COUPLER OPERATING MECHANISM

William J. Metzger, East Cleveland, Ohio, assignor to National Cassiggs Company, a corporation of Ohio

Filed May 16, 1957, Ser. No. 659,610

3 Claims. (Cl. 213—167)

This invention relates to railway car coupler operating mechanisms and, especially to a rotor shaft member which embodies means for preventing operation of the unlocking mechanism of the coupler in the event the coupler is accidentally pulled out of the end of its associated car.

The invention is particularly directed to structure for improving the operating characteristics of a rotor shaft member of the aforementioned type to provide a smoother and easier operating coupler mechanism.

This invention provides an improvement in the rotor shaft member disclosed in co-pending application of Edward Kozak, Serial No. 588,552, filed May 31, 1956, now Patent No. 2,949,195 dated Aug. 16, 1960.

Some of the present designs of railway couplers embody support means, such as an auxiliary support shelf disposed on the underside of the coupler head and/or interlocking wing and pocket structure having the function of supporting a mated coupler against dragging onto the track in the event one of the couplers is accidentally pulled out from the end of its car. However, it has been found, particularly with the A.A.R. Type F alternate standard interlocking coupler that in the event of a "pull-out," as the coupler is in the process of moving away from the car, the unlocking mechanism of the coupler is actuated by the operating rod of the pulled out coupler, which rod moves concentrically attached at one end to the rotor shaft of the coupler and at the other end to the usual bracket on the car structure. This actuation of the unlocking mechanism is due to the eccentric force exerted on the rotor shaft of the coupler by the operating rod which causes the shaft to rotate and thereby unlocks the coupler. Un locking of the pulled-out coupler invariably causes separation of the mated couplers, with the result that the pulled-out coupler drops to the track bed since, as is well understood by those skilled in the art, unless the coupler knuckles remain in locked position, neither the support means nor the interlocking wing means on the non-pulled out coupler is effective to support the pulled out coupler whose knuckle has been unlocked.

The aforementioned application, Serial No. 588,552, discloses and claims a rotor shaft member for a car coupler which is adapted to cause facile separation of the existing operating rod from its usual connection with the rotor shaft and thereby prevents actuation of the unlocking mechanism of the coupler in the event of accidental coupler pull-out.

The present invention is directed toward a rotor shaft member of the aforementioned type which embodies novel structure for improving the operating characteristics of the coupler, and in particular the operating characteristics of the rotor shaft member.

Accordingly, the primary object of the invention is to provide a rotor shaft member of the type that prevents actuation of the unlocking mechanism of the coupler in the event of accidental pull-out thereof, and which embodies means for improving the operating characteristics of the coupler.

Another object of the invention is to provide a car coupler having a rotor shaft member which, in the event of a coupler pull-out, provides for separation of the operating rod of the coupler from the rotor of the rod, without actuation of the unlocking mechanism of the coupler and without damage or distortion of the coupler or associated parts, and which embodies means associated with the rotor shaft for providing a smooth and easy operating coupler actuating mechanism.

A more specific object of the invention is to provide a rotor shaft member for a car coupler which comprises a head portion having an open section therein adapted to permit passage there through of the hook end of the operating rod of the coupler in the event of a coupler pull-out to thereby cause facile separation of the rod from the rotor shaft and preclude operation of the unlocking mechanism of the coupler and which comprises a rounded contour on the inner surface of the forward wall thereof for rolling engagement with the hook end of the rod to improve the operating characteristics of the rotor shaft during actuation of the operating mechanism of the coupler.

Other features and advantages of the invention will be apparent from the following description taken in conjunction with the drawings, wherein:

FIG. 1 is a top plan view of the operating mechanism of the coupler in reposed position, the coupler being shown in phantom lines.

FIG. 2 is an enlarged top plan view of the novel rotor shaft member with an uncoupling rod (shown in phantom lines) connected thereto and being in reposed position.

FIG. 3 is an enlarged elevational view of the FIG. 2 arrangement.

FIG. 4 is an enlarged, fragmentary sectional plan view of the head of the rotor shaft and the coupler operating rod in the position of the parts upon initial rotation of the operating rod to take up clearance between the rod and the head, with the top portion of the J-hook of the rod engaging the rear wall of the head of the rotor member and the bottom portion of the rod in engagement with the rounded contour of the inner surface of the front wall of the shaft member.

FIG. 5 is a vertical sectional view taken along line 5—5 of FIG. 3 but showing the uncoupling rod initially rotated as in FIG. 4 to take up clearance.

FIG. 6 is an enlarged fragmentary, sectional rear elevational view illustrating the engagement between the J-hook portion of the operating rod and the front and rear walls of the rotor shaft after the latter has been rotated approximately 90 degrees to substantially the full extent of its movement during actuation of the operating mechanism.

FIG. 7 is a vertical sectional view taken along line 7—7 of FIG. 6.

Referring to the drawings, the coupler operating mechanism is shown applied to a coupler 2 (indicated by dot-dash lines) and the end of a car body 4. The coupler is mounted on the car by means of the usual support structure 6 (also shown in dot-dash lines) and in the embodiment shown in an A.A.R. alternate standard type F interlocking coupler. It will be understood, of course, that while the invention has been shown associated with a particular type of coupler, it may be used with any coupler that utilizes an operating or uncoupling rod which at one end is connected to the unlocking mechanism of the coupler, and on the other end is attached to the car structure.

In the embodiment shown, the operating rod 5 is a conventional A.A.R. standard operating rod for the aforementioned type F coupler and near its outer end is supported in the U-shaped bearing portion 7 of the usual bracket 10, secured to car body structure 4. U-shaped portion 7 permits transverse movement of the rod with respect to the car in response to horizontal angling movement of the outer end of the rod terminates in depending handle portion 12 for actuation thereof. The J-shaped inner end portion 14 of the operating rod comprises the usual bottom portion 14a.
and a generally curved upper portion 14b. As FIGS. 1, 2, 5, and 7 clearly show, the rod portions 14a and 14b together provide a width of the J-shaped end portion greater than the distance between the forward and rearward walls 28 and 29 of the head portion 20 of the rotor 16. This relationship results in positive coupling of the rod with the rotor and enables rotation of the rotor 20 by the rod 5 when the latter is rotated. Thus, the inner end 16 of the rod is connected in loosely coupled relationship to a rotor member 16 which is mounted on the under side of the coupling head for rotation about a horizontal axis Y — Y extending transversely of the longitudinal direction of the coupler and defining generally the lengthwise direction of the rod 14, as is well known to those skilled in the art. Rotor 16 is connected to the usual coupler unlocking mechanism (not shown) which lifts the lock of the coupler out of locking position relative to the knuckle upon actuation of rod 5 by means of handle 12.

Rotor shaft member 16 comprises the conventional shank portion 18 and a head portion 20, to which the J-hook 14 of the uncoupling rod is connected. Shank portion 18 comprises cylindrical bearing sections 18a and 18b which are adapted to be received in the complementary bearings portions on the underside of the coupler head. Located between bearing portions 18a and 18b is the key portion 19 which is adapted to be received in the conventional rotor lever (not shown) of the coupler unlocking mechanism to operatively connect the rotor shaft 16 to the rotor lever.

In the embodiment shown, the coupler unlocking mechanism comprises the aforementioned rotor lever and the usual toggle or lifter link (not shown) which is connected to the lock of the coupler. Upon actuation of the operating rod 5, the rotor shaft 16 is caused to rotate, thereby operating the unlocking mechanism to cause the lock to move to unlocking position.

Head portion 20 of rotor member 16 comprises top and bottom walls 22 and 23, front and rear walls 24 and 26, and outer and inner end walls 28 and 29, defining a cavity 30 for receiving in connecting relationship the J-hook 14 of operating rod 5. It will be seen that hook portion 14 of the rod is received between the opposed walls 24 and 26 and overlaps end wall 28 of the rotor shaft 16, so that the rod is positively connected to the rotor shaft for all operating positions thereof. As shown in FIG. 5, the J-hook portion is wider in a vertical direction than the spacing of the walls 24 and 26 in a horizontal direction, adapting the hook 14, upon actuation of rod 5 by pulling upwardly on handle 12, to engage the inner sides of front and rear walls 24 and 26 of the rotor shaft to cause rotation of the latter in a counterclockwise direction, as viewed in FIG. 5, and thereby operate the unlocking mechanism of the coupler.

As may best be seen in FIG. 5, front wall 24 comprises a generally vertical upper portion 24a, a generally rearward and downwardly sloping central portion 24b and a generally vertical lower portion 24c, offset rearwardly of upper portion 24a. Sufficient clearance provided between the operating rod 5 and upper portion 24a of front wall 24 to ensure that no binding will occur between the outer edge 24d of portion 24a and the rod upon insertion of the latter to operate the coupler and during lateral angling of the coupler in service.

In accordance with the invention, portion 24c of wall 24 comprises a rearwardly facing inner abutting surface 32 of which its central portion is a generally rounded or convex ridge 33 extending, in its lengthwise direction, in a transverse relation with the axis of rotation Y — Y, and protruding convexly toward the opposite wall 26.

The ridge 33 is adapted to be engaged by hook portion 14 of the operating rod, as aforesaid, upon actuation of the rod by means of handle 12. As can be best seen from FIGS. 2, 4 and 6, the ridge 33, in a transverse direction, is disposed generally centrally between outer and inner end walls 28 and 29. The lateral portions 34 of surface 32 diverge forwardly from the ridge 33 and are generally tangential to the latter. Adjacent their outer ends, portions 34 merge with end walls 28 and 29. Adjacent its upper portion, surface 32 slopes forwardly and upwardly to merge with the inner surface of portion 24b of wall 24.

Outer end wall 23 of head portion 20 does not extend full the height of the latter but terminates below top wall 22 to thereby provide an open or slotted section 36 (FIG. 2) through which rod 5 extends. As can be seen in FIG. 3, the rod, when in assembled, reposed position in the rotor, is supported on the top surface 28a of end wall 28.

The outer end 28 of top wall 22 is disposed inwardly of end wall 28 (FIGS. 2 and 3) to provide a greater freedom of movement between rod 5 and wall 22 during actuation of the rod and during relative vertical movement between the coupler and the car, such as occurs in service. The inner end of top wall 22 is curved to conform to the general contour of hook portion 14 of the rod and merges with inner end wall 29. The inner portion of bottom wall 23 is adapted to be in embossed relationship, of generally acute configuration and merges with inner end wall 29. In a direction lengthwise of the axis Y — Y, the rear wall 26 is shorter than the forward wall 24 and terminates with the end thereof nearer the outer end of the wall 28 in spaced relation with the end wall 28 to form a rearwardly facing opening 39.

As can be best seen from FIG. 2, bottom wall or floor 23 extends generally rearwardly as at 23a with respect to top wall 22 and outer end wall 29 and is adapted to support the operating rod 5 during a pull-out, until the hook portion 14 of the rod is substantially entirely withdrawn through the opening 39 in the rotor shaft, as will be hereinafter more fully described. Sufficient clearance is provided between floor 23 and hook portion 14 of operating rod 5, when the latter is in supported position on top surface 28a of end wall 28 (FIG. 3) so that no interference occurs between the rod and floor 23 in normal operating position. Floor 23 also acts as a shield to protect cavity 30 in the head portion of the rotor shaft from the entry of foreign matter that might interfere with proper operation of the mechanism, in addition to tying together the various walls of the rotor head and materially strengthening the device.

Rear wall 26 comprises a generally vertical outer, generally vertical portion 26a (FIG. 5), an intermediate portion 26b which slopes downwardly and rearwardly from portion 26a and a lower portion 26c which extends generally vertically downwardly from portion 26b and precludes any interference between wall 26 and the hook portion 14 of the operating rod when the unlocking mechanism of the coupler is in lock-set position and the rod is in reposed position, as will be well understood by those skilled in the art. As may be seen in FIGS. 2-4, inclusive, the outer edge 37 of wall 26 is spaced from end wall 28 to form the aforementioned opening or passageway 39 for permitting withdrawal of hook portion 14 therefrom. It will be observed that the opening 39 is in direct communication with the aforementioned slotted section 36 between top surface 28a of end wall 28 and top wall 22.

Application of operating rod 5 to the rotor shaft is preferably accomplished by feeding the hook end 14 of the rod diagonally and upwardly into the cavity 30 of the head portion 20 of the end of the rotor shaft through opening 39 thereof, and then pivoting the rod into supported relationship with top surface 28a of end wall 28 of the rotor shaft. The outer end of rod 5 is then placed in proper position in U-shaped portion 7 of support bracket 10 and the usual cotter pin is inserted through portion 7 to maintain the rod in assembled condition.

The functioning of the novel rotor shaft during actua...
tion of the unlocking mechanism of the coupler is as follows.

Referring first to FIG. 4, which shows the position of the rotor shaft and J-hook end 14 of the associated uncoupling rod 5 upon initial rotation of rod 5 to actuate the operating mechanism of the coupler, it will be seen that engagement occurs at as points A and B between, respectively, the inner part of generally straight portion 14a of the J-hook and the ridge 33 of abutment surface 32 of front wall 24 and between the upper part of generally curved portion 14b of the J-hook and inner abutment surface 40 on top portion 26a of rear wall 26 of the rotor shaft head. It will be seen that these points of engagement A and B between the J-hook and the head of the rotor shaft member can be said to lie generally in a vertical plane (illustrated in FIG. 4 as imaginary plane X—X), the latter being disposed generally perpendicular (in the embodiment shown at an acute angle of approximately 75 degrees) to the axis of rotation Y—Y of the rotor shaft. It will also be seen from FIG. 5 that the vertical spacing provided between the points of engagement A and B remains generally the maximum possible.

In prior art constructions of this type of rotor shaft (i.e., the type shown in the aforementioned United States patent application No. 588,522), upon actuation of the rod, engagement occurred between the outer end of generally straight portion 14a of the J-hook and the generally flat inner surface of the front wall of the head and between the upper section of curved portion 14b of the rod and rear wall 26 of the rotor shaft head. Thus, in the prior art construction, the points of engagement between the J-hook and the front and rear walls of the rotor shaft head were disposed in a plane positioned at a much lesser acute angle to the axis of the rotation of the rotor shaft (i.e., at an angle of approximately 45 degrees), such that a substantial portion of the force applied to the handle of the operating rod during actuation of the operating mechanism of the coupler was wasted and caused the rotor shaft to attempt to pivot in a generally horizontal plane instead of the desired vertical plane pivoting about axis Y—Y. This attempt at horizontal pivoting, of course, resulted in the rotor shaft twisting somewhat and causing bending between the bearing portions 16a and 16b on the shank portion 16 of the rotor shaft head of the coupler member on the coupler head, and made actuation of the operating mechanism difficult under certain conditions.

The arcuate ridge 33 on the inner surface 32 of front wall 24 of the present arrangement insures that the engagement between the J-hook and the rotor shaft head during actuation of the operating rod will lie in a plane which is more nearly perpendicular to the axis of rotation Y—Y of the shaft, which thus ensures that substantially all of the actuating force applied to the handle 12 of the rod is effective to cause rotation of the rotor shaft in a vertical direction. Furthermore, by maintaining the greatest possible spacing between engagement points A and B, the movement of the J-hook during actuation of the rod is kept at a maximum, thus ensuring ease of operation of the actuating mechanism of the coupler.

The tangential slope in a forward and outward direction of the lateral portions 34 of abutment surface 32 insures that the engagement between surface 32 and the J-hook will occur on, or immediately adjacent to the ridges 33, and thus, the engagement between the J-hook and front wall 24 of the rotor shaft head. This centralized engagement will occur irrespective of the laterally angled position of the coupler.

Referring to FIG. 6, which shows a fragmentary rear elevational view of the rotor shaft after the latter has been rotated approximately 90 degrees about its axis Y—Y to substantially the full extent of its movement, during actuation of the operating rod of the coupler, it will be seen that J-hook portion 14 of rod 5 has rolled or fulcrumed slightly about the ridge 33 of surface 32, but that the engagement, as at C, between the lower portion 14a of the hook and the surface 32 of the rotor shaft head is still substantially centrally located in a transverse direction in the rotor shaft head. It will be noted that clearance as at D exists between the outer portion of generally straight section 14a of J-hook end 14 of the rod and the opposing lateral extremity 34 of surface 32. This rolling contact of the J-hook provides a smoother and easier operating mechanism and distinguishes from the prior art construction, wherein frictional sliding contact between portion 14a of the rod and the front wall 24 of the shaft head occurred during actuation of the operating mechanism. The rolling contact forms an important feature of the invention.

As will be clearly understood by those skilled in the art, the forwardly tapered lateral extremities 34 of surface 32 provide sufficient clearance to ensure that no binding or interference will occur between the J-hook 14 of rod 5 and the front wall upon horizontal angling of the coupler and upon withdrawal of the hook from the head of the rotor shaft during a coupler pull-out.

The functioning of the rotor shaft to prevent actuation of the unlocking mechanism of the coupler in case of an accidental coupler pull-out is the same as for the rotor shift disclosed in the aforementioned United States patent application No. 588,522 of Edward Kozeck, and is briefly as follows.

It will be understood that the pulled-out coupler will be supported by the opposing mated coupler as long as both couplers remain in locked condition. As the coupler is pulled away from the end of its car, the rod 5 is pulled by the coupler through U-shaped portion 7 of support bracket 19 until handle portion 12 of the rod engaged bracket 16. In the latter position it will be apparent that no further sliding movement of the rod with respect to the bracket can occur upon further outward movement of the coupler. During further outward movement of the coupler, the operating rod 5 leaves the supporting surface 28a of end wall 28 of the head portion of the rotor shaft and starts to pass through the opening 39 of head portion 29 to effect separation of the rotor shaft and operating rod as the pulled-out coupler is carried forward by the opposing mated coupler. This facile separation of the rod and shaft precludes actuation of the unlocking mechanism of the coupler and thus prevents the pulled-out coupler from dropping to the track bed. It will be understood that as rod 5 slips off support surface 28a on end wall 28 during a pull-out, hook portion 14 of the rod is supported on portion 23a of bottom wall 23 during final separation of the rod and shaft.

The hook portion 14 of the rod will slip through the opening 39 of the rotor shaft without interference and will not only prevent unlocking of the pulled-out coupler, but also will prevent any damage to the operating rod bracket 10, operating rod 5, and rotor shaft 16 of the pulled-out coupler. Once the rod has become disconnected from the coupler it will hang from bracket 16. In most prior art rotor shaft constructions there is no provision for automatic disconnection of the uncoupling rod therewith from a coupler pull-out and since the rod remains connected under such conditions, distortion and breakage of the support bracket rod or rotor shaft will occur, in addition to the unlocking of the coupler.

The novel rotor shaft is readily interchangeable with the existing rotor shaft with the Type B coupler and does not require any structural changes to be made in the coupler head or to the operating rod. It will be apparent that head portion 29 of the rotor shaft, as described herein, may be incorporated in various types of rotor shafts now in use on car couplers.

From the foregoing description and accompanying drawings it will be readily understood that the invention provides a novel car coupler rotor shaft member of the type
comprising a head portion having forward and rearward abutments therein adapted for engagement with a hook portion of the operating rod of the coupler to operate said shaft member during actuation of said rod, wherein the forward abutment is of generally rounded or arcuate configuration in a transverse direction and wherein said forward abutment in a transverse direction is disposed generally centrally relative to said head. It will also be understood that the novel rotor shaft embodies means in combination with the above-mentioned structure for preventing actuation of the unlocking mechanism of the coupler in the event of an accidental pull-out. Thus, dropping of the coupler to the track bed is prevented in the case where the pulled-out coupler is adapted to be supported by means on an opposing mated coupler.

The terms and expressions which have been employed are used as terms of description and not of limitation and there is no intention of excluding such equivalents of the invention described or of the portions thereof as fall within the purview of the claims.

What is claimed is:

1. In combination: a coupler for a railway vehicle, the coupler having a rotary shaft member mounted thereon comprising a hollow head portion disposed along the axis of rotation of the member, said axis extending transversely of the lengthwise direction of the coupler, said hollow head portion comprising a pair of opposing side walls extending generally parallel to said axis along opposite sides thereof; an uncoupling rod extending, in its operative position, with its length generally lengthwise of said axis and having an end portion normally positioned within said head portion between said pair of opposing walls; said end portion being of greater width in a direction transversely to said axis than the distance between said walls whereby each of opposite sides of the end portion necessarily engages one of said walls in rotation of the member by the rod; one of said walls extending from said shank portion lengthwise of said axis beyond an end of the other wall, and having a rounded ridge aligned transversely of said axis generally opposite to, and protruding toward, said end of the other wall; and said end of the other wall partially defining an opening in the head portion whereby said rod portion necessarily engages said walls primarily along the ridge of said one wall and a surface of said other wall adjacent said end of the other wall along a plane passing through said ridge substantially perpendicular to said axis.

2. In combination: a coupler for a railway vehicle, the coupler having a rotary shaft member mounted thereon comprising a shank portion and a hollow head portion disposed along the axis of rotation of the member, said axis extending transversely of the lengthwise direction of the coupler, said hollow head portion comprising a pair of opposing side walls extending from said shank portion generally parallel to said axis along opposite sides thereof; an uncoupling rod extending, in its operative position, with its length generally lengthwise of said axis and having an end portion normally positioned within said head portion between said pair of opposing walls; said end portion being of greater width in a direction transversely to said axis than the distance between said walls whereby each of opposite sides of the end portion necessarily engages one of said walls in rotation of the member by the rod; one of said walls extending from said shank portion lengthwise of said axis beyond an end of the other wall, and having a rounded ridge aligned transversely of said axis generally opposite to, and protruding toward, said end of the other wall; and said end of the other wall partially defining an opening in the head portion whereby said rod portion necessarily engages said walls primarily along the ridge of said one wall and a surface of said other wall adjacent said end of the other wall along a plane passing through said ridge substantially perpendicular to said axis.

3. A rotor shaft member for a car coupler comprising: a shank portion; a hollow head portion attached to an end of the shank portion for releasably coupling with the hook-end portion of an operating rod; said head portion comprising a pair of spaced opposed walls extending in a direction away from said end of the shank portion parallel to the axis of rotation of the member and adapted to receive the hook-end portion therebetween; one of said walls, in a normal operative position on a railway vehicle, being forward of the other wall with respect to the draft or forward direction of an associated coupler, and extending in a direction away from the shank portion lengthwise of the axis beyond an end of the other wall, said end of the other wall partially defining an opening in the head portion; said forward wall having a rounded ridge disposed in generally opposite relation with and protruding toward, said end of the other wall with the length of the ridge in transverse relation to said axis.

References Cited in the file of this patent

UNITED STATES PATENTS

2,949,195 Kozak -------------- Aug. 16, 1960