Sept. 13, 1932. J. HARRIS 1,877,308

HAND BRAKE

Filed Dec. 26, 1929

Fig. 1

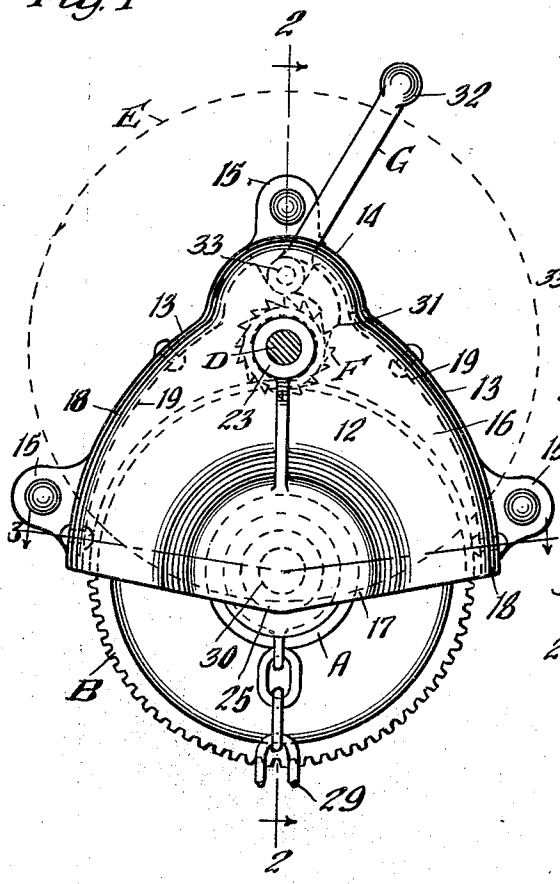


Fig. 2

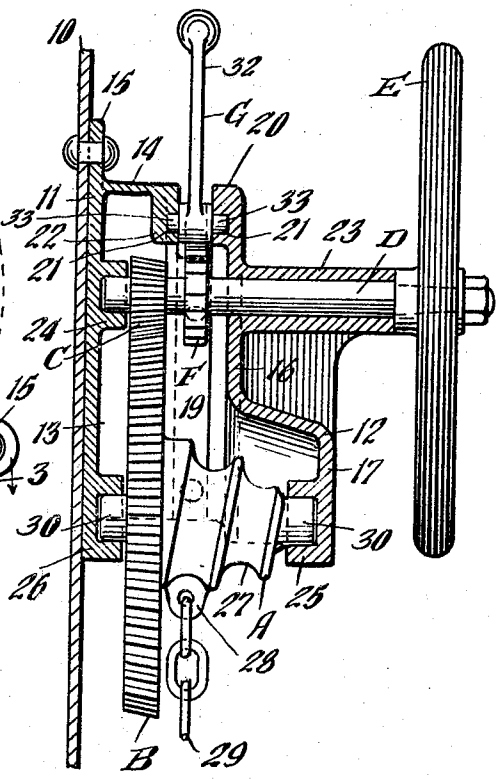
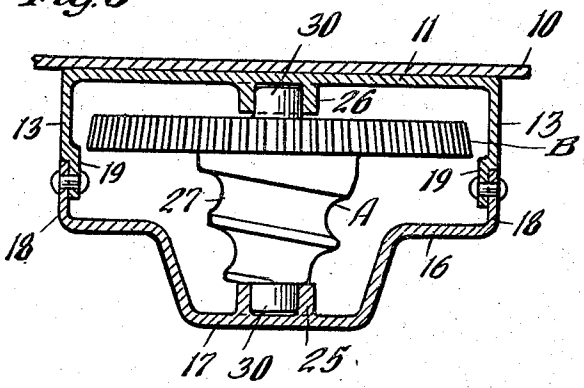


Fig. 3



Witness
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UNITED STATES PATENT OFFICE

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HAND BRAKE

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This invention relates to improvements in hand brakes.

One object of the invention is to provide a simple and efficient hand brake of the power multiplying gear type, including a conical or tapered drum on which the brake chain is wound to provide for quick takeup of the slack of the chain and brake mechanism at the initiation of the winding operation, during which operation the chain is wound on the larger diameter of the drum, followed by slower winding with increased force applied to the brake mechanism by winding of the chain on that portion of the drum which is of reduced diameter, wherein the driving gears are so designed that they counterbalance the end thrust produced by the winding of the chain, thereby greatly reducing the wear incident thereto on the bearings of the device and also overcoming the tendency of distortion of the parts of the mounting for the brake.

A further object of the invention is to provide a hand brake including a winding drum, power multiplying gearing for driving the drum, and a housing within which the parts are enclosed, all so designed that the parts may be readily and economically assembled. the housing for this purpose being composed of two parts which are rigidly secured together and the parts of which are provided with alined sets of bearing means for the bearing elements at opposite ends of the winding drum and the driving gear respectively.

A still further object of the invention is to provide a hand brake of the character described in the preceding paragraph including a ratchet member and cooperating pivoted dog for preventing retrograde movement of the winding drum, wherein the dog is provided with trunnions and the two sections of the housing are provided with alined pivot sockets accommodating the trunnions.

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

In the drawing, forming a part of this specification, Figure 1 is a front elevational view of my improved hand brake mechanism illustrating the same applied to the end wall of a railway car, certain parts of the mechanism interiorly of the housing being illustrated in dotted lines. Figure 2 is a vertical, sectional view corresponding substantially to the line 2—2 of Figure 1. And Figure 3 is a sectional view, taken on two transverse planes intersecting each other at an angle and corresponding substantially to the line 3—3 of Figure 1.

In said drawing, the end wall of the car is designated by 10 and serves as the supporting means for the housing of my improved hand brake mechanism.

In carrying out my invention, I provide a housing of the sectional type, preferably composed of two parts, as clearly shown in Figures 2 and 3. The housing comprises back and front sections designated by 11 and 12 respectively. The back section of the housing comprises a vertical wall member of plate-like form having spaced, laterally extending, vertically disposed side wall sections 13—13 formed integral therewith, which side wall sections are connected at the upper end by a curved top wall 14 also formed integral with the plate-like back wall 11. The walls 13—13 and 14 and the contour of the back wall 11 are substantially as shown in Figure 1. The back wall 11 is provided with three securing lugs 15—15—15, one of which is disposed at the upper end of the plate and the remaining two of which are disposed at opposite sides at the lower end of the same. Any well known type of securing means may be employed for fastening the section 11 of the housing to the end wall 10 of the car, and as herein shown the same is secured by rivets extending through the lugs 15 and said end wall 10 of the car. The front section of the housing includes a front wall proper 16, substantially parallel to the back wall of the rear section of the housing, and an outwardly offset portion 17 forming a pocket for a purpose hereinafter pointed out. The section 12 of the housing has vertically disposed, curved side walls 18—18 formed integral therewith and in alinement with the wall portions 13—13 of the rear section of the housing.

As clearly shown in Figure 3, the walls 13—13 of the rear section of the housing are offset inwardly along their outer edges as indicated at 19—19 so that the inner edges of the walls 18—18 of the outer section of the housing may be telescoped thereover. In order to permanently secure the parts of the housing together, the telescoped portions of the walls 13—13 and 18—18 are riveted together, as clearly shown in Figures 1 and 2. The upper end portion of the wall 16 is thickened, as indicated at 20, said thickened portion projecting inwardly and having a bearing opening 21 therein for a purpose hereinafter pointed out. The outer end of the top wall 14 of the rear section of the housing is provided with a depending thickened lug portion 22, which has a bearing opening in alinement with the opening 21 of the front section of the housing, said opening in the lug 22 being also designated by 21. The front wall 16 of the outer section of the housing is provided with an elongated hollow boss 23 outwardly extending therefrom and formed integral therewith. The hollow boss forms a bearing member for the operating shaft of my improved brake mechanism, as hereinafter more fully pointed out. The rear wall of the inner section of the housing is provided with a relatively short inwardly projecting bearing boss 24, having a bearing opening in alinement with the bearing opening of the boss 23. The wall 17 of the pocket at the lower end of the outer section of the housing is also provided with an inwardly extending boss 25 and the wall 11 of the inner section of the housing is provided with a similar boss 26 in alinement with the boss 25, the bosses 25 and 26 having alined bearing openings.

My improved brake mechanism proper comprises broadly a winding drum A, a gear B, a pinion C, a drive shaft D, a hand wheel E, a ratchet member F and a locking dog G.

The winding drum A is of conical form and has a substantially spiral winding groove 27 thereon. At the end of larger diameter, the drum is provided with an outstanding lug 28 to which the end of the brake chain 29 is secured. As will be understood, the brake chain 29 is connected to the brake mechanism of the car, not shown, in the usual manner. The brake drum A is provided with trunnions 30—30 at opposite ends thereof formed integral therewith and journaled in the bearing openings of the bosses 25 and 26 of the front and rear sections of the housing respectively. The gear B is preferably formed integral with the drum A and is located at the end of the drum which is of larger diameter. The gear B is of tapered or beveled form, as clearly shown in Figures 2 and 3 of the drawing.

The pinion C is fixed to the shaft D, which is rotatably journaled in the bosses or bearing projections 23 and 24 of the front and rear sections of the housing. The pinion C is also of the tapered or beveled type, the same being beveled in a direction reversely to the bevel of the gear B. The shaft D has the hand wheel E fixed to the outer end thereof in any well known manner so that the shaft will be rotated in unison with the hand wheel. The shaft D also has the ratchet F fixed thereto with which the locking dog G cooperates. The locking dog G is of bell crank form, one arm thereof being provided with a tooth member 31 which cooperates with the ratchet F and the other arm thereof being provided with a manipulating hand grip portion 32. The locking dog is provided with pivot trunnions 33—33 at opposite sides thereof which are journaled in the alined openings 21—21 of the front and rear sections of the housing. As clearly shown in Figure 1, the handle end of the dog is so disposed that the weight of the same urges the teeth of the dog into engagement with the ratchet member F by the action of gravity.

In assembling my improved hand brake mechanism, the trunnion at the inner end of the brake drum is engaged within the bearing boss 26 of the rear section of the housing, the inner end of the shaft D engaged within the bearing boss 24 of said section of the housing and the inner trunnion of the locking dog engaged within the bearing opening 21 of said rear section. The front section of the housing is then applied, the shaft D being passed through the bearing member 23 and the front trunnions of the winding drum A and the dog G engaged within the corresponding bearing openings of the front section. The parts of the housing are then riveted together, thereby securing all of the parts permanently in operative relation.

The operation of my improved hand brake mechanism is as follows: In applying the brakes, the hand wheel E is rotated in a clockwise direction, as viewed in Figure 1, thereby effecting rotation of the driving pinion C which meshes with the gear B, thereby rotating the latter in a contra-clockwise direction and rotating the drum A therewith, thereby winding the chain 29 on the drum. Inasmuch as the drum is of conical form and the brake chain is secured to that portion thereof which is of larger diameter, a relatively rapid takeup of the brake chain is effected during the initial chain winding operation due to the chain being wound about the larger diameter of the drum. The slack in the brake chain and the brake mechanism is thus rapidly taken up. During the further brake tightening operation, the chain 29 will be wound about the conical drum, thereby greatly increasing the power during the final application of the brakes due

to the chain being wound about the portion of the drum of decreasing diameter. Inasmuch as the gear B is of much greater diameter than the driving pinion, the power applied by the operator to the hand wheel E will be greatly multiplied in the brake winding operation. The locking dog G, which cooperates with the ratchet member F, prevents backward movement of the driving shaft D and through the intermeshing gears holds the chain winding drum A against movement in an unwinding direction.

While the brake chain is being wound on the conical or tapered drum A, a certain amount of end thrust is produced tending to force the drum in a lefthand direction, as viewed in Figure 2. The driving pinion C and the cooperating gear B being reversely beveled and the gear B having the bevel thereof tapered in a direction reversely to the taper of the winding drum, these intermeshing gears will counter balance the end thrust of the winding drum during the chain winding operation, the tendency of the intermeshing gears being to produce an end thrust toward the right, as viewed in Figure 2, of the gear B and the brake drum which is fixed thereto. As will be evident, my improved arrangement of bevel gearing thus counterbalances the end thrust on the drum due to the winding of the chain thereon, thereby greatly reducing the wear on the bearing members of the rotary parts of the brake mechanism and further preventing distortion of the housing due to said end thrust.

When it is desired to release the brakes, the operator disengages the dog G from the ratchet wheel, thereby permitting free rotation of the winding drum. In order to maintain the dog disengaged from the ratchet wheel, the hand grip is thrown to the left, as seen in Figure 1, to such an extent that it overbalances the toothed end of the dog, thereby maintaining the dog disengaged through the action of gravity. In case it is desired to back up the brakes, the hand wheel may be rotated in a contra-clockwise direction, as viewed in Figure 1, while the locking dog is disengaged from the ratchet member.

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 tapered drum on which the brake chain is wound; of a tapered gear of relatively large diameter fixed to the drum; a tapered driving pinion meshing with said gear, said gear and pinion being tapered reversely and said gear being tapered reversely to the conical drum; and means for rotating said pinion to wind the brake chain on the drum.

2. In a hand brake, the combination with a tapered drum on which the brake chain is adapted to be wound; of a tapered gear of relatively large diameter fixed to the drum at the end thereof of greatest diameter; a tapered driving pinion meshing with said gear, said gear and pinion being tapered reversely and said gear being tapered reversely to the conical drum; and means for rotating said pinion to wind the brake chain on the drum.

3. In a hand brake mechanism, the combination with a two-part housing comprising front and rear sections rigidly secured to each other, said housing sections having spaced front and rear walls respectively, said rear wall having an inwardly opening bearing socket and said front wall having a bearing opening aligned with said socket; of a chain-winding drum journaled in said front and rear walls for rotation about an axis at substantially right angles to said walls; a tapered gear fixed to the drum, said gear being tapered toward said rear wall; an operating shaft having a hand wheel at the outer end, said shaft extending through and being journaled in the bearing opening of said front wall, said shaft having the inner end thereof journaled in the bearing socket; and a tapered pinion fixed to said shaft, said pinion meshing with said gear and being tapered in a direction reverse to the taper of said gear, whereby the inner end of said shaft is held seated in said bearing socket.

In witness that I claim the foregoing I have hereunto subscribed my name this 23rd day of December 1929.

JOSEPH HARRIS.