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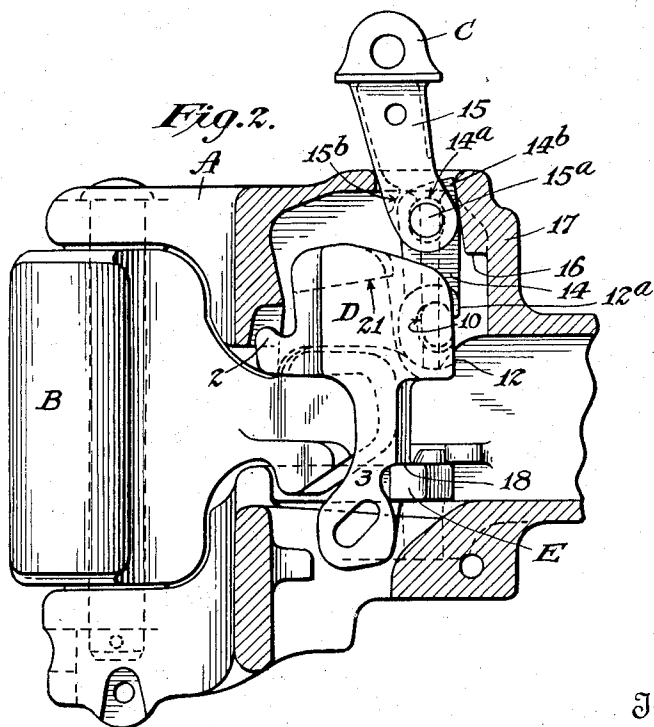
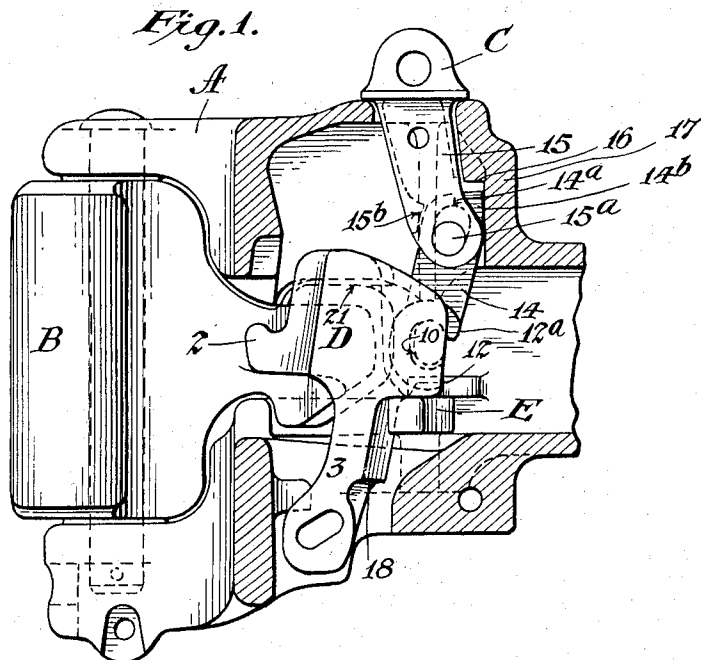
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1,932,503

CAR COUPLER

Filed July 26, 1929

3 Sheets-Sheet 1



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Oct. 31, 1933.

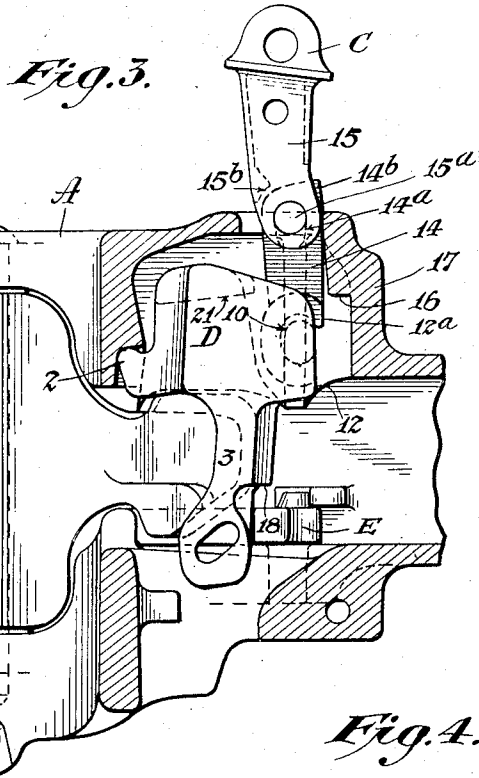
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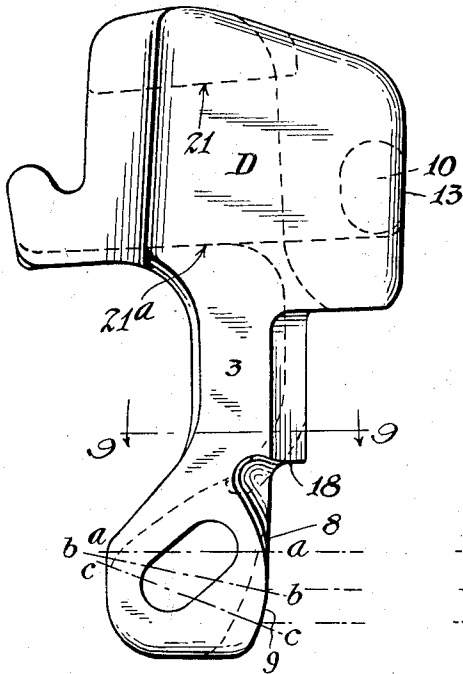
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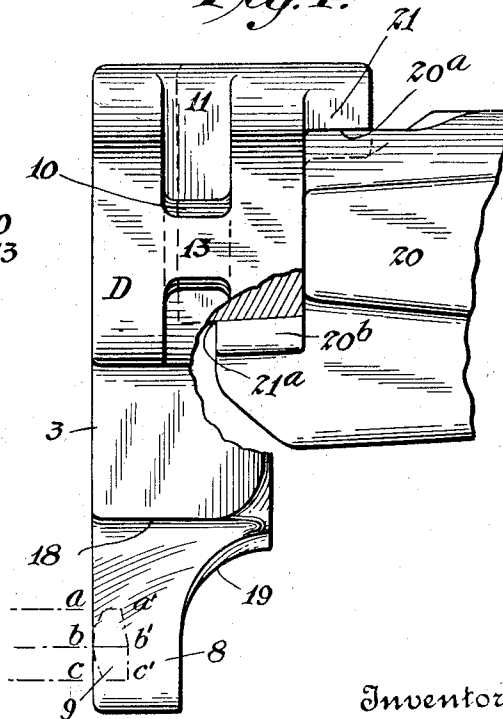
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*Fig. 5.*



*Fig. 4.*



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Fig. 6.

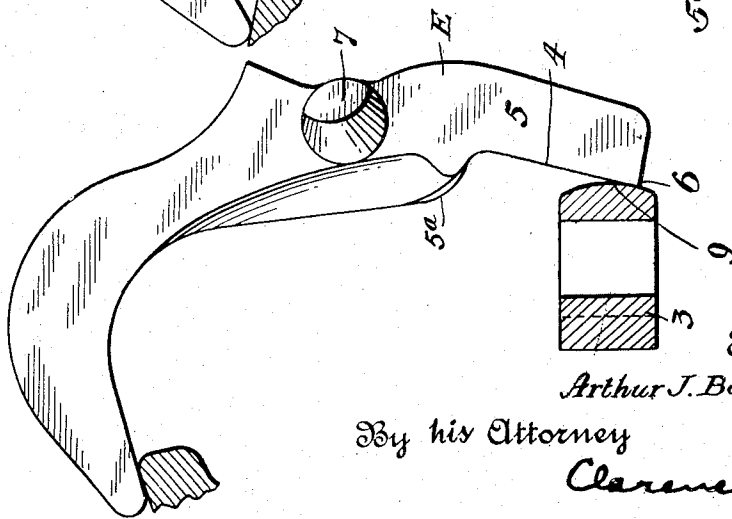


Fig. 7.

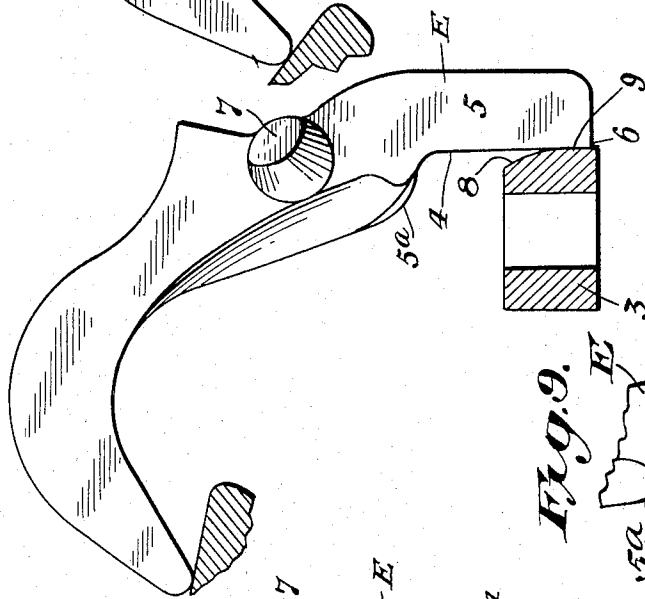


Fig. 8.

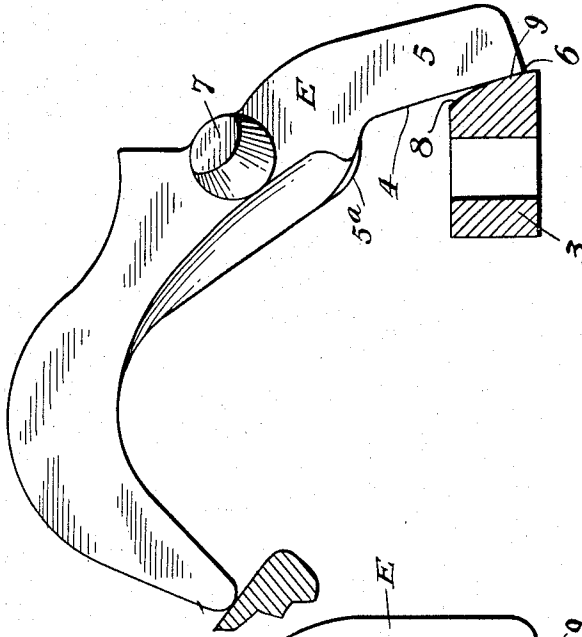
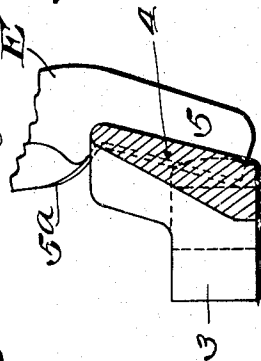


Fig. 9.



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# UNITED STATES PATENT OFFICE

1,932,503

## CAR COUPLER

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Application July 26, 1929. Serial No. 381,180

16 Claims. (Cl. 213—127)

My invention relates to car couplers, and particularly to improvements in the Standard American Railway Association type D-Coupler. The Standard D-Coupler has been in extensive use for more than ten years and as a result of such use various difficulties and defects have developed which the present improvements correct and overcome. My improvements are directed to increasing the leverage exerted to open the knuckle, which is effected by changing the shape and relation of the knuckle thrower, the lock and the lifter, in preventing the lock from sticking or jamming when in locked position, and in the consequent rearrangement of parts which has enabled a more positive lock-set and lock-to-the-lock to be provided. My invention also comprises various features which I shall hereinafter describe and claim.

The present application is a continuation in part of my application, Serial No. 317,971, filed November 8, 1928.

In the accompanying drawings I have shown in Fig. 1 an embodiment of my invention in which the coupler head is in section and the knuckle, lock and thrower are in elevation, with the parts in locked or lowermost position; Fig. 2 is a similar view, but with the parts in lock-set position, and Fig. 3 is a similar view with the parts in the position occupied at the beginning of knuckle-throw; Fig. 4 is a rear elevation of the lock and a portion of the knuckle tail; Fig. 5 is a side elevation of the lock; Fig. 6 is a partial horizontal section showing the engagement of the leg of the lock, with the arm of the thrower at the beginning of the knuckle-throw, the thrower itself being in plan; Fig. 7 is a view similar to Fig. 6, but showing an intermediate position occupied by the lock, thrower and knuckle tail in knuckle throwing; Fig. 8 is a similar view showing the position of the parts at the end of the knuckle-throwing movement; and Fig. 9 is a detail view showing the lock in section along line 9—9 of Fig. 5, and illustrating the cooperation with the lock of guiding means on the knuckle thrower, the parts being shown in lock-set position.

Referring more specifically to the drawings, the coupler head A contains the usual knuckle B, a lifter C, lock D and thrower E, all of which are of altered construction from the Standard American Railway Association D-Coupler.

To increase the leverage exerted on the knuckle, the top of the lock has been cut down toward the rear side of the head to give room for an added lift to the lock and a consequent greater

rotation about the fulcrum point 2, and a greater rearward movement of the leg 3 of the lock, with a consequent greater impulse to the knuckle thrower E. The face 4 of the arm 5 of the thrower, beginning at its point 6, is preferably arranged substantially on a radius of the pivot 7 of the thrower, as is shown in Figs. 6, 7 and 8, so as to ensure engagement of the face 4 of the thrower by the lock face 8 as far away from the pivot 7 as possible, for the purpose of increasing the leverage of the lock upon the thrower to the maximum extent. The rear lock face 8 is built out as at 9 in Fig. 4 in order to provide a line contact with the thrower, so as to maintain throughout the throwing movement the effective length of the lever arm 5 and thus preserve undiminished the impulse transmitted through the leg 3 of the lock to the thrower, as is shown in Figs. 6 to 8. It will be noted from Figs. 6, 7, and 8 that the knuckle thrower arm 5 is moved by the lock from a position diagonally in advance of the central position of said arm to a position diagonally in the rear thereof. The face 4 of the arm 5 is thereby maintained as nearly as possible normal to the line of thrust of the lock, so that the lateral component exerted by the lock on the arm 5 is kept at a minimum. Also, the zone of contact between the lock and the arm 5 is maintained substantially at the extremity of the arm.

At the beginning of the throwing operation the portion 9 of the rear face 8 of the lock is in contact with the thrower arm along the line *a a'*, as is indicated in Fig. 4. As the operation proceeds the line *b b'* in Fig. 4 represents the portion of the lock leg 3 which is in contact with the face 4 of the thrower, and the lock will have rotated about its fulcrum point 2 with the coupler head to the extent that the line *b b*, as indicated in Fig. 5, will have become horizontal. At the end of the knuckle throwing movement the line *c c'* represents the portion of the lock which is in contact with the face 4 of the thrower, and the lock will have been rotated about its fulcrum point 2 with the coupler head to the extent that the line *c c*, as indicated in Fig. 5, will then have become horizontal.

It will therefore be seen that an increased leverage is maintained throughout the knuckle throwing movement and that as the engagement between the leg of the lock and the thrower is a line contact, as distinguished from the present point contact, wearing conditions between lock and thrower have been greatly improved.

The knuckle thrower is also provided with a

forward or guiding projection 5<sup>a</sup> on its arm 5, which acts to prevent the lower portion 3 of the lock from swinging over toward the pivot pin side of the coupler and thus getting out of alignment as shown in Fig. 9.

To further increase the leverage on the knuckle, the lever arm between the fulcrum point 2 and the point of attachment of the lock and lifter has been lengthened. This is effected by changing the connection between lock and lifter so that the fulcrum portion or trunnion 10 is as near the rear edge of the lock as possible. The trunnion 10 bridges a slot 11 in the rear side of the lock near its upper end and provides a supporting pivotal connection with the rearwardly facing hooked lower end 12 of the lifter C. The trunnion 10 is oval in cross-section, having its greatest dimension vertically disposed, so that the opening in the lifter hook 12 need be only a little greater than the narrow dimension of the trunnion. As a result, when the hook 12 has been applied to the trunnion the heel 12<sup>a</sup> of the hook holds the lifter away from the inner wall of the slot and thus prevents the forward edge of the lower member of the lifter C from coming into contact with the inner wall of the slot and accordingly eliminates the possibility of the lifter binding against the lock in the slot. The shape of the inner wall of the lock slot, and the shape of the trunnion as well as that of the lower end of the lifter all cooperate so as to prevent the lifter hook 12 from being applied in the reverse direction. As the point of application of the lifting force is thus further from the fulcrum point 2 than in the D-Coupler, it is obvious that a greater leverage is thus applied for throwing the knuckle.

This new location of the lifting attachment has required a new form of lifter and lock-to-the-lock. I accordingly prefer to use a two-piece lifter C, in which the upper portion 15 has its lower end bifurcated to receive the upper end of the lower portion 14 which is held therein by the pin 15<sup>a</sup>, which passes through an elongated slot 14<sup>a</sup> in the lower portion. These parts are so arranged that the weight of the upper member 15 causes the lower member 14 to break to the rear and forces the shoulder 14<sup>b</sup>, when the parts are in lowest or locked position, under the ledge 16 in the coupler head to the rear of the coupler cavity, just forward of the rear wall 17 of the coupler horn, thus effecting a lock-to-the-lock. At the same time the upper member by reason of the slotted connection drops down relative to the lower member until the wall 15<sup>b</sup> in the bifurcation of the member 15 is in substantial engagement with the forward face of the lower member, thus providing an interlock between the two members, so that the lower member can not move out from under the lock-to-the-lock shoulder 16 until the top member is raised by the uncoupling mechanism.

One of the difficulties with the lock in the D-Coupler is that the intermediate portion of the leg of the lock is of such section that it is apt to break or crack off through the recess provided for lock-setting. To obviate this I have increased both the width of the lock and its cross-sectional area in and above the region of the lock-set seat 18, and have also cut away the bottom portion of the lock below the lock-set seat, as is indicated at 19 in Fig. 4. As a result of these improvements the strength of the leg of the lock has been greatly increased without substantial increase in its weight, and I have

also been enabled to extend the lock-set ledge or seat 18 to such an extent as to give the lock a greater bearing on the thrower arm 5 in lock-setting, and have thus made lock-setting more reliable.

In my improved coupler the lock when in locked or lowermost position is carried upon surface 20<sup>a</sup> of the tail 20 of the knuckle by a laterally projecting shoulder 21 which extends toward the pivot pin side of the coupler above the locking face of the lock, and by a lateral extension 20<sup>b</sup> of the knuckle tail having a surface which supports the lock below the locking face of the lock. The lock is thus, as is shown in Fig. 4, supported by its shoulders 21 and 21<sup>a</sup> upon these two surfaces. The latter are not only of ample extent but, furthermore, since the contacting surfaces of the shoulder 21<sup>a</sup> on the lock and the extension 20<sup>b</sup> on the knuckle are curved downwardly toward the rear, the forward upper corner of the head of the lock is prevented from dropping forwardly and jamming against the forward wall of the cavity just above the mouth of the cavity. Wear between said lock and said wall is thereby also prevented. Furthermore, it may be noted that, as shown in Fig. 1, the leg of the lock, when the latter is in locked or lowermost position, is out of contact with the walls of the opening in the bottom of the coupler head into which said leg extends. This is advantageous in that it reduces the danger of breakage of the lock leg such as has happened in previous arrangements wherein the leg is supported in contact with one or more portions of said walls.

In addition to the advantages hereinbefore pointed out as resulting from the provision of the surfaces above described for supporting the lock on the knuckle tail, it may be noted that there follows from this arrangement the result that the knuckle B may support a lock having only a lower shoulder, corresponding to shoulder 21<sup>a</sup> of applicant's lock D, but unequipped with an upper shoulder such as shown at 21. On the other hand, applicant's lock D may be supported by a knuckle tail having an upper supporting surface but no lower supporting projection 20<sup>b</sup>. In short, applicant's arrangement of cooperating supporting surfaces between lock and knuckle tail produces the result that said knuckle may be employed interchangeably with different forms of locks, while the lock disclosed may be utilized interchangeably with different types of knuckles.

Couplers of the D-type embodying my invention give greatly improved results. I have found, for instance, that the improvement in throwing the knuckle, because of the materially increased and maintained leverage, requires approximately 30 to 40% less effort than with the Standard D-Coupler, that my improved lock is much more rugged and is much less apt to break than are the standard D-locks, and that the difficulties with the jamming of the head of the lock against the forward side of the cavity have been obviated by supporting it on the knuckle tail, that the lock-set and lock-to-the-lock have been made more positive, while the wear on the lock and thrower and the accidental displacement and breaking of the latter have been obviated.

The terms and expressions which I have employed are used as terms of description and not of limitation, and I have no intention, in the use of such terms and expressions, of excluding any mechanical equivalents of the features

shown and described, or portions thereof, but recognize that various structural modifications are possible within the scope of the invention claimed.

5 What I claim is:

1. In a car coupler, a vertically disposed lock having a depending leg, a two-armed knuckle thrower pivoted in the coupler head, the leg of the lock having a reduced lower portion in the lateral zone of the lock nearest the guard arm side of the coupler to engage an extended portion of the thrower during the entire knuckle throwing movement, the leg of the lock also having an intermediate portion of substantially increased lateral extent and cross-sectional area, the lower rear portion of which forms a lock-set shoulder of substantially greater width than the reduced lower portion engaging the top surface of the thrower when in lock-set position.
2. In a car coupler, a lock, a two armed knuckle thrower pivoted in the coupler head, the lock having a rear face arranged to engage a face on one of the arms of the thrower, the arm face having a line engagement with the lock face in each of a series of different positions thereof during the knuckle throwing movement and being arranged to engage the lock surface at the extremity of said arm, one of said faces being a warped surface, said warped surface comprising means for limiting the shortening of the effective length of said thrower arm during the knuckle throwing movement.
3. In a car coupler, a lock, a knuckle, a two armed knuckle thrower pivoted in the coupler head and adapted to engage the knuckle for throwing the latter, the lock having a rear surface arranged to engage a face on one of the arms of the thrower for actuating said thrower, the arm face having a line engagement with the lock surface in each of a series of different positions thereof during the knuckle throwing movement.
4. In a car coupler, a knuckle, a knuckle thrower for operating said knuckle, a lock for operating said knuckle thrower, and means comprising a portion of the knuckle thrower and a portion of the lock cooperating with spaced portions of the lock for supporting the latter when in locked position.
5. In a car coupler, a lock having in its rear upper portion a slot open at its top and rear side, a web of substantially oval cross-section bridging the rear side of the slot, a two part lifter, the lower member of which terminates in a rearwardly facing hook adapted to be inserted into the slot and to engage the web and thereby support the lock, the hook comprising jaws spaced apart a distance less than the major diameter of the web.
6. In a car coupler, a vertically disposed lock having a depending leg, a two-armed knuckle thrower pivoted in the coupler head, one of the arms having a face extending diagonally forwardly with respect to the pivot of said thrower when the lock is in locking position, said face during knuckle throwing movement swinging rearwardly to a diagonally rearward position, said lock leg having an extension adjacent the extremity of said knuckle thrower arm for engaging with the latter, said knuckle thrower engaging extension of said lock leg being curved vertically whereby a line contact with said knuckle thrower is maintained during the knuckle throwing movements of said arm within an area adjacent the extremity thereof.

7. In a car coupler, a lock, a two armed knuckle thrower pivoted in the coupler head, the lock having a rear face arranged to engage a face on one of the arms of the thrower, one of said faces being a warped surface whereby a line engagement is maintained between the lock and knuckle thrower in each of a series of different positions thereof during the knuckle throwing movement.

8. In a car coupler, a vertically disposed lock having a depending leg, a two armed knuckle thrower pivoted in the coupler head, one of the arms having a face substantially radial to the pivot of the thrower and extending diagonally forwardly with respect to said pivot when the lock is in locking position, said face during knuckle throwing movement swinging rearwardly to a diagonally rearward position, said lock leg having a face engageable with said thrower arm adjacent the extremity thereof, one of said faces being a warped surface whereby a line engagement is maintained between the lock and thrower arm in each of a series of different positions thereof during the knuckle throwing movement.

9. In a car coupler, a vertically disposed lock having a depending leg, said lock comprising a main body portion for engagement with the tail of a knuckle for locking the same, a portion above said body portion overlying said knuckle tail for supporting said lock in locking position, a leg portion depending from said body portion and of lesser width and thickness than said body portion and terminating at its lowermost extremity in a lock-set seat and a downward projection from said leg for engaging a knuckle opening element, said projection extending downwardly on the guard arm side of said lock and being of less width than said leg portion.

10. In a car coupler, a lock having in its rear upper portion a slot open at its top and rear side, a trunnion substantially oval in cross-section bridging the rear side of the slot, a two-part lifter, the lower member of which terminates in a rearwardly facing hook adapted to be inserted into the slot in the lock and to engage the trunnion and thereby lift the lock, said hook having a heel partially encompassing and engaging the trunnion and serving by said engagement to hold the lower member away from the wall in the lock slot and to prevent binding thereagainst.

11. In a car coupler, a vertically disposed lock having a depending leg, a two armed knuckle thrower pivoted in the coupler head, one of the arms comprising means for engaging a lock-set seat on the leg of the lock, and means whereby a line contact is maintained between the knuckle thrower and a portion of the lock below said lock-set seat during the knuckle throwing movements of said thrower and within an area adjacent the extremity thereof.

12. In a car coupler, a vertically disposed lock member having a depending leg, a two armed knuckle thrower member pivoted in the coupler head, one of said arms being engageable with a knuckle and the other one of said arms having the extremity thereof located at a given distance forwardly from said pivot when the lock is in locking position, said extremity during knuckle throwing movement swinging rearwardly to a position substantially the same distance rearward of the pivot, and means comprising a narrowed extension of the lock leg having a surface cooperating with the aforesaid thrower arm

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for providing a contact between the lock and thrower arm at the extremity of said arm throughout the knuckle throwing movement.

13. In a car coupler, a vertically disposed lock member having a depending leg, a two armed knuckle thrower member pivoted in the coupler head, one of said arms being engageable with a knuckle and the other of said arms having a surface adjacent the extremity thereof substantially radial to the pivot of the thrower and extending diagonally forwardly with respect to said pivot when the lock is in locking position, said surface, during knuckle throwing movement, swinging rearwardly to a diagonally rearward position, said lock leg having an extension adjacent the extremity of the last mentioned knuckle thrower arm, said extension being provided with a thrower arm contacting surface to engage said radial surface on said arm, one of said members being cut away inwardly of its aforesaid surface to confine the contact between said lock and said arm to said radial surface adjacent the extremity of said arm in all cooperating positions of said parts.

14. In a car coupler, a lock, a lifter, a two-armed knuckle thrower pivoted in the coupler head, the lock having a rear face engaging one of the arms of the thrower and on its forward face a forwardly projecting fulcrum bearing against the coupler head, said lock also having on its rear side a connection for the lifter wherein the point of lifting contact between the lifter and the lock is below said fulcrum at the com-

mencement of the knuckle throwing movement of the lock, said point of lifting contact moving during said knuckle throwing movement to a point above said fulcrum.

15. In a car coupler, a knuckle having a tail, a vertically movable lock having a depending leg extending downwardly through an opening in the bottom of the head of the coupler, and means comprising a plurality of supports for said lock, one forward of the center of gravity of said lock and the other to the rear of said center of gravity, for supporting said lock with its leg out of contact with the rearward wall of said opening, each support being positioned below the portion of the lock engaged thereby, and one of said supports being on said knuckle.

16. A coupler knuckle comprising a hook-shaped nose portion for engagement with a similar portion of another knuckle and a tail portion for engagement with a lock, said tail portion having a vertical lock engaging face for engagement with a lock which is adapted to be moved vertically and to be tipped in a plane parallel to said lock engaging face, said knuckle tail having a substantially horizontal projection extending outwardly therefrom beneath said lock engaging face, said projection being inclined downwardly at its rear and serving to support a lock in a substantially upright locking position and to prevent forward movement of said lock.

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