Oct. 18, 1938. H. N. BLISS ET AL 2,133,777

RATCHET CLUTCH MECHANISM

Filed March 4, 1937

Fig. 1

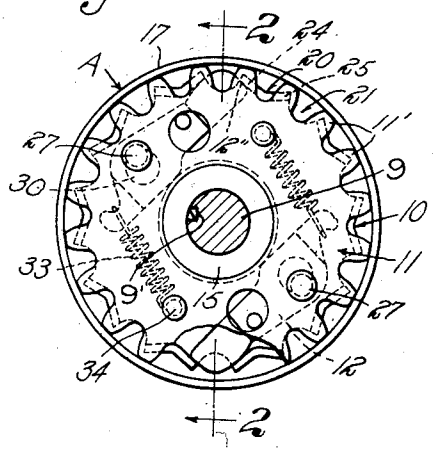


Fig. 2

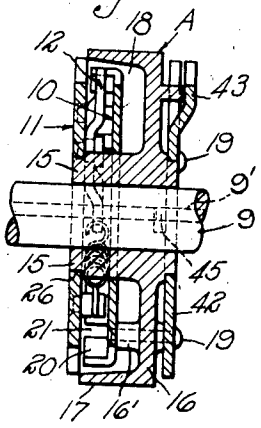


Fig. 3

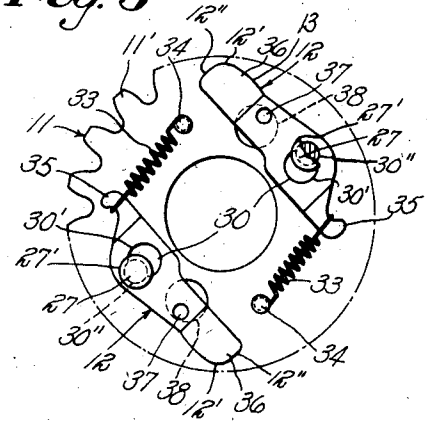


Fig. 4

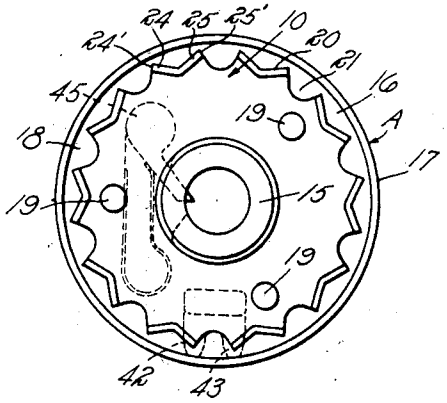


Fig. 5

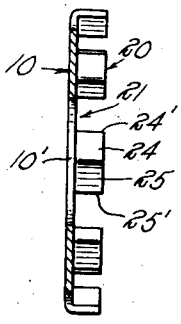
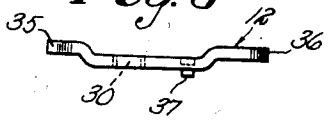


Fig. 6



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RATCHET CLUTCH MECHANISM

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Application March 4, 1937, Serial No. 128,886

5 Claims. (Cl. 192—46)

This invention relates to a ratchet clutch mechanism which finds particular application in a counter unit of the type having a numeral wheel, a drive member or gear, and a connection therebetween in the form of a ratchet device whereby the drive gear and numeral wheel may be driven as a unit during a registering operation and the numeral wheel may be reset to a starting position without transmitting rotation to the drive gear during the resetting operation.

It is an aim of the present invention to provide a ratchet clutch mechanism of the type described having various features of novelty and advantage and which is particularly characterized by its extreme simplicity in construction, economy of manufacture, and efficiency of operation.

A more particular object of the invention is to provide in a ratchet clutch mechanism for a counter unit of the character described an improved arrangement of pawls which is very simple and economical, which will permit a ready assembly, wherein the extent of movement of the pawls is effectively limited, and wherein breakage of the springs associated with the pawls is reduced to a minimum.

It is a further object of this invention to provide a counter device having a small number of parts and including a driving unit and a driven unit which may be quickly and easily assembled without the use of tools.

A still further object of the invention is to provide an improved arrangement for a counter unit having the above and other advantages and wherein the numeral wheel and driving member are automatically and properly located relative to one another.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawing illustrating one embodiment of our invention and wherein like numerals indicate like parts:

Figure 1 is a side elevation of the assembled counter unit;

Fig. 2 is a section through the unit taken along the line 2—2 of Fig. 1;

Fig. 3 is a side elevation of the drive member with the pawls assembled thereon;

Fig. 4 is a side elevation similar to Fig. 1 but with the drive member removed;

Fig. 5 is a sectional view through the ratchet wheel forming part of the counter unit; and

Fig. 6 is a side elevation showing one of the pawls.

In accordance with the present invention as illustrated, we have provided a numeral wheel A containing a ratchet wheel 10 rigidly secured thereto or forming a part thereof, and a drive member 11 journalled on a hub of the numeral wheel transmits unidirectional rotation thereto by means of pawls 12. The numeral wheel A is rotatably mounted in cooperative relation with one or more similar numeral wheels on a reset shaft 9 which is normally held fixed during a counting operation. This shaft is provided with a longitudinally extending groove 9'. During a resetting operation, the shaft is rotated in the same direction as that in which the counter unit is driven for registration. At this time, the groove will pick up the nose portion of a spring pressed reset pawl 45 pivotally carried by the numeral wheel causing the numeral wheel to be reset to a zero or other starting position. This resetting movement is independent of the driving member in view of the ratchet connection between the drive member and the numeral wheel.

The wheel A is provided with a central hub 15 from which extends a disk-like web 16 terminating in a peripheral flange 17. Spaced numerals from "0" to "9" may be provide on the flange in consecutive relation in accordance with general practice to register a counting operation. The numeral wheel A also has an annular cavity 18 between hub 15 and flange 17, and the ratchet wheel 10 is supported in this cavity coaxially of wheel A by rivets 19 passing through bosses 16' extending from web 16 so that any rotation imparted to the ratchet wheel will result in a corresponding rotation of wheel A. In the present showing, the ratchet wheel 10 which has a central hole 10' receiving hub 15, is blanked out from sheet metal and bent to form, providing ratchet teeth 20 spaced by notches 21. These teeth comprise duplicate bent over portions extending substantially at right angles from, and to one side of, the body portion of the ratchet wheel at its periphery. In order to insure proper relation between the driving gear and the numeral wheel, each of these teeth are of V shape having a pair of obtusely disposed interconnected walls 24 and 25, the apexes of the teeth being disposed towards the

axis of the ratchet wheel and being equally spaced about said axis. The walls of each tooth are symmetrical with respect to a radial line passing through the apex of the tooth and the axis of the wheel, so that the adjacent walls 24 and 25 of adjacent teeth form the notches 21 in substantially V shape. However, the present showing is only exemplary of one embodiment of a numeral wheel and ratchet wheel assembly, and it will be appreciated that a numeral wheel having similarly shaped and similarly located V shaped teeth integrally formed therewith and within cavity 18 would not deviate from the scope of our invention.

The outer left-hand end of hub 15, as viewed in Fig. 2, projects beyond the plane of the edge of flange 17 and terminates in a reduced bearing portion 26 upon which is journalled the disk-shaped drive member 11 which, in the present instance, is illustrated in the form of a gear having uniformly spaced peripheral teeth 11'. For the purpose of operatively associating the drive member or gear 11 with the numeral wheel, there is provided a pair of pawls 12 pivotally mounted between their ends on studs 27 carried by the driving gear. Springs 33 connected between studs 34 on the drive member and hooked ends 35 on the pawls normally urge the outer or driving ends 36 of the pawls into engagement with the ratchet teeth. As shown in Fig. 6, the opposite ends of the pawls are offset to facilitate the attachment of springs 33 and to assure the proper engagement of the outer pawl ends with teeth 20. It has been found advisable in the assembly of our counter units on a reset shaft to permit a slight amount of end play between the drive member 11 and the numeral wheel to prevent the binding of parts. As shown in Fig. 2, the extent of offset of the outer end of each pawl is such that the pawl cannot spring past the ends of the V-shaped teeth.

The outer or driving end of each pawl is so constructed and shaped as to cooperate with the adjacent V-shaped teeth in order to insure a proper driving relation between the drive gear and the numeral wheel and also to permit turning of the number wheel and ratchet wheel independently of the driving gear during a resetting operation. More particularly, the driving end of each pawl has an end edge 12'' and a side edge 13 disposed relative to one another at substantially the same angle as are the walls 24 and 25 of adjacent ratchet teeth so that when the parts are in proper driving relation those edges will respectively engage said sides of the teeth. The corner 12' between the edges 12'' and 13 is curved so as to have a camming action on the teeth which insures that the driving end of the pawl will properly ride into a seated position within the notch formed by the adjacent walls 24 and 25 of adjacent teeth and also to permit the pawl to ride out of those notches during the resetting operation. In view of the fact that each tooth 20 has its two sloping walls 24 and 25 diverging outwardly from an apex, it will be appreciated that the camming action of the pawls against the teeth will tend to locate the numeral wheel in predetermined relation to the drive member with the pawls seated between adjacent teeth, as shown in Fig. 1. Hence, there will be no tendency for the pawls to frictionally locate on intermediate tooth portions and the numeral wheel will not stop in an intermediate registering position between two of its numbers either during a counting or a resetting movement.

In accordance with the present invention, there is provided a very simple and effective arrangement for mounting the pawls in position and for mounting the drive gear in the interest of economy and ease of assembly. To these ends, the studs 27 which are carried by and extend laterally from the inner face of gear 11 have on their outer ends enlarged heads 27', and each pawl has a key slot opening 30 having an enlarged portion 30' through which the head is adapted to be received and a smaller portion 30'' adapted to closely and rotatably receive the shank of the stud behind the head. During assembly, the enlarged portion 30' is first passed over head 27', after which spring 33 serves to maintain portion 30'' rotatably mounted on the shank portion of the stud and urges the outer end of the pawl into position to engage with the toothed portion of the ratchet wheel.

To facilitate assembly of the counter unit and effectively limit the extent of angular pawl movement and minimize spring breakage, a struck out portion 37 which projects laterally from each pawl between stud 27 and the end 36 is received within a hole 38 through the drive member 11. This struck out portion 37 moves into engagement with the opposite edges of hole 38 and limits the extent of pivotal movement of its pawl into and out of driving position. Hence, springs 33 are economically limited as to the extent of their resilient movement, and the pawls are maintained at all times in journalled position on their respective studs. Struck out portions 37 and holes 38 are preferably so positioned relative to each other that the outer ends of the driving pawls are so located that they may be easily slid into toothed engagement with the ratchet wheel to facilitate assembly of the counter unit without requiring the use of tools.

It is, of course, understood that the drive gear 11 may be rotated either directly by the driving mechanism or through the usual transfer pinion, depending upon whether the unit is the first or a subsequent one of a series composing the counter assembly. On the side of the wheel opposite the drive gear 11 and secured by rivets 19 is the usual locking disk 42 having a mutilated or two toothed gear 43 struck out from it and adapted to cooperate with the usual transfer pinion for operating the next succeeding unit. The transfer mechanism may be similar to that disclosed in the patent to Spaunburg No. 2,040,031 issued May 5, 1936, and needs no further description. It is apparent, of course, that the positions of the ratchet wheel and pawls may be reversed, the ratchet wheel being secured to the driving member and the pawls being carried by the numeral wheel, and such an arrangement comes within the scope of the appended claims.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter

of language, might be said to fall therebetween.

We claim as our invention:

1. In combination, a driven member, a ratchet wheel secured thereto and having peripheral, equally spaced apart, laterally extending teeth with notches therebetween, a driving member rotatable relative to said driven member and having an aperture, a pawl pivoted between its ends on said driving member eccentrically with respect to the axis of the unit and having one end adapted to engage with said teeth, and a coiled spring anchored at one end to said driving member and connected at its other end to the other end of said pawl for urging the driving end of the pawl into engagement with said teeth, said pawl having a projection extending laterally therefrom and projecting into said aperture for limiting the extent of movement of said pawl under the influence of said spring.

2. In combination, a driven member, a ratchet wheel secured thereto and having spaced laterally extending teeth to one side thereof, a driving member rotatable relative to the ratchet wheel, a stud extending laterally from the driving member and having a shank portion and a head, a pawl having one end engageable with said teeth, said pawl having an aperture between its ends provided with an enlarged portion for accommodating said head and a smaller portion for receiving said shank, and a spring between the driving member and the other end of said pawl urging the pawl into toothed engagement and maintaining said reduced portion in journalled engagement with the shank portion of the stud.

3. In combination, a driven member, means associated with the driven member and having annularly disposed, laterally extending, V-shaped teeth with their apexes towards the axis of the wheel, a driving member rotatable relative to said driven member adjacent said teeth and having an aperture, a pawl pivoted between its ends on said driving member and eccentrically disposed with respect to the axis of the unit and having one end engageable with said teeth, and a coiled spring anchored at one end to said driving member and connected at its other end to the other end of said pawl for urging the pawl into tooth engagement, said pawl having a laterally extending projection between its ends and extending into said aperture for engagement with the sides of the aperture to limit the extent of pawl movement under influence of said spring.

4. In combination, a driven member, a driving member rotatably supported adjacent to said driven member, one of said members having a set of annularly disposed, laterally extending, spaced, V-shaped teeth secured thereto and having their apexes disposed towards the axis of rotation of said member, a stud extending laterally from the other member and having a shank portion and a head, a pawl having one end engageable with said teeth and having an aperture between its ends provided with an enlarged portion for accommodating said head and a smaller portion for receiving said shank, and resilient means between said other member and the other end of said pawl urging the pawl into toothed engagement and maintaining said reduced portion in journalled engagement with the shank portion of the stud.

5. In combination, a driven member, a ratchet wheel secured thereto and having peripheral, equally spaced apart, laterally extending teeth with notches therebetween, a driving member rotatable relative to said driven member and having an aperture, a stud extending laterally from the driving member and having a shank portion and a head, a pawl having one end engageable with said teeth, said pawl having an aperture between its ends provided with an enlarged portion for accommodating said head and a smaller portion for receiving the shank, and a spring between the driving member and the other end of said pawl urging the pawl into toothed engagement and maintaining said reduced portion journalled on the shank, said pawl having a lateral projection extending into the aperture of the driving member for limiting the extent of pawl movement under influence of said spring.

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