Feb. 7, 1956 H. J. DYKE 2,733,790

CLUTCH MECHANISM FOR RAILWAY HAND BRAKES

Filed June 9, 1951 2 Sheets-Sheet 1

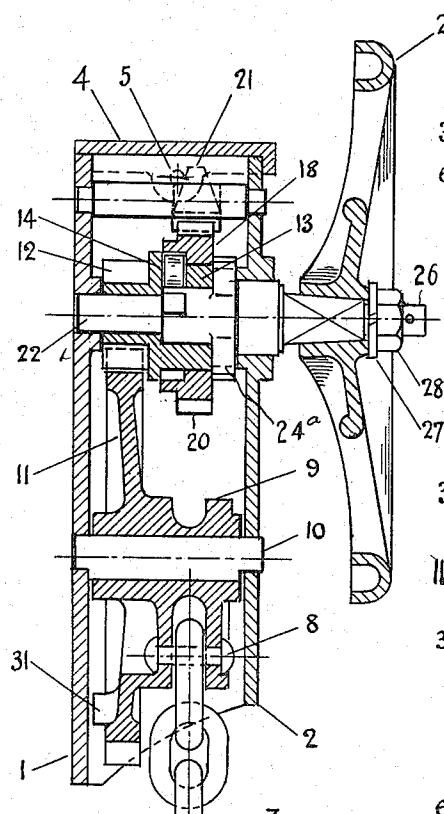



FIG. 2

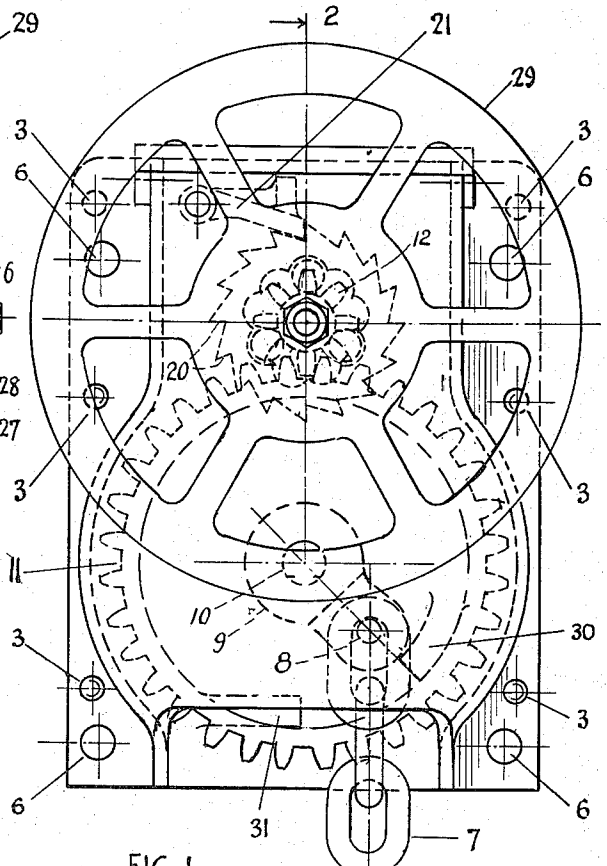



FIG. 1

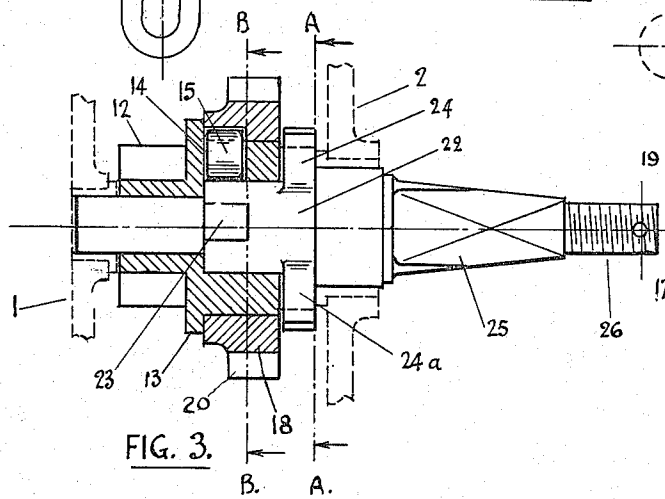



FIG. 3.

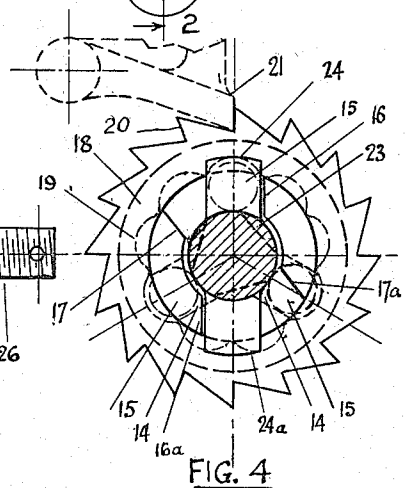



FIG. 4

INVENTOR

HERBERT JEFFEREY DYKE

By Frederick C. Bromley ATTY.

Feb. 7, 1956 H. J. DYKE 2,733,790

CLUTCH MECHANISM FOR RAILWAY HAND BRAKES

Filed June 9, 1951 2 Sheets-Sheet 2

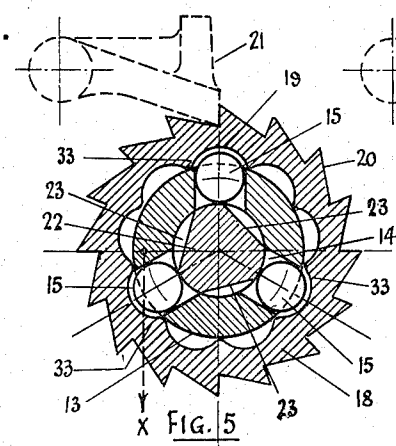



FIG. 5

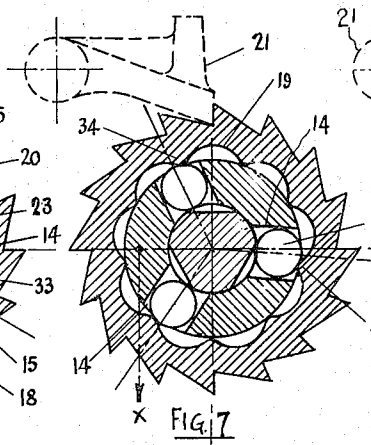



FIG. 7

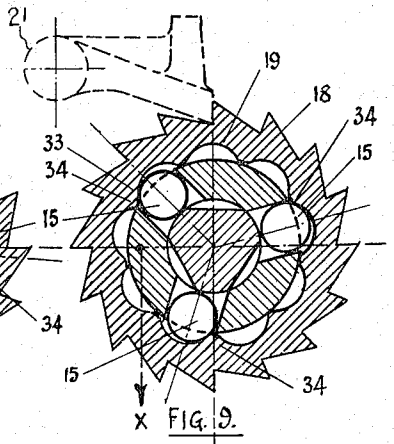



FIG. 9.

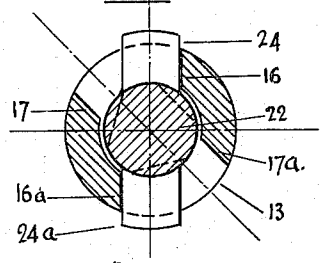



FIG. 6.

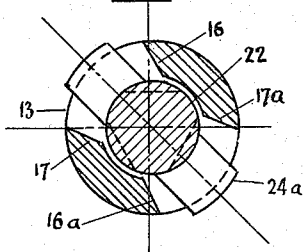



FIG. 8.

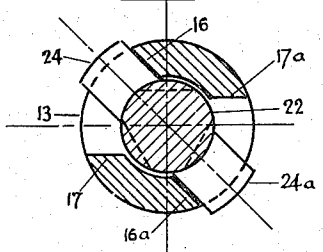



FIG. 10

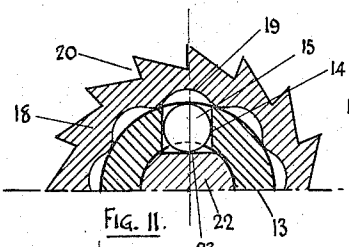



FIG. 11.

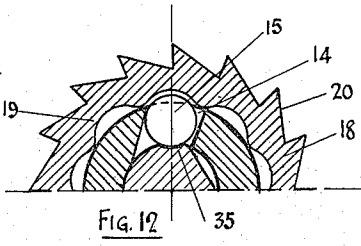



FIG. 12

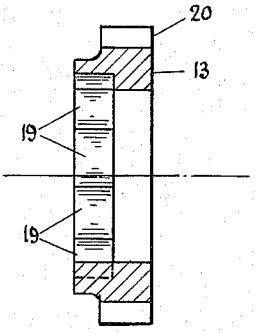



FIG. 13

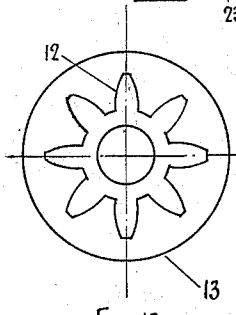



FIG. 15

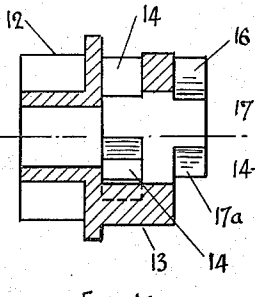



FIG. 14

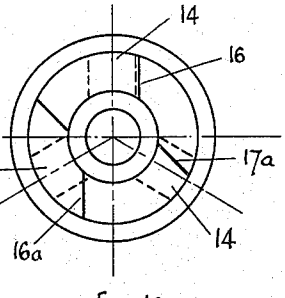



FIG. 16

INVENTOR

HERBERT JEFFEREY DYKE

By Frederick C. Bromley

ATTY

United States Patent Office 2,733,790
Patented Feb. 7, 1956



2,733,790

# CLUTCH MECHANISM FOR RAILWAY HAND BRAKES

Herbert Jeffrey Dyke, Weston, Ontario, Canada

Application June 9, 1951, Serial No. 230,759

6 Claims. (Cl. 192—16)

My invention relates to the type of hand brake operating mechanism for railway cars which is usually fastened to the vertical side of a car and actuated by means of a hand wheel rotatable about a horizontal shaft. The hand wheel shaft operates a chain drum through a clutch mechanism and gearing, the chain being attached to the pull rod connections of the usual brake rigging.

The object of my invention is to provide a safe holding and releasing clutch mechanism for the winding drum whereby the chain may be wound up, or gradually released, solely by the manipulation of the hand wheel by the brakeman without the use of trip levers or the like, and with the mechanism so devised that the hand wheel does not spin back when the strain on the brake chain is being reduced.

With the hand brake mechanism described herein, the brakeman, standing on the usual platform with which a car is provided, operates the hand wheel with his right hand and with his left hand takes a firm hold on some fixed part of the car, and maintains this position while controlling the car by means of the hand brake. The chain of the winding drum is connected to the usual rods, levers, etc. of the brake rigging belonging to the railway car. Winding up the hand brake mechanism tightens these connections and forces the brake shoes against the wheels of the car. Releasing the hand brake reduces the pull on the brake rigging connections and permits the brake shoes to fall away entirely, or in part, from the wheels of the car in order to disengage the brakes.

While this invention follows closely the mechanism claimed in my Patent No. 2,189,978 granted February 1940, there is a fundamental difference in the arrangement of, and results obtained from, the present improvement.

In my prior patent above referred to, the operating power from the hand wheel is transmitted through the shaft to a ratchet body, and by means of the releasing rollers to the clutch body which is rigid with a pinion. This pinion is in mesh with the drum gear wheel, the drum being operative to wind up the chain. To release the brakes the hand wheel can be turned backwardly through a small angle, thus while the hand wheel is turned at will to wind up the chain, it can only be turned in the reverse direction for a very limited angular movement when under stress and also when free of stress.

In the present invention the operating power from the hand wheel is transmitted from the hand wheel shaft to the driving element of the roller clutch. The driven member of this clutch rigidly carries the pinion, the pinion working with the drum gear to operate the chain. The driving member is mounted on an actuator which is rigid with the hand wheel shaft, and the ratchet wheel is rigid with the driven element. The hand wheel is therefore free to be rotated in both directions when not under stress from a load on the chain, but can only be moved in the releasing direction with a step by step motion when there is a load on the chain as will be later explained in detail.



The various advantages are obtained by the instant invention as pointed out in connection with its description.

In the accompanying drawings:

Fig. 1 is a front elevation of the hand brake mechanism in which the present invention is incorporated.

Fig. 2 is a vertical sectional elevation of the hand brake mechanism taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged sectional elevation of the hand brake shaft and clutch mechanism.

Fig. 4 is a cross sectional view of the clutch mechanism on line A—A of Fig. 3 showing the clutch members locked by the rollers.

Fig. 5 is a cross sectional view of the clutch mechanism on line B—B of Fig. 3 showing the clutch elements in their relation one to the other, when they are in their engaged positions.

Fig. 6 is a cross sectional view of the shaft and stops showing their relative position with the clutch body when the various clutch parts are positioned as shown in Fig. 5.

Fig. 7 is a cross sectional view of the clutch mechanism on line B—B of Fig. 3 showing the rollers disengaged from the respective notches in the operation of the clutch.

Fig. 8 is a cross sectional view of the shafts and stops in their relation to the clutch elements when the various parts of the clutch are positioned as shown in Fig. 7.

Fig. 9 is a cross sectional view of the clutch mechanism on line B—B of Fig. 3 when the clutch members have moved one notch in the releasing direction.

Fig. 10 is a cross sectional view of the shaft and stops in relation to the clutch elements when the various parts are positioned as shown in Fig. 9.

Fig. 11 is a fragmentary sectional view on line B—B of Fig. 3 showing the position which the releasing rollers assume when the shaft has moved to the fully released position of the clutch.

Fig. 12 is a fragmentary cross sectional view similar to Fig. 11, but showing a variant form of the invention in which the actuator is notched to hold the rollers from initial release.

Fig. 13 is a cross sectional view of the combined driven member of the clutch and the ratchet.

Fig. 14 is a longitudinal sectional elevation of the driving element of the clutch.

Fig. 15 is an end view of Fig. 14 showing the pinion, and

Fig. 16 is an end view of Fig. 14 showing the shaft stops.

Similar numerals refer to similar parts throughout the several views.

The brake actuating mechanism is enclosed within a housing comprising a back plate 1, a front casing 2 secured together by rivets or bolts 3, top cover 4 is held in place by bolt 5, Fig. 2. Holes 6 are provided for fastening the housing to the body of the railway car.

The winding chain 7 is attached by means of a rivet 8 or the like to a winding drum 9. Said winding drum is freely journalled on a shaft 10 which is fixed in the back and front walls 1 and 2 of the housing. A gear wheel 11 integral with the drum 9 meshes with a pinion 12. Integral with the pinion 12 is a driving element 13 of a roller clutch. The driving element 13 is provided with a plurality of radial slots 14 in which clutch rollers 15 freely fit. The driving element is formed with stops 16, 16*a*, 17 and 17*a* which engage with the driving lugs 24 and 24*a* on shaft 22. A driven clutch element 18 is freely journalled on said driving element 13 and is provided with a plurality of concave notches 19 internally arranged and with which the clutch rollers 15 are free to engage. The driven element 18 has a plurality of one-way ratchet teeth 20 formed on its outside periphery which engage with a ratchet pawl 21 which is freely

journalled in the front and back walls 1 and 2 of the housing. The shaft 22 is journalled in the front and back walls 1 and 2 of the housing and is provided with a plurality of recesses 23 arranged to transversely align with the slots 14 in the driving element 13 and the concave notches 19 of the driven element 18, the clutch rollers 15 being free to enter recesses 23 when the shaft 22 is rotated to free the clutch mechanism. The recesses 23 have flat bottom faces. Lugs 24, 24*a* are provided on the shaft 22 to engage the stops 16, 16*a* and 17, 17*a* on the driving element 13, a square sectioned extension 25 is provided to firmly seat the hand wheel 29. A further threaded extension 26 is provided with a spring washer 27 and nut 28 to hold the hand wheel 29 firmly on the seat 25. The ratchet pawl 21 is freely pivoted at an end in the front and back walls 1 and 2 of the housing and is weighted so that its distal end will fall freely by gravity to engage the ratchet teeth 20. A stop 30 is arranged on the gear wheel 11 which contacts a corresponding stop 31 provided on the back plate 1 of the housing, stops 30 and 31 contact only when the mechanism is fully unwound. Any suitable housing, chain, drum and gear wheel, pawl and hand wheel can be used and those shown are of the forms generally in use and serve to illustrate the relation thereto of the specific clutch structure by which the advantageous features of this invention are obtained.

In operation, the brakeman, standing on the car platform and grasping some fixed part of the car with his left hand, will manipulate the hand wheel with his right hand to perform the function of winding up, or releasing, the hand brake mechanism to operate the brake shoes on the wheels of the car as aforesaid.

Generally to wind up hand brake mechanisms of this type the hand wheel is rotated in a clockwise direction as viewed from the front of the housing, and in the instant disclosure it is to be understood that this is the direction in which the hand wheel turns. The mechanism however would be equally effective were the opposite direction chosen. To apply the brakes the brakeman rotates the hand wheel 29 in a clockwise direction carrying the shaft 22 with it. The shaft lugs 24, 24*a* engage with the stops 16, 16*a* on the clutch driving element 13 and thus turns this driving element. The pinion 12 turns with the driving element 13. The engagement of the pinion with the teeth of gear wheel 11 rotates the winding drum 9 and winds up the chain 7 as can be clearly seen from an inspection of Fig. 1. The clutch element 13 carries with it the clutch rollers 15 and as these are forced into the concave ratchet notches 19 of the driven clutch element 18 the element 18 turns as a unit with the shaft 22 and the ratchet pawl 21 rides over the ratchet teeth 20. The strain on the chain tends to make the pinion 12 turn in a counter-clockwise direction but as the driving element 13 is integral with the pinion this strain is transmitted through the clutch rollers 15 to the driven element 18. The pawl 21 by engaging a tooth of the ratchet teeth 20 prevents retrograde movement of the mechanism in a winding operation. This is clearly shown in Fig. 5, the force X which represents the pull from the chain 7 tends to revolve the clutch driving element 13 in a counter-clockwise direction until the three rollers 15 engage the concave notches 19 of the driven element 18 at pressure points 33. Since the rollers 15 are held firmly against the periphery of the shaft 22, the force X tends to reversely turn the driven element 18 but this is prevented by the pawl 21. As a result the assembly is locked against retrograde movement.

It may be here remarked that the stops 16, 16*a*, 17 and 17*a*, together with the lugs 24 and 24*a* constitute a lost motion connection which keys the shaft to said driving element in a manner to permit the shaft to turn independently of the driving element through an angle corresponding to the angular spacing between the radial slots.



To release the brakes the brakeman turns the hand wheel 29 in a counter-clockwise direction and the shaft 22 turns with it. Since shaft 22 is free to turn through a small angle independently of the driving element 13 the reverse movement of the hand wheel brings the notches 23 toward alignment with the slots 14 in the driving element 13, due to pull of the chain, as shown by arrow X, Fig. 7. Continued reverse movement of the hand wheel forces rollers 15 between the notches 23 and the points 34 of the notches 19 and snaps the rollers 15 into the next series of concave notches 19 of the driven element, this is clearly shown in Figs. 7 and 8, which views not only show the intermediate position of the driving element but also show the rollers 15 in an intermediate position. The final position is shown in Fig. 9 and Fig. 10 from which it can be seen that the mechanism has turned one notch in an anti-clockwise direction and is held from such further movement by the pawl 21. The backward movement of the hand wheel 29 can then be repeated and the mechanism will be released notch by notch until the pull of the chain no longer snaps the rollers into succeeding notches 19. The hand wheel 29 can then be further turned freely to further slacken the chain until the stop 31 on the chain drum 9 engages the stop 32 on the back plate 1 of the housing.

When the brake is fully wound up to force the brake shoes tightly against the wheels of a car the pressure of the rollers 15 against the periphery of the shaft 22 is very great and considerable force has to be exerted on the hand wheel 29 to release the brakes. However to make the initial pull on the hand wheel 29 greater so as to further ensure that the mechanism will hold should the car receive a forceful blow when being switched, indentations 35 on the shaft 22 as shown in Fig. 12 can be provided under the pressure points of the rollers 15 and it can readily be seen that the pull on the hand wheel 29 will be much greater because the initial pull will have to raise the rollers 15 against the full load pressure before release takes place.

From the foregoing it will be understood that the function of winding up and releasing the hand brake mechanism is controlled solely by the manipulation of the hand wheel and while said hand wheel is free to be rotated to wind up the brakes the unwinding pull of the brake rigging cannot spin the hand wheel, which is a highly important feature of the invention.

In the drawings the clutch engaging members are shown as short round rollers and three in number. Obviously I may also use balls in lieu thereof or rectangular fingers with rounded or angular shaped ends with the holding and releasing notches shaped to correspond. Furthermore I may use a lesser or greater number of inter-engaging clutch elements; moreover while the roller slots are directed radially they may be made to slope at an angle, as indicated in Fig. 12, without departing from the scope of the invention.

From the preceding description it will be manifest that the invention provides a highly efficient and serviceable brake mechanism.

What I claim is:

1. A clutch structure for a hand brake of the kind described, comprising a driving element supported to rotate about an axis for exerting a winding stress when turned in a brake applying direction, said driving element having an annular section supplied with an axial passage and provided with a plurality of radial slots equidistantly spaced, locking elements movably contained in said slots, a driven element having a bore by which it is sleeved on said driving element and having its bore provided with a circular succession of notches, the angular spacing of said notches being such as to render the notches receptive to portions of said locking elements when the locking elements are moved outwardly to establish a driving connection, means for preventing retrograde movement of said driven element with respect to the direction in which said

driving element turns in exerting a winding stress in a brake applying direction, co-axially supported shaft having a section disposed in said axial passage and provided with flats corresponding in number and angular spacing to said slots, said flats functioning to allow said locking elements to recede from engagement with notches when said shaft is reversely turned to bring the flats into register with said slots, manual means for turning said shaft and keying means empowering said shaft to turn said driving element in the brake applying direction, said keying means including a lost motion connection permitting said shaft to turn counterclockwise when said locking elements are engaged with said notches and the driven element is held against retrograde movement, said lost motion connection having such an angular magnitude as to cause said locking element to engage in adjacent notches when they recede from the engaged notches.

2. A clutch structure as set forth in claim 1, in which the locking elements are in the form of rollers.

3. A clutch structure as set forth in claim 1, in which the means for preventing retrograde movement of the driven element comprises peripheral teeth on said driven element, and a co-acting pawl mounted on a relatively fixed support.



4. A clutch structure as set forth in claim 1, in which a hand-wheel is used to turn the shaft.

5. A clutch structure as set forth in claim 1, in which the keying means provides spaced abutment faces.

6. A clutch structure as set forth in claim 1, in which the keying means comprises interfitted stops in angular spaced relation.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 625,359 | Sedwick | May 23, 1899 |
| 1,535,790 | Richardson et al. | Apr. 28, 1925 |
| 2,189,978 | Dyke | Feb. 13, 1940 |
| 2,265,376 | Klasing | Dec. 9, 1941 |
| 2,300,223 | Hottenroth, Jr. | Oct. 27, 1942 |
| 2,398,261 | Stone | Apr. 9, 1946 |
| 2,416,251 | Camp | Feb. 18, 1947 |