May 17, 1932. J. F. O'CONNOR 1,858,520

HAND BRAKE

Filed Jan. 6, 1930

Fig. 1

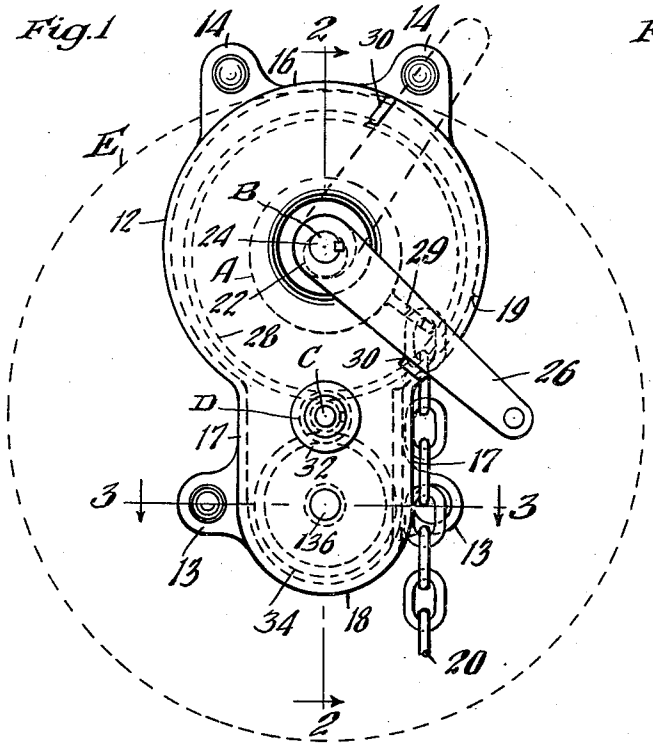


Fig. 2

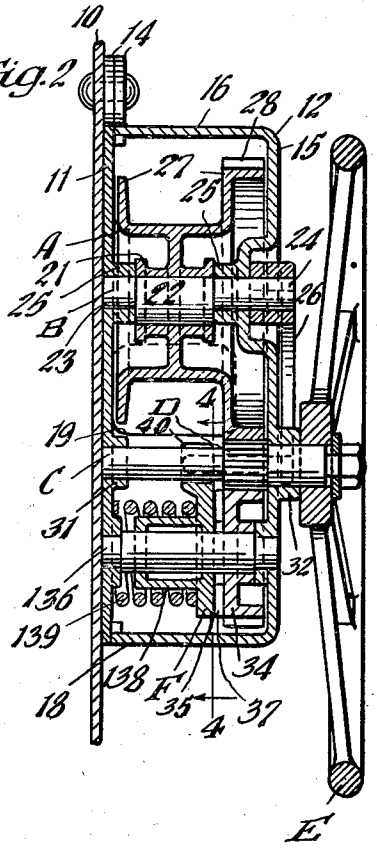


Fig. 3

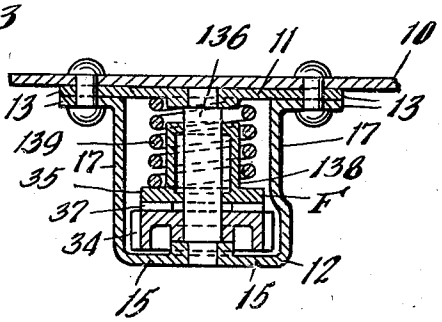


Fig. 4

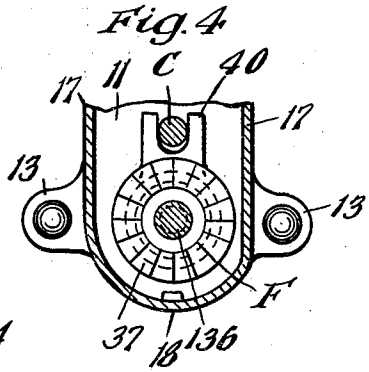
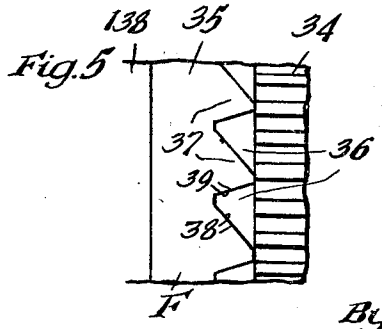


Fig. 5



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1,858,520

UNITED STATES PATENT OFFICE

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HAND BRAKE

Application filed January 6, 1930. Serial No. 418,797.

This invention relates to improvements in hand brakes.

One object of the invention is to provide a hand brake mechanism for railway cars especially adapted to be mounted on the end wall of a car, including a chain winding drum and gear means for rotating the drum, wherein ratchet means is employed for preventing retrograde movement of the chain winding drum, the ratchet means being so designed that the brake may be backed off or eased off against the action of said ratchet means.

Another object of the invention is to provide a hand brake mechanism including a rotary chain winding drum, a pinion geared to the drum for actuating the same, and ratchet means for opposing retrograde movement of the drum, wherein the ratchet means is geared to the driving pinion and is so designed that the brake mechanism may be backed or eased off against the action of said ratchet means, and wherein free running of the brake drum is obtained to permit unwinding of the brake chain in release by disengagement of the driving means of the drum and pinion by moving the drum away from the pinion.

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

In the drawings, forming a part of this specification, Figure 1 is an elevational view of my improved hand brake mechanism, illustrating the same as mounted on the end wall of a railway car. Figure 2 is a vertical, sectional view longitudinally of the car, corresponding substantially to the line 2—2 of Figure 1. Figure 3 is a horizontal, transverse, sectional view corresponding substantially to the line 3—3 of Figure 1. Figure 4 is a vertical, sectional view in a plane transverse of the car of the lower end portion of my brake mechanism, corresponding substantially to the line 4—4 of Figure 2. And Figure 5 is an enlarged, elevational view of portions of two cooperating ratchet members employed in connection with my improved hand brake.

In carrying out my invention, I preferably enclose the operating parts of the hand brake in a two part housing which is mounted on the end wall of the car, the end wall of said car being designated by 10 in the drawings. The two part housing comprises a back plate 11 and a cover member 12. The back plate 11 is substantially of the outline shown, in Figure 1 and has a pair of laterally projecting securing lugs 13—13 at the bottom end thereof, and a pair of upstanding securing lugs 14—14 at the upper end.

The cover member 12 of the housing comprises a vertical outer wall 15 and a projecting flange portion 16 forming a cylindrical side wall of curved outline at the upper end of the cover member and having vertical sections 17—17 at the lower end connected by a curved bottom wall 18. The side wall 16 is provided with an opening 19 at the right hand side of the housing, as seen in Figure 1, through which the brake chain operates. The chain of the brake mechanism is indicated by 20 and is connected in the usual way to the brake mechanism proper, not shown, which includes the usual brake shoes.

My improved hand brake mechanism proper comprises broadly a chain winding drum A; an eccentric journal member B, on which the drum is rotatably supported; an operating shaft C having a driving pinion D thereon; an operating hand wheel E; and spring pressed ratchet means F geared to the pinion D.

The chain winding drum A has a hub portion 21 which is rotatably mounted on a journal section 22 of the journal member B. The section 22 is of such a length as to correspond with the length of the hub portion of the drum. The journal member B is provided with a pair of trunnions 23 and 24 which are rotatably journaled in bearing members 25—25 inwardly projecting from the front and rear walls of the housing respectively, and engaging the opposite ends of the hub of the chain winding drum A. The bearing portion 22 is substantially cylindrical and is eccentric with respect to the trunnion members 23 and 24. The trunnion member 24 extends outwardly of the front wall of the housing and has an operating lever member 26 secured to the outer end thereof by which

the journal member B may be turned to displace the eccentric portion thereof and move the brake drum upwardly away from the pinion D. As clearly shown in Figure 2, the front wall of the housing is depressed about the bearing member 25 to provide a socket adapted to accommodate the hub portion of the operating handle lever 26. The brake drum is of substantially cylindrical form and has spaced upstanding annular flanges 27—27 defining a relatively wide chain winding channel therebetween. The outer flange 27 is provided with an annular, laterally extending portion 28 forming a gear member which is integral with the drum. The brake chain 20 is secured to the winding drum A by an outstanding lug 29 within the channel of the drum, the end link of the chain extending through an opening in said lug. The operating handle 26 for the journal member B has its oscillating movement limited by a pair of spaced lugs 30—30 which determine the extreme movements of said lever and the eccentric journal member B.

The operating shaft C has its inner end journalled in a bearing opening 31 provided in the rear plate 11 of the housing. The outer end portion of the shaft C is of slightly larger diameter at the inner end thereof and is journaled in an outstanding boss 32 on the front wall of the housing. The shaft C projects outwardly beyond the boss 32 and has the hand wheel E fixed thereto in any suitable manner. As shown in Figure 1, the hand wheel is secured by a key member and is held in position by the usual nut threaded on the end of the shaft. The pinion D is preferably formed integral with the shaft C and meshes directly with the gear teeth of the gear 28.

The ratchet means comprises a pair of disc-like cooperating ratchet members 34 and 35. The ratchet members are journaled on a shaft 136, which has its opposite ends seated in alined openings provided in the front and rear walls of the housing. The ratchet member 34 is in the form of a gear member and meshes with the pinion D. On the inner side the ratchet member 34 is provided with a plurality of ratchet teeth 36 arranged in annular series, radiating from the axis of rotation of the disc and cooperating with a similar set of ratchet teeth 37 on the member 35. The member 35 has a cylindrical hub portion 138 which surrounds the shaft 136 and has the inner end spaced an appreciable distance from the vertical end wall 11 of the housing. A helical spring 139 surrounds the hub portion 138 and is interposed between the outer disc-like section of the member 35 and the wall 11 of the housing and urges the teeth 37 of the member 35 toward the teeth 36 of the member 34. In order to hold the ratchet member 35 against rotation, the same is provided with a forked lug 40 which embraces the operating shaft C, as clearly shown in Figure 4.

Upon reference to Figure 5, it will be seen that the ratchet teeth 36 and 37 of the two ratchet members 34 and 35 are so designed that a ratcheting action will be had when said members are rotated relatively to each other in either direction but that greater resistance to rotation is offered in one direction than in the other. The teeth 36 and 37 of the two ratchet members are of like design and each tooth has an opposed pair of inclined surfaces 38 and 39 which are disposed at different angles with respect to the plane of rotation of the ratchet members. As clearly shown in Figure 5, the surface 38 of each tooth is arranged at a keener angle with respect at the plane of rotation of the ratchet members than the face 39 of said tooth. The inclination of the faces 38 of the teeth of the two ratchet members preferably corresponds substantially to the inclination of the engaging surfaces of the usual ratchet members employed in hand brakes. The inclination of the faces 39 of the ratchet teeth is such that relative rotation of the two ratchet members will be prevented when the brake chain is being tightened and when the same is fully tightened. In other words, the resistance to rotation offered by the engaging surfaces 39—39 of the ratchet members exceeds the force exerted by the pull of the brake chain during the winding operation and when fully tightened so as to prevent retrograde movement of the chain winding drum and hold the brakes in tightened condition when applied. It is further pointed out that the inclination of the faces 39 of the teeth of the ratchet members is such as to permit ratcheting of these members and relative rotation thereof when power is applied to rotate the hand wheel of the brakes in a direction so as to effect unwinding of the brake chain. The parts are so adjusted and the tension of the spring 139 is such that only slight additional force need be exerted by the operator to effect rotation of the hand wheel in the direction to unwind the brake chain.

The operation of my improved hand brake mechanism during a chain tightening operation is as follows: The hand wheel E is rotated in a clockwise direction, as viewed in Figure 1, thereby effecting rotation of the pinion B and through the gear 28 which meshes with the pinion rotation of the chain winding drum in a contra-clockwise direction, thereby winding the chain on the same. During this action, the ratchet member 34 will be rotated by the pinion D and the same will ratchet on the member 35, the inclined surfaces 38 of the teeth 36 of the member 34 passing over the inclined surface 38 of the teeth 37 of the relatively stationary member 35. As will be evident, due to the keen angularity of the faces 38 of the teeth little re-

sistance is opposed to rotation of the pinion during the chain winding operation. However, backward rotation of the member 34 with respect to the member 35 is prevented by the relative blunt cooperating engaging faces 39—39 of the teeth 36 of the gear 34 and the teeth 37 of the gear 35. As hereinbefore pointed out, the resistance offered by these cooperating faces of the teeth is sufficient to prevent retrograde movement of the chain winding drum A and hold the brakes tightened.

When it is desired to ease off or back up the brakes, the hand wheel E is rotated in a contra-clockwise direction, as viewed in Figure 1, thereby effecting rotation of the chain winding drum in a clockwise direction and also effecting rotation of the ratchet member 34 in a clockwise direction, movement of the ratchet member 34 being permitted by the cooperating teeth of said member and the member 35, as hereinbefore pointed out. The slight additional force exerted by the operator on the hand wheel E is sufficient to overcome the resistance between the cooperating surfaces 39—39 of the ratchet teeth. In this connection, it is pointed out that the pull of the tightened brake chain assists the operator in the backing off or easing up of the brakes. When it is desired to completely release the brakes, the lever 26 is moved to the dotted line position shown in Figure 1, thereby rotating the eccentric journal member B and lifting the chain winding drum A away from the pinion D so as to disengage the cooperating teeth thereof. Free running of the chain winding drum A is thus permitted and the brakes released.

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, the combination with a chain winding drum; of a rotatable, eccentric supporting means on which the drum is mounted for rotation; a pinion for operating said drum; means cooperating with said pinion for preventing retrograde movement of the drum, including an interengaging pair of ratchet members, said members having cooperating ratchet teeth, each tooth having a pair of reversely inclined engaging surfaces; and means for turning said eccentric support to disengage the pinion and drum to permit free running of the drum and release of the brakes.

2. In a hand brake, the combination with a chain winding drum; of a rotatable, eccentric support on which the drum is mounted for rotation; of a pinion for rotating said drum; means geared to said pinion for opposing retrograde movement of the drum, including an interengaging pair of ratchet members, said members having cooperating ratchet teeth, each tooth having a pair of reversely inclined engaging faces, one of said faces being disposed at a relatively keen angle with respect to the plane of rotation of said ratchet member to permit relative rotation thereof when said drum is operated in a chain winding direction and the other face of which is disposed at a relatively blunt angle to said plane of rotation to oppose retrograde relative movement of said members to hold said drum against retrograde rotation, the angle of said blunt faces being such that the resistance to relative movement of the ratchet members is overcome when power is applied to the actuating pinion to back off the brakes; and means for turning said eccentric support to disengage the pinion and drum to permit free running of the drum and release of the brakes.

3. In a hand brake mechanism, the combination with a rotary chain winding drum; of means for rotating the drum in reverse directions for winding and unwinding the chain; and means yieldingly opposing rotation of said drum in chain unwinding direction, including an annular ratchet member rotatable with the drum in both directions, a second annular ratchet member held against rotation, and yielding means for forcing said ratchet members in engagement with each other, said ratchet members having cooperating interengaging teeth, said teeth having two sets of cooperating inclined engaging faces, one set of cooperating faces being reversely inclined to the other set, one of said sets of cooperating faces being disposed at such an inclination to permit free ratcheting action when the drum is operated in chain winding direction, and the other cooperating set of faces being of such an inclination as to normally resist rotation of the drum in chain unwinding direction, but permitting ratcheting action in said last named direction when power is applied to said means for rotating the drum in unwinding direction, thereby permitting manual backing-off of the brakes.

4. In a hand brake mechanism, the combination with a rotary chain winding drum; of rotary means for rotating said drum in reverse directions to respectively wind and unwind the chain; and means for yieldingly opposing rotation of said drum in unwinding direction, including a ratchet disc rotatable with the drum in both directions, a cooperating ratchet disc held against rotation, but movable toward and away from said first named ratchet disc, and spring means yieldingly urging said last named disc toward the first named disc, the cooperating teeth of said ratchet disc having two sets of cooperating engaging faces, the faces of one cooperating set being reversely inclined to the faces of the other cooperating set, one of

said sets of cooperating faces being disposed at a relatively keen angle with respect to the plane of rotation of said ratchet discs to permit relative rotation thereof when said drum is operated in a chain winding direction, and the other set of cooperating faces being disposed at a relatively blunt angle with respect to said plane of rotation to oppose reverse relative movement of said discs to hold said drum against retrograde movement, said blunt faces being disposed at such an angle with respect to the plane of rotation of said discs that the resistance to relative movement of said discs is overcome when power is applied to the actuating means to back off the brakes.

In witness that I claim the foregoing I have hereunto subscribed my name this 3rd day of January 1930.

JOHN F. O'CONNOR.