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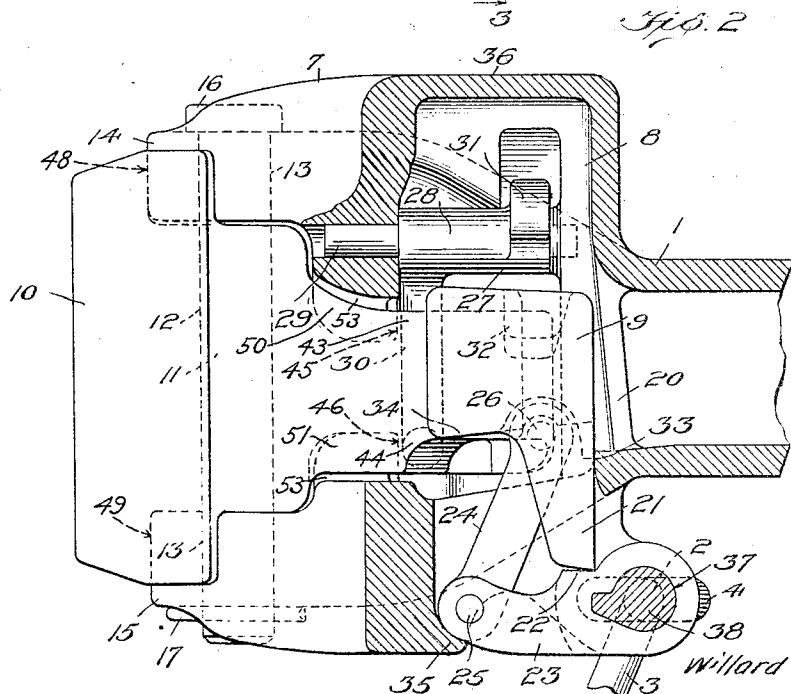
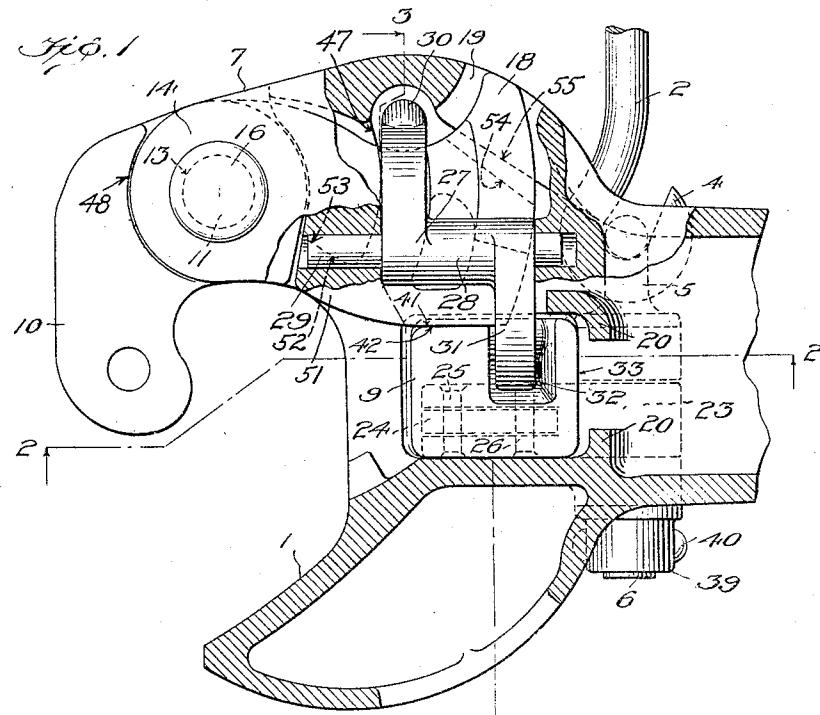
W. F. RICHARDS

1,897,278

COUPLER

Filed May 19, 1928

3 Sheets-Sheet 1



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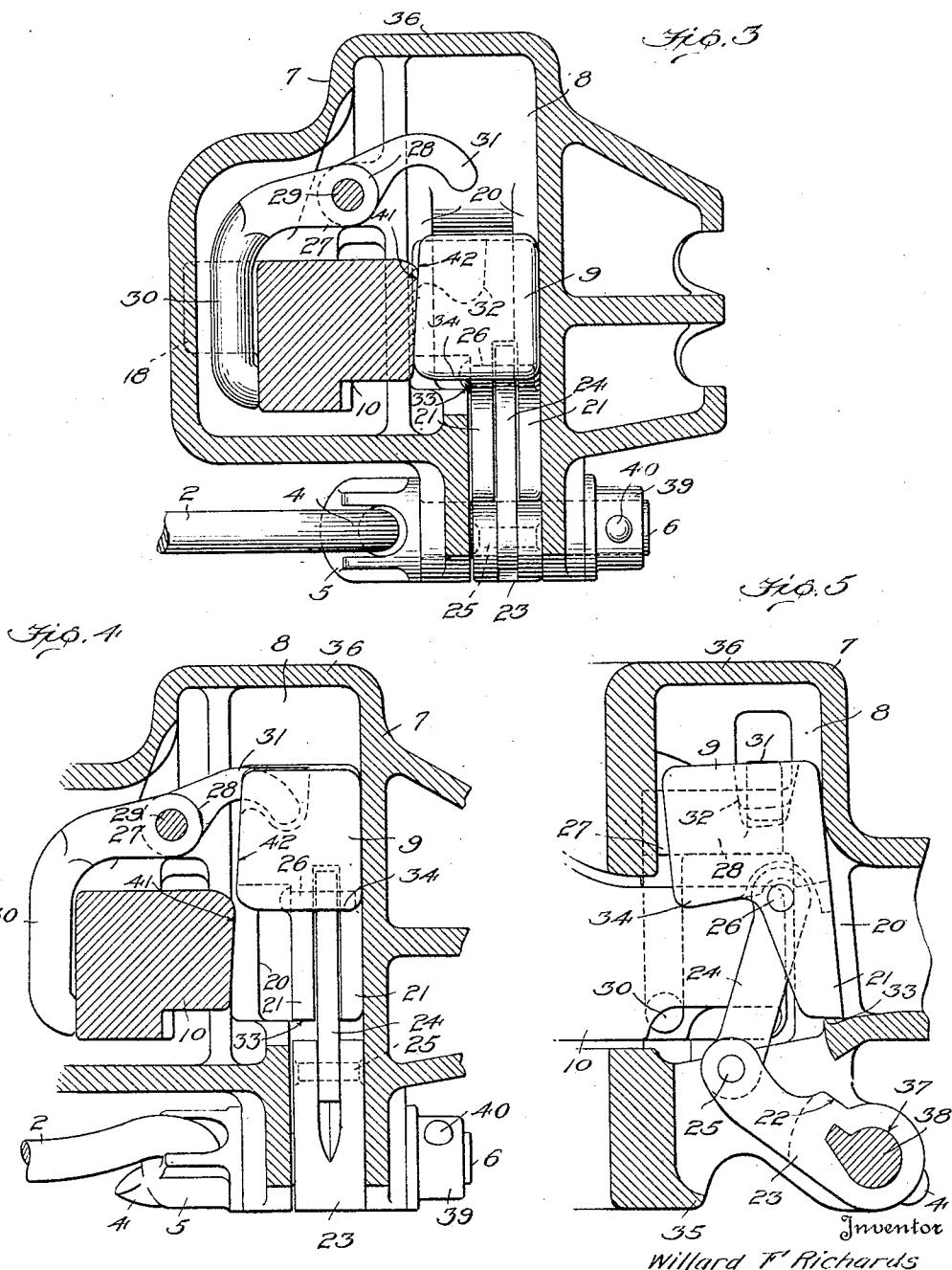
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Fig. 6

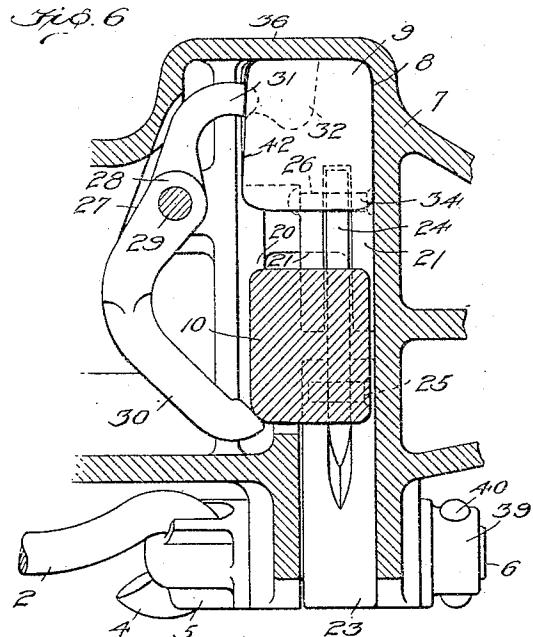


Fig. 7

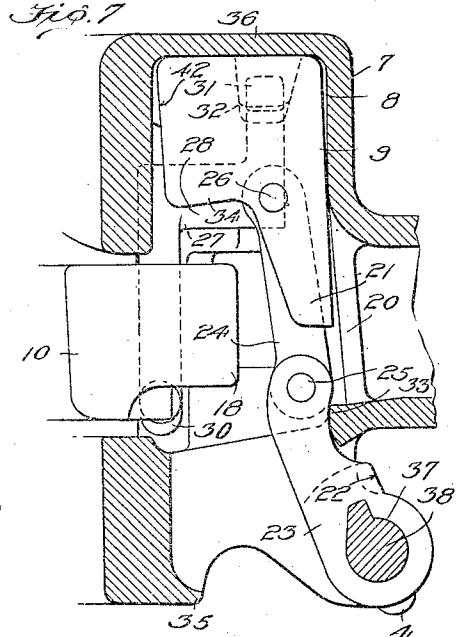


Fig. 8

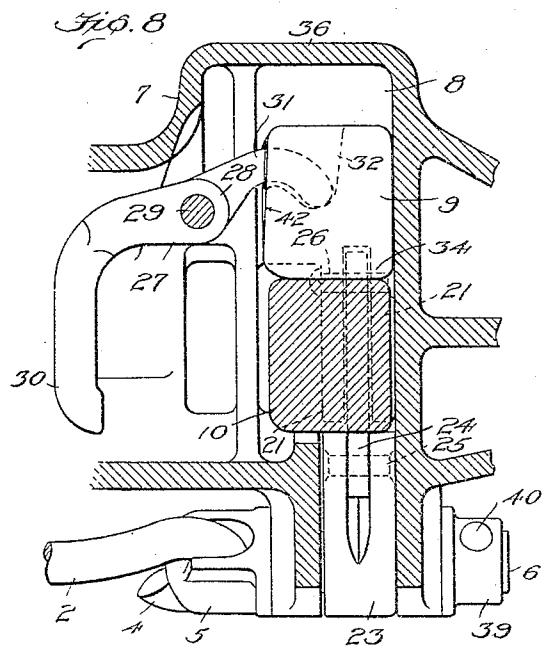
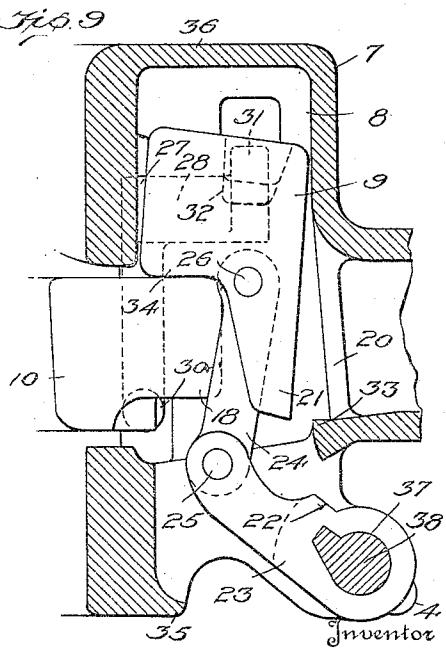


Fig. 9



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UNITED STATES PATENT OFFICE

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COUPLER

Application filed May 19, 1928. Serial No. 279,017.

This invention relates to couplers and more particularly to an automatic coupler operated by a transversely extending rocker shaft.

The principal object of my invention, generally considered, is to provide a coupler of the bottom-operated type in which all parts of the mechanism work on pivots for facilitating the operation of said coupler, and in which an operating rod is provided with a depending arm, which serves the double purpose of operating the locking mechanism of the coupler and alining the coupler head for effecting the operation of coupling, said coupler being particularly adapted for use on railway rolling stock of the type generally used in countries foreign to the United States.

Another object of my invention is to provide an automatic coupler in which the lock thereof is of the vertically movable type which engages a bell crank lever acting as a knuckle opener upon upward movement thereof, the mechanism for operating said lock comprising a lock lever on a rocker shaft and a link connecting said lever to said lock, the parts being so arranged that during the unlocking operation, as the leverage of the knuckle opener decreases, the mechanical advantage of the lock lever and link increases.

A further object of my invention is to provide an automatic coupler with a vertically movable lock operated by a lock lever and lock link from a rocker shaft, said lock being positively moved to lock-set position by the lock link which acts as an inclined strut urging said lock rearwardly and at the same time preventing the same from working out of the face of the coupler head.

A still further object of my invention is to provide an automatic coupler in which the parts thereof are pivoted, whereby ease of operation is secured, said coupler being operated by a transversely extending rod with a relatively short depending arm, said rod upon rotation thereof serving to unlock the coupler and upon longitudinal movement thereof, serving to aline the coupler for coupling with the coupler of an adjacent car.

An additional object of my invention is to provide an automatic coupler with a rocker

shaft, lock lever and lock link for operating the vertically movable lock thereof, the bottom of the coupler head being provided with a limiting stop ledge for the lock lever and lock, said lock lever being likewise provided with a stop ledge for the bottom of the lock and more particularly the depending legs on said lock, said lock link being pivoted between said legs and serving not only to raise the lock but to positively force the same into lock-set position.

A further object of my invention is to provide an automatic coupler with a knuckle opener mounted on a longitudinally extending pivot and formed with an elongated hub from the forward portion of which extends an arm engaging the tail of the knuckle and from the rearward portion of which extends another arm engaged by the lock for effecting operation of said opener, the tail of said knuckle and the face of the lock engaged thereby being correspondingly inclined for preventing creeping of the lock.

Other objects and advantages of the invention relating to the particular arrangement and construction of the various parts will become apparent as the description proceeds.

Referring to the drawings illustrating my invention, the scope whereof is defined by the appended claims:

Figure 1 is a plan view of a coupler embodying my invention, a portion thereof being shown in horizontal section, the parts of the coupler being shown in locked position.

Figure 2 is a vertical sectional view on the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a transverse sectional view on the line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a fragmentary view, corresponding to Figure 3, but showing the parts of the coupler in lock-set position.

Figure 5 is a fragmentary view corresponding to Figure 2, but showing the parts of the coupler in lock-set position.

Figures 6 and 7 are fragmentary views corresponding, respectively, to Figures 4 and 5.

5, but showing the parts of the coupler in full open position of the knuckle.

Figures 8 and 9 are fragmentary views corresponding, respectively, to Figures 4 and 5, but showing the parts of the coupler in position to couple, with the lock-set off and the knuckle open.

Referring to the drawings in detail, like parts being designated by like reference characters, there is shown a coupler 1, which is particularly adapted for service on foreign railways where the curves are sharp and where it is desirable that the employee effecting the coupling and uncoupling operations should not go between the cars. For that purpose the coupler is provided with an operating rod 2 provided with a handle 3 at its outer end, preferably normally inclined in the direction of unlocking to minimize swinging thereof and thereby avoid unintentional unlocking of the coupler. Said rod is preferably formed with a hook 4 at its inner end for engagement in an eye 5 of a rocker shaft 6, which preferably extends transversely of the coupler and in turn effects the operation of the coupler upon rotating or turning of said shaft. The operation of the coupler is not affected by longitudinal movement of the operating rod or rocker shaft, so that such longitudinal movement may be employed for alining the coupler with an adjacent coupler to which it is desired to couple it, the inner end of the coupler stem (not shown) being for that purpose, desirably adapted for angling or pivotal movement with respect to the car under-frame.

The coupler 1 comprises a head 7 formed with a bottom opening compartment or pocket 8 receiving a vertically movable bottom-operated lock 9. Said head is provided with a knuckle 10 swingingly mounted with respect thereto by means of a pin 11 passing through a vertical aperture 12 in the knuckle 10 and correspondingly registering apertures 13 in the upper pivot lug or ear 14 and lower pivot lug or ear 15. The pin 11 is, in the present embodiment, formed with a head 16 and prevented from loss or undesired removal by means of a cotter 17 extending through the lower end thereof below the ear 15. The knuckle 10 is, as usual, provided with a tail 18 received, when in locked position, in a pocket 19 in the head 7.

The locking mechanism for the knuckle 10 in the present embodiment comprises the locking block 9 which is guided for up and down movement in said head by guide portions 20 which slope downwardly and slightly rearwardly to permit said lock to move to lock-set position, as indicated particularly in Figure 5. The lock 9 is desirably formed with a pair of depending legs 21 which, when in lowermost position as indicated in Figure 2, rest on a ledge 22 provided on the lock

lever 23 rigidly mounted on, and normally extending longitudinally of the coupler from, the operating rocker shaft 6. The lock or lock block 9 is raised to lock-set or full open position as indicated, respectively, in Figures 5 and 7 by means of a link 24, pivoted at its lower end to the free end of the lock lever 23, as indicated at 25, and preferably likewise pivoted at its upper end to the block or lock 9 between the depending legs 21 by pivotal means indicated at 26. When in full open position, the pivotal means 25 is disposed rearwardly of the transverse vertical plane of the means 26.

For effecting the opening of the knuckle 10 a knuckle opener 27 is provided, said opener taking the form of a bell crank and provided with a longitudinally elongated hub portion 28 mounted on a longitudinally extending pivot 29. The forward end of said hub portion 28 is provided with an angular arm or kicker 30, the lower depending portion of which normally engages the lower portion of the tail 18 of the knuckle 10 for effecting the opening operation thereof. During the opening movement of the knuckle, the mechanical advantage of the opener 27 decreases on account of the point of engagement of the kicker with the knuckle tail departing further from the plane of the pivotal axis of the opener, as will be clear from a comparison of Figs. 4 and 6. The rear portion of the hub 28 is formed with a transversely extending arm 31 which fits in a depression 32 in the top of the locking block 9 and is engaged by said locking block upon upward movement thereof for effecting the opening of the knuckle, as indicated particularly in Figures 4 and 6.

The operation of the embodiment of my invention illustrated is as follows: Figures 1, 2 and 3 show the lock and associated parts of a coupler in closed or locked position. Upon rotating the rocker shaft clockwise, as viewed in Figure 2, by raising the operating rod arm 3, the lock lever raises the lock link and connected lock or block to the position shown in Figures 4 and 5, where, because of the longitudinal component of the force transmitted by the link 24, and the fact that the pivotal means 25 is disposed rearwardly of the center of gravity of the lock 9, so that the lock tends to rotate by gravity, counterclockwise as viewed in Fig. 2, the lock is positively moved to the lock-set position shown. Upon further clockwise rotation of the rocker shaft, the lock may be moved to the position shown in Figures 6 and 7, when the knuckle is opened for coupling with another coupler, the arm 30 of the knuckle opener having moved the tail of the knuckle outwardly to open or unlocked position. The operating rod may then be released to allow the lock or block 9 to drop to the lock-set position shown in Figures 4 and 5, where

the depending legs 21 of the lock engage the lock-set ledge 33 to hold the lock in position for coupling. Upon engagement of the knuckle 10 with another coupler during the 5 coupling operation, said knuckle is swung inwardly to locked position and the tail 18 thereof passes under the lock 9, as indicated particularly in Figures 8 and 9, raising the forward portion 34 of said lock and without 10 drawing said lock from lock-set position, as indicated particularly in Figure 9. After the lock has been withdrawn from lock-set position and the tail 18 of the knuckle has passed to the locked position indicated in 15 Figures 1, 2 and 3, the lock 9 automatically drops to locked position, indicated particularly in Figure 2, where the legs 21 thereof engage ledge 22 and the free end of the lock lever and the corresponding end of the lock 20 link rest on the ledge 35 provided on the bottom of the coupler head.

From the foregoing disclosure it will be apparent that I have devised a coupler especially adapted for foreign passenger service although, as is obvious, it is not limited to such service. The lock is bottom-operated by rotation of a transversely extending rod and connected rocker shaft, whereby said coupler is not only operated but may be positioned in the desired angular relation for coupling with another car. The upper portion of the head 7 is desirably, though not necessarily, closed, as indicated at 36 to prevent the entrance of water or other undesired 30 foreign matter. The lock lever 23 is connected to the rocker shaft for turning therewith in any desired manner, as by having a non-circular aperture 37 therein fitting a correspondingly formed non-circular portion 38 40 of said rocker shaft. Said shaft 6 is desirably retained in place by the eye portion 5 serving as a head on one end and a nut or washer portion 39 securely connected to the other end, as by means of a rivet 40. 45 The operation of the coupler is greatly facilitated by pivotally connecting all of the parts of the mechanism and by having the bell crank knuckle opener and the lock lever and lock link so proportioned that when the 50 leverage of the actuated portion 31, and the mechanical advantage, of the knuckle opener decreases, so that ordinarily the force transmitted to the kicker portion would be relatively small, such force is increased by the 55 increase in mechanical advantage of the toggle formed by the lock lever and lock link coming into approximate alignment, so that the resultant force transmitted from the kicker to the tail of the knuckle is maintained 60 approximately constant upon the application of a constant operating force to the operating rod 2. It will be appreciated that the movement of the lock to lock-set position is, as contra-distinguished from some previous 65 forms of couplers, positive in its action due

to the angularity or inclination of the lock link, which inclination also functions to keep the lock rearward and prevent it from working out of the face of the coupler. In order to prevent creeping of the lock the engaging faces 41 on the knuckle tail 18 and 42 on the lock are desirably inclined upwardly and away from said tail so that there is no tendency for the lock to work out of locked position.

Having now described my invention, what I claim is:—

1. In combination, a coupler head, a swinging knuckle, a locking block, and means for operating said block and alining the coupler head comprising a rocker shaft disposed rearwardly of said block, an arm connected to said shaft and serving to directly support said block when in locked position, and a link pivoted to said arm and block and forming a toggle with said arm adapted to straighten into substantial alignment for raising said block.

2. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle comprising a block guided by walls of the head, a lock set ledge on said head adapted to be engaged by said block to hold it in lock-set position, operating means for said block comprising a rocker shaft, a lever on said shaft, and a link connecting said lever and block, the connection between the link and block being such that the block tends to swing by gravity thereabout to lock-set position, said link acting diagonally upward and longitudinally of the head to provide a force-component to move said block longitudinally to lock-set position when the rocker shaft is operated to raise said block.

3. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle comprising a block movable up and down and guided in the head, operating means for said block comprising a rocker shaft, a lock lever on said shaft, and a link connecting said lever and block, the head being formed with a portion normally engaged by the link when in its lowermost position so that said link then limits downward movement of said block in the head.

4. In combination, a coupler head with a stop ledge, a swinging knuckle, a lock for said knuckle, operating means for said lock comprising a rotating shaft, a lever rigidly mounted on said shaft with the free end engaging said stop ledge when the lock is in the lowermost position, and a link pivotally connected to the free end of said lever and said lock and extending upwardly and rearwardly to said lock to keep said lock in proper position.

5. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle comprising a block adapted to engage the tail of the knuckle and hold said knuckle in

locked position, the engaging faces of said tail and block being inclined upwardly and away from said tail to avoid creeping of said block, operating means for said block comprising a rocker shaft, a lock lever on said shaft, and a link pivotally connected to said block and the free end of said lever.

6. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle comprising a block, operating means for said block comprising a rocker shaft, a lock lever on said shaft, a limiting stop ledge for said lock lever on the bottom of said head, and a link connecting said lever and block.

7. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle comprising a block with depending legs and guided by walls of the head, a lock-set ledge on said head adapted to be engaged by the legs of said block to hold it in lock-set position, operating means for said block comprising a rocker shaft, a lock lever on said shaft directly engaged by said legs for supporting the block in locked position, and a link connecting said lever and block, said link being pivoted between said legs, in such a position that the block tends to rotate by gravity thereabout to lock-set position, and acting diagonally upward and longitudinally of the head to provide a force-component to move said block longitudinally to lock-set position when the rocker shaft is operated to raise said block.

8. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle comprising a block formed with depending legs, operating means for said block comprising a rocker shaft, a lock lever on said shaft, a limiting stop ledge for said lock lever on the bottom of said head, a stop ledge on said lever for the locking block legs, and a link connecting said lever and block.

9. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle guided by engagement with the head and formed with depending legs, a lock-set ledge adapted to be engaged by said legs to hold the device in lock-set position, operating means for said device comprising a transversely extending shaft, a lever on said shaft extending longitudinally to a position forwardly of said legs, and a link pivoted between said legs, at such a location that the legs of the device tend to swing by gravity to lock-set position, and connected to said lever at a point forwardly of the link connection with said legs to provide a rearward component of the link lifting force for urging the legs longitudinally of the head to lock-set position when the operating means are actuated to raise the locking device.

10. In combination, a coupler head, a swinging knuckle, a lock for said knuckle, and operating means for said lock comprising a pivoted shaft, a lock lever mounted on

said shaft, and a link connecting said lever to said lock for the operation of the latter, the free end of said lever being normally supported on a portion of the head when the lock is in lowermost position.

11. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle, operating means for said device comprising a shaft and a lever with an end mounted on said shaft, and a link connecting said lever and locking device, said head being formed with a portion normally supporting the lower end of said link when in its lowermost position.

12. In combination, a coupler head, a locking block guided by portions of said head for vertical movement, a lock-set ledge adapted to be engaged by said block when in lock-set position, operating means for said block comprising a rocker shaft, a lever actuated by said shaft, and a link connecting said lever and block, the connection between said link and block being rearwardly of the center of gravity of the latter so that said block tends to swing thereabout to lock-set position, said link acting diagonally upward and rearwardly of the head to provide a force component for moving said block longitudinally to lock-set position when the shaft is operated to raise said block from locked position.

13. In combination, a coupler head, a swinging knuckle, a locking block for said knuckle, knuckle opening means between said knuckle and block, and operated by the latter, comprising means operated at a decreasing mechanical advantage as the knuckle swings to open position, and operating means for said block comprising a rotatable shaft, a lever mounted on said shaft to rotate therewith and with its free end normally engaging a portion of the head to limit downward movement thereof, and a link pivotally connected to the free end of said lever and said block and normally extending upwardly and rearwardly to said block to keep it in proper position, said engaging portion of the head maintaining said lever in a position to give an increasing mechanical advantage as the lock is raised and the knuckle opening mechanism operated.

14. In combination, a coupler head, a swinging knuckle, a lock for said knuckle, means operated by said lock for opening said knuckle comprising a pivoted arm acting on the tail of the knuckle with the point of its engagement departing further below the plane of the pivotal axis of the arm as the knuckle opens, whereby said means operates at a decreasing mechanical advantage as the knuckle swings to open position, operating means for said lock comprising a shaft, a lock lever on said shaft, means for normally holding said lever in substantially horizontal position while allowing upward swinging there-

of for raising said lock, and a link connecting said lever and lock and arranged with respect thereto so that the mechanical advantage of the lock lifting mechanism increases as the lock is being raised and the knuckle opened.

In testimony whereof I affix my signature.

WILLARD FILLMORE RICHARDS.

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