Sept. 15, 1953 F. E. MINER ET AL 2,652,199

ODOMETER RESETTING MECHANISM

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FIG. 1.

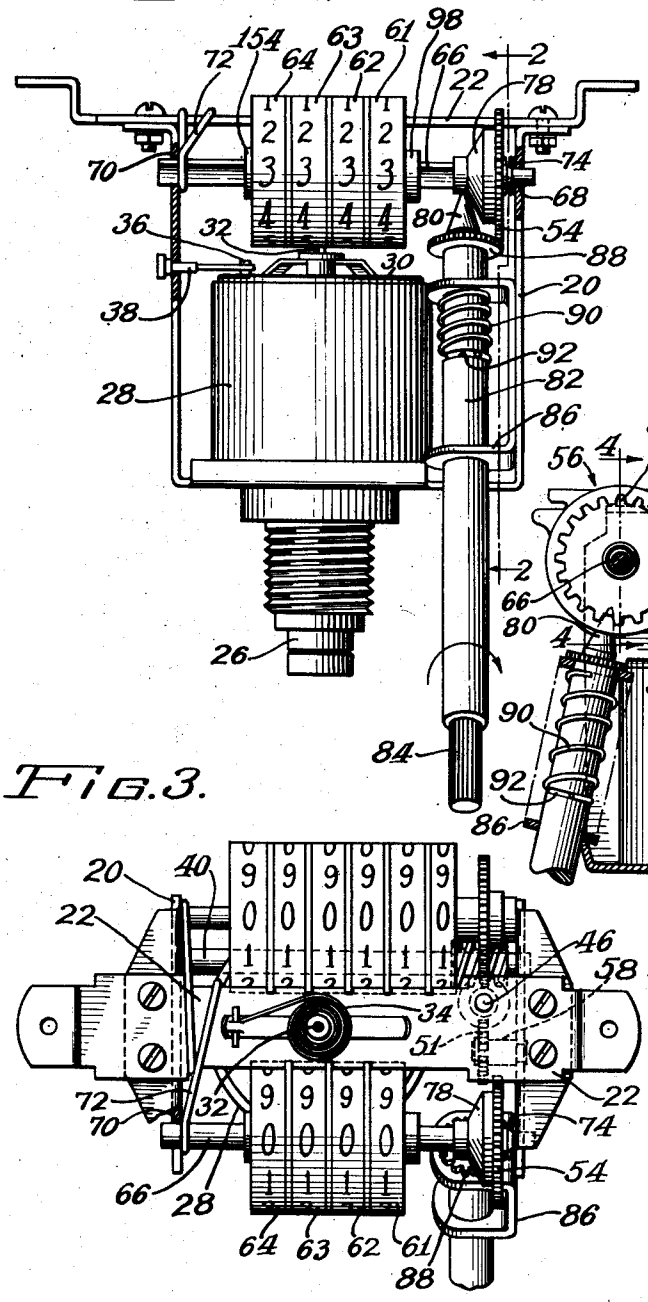

FIG. 2.

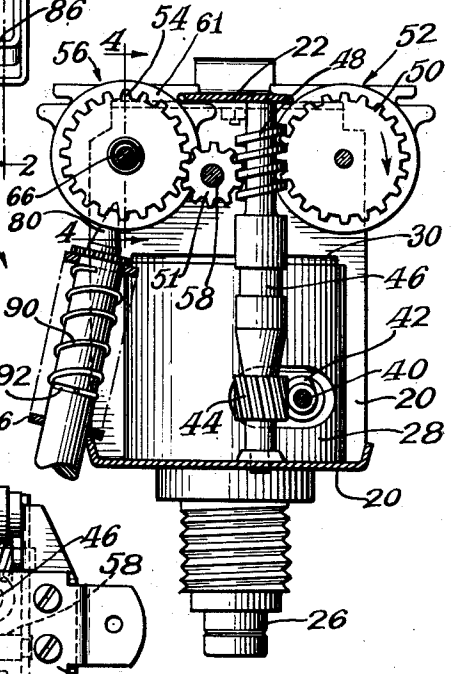

FIG. 3.

Inventors:
Floyd E. Miner
Edward C. Murbach

By Hinkle, Horton, Ahlberg, Hammann & Wupper
Attorneys

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FIG. 4.

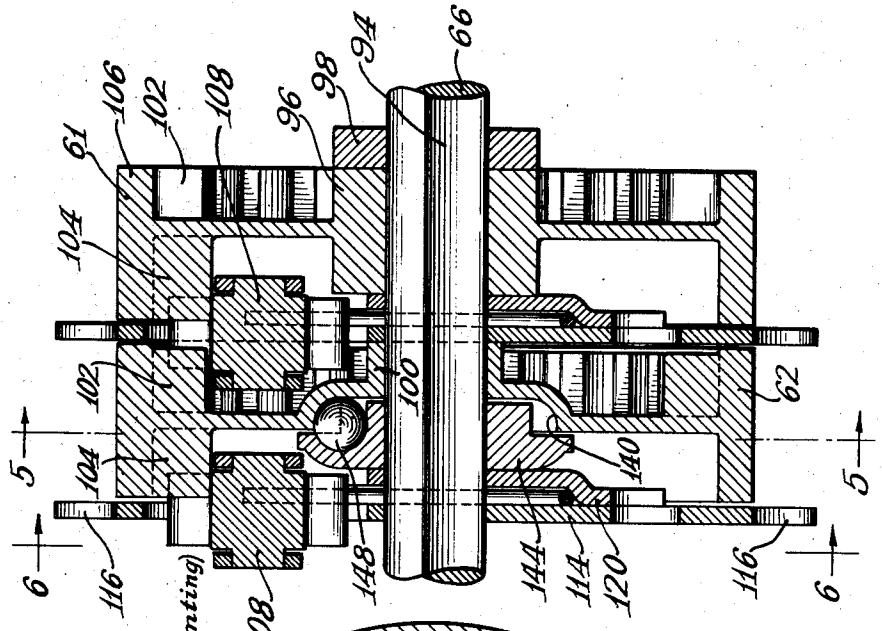
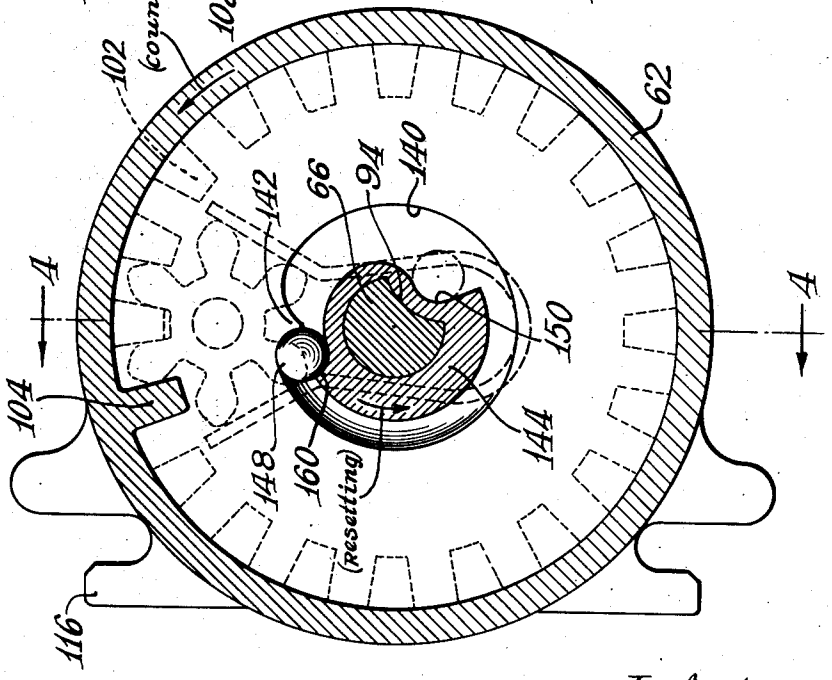


FIG. 5.



Inventors:
Floyd E. Miner
Edward C. Murbach

By Hinkle, Horton, Cullberg, Hansmann & Wupper
Attorneys

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ODOMETER RESETTING MECHANISM

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Fig. 6.

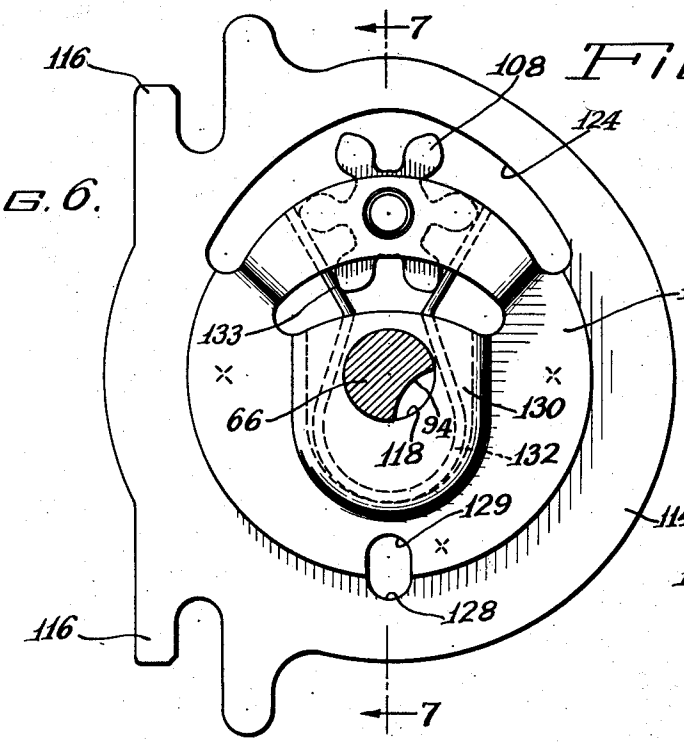


Fig. 7.

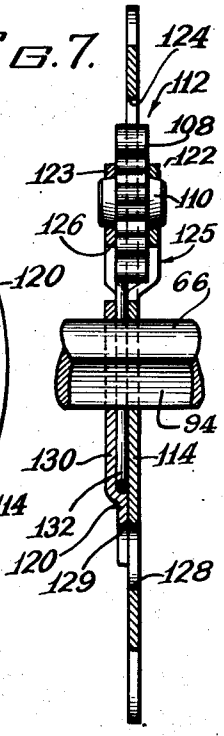


Fig. 9.

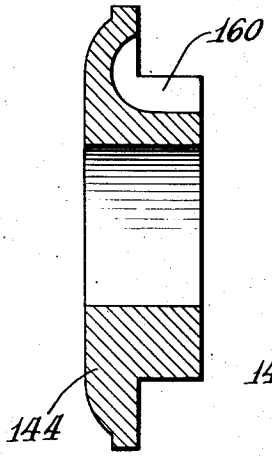


Fig. 8.

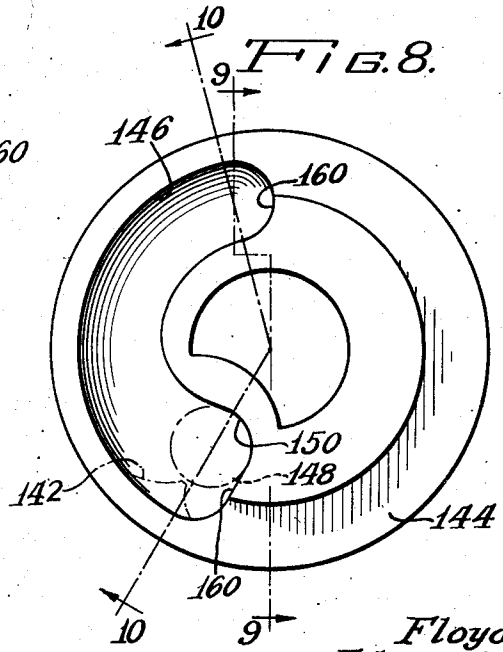
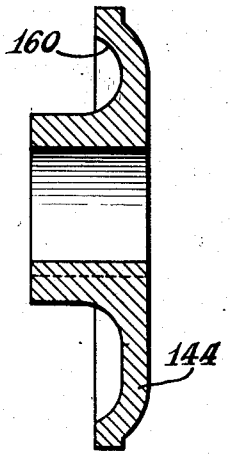


Fig. 10.



Inventors:
Floyd E. Miner
Edward C. Murbach

By Hinkle, Horton, Ahlberg, Hamzmann & Wupper
Attorneys

Sept. 15, 1953 F. E. MINER ET AL 2,652,199

ODOMETER RESETTING MECHANISM

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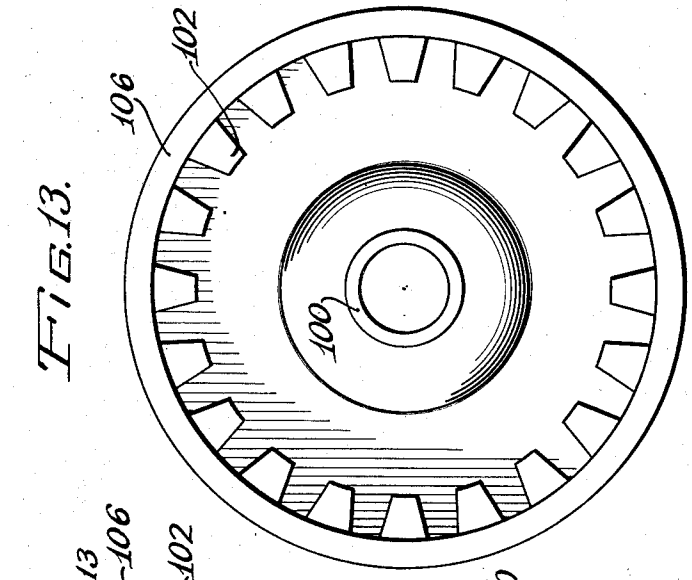

FIG. 13.

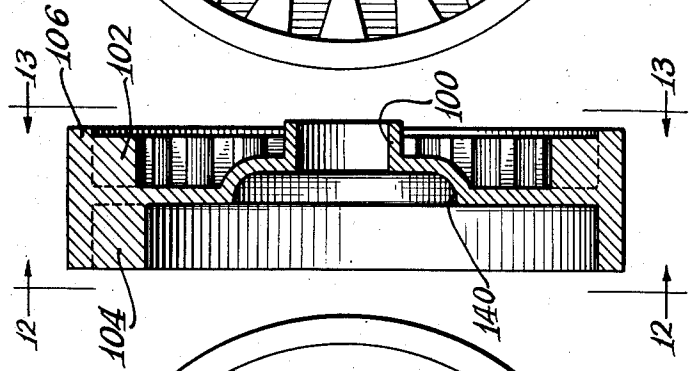

FIG. 11.

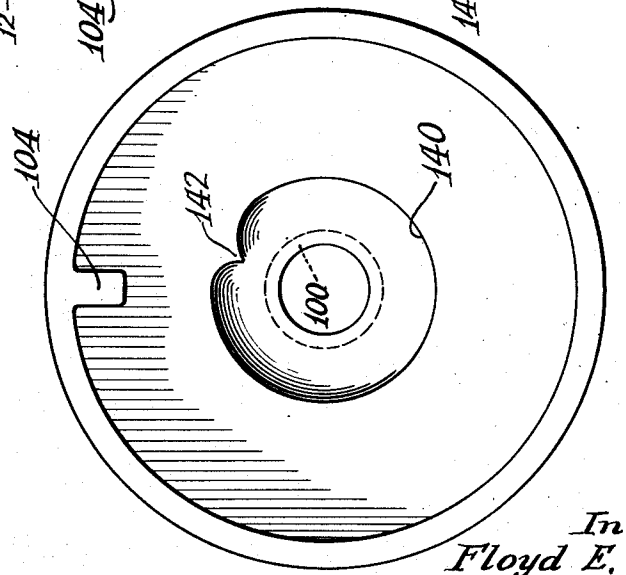

FIG. 12.

Inventors:
Floyd E. Miner
Edward C. Murbach
By Hinkle, Horton, Ahlberg, Hansmann & Klupper
Attorneys

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UNITED STATES PATENT OFFICE

2,652,199

ODOMETER RESETTING MECHANISM

Floyd E. Miner, Lombard, and Edward C. Murbach, Chicago, Ill., assignors to Stewart-Warner Corporation, Chicago, Ill., a corporation of Virginia

Application October 6, 1949, Serial No. 119,929

1 Claim. (Cl. 235—144)

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Our invention relates generally to odometers and more particularly to improved driving, transferring and resetting means for odometers and counters.

In odometers of the type used as mileage indicators in conjunction with automotive speedometers, the transferring and resetting mechanisms occasionally proved unreliable, the mechanisms became jammed, and for other reasons failed to function properly after a period of use.

It is, therefore, the primary object of our invention to provide an improved odometer of simplified construction wherein the transferring and resetting mechanisms will operate reliably at any speed at which the odometer may be operated, which may be economically manufactured, and which has a useful life longer than that of the vehicle upon which it is mounted.

Other objects will appear from the following description, reference being had to the accompanying drawings, in which:

Fig. 1 is a bottom plan view, in slightly enlarged scale, of a combined speedometer and odometer, portions thereof being shown in fragmentary section;

Fig. 2 is a sectional view thereof taken on the line 2—2 of Fig. 1;

Fig. 3 is a front elevational view;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a greatly enlarged transverse sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 4;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6;

Fig. 8 is an enlarged scale elevational view of a reset clutch member;

Figs. 9 and 10 are sectional views of the clutch member taken on the line 9—9 and 10—10, respectively, of Fig. 8;

Fig. 11 is a diametrical sectional view of one of the numeral wheels; and

Figs. 12 and 13 are left and right side elevational views of the numeral wheel shown in Fig. 11.

As best shown in Figs. 1, 2 and 3, the combined speedometer and odometer assembly comprises a frame including a U-shaped bracket 20, the ends of the legs of which are secured together by a cross member 22. The assembly is driven from a part, the speed and the number of revolutions of which are to be indicated, through a shaft, usually of the flexible type, connected to a coupling 26. This coupling is connected to drive a

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permanent magnet contained within a housing 28 and thereby impart a rotational torque to a drag cup 30 secured to a shaft 32, the latter being biased to rotate, in a direction opposite to that in which the cup 30 is driven, by a hair spring 34 (Fig. 3), one end of which is secured to the shaft and the other end of which is anchored to the cross member 22. The rotation of the shaft 32 under the influence of the spring 34 is limited by a pin 36 (Fig. 1), fixed to the drive cup 30, which engages with the zero stop pin 38 when the shaft 32 has been rotated to its zero position by the spring 34.

A cross shaft 40, the ends of which bear in the U-shaped frame bracket 20, has a worm drive connection with the shaft coupling 26 and has a worm 42 secured thereto, or cut therefrom, this worm meshing with a worm gear 44 formed on a shaft 46, the ends of which have bearings in the frame 20 and crosspiece 22, respectively. The shaft 46 has a worm 48 formed thereon meshing with pinions 50 and 51, the pinion 50 forming part of the cumulative odometer or mileage indicator 52 for driving the latter, and the pinion 51 being an idler which meshes with a gear 54 forming part of a resettable trip mileage odometer 56. The idler pinion 51 is suitably mounted for rotation upon stud 58 riveted to the frame 20.

The trip mileage odometer 56 comprises a plurality of numeral or register wheels and it is illustrated as comprising a tenths numeral wheel 61, a unit wheel 62, tens wheel 63, and a hundreds wheel 64. The numeral wheels 61—64 are mounted upon a shaft 66, one end of which projects through a bearing hole 68 formed in one leg of the frame bracket 20, and the other end of which is seated in a notch 70 of the other leg of the frame bracket 20, being held therein by a suitably bent wire spring 72 which is wound about the cross member 22. The shaft 66 is mounted for limited longitudinal sliding movement in its bearings 68 and 70, the shaft being held in its leftmost position (Figs. 1 and 3) by a coil spring 74 compressed between the gear 54, which is fixed to the shaft 66, and the adjacent wall of the frame bracket 20. The gear 54 has a frusto-conically surfaced hub part 78 which is adapted to be engaged by the pointed end 80 of a reset shaft 82. This reset shaft is provided with a suitably striated knob portion 84 and is mounted for rotary and longitudinal sliding movement in a U-shaped stamped bearing part 86 which may be welded to one of the legs of the frame bracket 20. This reset shaft 82 has a pinion 88 secured thereto, as by staking, this pinion

being adapted to mesh with the gear 54 (as shown in Fig. 1) when the reset shaft 82 is moved axially inwardly against the force applied by a coil spring 90, one end of which abuts against a part of the bearing bracket 86, and the other end of which has its end turn positioned in an annular groove 92 formed in the reset shaft 82. As will be apparent from the following description, when the odometer numeral wheels 61—64 are to be reset to zero, the reset shaft 84 is pushed inwardly (to the position shown in Fig. 1), causing the conical point 80 thereof to engage the frusto-conical surface 78 and thereby cam the shaft 66 and all parts carried thereby to the right (Figs. 1 and 3) against the force of the compression coil spring 74, thereby disengaging the gear 54 from the idler pinion 51, as shown in Fig. 3, and thus permitting the shaft 66 to be rotated in a direction opposite to that at which it is driven by the pinion 51, to reset the mileage or trip odometer 56 to zero position, all as will be more fully described hereinafter.

The shaft 66 has a keyway groove 94 extending the full length thereof. The tenths numeral wheel 61 has an opening conforming to that of the shape of the shaft 66 so that it is keyed to and rotates with the shaft 66. The remaining numeral wheels 62, 63 and 64 have cylindrical bores for the reception of the shaft 66 and are thus free to rotate relative thereto.

The tenths numeral wheel 61 has a hub 96 and is prevented from movement toward the right (Fig. 4) by a washer or collar 98 having a tight press fit on the shaft 66. The other numeral wheels 62, 63 and 64 have sidewardly extending hub parts 100 which bear upon the shaft 66. Each of the numeral wheels has an internal twenty-tooth gear 102 formed at its right-hand side (Fig. 4) and at its left side, a single tooth 104 projecting inwardly from the peripheral flange portion 106 thereof. The single teeth 104 of the numeral wheels 61, 62 and 63, respectively, rotate in the paths of transfer pinions 108, of brass or the like, and these pinions 108 mesh, respectively, with the twenty-tooth internal gears 102 of the numeral wheels 62, 63 and 64.

As best shown in Figs. 6 and 7, each of the transfer pinions 108 is formed integrally with bearing parts 110 which extend through bearing openings formed in a supporting frame 112. Each of the frames 112 comprises a disc-like element 114 having notched ears 116, a central hole 118, and a smaller disc 120 which is preferably spot welded to the disc 114. The discs 114 and 120 have offset bridge parts 122 and 123, respectively, in which the bearing holes for the pinion parts 110 are formed. These bridge parts 122 and 123 form supports and guides for the pinion carried thereby, it being noted that the disc 114 has arcuate notches 124 and 125 formed therein, while the disc 120 has an arcuate notch 126 formed therein, the arcs 125 and 126 being of substantially the same shape. The disc 114 has a hole 128 which is brought into registry with a notch 129 in the disc 120 properly to align the discs during the welding operation.

The disc 120 has a generally centrally located offset part 130 which, with the adjacent portion of the disc 114, forms an enclosure for a generally V-shaped wire spring 132 of bronze or similar material. The two extreme end portions 133 of the spring 132 are straight and engage the teeth of the pinion 108 so as to function as a detent for the pinion, normally holding it in the position shown in Fig. 6, wherein two of the teeth of the pinion project through the space provided by the slot 124 and are thus in position to be engaged by the single tooth 104 of the adjacent lower order numeral wheel. These teeth of the pinion 108 are also in meshing engagement with the teeth of the internal gear 102 of the adjacent higher order numeral wheel, as clearly shown in Fig. 4.

The notched ears 116 of the pinion supporting frames 112 engage the cross member 22 and the frames are thus held against rotary motion.

The hubs of the numeral wheels 62, 63 and 64 are each provided with an irregularly shaped groove 140 (Fig. 5) which is circular except for a cusp-like indentation 142. A ball clutch retainer 144 is nonrotatably mounted on the shaft 66, having a part thereof fitting in the keyway groove 94 of the shaft, and, as best shown in Figs. 8, 9 and 10, this retainer has a groove 146 formed in the side thereof which faces the groove 140 of the adjacent numeral wheel. The groove 146 extends arcuately through an angle of approximately 150° and, together with the groove 140, forms a partial enclosure for a clutch ball 148. One end of the groove 146 is of increased width to provide a recess 150, this recess extending inwardly toward the center of the shaft 66 a sufficient distance that the ball 148 may be forced into the recess by the cusp-like projection 142, and permit the projection to pass the ball when the numeral wheel is rotated counterclockwise (as viewed in Fig. 8) with respect to the adjacent ball clutch member 144, as indicated in phantom lines.

The numeral wheels 61—64 are held against longitudinal movement on the shaft and in assembled relation with their intermediate pinion supporting frames 112 between the collar 98 and a collar 154 which has a press fit on the shaft 66.

In operation, the rotation of the coupler 26, by which the speedometer and odometer assembly is driven, is transmitted through the shaft 40, worm 42, worm wheel 44, shaft 46, and worm 48, thus to drive the gear 50 of the cumulative odometer 52, and through the idler pinion 51, to drive the gear 54 of the trip odometer 56. The gear 54 is nonrotatable with respect to the shaft 66, as is the tenths numeral wheel 61, so that the latter is positively driven through the described gear train from the shaft coupling 26. As the numeral wheel 61 rotates from its "9" to its "0" registering position, its single tooth 104 engages between the teeth of the adjacent pinion 108 and rotates the latter through the pitch distance of two teeth. Since the pinion 108 has six teeth, it will thus be rotated through an angle of 120°. The pinion 108 being in mesh with the twenty-tooth internal gear 102 of the units numeral wheel 62, the latter will be rotated through an angle of twice its tooth pitch, namely, 36°, thus causing it to show the next higher digit through the usual sight window (not shown). A transfer is effected in a similar manner from the units wheel 62 to tens wheel 63 as the units wheel 62 rotates from its "9" to its "0" position; and similarly a transfer of a unit is effected from the tens numeral wheel 63 to the hundreds numeral wheel 64 as the wheel 63 moves from its "9" to its "0" registry position. The odometer thus operates to indicate the total number of revolutions of the shaft 66, the calibration being customarily in miles traveled.

During the time that the odometer 56 is being driven by the vehicle in the manner above described, the shaft 66 is rotating counterclockwise,

as viewed in Fig. 5. The lowest order numeral wheel 61 rotates counterclockwise with the shaft and the higher order wheels 62—64 rotate counterclockwise intermittently as they are advanced step by step. The ball retainers 144, rotating with the shaft 166, pick up the balls 148 and carry them along, in or adjacent the recesses 150. The balls, carried by the retainers, pass free freely over the cusp-shaped projections 142 on the numeral wheels, since the projections cam the balls radially into the recesses and the latter provide radial clearance between the projections and the retainers 144.

When it is desired to reset the numeral wheels 61—64 to "0000" registering position, the reset shaft knob 84 is grasped and pushed inwardly against the force of the spring 90, such inward movement causing engagement of the pointed end portion 80 of this shaft with the frusto-conical surface 78 of the hub of the gear 54, thus forcing the latter to slide to the right (Fig. 1), together with its shaft 66, against the force of the compression coil spring 74. Such inward movement of the reset shaft 82 also causes its gear 88 to mesh with the gear 54. The operator then rotates the shaft 82 clockwise (in the direction of the arrow shown in Fig. 1) and thereby rotates the shaft 66 clockwise, as viewed in Fig. 5. As the ball clutch retainers 144 are thus rotated clockwise with the shaft 66, the end walls 160 of their grooves 146 engage the clutch balls 148 and carry the latter with them until the balls 148 engage the projections 142 of the adjacent numeral wheels. When this occurs, a positive driving connection is established between the shaft 66 and the numeral wheels 62, 63 and 64 so that the latter are carried with the numeral wheel 61. Since all of the ball retainers 144 are keyed to the shaft 66, and these parts are identical, it will be clear that upon resetting rotation of the shaft the numeral wheels will be successively picked up in such positions that eventually all of their numeral indicia will be in alignment. The operator thus continues to rotate the reset shaft 82 until the "0" registrations of all of the numeral wheels appear through the sight openings. The trip mileage odometer is thus reset to "0000" position.

The transfer mechanism of the counter is extremely simple in construction and its manufacturing cost is low. The numeral wheels are preferably die-castings with the numeral indicia enameled thereon and the transfer pinions may be produced from pinion rod stock by automatic screw machines. The pinion supporting frame is composed of two simple sheet metal stampings which when spot-welded together form a permanent compact subassembly providing the support for the transfer pinion and its detent spring. The assembly of the odometer or counter is very easily accomplished. The cost of production of the odometer is, therefore, very low while at the same time its operation and durability are improved.

While we have shown and described a particular embodiment of our invention it will be apparent to those skilled in the art that numerous variations and modifications thereof may be made without departing from the underlying principles of the invention.

We claim:

In a counter assembly having a plurality of numeral wheels mounted upon a shaft for rotation relative thereto, the combination of means on each of the numeral wheels providing a groove extending throughout substantially 360° and having a single radial inwardly extending projection, a clutch member secured to the shaft adjacent each wheel and having a groove extending somewhat less than 180°, said groove having an enlargement formed at one end thereof, the grooves being confrontingly positioned to form a ball race, a ball located within the race formed by the grooves in the numeral wheel and in the clutch member, said groove on the clutch member having a recess of sufficient size that the ball may be forced thereinto by the projection on the numeral wheel during relative rotation of the wheel and the clutch member in one direction so as to permit the free relative rotation of the numeral wheel and the clutch member in said direction, said ball being engageable by the projection and forming a positive driving connection between the clutch member and the numeral wheel upon relative movement thereof in the opposite direction.

FLOYD E. MINER.
EDWARD C. MURBACH.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
847,759	Gancher et al.	Mar. 19, 1907
1,039,227	Veeder	Sept. 24, 1912
1,425,982	Krug	Aug. 15, 1922
1,710,229	MacNeil	Apr. 23, 1929
1,909,740	Zubaty	May 16, 1933
1,929,622	Carlson	Oct. 10, 1933
2,004,881	Slye	June 11, 1935
2,087,093	Marquart	July 13, 1937
2,117,024	Helgeby et al.	May 10, 1938
2,238,920	Studley	Apr. 22, 1941
2,358,780	Vroom	Sept. 26, 1944