Feb. 5, 1935. C. H. TOMLINSON 1,989,894

CAR COUPLER

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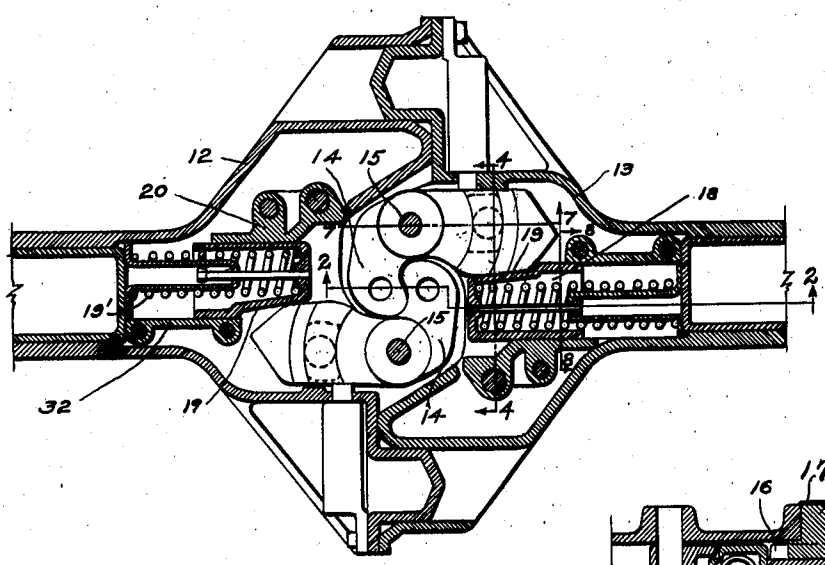


FIG-1

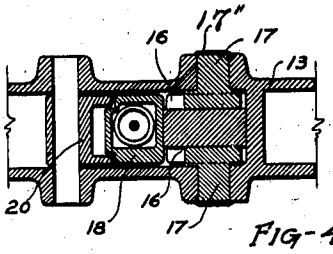


FIG-4

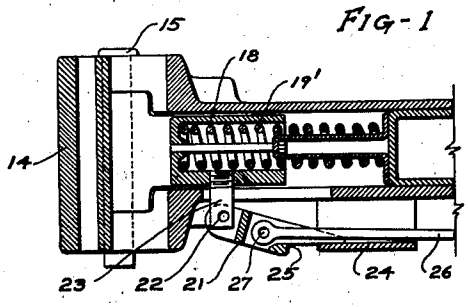


FIG-2

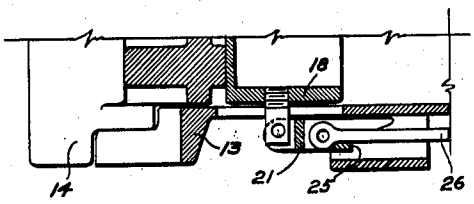


FIG-6

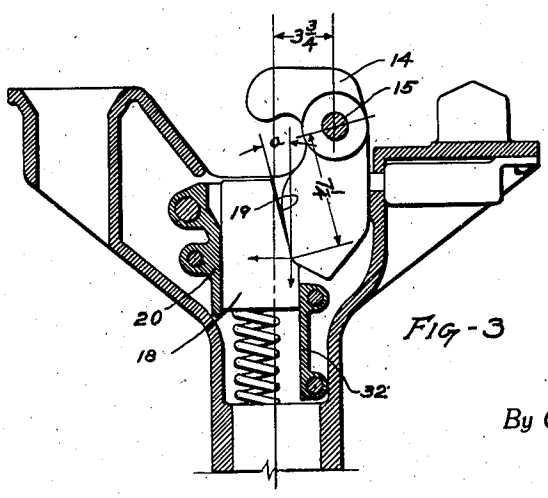


FIG-3

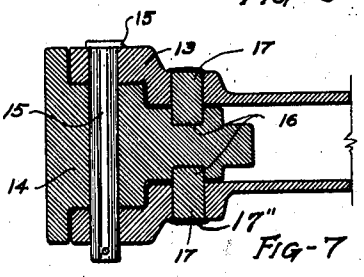


FIG-7

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CAR COUPLER

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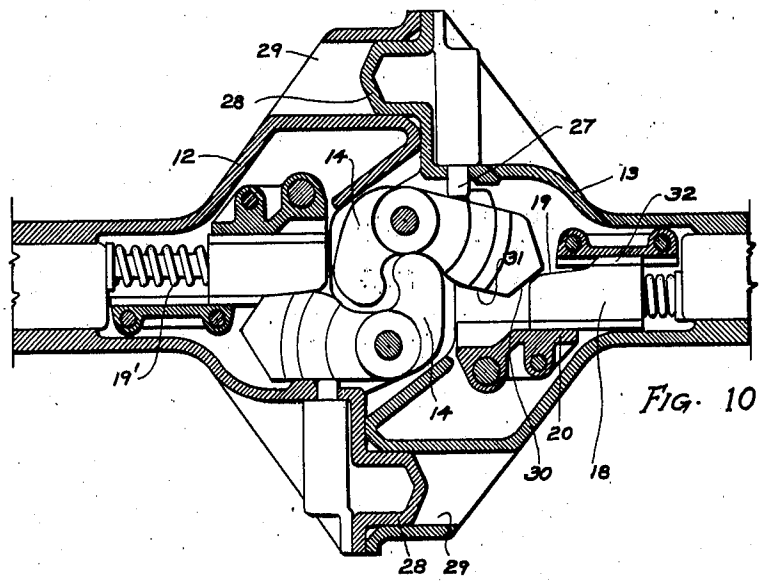


FIG. 10

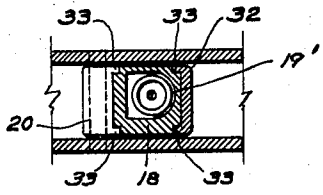


FIG. 8

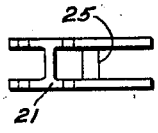


FIG. 9

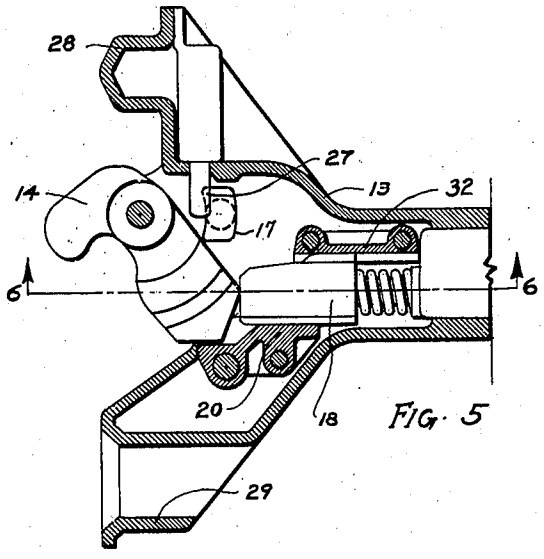


FIG. 5

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CAR COUPLER

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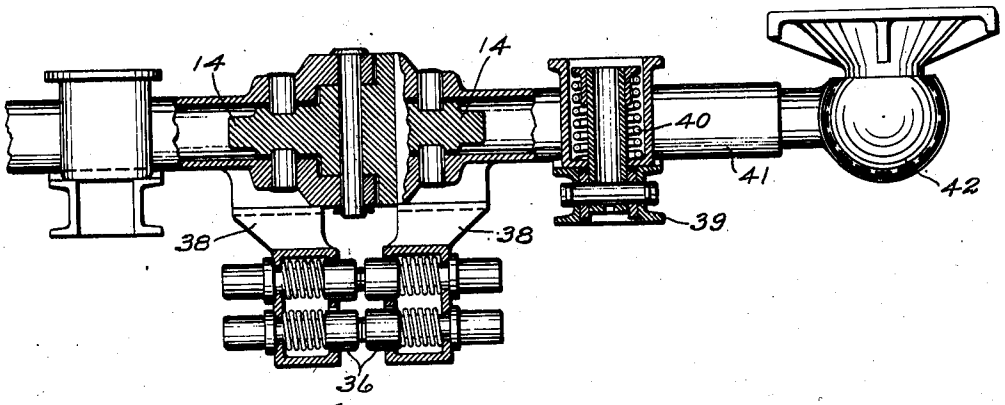


FIG. 11.

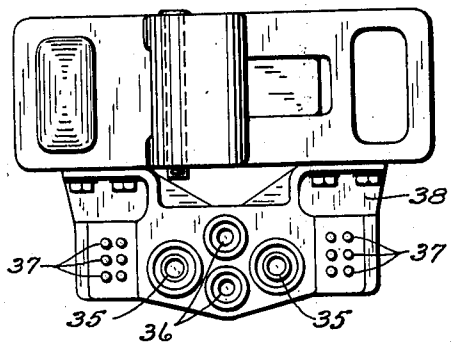


FIG. 12.

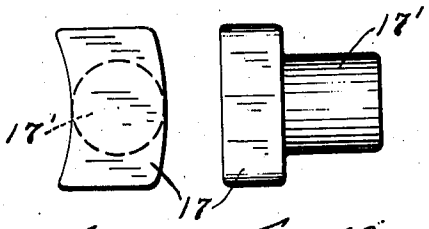


FIG. 14. FIG. 13.

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UNITED STATES PATENT OFFICE

1,989,894

CAR COUPLER

Charles H. Tomlinson, Mansfield, Ohio, assignor to The Tomlinson Coupler Company, Mansfield, Ohio, a corporation of Ohio

Application November 3, 1930, Serial No. 492,902

8 Claims. (Cl. 213—76)

This invention relates to couplers for cars, and has for one of its objects the provision of a coupler of the tight lock type in which danger of accidental uncoupling is eliminated.

A further object is to provide a coupler of the Janney type in which the force of the load on the coupler will be divided between the pivot pin for the coupling knuckle and abutment members on the knuckle and coupler head.

A further object is to provide a coupler having a sliding lock so mounted and guided that it will not jam in operation.

Other objects and advantages will appear from the following description.

The invention is exemplified by the combination and arrangement of parts shown in the accompanying drawings and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a horizontal sectional view of a pair of connected couplers embodying one form of the present invention.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a horizontal section of a single coupler head showing relative proportions of the parts of the coupler with the knuckle closed.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 3 but showing the coupler knuckle open.

Fig. 6 is a section on line 6—6 of Fig. 5.

Fig. 7 is a section on line 7—7 of Fig. 1.

Fig. 8 is a section on line 8—8 of Fig. 1.

Fig. 9 is a plan view of a detail.

Fig. 10 is a view similar to Fig. 1 but showing the coupler knuckles in a position assumed during coupling operation.

Fig. 11 is a fragmentary elevation with parts in section showing a pair of connected coupler heads and a portion of the draft gear and train line couplers.

Fig. 12 is an end elevation of a coupler head and train line coupler carried thereon.

Figs. 13 and 14 are plan and elevation, respectively, of one of the concentric abutment members for engaging the knuckle tails.

The present invention is in the nature of an improvement over the device in my prior Patent #1,660,733, dated February 28, 1928. In my prior patent a tight locking coupler of the Janney type is provided in which the knuckles are continuously urged toward their closed position by a wedging lock pressed into place by a spring.

In the present improvement I make the wedging angle of the lock less than the critical angle of friction between the engaging faces so that the frictional force, acting to hold the lock in its closed position, is greater than the component of the pressure on the wedging surface tending to open the lock. I have discovered that with the proper relation of the coupler parts, a wedging angle of this kind will have sufficient take-up to hold the couplers tight and, at the same time, the holding action of the friction between the lock and its guides and between the lock and the knuckle tail is such that the greater the drawbar pull the tighter will the lock be held in its locking position, entirely independently of the force of the closing spring.

In the present improvement I have also devised a safety catch which will automatically secure the coupler lock in place and prevent accidental uncoupling. Because of the relative position of the parts of the coupler and lock, the position at which the operating rod is attached to the coupler lock is such that it tends to tilt or cock the lock when an uncoupling force is exerted upon it, thus adding frictional resistance to the force of the spring and making uncoupling difficult. In the present invention I have overcome this difficulty by providing guides at all four corners of the coupler lock which prevent any tilting or cocking in the lock.

In order to reinforce the coupler pin and prevent danger of separation of the cars in case a pin should be sheared or broken, I have provided cooperating lugs on the knuckle and coupler head which are concentric with the pivotal axis of the coupler knuckles. This concentric arrangement permits unrestricted movement of the coupler knuckles about their pivots so that the coupler heads may be readily held in tight locking relation at all times by the wedging locks. The pivot pins and the reinforcing lugs are fitted as closely as practical manufacturing operations will permit so that the force on the couplers is divided between the coupler pin and the reinforcing lugs. Where the parts are thus fitted they will automatically be maintained in this relation since any wear on one will tend to relieve the pressure at that point, transferring the load to the other, so that the wear will also be transferred and the parts will be maintained in their relation such that the load is divided between the two sets of pulling members.

Referring now more particularly to the drawings, the numerals 12 and 13 designate generally two coupler heads held together by coupling knuckles 14 pivoted on pins 15. The tail piece of each knuckle is provided with a pair of

grooves 16 concentric with the pivot pin 15. As shown more clearly in Figs. 4 and 7, each of the coupler heads carries abutment blocks 17 which extend into the grooves 16. These blocks and grooves are so fitted that a maximum clearance of about $\frac{1}{16}$ of an inch is permitted to give free action of the coupler knuckles and to provide sufficient tolerance for practical manufacturing operations. A maximum difference in diameter between the pins 15 and the openings in the knuckles of approximately $\frac{1}{32}$ of an inch is allowed and a similar difference between the diameter of the pins and the openings in the ears formed on the coupler head through which the pins extend. This will permit of the same amount of movement of the knuckle at its pivotal support as is allowed at the reinforcing abutments so that both in tension and compression the load will be sustained both by the pin and the abutments, and the wear of the bearing parts will automatically maintain this relation. I have found that the fit described above is sufficiently close practically to eliminate movement and yet permits of practical commercial manufacturing operations. Any looseness of course is taken up by the wedging locks which hold the couplers in tight relation when coupled together. Since there is practically no play between the knuckle and its pivot and between the abutments concentric with the pivot, the angle of the wedging surface can be made sufficiently acute that the sliding lock will be held in place by the friction of the contact faces.

The wedging locks for the coupling knuckles are shown at 18 and are provided with inclined faces 19 which engage the tails of the knuckles. Guide plates 20 bear against the faces of the locks opposite the tail pieces and form abutments for resisting the force exerted by the tail pieces upon the locks. The locks 18 are preferably made hollow to receive springs 19′ which urge the locks forward to their closed positions. For standard railway equipment, the leverage arm of the knuckle nose, as shown in Fig. 3, is 3¾ inches while the effective leverage arm of the tail piece is 7¼ inches. The wedging angle of the lock is indicated at *a* in Fig. 3 of the drawings. It has been found in practice and may be mathematically demonstrated that where the angle *a* is approximately 12 degrees the frictional resistance to backward movement of the lock produced by the bearing plate 20 and the contact between the knuckle tail and the inclined face of the lock will be approximately equal to the component of the force exerted by the tail on the surface 19, tending to force the lock back. This may be designated as the critical angle of friction for the lock and is based on the assumption of a coefficient of friction between the contacting surfaces of .114 which is the lowest figure usually given in standard reference books where two smooth metal surfaces are in contact; the surfaces being lubricated but the pressure being sufficiently great to squeeze the lubrication out, giving a metal to metal contact. I find in practice that it is desirable to reduce this angle to approximately 6 degrees which gives a factor of safety a little more than two so that with an angle of this magnitude the frictional force resisting opening of the lock is a little more than twice as great as the wedging action of the knuckle tail tending to force the lock back. With this relation the greater the load exerted on the knuckle the greater will be the difference between the opposing forces and the less danger there will be of uncoupling.

To make assurance doubly sure, I provide a safety catch for the tail lock designated by the numeral 21. This catch is pivoted at 22 to a lug 23 secured to the sliding lock. The tail of the catch 21 rests upon a plate 24 suspended from the under side of the coupler head, and the catch is provided with a shoulder 25 arranged to engage the edge of the plate 24 and arrest any rearward movement of the tail lock before the lock has cleared the knuckle tail. An operating rod 26 is connected to the safety catch at 27 and lifts the catch to the position shown in Fig. 6 when tension is exerted on the rod to retract the lock, so that the safety catch does not interfere with intentional uncoupling although it prevents accidental uncoupling.

When the coupler lock has been withdrawn to permit uncoupling of the knuckles, the knuckles will be swung to the position shown in Fig. 5 by a spring plunger 27 and when the lock is released the front end of the lock will engage the knuckle tail in the manner indicated in Fig. 5 and hold the lock in its open position ready to couple with another car upon impact, irrespective of the position of the knuckle of the other car. Tight fitting pins 28 and recesses 29 are provided for guiding the coupler heads into cooperating relation and for preventing relative transverse movement of the coupler heads when coupled. When the cars are brought together on impact, if one knuckle is already closed the other will assume the position shown at the right in Fig. 10 at the time the abutments at the sides of the coupler heads engage. During approach of the coupler heads, the lock 18 will be forced back by the tail of the knuckle and then will shoot forward to the position shown in Fig. 10 which will bring the lock 18 into engagement with the beveled face 30 on the rear end of the knuckle tail so that the spring pressure of the lock will force the knuckle to its closed position and permit the inclined face 19 of the lock to engage the face 31 of the knuckle tail in position to exert a continuous pressure on the knuckle. When the wedging lock is in its closed position, the safety catch 21 will drop into the position shown in Fig. 2 and the operator may thus be easily apprised of the closing of the wedging lock by looking beneath the coupler head to note the position of the safety catch 21.

A bearing plate 32 is secured to the coupler head in position to engage the side of the lock 18 opposite the plate 20, and the plates 20 and 32 as shown in Fig. 8 are provided with ways 33, one at each corner of the sliding lock 18 so that the lock is definitely and positively guided in straight line movement and any cocking or tilting is prevented. This avoids jamming or excess frictional resistance to the movement of the lock.

It will be noted from the drawings that the coupling knuckles when closed fit very loosely within the contour of the openings in the coupler heads, so that they are free to swing into and out of coupled position and so that they will readily connect with standard Janney type couplers now in use. Notwithstanding this clearance in the contours, the tight fit between the coupling knuckles and their pins and between the concentric abutments draws the side abutments of the two coupler heads tightly together when two couplers like those shown in the drawings are connected. The knuckle is held rigidly in place by its wedging lock even when connected with a

standard Janney type coupler so that the only wear is on the pulling face of the knuckle.

Referring to Figs. 11 and 12 in the drawings, it will be seen that the steam line connectors 35, air line connectors 36, and the electric contacts 37 are carried on a bracket 38 projecting downwardly from the coupler head and secured rigidly thereto. The connectors 35, 36 and 37 are all spring pressed and extend beyond the coupling faces so that when the couplers are connected together the springs are all under compression. It will be seen that these springs will exert considerable force, tending to spread the lower faces of the couplers apart and swing the couplers downwardly. If no provision were made for resisting this movement of the couplers downwardly, they would engage at their upper surfaces on impact and the force of the impact would be received at the tops of the couplers and would not operate to compress the spring-held train line contacts. To avoid this difficulty, the drawbar carriers 39 are provided with springs 40 of sufficient strength to overcome the force of the springs behind the train line couplers, and hold the couplers in horizontal alinement on impact of the cars. The drawbars 41 are secured to the car frame by a universal joint connection 42 and the spring 40 has a lever arm equal to the distance from the vertical axis of the ball and socket joint to the vertical axis of the spring. The train line connectors have a lever arm equal to the vertical distance between the connectors and the horizontal plane passing through the horizontal axis of the ball and socket joint 42. In order to insure proper compression of the train line contacts, the moment of the spring 40 about the pivotal support 42 must be sufficient to overcome the moment of the train line contacts about this axis. If the couplers are held up so that the contacts will be brought into engagement before the abutment faces of the couplers, the force of the impact will readily compress the contacts, but if the couplers were permitted to sag so that the abutment faces of the couplers engage before the contacts are compressed, the force of the impact will be received by the abutment faces and will not be applied to the contacts for compressing their springs.

Since the tail pieces of the knuckles fit tightly in the coupler heads, the knuckles will not tilt vertically in the coupler heads and their pulling faces will be held parallel to the side abutment faces of the couplers so that when the couplers are connected together and held by the wedging locks, the side abutment faces and the pulling faces of the knuckles will be at 90° with the horizontal axis of the couplers and the couplers will be held from sagging, notwithstanding the great pressure exerted by the train line connectors.

The concentric abutment members 17 are formed separately and provided with shanks 17′ which are inserted in openings in the coupler heads 13 and welded in place by a welding flame as indicated at 17″. This permits much easier machining of the abutment and assembling of the parts and makes it possible to properly align the abutment on the head with the complementary abutments on the tail piece.

Various changes in detail of construction within the scope of the invention will no doubt suggest themselves to those skilled in the art, and I therefore do not wish to confine the invention to details of construction other than as defined in the appended claims.

I claim:

1. A coupler of the Janney type comprising a body, a knuckle pivoted to the body and a horizontally movable wedge lock to engage the knuckle to hold it in the locked position, an elongated recess in the lock closed at one end and open at the other end, a spring mounted in the recess and projecting for a part of its length without the recess and the end of the projecting part engaging stationary means on the body, the spring constantly urging the lock forward and means to limit the amount of accidental backward movement of the lock while the knuckle is closed to prevent the lock releasing the knuckle.

2. A coupler comprising a body, a knuckle, a wedge lock to engage the knuckle to constantly urge the knuckle to its closed position, safety means on the lock to engage stop means to prevent accidental withdrawal of the lock, means to withdraw the lock from engagement with the knuckle and simultaneously and automatically move said means on the lock out of engageable relation with the stop means.

3. A coupler comprising a body, a knuckle mounted thereon, a longitudinally slidable wedge lock to engage the knuckle, a safety means on the lock to engage a fixed stop to limit the accidental backward movement of the lock to prevent unintentional disengagement of the lock and knuckle, a slot through one face of the body, a projection on the lock extending through the slot and movable with the lock and longitudinally movable means acting upon the projection to move the lock out of engagement with the knuckle and the safety means out of engageable relation with the fixed stop to intentionally release the knuckle.

4. A coupler of the Janney type having a knuckle and a horizontally movable lock to alternately engage and disengage the knuckle to hold it in the locked position and to release the knuckle respectively, a spring constantly urging the lock forward and means to limit the amount of accidental backward movement of the lock while the knuckle is closed to prevent the lock releasing the knuckle.

5. A coupler of the Janney type having a knuckle and a horizontally movable lock to engage the knuckle to hold it in the locked position, means to automatically and positively limit the amount of backward movement of the lock while the knuckle is closed to prevent unintentional disengagement of the lock from the knuckle and a spring which engages means in the lock to urge the lock forward and to effect the functioning of the limiting means as described.

6. A coupler comprising a body member, a coupling member, a wedge lock to move the coupling member to its coupling position and yieldingly maintain it in such position, spring means tending to advance said lock, means on the lock to engage stop means on the body to prevent accidental release of said lock relative to said coupling member, a slot in said body adjacent the lock, means secured to the lock and projecting through said slot and means secured to said projecting means to retract the lock and move the said means on the lock out of engageable relation with the means on the body to permit retraction of the lock beyond that permitted by the stop means.

7. A coupler comprising a body, a coupling member, a horizontally slidable lock to engage and maintain the coupling member in its closed position, a spring to advance the lock, safety

means on the lock movable into and out of engageable relation with means on the body to prevent unintentional release of the lock relative to the coupling member and manually operable means associated with the lock to automatically move the safety means out of engageable relation with the said means on the body when the lock is intentionally released relative to the coupling member.

8. A coupler comprising a body, a coupler member, a horizontally movable wedging lock, means to yieldingly advance the lock into engagement with the coupling member to hold the coupling member in coupled position, means to retract the lock against the yielding means and safety means comprising means on the lock to engage means on the body to prevent the unintentional release of the coupling member by the lock, the safety means being rendered automatically inoperative when retracted by the said retracting means.

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