Dec. 23, 1941. E. C. MERSEREAU 2,267,037

HAND BRAKE MECHANISM

Original Filed March 30, 1939

Fig. 1.

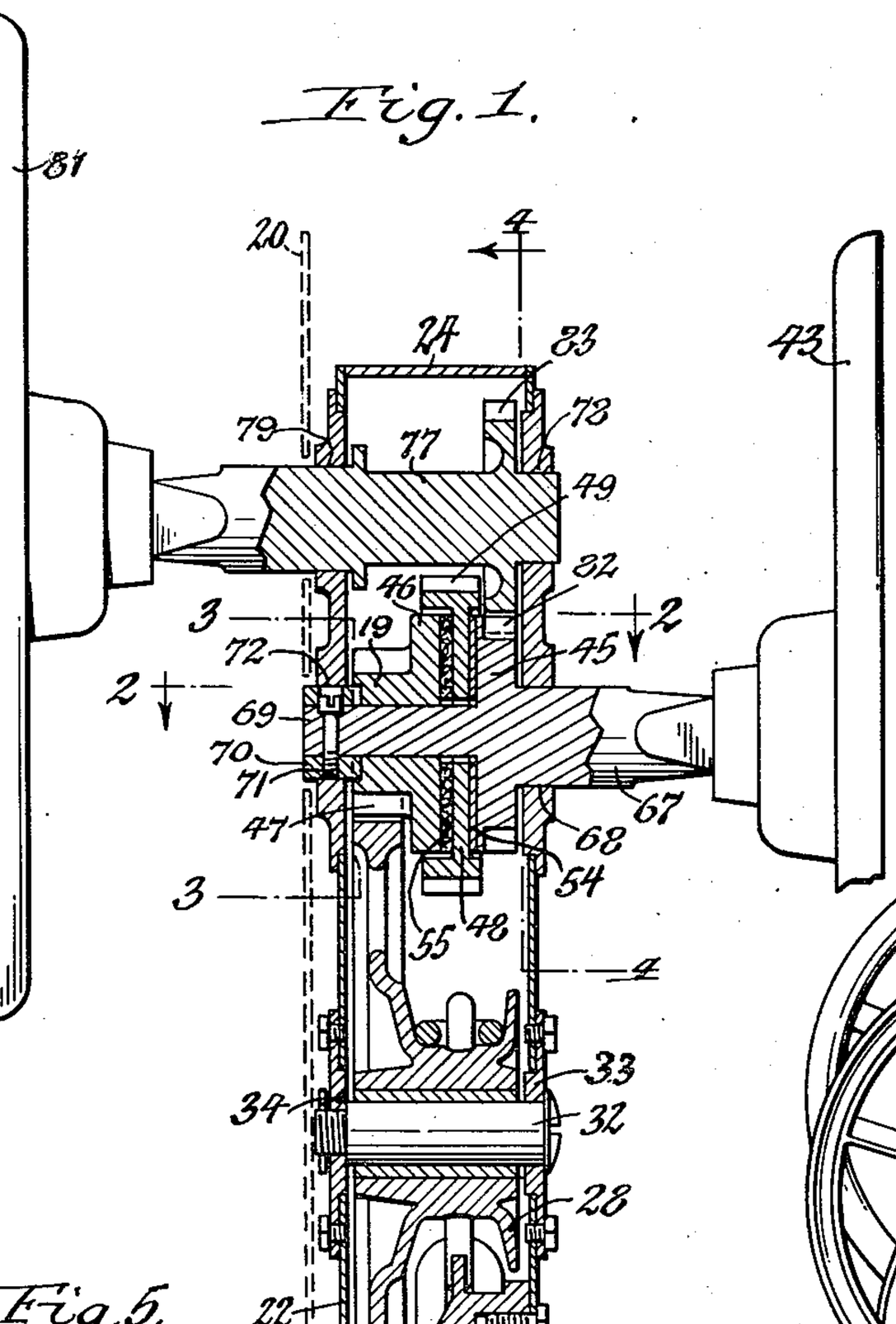


Fig. 4.

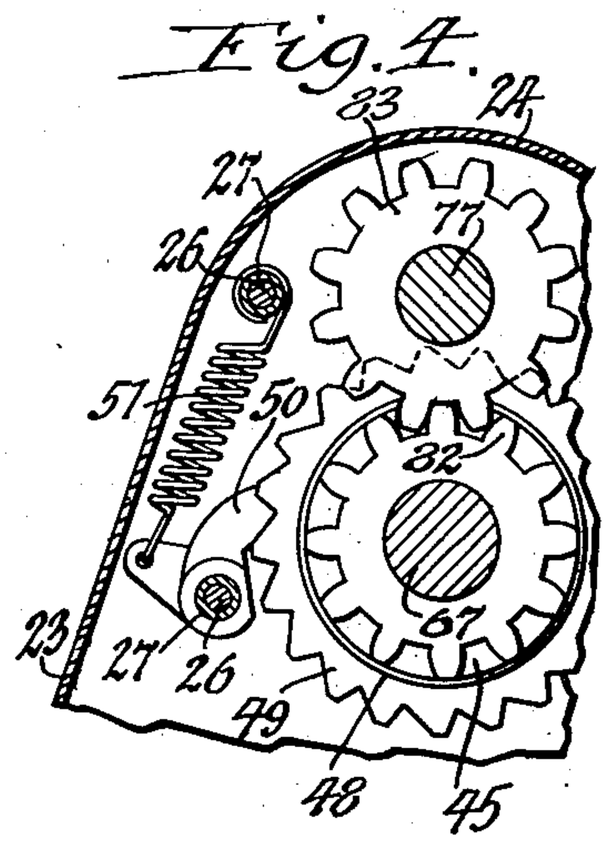


Fig. 6.

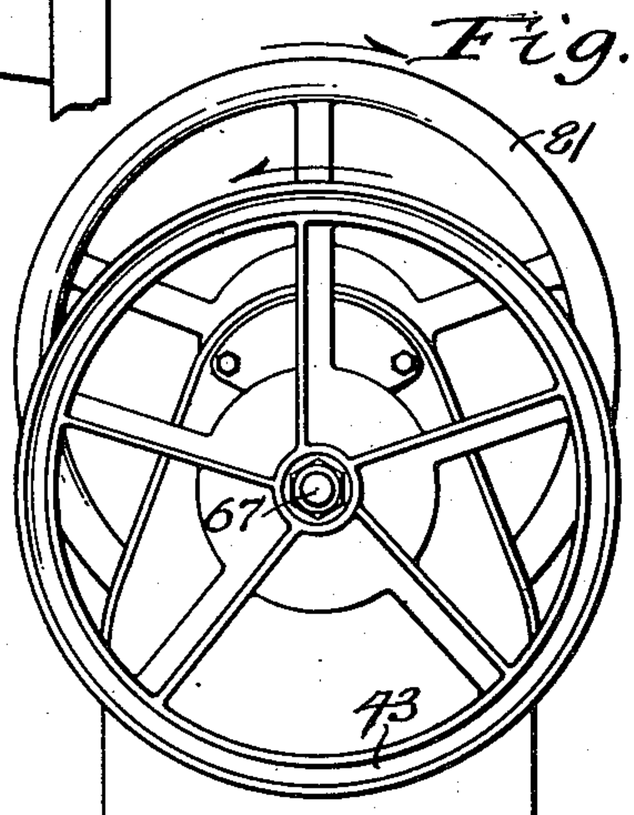


Fig. 5.

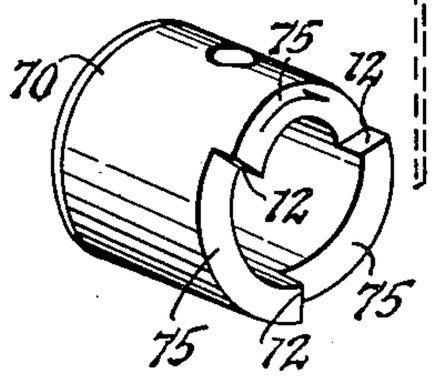
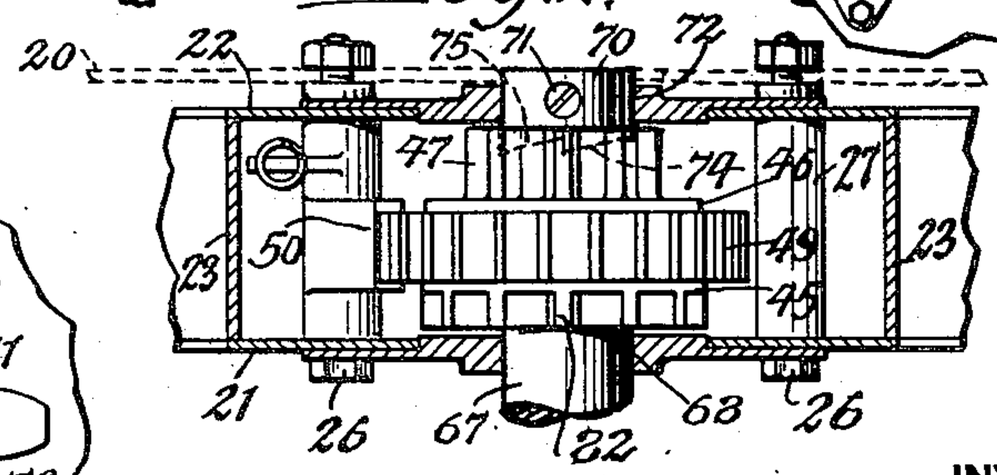


Fig. 2.



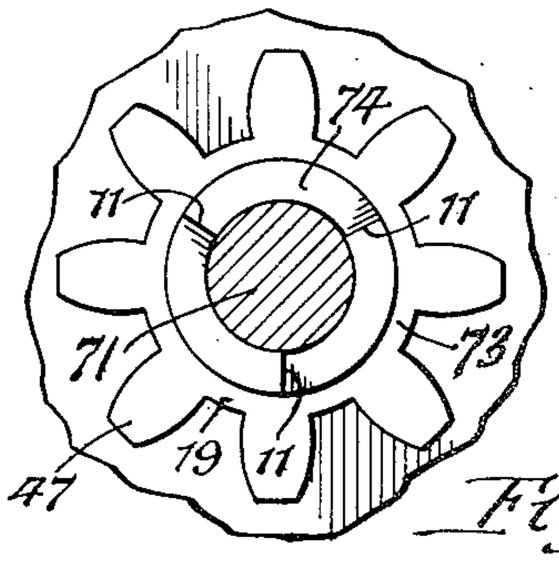


Fig. 3.

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HAND BRAKE MECHANISM

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1 Claims. (Cl. 74—505)

This invention relates to a hand brake mechanism for railway cars which embodies a non-return detent device whereby the brake mechanism is held in its applied position, and also cam means whereby the brake mechanism may be gradually released without permitting the hand wheel to spin backwardly but which will cause the backward pulling load of the brake mechanism to automatically relock the same against further releasing movement the instant that backward rotation of the hand operated wheel ceases.

A hand brake mechanism of this character is shown and described in United States patent application No. 265,011 of which the present application is a division.

The object of this invention is to provide an improved organization of this type of brake mechanism which is simple in construction, reliable in operation, and capable of being manufactured at low cost.

In the accompanying drawing:

Fig. 1 is a vertical longitudinal section of a brake mechanism embodying this improvement.

Fig. 2 is a fragmentary horizontal section of the same taken on line 2—2, Fig. 1.

Fig. 3 is a fragmentary vertical transverse section, on an enlarged scale, taken on line 3—3, Fig. 1.

Fig. 4 is a fragmentary vertical transverse section taken on line 4—4, Fig. 1.

Fig. 5 is a perspective view of a collar which is mounted on the main operating shaft of the brake mechanism and provided with helical surfaces for cooperation with a gear pinion of the clutch device forming part of the brake mechanism.

Fig. 6 is an elevation of the brake mechanism, on a reduced scale, viewed from the outer side of the same.

In the following description similar reference characters indicate like parts in the several figures of the drawing.

Although the hand brake mechanism which embodies the present improvements may be variously organized as to details of construction and the manner of mounting the same on a railway car the present construction is mounted on the upright end wall 20 of a car body and the same is capable of being operated from the exterior and also the interior of the car.

The main parts of this brake mechanism are enclosed within a metal casing which also serves as the main frame for this mechanism and, as shown in Fig. 1, this casing is arranged on the outer side of the car wall 20, and comprises transverse front and rear walls 21, 22, two longitudinal side walls 23, and a top 24 connecting the side walls, leaving the lower end of this casing open, as shown at 25. This casing may be secured to the wall of the car body in any suitable manner but preferably by means of a plurality of bolts 26 extending lengthwise through the front and rear walls 21, 22 of the casing and also through the wall 20 of the car body, as shown in Fig. 2, each of said attaching bolts being surrounded within the casing by a spacing sleeve or bushing 27.

Although the casing is represented in the drawing as mounted on the outer side of the car body the brake controlling and operating mechanism contained therein is not dependent on such location of the casing inasmuch as the latter may be mounted within the car body without altering the brake controlling mechanism. For convenience of description, therefore, the wall 21 of the casing will be regarded as the front side of the apparatus and the wall 22 as the rear side of the same.

Within the lower front part of the casing is arranged a chain drum or wheel 28 over which a flexible draft member 29 forming part of the brake mechanism is adapted to pass and interengage therewith in a manner resembling a sprocket chain and wheel. This flexible member consists preferably of a chain which has one end passing over the upper part of the chain drum or wheel, while the opposite end of the same is operatively connected with the brake shoes of the car. The chain is positively moved forwardly or backwardly upon turning the drum in the corresponding directions and thus cause the chain to be either tightened and the brake shoes pressed against the wheels of the car or loosened for releasing the pressure of the shoes against said wheels.

This drum is mounted for rotation on a longitudinal axle or arbor 32 which is supported at its front and rear ends on bearing disks 33, 34 secured, respectively, to the front and rear walls of the casing. Within the lower rear part of the casing is arranged a gear wheel 35 which turns with the chain drum 28 and is preferably cast in one piece therewith, as shown in Fig. 1. Above the chain drum and gear wheel 35 is arranged a main operating shaft which, in the construction shown in Fig. 1, is made in one piece and has a front part 67 of comparatively large diameter which is journaled in a bearing 68 on the front wall 21 of the casing and a reduced rear

part 69 which has a cylindrical collar 70 secured thereto by a transverse screw 71 and turning in a bearing 72 on the rear wall 22 of the casing.

On the front end of the main operating shaft 67, 69 is mounted a handle or manually operable wheel 43 which is arranged in front of the casing and outer side of the car body. Adjacent to the inner side of the front wall 21 of the casing the main operating shaft is provided with a front or abutment clutch disk 45 which is preferably formed integrally with this shaft. Opposing the abutment clutch disk is a controlling clutch disk 46 which is connected with the hub 19 of a gear pinion 47 mounted on the rear part of the main driving shaft within the casing and in front of the collar 70. This gear pinion 47 meshes with the upper teeth of the main gear wheel 35, as shown in Fig. 1.

Between the front or abutment clutch disk 45 and the rear or controlling clutch disk 46 is arranged an intermediate or detent clutch disk 48 which is capable of forward rotation about the adjacent part of the main operating shaft. Detent ratchet means are provided whereby the detent clutch disk 48 is permitted to turn forwardly but is prevented from moving backwardly, which detent means preferably comprise an annular row of ratchet teeth 49 arranged on the periphery of the detent disk 48 and a detent pawl or dog 50 pivoted upon one of the casing fastening bolts 26 within the casing and yieldingly held in engagement with the teeth 49 of the detent disk 48 by means of a spring 51 which is connected at one end with the detent pawl 50 while its opposite end is connected with an upper casing fastening bolt 26, as shown in Figs. 2 and 4, or with any other available stationary part of the casing. During the forward rotation of the detent disk 48 its ratchet teeth 49 trip idly past the detent pawl 50 but backward rotation of this disk is prevented by engagement of this pawl with the tooth 49 of the detent disk immediately in front of this pawl, as shown in Fig. 4.

Clutch means are provided whereby a forward rotation of the main operating shaft in a clockwise direction, when viewed from the front of the casing, or in an anti-clockwise direction, when viewed from the rear of the casing, will cause the gear pinion 47 and its controlling disk 46 to be moved forwardly on the main operating shaft and cause the front abutment disk 45 to press against the front side of the detent disk 48 for compelling the latter to rotate forwardly with the main operating shaft, which clutch means upon turning the main operating shaft backwardly will cause the rear controlling clutch disk 46 to be moved away from the rear side of the detent disk 48 and the front abutment disk 45 to release its grip on the front side of the abutment disk and thereby permit said front and rear disks 45 and 46 to move backwardly independently of the detent disk while the latter is being held against backward movement by the dog 50. Although various means may be employed for effecting this axial movement of the gear pinion 47 and controlling disk 46 relative to the operating shaft this is accomplished in the construction shown in Figs. 1, 2, 3 and 5 as follows:

On its rear end the hub 73 of the gear pinion 47 is provided with a plurality of inclined, helical or cam surfaces 74 which engage with correspondingly inclined, helical or cam surfaces 75 on the collar 70. The inclination of the cooperating helical or cam surfaces 74, 75 is such that upon turning the operating shaft 67, 69 forwardly or in a clockwise direction, the hub 19 will be moved forwardly by a screw action and cause the controlling clutch disk 46 to be pressed against the rear side of the detent disk 48 while the abutment disk 45 on the main shaft is pressed against the front side of this detent disk, thereby causing the latter to turn forwardly and trip idly with its teeth 49 past the detent ratchet mechanism which includes the detent dog or pawl 50 pivoted on one of the lower casing bolts 26 and held yieldingly in engagement with the ratchet teeth 49 on the detent disk 48 by the spring 51.

Upon turning the main operating shaft forwardly manually by means of the hand wheel 43 on one side of the casing, the cooperating helical faces 75 on the collar 70 of the operating shaft and the hub 19 of the gear pinion 47 produces a wedging or cam action whereby the controlling disk 46 is moved axially forward relative to the main operating shaft and against the rear side of the detent disk 48 and also causes a rearward pressure of the abutment disk 45 against the front side of the detent disk 48, whereby the latter is gripped and caused to rotate forwardly with the operating shaft. While thus turning the main operating shaft forwardly, the gear pinion 47 causes the main gear wheel 35 and the drum 28 connected therewith to also turn forward at a reduced speed or in the direction in which the brake chain 29 is moved forwardly or wound on the drum to take the slack out of the chain and cause it to move the brake shoes in the direction for pressing the same against the wheels of the car for braking purposes. Upon discontinuing the forward rotary movement of the main operating shaft, the same together with the chain drum are held in this position by engagement of the detent pawl 50 with the respective tooth 49 of the detent disk, whereby the brake mechanism is retained in its tightened condition and retards or stops the rotation of the wheels of the car.

If it is desired to release the braking effect of the shoes of the brake mechanism on the wheels of the car, the main operating shaft 67, 69 is turned backwardly to the desired extent, that is, in an anti-clockwise direction by operating the front hand wheel 43. When turning the main operating shaft backwardly the opposing helical faces 75, 74 on the collar 70 of the main operating shaft and the hub 19 of the gear pinion 47 cause the pressure of the rear or controlling clutch disk 46 against the rear side of the detent disk 48 and the pressure of the front or abutment disk 45 against the front side of the detent disk 48 to be relieved, thereby releasing or unclutching the shaft 67, 69 and the gear pinion 47 and permitting the gear wheel 35, and drum 28 to be turned backwardly by the load on the chain 29 which connects this drum with the brake shoe actuating mechanism. The instant, however, that the pressure of the rear and front clutch disks 46 and 45 against the detent disk 48 is relieved by the backward movement of the gear pinion hub 19 during the backward rotation of the main operating shaft, the backward pull of the load on the brake chain 29 will turn the gear pinion 47 backwardly relative to the main operating shaft and in doing so, the cooperating helical or cam faces on the collar of the main operating shaft and the hub 19 of the gear pinion 47 will instantly cause this last mentioned disk to be moved axially forward against the rear side of the detent disk 48 and also press the abutment disk 45 against the front side of this detent disk and thereby produce a clutch action whereby fur-

ther backward movement of the chain wheel or drum is arrested. The backward movement of the main operating shaft can be effected easily by the operator to a greater or lesser extent in accordance with the desired amount of release which it is desired to give the brake mechanism, this releasing effect on the brakes being arrested instantly when the operator ceases to turn the main operating shaft backwardly. It therefore follows that the operator by this means can release the brakes gradually and hold the brakes at any stage of the releasing operation as may be necessary to meet requirements and also to immediately apply the brakes fully by again turning the main operating shaft forwardly the required extent. It will thus be evident that at no time can the main operating shaft spin or turn backwardly fully at a rapid rate so that the operator is not liable to be hit by any rapid backwardly rotating handle or hand wheel, nor is it possible for the brake mechanism to become released or unset fully at a rapid rate which otherwise would require taking up excessive slack in the brake rigging before the brakes are again fully set. This brake mechanism therefore is under the absolute control of the brakeman and enables him to control the brakes easily and promptly to suit different conditions which may be encountered.

The collar **70** and the abutment disk **45** form positive stop means on the main shaft which limit the extent of the separating movement of the controlling disk and abutment disk from opposite sides of the detent disk **48** and thereby not only prevent spreading of the front and rear walls **21**, **22** of the casing which otherwise might be engaged by the abutment disk **45** and collar **70**, respectively, but also enabling the brakeman to positively turn the gear pinion **47**, gear wheel **35**, and drum **28** backwardly in case these or other parts of the brake rigging should become stuck by rust or other cause, and thus aid in unwinding the brake chain and the parts connected therewith for effecting a release of the brake mechanism.

If upon turning the main operating shaft **67**, **69** backwardly the gear pinion **47** is not turned backwardly due to insufficient load or pull on the draft chain **29** or due to the drum **28** and the gear wheel **35** being stuck or any other reason, then the gear pinion **47** will move backwardly idly lengthwise of the main operating shaft until the rear end of the gear pinion **47** engages the collar **70** on the operating shaft **67**, **69**. When this occurs the gear pinion **47** becomes locked on the operating shaft and turns backwardly therewith as a unit, whereby a positive backwardly rotary movement is imparted to the gear wheel **35** and drum **28** by the manual power applied to the operating shaft **67**, **69** and the draft chain is paid out from the drum. If therefore the gear pinion **47**, the gear wheel **35**, the drum **28** or any part of the brake rigging connecting this drum with the brake shoes should become stuck or operate sluggishly due to rust, dirt, snow, ice or other obstruction the resistance which otherwise might be imposed by said gear pinion and wheel and drum on the releasing movement of the brake rigging is eliminated and permits the remaining parts of the brake mechanism to relax and release the brake shoes from the car wheels.

Due to the cooperating cam faces which are formed respectively on the collar **70** of the main operating shaft and the hub of the gear pinion **47** the chain drum can be turned forwardly with great force for effectively applying the brake mechanism by the sole use of manual power but since the backward rotation of the operating shaft by manual power is aided materially by the backward pull of the load on the controlling disk it follows that the release of the brake mechanism can be effected with much less power than that required for applying the same. This is particularly advantageous in case a comparatively powerful brakeman has applied the brakes heavily and thereafter a brakeman of less strength has to release the brakes.

For the purpose of increasing the grip of the controlling disk **46** against the side of the detent disk a friction disk **55** of suitable material is interposed between these members, and to permit prompt release of the abutment disk **45** from the detent disk a releasing disk **54** of suitable material is interposed between these last mentioned members, as shown in Fig. 1.

When it is desired to manually operate the brake mechanism from only one side of the enclosing casing, for example, on the front side thereof, and on the exterior of the car as shown in Fig. 1, then only the main operating shaft **67**, **69** is required to operate the brake mechanism.

Under normal conditions the controlling disk **46** is turned backwardly by the pull of the brake rigging immediately after manually effecting the first part of the backward turning movement of the operating shaft **67**, **69** which is caused by the pressure of the controlling disk **46** and abutment disk **45** against the front and rear sides of the detent disk **48** being relieved due to the inclined or cam faces **75** of the collar **70** riding part way down the cooperating inclined or cam faces **74** on the hub **73** of the gear pinion **47** and controlling disk **46**, and thereby causing the brake mechanism to relax or release. When, however, the grip of the controlling disk **46** against the detent disk **48** has been released by the initial part of the backward movement of the operating shaft **67**, **69** and said controlling disk is not also moved backwardly by the pull of the brake rigging on the same due to rusting or clogging of any of the parts, then the gear pinion **47** and controlling disk **48** will be positively turned backwardly by the manual power applied to the operating shaft **67**, **69** at which time the shoulders **12** between the high and low parts of the cam surfaces **75** on the collar **70** engage with the shoulders **11** on the hub **73** between the high and low parts of the cam surfaces **74** thereof, whereby the gear wheel **35** and drum **28** are also turned backwardly and the brake chain **29** is unwound or moved backwardly from the drum and any resistance which this drum gear, wheel **35**, gear pinion **47**, and controlling disk **46** might offer is eliminated and the brake mechanism is permitted to release itself.

In order to permit of operating the brake mechanism so that the winding drum will always turn in one direction while operating the same either from the interior or the exterior of the car and that during unwinding of the drum the same also turns in the opposite direction regardless of whether the same is controlled from the exterior of the car, auxiliary operating means are provided which are constructed as follows:

The numeral **77** represents an auxiliary operating shaft arranged above the main operating shaft and parallel thereto and having its front part extending across the upper part of the casing and journaled in bearings **78**, **79** on the front and rear walls of the casing, while the rear part

of this auxiliary shaft extends rearwardly through the adjacent wall 28 of the car body and is provided within the latter with an auxiliary handle or hand wheel 81. On the periphery of the abutment clutch disk 45 the same is provided with a gear rim or wheel 82 which meshes with a gear wheel 83 turning with the auxiliary shaft 77 and preferably formed integrally with the front part thereof, as shown in Fig. 1.

By means of this construction, the main operating shaft 67, 69 can be turned forwardly by the brakeman grasping the front or main hand wheel 43 and turning the same clockwise while facing this wheel, and the main operating shaft can also be turned forwardly for setting the brakes by the brakeman turning the auxiliary hand wheel 81 in a clockwise direction while facing the same inasmuch as the clockwise movement of the rear or auxiliary hand wheel 81 due to the cooperating gear wheels 82 and 83 which are mounted respectively on the main shaft 67, 69 and the auxiliary shaft 77. Release of the brake mechanism may also be effected by turning the front hand wheel 43 in an anti-clockwise direction while the brakeman faces this wheel and also by the brakeman turning the rear hand wheel 81 in an anti-clockwise direction while facing this last mentioned wheel. The ability of thus operating the brake mechanism from the rear of the casing or the interior of the car and also from the front of the casing or the exterior of the car by moving the internal and external hand wheels in corresponding directions when applying the brakes or releasing the same, confusion as to the proper direction for turning these hand wheels for setting or releasing the brakes is avoided. Moreover safety in the handling of the cars is increased inasmuch as no time is lost in promptly handling the brakes when this becomes necessary in case of an emergency.

Inasmuch as this mechanism permits of limiting the extent of release of the brake mechanism, it is possible to again fully set the brakes without the necessity of taking up an undue amount of slack in the brake rigging after the releasing operation before the brakes are again applied.

This hand brake mechanism is not only comparatively simple in construction but the same is also composed of relatively few parts which are not liable to get out of order and as a whole this brake mechanism is also very compact so that it is capable of being easily installed in places where a limited amount of space is available.

I claim as my invention:

A hand brake mechanism for operating the brake shoes of cars, comprising a chain adapted to be connected with said brake shoes, a drum over which said chain passes forwardly for tightening said brake shoes and backwardly for loosening said brake shoes, a gear wheel connected with said drum, a gear pinion meshing with said gear wheel, a controlling clutch disk connected with said gear pinion, an abutment clutch disk opposing said controlling disk, a detent disk interposed between said controlling and abutment disks, a ratchet detent device which permits said detent disk to turn forwardly but prevents backward turning thereof, a manually operable main shaft connected with said controlling disk and having a main hand wheel arranged on one side of said disks, wedge means having cooperating helical faces which are arranged respectively on said shaft and gear pinion and which under the pull of a load on said chain constantly tend to press said abutment and controlling disks toward opposite sides of said detent disk and which upon turning said main shaft backwardly release said abutment and controlling disks from said detent disk, a countershaft arranged parallel with said main shaft, intermeshing auxiliary gear wheels turning respectively with said main and auxiliary shafts, and an auxiliary hand wheel arranged on said auxiliary shaft on the opposite side of said disks.

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