April 8, 1930. F. L. FELTY 1,753,923

SPEEDOGRAPH

Filed June 25, 1923 6 Sheets-Sheet 1

Fig. 1

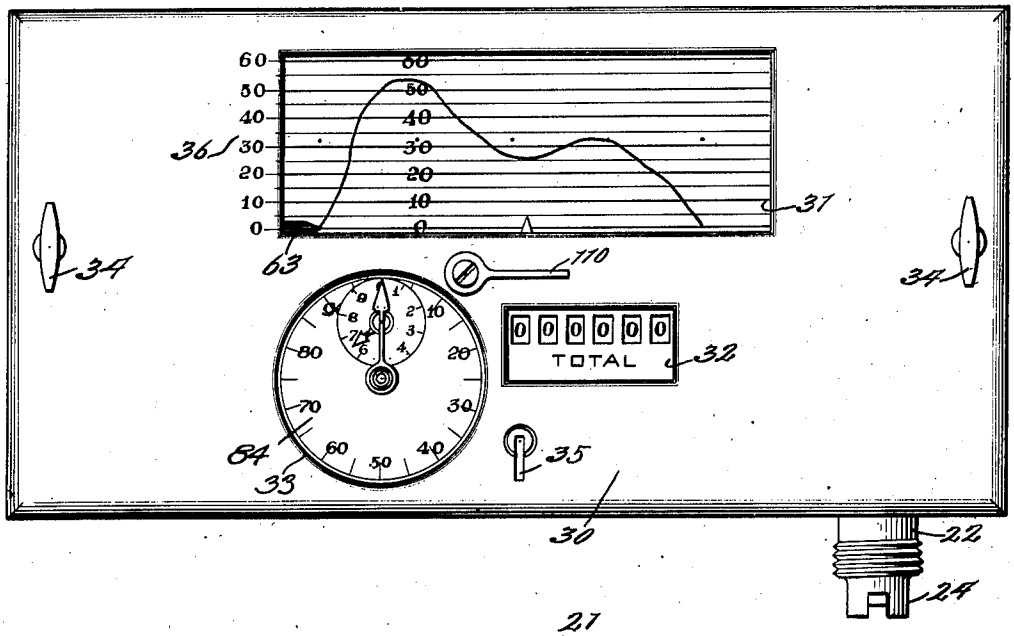
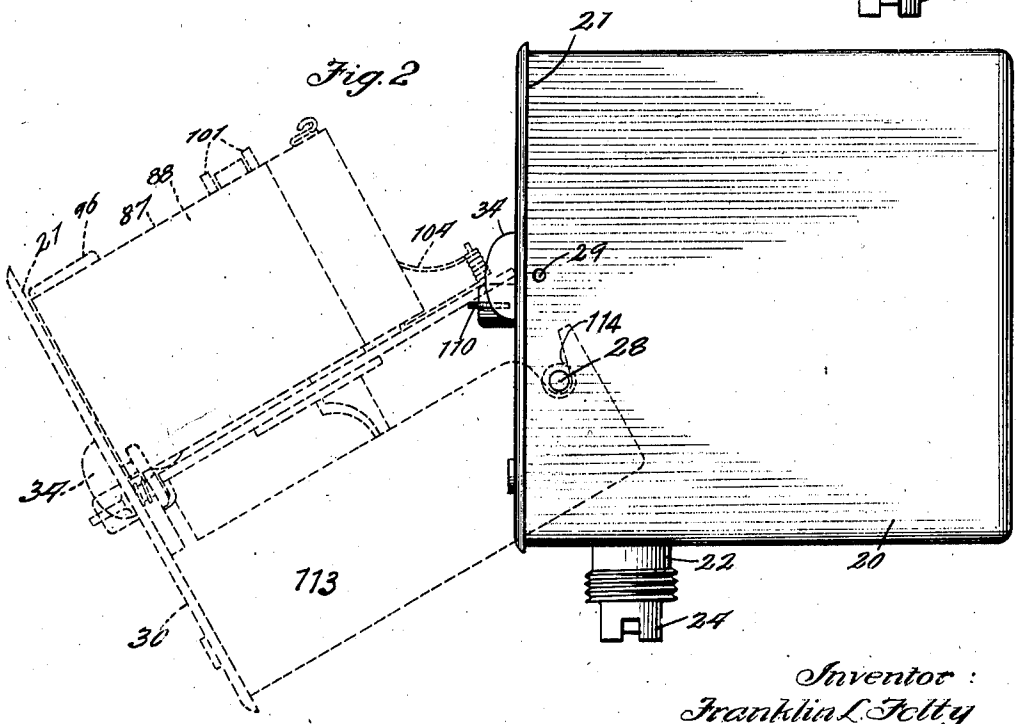


Fig. 2



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April 8, 1930. F. L. FELTY 1,753,923

SPEEDOGRAPH

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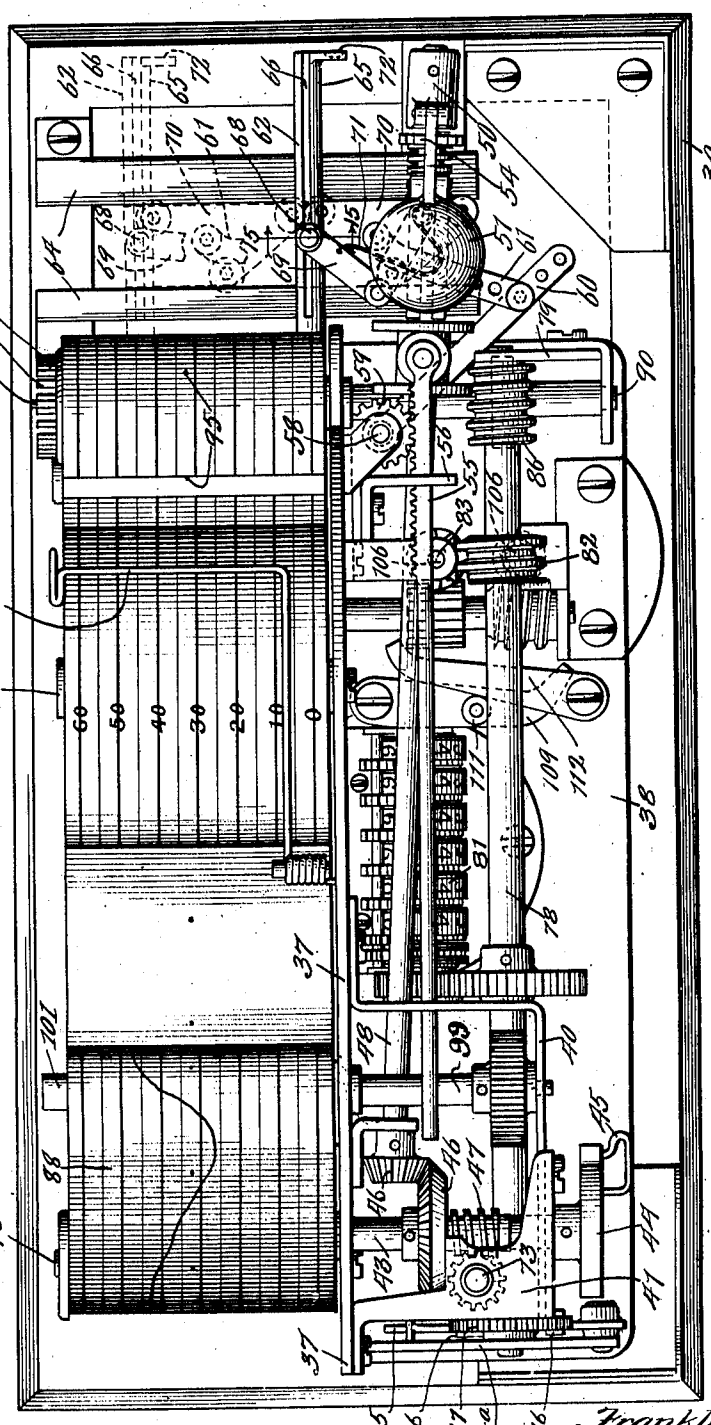


Fig 3.

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April 8, 1930. F. L. FELTY 1,753,923

SPEEDOGRAPH

Filed June 25, 1923 6 Sheets-Sheet 3

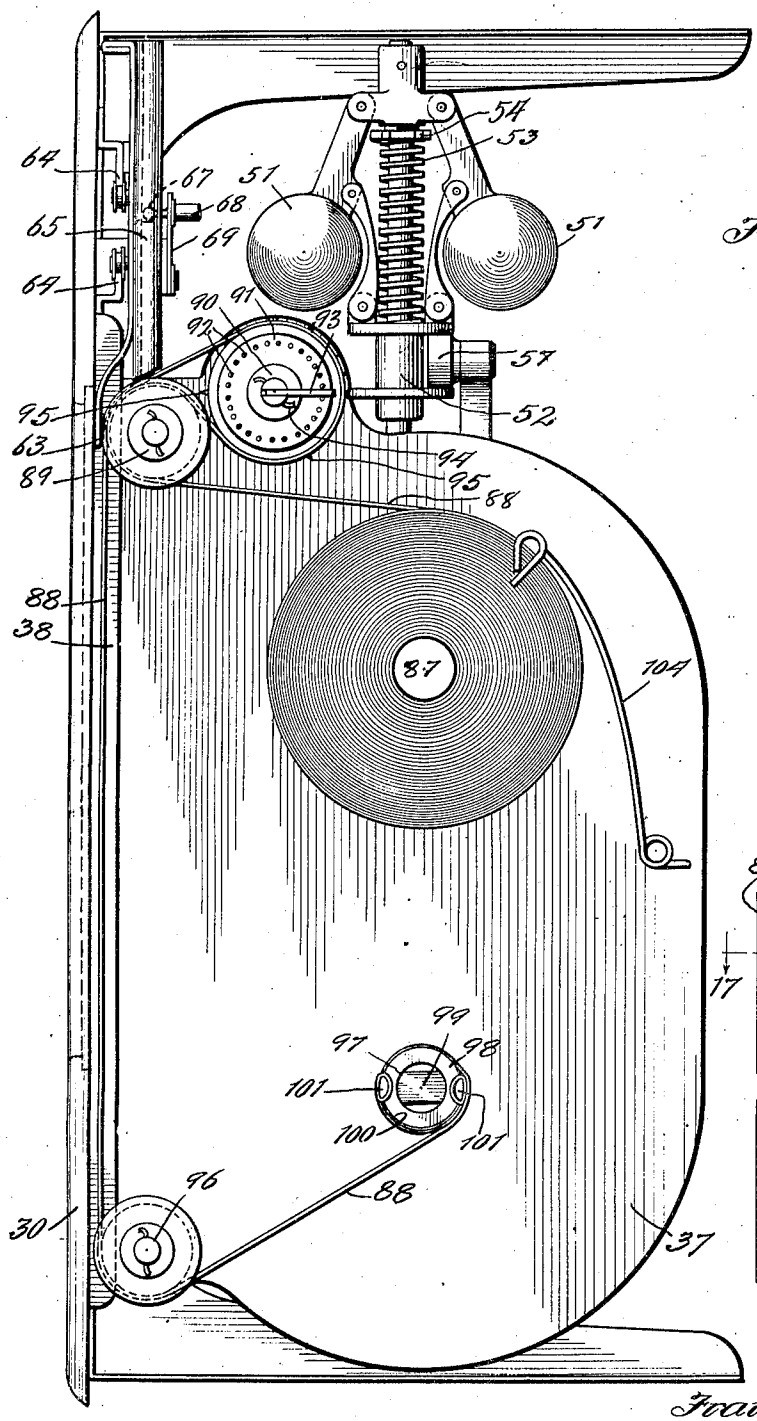


Fig. 4

Fig. 17.

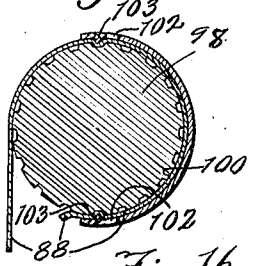
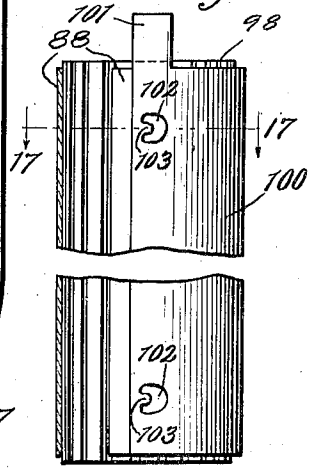


Fig. 16.



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April 8, 1930. F. L. FELTY 1,753,923

SPEEDOGRAPH

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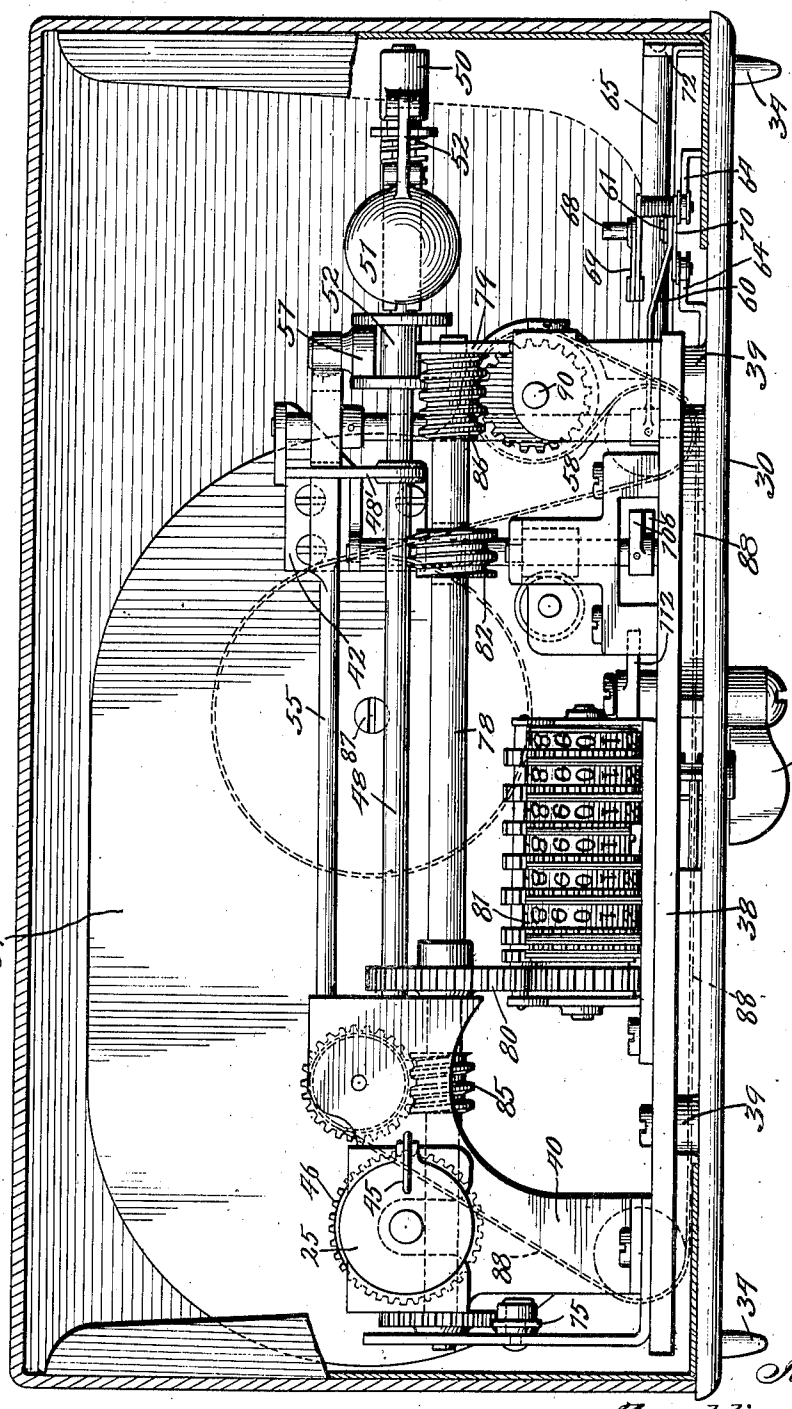


Fig. 5

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April 8, 1930. F. L. FELTY 1,753,923

SPEEDOGRAPH

Filed June 25, 1923 6 Sheets-Sheet 5

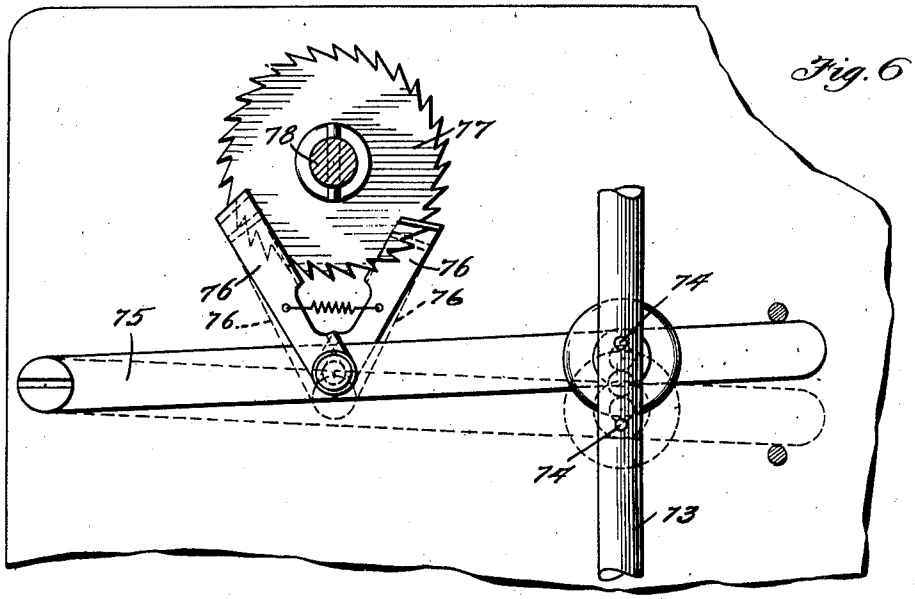


Fig. 6

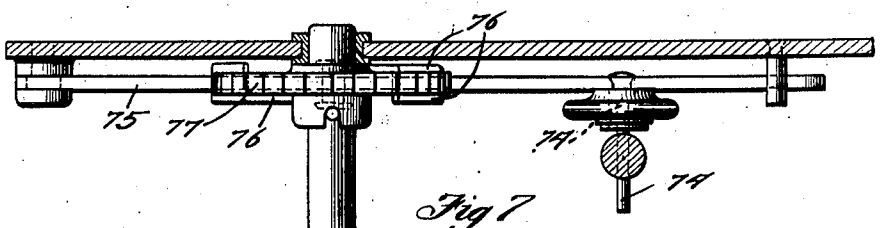


Fig 7

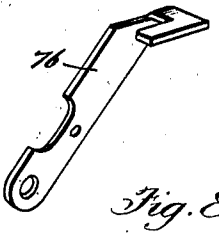


Fig. 8

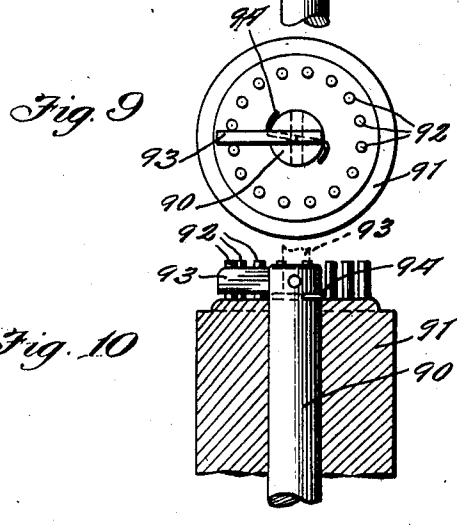


Fig. 9

Fig. 10

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SPEEDOGRAPH

Filed June 25, 1923 6 Sheets-Sheet 6

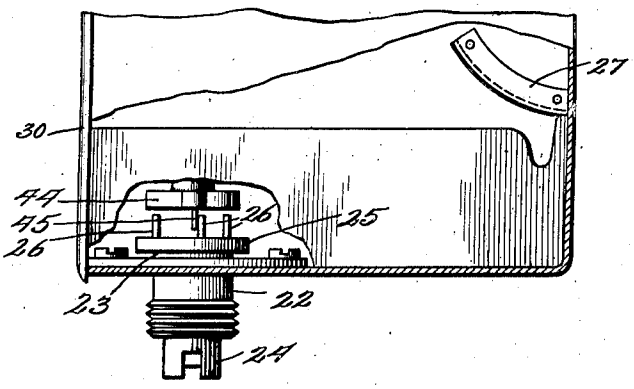


Fig. 11

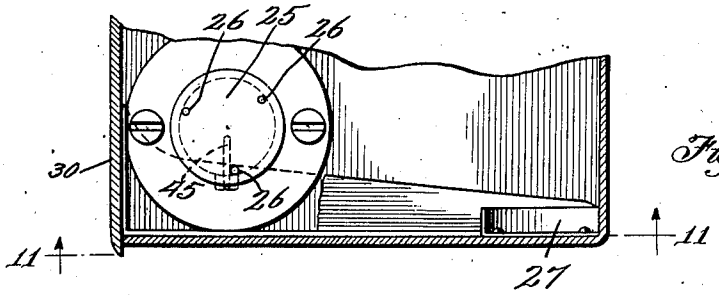


Fig. 12

Fig. 13

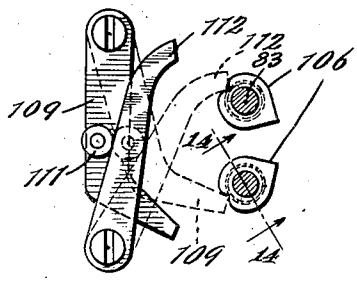
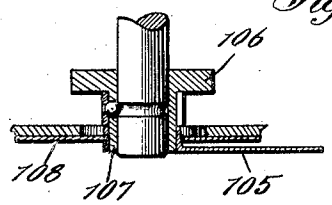


Fig. 14



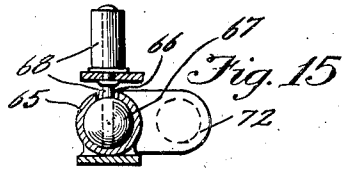


Fig. 15

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By: Atty.

Patented Apr. 8, 1930 1,753,923

UNITED STATES PATENT OFFICE

FRANKLIN L. FELTY, OF CHICAGO, ILLINOIS; MAUDE M. FELTY ADMINISTRATRIX OF SAID FRANKLIN L. FELTY, DECEASED

SPEEDOGRAPH

Application filed June 25, 1923. Serial No. 647,542.

The present invention relates to tachometers or similar instrumentalities, and has particularly to do with the arrangement, development and refinement of the mechanisms of such devices.

The objects of the invention include the production of an instrument indicating and recording speed and travel operable equallv effectively in either direction of vehicular travel. In different language, the object may be stated as the provision of a speed indicator operable in either direction and equally effective whether the movement of the subject to which it is affixed is forward or backward in conjunction with a recorder and other indicators moved in one direction only irrespective of vehicular direction.

Other objects of the invention are the provision of an improved assembly of recording and indicating mechanisms, an advance in structural details for simplifying the production and use of such instrumentalities, an assembly for the device incapable of completion until all parts are operably associated, a refinement of parts and structural details for the attainment of unassailably correct results, of means for advancing a recording tape in direct ratio with the travel and of marking upon the tape the distance of travel of the device, of improved recording, tape-advancing, tape locking and releasing, and indicator resetting mechanisms, and of a novel writing member.

These, and such other objects as may hereinafter appear are attained by the novel construction, combination and arrangement of the various parts of my device, all of which are fully disclosed in the specification which follows and in the six sheets of drawings hereto appended and made a part of the specification, and in which:—

Figures 1 and 2 are a front and end elevation of the device fully housed;

Figures 3, 4 and 5 are, respectively back, top and bottom views of the mechanism, the housing being removed;

Figures 6, 7 and 8 are, respectively, details in elevation and in horizontal section of the apparatus for imparting movement to the recording instruments and tape advancing mechanisms;

Figures 9 and 10 are respectively, a top view and vertical section of one of the tape advancing instrumentalities;

Figures 11 and 12 are, respectively, an elevation and plan view of the connecting member intermediate the instrument and a shaft driven by the object upon which employed;

Figure 13 is a detail of the resetting mechanism in a position of rest, dotted lines indicating the position of the same parts at the completion of a resetting operation;

Figure 14 is a section on the line 14—14 of Figure 13;

Figure 15 is a vertical section of the follower member I employ taken in line 15—15 of Figure 3;

Figure 16 is a detail in elevation of the clip member for holding the recording tape;

Figure 17 is a horizontal section on the line 17—17 of Figure 16.

Like reference characters are used to designate similar parts in the drawings and in the description which follows.

Reference should be had first to Figures 1 and 2. A casing or housing 20 which comprises, preferably, a metallic box having an open front 21 is provided for the mechanism. Adjacent one end of casing 20, and preferably upon its bottom a boss 22 is disposed, such boss providing a journal for a connecting member 23 arranged intermediate a flexible shaft (not shown) geared to the rotating member the speed and travel of which is to be measured and the internal mechanism of the device for measuring and recording such speed and travel.

Member 23, illustrated in detail in Figures 11 and 12, includes a shaft 24 having an enlarged head 25, the latter being provided with a plurality (preferably three) of vertically pointed and circumferentially disposed pins 26. Any suitable connecting arrangement may be provided between the flexible shaft referred to (not shown) and shaft 24.

Adjacent the rear of the case or housing 20, tracks or guides 27 are provided for aligning the apparatus to be confined in the hous-

ing, and pins or studs 28, best shown in Figure 2, are arranged at each end of housing 20 to prevent accidental displacement of the mechanism therefrom after the device is opened to change tapes, or for any other purpose. Preferably housing 20 is made water tight.

For facilitating the locking of the device in operable position, a second set of pins or studs 29 is disposed above studs 28, the position thereof being indicated in Figure 2. Their connection with the locking mechanism is fully disclosed in the dotted lines in Figure 2.

A removable front 30 is provided for attachment to housing 20. To this front is secured a platform or base upon which all of the mechanism of the device depends. Three openings, 31, 32 and 33, respectively, are provided in said front for viewing the recording tape and speed indicator, the total mileage register, and the trip and fractional mile indicators, such openings being covered with glass or other suitable transparent material. A reset key for the trip and fractional mile indicators is preferably secured to said front, and adjacent the ends of said front are locking screws 34, best illustrated in Figure 2 in dotted lines, having exposed operating handles, said screws engaging upon pins 29 to seat front 30 in housing 20. A key lock 35 as an additional locking mechanism intermediate front 30 and housing 20 may also be employed, and upon one or the other or both of the vertical ends of the openings 31, an index 36, declaratory of the speed of the vehicle upon which the indicator is used, appears.

Reference should now be had to Figures 3, 4, and 5, which are, respectively, a rear elevation, a top plan, and a bottom view, of the mechanism of the device generally.

As hereinabove indicated, the entire mechanism is disposed upon a platform or base 37 having an angular portion or flange 38 secured to front 30 by rivets or other suitable means, the platform 37 being slightly offset from said front 30 by bosses 39 or ribs, or removable bars. Adjacent one end, (the left end of Figures 3 and 5,) depending frames or brackets 40 and 41 are affixed, to base 37, such brackets preferably being anchored to flange 38. A third bracket 42, is disposed near the opposite end (the right hand end) of platform 37. In respect to frame work, the structure is not unlike that of a clock.

Journaled in bracket 41 and base 37 is a vertical shaft 43 axially coinciding with shaft 24, and having at its bottom a disc or plate 44 upon the radius of which is disposed an arm 45 adapted to engage one of pins 26. Rotative movement of shaft 24 is by the engagement between arm 45 and pin 26 communicated to vertical shaft 43, which shaft has at its upper end gearing 46, and immediately therebeneath a worm gear 47.

Gearing 46 drives a horizontally disposed spindle 48 journaled in a bracket 48′ which is fixed to a plate 37 constituting a part of the frame. It is also possible to journal said spindle 48 in bracket 40. Upon the right hand extremity of said spindle 48, an eared head 50 is formed or secured. Depending from this head and on opposite sides thereof, are ball governors 51. Increase in speed causes the balls 51 to fly outwardly from their pivot connections between the ears upon head 50 whereby to move a slidable sleeve 52 linked thereto, horizontally, such movement being against the resistance of a coil spring 53 disposed intermediate head 50 and sleeve 52. A tensioning sleeve 54 is disposed adjacent head 50, and by rotating said sleeve 54, upon threads on spindle 48, spring 53 may be compressed or released thus determining the rotative speed or force incident to outward movements of balls 51.

A rack 55, slidably disposed in a bracket 56 at one end and in bracket 40 at its other end, has at one extremity a roller bearing 57 adapted to be seated in sleeve 52, whereby to impart a lineal displacement of said rack with the varying of the speed with which spindle 48 is revolved. A rock-shaft 58 is arranged transversely of base or platform 37, and is journaled in brackets or plates secured to the latter. Said shaft is oscillated by a gear 59 at one end in engagement with rack 55. At the opposite end of shaft 58, an arm 60 is fixedly secured thereto, and by a lever 61, a pencil carrier 62, having a needle or indicator 63 at one end, is reciprocated vertically upon guides or tracks 64, as is shown in dotted lines in Figure 3. The movement of arm 60 is mathematically calculated with respect to sleeve 52 and intermediate parts so that the movement upwardly of pencil carriers 62 along track 64 is equal and regular for each additional mile of speed at which the vehicle upon which the device is used travels. As clearly indicated, the connections intermediate the levers 61 and rock shaft 58 are adjustable to enlarge the sphere of movement of the pencil carrier 62.

Pencil carrier 62 comprises a tube 65 adapted to receive lead, such as is common in the art, and has a slot 66 extending from the outer end thereof substantially to its innermost extremity. A follower for such lead comprising a ball 67 (see Figure 15) removably disposed in said tube 65 is actuated by pressure exerted thereupon by a pin 68, from which said ball depends, said pin projecting outwardly through slot 66. Pin 68 at its outer end may be pivotally connected to a pair of pivoted arms 69, connected to a block 70 to which pencil carrier 62 is affixed. Intermediate arms 69, a spring 71 may be employed for giving lineal pressure against ball 67.

For convenience in loading pencil carrier

62, a projecting extension or lip 72 is formed at its outermost end and on one side thereof such extension providing a seat for ball 67 when the latter is withdrawn from tube 65. Pin 68 and the outermost of arms 69, when ball 67 rests upon extension 72, project outwardly of the device sufficiently to engage against housing 20 when cover 30 is about to be slipped thereon to prevent the closing of the device when the pencil is not in positive operating position. The uppermost of the plurality of arms 69 is also adapted to be secured to block 70 for raising and lowering pencil carrier 62.

For imparting a one way motion to a total, a trip and a fractional mile indicator, the worm gear 47 meshes in gearing on a transverse shaft 73 suitably journaled in bracket 41 and flange 38. Upon such transverse shaft are spaced and oppositely disposed pins 74 (see Figures 6 and 7) alternately engaging the opposite surfaces of a roller bearing on a rock lever 75 pivoted to the mechanism frame or upon a separate head piece 75[a] to which are also pivoted oppositely disposed and spring connected pawls 76 (see Figure 8) in engagement with a notched or toothed wheel 77, the latter being fixedly secured upon a horizontal shaft 78 journaled in brackets 40 and 42, and preferably also journaled in a bracket 79 fixedly associated with the flange 38. Upon shaft 78 are, respectively, gearing 80 in engagement with a counter or indicator 81 showing the total number of miles travelled, and gearing 82 in engagement with a shaft 83 connected with the fractional mile and trip indicator 84. Additional gears 85 and 86 are disposed upon shaft 78 for the purpose of driving the recording device later to be described.

The purpose in using pin 74 and roller bearings upon the rock lever 75 is to provide an engagement intermediate shaft 73 of lever 75 in which there will be no tendency to wear the parts by friction. The impingement of the bars upon a roller bearing will tend to produce uniform wear and supply a long life to the parts. Were both of the engaging and impinging members fixed and not movable as an incident to impingement, in a short time there would be pronounced wear which would have a tendency to produce inaccurate results. The roller bearings prevent undue friction against the pins 74 and present new surfaces from time to time.

As shaft 73 is rotated, the pins 74 alternately impinge the roller bearing on rock lever 75, raising or lowering it toward or from the notched wheel 77. With the upward movement of lever 75, left hand pawl 76 (Figure 6) advances wheel 77 by engaging one of its notches. Concurrently therewith the right hand pawl 76 slides over one of the notches in toothed wheel 77, and as lever 75 is moved downwardly, said right hand pawl 76 sliding over another tooth or notch in said wheel to repeat the operation hereinabove set forth. It is immaterial in what direction the device is rotated in so far as the movement of shaft 78 is concerned for this is rotatable in one direction only and travels at the same speed. Pawls 76 are disposed upon opposite sides of wheel 77 to equalize wear and are interchangeable.

All of the apparatus heretofore described has been disposed below the level of the platform 37 leaving its upper surface free to receive the tape winding mechanisms. Upon this platform is disposed a spindle 87 adapted to receive a roll of suitable recording paper or tape 88, which paper is first threaded about a guide pulley 89 and thence onto a spindle 90 driven by gear 86 and upon which a shell 91 having at its upper end a plurality of pins 92 is locked in engagement by a pivoted handle or latch member 93 preferably upon the axis of such spindle and adapted to be folded downwardly intermediate two of pins 92 when the device is in operable or recording position. (See Figures 9 and 10.) Latch 93 is adapted to project upwardly sufficiently that when shell 91 is not locked on spindle 90 it presents an obstacle engaging the housing 20 to prevent front 30 from being secured thereto. A spring 94 is adapted to prevent accidental displacement of latch 93.

Upon the surface of shell 91 are pins 95 for perforating tape 88. The space between such perforations is used to indicate the travel of the vehicle upon which the device is employed, a measured or arbitrary distance as for example one mile.

After passing around shell 91 the tape 88 is brought to bear upon guide pulley 89 and the portion of tape drawn thereover and then is drawn across opening 31 to a second guide pulley 96, and from thence to a receiving spindle or winding member 97 in mesh with gear 85 on shaft 78. Pencil carrier 62 is so positioned that the point of the pencil carried thereby is brought to bear upon the outermost portion of tape 88 as it passes over guide pulley 89 for the second time, thereby recording upon the tape 88 an indication of the speed of the vehicle which indication becomes quickly visible through opening 31 and remains visible during the travel of the tape across such opening. It will be noted that the pencil engagement is had upon the tape 88 where it has a double thickness which results in more clearly defined recordations.

Winding member or spindle 97 includes a fluted barrel 98 frictionally secured to the central vertical shaft 99 in mesh as above described, it being preferred that shaft 99 and barrel 98 be in close frictional engagement but not so securely engaged as to prevent slippage therebetween to equalize the movement of tape 88 between spindles 90 and 97.

The tape 88 after being wrapped partially

about barrel 98 is secured thereto by a clip member 100, (see Figure 16) such member comprising a semi-cylindrical portion of metal detachably associated with the barrel 98 and having at its top ends two handle-like members 101 for facilitating its separation from barrel 98. The material of the clip 100 is cut out at 102 to provide projections or teeth 103 adapted to be pointed inwardly for engagement with the protrusions or flutes upon said barrel. The slip 100 is slipped over tape 88 and barrel 98 from the outside by a flexing motion of clip 100 and the tape 88 is then secured against removal. Pointing the teeth 103 inwardly allows such assembly but allows removal of said clip 100 by longitudinal movement upward only.

A brake member comprising a wire body bent to proper shape is provided for tape 88 as it is unwound from the supply spindle, such brake member being indicated by the ordinal 104 and comprises a wire spring secured to platform 37, and having an overhanging or horizontal portion resting upon the edges of tape 88 and the outer surface of the coiled portion thereof in order to insure its being unwound therefrom in a level horizontal plane and even manner.

For resetting the indicator of the trip and fractional mile indicators 84 visible through openings 32 and 33, the means illustrated in Figures 13 and 14 are employed. The hand on one of the indicators (Figure 14) is indicated by the ordinal 105. Such hand 105 is affixed, frictionally, to one of a pair of heart shaped cams 106, (a groove, split ring, and ball construction being shown) which cam 106 has a sleeve 107 projecting outwardly through indicator face 108. Reset lever 109 is operated by a handle 110 and is provided with a small roller bearing 111 which, when the handle 110 is manipulated, engages a second reset lever 112, (Figure 13) thus bringing the reset levers 109 and 112 concurrently into engagement with the heart shaped cams 106. Pressure upon handle 110 will cause the levers 109 and 112 to press upon the cams 106, in a camming action, until the lowermost point in said cams, as is indicated in the dotted lines in Figure 13, is attained. The hands or indicators are thus forced back into a starting position.

For guiding cover 30 within housing 20, two members 113 are provided. These are of a generally elongated rectangular configuration with a notched portion at their innermost ends such notched portion 114 being adapted to impinge against pins or studs 28 when the device is in the position indicated in Figure 2 to prevent the mechanism from dropping clear of housing 20 and also to allow the changing of tape 88. Displacement and complete disconnection between front 30 and casing 20 can be had only by disengaging the members 113 from studs 28 which is accomplished by pressing either of said members 113 inwardly until out of alignment with the corresponding locking pin 28.

After assembly of the device upon front 30, the front is slipped into position in casing 20, side members 113 engaging with and being forced beneath guides 27 to align front 30 with opening 21. Screws or bolts 34 which have a segmental circumferentially grooved head engage pins 29 in a camming action to draw the front into proper position, the grooves in screws 34 having a slight pitch, are then rotated a fractional turn into proper position, and lock 35 fastened.

The connection and disconnection of the mechanism from the flexible driving shaft incident to inserting the mechanism into casing 20 and removing it therefrom is readily accomplished in view of the arrangement of pins 26 with respect to arm 45. No matter what the position of the latter, it will disengage itself from pins 26 upon outward movement of front 30, and upon reassembly of the device, the arm 45 is readily insertable intermediate two of said pins 26 and will engage one or the other thereof according to the direction of movement of the vehicle upon which employed.

The rotative movement of the flexible shaft connected to a vehicle wheel or other moving member causes several entirely independent (but correlated) movements in the device. A speed indicating and recording mechanism is set into motion. Tape to receive the inscription of the recording device is moved in direct ratio to the movement of the vehicle, and upon its face appears the history of every journey, in mechanically exact details, from start to finish.

Shaft or spindle 48 should be very free running and may be journaled in ball bearings disposed in brackets 42 and 49, and when a head piece 75a is employed, said shaft may also be journaled therein.

I claim:

1. In combination with a recorder, a case therefor, a front for said case having a platform on which said recorder is disposed, a tape, a tape winding mechanism, and a latch for said tape winding mechanism adapted to prevent the attachment of said front to said case when said tape winding mechanism is in inoperable position.

2. In combination, a recorder, a writing member, a tape, a tape advancing mechanism, a case for said recorder, and a front for said case, said writing member when in inoperable position preventing the attachment of said front to said case.

3. In combination, a case, a cover for said case, recording and indicating mechanisms upon said cover, guide arms upon said cover extending inwardly of said case to guide the removal thereof from said case in a line parallel to the walls of said case.

4. The combination described in claim 3, and in which said arms have means cooperating with said case whereby said cover may be moved angularly to said case when said recording and indicating mechanisms are wholly without said case, said cooperating means engaging said case to lock said cover in an angular position upon said case for inspection and adjustment.

5. In combination with vehicle speed recording and speed indicating mechanism, a case, a cover therefor, a platform upon said cover providing a support for said mechanisms, arms upon said cover projecting into said case to provide guide members for the insertion and removal of said cover, and means upon said case cooperating with said arms to sustain said cover in a partially removed position from said case, thereby maintaining said mechanisms in position for inspection and adjustment.

6. In combination, a case, a cover for said case, recording and indicating mechanisms upon said cover, guide arms upon said cover extending inwardly of said case to guide the removal thereof from said case in a line parallel to the walls of said case, and means on said case cooperating with said arms to sustain said cover in a predetermined position.

FRANKLIN L. FELTY.