwardly into said notch; the front surface of the ridge adapted for engaging the rear surface of the front leg and constituting said stop means; the rear surface of the ridge being inclined forwardly and upwardly and in combination with the forward surface of the rear leg constituting said cam means.

10. The coupler of claim 9 wherein: said pawl has a downward-facing cam surface extending rearwardly and downwardly along the side of the pawl facing the lever and terminating at the lower end of said rearward-facing surface, said cam surface being spaced from said axis at the lowest position of the pawl, for engagement with said other extension.

11. The coupler of claim 7 wherein: the head is provided with a recess immediately under the pawl; and the bottom of the pawl comprises an inverted saw-tooth portion adapted to fit in the recess; the rear surface of said recess constituting said stop means; the forward surface of the saw-tooth portion being inclined upwardly and forwardly and in combination with the forward surface of the recess constituting said cam means.

12. The coupler of claim 11, wherein: said pawl has a downwardly-facing cam surface extending rearwardly and downwardly along the side of the pawl facing the lever and terminating at the lower end of said rearward-facing surface, said cam surface being spaced from said axis, at the lowest position of the pawl, for engagement with said other extension.

13. The coupler of claim 7 comprising: a handle attached to the upper end of the pawl and extending to a manually accessible region exteriorly of the head.

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