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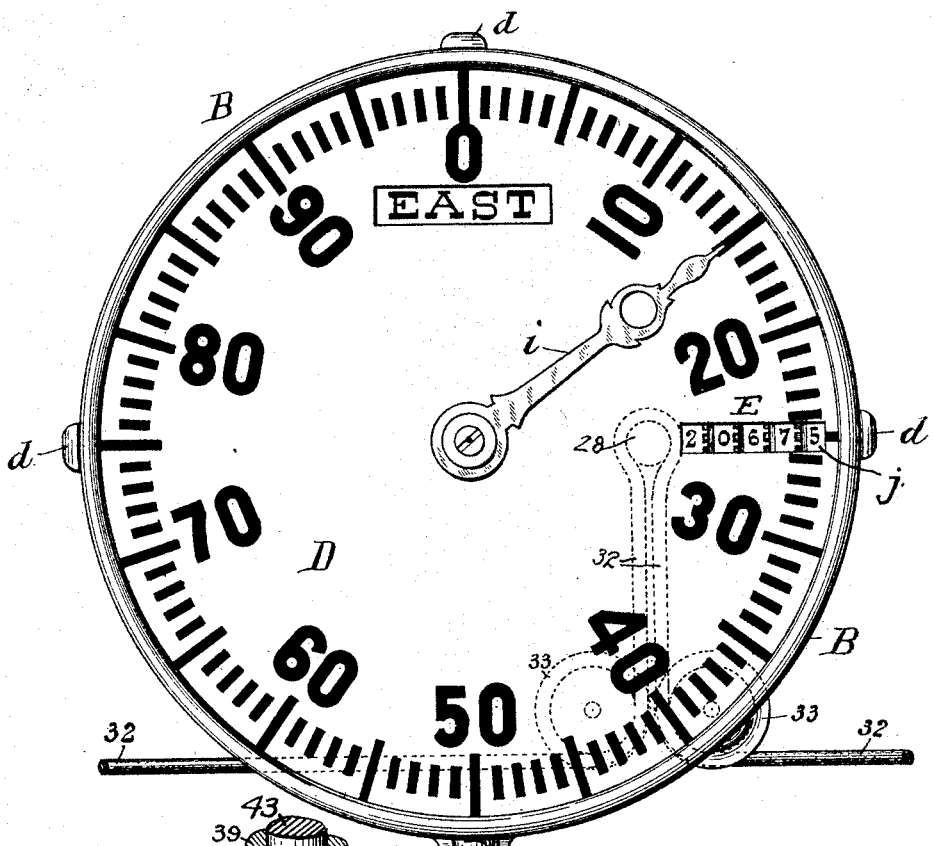
L. EHRLICH.

STREET CAR REGISTER.

No. 490,342. Patented Jan. 24, 1893.

Fig. 1.



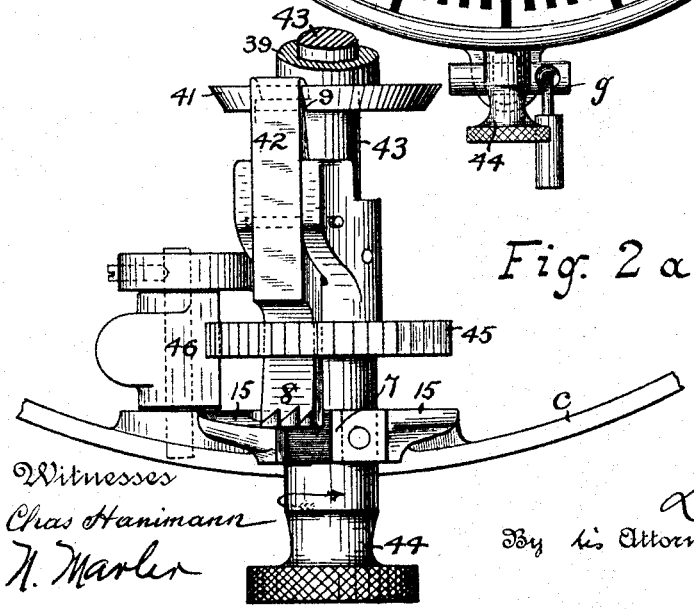


Fig. 2 a.

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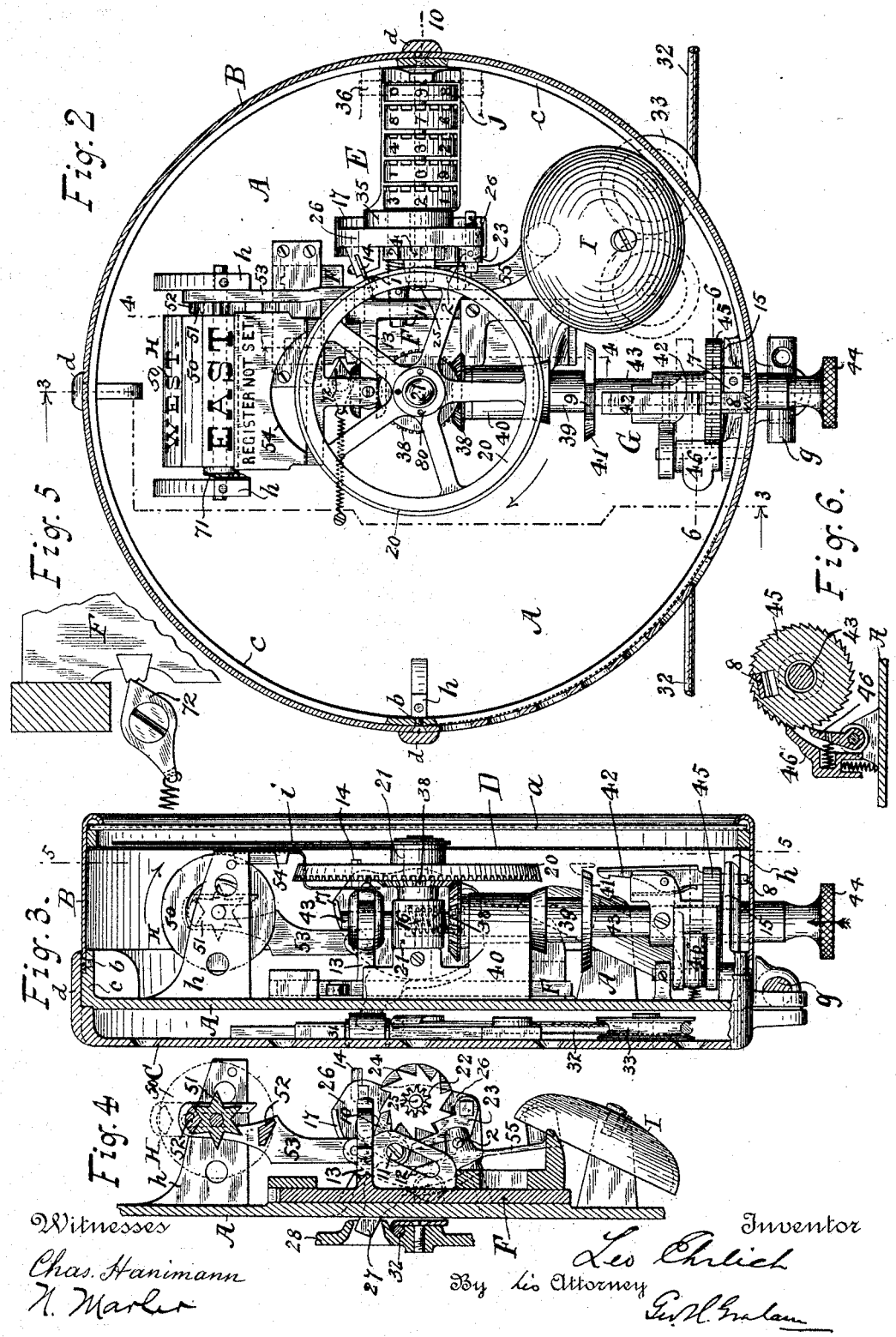

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(No Model.) 4 Sheets—Sheet 3.

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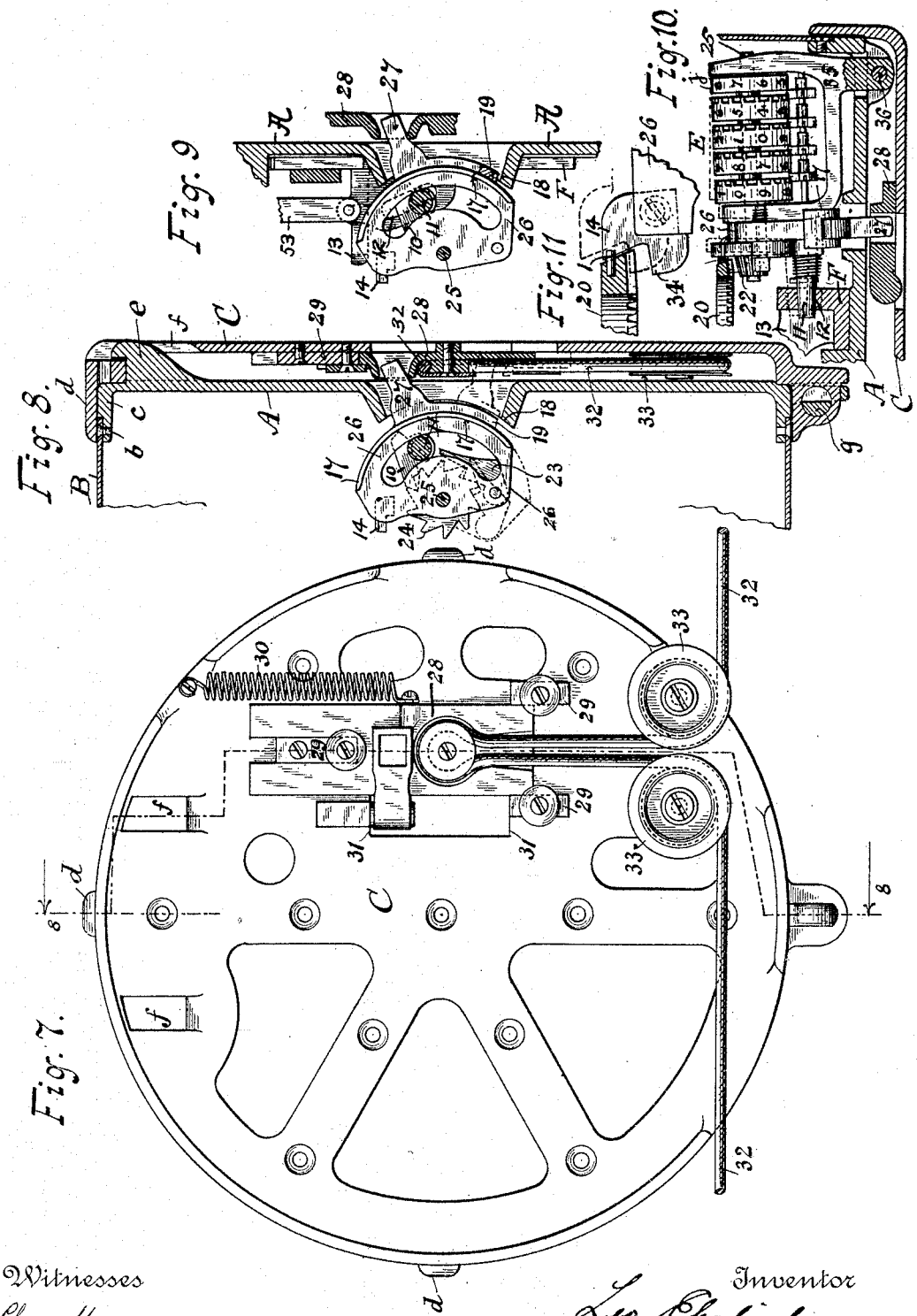

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(No Model.) 4 Sheets—Sheet 4.

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No. 490,342. Patented Jan. 24, 1893.

Fig. 12.

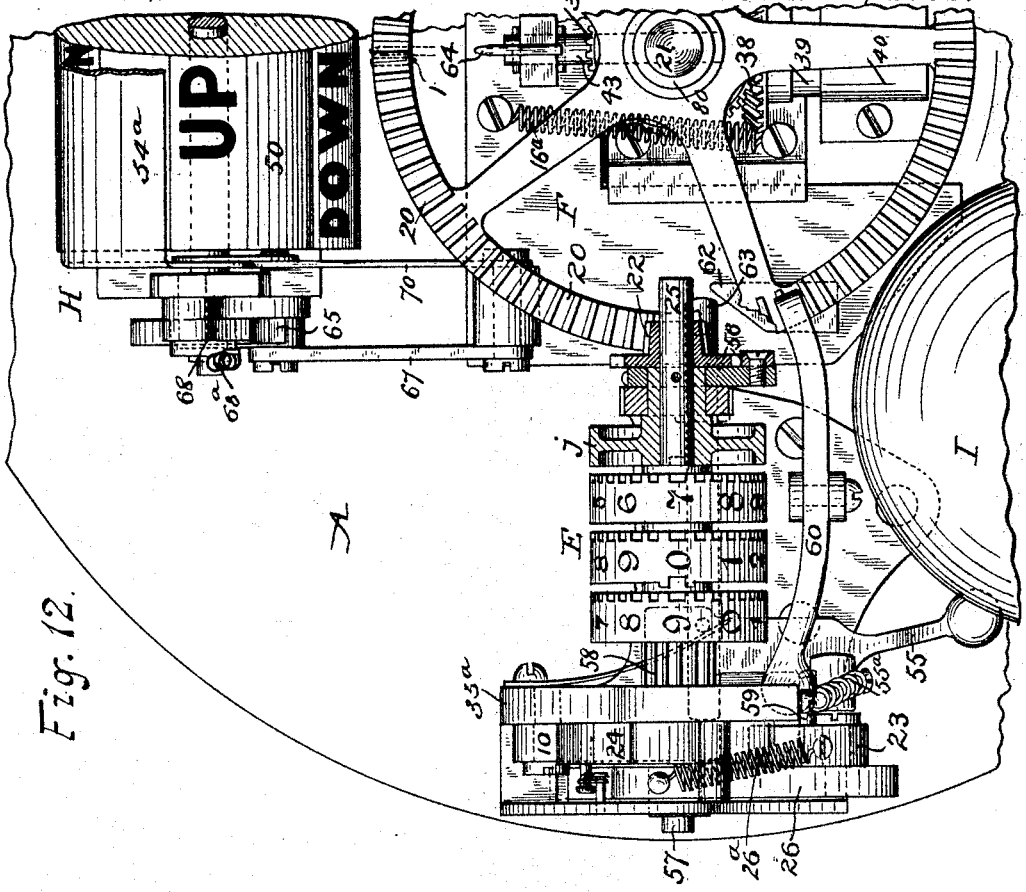
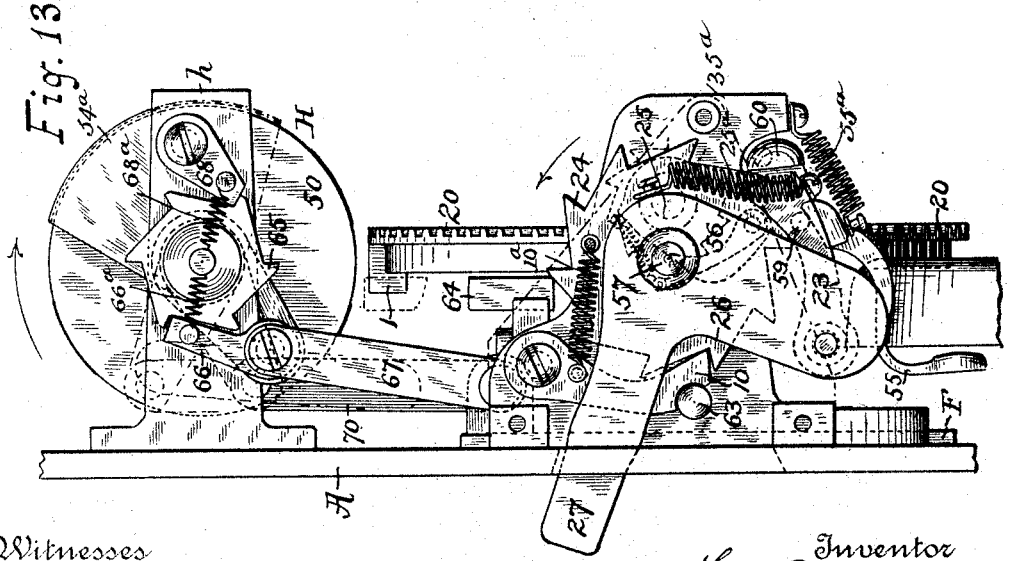


Fig. 13.



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UNITED STATES PATENT OFFICE.

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STREET-CAR REGISTER.

SPECIFICATION forming part of Letters Patent No. 490,342, dated January 24, 1893.

Application filed October 28, 1891. Serial No. 410,077. (No model.)

To all whom it may concern:

Be it known that I, LEO EHRLICH, a citizen of the United States, residing in the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Street-Car Registers, fully set forth in the following description and represented in the accompanying drawings.

This invention relates to that class of registers and indicators commonly called street car or fare registers wherein is employed a step by step revoluble index moving over a fixed indicator dial in connection with a permanent register or set of adding wheels that are moved in unison with the index to preserve the sum of the operations of the total register while the index of the trip register may be returned to zero.

The object of the present invention, among other things, is to materially improve and simplify the construction and operation of the fare register, whereby the operative parts are reduced to the minimum and consequently lessening its cost; and to form an intimate cooperation of the various devices whereby certain safeguards against fraudulent manipulation are provided. To this end the improved fare register embraces, in brief, a trip register consisting of an indicator-dial over which moves a step by step revoluble index; a permanent register or set of adding wheels, and an actuating device geared with the index and with the adding wheels whereby both are moved step by step in unison; a disconnecting device adapted to disconnect the index of the trip register from the adding wheels of the permanent register to place the former in condition to be returned to zero without disturbing the position of the adding wheels; a zero stop normally out of position adapted to be moved into position to check the return of the index at zero and prevent its over movement; a lock preventing the movement of the adding wheels while the index is being returned; a direction-indicator moved for instance to change from "East" to "West," or vice versa, in unison with the setting of the index to zero; a guard or shield temporarily hiding the direction-indicator during its change of position; a guard preventing the premature return of the setting device before completing the return of the index to zero; a detent preventing any over movement of the index or of the adding wheels; and various details of construction and combinations of parts fully hereinafter set forth.

With this general statement of the parts of the register, a detailed description thereof will now be given, reference being had to the accompanying drawings, which illustrate a practical embodiment of the same.

In said drawings:—Figure 1, is a front elevation of the improved register. Fig. 2, is an elevation of the interior mechanism, the index and indicator dial being removed to properly disclose the underlying parts; and Fig. 2ª is an enlarged elevation of the shaft of the setting device in its moved position. Fig. 3, is a side elevation of the parts shown in Fig. 2, the inclosing case and base or back plate of the register being shown in section, taken on the line 3—3, of said figure. Fig. 4, is a vertical sectional elevation taken on the line 4—4, of Fig. 2, the inclosing case and some other parts being omitted. Fig. 5, is an enlarged detail of a pawl and its immediate connections for insuring a complete movement of the setting device. Fig. 6, is a detailed section on the line 6—6, of Fig. 2, showing the ratchet of the setting device and its double pawls. Fig. 7, is an elevation of the false back plate showing the actuating slide for the register. Fig. 8, is a vertical section taken on the line 8—8, of Fig. 7, showing a portion of the actuating pawl carrier. Fig. 9, is a similar view of a portion of the devices shown in Fig. 8, with the locking device in position. Fig. 10, is an irregular sectional elevation taken on the line 10 of Fig. 2, with the adding wheels and the index wheel out of gear. Fig. 11, is an enlarged sectional detail of the stops and index wheel for preventing an over movement of said wheel during its step by step rotation and during its return to the zero position. Fig. 12, is a partial plan view of a slightly modified structure, partially in section. Fig. 13, is a side elevation of the same, a portion of the frame being removed to disclose the carrier of the actuating pawl.

Referring to said drawings it will be understood that the improved fare register is supported by a back or base plate A, and in-

closed by a circular casing B, with a glass front *a*, the whole being carried by a false back C. The casing is secured by screws *b*, to an annular flange *c*, of the back plate, and the false back is formed with ears *d*, that overlie the screws and prevent fraudulent removal of the casing for access to the interior parts. The false back C is intended to be secured in place, as against the end of a street-car, by screws, and the back A, carrying the register, is provided with rearward tongues *e*, which pass into slots *f*, in the false back and engage with the latter, in which position it is locked by a bolt *g*, and padlock, as shown in Fig. 1.

The register is provided with a trip register and a permanent register. The trip register consists of the usual dial D, supported by and secured to posts *h*, projecting from the back plate A, leaving a space between its face and the glass front for an index *i*.

The index is fixedly secured to the hub 80 of a bevel gear 20 that is supported to rotate loosely on a central bearing stud 21 projecting from the back plate. The step by step indicating movements of the index are imparted by the oscillations of an actuating device consisting of a pawl 23 that engages with a ratchet 24 fast to a bevel pinion 22 which meshes with the gear 20. The ratchet 24 and bevel pinion 22 are both fast to the shaft 25 of an adding device or permanent register E, the units wheel *j* of which is also fast to said shaft. The pawl 23 is carried by a pawl carrier 26, see Figs. 4, 8, and 9, hung loosely on the shaft 25 and said pawl carrier has a finger 27 that projects rearwardly through an opening in the back plate A and is engaged by a reciprocating slide 28 which is supported in bearings 29 on the face of the false back C. The slide 28 is moved between a pair of stops 31 against the force of a spring 30, by an operating cord 32 extending within reach of the operator. The cord, see Figs. 7 and 8, is doubled around and secured to a stud projecting from the slide 28 and its ends pass in opposite directions around grooved guide wheels 33 carried by the false back.

From the foregoing it will be seen that each time the operating cord is pulled down upon, the slide 28 is reciprocated which in turn oscillates the pawl carrier 26 in one direction into the position indicated by dotted lines Fig. 8, against the force of the spring 30, so that the pawl 23, in thus moving backward, engages with the succeeding tooth of the ratchet 24. Upon releasing the operating cord, the spring 30 causes the slide 26 and pawl carrier to return to their normal positions thus feeding the ratchet 24 forward one step, which in turn through the pinion 22 and gear 20 similarly moves the index over the dial one step. Any over movement of the index due to momentum is prevented by providing a detent 34, see Fig. 11, for engagement with a tooth of the bevel gear 20 at the completion of each step movement. This detent is carried by the pawl carrier 26 and engages with the gear in the normal position of the pawl carrier. As soon as the pawl carrier is oscillated the detent is removed to free the bevel gear and again engages therewith on its return to the normal position.

The permanent register E consists of the usual series of adding wheels, representing units, tens, hundreds, thousands, &c., carried by the shaft 25 in the frame 35, the said adding wheels having carrying pinions as usual. This frame is hinged upon a pin 36 at its outer side to the back plate A, see Fig. 10, so that the frame may be rocked and the bevel pinion 22 moved out of mesh with the bevel gear 20, as shown in said Fig. 10. When the parts are in their normal positions, the bevel gear 20 and pinion 22 being in mesh, each complete oscillation of the pawl carrier 26 moves the ratchet 24 a step forward, and as it and the bevel pinion 22 and the units wheel *j* of the adding wheels are fast to the same shaft 25, it results in the simultaneous movement of the index of the trip register and the units adding wheel *j* of the permanent register. When the frame 35, which also supports the pawl carrier 26, is rocked to disconnect the bevel pinion and gear, it is necessary to lock the permanent register against movement, the trip register being then out of connection cannot be moved except by the devices hereinafter set forth. For this purpose the pawl carrier, and hence the permanent register, is locked against movement when the frame is in its moved position by a projection 19 on the pawl carrier being moved behind an abutment 18 formed by the wall of the opening in the back plate A through which the finger 27 extends. The underside of the pawl carrier 26 is formed with a flange 17 (see Fig. 2) forming a guard concentric with the pivot of the carrier and overlying the opening through the back plate to prevent access to the interior of the register past said opening. The underside of the flange carries the projection 19 which is continued to the finger 27, and in the normal position of the parts as in Fig. 8, moves freely over the extended walls of the opening whenever the pawl carrier is oscillated, but when the frame 35 is moved, as in Fig. 10, the projection 19 moves down into the opening behind the abutment 18, as in Fig. 9, and thus prevents any movement of the pawl carrier and locks the register against movement. The continuation of the projection 19 toward the finger 27, prevents the disconnecting movement of the frame 35 until the pawl carrier is returned to its normal position at the end of its operative movement.

The setting device or the mechanism by which the trip register is returned to zero or its starting point without disturbing the permanent register, consists incidentally of a reciprocating slide F for moving the permanent register into its locked position, and mainly of a reciprocating and rotary coupler for en-

gagement with the other part of the coupler to rotate it and the index back to the starting position.

The bevel gear 20 has secured to it one of a pair of miter gears 38, see Figs. 2 and 3, the other being fast to a revoluble sleeve 39, mounted in a bearing 40 projecting from the back plate A. This revoluble sleeve carries a disk 41 forming part of a coupler G, the other engaging part being formed by a pivoted latch 42 carried by a reciprocating and revolving shaft 43. The shaft 43 is mounted in bearings on the back plate and extends through the revoluble sleeve 39 and an opening in the central stud 21 and has a shoulder borne upon by a spring 16 within the stud to hold the parts of the coupler normally disconnected, (the weight of the parts acting by gravity may effect the same result;) the end of the shaft 43 has a grasping piece 44 extending to outside of the casing by which the shaft is moved longitudinally as well as rotated together with the connected parts. The shaft carries a ratchet 45 that is engaged by two spring-pressed pawls 46, see Fig. 6, which are adapted to hold the shaft against backward movement a distance less than a full tooth of the ratchet; the pawls being wider than the face of the ratchet to still engage with it in the moved position of the shaft and ratchet as indicated by dotted lines Fig. 2, and in Fig. 2^a.

The disk 41 has a beveled circumferential face coacting with the inclined nose of the latch 42 to allow the easy engagement of the two in the longitudinal movement of the shaft and latch for that purpose. The disk is provided at one point in its circumference with a cut away portion or recess 9 Figs. 2 and 2^a sufficiently wide to permit the seating therein of the nose of the latch, so that the disk and the latch become coupled and the disk thus be rotated with the latch 42 and shaft 43. As the bevel gear 20 and disk 41 rotate in unison, the recess 9 is arranged to coincide with or extend in alignment with the normal starting position, of the latch when the index *i* is at its normal starting position, that is to say, pointing at zero on the dial, and in the rotation of the index and consequently the disk 41 the recess 9 moves a corresponding distance away from this normal position.

The end 8 of the latch 42 passes loosely through an opening in the ratchet 45 and normally lies in a recess in the framework against a stop 7, the inner face of which forms a guard 15 for the end 8 of the latch when in its coupling position and holds it in such position during its rotation (see Fig. 2^a.) The face of this guard 15 is substantially straight or parallel with the rear side of the disk 41 for the greater portion of its distance, but as it approaches the stop 7 it gradually inclines or retreats from the parallel position as indicated in Figs. 2 and 2^a, so that as the latch 42 approaches its normal position as indicated in Fig. 2^a, with its end 8 bearing against the guard, the latch will be gradually moved longitudinally outward so that said end is back of the face of the guard at the stop 7 and hence further rotation of the parts will be stopped by striking said stop and the latch be free to pass from the recess 9 in the disk 41 and return to its uncoupled position, its end 8 seated against the stop 7, as shown in Fig. 2.

If the trip register has not been operated since it was returned to the zero position, no movement of the disk 41 will have occurred and hence its recess 9 will remain in alignment with the nose of the coupling latch 42, so that should the shaft 43 and latch be moved longitudinally into coupling position the latch will pass idly through the recess 9 in the disk 41 and thus the shaft 43 be locked with the disk 41 so long as the shaft 43 and latch 42 are held in said moved position. In this position, however, it is deemed best to prevent any rotation of the parts, and for this purpose a zero stop 1 is introduced. This stop, see Figs. 2 and 11, projects from the side of the bevel gear 20 and is met by a coacting abutment 14 carried by the actuating-pawl carrier 26. In the normal position of the permanent register frame 35, and during the oscillation of the pawl carrier 26, this zero stop abutment 14 is out of the path of the zero stop 1 hence the index *i* of the trip register may be moved more than a complete rotation, should it become necessary, but when the permanent register E is moved into its locked position, disconnected from the trip register, the abutment 14 is simultaneously moved into position in the path of movement of the zero stop 1, ready to prevent any further return movement of the bevel gear 20, and hence of the trip register. Before the trip register can be moved forward in its regular movement again, of course the zero stop abutment 14 will have been moved back to its normal idle position simultaneously with the rocking of the frame 35 to place in gear the trip and permanent registers as before explained.

To return to the setting device: When the trip register has been moved one step or more from the zero position the recess 9 of the disk 41 will have been correspondingly moved, so that when the shaft 43 and latch 42 are moved longitudinally into coupling position, the nose of the latch will ride up and pass over the beveled edge of the disk and rest thereon, its hook being on the back of the disk preventing the return of the shaft and latch at this time, while the end 8 of the latch will be moved to pass the stop 7 and ride along the surface of the guard 15 during the shaft's rotation. The shaft 43 may now be rotated in the direction of the arrow, Fig. 2^a, idly so far as the disk 41 is concerned, until the latch 42 arrives over the recess 9 therein, when it immediately seats itself therein and thus locks the disk and shaft together so that during the further rotation of the shaft to its normal position, the disk moves with it, and by reason of its connection with the bevel gear 20 of

the trip register, causes a simultaneous movement of the trip register index *i*. As the parts approach the normal stopping point, the end 8 of the latch 42 rides along the inclined edge of the guide 15, tending to withdraw the nose of the latch from the recess 9 and also moving rearward sufficient to be in line with the stop 7, as is clearly seen in Fig. 2ª. As soon as the latch 42 reaches the normal position, the zero stop 1 on the bevel gear 20 has met the abutment 14 and further return movement of the trip register is prevented, and simultaneously the shaft 43 and latch 42 will move back longitudinally out of coupling position, with the end 8 of the latch seated against the stop 7, this backward movement being had automatically by gravity, or by the spring 16, see Fig. 3.

To effect the disconnection of the trip and permanent registers and the locking of the latter register, the coupling movement of the shaft 43 is made the means for effecting this result. Thus the upper end of the shaft 43 is connected through an arm 13, loosely embracing a grooved collar on the shaft, with the reciprocating slide F that is mounted to slide in guides on the face of the back plate A, see Fig. 4. This slide F is provided with an inclined slot 12 that is engaged by a stud 11 projecting rigidly from the end of the permanent register frame 35, through an opening in the pawl carrier 26, see Figs. 4, 8, 9, and 10; and this stud supports the hold-back pawl 10 for engagement with the ratchet 24. The inclined slot 12 is so arranged that when the slide F and the shaft 43 are in their normal positions the permanent register is held in gear with the trip register, or, in other words, the bevel gear 20 and pinion 22 are in mesh; but when the shaft 43 and slide F are moved inwardly, the slot 12 moving over the stud 11, rocks the frame 35 downwardly and moves the pinion 22 out of mesh with the gear 20 and simultaneously moves the projection 19 into locking engagement behind the abutment 18, as in Figs. 8 and 10. On the return of the slide and shaft 43 to their normal positions, the register frame 25 will also be returned, placing the pinion 22 and gear 20 in gear again, see Fig. 2.

In order to compel a complete back and forward movement of the shaft 43 and slide F, the latter is provided with a toothed edge, see Figs. 2 and 5, that is engaged by a dog 72 only capable of changing its position in the notches at each end of the toothed edge. The movement of the slide F also operates a direction indicator H, see Figs. 2, 3, and 4. This indicator consists of a roll 50 bearing direction plates such as "East," "West" or "Up," "Down," or the like, and these plates are duplicated one or more times around the roll with a space between them according to the size of the roll and the number of steps necessary to cause a complete turn of the roll. The roll 50 is mounted to rotate in bearings in a pair of posts *h*, against the friction of a flat spring 71, and carries on one side a star wheel 51 that is engaged by two detents 52 of an anchor lever carried by an arm 53 projecting from the slide F. When the slide is reciprocated in one direction, one detent engaging with the star wheel rotates the latter and the roll one half of a complete forward step moving the direction plate, showing "East" through the opening of the dial D, behind the dial and bringing a blank space on the roll to coincide with said opening; on the rearward or return reciprocation of the slide, the other detent moves into engagement with the star wheel and moves it and the roll another one half step and completes the step movement bringing the direction plate bearing "West" to view through the opening in the dial; and this will occur in the present structure, as will be apparent, when the latch 42 has returned to its normal uncoupled position, and the permanent register has been unlocked, and the pinion 22 placed in mesh with the gear 20.

In order to show that the trip register is in position to be returned to the zero position, so that no attempt will be made to move the locked pawl carrier 26, by pulling upon the operating cord, there is provided a shield 54 adapted to be moved over the direction indicator roll 50 and hide it from view. This shield is secured to the arm 13 so as to move in unison with the reciprocation of the slide F; and the shield may bear the words "Register not set" which in its moved position will show through the opening in the dial in place of the indicator. Upon the movement of the slide F and the anchor lever 53 to change the direction indicator, the shield 54 moves into position below the opening in the dial D, and on the return movement of the slide and the complete step movement of the direction indicator H, it returns to its normal position exposing the indication through said opening.

The bell I is sounded on the forward movement of the pawl carrier 26 and before the registers are actually moved. Thus the bell hammer 55 is pivoted at its rear end to the back plate A and pressed upwardly by a spring, not shown. The hammer has a pin 2, see Fig. 4, which as the actuating pawl 23 is pressed outward in passing over a tooth of the ratchet 24 rocks the bell hammer 55 downwardly and as it suddenly engages with that tooth frees the bell hammer and allows it to strike the bell I.

In Figs. 12 and 13, there is shown a slight modification of the means for disconnecting the trip and permanent registers; of the lock for locking the actuating pawl carrier against movement during the setting back operation; of the zero stop; and of the direction indicator. The bevel gear 20 of the trip register is constantly engaged by the bevel pinion 22 of the permanent register shaft 25, the said pinion 22 being connected to the shaft through a pawl and ratchet 56, the ratchet being secured to the pinion, and the arm sustaining

the pawl fixed to the shaft 25. By this construction, the pinion and gear being constantly in mesh, the trip and permanent registers are simultaneously moved together in the forward direction; and when the trip register is moved back to the zero position during the rotation of the gear 20 by the operation of the setting device, the pinion 22, will rotate idly on the shaft 25 without moving the permanent register. In this case the permanent register frame 35^a is fixed. The two registers are moved by the oscillation of the actuating pawl carrier 26 and pawl 23 that engages with the ratchet 24, a coiled spring 26^a returning the pawl-carrier after each movement.

Instead of mounting the ratchet 24 on the register shaft 25, it is mounted on a countershaft 57, the two shafts being geared together by gears 58, one of which is shown; and the ratchet is engaged as before by the hold-back pawl 10 that is held to duty by a coiled spring 10^a.

The actuating pawl 23 is provided with a pin 59 which performs the double function of rocking a lever 60 to move its end into engagement with the teeth of the bevel gear 20 to prevent over movement of the latter due to momentum, and on its backward oscillation to rock and trip the bell hammer 55 against the pull of a coiled spring 55^a to strike the bell I.

The means for moving the trip register back to the zero position is the same as before set forth. The reciprocating slide F, however, moved against the pull of the coiled spring 16^a carries an inclined projection 62 adapted to bear against the inner end of a spring-pressed bolt 63 that slides in bearings in the permanent register frame and when moved outwardly on the reciprocation of the slide F moves under the hold-back pawl 10 and thus locks it in engagement with the ratchet 24, thereby preventing any movement of the actuating pawl 23 and consequently of the registers.

The zero stop 1 is carried by the bevel gear 20 as before, but the coacting abutment 64 is carried by the reciprocating slide F which in its normal position lies back out of the path of the zero stop during the movement of the trip register. When the reciprocating slide F is moved forward preliminary to returning the trip register index to zero, the abutment 64 is moved forward into the path of the zero stop and acts to stop the trip register at the zero position, whereupon the parts are returned to their normal positions.

The direction indicator H consisting of the revoluble roll 50, instead of being moved half steps as before, is provided with a ratchet 65 secured to its shaft that is engaged by a pawl 66 carried by an arm swinging loosely on the roll shaft and oscillated by a connecting rod 67 from the slide F. Upon the forward reciprocation of the slide, the pawl moves the ratchet and roll a complete step forward to change the indication from "Up" to "Down;" a hold-back pawl 68 preventing any backward movement of the roll. On the return of the slide the pawl 66 simply moves idly back into position to engage with another tooth of the ratchet to move the indication roll when the slide is again operated. The pawls 66 and 68 are held to duty by coiled springs 66^a and 68^a respectively.

The shield 54^a instead of reciprocating to cover and uncover the roll by a direct connection with the slide F, is secured to arms hung loosely on the roll shaft, one of the arms being extended and connected by a rod 70 with the slide; and is thus rocked to cover the roll on the forward movement of the slide F and rocked backward to uncover that roll on the return movement of the slide.

What is claimed is:—

1. The combination with the trip and permanent registers having their axes at right angles to one another, and their intermeshing beveled gears, of a ratchet connected with one of said beveled gears, an actuating pawl for the ratchet for moving both registers simultaneously step by step, an abutment for preventing the movement of the beveled gear of the permanent register and normally out of action, and means for disconnecting the beveled gears and placing said abutment in action, whereby the registers are disconnected and the permanent register locked against rotation, substantially as described.

2. The combination with the trip register, and its bevel wheel, a permanent register having its axis at right angles to the axis of the trip register, and its bevel pinion meshing with said bevel wheel, of a ratchet connected to said bevel pinion, an actuating pawl for the ratchet, and means for moving the pinion, ratchet, and pawl out of operative position to disconnect the trip and permanent registers, substantially as described.

3. The combination with the trip register, a permanent register having its axis at right angles to the trip register, a bevel wheel and intermeshing bevel pinion connected with the registers, of a ratchet connected to the bevel-pinion, an actuating pawl, a stop for locking the actuating pawl, and means for moving the pinion, ratchet, and pawl to disconnect the registers and lock the pawl, substantially as described.

4. The combination with the trip register, and a permanent register having its axis at right angles to the trip register, and a rocking frame in which the permanent register is mounted, of an actuating pawl, a stop for locking the same, and means for rocking the frame to disconnect the trip register and lock the pawl, substantially as described.

5. The combination with the trip register, and a rocking frame supporting the permanent register, and a pinion connecting it with the trip register, of an actuating pawl also

carried by the rocking frame, and means for rocking the frame to disconnect the pinion, substantially as described.

6. The combination with the trip register and a rocking frame supporting the permanent register and the actuating pawl carrier and pawl, of a projection on the pawl carrier, an abutment, and means for rocking the frame to move the projection behind the abutment to lock the register against movement, substantially as described.

7. In a register, the combination with the rocking frame, of the actuating pawl carrier and pawl supported by the frame, a projection on the carrier, a coacting abutment and means for rocking the frame to move the projection behind the abutment to lock the pawl carrier, substantially as described.

8. In a register, the combination with the rocking frame, of the actuating pawl carrier and pawl supported by the frame, an abutment, a coacting projection on the carrier with a continuous rearward surface preventing the rocking of the frame until the carrier is returned to its normal position and means for rocking the frame to move the projection behind the abutment to lock the carrier, substantially as described.

9. In a register, the combination with the rocking frame supporting the permanent register and a pinion, of the trip register in gear with said pinion, and a reciprocating slide connected with said frame for rocking the pinion into and out of gear with the trip register, substantially as described.

10. The combination with the trip register, of a rocking frame, the permanent register, the actuating pawl and a pinion for gearing with the trip register, all supported by said frame and a reciprocating slide connected with the frame for rocking the latter to move the pinion into and out of gear, substantially as described.

11. In a register, the combination with the bevel gear of the trip register and a bevel pinion for rotating the gear, of an actuating pawl carrier and pawl for moving the pinion, said pawl-carrier mounted loosely on the shaft of the bevel pinion; and a detent moved by the carrier into engagement with the teeth of the bevel gear to prevent over movement of the trip register, substantially as described.

12. The combination with the trip register, of a setting device therefor consisting of a longitudinally movable and revoluble shaft and a coupler for connecting the shaft to the trip register, said coupler including a latch adapted to become locked to the co-operating part of the coupler, whereby upon the initial longitudinal movement of the setting-device the coupler is locked against disengagement, substantially as described.

13. The combination with the trip register, and an actuating pawl, of a setting device for the register consisting of a longitudinally movable and revoluble shaft and a coupler for connecting the shaft to the trip register, and connections between the setting device and the actuating pawl for disconnecting it from the register during the operation of said device, substantially as described.

14. The combination with the trip and permanent registers, of a setting device for the trip register, consisting of a longitudinally movable and revoluble shaft and a coupler for connecting the shaft to the trip register, and connections with said setting device for disconnecting said two registers during the operation of the setting device, substantially as described.

15. The combination with the trip and permanent registers and a pivoted frame supporting the permanent register, of a setting device for the trip register, consisting of a longitudinally movable and revoluble shaft and a coupler for connecting the shaft to the trip register, and a connection between the shaft and the frame for rocking the latter to disconnect the registers, substantially as described.

16. The combination with the trip register having a disk containing a recess movable in unison therewith, of a longitudinally movable and revoluble latch for engaging the disk and its recess for setting the trip register to the zero position, substantially as described.

17. The combination with the trip register having a disk movable in unison therewith, of a longitudinally movable and revoluble latch for engaging the disk for turning the register to the zero position, and a guide coacting with the latch to determine its return longitudinal movement, substantially as described.

18. The combination with the trip register, having a disk movable in unison therewith, of a longitudinally movable latch for engaging the disk, and a grasping piece for turning the latch, disk and register, substantially as described.

19. The combination with the trip register having a disk with a recess movable in unison therewith, of a longitudinally movable latch for engaging the recess in the disk, a guide for holding the latch in engagement with the recess, and a grasping piece for rotating the latch, disk, and register, substantially as described.

20. The combination with the trip register having a disk movable in unison therewith, of a longitudinally movable latch for engaging the disk, a guide for holding the latch in engagement therewith, means for rotating the latch, disk and register, and a stop limiting the movement of the latch, substantially as described.

21. The combination with the trip register having a disk movable in unison therewith, of a longitudinally movable latch for engaging the disk, a grasping piece for revolving the latch, disk and register, and a zero stop and abutment for stopping the register at the zero position, substantially as described.

22. The combination with the trip register

having a disk movable therewith, and an actuating pawl carrier and pawl, of a longitudinally movable latch for engaging the disk, a grasping piece for rotating the latch, disk and register, a zero stop on the register, and an abutment on the pawl carrier, and connections with the latch to move the abutment into the path of the zero stop, substantially as described.

23. The combination with the trip-register and a beveled and recessed disk movable in unison with said register, of a longitudinally movable latch for locking engagement with the beveled disk, to prevent the return of the latch until the recess is in line with said latch and means for returning the trip-register and disk to the normal starting position, substantially as described.

24. The combination with the trip and permanent registers, of a revoluble direction indicator, a setting device for returning the trip register to zero, a reciprocating slide operated by the setting device, and an anchor-lever connected with the slide for rotating the indicator two half steps for each change of direction, substantially as described.

25. The combination with the trip and permanent registers, of a direction indicator, a setting device for returning the trip register to zero and connections for changing the indicator and a guard for the indicator moved with the setting device, substantially as described.

In witness whereof I have signed my name, in the presence of two witnesses, this 27th day of October, 1891.

LEO EHRLICH.

Witnesses:
GEO. H. GRAHAM,
N. MARLER.