

Oct. 29, 1935.

E. C. MERSEREAU

2,019,190

HOLDING AND RELEASING MECHANISM

Filed March 22, 1934

2 Sheets-Sheet 1

Fig. 1.

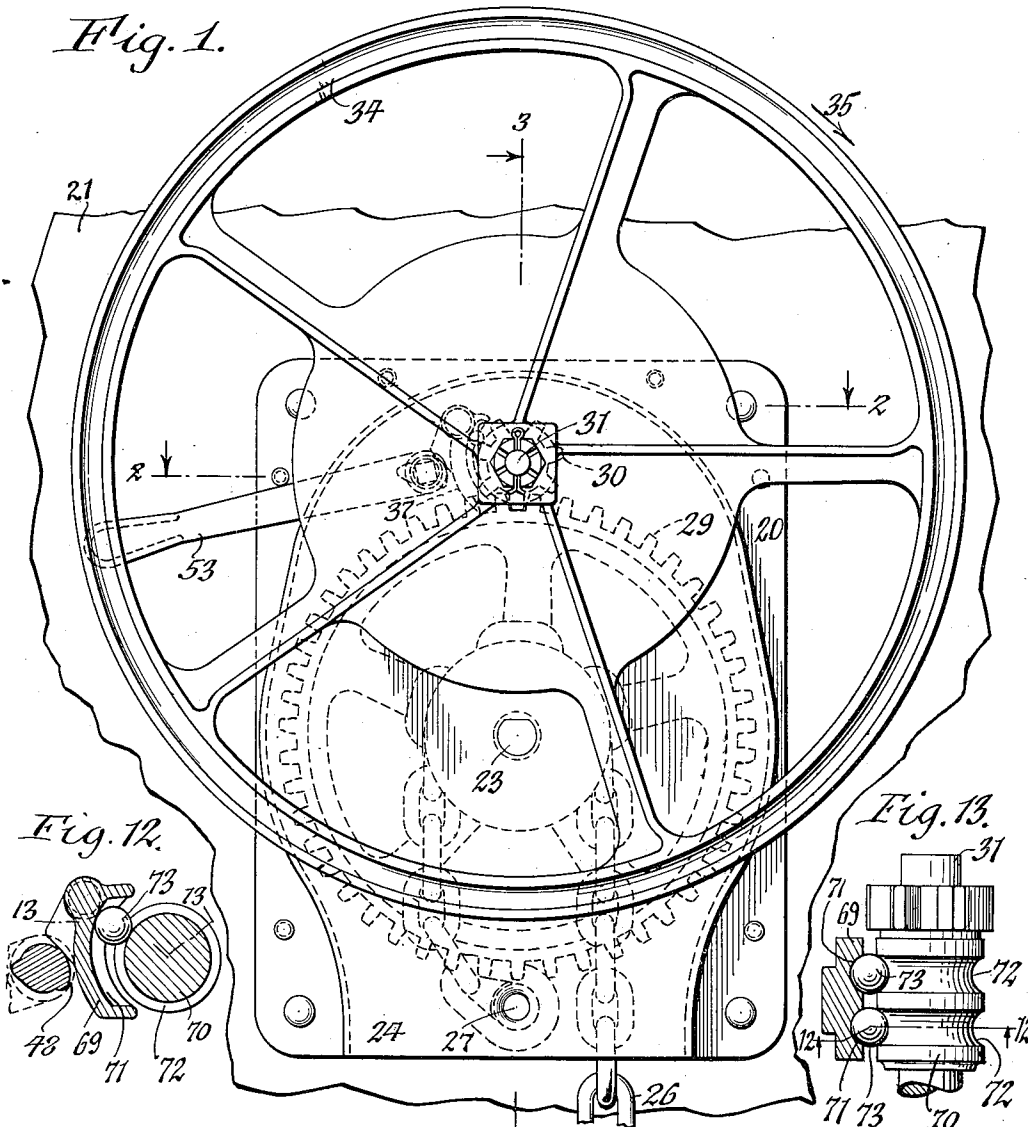


Fig. 12.

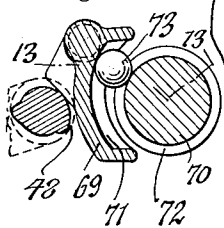


Fig. 13.

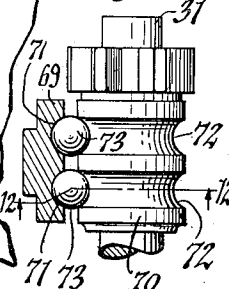
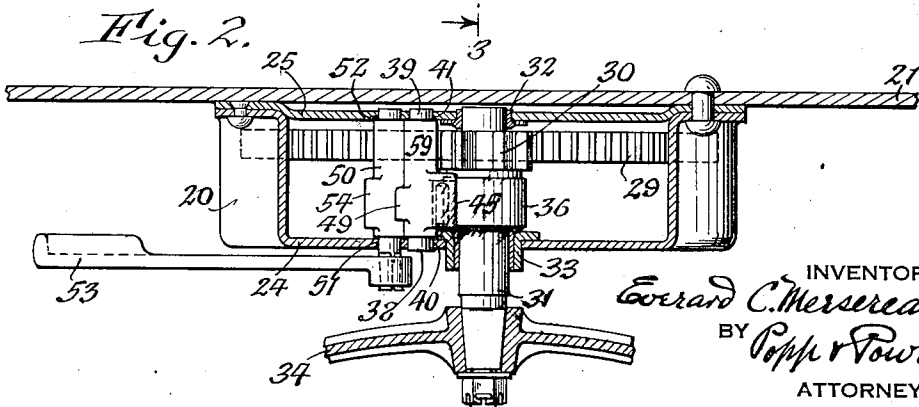


Fig. 2.



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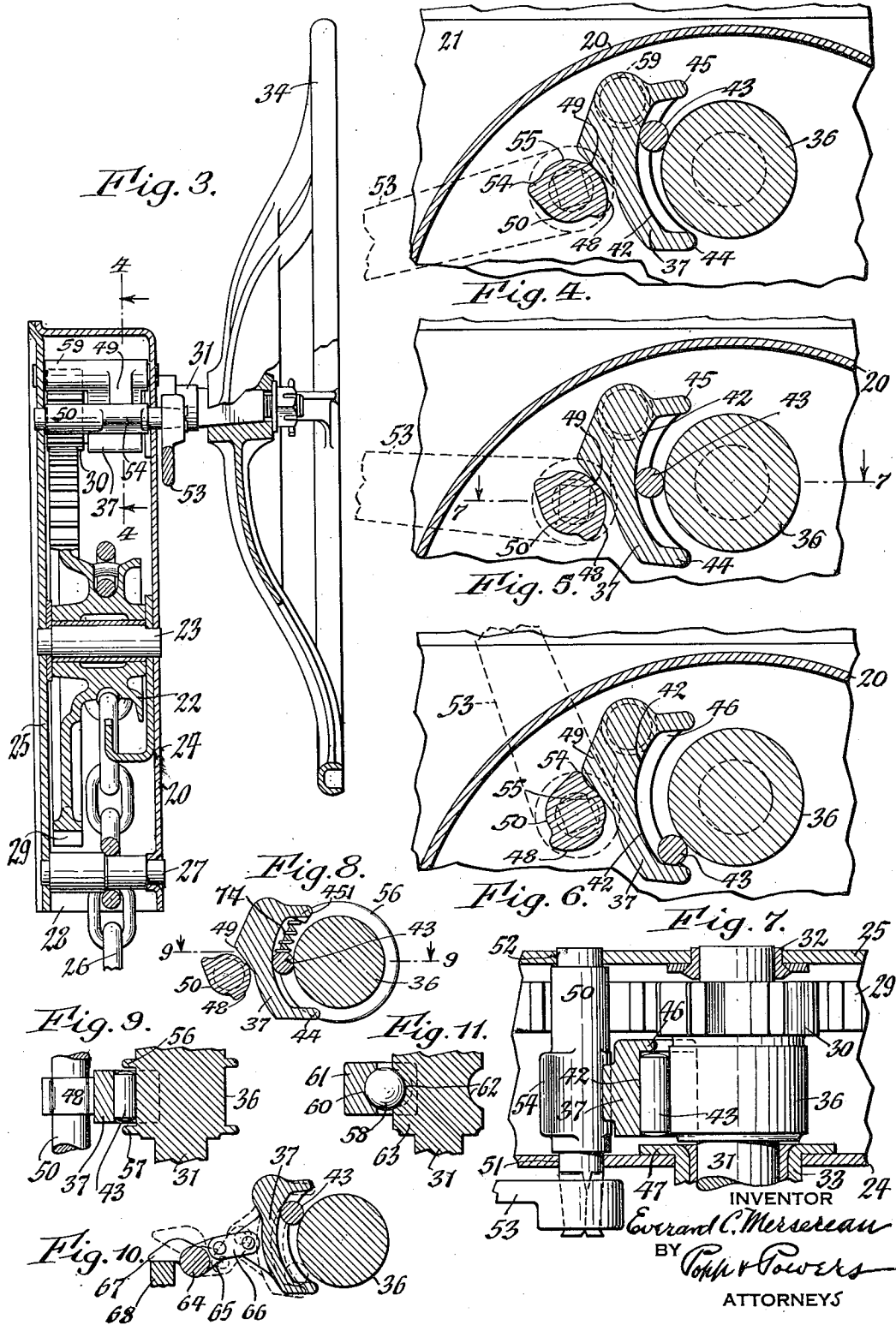
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,019,190

HOLDING AND RELEASING MECHANISM

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7 Claims. (Cl. 188—81.1)

This invention relates to a holding and releasing mechanism which is more particularly intended for use as a ratchet or detent device in connection with a hand operated railway brake mechanism, but the same can also be advantageously employed in other installations where devices for performing similar functions are required.

Devices for this purpose, as heretofore constructed, are objectionable on account of the same being complicated, noisy in operation, liable to get out of order and requiring the expenditure of considerable manual power for operating the mechanism when releasing the same under heavy loads.

The object of this invention is the provision of holding and releasing mechanism which is comparatively simple and durable in construction and low in cost, not liable to derangement and capable of easy and noiseless operation.

In the accompanying drawings:

Fig. 1 is a front elevation of a hand operated railway brake mechanism showing one manner of utilizing my invention.

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

Fig. 3 is a vertical longitudinal section thereof, taken on the correspondingly numbered line in Fig. 1.

Figs. 4, 5 and 6 are fragmentary vertical transverse sections, on an enlarged scale, showing different positions of the parts during the operation of the same.

Fig. 7 is a fragmentary horizontal section, taken on line 7—7, Fig. 5.

Fig. 8 is a fragmentary vertical transverse section, similar to Figs. 4, 5 and 6, showing a modified form of my invention.

Fig. 9 is a horizontal section, taken on line 9—9, Fig. 8.

Fig. 10 is a fragmentary vertical section, showing another variation of my invention.

Fig. 11 is a fragmentary horizontal section showing a different form of rolling detent member as compared with that shown in Figs. 4—10.

Fig. 12 is a fragmentary vertical section similar to Fig. 4, showing still another modified form of holding and releasing mechanism made in accordance with my invention, taken on line 12—12, Fig. 13.

Fig. 13 is a horizontal section, taken on line 13—13, Fig. 12.

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

Although this invention is capable of use in connection with any apparatus which requires a device for holding and releasing working parts on the principle of a ratchet mechanism the same has been represented in the drawings as an example of one practical application, in connection with a brake mechanism for railway cars which is manually operated.

The brake mechanism here shown is generally constructed and operated as follows:

The numeral 20 represents a housing or casing which encloses the principal working parts of the brake mechanism and is mounted on a wall 21 of the locomotive, freight car, passenger car or other vehicle on which the respective mechanism is installed.

Within the central part of this housing is arranged a brake drum 22 which is pivotally mounted to turn vertically on a horizontal longitudinal axle or pin 23 supported at its opposite ends on the front and rear walls 24, 25 of the housing, as best shown in Fig. 3. Over this drum passes a brake chain 26 which forms part of the brake mechanism and which has one end anchored to the front and rear walls of the housing by a pin 27 while its other end passes through an opening 28 in the lower end of the housing and is connected with the brake rigging in any well known and approved manner.

On its inner or rear end the brake drum is provided with a driven gear wheel 29 and the upper part of the latter meshes with the underside of a driving gear pinion 30 which is arranged in the upper part of the housing. This pinion is connected with or forms a part of a horizontal longitudinal operating shaft 31 which has its rear end journaled in a bushing bearing 32 on the rear wall of the housing, while the intermediate part of this shaft is journaled in a bushing bearing 33 on the front wall of the housing and the front end of this shaft projects beyond the front side of the housing and is provided with a hand operated wheel 34.

For the purpose of applying the brakes the brakeman turns the hand wheel in a clockwise direction, as indicated by the arrow 35 in Fig. 1, thereby winding the chain over the drum and causing the brake shoes to be applied to the wheels of the vehicle. Upon releasing the brake mechanism the hand wheel turns in an anti-clockwise direction, and permits the brake chain to unwind from the drum and thereby create a slack in the brake rigging which releases the brake shoes from the vehicle wheels.

The holding and releasing mechanism which is

associated with the brake mechanism above described and which embodies my invention is constructed as follows:

The numeral 36 represents a cylindrical clutch body or collar arranged on the central part of the operating shaft between the front wall of the housing and the driving pinion and preferably formed integrally with this shaft and having its periphery concentric therewith. Adjacent to this cylindrical body and preferably on the left hand side of its periphery is arranged an abutment or shoe 37 which is movable toward and from the body for varying the form of the space between the abutment and the clutch body. In the preferred construction the abutment has the form of a pendant bar which is pivoted at its upper end parallel with the axis of the clutch body and adapted to swing with its lower part below the axis thereof toward and from the clutch body. For this purpose the abutment may be pivoted by various means for example, by means of an abutment shaft 59 carrying the abutment at its upper end and having trunnions 38, 39 on its front and rear ends journaled in bearing openings 40, 41 in the front and rear walls of the housing, as best shown in Fig. 2. On the inner side of the abutment the same is provided with a concavely curved gripper face 42 which together with the opposing peripheral part of the clutch body forms a raceway which contains a rolling detent member 43 forming part of the load holding means. In the construction shown in Figs. 1-7 this rolling detent member has the form of a roller whose axis is parallel with the axes of the clutch body and the abutment and engages its opposite sides with the gripping face of the abutment and the opposing part of the periphery of the clutch body. Upon moving the abutment toward the clutch body a sufficient extent the gripping face of the abutment will be arranged eccentrically to the periphery of the clutch body and thereby form a raceway between the abutment and clutch body which is of tapering form with the wide end at the top and the narrow end at the bottom. When the abutment is in its near position to the clutch body the upper part of the raceway is wide enough to receive the rolling detent member but the lower part of this raceway is narrower than the diameter of the detent member, consequently the latter is retained at this time in the upper part of the raceway. While the parts are in this position, as shown in Fig. 4, the clutch body or collar 36 can be freely turned in a clockwise direction inasmuch as the periphery of this body by engagement with the detent member will merely turn the latter toward the upper wide end of the raceway. When, however, the clutch body is turned in an anti-clockwise direction then the engagement of the periphery of the clutch body will cause the detent member to roll down the gripping surface of the abutment member toward the narrow end of the raceway and thereby produce a wedging effect between the abutment, detent and clutch body which operates to stop the anti-clockwise movement of the clutch body when the maximum downward wedging movement of the detent has been reached. Upon moving the abutment to some extent away from the clutch body so as to reduce the amount of downward taper of the raceway then the detent will be released and permitted to move further toward the lower end of the raceway, as shown in Fig. 5, and thus permit a partial anti-clockwise rotation of the clutch body. When, however, the abutment

is fully retracted from the clutch body so that the raceway is substantially equal throughout its length and the detent member is capable of moving freely from the upper to the lower end of the raceway and no wedging effect is exerted against the abutment and clutch body, as shown in Fig. 6, then the latter is fully released and capable of turning freely in either a clockwise or an anti-clockwise direction. Upon again moving the abutment toward the clutch body so that the raceway therebetween is of downwardly tapering form then the clutch body will be able to turn clockwise and roll the detent from the lower narrow part of the raceway toward the upper wide part of the same but rotation of the clutch body in the opposite direction will be prevented by the wedge action of the detent on the abutment and clutch body.

In order to prevent the escape of the rolling detent member from the lower end of the raceway when the abutment is fully withdrawn from the clutch body, the lower end of the abutment is provided with a lower stop 44 which projects toward the clutch body and bridges the gap between the latter and the abutment a sufficient extent to arrest the further downward movement of the detent, as shown in Fig. 6. For a like reason the upper end of the abutment is provided with an upper stop 45 which projects a sufficient distance toward the clutch body so that the gap between the latter and the abutment is never wide enough to permit the escape of the detent from the upper end of the raceway when the detent is moved upwardly by a rapid clockwise movement of the clutch body. Lateral escape of the detent from the raceway in the construction shown in Figs. 1-7 is prevented by a longitudinal guard flange 46 projecting from the rear side of the abutment toward the clutch body and adapted to be engaged by the rear end of the roller shaped detent member 43. Lateral escape of the detent from the front side of the raceway is prevented by an annular flange 47 on the rear end of the bushing bearing 33 which extends across this side of the raceway, as shown in Figs. 2 and 7.

Various means may be employed for actuating the abutment and controlling its position relative to the clutch body, but the means for this purpose, shown in Figs. 1-7, have been found satisfactory in practice and are constructed as follows:

The numeral 48 represents a rotary control cam which engages with a bearing lug 49 on the outer side of the abutment and adapted when turned in an anti-clockwise direction to move the abutment toward the clutch body to form a downwardly tapering raceway therebetween and permit the detent to exert a wedging effect and when this cam is turned clockwise it releases the abutment and permits the same by gravity and the pressure of the load on the same to move away from the clutch body so that the gripping face of the abutment and the periphery of the clutch body forming the raceway are substantially concentric and thus eliminate the wedging effect of the detent member.

This control cam is preferably formed integrally with a control shaft 50 which turns about a horizontal longitudinal axis adjacent to the outer side of the abutment and is journaled at its front and rear ends in bearing openings 51, 52 in the front and rear walls of the housing, as best shown in Fig. 7. Turning of this control shaft and cam is effected manually by a hand lever 53 se-

cured to the front end of the control shaft which terminates in front of the housing.

In order to limit the clockwise movement of the control cam and thus prevent the abutment from moving away from the clutch body to such an extent as to permit the detent to escape from the lower end of the raceway stop means are provided which consist preferably of a stop lug 54 adapted to engage the upper part of the bearing lug 49 when the abutment reaches its predetermined position away from the clutch body, as shown in Fig. 6.

The connection between the control lever and the control shaft is preferably such that when the abutment is moved anti-clockwise by a high part of the control cam toward the clutch body for producing a wedge action of the detent this lever will be arranged below a horizontal line, as shown by full lines in Fig. 1 and by dotted lines in Fig. 4. When the cam has been moved clockwise so that the lowest part of the cam engages the abutment and the latter is permitted to recede from the clutch body sufficiently to permit the detent to roll downwardly on the abutment and the clutch body to turn anti-clockwise and at this time the hand lever has been raised into a substantially horizontal position, as shown in Fig. 5. When the clockwise movement of the hand lever and cam is arrested, the bearing lug 49 of the abutment engages with a concentric resting face 55 which is arranged at the low end of the cam and is of slightly smaller diameter so that the detent is free to drop to the lower end of the raceway and fully release the clutch body, in which position the hand lever is raised nearly to a vertical position on the left hand side of its axis, as shown in Fig. 6. It will therefore be apparent that the hand lever is at all times on the same side of its vertical axis and therefore must always be lifted manually for releasing the clutch body from the holding effect of the detent, but when the lever is free the same will always drop by gravity into a position in which the control cam moves the abutment toward the clutch body and causes the detent to hold the clutch body against rotation in an anti-clockwise direction. The eccentric face of the control cam is sufficiently long so that the same can automatically take up or compensate for any wear on the co-operating surfaces of the clutch body, detent, abutment and cam and thus insure proper working of the holding and releasing mechanism for a considerable period after it is installed.

The control shaft and the abutment are preferably fitted sufficiently loose in these bearings so that the same can adapt themselves the required extent to the roll shaped detent member for causing the latter to always bear throughout its length on opposite sides thereof against the clutch body and abutment and thus insure a full wedging or gripping effect between these members and also prevent the detent from becoming cocked or assuming a non-parallel position relative to the axis of the clutch body and abutment which otherwise might interfere with the proper operation of the mechanism.

For applying the brakes with the hand brake mechanism shown in Figs. 1-7, the brakeman turns the hand wheel 34 clockwise until the chain 26 has been run over the brake drum 22 to such an extent that the brake shoes are drawn against the wheels of the vehicle with the desired pressure and during this time the control cam is holding the abutment toward the clutch body and the detent is rolled upwardly toward the wide

end of the raceway, but the instant that the clockwise movement of the clutch body ceases and the same tends to move anti-clockwise then the detent will become wedged in the downwardly tapering raceway and prevent any anti-clockwise rotation of the clutch body, thereby causing the brakes to be held in an applied position, as shown in Fig. 4.

Upon turning the control cam so as to permit the detent to roll downwardly in the raceway the holding grip on the clutch body will be relieved and the brake mechanism is permitted to relax, as shown in Fig. 5. When, however, the control cam is moved clockwise to the extreme in this direction the abutment is retracted to the maximum extent, the detent is permitted to drop to the bottom of the raceway and the clutch body can rotate freely anti-clockwise for completely releasing the brake shoes from the vehicle wheels.

In the construction shown in Figs. 4-7 the 20 longitudinal flange 46 on the rear side of the abutment serves the purpose of strengthening this abutment in addition to serving as a stop to prevent the detent roller 43 from escaping rearwardly from the raceway between the abutment 25 and the clutch body.

If desired the flange 46 on the abutment may be omitted and the detent roller may be confined within the detent raceway by means of annular stop flanges 56, 57 arranged on the clutch body 30 and extending across the front and rear sides of this raceway, as shown in Figs. 8 and 9.

Instead of constructing the detent member in the form of a roller 43, as shown in Figs. 7 and 9, a rolling detent member 58 of spherical or ball 35 form may be employed, as shown in Fig. 11, in which case the gripping face 60 on the inner side of the abutment 61 and the annular gripping face 62 on the periphery of the clutch body 63 are both made in the form of grooves so as to 40 secure a large area of contact between these members during the wedging operation of the detent member in the raceway.

As an alternative for the control cam 48 a toggle mechanism may be employed for actuating the abutment, as shown in Fig. 10. In this construction the control shaft 64 is provided with a toggle arm 65 and the latter is connected by a toggle link 66 with the outer side of the abutment 37. Rocking movement of this 50 control in an anticlockwise direction is limited by a stop lug 67 arranged on this shaft and adapted to engage with a stationary stop 68 on a part of the housing. Upon turning the control shaft in the direction for engaging the stops 55 67, 68 the straightening action of the toggle members 65, 66 will cause the abutment member to be moved to such an extent toward the clutch body that a tapering raceway will be formed between them in which the rolling detent member 60 43 will exert a wedge action for holding the clutch body against anti-clockwise rotation under a load, as shown by full lines in Fig. 10, but when turning the control shaft in the opposite direction these toggle members will be folded and the abutment will be withdrawn from the clutch body against anti-clockwise rotation figure, and thus eliminate the wedging effect of the detent and permit the clutch body to turn freely in either direction. When the control 70 shaft 64 has been turned to the limit in an anti-clockwise direction, the pivotal connection between the toggle arm 65 and the toggle link 66 is slightly above the dead center line extending from the axis of the abutment 37 to the axis 75

of said control shaft, thereby causing the pressure of the load on the inner face of the abutment to hold the toggle members in an unfolded or straightened position, as shown by full lines in Fig. 10.

The movement of this control shaft in a clockwise direction is arrested when the toggle members 65, 66 have been folded to an extent which brings the pivotal connection between these toggle members in line with the axis of the abutment 37 and the pivotal connection between the latter and the toggle link 66, as shown by dotted lines in Fig. 10.

In the construction shown in Fig. 11, only one ball shaped detent member is employed which engages its opposite sides with grooves 60, 62 in the opposing surfaces of the abutment or shoe 61 and the clutch body or collar 63, but if desired a plurality of detent balls and corresponding pairs of grooves may be employed so as to form a plurality of gripping, clutching or detent units which are arranged side by side but may act either individually or in unison. For example, as shown in Figs. 12 and 13, the opposing surfaces of the abutment 69 and the clutch body 70 are each provided, respectively, with two grooves, 71, 71, and 72, 72, and two detent balls 73, 73, are employed each of which engages one of its sides with the longitudinal groove 71 in the abutment 69 and while its opposite side engages with a companion circumferential groove 72 in the clutch body. The movement of the abutment 69 toward and from the clutch body 70 is controlled in the same manner in which this is accomplished by the rotary control cam 48 in Figs. 4-9, or the toggle members 65, 66 in Fig. 10, and each of the detent balls 73 operates to produce a wedging or clutching effect between the abutment and the clutch body similar to the functioning of the detent roller in Figs. 4-9 and the detent ball in Fig. 11.

In the construction of this holding and releasing mechanism gravity is utilized to move the detent member from the wide toward the narrow part of the raceway, but when the installation is such that gravity cannot be utilized for this purpose then other means may be employed to secure the benefits of this invention. Assuming therefore that in the construction shown in Figs. 8 and 9 the axes of the clutch body, 36, abutment 37, detent roller 43 and control cam 48 are arranged vertically so that gravity is not available for moving the detent roller from the wide to the narrow part of the raceway between the clutch body and the abutment then a spring means may be employed for yieldingly urging the detent roller 43 in the direction for producing a wedging engagement with the clutch body and abutment, such as an expansible helical spring 74 arranged in the wide end of the raceway and interposed between the detent roller 43 and the upper stop 451, as shown in Fig. 8.

I claim as my invention:

1. A holding and releasing mechanism, comprising a cylindrical clutch body adapted to rotate circumferentially in either direction, an abutment movable toward and from said body and having a gripping face opposite the periphery of the body and forming therewith a circumferential raceway, a rolling detent member arranged in said raceway and engaging its opposite sides with the periphery of the body and the gripping face of said abutment, said raceway being of tapering form upon moving said abutment toward said body and causing said detent

member to be wedged between said abutment and body and prevent rotation of the latter from the wide toward the narrow end of said raceway but release the grip of said detent member on the body and permit the body to turn in either direction upon moving said abutment away from the body, and a stop arranged on said abutment at the narrow end of said raceway to limit the movement of the detent member toward that end of the abutment.

2. A holding and releasing mechanism, comprising a cylindrical clutch body adapted to rotate circumferentially in either direction, an abutment movable toward and from said body and having a gripping face opposite the periphery of the body and forming therewith a circumferential raceway, a rolling detent member arranged in said raceway and engaging its opposite sides with the periphery of the body and the gripping face of said abutment, said raceway being of tapering form upon moving said abutment toward said body and causing said detent member to be wedged between said abutment and body and prevent rotation of the latter from the wide toward the narrow end of said raceway but release the grip of said detent member on the body and permit the body to turn in either direction upon moving said abutment away from the body, a stop arranged on said abutment at the wide end of said raceway to limit the movement of the detent member toward that end of the abutment.

3. A holding and releasing mechanism, comprising a cylindrical clutch body adapted to rotate circumferentially in either direction, an abutment movable toward and from said body and having a gripping face opposite the periphery of the body and forming therewith a circumferential raceway, a rolling detent member arranged in said raceway and engaging its opposite sides with the periphery of the body and the gripping face of said abutment, said raceway being of tapering form upon moving said abutment toward said body and causing said detent member to be wedged between said abutment and body and prevent rotation of the latter from the wide toward the narrow end of said raceway but release the grip of said detent member on the body and permit the body to turn in either direction upon moving said abutment away from the body, and stops arranged at opposite ends of said abutment to limit the movement of the detent member in either direction relative to the periphery of the body.

4. A holding and releasing mechanism, comprising a cylindrical clutch body adapted to rotate circumferentially in either direction, an abutment movable toward and from said body and having a gripping face opposite the periphery of the body and forming therewith a circumferential raceway, a rolling detent member arranged in said raceway and engaging its opposite sides with the periphery of the body and the gripping face of said abutment, said raceway being of tapering form upon moving said abutment toward said body and causing said detent member to be wedged between said abutment and body and prevent rotation of the latter from the wide toward the narrow end of said raceway but release the grip of said detent member on the body and permit the body to turn in either direction upon moving said abutment away from the body, and a rotatable cam adapted to engage said abutment for moving the same toward said body, and having a stop adapted to engage said abutment

and limit the action of the cam in moving the abutment toward said body.

5 5. A holding and releasing mechanism, comprising a cylindrical clutch body adapted to rotate circumferentially in either direction, an abutment movable toward and from said body and having a gripping face opposite the periphery of the body and forming therewith a circumferential raceway, a rolling detent member arranged
10 in said raceway and engaging its opposite sides with the periphery of the body and the gripping face of said abutment, said raceway being of tapering form upon moving said abutment toward said body and causing said detent member to be
15 wedged between said abutment and body and prevent rotation of the latter from the wide toward the narrow end of said raceway but release the grip of said detent member on the body and permit the body to turn in either direction upon moving said abutment away from the body said abutment being provided on one of its longitudinal
20 edges with a step flange adapted to prevent the escape of said detent member from the respective side of the raceway, and a housing on which
25 said body and abutment are mounted and which is provided with a closure on the opposite side of said raceway and prevent the escape of said detent member thereat.

30 6. A holding and releasing mechanism, comprising a cylindrical clutch body adapted to rotate circumferentially in either direction, an abutment movable toward and from said body and having a gripping face opposite the periphery of the body and forming therewith a circumferential raceway, a rolling detent member arranged
35 in said raceway and engaging its opposite sides with the periphery of the body and the gripping face of said abutment, said raceway being of tapering form upon moving said abutment toward
40 said body and causing said detent member to be wedged between said abutment and body and pre-

vent rotation of the latter from the wide toward the narrow end of said raceway but release the grip of said detent member on the body and permit the body to turn in either direction upon moving said abutment away from the body, and
5 operating means associated with said abutment and adapted to be shifted manually for permitting said abutment to move away from said clutch body and adapted when released to act under gravity for moving said abutment toward said
10 body and retain the abutment in this position relative to the body.

7. A holding and releasing mechanism, comprising a cylindrical clutch body adapted to rotate circumferentially in either direction, an abutment arranged adjacent to said body and pivoted
15 at its upper end and adapted to move toward and from said body and having a curved gripping face arranged opposite the periphery of said body and forming with said periphery a curved raceway, a
20 rolling detent member arranged in said raceway and engaging its opposite sides with the periphery of said body and the gripping face of said abutment, said raceway being of tapering form with
25 its wide part at the upper end and its narrow part at the lower end thereof when the abutment is moved toward said body and causing said detent member to be wedged between said abutment
30 and body and prevent rotation of the latter from the upper wide end toward the lower narrow end of said raceway, but release said gripping member upon moving the abutment away from the
35 body and permit the latter to turn in either direction, means for actuating said abutment including a rotary cam engaging the outer side of the abutment below its upper end, a hand lever
40 connected with said cam, and means for confining the rotation of said hand lever to that side of its axis opposite to the abutment.

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