Nov. 17, 1931. R. J. OLANDER 1,831,927

HAND BRAKE

Filed Jan. 30, 1930

Fig. 1

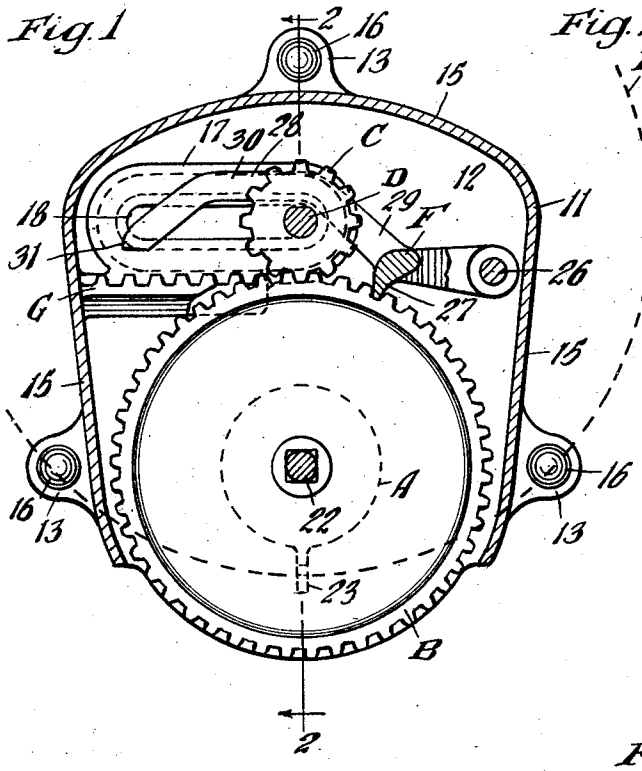


Fig. 2

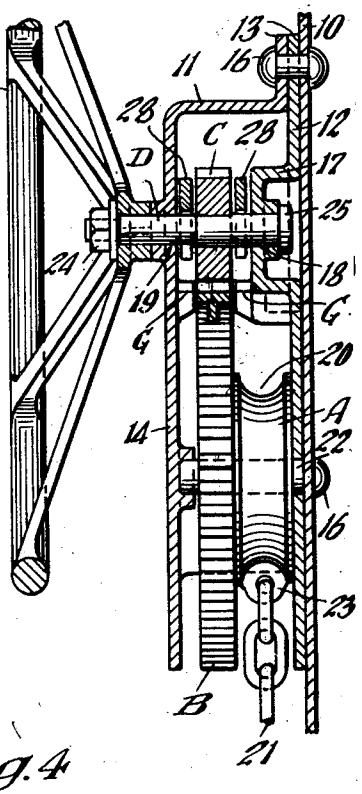
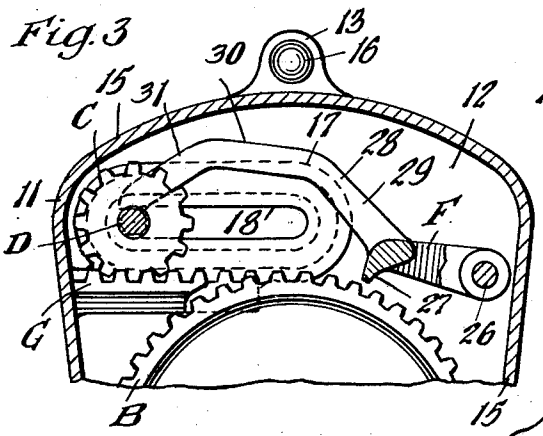
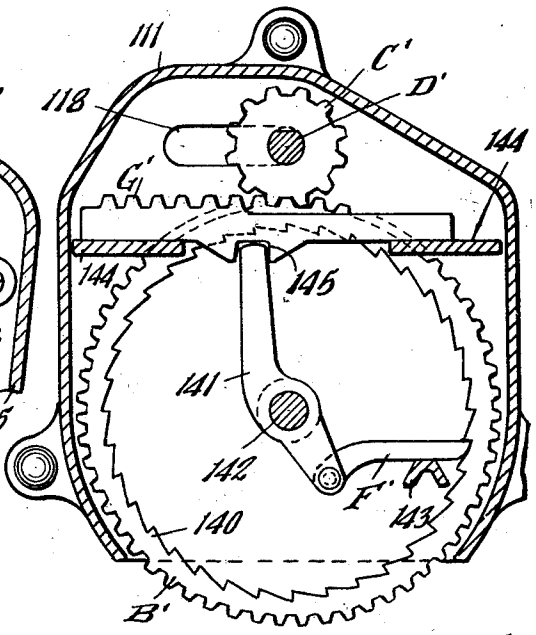


Fig. 4

Fig. 3





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UNITED STATES PATENT OFFICE

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HAND BRAKE

Application filed January 30, 1930. Serial No. 424,500.

This invention relates to improvements in hand brakes.

One object of the invention is to provide a simple and efficient hand brake mechanism especially adapted for railway cars, wherein both the application of the brakes and the release thereof is effected by the same manually operated means.

Another object of the invention is to provide a hand brake mechanism of the character indicated, including a rotary chain winding member and a manually actuated rotary driving member for the winding member, wherein the manually actuated member serves, when operated in one direction, to wind the chain and, when operated in a reverse direction, is automatically disengaged from the chain winding member to permit unwinding of the same.

A still further object of the invention is to provide a brake mechanism of the character indicated in the preceding paragraph, wherein the chain winding member is held against retrograde rotation by a locking dog while the manually actuated operating member is rotated in a direction to effect winding of the chain, and wherein upon operation of said manually actuated member in a reverse direction, to disengage the same from the winding member, the locking dog is automatically thrown out of engagement with the winding member, thereby permitting free running of the latter to release the brakes completely.

Other objects of the invention will more fully appear from the description and claims hereinafter following.

In the drawings, forming a part of this specification, Figure 1 is a vertical, sectional view of my improved hand brake mechanism, illustrating the same as applied to the vertical end wall of a railway car. Figure 2 is a vertical, sectional view corresponding substantially to the line 2—2 of Figure 1, said view being in a plane at right angles to the view shown in Figure 1. Figure 3 is a view similar to Figure 1, showing part only of the brake mechanism, and illustrating the same in released condition. And Figure 4 is a view similar to Figure 1 illustrating another embodiment of the invention.

Referring first to the embodiment of the invention illustrated in Figures 1, 2 and 3, 10 designates the vertical end wall of a railway car, on which my improved hand brake mechanism is mounted. In carrying out my invention, I enclose the operative parts of the brake mechanism within a housing composed of two parts 11 and 12. The part 12 forms the back wall of the housing and is in the form of a plate having three securing lugs 13—13 thereon. The part 11 of the housing is in the form of a cover member and has a vertical wall 14 disposed parallel to the wall formed by the plate 12 and spaced therefrom. The wall 14 is provided with top and side flanges forming top and side wall portions 15 of the cover member 11. The wall portions 15 are provided with three laterally projecting securing lugs, corresponding to the lugs 13 of the plate 12 and registering therewith, these lugs being also designated by 13. The two parts of the housing are secured together by rivets 16—16 extending through the lugs 13—13 of the sections 11 and 12 of the housing. The rivets 16 preferably also serve to secure the housing to the end wall 10 of the car, and as shown clearly in Figure 2, extend through said end wall. Near the upper end, the plate member 12 is provided with an outwardly offset section 17 having a substantially horizontally disposed guide slot 18 therein, which is suitably reinforced by flange portions surrounding the opening. The cover member 11 has the wall 14 thereof provided with a similar guide slot 19, which is in alinement with and corresponds in length to the slot 18. This slot is also reinforced by outstanding flange portions, as clearly shown in Figure 2.

My improved hand brake mechanism proper, as illustrated in Figures 1, 2 and 3, comprises broadly a chain winding drum A, a driving gear member B, a hand operated pinion or gear element C, a driving shaft D, a hand wheel E, a locking dog F and a rack G.

The chain winding drum A is in the form of a cylinder and has an annular peripheral groove 20 adapted to accommodate the brake

chain 21 when wound thereon. The drum member preferably has the gear B formed integral therewith. Both the drum and the gear member B are rotatably supported on a journal pin 22 having its opposite ends fixed in the front and rear walls of the housing. The chain 21 is secured to the drum A by means of an outstanding lug 23 located within the groove of the drum. As clearly illustrated in Figures 1 and 2, the bottom of the housing is open so as to accommodate the chain 21.

The pinion or gear element C is secured to the operating shaft D which has the opposite ends thereof extending through the slots 18 and 19 of the rear and front walls of the housing. As most clearly shown in Figure 2, the operating shaft D projects outwardly beyond the wall 14 of the housing and the hand wheel E is fixed to the outer end thereof. The hand wheel may be secured in any suitable manner and is preferably keyed to the outer end of the shaft D and held in position by the usual securing nut 24 bearing on the outer face of the hub of the wheel E. As illustrated in Figure 2, the inner end of the shaft D is provided with a head member 25 of larger diameter than the width of the slot 18, thereby retaining the shaft in position. As will be evident, the guideways 18 and 19 form bearing members for rotatably supporting the shaft D and also form guide means for permitting movement of the shaft in a horizontal direction toward and away from the gear B. The slots or guideways 18 and 19 are of such a length that when the operating shaft D is located at the extreme righthand end of said guide slots, as clearly shown in Figure 1, the teeth of the pinion C intermesh with the teeth of the gear B. At this time, the pinion is in operative driving relation with the gear B and rotation of the hand wheel E, in a clockwise direction, as viewed in Figure 1, will effect rotation of the pinion C in a similar direction and through the pinion C and the gear B rotation of the chain winding drum in a contra-clockwise direction, thereby effecting winding of the chain 21 on the drum and tightening of the brakes. The walls of the guide slots 18 and 19 at the extreme righthand end thereof, as viewed in Figure 1, form stop means for limiting the movement of the shaft D in a righthand direction, as viewed in said figure, and thereby maintain the operative engagement between the pinion C and the gear B during the chain tightening operation. The rack G is located beneath the guideways 18 and 19 and preferably disposed parallel to the same and spaced such a distance therefrom that the teeth of the pinion C will mesh with the teeth thereof. This rack may be formed as a separate member but is preferably cast integral with the front and rear walls of the housing, the rack being formed in two sections, each section being formed as a part of the corresponding housing section and both sections of the rack having the teeth formed thereon. As most clearly shown in Figure 1, the inner end of the rack G terminates to the left of a radial vertical plane, passing through the axis of rotation of the gear B. The distance the inner end of the rack is spaced from said plane, is preferably greater than the width of one of the teeth of the gear B. As clearly shown in Figure 1, the inner tooth of the rack is so located that when the pinion C is rotated in a clockwise direction, as viewed in Figure 1, with the operating shaft D disposed at the righthand ends of the slots 18 and 19, the teeth of the pinion will clear the end tooth of the rack.

The locking dog F is in the form of a pivoted lever mounted on a pivot member 26 having its opposite ends fixed in the front and rear walls of the housing and located to the right of the gear B, as viewed in Figure 1. At the inner end, the dog F is provided with a tooth 27 which co-operates with the teeth of the gear B to prevent retrograde rotation of the chain winding drum. The dog is also provided with a pair of spaced arms 28—28 extending therefrom, each arm being provided with an upwardly inclined section 29 adjacent the tooth of the dog, a horizontal section 30 and a downwardly inclined outer end section 31. The two arms 28 are disposed on opposite sides of the pinion C and the horizontal sections 30 of said arms are disposed above the shaft D, as clearly shown in Figures 1 and 2. In the normal position of the parts with the locking dog F resting on the gear B, the horizontal sections 30 of the arms are spaced slightly above the shaft D so as to clear the same. As will be evident, when the shaft D is moved to the left, as viewed in Figure 1, the same will engage the inclined portions 31—31 of the arms 28, thereby raising the dog F, as shown in Figure 3 and disengaging the tooth thereof from the gear B. As will be evident, the dog is thus rendered inoperative and free running of the gear and the chain winding drum is permitted, thereby allowing complete release of the brakes.

The operation of my improved hand brake mechanism is as follows: Assuming that the parts are in the position illustrated in Figures 1 and 2, rotation of the hand wheel E in a clockwise direction effects rotation of the pinion C in a similar direction and the pinion C meshing with the gear B effects rotation of the chain winding drum in a contra-clockwise direction, winding the chain thereon and tightening the brakes. During this rotation of the chain winding drum, the locking dog F, which is gravity influenced, ratchets over the gear teeth of the member B and prevents retrograde rotation of the same and the chain winding drum. When the

brakes have been fully tightened, the locking dog F holds the same in that condition.

When it is desired to release the brakes, the operating hand wheel E is rotated in a contra-clockwise direction, as viewed in Figure 1. Inasmuch as the gear B is held against rotation by the locking dog F, rotation of the pinion C, through the cooperating teeth thereof and the teeth of the gear B, will cause the pinion to travel to the left as viewed in Figure 1, movement of the same being guided by the shaft D cooperating with the guide slots 18 and 19. As the pinion C rolls to the left, the teeth thereof will engage the teeth of the rack G, thereby causing the pinion to travel to the left on said rack. When the pinion approaches the extreme lefthand position thereof, the shaft D of the same engages the inclined portions 31—31 of the arms of the dog F, as hereinbefore pointed out, thereby lifting the dog. As shown in Figure 3, when the pinion C reaches its extreme lefthand position, the arms of the dog are raised to such an extent that the dog is lifted entirely clear of the gear B, thus permitting free running of the same and unwinding of the chain from the drum A to release the brakes.

Assuming that the brake mechanism is left in the condition shown in Figure 3, and it is desired to apply the brakes, it is merely necessary to rotate the hand wheel in a clockwise direction to again bring the pinion into driving relation with the gear B. As will be evident, rotation of the pinion in a clockwise direction, as viewed in Figure 3, will cause the same to travel to the right on the rack G until the same passes from the end of the rack, whereupon the teeth of the pinion will engage with the teeth of the gear B and establish driving relation therebetween. As hereinbefore pointed out the end walls of the slots 18 and 19 positively limit the movement of the shaft D in said righthand direction, thereby maintaining proper meshing relation between the pinion and the gear B. Continued rotation of the hand wheel and the pinion C in a clockwise direction effects tightening of the brake chain, as hereinbefore described.

Referring next to the embodiment of the invention illustrated in Figure 4, the same also comprises a brake mechanism which is enclosed within a housing mounted on the end wall of the car, the housing being designated by 111 and being preferably formed of two sections, substantially similar to the sections of the housing illustrated in Figures 1, 2 and 3. In this embodiment of the invention, the brake mechanism comprises a chain winding drum, a driving gear, a cooperating pinion, a drive shaft and a hand wheel substantially the same as the corresponding elements hereinbefore described. The driving gear of the hand brake mechanism illustrated in Figure 4 is indicated by B′, the pinion by C′ and the driving shaft by D′. The front and rear walls of the housing 111 are also provided with alined guide slots 118, which are similar to the guide slots 18 and 19 hereinbefore described and accommodate the operating shaft D′ for movement in a horizontal path.

The gear B′ is provided with internal ratchet teeth 140 with which a locking dog F′ cooperates. The locking dog F′ is carried on the outer end of an oscillating member 141 pivoted between its ends on the shaft 142 which rotatably supports the chain winding drum and the gear B′. The inner end of the dog F′ is pivoted to the outer end of the bottom arm of said member 141. The upper arm of the member 141 normally extends substantially vertically, as clearly shown in Figure 4. The dog F′ is supported by an outstanding lug member 143 formed on one of the walls of the housing which limits the downward movement of the dog to maintain the same in locking engagement with the ratchet teeth of the gear B′. As will be evident, the dog is free to swing upwardly, thereby permitting ratcheting action when the gear B′ is rotated in a contra-clockwise direction. A rack member G′ cooperates with the pinion C′, the rack member being slidably supported on shelves 144—144 formed on the housing walls. At the lower side, the rack G′ is provided with a notch 145 within which the end of the upper arm of the oscillating member 141 engages. The teeth of the rack G′ are so arranged that when the locking dog F′ is in the position shown, the teeth of the pinion C′ will clear the tooth at the righthand end of the rack so as to permit free rotation of the pinion C with respect to said rack.

Assuming the parts to be in the position shown in Figure 4, and it is desired to apply the brakes, the shaft D′ is rotated in a clockwise direction by means of the usual hand wheel, not shown, thereby causing rotation of the pinion C′ in a similar direction. Inasmuch as the pinion C′ is held against movement toward the right by the end walls of the guide slot 118, the pinion is confined to rotary movement and through engagement with the teeth of the gear B′ effects rotation of the latter is a contra-clockwise direction, thereby effecting winding of the chain on the drum. Retrograde rotation during the winding operation is prevented by the locking dog F′. When it is desired to release the brakes, the shaft C′ is rotated in a contra-clockwise direction, and inasmuch as the gear B′ is held against rotation by the locking dog F′, the pinion C will be forced to travel bodily to the left, as viewed in Figure 4. By this movement of the pinion, the teeth thereof will be brought into engagement with the teeth of the rack G′, thereby causing further

travel to the left of the pinion C′. When the pinion C′ has been displaced to the left to such an extent that the shaft D′ engages the lefthand end walls of the slots 118, further rotation of the pinion C′ will cause movement to the right of the rack G′. Through the movement of the rack in a righthand direction, the member 141 will be oscillated, thereby withdrawing the locking dog F′ from engagement with the ratchet teeth of the gear B′. When the dog has been thus disengaged from the gear B′, the chain winding drum will be free to rotate to release the brakes.

Assuming that the brake mechanism has been released as hereinbefore described, and the pinion C′ is at the extreme lefthand end of its limit of travel, and it is desired to again apply the brakes, it is merely necessary to rotate the hand wheel in a direction to effect clockwise rotation of the shaft D′ and the pinion C′. Rotation in this direction will first effect movement of the pinion to the right on the rack G′ until the shaft D′ engages the end walls of the slots, whereupon further rotation of the pinion effects movement of the rack G′ to the left, as viewed in Figure 4, thereby throwing the locking dog F′ into operative engagement with the ratchet teeth of the gear B′. When the dog has been thus engaged, the gear C′ will be freed from the rack as shown in Figure 4 and thus permitting the brakes to be tightened in the manner hereinbefore described.

From the preceding description taken in connection with the drawings, it will be evident that I have provided an exceedingly simple and efficient brake mechanism, wherein the brakeman's attention is required only in operating the hand wheel, the releasing of the brakes being entirely automatic, and rotation of the manually operated hand wheel in a chain winding direction effecting tightening of the brakes and a reverse rotation thereof, automatically effecting disengagement of the manually operated driving member from the driving means of the chain winding element and also releasing the locking dog to permit free running of the chain winding drum and complete release of the brakes.

It is further pointed out that the operation of releasing the locking dog is entirely automatic and is effective only after the driving element has been disengaged from the chain winding element, thereby protecting the brakeman against accidental injury by entirely eliminating backward rotation of the hand wheel through the tension of the brake chain, the driving means being at all times disengaged prior to release of the locking dog.

I have herein shown and described what I now consider the preferred manner of carrying out my invention, but the same is merely illustrative and I contemplate all changes and modifications that come within the scope of the claims appended hereto.

I claim:

1. In a hand brake for railway cars, the combination with a chain winding member; of manually operated means for actuating said winding member; means for maintaining said manually operated means in operative engagement with said winding member when said manually operated means is actuated in a direction to tighten the brakes; means for preventing retrograde rotation of said winding means; and means for automatically disengaging said manually operated means from said winding means when the former is operated in a reverse direction and throwing said means for preventing retrograde rotation out of operation to completely release the brakes.

2. In a hand brake mechanism for railway cars, the combination with a chain tightening member; of manually actuated means for operating said tightening member, said means being operable in reverse directions; means for maintaining operative engagement of said means and member when the former is actuated in one of said directions to effect tightening of the brakes; means for preventing retrograde rotation of said winding means; and means for automatically disengaging said manually operated means from said winding means when the former is operated in a reverse direction and throwing said means for preventing retrograde rotation of the winding means out of operation to completely release the brakes.

3. In a hand brake mechanism, the combination with a rotary chain winding element; of rotary driving means operatively connected to said element; a manually actuated rotary member for operating said driving means, said member being movable toward said means to operatively engage the same in driving relation therewith; and means for automatically moving said rotary member toward said driving means and engaging the same therewith when said member is rotated in a direction to wind the chain and automatically move said member out of engagement with said driving means when the former is rotated in a reverse direction, said last named means including a releasable locking mechanism for holding said chain-winding element against rotation in one direction.

4. In a hand brake mechanism, the combination with a rotary chain winding element; of rotary driving means operatively connected to said element; a manually actuated rotary member for operating said driving means, said member being movable toward said means to operatively engage the same in driving relation therewith; means for locking said winding element against retrograde rotation; and means for automatically moving said rotary member toward

said driving means and engaging the same therewith when said member is rotated in a direction to wind the chain and automatically move said member out of engagement with said driving means when the former is rotated in a reverse direction, movement of said member away from said rotary driving means rendering said locking means inoperative.

5. In a hand brake, the combination with a rotary chain winding element; of a driving gear operatively connected to said element; a manually actuated rotary gear member, said gear member being movable toward and away from said driving gear; means cooperating with said gear member for moving the same toward said driving gear to engage the same therewith when the former is rotated in a direction to wind the chain, and moving the same away from said driving gear member to disengage said parts when said rotary gear member is rotated in a reverse direction; means for maintaining the manually actuated gear member in driving relation with said driving gear when the manually actuated gear member is rotated in a chain winding direction; releasable locking means normally operative for preventing rotation of said winding element in an unwinding direction, and means actuated by movement of said manually actuated gear member away from said driving gear for releasing said locking means from operative engagement with the winding element.

6. In a hand brake mechanism, the combination with a rotary chain winding drum; of a driving gear operatively connected to said drum; a manually actuated rotary gear member movable toward and away from said driving gear to engage the same therewith and disengage the same therefrom; stop means for limiting movement of said manually actuated gear member toward said driving gear and maintaining the same operatively engaged therewith; a rack member cooperating with said manually actuated gear member for effecting movement of the latter toward and away from said driving gear when said member is rotated in chain winding and unwinding directions; and a locking dog normally holding said winding drum against retrograde rotation, said dog being thrown out of holding engagement by movement of said manually actuated member away from said driving gear.

7. In a hand brake mechanism, the combination with a chain winding drum; of a driving gear operatively connected to the drum and rotatable about a fixed axis; a manually actuated gear member cooperating with said driving gear, said manually actuated gear member being rotatable in one direction to wind the chain and also rotatable in a reverse direction; means for guiding said manually actuated gear member toward and away from said driving gear; means cooperating with said manually actuated gear member for effecting movement of the same toward said driving gear when the former is rotated in a chain winding direction to operatively engage the same with said driving gear to effect rotation of the chain winding drum, and effecting movement of said manually actuated member away from said driving gear to disengage the same therefrom when the former is rotated in said reverse direction; releasable holding means cooperating with the drum for preventing retrograde rotation of the latter; and means actuated by movement of said manually actuated gear away from the driving gear for releasing said holding means.

8. In a hand brake mechanism, the combination with a rotary chain winding drum; of a driving gear member operatively connected to said drum, said gear member being rotatable about a fixed axis; a manually operated shaft; a rotary gear element fixed to said shaft and adapted to be engaged with said gear member; spaced guideways for said shaft extending toward said gear member; and rack means between said guideways engageable with said gear element, said rack means extending in the same direction as said guideways, said manually actuated shaft being movable in said guideways toward and away from the gear member.

9. In a hand brake mechanism, the combination with a rotary chain winding drum; of a driving gear member operatively connected to said drum, said gear member being rotatable about a fixed axis; a manually operated shaft; a rotary gear element fixed to said shaft and adapted to be engaged with said gear member; guideways for said shaft extending toward said gear member; rack means engageable with said gear element, said rack means being adjacent said guideways and extending in the same direction, said manually actuated shaft being movable in said guideways toward and away from the gear member; a gravity actuated locking dog for preventing retrograde rotation of said winding drum; and means engaged by said shaft when moved away from said gear member for withdrawing the dog from operative locking engagement with said drum.

10. In a hand brake for railway cars, the combination with a tightening member; of means operative in reverse directions for actuating said chain tightening member, said actuating means when operated in one direction effecting tightening of the brakes and when actuated in a reverse direction operating said tightening member in a direction to release the brakes; locking means for preventing release of the brakes; and means for automatically withdrawing said locking means from operative engagement when said actuating means is operated in a direction to effect release of the brakes, and automatically

effecting reengagement of said locking means when the actuating member is operated in a direction to tighten the brakes.

11. In a hand brake for railway cars, the combination with a rotary chain winding member; of an operating member geared to said winding member for rotating the same; a locking dog cooperating with said winding member to prevent retrograde rotation thereof; and means thrown into operation by rotation of the operating member for disengaging said locking dog to release the brakes, when said operating member is rotated in chain unwinding direction and effecting operative engagement of said dog when said operating member is rotated in a chain winding direction.

12. In a hand brake for railway cars, the combination with a chain-winding member; of a manually operated element rotatable in reverse directions; interengaging means on said element and member connecting the same in driving relation; means for maintaining said interengaging means of said element and member engaged when said manually operated element is rotated in one direction to communicate rotation to said member in a direction to tighten the brakes; releasable means for holding said member against rotation, whereby said element is moved away from said member upon rotation of said element in a reverse direction; and means cooperating with said element upon movement thereof away from said member for completely severing the driving relation between said element and member.

13. In a hand brake mechanism, the combination with a rotary chain-winding member; of a driving element connected thereto; a rotary manually actuated operating means rotatable in reverse directions; a ratchet member preventing rotation of said winding member in unwinding direction; and means actuated by rotation of said operating means in one direction for connecting said operating means and driving means to rotate the chain-winding member continuously in unison therewith to wind the chain thereon and tighten the brakes, and actuated by rotation in a reverse direction of said operating means for disconnecting said operating means and driving means.

In witness that I claim the foregoing I have hereunto subscribed my name this 28th day of January, 1930.

ROLAND J. OLANDER.