

July 31, 1923.

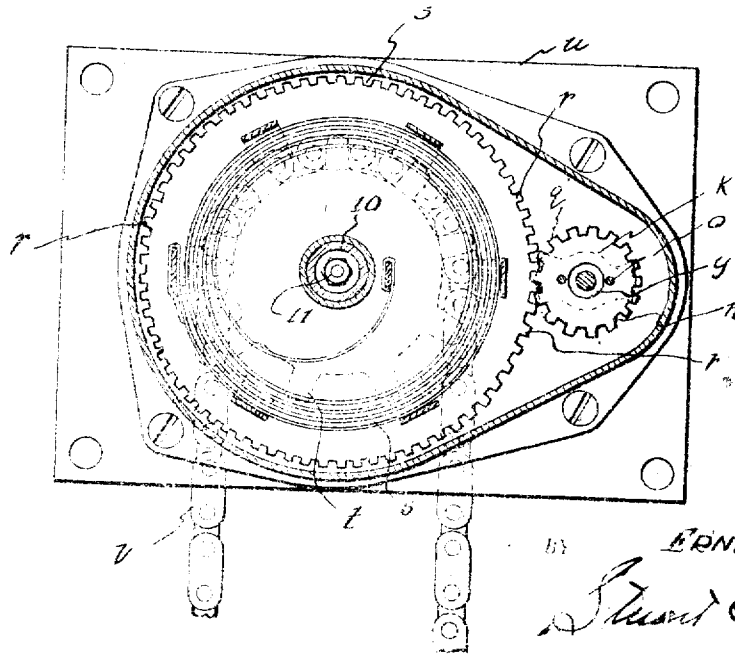
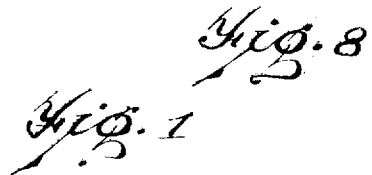
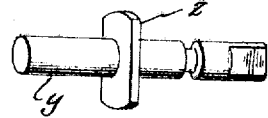
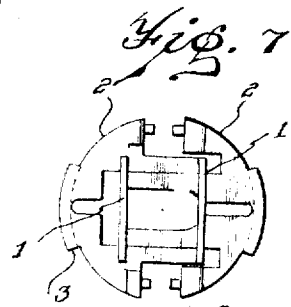
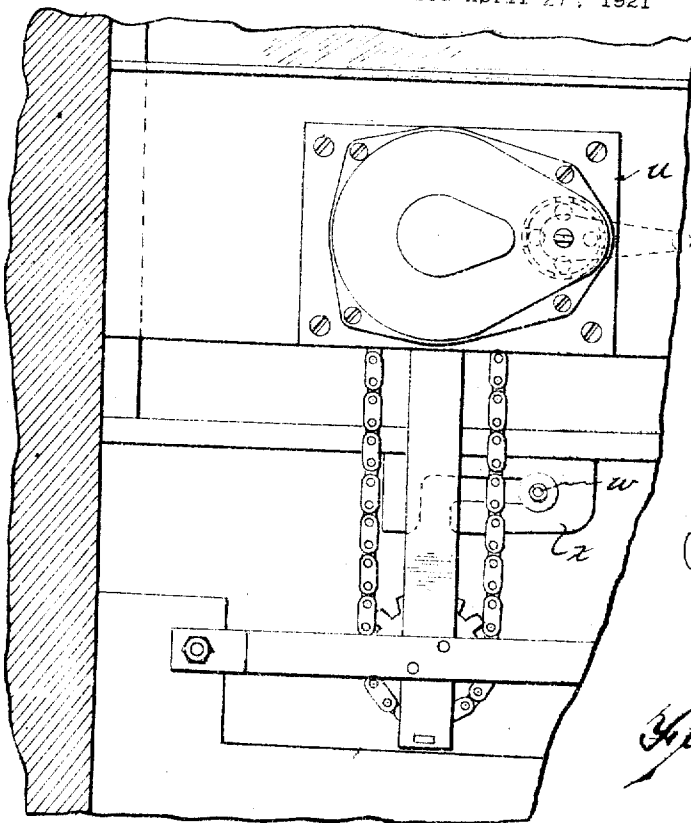
E. E. HEINTZ

1,463,422

WINDOW REGULATOR

Filed April 27, 1921

2 Sheets-Sheet 1



INVENTOR.

BY *ERNEST E. HEINTZ*
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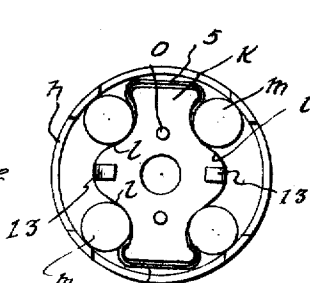
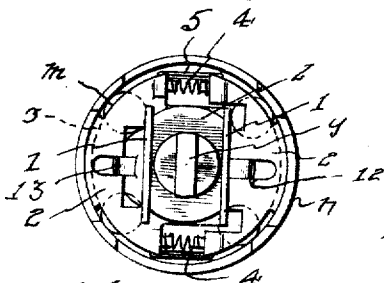
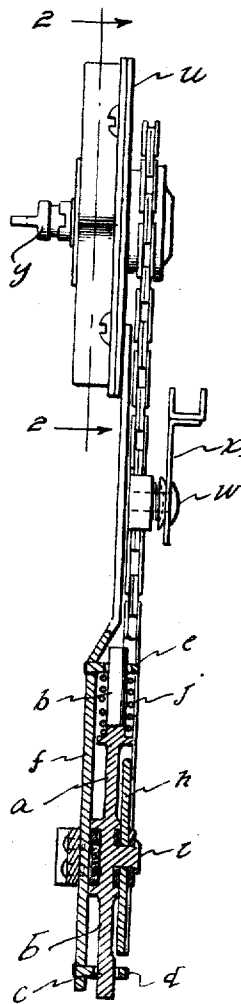
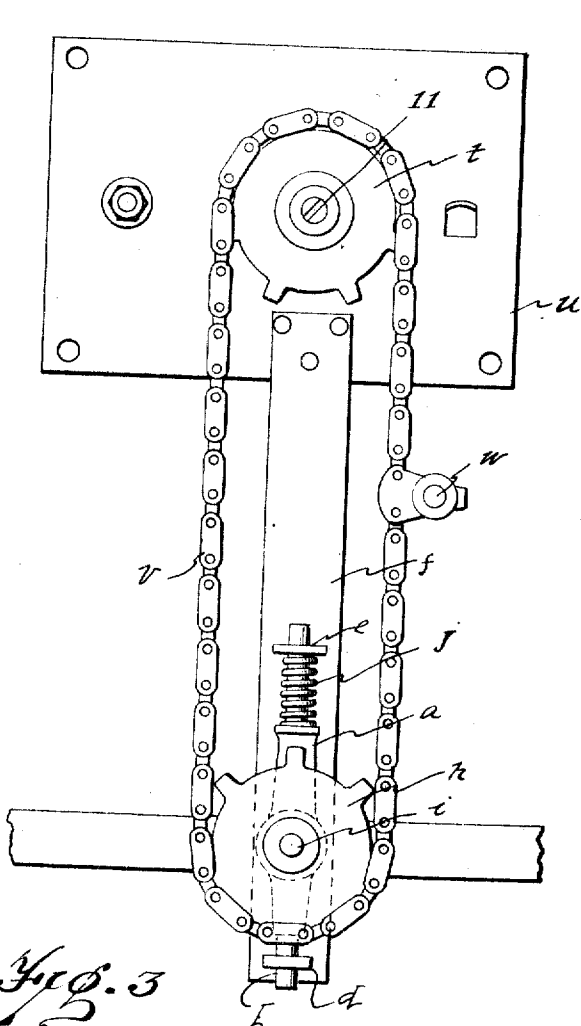
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2 Sheets-Sheet 2



INVENTOR.

ERNEST E. HEINTZ

ATTORNEY.

Patented July 31, 1923.

1,463,422

UNITED STATES PATENT OFFICE.

ERNEST E. HEINTZ, OF DETROIT, MICHIGAN, ASSIGNOR TO TERNSTEDT MANUFACTURING COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

WINDOW REGULATOR.

Application filed April 27, 1921. Serial No. 484,870.

To all whom it may concern:

Be it known that I, ERNEST E. HEINTZ, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Window Regulators, of which the following is a specification.

This invention relates to window regulators. In certain types of window regulators it is possible to continue the rotation of the crank handle a short distance after the window has reached the bottom of the window well. In some window regulators of this type when the clutch locks immediately the turning effort is released upon the crank handle, an objectionable slack occurs in the chain. It is the object of the present invention to co-ordinate the action of a naturally quick acting clutch with the chain tensioning spring so that the clutch locking is delayed until after the chain tensioning spring takes the slack out of the chain.

To be more specific, in such a window regulator as is shown in the drawings of this case and claimed in the prior Allmand and Lawrence Patent No. 1,317,150 of Sept. 30, 1919, the lower sprocket is supported upon a slidable bearing. This lower sprocket is normally projected outwardly by a coiled spring, thereby keeping the chain taut. The window in its descent strikes the stop at the bottom of the window well. The operator not seeing this may continue the turning of the crank until he can turn it no further. The turning of the crank handle after the window strikes the bottom of the window well will pull up on the left hand vertical run of the chain until the coiled spring is collapsed. Now obviously, if the clutch locks immediately, the chain is locked in this condition with the run of chain on one side tight and the run of chain on the opposite side very slack. This slack chain lashes back and forth with the vibration of the car, resulting in annoying noises. It is the object of the present invention to make this result impossible because by the delaying devices employed in the present clutch when the turning effort is released on the handle the chain tensioning spring will beat the revised clutch action and force the chain back to normal position before the clutch locks.

There are some types of clutches in which this problem does not arise at all, because the clutch action is naturally so slow that the chain tension spring returns the chain to its natural position before the clutch locks. There are other clutches which do not positively lock and hence the chain-tensioning spring may slip the clutch enough to return the parts to their natural position. It is the merit of the present invention that recognition is made of this problem of slack chain and that it is due to premature clutch-locking in a window regulator having a chain-tensioning spring and a movable sprocket bearing. The object of the invention is to apply a corrective remedy by adding an element to the combination that properly co-ordinates the chain-tensioning functions and the clutch action. This permits the use, without objectionable chain slack, of clutches desirable for other reasons, which if left uncontrolled will inevitably produce chain slack.

The fact that the problem does not arise with certain types of clutch does not detract from the importance of the improvement, for it permits the use of clutches that are more reliable in their locking action and perhaps a better manufacturing proposition.

In a co-pending application No. 588,328, I have claimed the clutch per se. This clutch is an independent invention as it might be used with apparatus other than window regulators and it would be useful with window regulators, where the present problem does not arise, for instance, a window regulator with a screw adjustment for the lower sprocket or no adjustment at all. Even in such a surrounding the clutch with the yieldable driving plates has a useful function, to wit: the yieldable driving plates take up the lost motion in the handle and hence avoid vibration of the handle which is otherwise inevitable with this "ball type" of clutch. On the other hand the broad combination which is claimed in the present application might be achieved by quite different individual elements than those that happen to be shown, for instance a pawl or tooth type of clutch might lock in advance of the release of the slack in the chain, and the same useful results achieved by applying a corrective in the way of a properly timed retarding device.

In the drawings,—

Fig. 1 is a side elevation showing the window regulator attached to the lock-board.

Fig. 2 is a section on the line 2—2 of

Fig. 4.

Fig. 3 is a side elevation showing the side of the window regulator opposite to that shown in Fig. 1.

Fig. 4 is a side elevation partly in section but taken at an angle of ninety degrees from the showing in Fig. 3.

Fig. 5 is a detail view of the clutch with the retarding plates removed.

Fig. 6 is a view of the clutch with the retarding plates assembled in place.

Fig. 7 is a view of the retarding plates disassembled from the remaining clutch parts.

Fig. 8 is a perspective of the operating spindle.

Fig. 9 is an edge view of one of the retarding plates.

This window regulator is of the chain type shown in the prior patent to Lawrence and Allmand No. 1,317,150 dated Sept. 30, 1919. This patent describes the chain tensioning device, which comprises the lower sprocket support *a*, which has a pair of trunnion-like ends *b* and *c* that engage in struck-out portions *e* and *d* of the vertical strap iron *f* that connects the upper and lower sprockets. The lower sprocket wheel *h* is journaled on a stud *i* projecting from this support *a*. This support *a* is projected downwardly by the coil spring *j* which constitutes a chain tensioning spring and ordinarily keeps the chain taut. By reason of the trunnion-like ends of the bearing support the lower sprocket may rock slightly to accommodate itself to the upper sprocket to prevent the chain from running off the sprocket teeth.

In prior patent to Simpson, Schmidt and Carstens No. 1,343,410 of June 15, 1920, the main features of the clutch here shown are described and claimed. In that patent there is described and claimed a clutch which locks when the turning effort is applied from the driven parts of the window regulator but which is free to turn when the turning effort is applied from the driving parts of the regulator. To be more specific, *k* is a cam which is provided with inclines *l* so that, when the cam is turned in either direction by effort applied to the driven parts of the regulator, these inclines *l*, which are four in number, creep in under the disks *m* and jam these out against the wall of the clutch casing *n*. This effectively locks the clutch elements from any effort applied by the driven parts of the regulator, for the cam *k* is connected by the pins *o* with the pinion *q* (Fig. 2.) This pinion *q* is in mesh with the larger gear *r* which engages under the counterbalancing spring *s*. This larger gear is

connected by a suitable hollow spindle 10 and bolt 11 with a chain sprocket *t* (Fig. 3) on the opposite side of the upper supporting plate *u*. Around this upper sprocket, which is the driving sprocket, runs the chain *v*, which, as already explained, runs also over the lower sprocket *h*. The window lifting pin *w* is provided on one of the links of the chain to engage in a sash plate *x* in a familiar way that need not here be detailed.

Now turning to Fig. 6, it will be seen that the operating spindle *y* (detailed in Fig. 8) is provided with an integral key *z* that fits between the flanges 1 on the two retarding plates 2. The right hand flange 1 is attached to the left hand retarding plate 2 and the left hand flange 1 is attached to the right hand retarding plate 2 (see Fig. 7). Hence when turning effort is exercised on the spindle *y* the key *z* first spreads the flanges 1 and hence draws in the retarding plates. Each of these retarding plates is provided with a slot 12 which is guided on the struck-out lug 13 of the cam *k*. Hence the retarding plates 2 can only move perpendicular to the major axis of the cam. Hence when turning effort is exercised upon the crank handle (which is part of the driving parts of the regulator) the retarding plates hold the rolling members or disks *m* from being thrust out against the wall of the casing to lock the clutch. Of course, as long as the driving effort of the driving parts is greater than the resistance in the cam, there is no tendency for the clutch parts to lock. This is the action of the clutch described and claimed in the prior Simpson, Carstens and Schmidt patent, where no retarding plates are used but a single solid driving plate.

The operation of same type of clutches and the clutch in the prior Simpson, Carstens and Schmidt patent is such that when a heavy resistance is met, as, for instance, when the chain tensioning spring becomes collapsed, then the cam will start rotating in the opposite direction immediately the dead point of resistance has been met and the effort on the handle falters in the least. Any movement of the cam reversely, although very small, locks the clutch in the Simpson et al. clutch, thrusts the disks or locking pieces outward and locks the regulator. This, of course, leaves the one run of the chain slack.

The action of the composite driving plate which comprises the two retarding plates and the springs 4 which tend to spread them, is as follows: The driving action due to the actuation by the driving parts of the regulator is substantially the same as in the Simpson, Carstens and Schmidt clutch. However, the flat springs 5 which engage over the ends of the cam yieldingly hold the disks or locking pieces always in contact with the driving plate and thereby avoid any objec-

tionable clicking or noise. When the clutch parts reach a dead point of resistance as when the sash has reached the bottom of the well and the chain tensioning spring *j* has been completely collapsed, the operation of the clutch differs quite materially from the action of the previous clutch of the Simpson, Carstens and Schmidt patent. Assuming the exact dead point of resistance has been reached and turning effort on the handle falters or is released, now of course, the chain tensioning spring *j* tends to reversely rotate the same. This, as we have seen in the old Simpson, Carstens and Schmidt clutch, immediately locked the clutch. This is not so in this clutch for here the retarding plates preclude any such locking until they have been spread. The reason for this is that the retarding plates, by means of the slots 12 on the lugs or the keys 13, are tied to the cam to rotate with it. Hence the reverse movement of the cam simply tends to reversely rotate the retarding plates or the composite driving plate. The locking disks or rolling members are simply carried along in a reverse direction but in no way projected out to lock the clutch parts. However, the turning effort having been released upon the crank handle and hence the key 2, the small and weak springs 4 are free to bring back the flanges 1 against the sides of the key and at the same time spread the retarding plates. When the retarding plates are spread then the locking disks or rolling members are free to be thrust out. After they have been thrown out or thrust out by the ends of the springs 5, they meet friction on the inside of the casing and cease to rotate with the cam. The inclined surface *l* of the cam then drives in under the disk and locks the clutch parts by jamming the disks in between the cam and the cylindrical wall of the casing. Hence when no effort is exercised on the crank handle the retarding plates are expanded and permit any movement in either direction of the cam to jam the inclines in under the balls and lock the clutch parts.

As I understand the action of this apparatus, the weak springs 4 that spread the retarding plates act slower than the strong chain tensioning spring *j*. Consequently the spring *j* snaps the chain back to its normal position before the retarding plates release the clutch, permitting it to lock. The result

is that this clutch never locks when there is slack in the chain due to the collapsing of the chain tensioning spring. The retarding plates prevent this.

It will be apparent from the above description that a new combination of mechanical elements has been worked out, to wit: the sprockets, the endless chain, the collapsible chain tensioning spring, the clutch which in its natural action will lock before the chain tensioning spring will take the slack out of the chain and a corrective element which is inserted in the clutch for the purpose of delaying the clutch action and coordinating it with the chain tensioning spring. So far as this broad combination is concerned, it makes no difference what is the specific character of the clutch and the corrective element. The corrective element will naturally have to vary with the nature of the clutch.

I have claimed the clutch per se together with the retarding plates in a separate application No. 588,328 for it is conceivable that a clutch with a retarded locking action may be useful in other connections and it also transpires that the retarding or driving plates in this specific clutch are useful in taking up the lost motion in the handle regardless of what kind of a driving member or driving connection is used.

What I claim is:

In a window regulator, the combination of a pair of rotatable members, one of which is slidably supported, an endless flexible draft member running over the rotatable members, and arranged for connection with the window, means for yieldingly forcing said slidable rotatable member outwardly to tension the flexible draft member, and means for rotating one of said rotatable members including a clutch which, if uncontrolled, locks before the draft-tensioning means can return the draft member to taut relation after the draft-tensioning member has been collapsed by continued driving effort on the rotating member after the window has been stopped, the said clutch provided with devices for retarding the clutch action so that the clutch only locks after the draft-tensioning means has returned the flexible draft member to taut relation.

In testimony whereof I affix my signature.

ERNEST E. HEINTZ.