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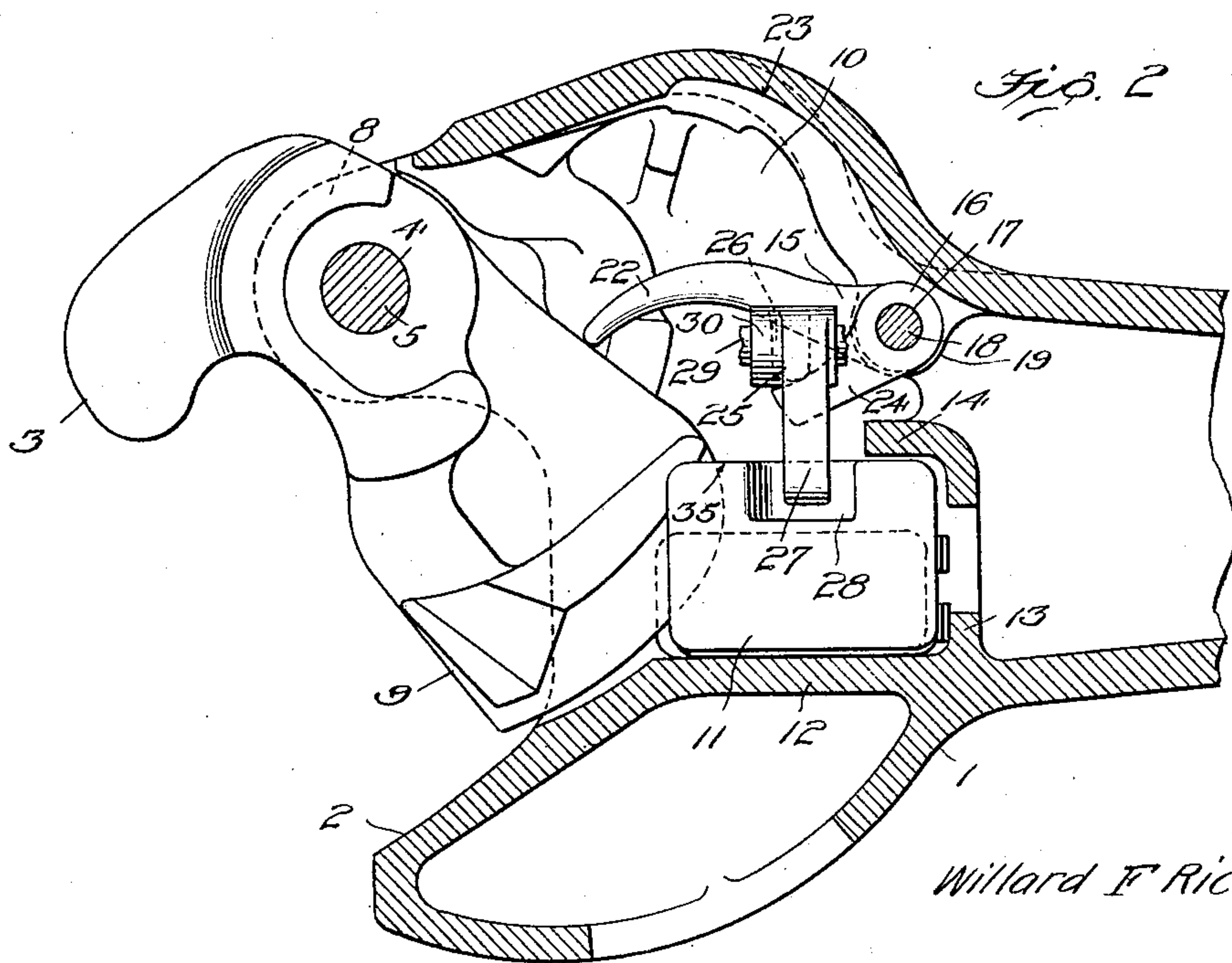
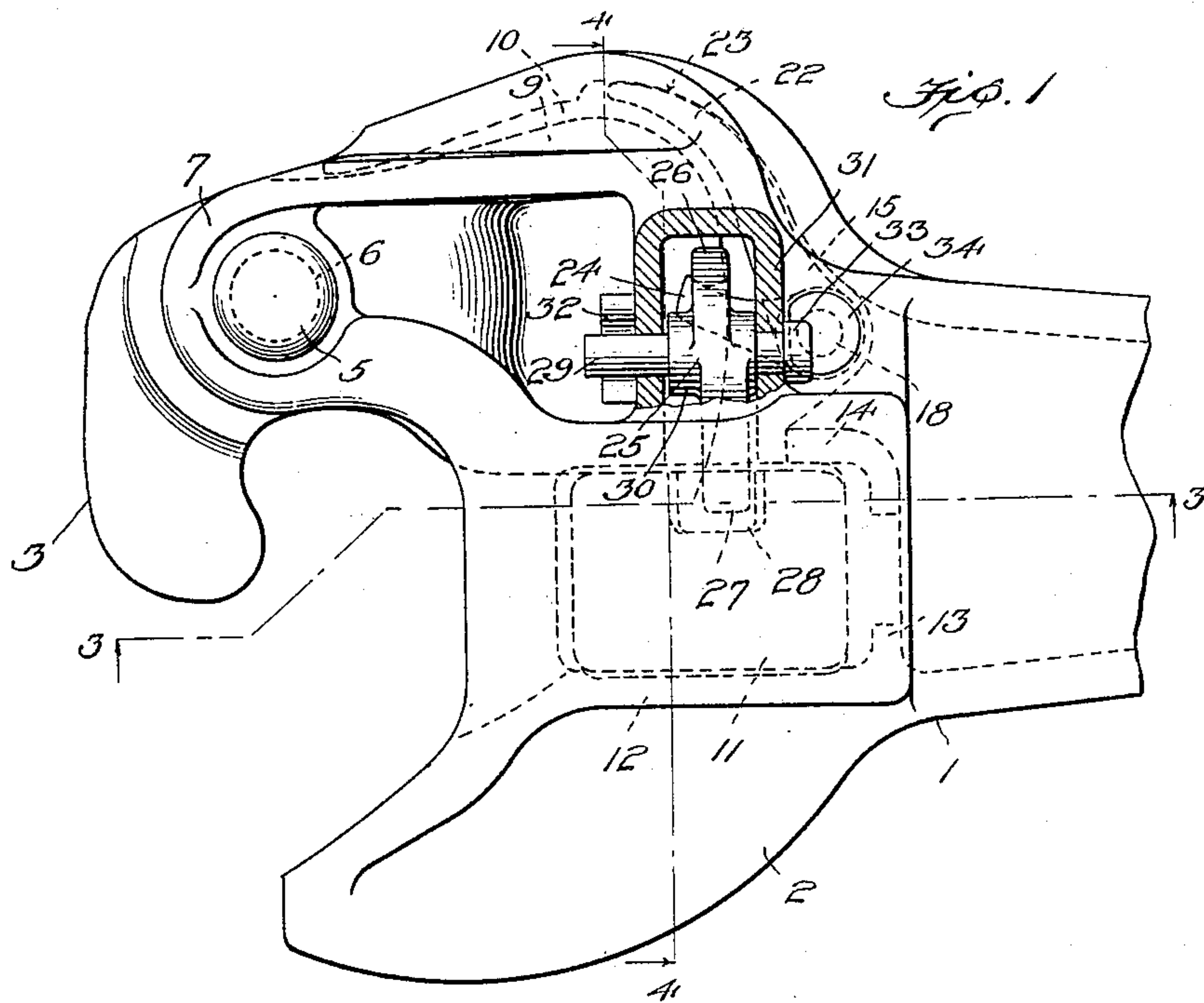
W. F. RICHARDS

1,897,279

COUPLER

Filed Aug. 23, 1929

2 Sheets-Sheet 1



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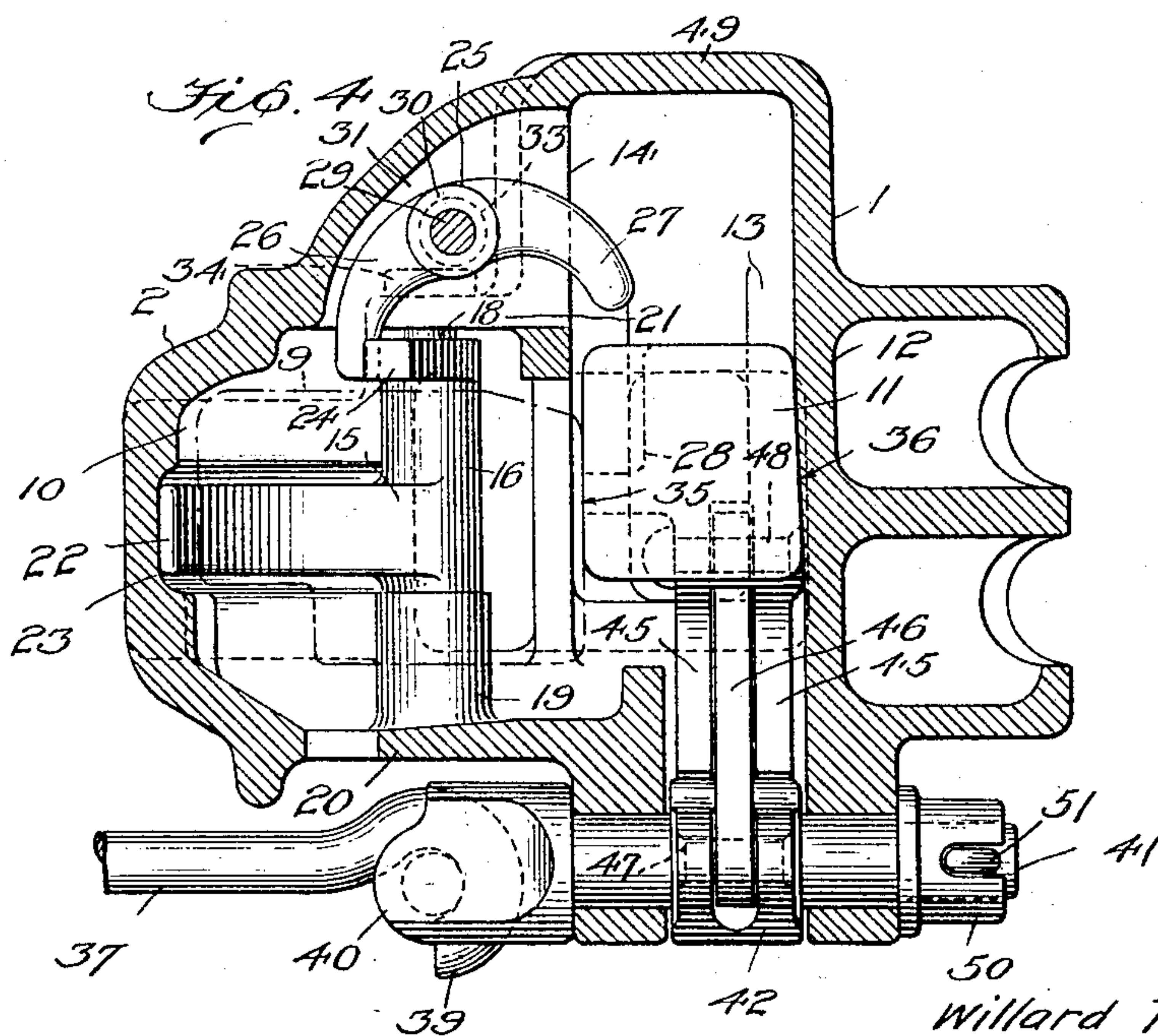
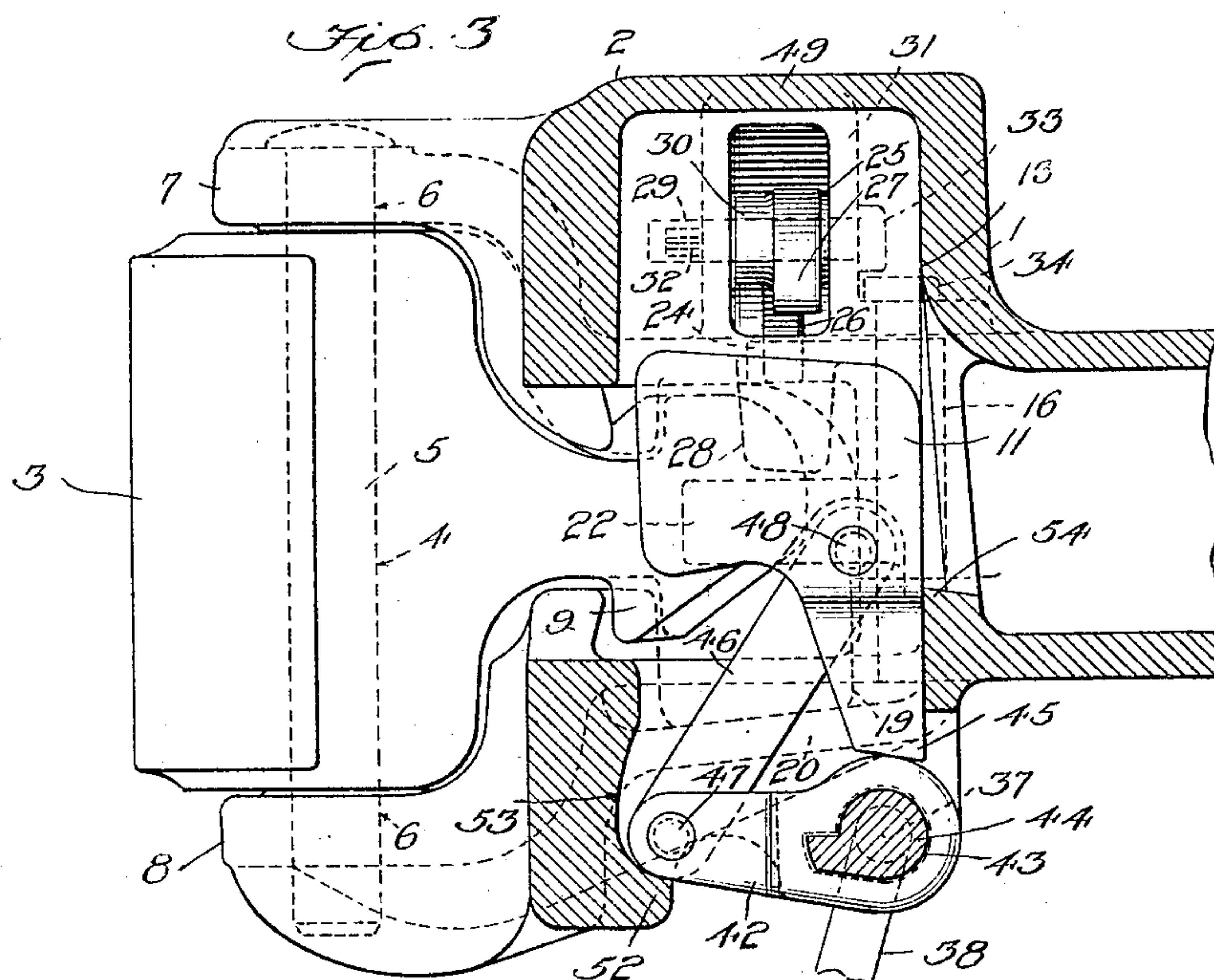
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## UNITED STATES PATENT OFFICE

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## COUPLER

Application filed August 23, 1929. Serial No. 387,878.

This invention relates to couplers and more particularly to an improved car coupler adapted to interchange with the standard "D" coupler.

The principal object of my invention, generally considered, is the provision of a coupler for railway rolling stock provided with improved locking and knuckle opening mechanism.

An object of my invention is to provide a car coupler with a knuckle opener which is vertically pivoted and operated from the locking mechanism through a pivoted bell crank lever.

Another object of my invention is to provide a car coupler having parts which are simple in contour and adapted to be readily constructed and placed in position in the associated head.

A further object of my invention is the provision of a coupler with improved locking mechanism involving a unitary locking block guided between walls of the head and formed with depending legs adapted to seat on a ledge on the head to cause said block to assume a lock-set position.

A still further object of my invention is to provide a coupler of the bottom operated type in which all parts of the mechanism work on pivots to facilitate operation thereof, the operating rod being provided with a depending arm which serves the double purpose of operating the locking mechanism and aligning the coupler head for effecting the operation of coupling.

An additional object of my invention is to provide an automatic coupler in which the lock is of the vertically movable type and engages one of a pair of cooperating bell crank levers forming knuckle opening mechanism upon upward movement thereof, said lock being operated by a rocker shaft with a lever thereon and a link connecting said lever and lock, the parts being so arranged that during the unlocking operation the

mechanical advantage of the lock operating mechanism increases as that of the knuckle opening mechanism decreases, so that a substantially constant knuckle opening force is provided for.

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 of one embodiment of my improved form of coupler shown partly in horizontal section with the knuckle in closed or locked position.

Figure 2 is a horizontal sectional view of the coupler showing the knuckle in plan and in opened or unlocked position.

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

Figure 4 is a transverse sectional view on the line 4—4 of Figure 1 looking in the direction of the arrows, with the knuckle illustrated diagrammatically.

Referring to the drawings in detail, like parts being designated by like reference characters, I have shown a coupler 1 particularly adapted for railway cars and comprising a head 2 and a knuckle 3, said knuckle in the present embodiment being such as is used in a standard "D" coupler. The knuckle 3 is formed with a normally vertical aperture 4 receiving a pivot pin or pintle 5 which may be of standard or desired construction extending through registering apertures 6 in hinging ears 7 and 8 of the head. The knuckle is provided with a tail 9 received in a pocket 10 in the coupler head 2.

The locking mechanism for the knuckle 3 in the present embodiment comprises a lock, locking device or block 11 which is movable vertically in the head and guided between walls 12, 13 and 14 of said head which re-

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strain rearward and sideward movement thereof. Forward movement of said block is restrained by the raising or operating mechanism to be hereinafter described.

- 5 For opening the knuckle 3 I have provided a knuckle opener 15 which in the present embodiment comprises a bell crank lever with a hub portion 16 formed with a normally vertical opening 17 therethrough receiving a  
10 pivot pin or pintle 18 extending between a corresponding apertured hub 19 rising from the bottom of the wall 20 of the head and a flange or web 21 overlying the top of the hub portion 16. From the lower portion of the hub  
15 16 a knuckle opening arm, lever, or kicker 22 extends and is received when in inactive position in a corresponding groove 23 in the adjacent wall of the head 2. It will be appreciated that as the opener 15 is vertically pivoted and has its axis substantially parallel  
20 with that of the knuckle, it is in a position to more effectively open the same by engaging the adjacent portion of the knuckle tail 9 with its curved arm or lever 22.
- 25 On account of the arm 22 being curved to correspond with the knuckle side of the head and the engaged portion of the tail of the knuckle, the mechanical advantage of the arrangement for opening the knuckle is a maximum initially and decreases slightly as the  
30 knuckle is opened on account of the point of engagement with the arm 22 advancing from the pivotal axis of the hub 16 toward the pivotal axis of the knuckle 3, as will be understood from a comparison of Figures 1 and 2. Some frictional or sliding movement is avoided on account of the arm 22 operating in the  
35 plane of movement of the knuckle tail rather than at an angle thereto. This construction makes it relatively easy to open the knuckle and is complementary as compared with the lock raising or unlocking mechanism, whereby the force required to operate the coupler may be substantially uniform.
- 40 For imparting motion to the knuckle opener 15 and the kicker portion 22 thereof, the hub 16 is formed preferably adjacent its upper part with an actuating arm or extension 24, said arm preferably extending horizontally but being angularly disposed with respect to the kicker arm 22 in plan. In order to transmit motion between the locking block 11 and the opener 15 and more particularly the arm 24 thereof, a bell crank lever or pivoted member 25 is provided, said member  
50 having angularly disposed arms 26 and 27, the former of which engages the arm 24 of the knuckle opener, and the latter of which is operated from the locking mechanism, preferably the locking block 11. In the present embodiment the arm 27 fits into a recess 28 in the locking block 11 for actuation by said block upon the same being raised. The bell crank lever 25 is preferably pivotally  
60 mounted in the head 2 by having a substantial-

ly horizontal pivot pin 29 extending through a central or hub portion 30 thereof and through corresponding registering apertures in the transversely extending walls 31 of the head disposed forwardly and rearwardly of the bell crank lever 25. Said pin 29 may be retained in position in any desired manner as by means of a cotter 32 passing through an aperture adjacent the end of the pin 29 and with its bifurcated end expanded in place to prevent loss thereof. No cotter or other independent securing means is necessary for the pivot pin 18, because the head 33 of the pin 29 overlies the head 34 of said pin 18 and prevents undesired removal or loss thereof.

Upon referring particularly to Figure 4, it will be seen that the tail 9 of the knuckle, indicated only diagrammatically by dot and dash lines, which is held in locked position by the locking block 11, presents a substantially vertical or upright face 35 thereto. In order to prevent creeping of the lock 11, the same is preferably formed wider at the lower portion thereof and the wall of the lock cavity at the guard arm side of the head is correspondingly inclined as indicated at 36.

In order to provide for raising the lock block 11 to permit uncoupling, an operating rod 37 is provided having a handle 38 preferably normally inclined in the direction of unlocking to minimize swinging thereof and thereby avoiding unintentional unlocking of the coupler. Said rod 37 is preferably formed with a hook 39 at its inner end for engagement with an eye 40 of a rocker shaft 41, which 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 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 operating mechanism for the locking block 11 which is guided for up and down movement in the head, comprises a lever or arm 42 rigidly mounted on the operating rocker shaft 41 as by having a non-circular aperture 43 fitting on a corresponding portion 44 of the shaft. The locking block 11 is desirably formed with a pair of depending legs 45 which, when in lowermost position as indicated in Figure 3, rest upon the hub of the arm 42 preferably directly over the axis of the shaft 41. The lock or lock block 11 is raised to lock-set or full opened position, as desired, by means of a link 46 pivoted at its lower end to the free end of the arm 42 as indicated at 47 and preferably likewise pivoted at its upper end to the lock or block 11 be-



tween the depending legs 45 thereof by pivotal means indicated at 48.

The upper portion of the head 2 is desirably, though not necessarily, closed, as indicated at 49, to prevent the entrance of water or other foreign matter. The shaft 41 is desirably retained in place by the eye portion 40 serving as a head on one end and a nut or washer portion 50 securely connected to the end as by means of a cotter or the like 51. The head 2 is formed with a ledge 52 serving as a stop or rest for the link 46 and the free end of the arm 42, thereby securely holding the lock block 11 in proper locked position, as indicated in Figure 3, with the arm 42 substantially horizontal. Immediately above the ledge 52 is a pocket 53 receiving the free end of the arm 42 and the lower end of the link 46 with sufficient clearance to permit the required movement of said members.

The operation of the aforedescribed embodiment of my invention is as follows. Upon rotating the rocker shaft 41 clockwise as viewed in Figure 3 as by raising the operating rod arm 38, the lock lever or arm 42 raises the lock link 46 and connecting lock block 11 until the knuckle is opened for coupling with another coupler, the top portion of the lock block having engaged the arm 27 of the bell crank lever 25 to cause the arm 26 thereof to move the kicker 22 through engagement between the arms 26 and 24 to swing the knuckle from the position illustrated in Figure 1 to that illustrated in Figure 2. Upon releasing the operating rod, the lock or block 11 is allowed to drop to lock-set position (not illustrated) where the depending legs 45 engage the lock-set ledge 54 to hold the lock in position for coupling. Upon engagement of the knuckle 3 with another coupler during the coupling operation, said knuckle is swung inwardly to locked position and the tail 9 thereof passes under the lock 11 and withdraws said lock from lock-set position. After this has been effected, the lock automatically drops to locked position, as shown in Figure 3, where the legs 45 engage the hub of the arm 42, and the free end of said arm and its connected link 46 rests on the ledge 52 provided as a limit stop.

From the foregoing disclosure, it will be apparent that I have devised an improved coupler in which the knuckle opening mechanism and the lock raising mechanism are so constructed that the mechanical advantage of one varies in a different way from that of the other, so that the force available for opening the knuckle is maintained substantially uniform. On account of having the operating parts pivoted with the avoidance of sliding friction, the coupler is operated without the necessity for any great exertion on the part of the operator.

Although I have described a preferred embodiment of my invention, it is to be under-

stood that the same is merely illustrative and that modifications may be made within the spirit and scope of the appended claims without departing from my invention.

This application is a continuation in part of my copending applications Serial Nos. 279,017, filed May 19, 1928, and 349,131, filed March 22, 1929. As in said applications, the arm 42 and link 46 form a toggle, for raising the lock 11, the mechanical advantage of which increases as the lock is raised.

Having now described my invention, I claim:

1. In combination, a coupler head, a swinging knuckle, a locking device for said knuckle comprising a block formed with a depending portion, operating means for said block comprising a shaft, an arm thereon, and a link connecting said arm and block, said shaft being disposed with its axis directly beneath said depending portion, and said arm being formed with a hub on said shaft serving to directly support said depending portion above the axis of said shaft when the block is in its lowermost position.

2. In combination, a coupler head, a swinging knuckle, a lock for said knuckle, operating means for said lock comprising a shaft, an arm with a hub on said shaft, and a link connecting said arm and lock, said hub serving to support said lock, when in its lowermost position, with the point of engagement therebetween directly above the axis of said shaft.

3. 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, a portion of said block normally supported on said lever in vertical alignment with its axis of rotation, 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.

4. In combination, a coupler head, a swinging knuckle, a lock for said knuckle, means operated by said lock for opening said knuckle comprising an arm acting on the tail of the knuckle with the point of its engagement therewith advancing in a normally horizontal plane toward the pivotal axis of the knuckle as the latter 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  
5 substantially horizontal position while allowing upward swinging thereof 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  
10 lifting mechanism increases as the lock is being raised and the knuckle opened.

In testimony whereof I affix my signature.

WILLARD F. RICHARDS.

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