Oct. 28, 1941. R. WENTWORTH ET AL 2,260,416

CLUTCH DETENT

Filed Oct. 25, 1938

FIG. 1

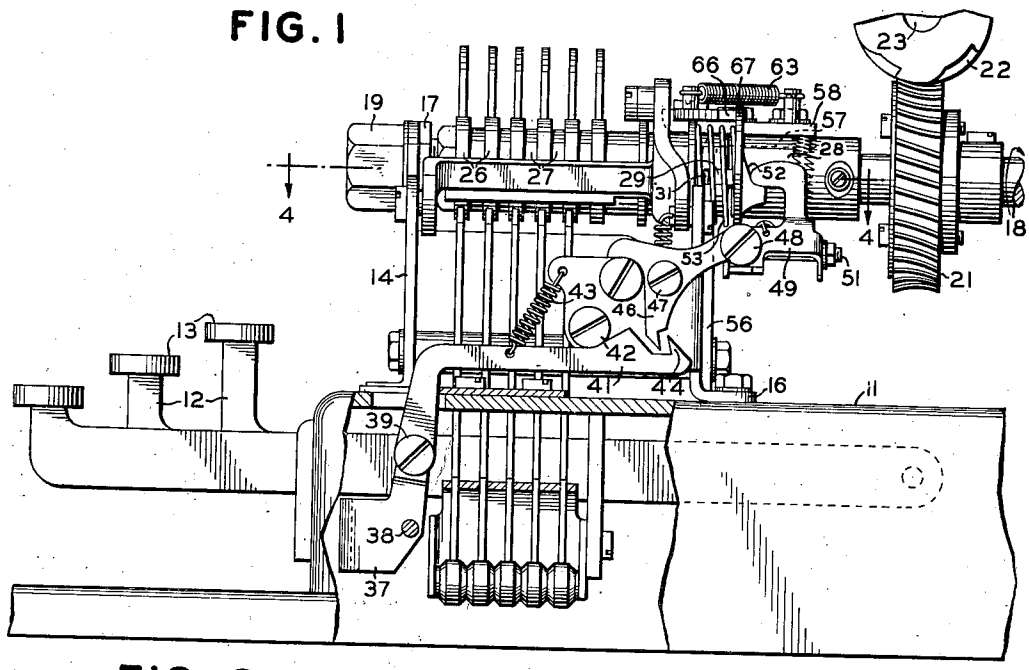


FIG. 3

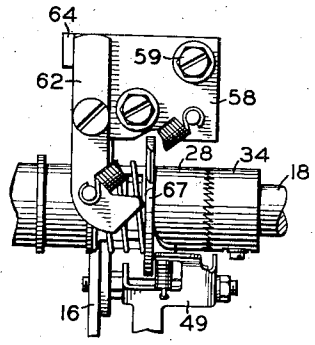


FIG. 2

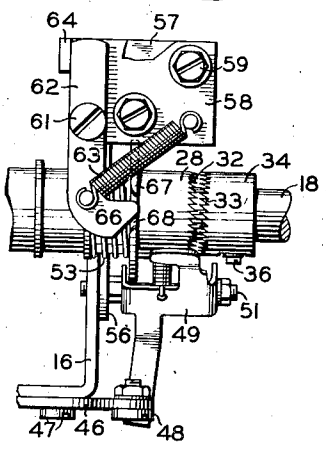
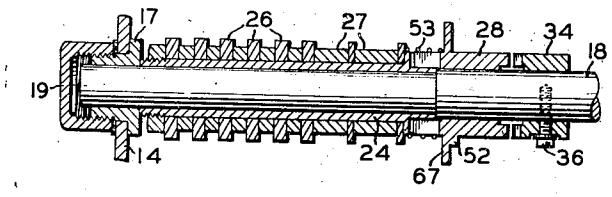


FIG. 4



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CLUTCH DETENT

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4 Claims. (Cl. 192—24)

This invention relates in general to grab or ratchet type clutches and more particularly to an attachment or detent for such types of clutches when employed, for example, on telegraph transmitting mechanisms wherein a rotatable distributor, or transmitting cam sleeve contact actuating member is clutched for one revolution at a time to a constantly rotating shaft once for each character group of signals transmitted, the detent insuring positive and full engagement of the clutch members during substantially the entire period that it is rotating as will be hereinafter described. It should be kept in mind, however, and will be more apparent hereinafter, that the application of the invention is not limited to this particular type of clutch and service, but can be advantageously applied to various other types of clutches and services where it is desired to have a quick and positive acting clutch with no slipping of the clutch members from the time the clutch is engaged until it is disengaged.

In telegraph keyboards of the nature with which this invention especially is concerned such as, for example, the type similar to that disclosed in a patent to H. L. Krum, No. 1,595,472, issued August 10, 1926, wherein the depression of any one of a set of key levers causes the release of a normally at rest transmitting sleeve for one revolution which during its rotation transmits to the line circuit a code group of impulses representing according to a predetermined arrangement the actuated key lever. Each of these groups of signals thus transmitted are of the permutation type having a start impulse followed by a group of either five or six intelligence impulses and terminated by a rest impulse, making a total of seven or eight separate impulses for each signal. The length of duration of the start impulse and the five or six variable intelligence impulses are usually the same while the length of the rest impulse varies with the frequency with which the groups are transmitted, its length approaching the length of one of the intelligence impulses as a minimum. The rest impulse is transmitted during the last part of the revolution of the distributor member and during the time the member is at rest. Where there are six intelligence impulses in each code group, the distributing member or cam sleeve is divided into approximately eight equal divisions and in high speed service where the distributor or keyboard operates at a rate such as, for example, five hundred characters per minute, the period allotted to transmit each separate impulse is obviously of very short duration. Therefore, any slight slippage of the clutch members or any relative rotative movement of the driven and driving members during its operation will tend to vary the length of some or all of the impulses which, as is well known to those versed in the art, has an adverse effect on an associated receiver or, in the terminology of the art, decreases the range of the receiver or receivers in the circuit. If, for example, the clutch did not fully engage until it had made part of a revolution and when it did fully engage allowed the driving member to rotate a small amount, such as one half the distance between two consecutive teeth on a forty tooth ratchet clutch which would be about five degrees relative to the driven member, it would cause a lengthening of the impulse being transmitted at the time the clutch slipped an amount equal to about 10% of the length it should be, and as stated above would adversely affect the operation of associated receiving instruments. Other causes that could affect the length of signals transmitted may be due to the sudden engagement of the driven and driving members causing the driven member to jump ahead of the driving member a tooth or two and thus shorten the length of the start impulse.

It is therefore one of the primary objects of the invention to provide a detent or attachment for clutches of the above general type which prevents substantially all rotation of the driven member until it has been properly engaged with the driving member. The proper engagement between the driven and driving members occurs when a substantial portion or more of the driving surfaces on these members are engaged in overlapping relation so that substantially all relative rotation of these members with respect to one another is prevented.

Another object of the invention is to prevent disengagement of the driving and driven members during substantially a complete revolution thereof and thus establish a substantially positive coupling between the two members during rotation of the driven member.

Still another object of the invention is to provide a detent for clutches of the above general type which when used in conjunction with keyboards enables the force of the spring tending to move the driven member to be reduced, thus enabling the clutch release or throw-out lever to be more easily operated and consequently require a lighter pressure on the keylevers to trip the clutch.

Other objects of the invention reside in the

manner in which it is easily attached to keyboards of the above type.

These and other objects of the invention will be more apparent from the following detailed description of the invention when taken in conjunction with the accompanying drawing, in the latter of which:

Fig. 1 is an elevational view, partly in section, of some of the elements of the keyboard transmitter of the above type cooperating with the invention and the manner in which the invention is associated therewith;

Fig. 2 is a plan view of the elements of the invention and some of the cooperating elements of the associated clutch mechanism employed on the keyboard in their normal rest position;

Fig. 3 is a view of the elements shown in Fig. 2 showing the clutch in an operating position; and

Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 1 showing the distributing member such as a transmitting sleeve and the transmitting shaft.

Referring first to Fig. 1, only the elements of the keyboard that affect or are affected by the invention or are thought to be necessary for a complete understanding of the operation of the invention are shown. The description of the operation of this type of a keyboard is fully given in the above mentioned patent to Krum and in the following paragraphs the description thereof will be limited to the extent to which it cooperates with the elements of the invention. In general the keyboard comprises a base member 11 upon and in which are attached and supported the various elements of the keyboard. Pivoted in the base 11 and extending horizontally from the front are a series of key levers 12 which have on the upturned ends thereof key designating caps 13 arranged substantially like those of an ordinary typewriter. Secured to the top of the base 11 and in spaced relation to one another are two right-angled brackets 14 and 16 which support the transmitting mechanisms. Supported in the upper section of the bracket 14 is a flanged bushing 17, Figs. 1 and 4, which has journaled therein the left hand end of the transmitting shaft 18. The bushing 17 is held in place in the bracket 14 by a cap nut 19 threaded on the bushing. The right hand end of the transmitting shaft 18 is suitably journaled in a bearing (not shown) adjacent the rear of the base 11. The shaft 18 has fixed thereto for rotation therewith a helical gear 21, Fig. 1, which meshes with a pinion gear 22 located thereabove. The pinion 22 is fixed for rotation therewith to the shaft 23 of a constantly rotating electric motor (not shown) and, therefore, through the gears 21 and 22, the shaft 18 is adapted to be continuously rotated.

Loosely mounted on the shaft 18 adjacent the left hand end thereof is a transmitting sleeve 24, Fig. 4, which has fixed thereon in predetermined arrangement a series of transmitting cams 26 intermediate with spaces such as 27. Also loosely mounted upon the transmitting shaft 18 to the right of the sleeve 24 is a collar 28 which is engaged with the sleeve 24 by means of interengaging tongues and grooves 29 and 31, Fig. 1, formed on and in the collar 28 and the sleeve 24 respectively. The sleeve 24 is prevented from longitudinal movement along the shaft 18 while the collar 28 is free to slide there along within predetermined limits. However, the collar 28 is at all times engaged with the sleeve 24 for rotation therewith by means of the tongues and grooves 29 and 31. Formed on the right hand face of the collar 28 are a series of ratchet teeth 32, Fig. 2, which are in operative relation with a similar set of teeth 33 formed on the left hand face of a collar 34 fixed to the shaft 18 for rotation therewith by a set screw 36. Normally the teeth 32 and 33 are not in engagement and the sleeve 24 and the collar 28 are held from rotating in a normal rest position by means hereinafter described. The collars 28 and 34 comprise the driven and driving members respectively of the clutch employed to rotate the transmitting sleeve 24, the operation of which will be more fully described in the following paragraphs.

Whenever any one of the key levers 12 is actuated to initiate the transmission of a group of representative code signals it causes the universal bail 37 pivotally mounted at 38 to pivot a slight amount in a counter-clockwise direction. The upwardly extending arms of the universal bail has pivotally attached to it by shoulder screw 39 a trip lever 41. The trip lever 41 is held against the stop 42 by an attached spring 43 and has a hook 44 adjacent its right hand end which is in operative relation with the depending arm of a three-armed lever 46. The lever 46 is pivotally mounted on a shoulder screw 47 and the rightwardly extending arm thereof has an eccentric screw 48 therein which cooperates with the horizontal arm of the clutch throw-out lever 49.

The clutch throw-out lever 49 is pivoted on a stud 51 extending horizontally from the bracket 16. The upper end of the substantially vertical arm of the throw-out lever 49 engages a side cam surface 52 formed on the periphery of the collar 28 and normally holds the collar in its left hand position against the action of a compression spring 53 coiled about the tongues and grooves 29 and 31, tending to slide the collar toward the right. Whenever the key lever 13 is actuated, it in the well known manner through the instrumentalities of the universal bail 37, the trip lever 41 and the three-armed lever 46, causes the withdrawal of the end of the upwardly extending arm of the clutch throw-out lever 49 from engagement with the side cam surface 52. This operation of the throw-out lever 49 allows the spring 53 to slide the collar 28 to the right to engage its teeth 32 with the teeth 33 on the collar 34 rotating with the shaft 18, whereupon the collar 28 and the sleeve 24 start rotating. The trip lever 41 and the three-armed lever 46 are arranged so that after being operated, the clutch throw-out lever 49 is permitted to quickly return to its normal position where the upper end rides on the periphery of the collar 28 in the path of the side cam surface 52 to cause disengagement of the teeth on the collar 28 with those on the collar 34 and stop the rotation of the collar 28 and the transmitting sleeve 24 after one revolution thereof.

When a clutch of the above type is employed on shafts rotating at a comparatively slow speed, the possibility of the teeth, such as 32 and 33 not fully engaging is less than when such clutches are employed on keyboards capable of operating at speeds such as 500 characters per minute, where various factors such as the inertia of the moving elements and the friction between the transmitting shaft 18 and the transmitting sleeve sometimes prevents the clutch teeth from properly engaging until after the driven member has made a part of a revolution. The failure of a driven member such as the collar 28 may be due

to the tips of the teeth engaging sufficiently, together with the friction between the shaft and the sleeve, to rotate the sleeve for part of a revolution before the tips of the teeth slip past one another to more fully engage the next tooth. Such slipping of the clutch members allows the driving member to rotate relative to the driven member an amount equal to the distance between two consecutive teeth and as heretofore stated, lengthen the impulse being transmitted at this time an appreciable amount. During the first part of a revolution of the driven member the beveled surfaces of the teeth **32** and **33** may engage sufficiently to rotate the driven member for part of a revolution before the engagement of the surfaces parallel to the axis of the shaft. This allows the driving member to rotate a slight amount relative to the driven member until the parallel surfaces do engage at some point in the rotation of the driven member and lengthen the impulse being transmitted at that time. As will be hereinafer described the invention overcomes these difficulties by preventing any appreciable rotation of the driven member until at least a substantial portion of the driving surfaces on the teeth are properly engaged in overlapping relation and maintaining the teeth in such proper engagement for substantially a complete revolution of the driven member.

In accordance with the invention a plate **56** is attached to the bracket **16** and the upper section **57** thereof, shown dotted in Fig. 1, is bent horizontally to form a mounting for an adjustable plate **58** adjustably secured thereto by screws such as **59**, Figs. 2 and 3. Pivotally mounted on the plate **58** by a shoulder screw **61** is a lever or detent **62** with an attached spring **63**. The spring **63** is comparatively strong and holds the straight end of the detent **62** in engagement with a stop **64** formed by a turned up section of the plate **58**. The bent end **66** of the detent **62** is in operative relation with a flange **67** formed integral with the movable element of the clutch or collar **28**. The flange **67** has a radial slot or notch **68** therein and in the normal rest position of the collar **28** the bent end **66** of the detent extends into the notch **68** an amount slightly less than the distance the collar **28** moves to the right to have its teeth **32** fully engage the teeth **33** on the driven member or collar **34**. If at the start of a revolution of the collar **28** the driving surfaces of the teeth thereon do not have a substantial portion thereof engaged with the driving surfaces of the teeth on the driving member **34** or the collar **28** has not slid to the right its proper amount, the leading radial edge of the notch in the flange **67** engages the beveled end of the detent **66** and due to its rotative movement cams the collar **28** toward the right. If at the time the leading edge of the notch **68** on the flange **67** engages the beveled end **66** of the detent, the tips of the teeth or other than the driving surfaces thereof are engaged, the detent will stop further rotation of the collar **28** until the driving surfaces of the teeth are engaged. Any delay thus caused in the rotation of the transmitting sleeve at this time does not affect the signals to be transmitted during the rotation of the sleeve because during this time the rest impulse of the previous code group is being transmitted and its length only determines the interval between code groups. When the teeth on the driven and driving elements are properly engaged, the flange **67** is moved to the right sufficiently so that it just clears or is out of engagement with the end **66** of the detent as shown in Fig. 3. During rotation of the collar **28** the end of the detent **66** is sufficiently close to the left hand face of the flange **67** to prevent disengagement of the teeth **32** and **33** until the notch **68** is again opposite the end of the detent at the end of a revolution of the transmitting sleeve **24**. Normally the spring **63** attached to the detent **62** does not flex, it being provided to allow the detent to pivot, should the clutch happen to jam for some reason. Thus the driven member of a clutch of the above type, such as the collar **28**, is held from rotating a substantial amount until the driving surfaces of the teeth engage whereupon they are fully engaged and are prevented from being disengaged for substantially the remainder of the revolution or until the end of the clutch throw-out lever **49** engages the side cam surface **52** to cam the collar to the left to bring it to rest in its normal rest position, as shown in Fig. 2.

As is apparent to those skilled in the art an increase of the force of the spring **53** tends to give better engagement of the driven and driving members **28** and **34**, respectively. However, such an arrangement does not insure full and proper engagement of the driven and driving member on every operation, and in addition has the disadvantage of requiring more force on the key-levers to actuate the throw-out lever **49**. By employing the detent **62**, the force of the spring **53** may be decreased until it is just strong enough to start the engagement of the driven member with the driving member. Under such conditions, the full and proper engagement of the driven and driving members is insured by the detent, and it prevents substantially all rotation of the driven member until the members are properly engaged. An additional advantage obtained by employing the detent is that with a weak spring **53** only a light pressure is required on the keylevers to actuate the throw-out lever **49**.

It is obvious, of course, that the invention may be applied to clutches other than those operating in conjunction with keyboards and various modifications of the invention may be made without departing from the spirit or essential attributes thereof, and it is desired, therefore, that only such limitations shall be placed thereon as are imposed by the prior art or are specifically set forth in the appended claims.

What is claimed is:

1. In a clutch of the type described adapted to make one revolution at a time comprising a driving member and a driven member, engageable surfaces on said driving and said driven members for rotating said driven member with said driving member on engagement thereof, resilient means for initiating the engagement of said engageable surfaces, means for completely engaging said engageable surfaces when initiated into engagement by said resilient means, means including said last-mentioned means for preventing substantially all rotation of said driven member with respect to said driving member during engagement of said engageable surfaces, and means independent of said last-mentioned means for stopping rotation of said driven member after each revolution thereof.

2. In a device of the type described, a constantly rotating driving member, a normally at rest driven member having a normal rest position, said driving and driven members being adapted to engage one another to rotate said driven member, a flange formed integral with

said driven member, a notch in said flange, a detent having a sloping surface relative to the direction of rotation of said flange in said notch in the rest position of said flange, resilient means, means comprising said resilient means and the sloping edge of said detent engaging an edge of the notch in said flange for initiating the rotation of said driven member with said driving member and preventing substantially all rotative movement thereof until full engagement with said driving member, means comprising the end of said detent and a side surface of said flange for preventing disengagement of said driven and driving members during predetermined portions of each revolution of said driven member, a cam rotatable with said driven member and means including said cam for disengaging said driven and driving members after each revolution of said driven member.

3. In a device of the type described, a normally rotating driving member having teeth with driving surfaces disposed on one face thereof, a normally at rest driven member, resilient means for moving said driven member axially to bring driving surfaces of teeth disposed on one face thereof into engagement with the driving surfaces of teeth on said driving member to be rotated thereby, a clutch throw-out lever, means including said clutch throw-out lever for preventing axial and rotative movement of said driven member, means for operating said clutch throw-out lever to render said resilient means effective to move said driven member to bring the teeth thereon into engagement with the teeth on said driving member, means for preventing substantially all rotation of said driven member until substantial engagement of the driving surfaces of the teeth thereon with the driving surfaces of the teeth on said driving member, and means including said clutch throw-out lever for disengaging the driving surfaces of said teeth after each revolution of said driven member.

4. In a device of the type described, a normally rotating driving member having teeth with driving surfaces disposed on one face thereof, a normally at rest driven member, resilient means for initiating the movement of said driven member axially to bring driving surfaces of teeth disposed on one face thereof into engagement with the driving surfaces of teeth on said driving member to be rotated thereby, a throw-out lever, means including said throw-out lever for preventing axial and rotative movement of said driven member, means for operating said throw-out lever to render said resilient means effective to axially move said driven member, means for preventing substantially all rotation of said driven member until at least a portion of the driving surfaces of the teeth thereon are in engagement with the driving surfaces of the teeth on said driving member, means including said last-mentioned means for bringing the driving surfaces of said teeth into substantial full engagement, and means for preventing disengagement of the driving surfaces of said teeth during substantially all the rotative movement of said driven member.

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