HOLDING AND RELEASING MECHANISM FOR RAILROAD HAND BRAKES

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This invention relates to improvements in holding and releasing mechanism for hand brakes. The object of the invention is to provide an improved and simplified holding and releasing mechanism for hand brakes.

Hand brakes for railroad cars are subjected to numerous conditions of service which impose rigorous requirements upon the type of structure which is employed to operate the brakes. The operating mechanism for the brakes usually is mounted upon the exterior of the end of each railroad car. The operating mechanism must be accessible and accordingly can be only partially housed. The parts therefore are exposed to all varieties of weather conditions and the constant presence of dust, cinders and soot in the air through which the train moves. Severe stresses are imposed by the operation of the braking mechanism and the shocks of travel, and many other factors are encountered which impose special requirements of construction which must nevertheless render the brake at all times available to service and positive of operation.

In the operation of hand brakes on railroad cars it is frequently necessary to apply the brakes suddenly by a quick rotation of the hand wheel by which the brakes are brought into braking position, and it is desirable that during operation the hand wheel be automatically held against reverse movement. When the brakes are released it is also desirable that the holding mechanism by which the brake and hand wheel is held in braking position, be completely and quickly released. It is also desirable and frequently necessary that either of these operations be accomplished by the use of a single hand by the brakeman, who may require the use of his other hand to retain his hold to the hand-holds by which he maintains an elevated position upon the end of the car. It is therefore necessary that the brake holding and releasing mechanism be capable of being readily set into either holding or releasing position by one hand which may then be immediately devoted to the operation of the brake hand wheel by which the brakes are set and released.

It is the object of this invention to provide a holding and releasing mechanism which will meet these requirements of a serviceable brake and which possesses other advantages in construction and operation.

A further object of the invention is to provide a holding and releasing mechanism for hand brakes which is simple in construction, sturdy, has few moving parts, and is not capable of getting out of adjustment.

A further object of the invention is to provide a holding and releasing mechanism for hand brakes in which all moving parts swing upon simple pivots, and there are no sliding movements or other movements in which exposed surfaces of the moving parts are open to the accumulation of dirt and other foreign matter which may interfere with the operation of the mechanism.

A further object of the invention is to provide a holding and releasing mechanism for hand brakes which has only two manual controls, the hand wheel by which the brake is operated, and a simple hand lever for setting the mechanism into either holding or releasing position.

A further object of the invention is to provide a mechanism of this character in which operation of the trip lever for setting the mechanism into either holding or releasing position will positively operate the mechanism but nevertheless operation of the hand wheel and movement of the mechanism will not be transmitted into oscillation of the hand lever on the exterior of the mechanism housing except for slight oscillation thereof.

A further object of the invention is to provide a holding and releasing mechanism for hand brakes in which the holding pawl, by which the ratchet is locked in holding position, is not forcibly disengaged by the operator, but is permitted to disengage itself upon manipulation of the hand wheel and without the application of force to the pawl mechanism.

A further object of the invention is to provide a holding and releasing mechanism for hand brakes which is susceptible of construction in many forms without modification of the principle of the invention, and which lends itself to construction from the ordinary and familiar materials of manufacture.

In additional to the objects hereinabove enumerated, additional objects, advantages and capabilities of this invention will appear from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings in which:

Figure 1 is a fragmentary elevation of the end of a box car provided with the holding and releasing mechanism for hand brakes incorporating this invention;

Fig. 2 is a fragmentary vertical sectional view of the holding and releasing mechanism incor-
porating this invention taken on the line 2—2 of Fig. 1 looking in the direction of the arrows; Fig. 3 is a vertical sectional view of a fragment of the housing enclosing the mechanism of this invention, taken on the line 2—3 of Fig. 2, showing the mechanism in elevation with the parts in holding position; Fig. 4 is a view similar to that shown in Fig. 3, with the respective parts shown in holding position, but with the ratchet turned slightly forward and the pawl riding upon the high point of the ratchet teeth as the hand wheel is being turned and the brake being applied; Fig. 5 is a similar view in vertical section of the mechanism of this invention with the parts in the respective positions occupied when the operating hand lever has been swung into releasing position; Fig. 6 is a perspective view of the operating shaft and operating cams of the hand lever by which the holding and releasing mechanism is set into either holding or releasing position by the brake man; The embodiments of Figures 9 to 13 operate in substantially the same manner as that of Figures 1 to 8 as described above. The only difference is that the springs replace the weight and tend to move the pawl to its release position shown in each of Figures 9, 11 and 12 when the lever 50 is swung to the right as shown in dotted lines in these figures. Fig. 7 is a perspective view of the counterweighted pawl element of this invention; Fig. 8 is a perspective view of the pivoted pawl carriage; Fig. 9 is a fragmentary sectional view of the holding and releasing mechanism in modified form, in which a spring is employed in place of the counter-weight on the pawl element; Fig. 10 is a fragmentary top plan view of the end of the pawl carriage in which the spring operated pawl of Fig. 9 is pivotally mounted, the view being taken on line 10—10 of Fig. 9; Fig. 11 is a view similar to that in Fig. 9 of another modified form of the holding and releasing mechanism of this invention with a spring-operated pawl; Fig. 12 is a view similar to that shown in Fig. 9 of a third modified form of spring-operated pawl; Fig. 13 is a vertical sectional view through the pawl and pawl carriage of the modified form of this invention shown in Fig. 12, taken on the line 13—13 of Fig. 12. Similar reference characters designate corresponding parts throughout the several figures of the drawings.

The construction of the mechanism

Referring to the structures shown in Figs. 1–8, inclusive, showing a preferred form of an embodiment of this invention, Fig. 1 shows a fragment of the end of a box car indicated by the reference numeral 20. Secured by the bolts 21 to the end of the box car and near the top thereof is the housing 22 containing the holding and releasing mechanism for the hand brake. In addition to the holding and releasing mechanism of this invention, this housing contains a suitable sheave indicated by the numeral 23, upon which is wound a flexible brake chain 24. This chain is secured to the end of a rod 25 which runs to the bottom of the car and is there suitably linked to the conventional brake-operating mechanism which is standard equipment on freight cars, and which forms no part of this invention.

The sheave 23 is driven by a large gear indicated by the numeral 26, which is in turn driven by the pinion 27 secured to the shaft 25 which is operated by the hand wheel 28. Thus by operation of the hand wheel 28 the sheave may be turned and the brake chain 24 wound thereon. The use of the small pinion 27 enmeshed with the large gear 26 enables the brakeman to apply to the chain 24 the power necessary to operate the brakes merely by application of manual force to the hand wheel 28.

The handwheel shaft assembly

The handwheel shaft assembly A, best shown in Fig. 2, is driven by the handwheel 26, mounted upon the end of the shaft 29, and through rotation of the pinion 27 imparts the power necessary to rotate the brake chain sheave 23. The ratchet 33, which forms part A, is also keyed to the shaft 29 and to the pinion 27 to provide control of the shaft against reverse movement. The shaft 29 is rotatably supported by a gudgeon in the rear wall of the housing 22, and runs through the front wall of the housing where it is suitably journaled, to effect a substantial distance beyond. The entire assembly rotates as a single unit, its movement corresponding to the movement of the handwheel 28.

The pawl element

The pawl element B, shown in perspective in Fig. 7, is made in the form of a counterweighted unit, pivoting upon the central bearing 32, by which the pawl element rocks upon the pivot 31 (see Fig. 9). The counterweight 33 is suspended upon one arm of the element. The other arm projects in the opposite direction to provide the pawl tooth 34 near the bearing 32, and the pawl control finger 35 extending a short distance beyond and above the pawl tooth. The pawl tooth 34 is designed to form a detent for the ratchet 36.

The pivoted pawl carriage

The pawl element B is designed to be pivotally supported within the pivoted pawl carriage C which is shown in Fig. 8. This carriage is built in the form of a hollow frame, composed of the side walls 36 and 37, joined by the top cross member 38 and the bottom cross member 39. The cross member 38 is formed with the boss 40 along its length to give added strength to the member. The carriage is pivotally supported within the housing 22 by the gudgeons 41. The side walls 36 and 37 are perforated to form bearings 42 at the end most remote from the gudgeons 41 to receive the pivot 31, by which element B is supported within the carriage C.

The carriage side wall 36 bears the spur 43 directly above the gudgeon 41. The purpose of this spur will be explained hereafter.

As best shown in Figs. 3, 4, and 5, the pawl carriage C is pivotally mounted within the housing 22 over the handwheel shaft assembly A and in such relation thereto that when the pawl element B is mounted within the carriage, the pawl tooth 34 lies directly over the axis of the shaft 29.

The operating hand lever shaft

The operating hand lever shaft D is shown in perspective in Fig. 6. This shaft, like the handwheel shaft 26, is supported in the back wall of the housing 22 by the gudgeon 45, and projects
through the front wall of the housing. The projecting end 46 of the shaft is squared to receive the rocker 47, which is thereby keyed to the shaft. The rocker 47, shown in Fig. 1 and in phantom in Figs. 3, 4 and 5, is mounted outside of the housing 22. Its two ends are formed into the fingers or stops 48 and 49, between which the operating hand lever or trip lever 50 moves swungly upon the hand lever shaft D. The trip lever 50 thus has a limited range of free movement between the rocker-stops 48 and 49, beyond which it moves the rocker 47 and in parts movement to the shaft. This free movement is over a short range above the axis of the shaft D, so that any movement beyond the free range is aided by the weight of the hand lever 50, and when swung into its extreme positions, the weight of the hand lever thus insures that substantial leverage will be exerted upon the shaft D solely by the weight of the lever itself. For this purpose the hand lever 50 is given substantial length and weight.

It is to be noted that the hand lever shaft D is shorter than the hand wheel shaft 25, so that the rocker 47 and the hand lever 50 are mounted and move between the handwheel 28 and the housing 22, and are thus protected by the handwheel against accidental contact with any body that might tend to move them.

The shaft D is formed with the cam 51 and the trip finger 52, intermediate its length. When the shaft D is in position within the housing 22 the cam 51 rides over the control finger 35 upon the pawl element B and the trip finger 52 swings in an arc which is determined by the spur 43 on the pawl carriage C. The operation of these parts will be explained in detail in the description of the operation of this mechanism.

Within the housing 22 and preferably made integral with the rear wall thereof is the boss or stop 54, upon which the pawl carriage C rests in its lowermost position. Upon the upper side wall of the housing is the stop 54 which obstructs movement of the pawl carriage 33 beyond the range necessary for operation of the mechanism, and thus prevents any violent movement of the pawl carriage C out of operative position. On the other side wall of the housing the stop 44 similarly limits the range of movement of the trip finger 52 and the hand lever shaft D upon which it is mounted.

Alternative forms of structure

In Figs. 9–13 inclusive, are shown three alternative forms of construction of this invention, characterized by a slightly different form of pawl element and pawl carriage to permit the use of a spring instead of a counterweight to operate the pawl. In Fig. 9 the pawl carriage is varied from that previously described by the addition of the boss 158, and the pawl element terminates beyond the pivot 131 in the finger 156. Between the boss 158 and the finger 156 is compressed coil spring 133, which forces the pawl tooth 135 upward whenever the pawl control finger 135 is free of the projection of the cam 51.

In the form shown in Fig. 11, the pawl element terminates in the ear 167, and another ear 158 is formed on the side wall of the housing 22. These ears are connected by a spiral spring 133 which forces the pawl tooth 135 upward.

The form shown in Figs. 12 and 13, varies slightly from the form shown in Figs. 9 and 10 in the location of the finger 158 upon the pawl 15.
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the pawl carriage spur 43, and the pawl counterweight 33 will immediately lift the pawl tooth 34 clear of the ratchet, until the parts occupy the respective positions indicated in Fig. 5, when the mechanism is completely released. This will be noted that the pawl carriage C makes no movement during this operation, but rests within the housing upon the boss 53.

It is to be noted that when the trip lever 50 is left in the intermediate position indicated in Fig. 3, and the handwheel is turned counterclockwise to release the pawl tooth 34 from the ratchet 30, the further movement of the trip lever 50 is caused entirely by its own weight, as the trip lever is free to move between the stop 48 and the stop 49, and no movement of the other parts of the mechanism forces the trip lever to move. This feature of the structure prevents any forced movement of the trip lever which might endanger the hand of the operator.

In order to restore the holding and releasing mechanism into condition to control the handwheel ratchet 19, it is merely necessary to swing the trip lever 50 counterclockwise, whereupon its weight upon the stop 49 of the rocker 47 will swing the hand lever shaft D in the same direction and force the cam 51 into contact with the pawl control finger 35, restoring the parts to the condition shown in Fig. 3, whereupon the mechanism is in condition for application of the brakes.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A holding and releasing mechanism for a hand brake comprising a ratchet, a pivoted pawl carriage above said ratchet, a pawl pivotally mounted upon said pawl carriage and normally moving with said pawl carriage, manually controlled means engaging the pawl normally to constrain it to move with said carriage and movable to a position to permit movement of said pawl independently of said carriage, and means to move said pawl out of engagement with said ratchet whenever said means is in a position such that the pawl is capable of independent movement.

2. A holding and releasing mechanism for a hand brake comprising a ratchet, a pivoted pawl carriage above said ratchet, a pawl pivotally mounted upon said pawl carriage, a counterweight upon said pawl tending to lift said pawl out of engagement with said ratchet and tending to force said pawl carriage toward said ratchet, and means to permit said pawl to pivot in said pawl carriage.

3. A holding and releasing mechanism for a hand brake comprising a ratchet, a pivoted pawl carriage above said ratchet, a pawl pivotally mounted upon said pawl carriage, a counterweight upon said pawl tending to lift said pawl out of engagement with said ratchet and tending to force said pawl carriage toward said ratchet, and manually controlled means to permit said pawl to pivot in said pawl carriage.

4. A holding and releasing mechanism for a hand brake comprising a ratchet, a pawl carriage pivoted above said ratchet, a pawl pivotally mounted upon said pawl carriage, and a manually controlled means to move said pawl about its pivot on the carriage independently of movement of the carriage to engage or disengage the ratchet, the pawl being movable with the carriage to permit movement of the ratchet in one direction.

5. A holding and releasing mechanism for a hand brake comprising a ratchet, a pawl positioned to engage said ratchet, a pivoted pawl carriage holding said pawl in engagement with said ratchet, manually controlled means to free said pawl for movement relative to and independently of said pawl carriage and out of engagement with said ratchet, and means to move said pawl out of engagement with said ratchet, and manually controlled means whereby said first means may be rendered inoperative.

6. A holding and releasing mechanism for a hand brake comprising a ratchet, a pawl carriage, a pawl pivotally mounted upon said pawl carriage, and manually controlled means selectively to confine said pawl to movement with said carriage or to free said pawl for movement independently of said carriage.

7. A holding and releasing mechanism for a hand brake comprising a ratchet, a pawl carriage, a pawl pivotally mounted upon said pawl carriage, and manually controlled means selectively to confine said pawl to movement with said carriage or to free said pawl for movement independently of said carriage.

8. A holding and releasing mechanism for a hand brake comprising a ratchet, a pawl carriage pivotally mounted upon said pawl carriage, a pawl pivotally mounted upon said pawl carriage, and manually controlled means selectively to confine said pawl to movement with said carriage or to free said pawl for movement independently of said carriage.

9. A holding and releasing mechanism for a hand brake comprising a ratchet, a pawl carriage pivotally mounted upon said pawl carriage, a pawl pivotally mounted upon said pawl carriage, and manually controlled means selectively to confine said pawl to movement with said carriage or to free said pawl for movement independently of said carriage.
said pawl carriage and movable therewith or independently thereon, disengaging means upon said pawl to move said pawl independently of said carriage and to disengage said pawl from said ratchet, a trip lever shaft rotatably mounted within said housing, a trip lever mounted upon said shaft and without said housing, and a cam upon said trip lever shaft to engage said pawl to prevent movement thereof independently of the movement of said pawl carriage.

13. A holding and releasing mechanism for a hand brake comprising a housing, a ratchet rotatably mounted within said housing, a pawl carriage pivoted within said housing, a pawl pivoted upon said pawl carriage and movable therewith or independently thereon, disengaging means upon said pawl to move said pawl independently of said carriage and to disengage said pawl from said ratchet, a trip lever shaft rotatably mounted within said housing, a rocker secured to said shaft, a trip lever rotatably mounted upon said shaft and having a free range of movement thereon beyond which said trip lever engages said rocker and moves said shaft, and a cam upon said shaft to engage said pawl to prevent movement thereof independently of the movement of said pawl carriage.

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