No. 775,408. PATENTED NOV. 22, 1904.

L. A. SCHMIDT.

ELECTRICAL REGISTER AND SYSTEM THEREFOR.

APPLICATION FILED FEB. 6, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

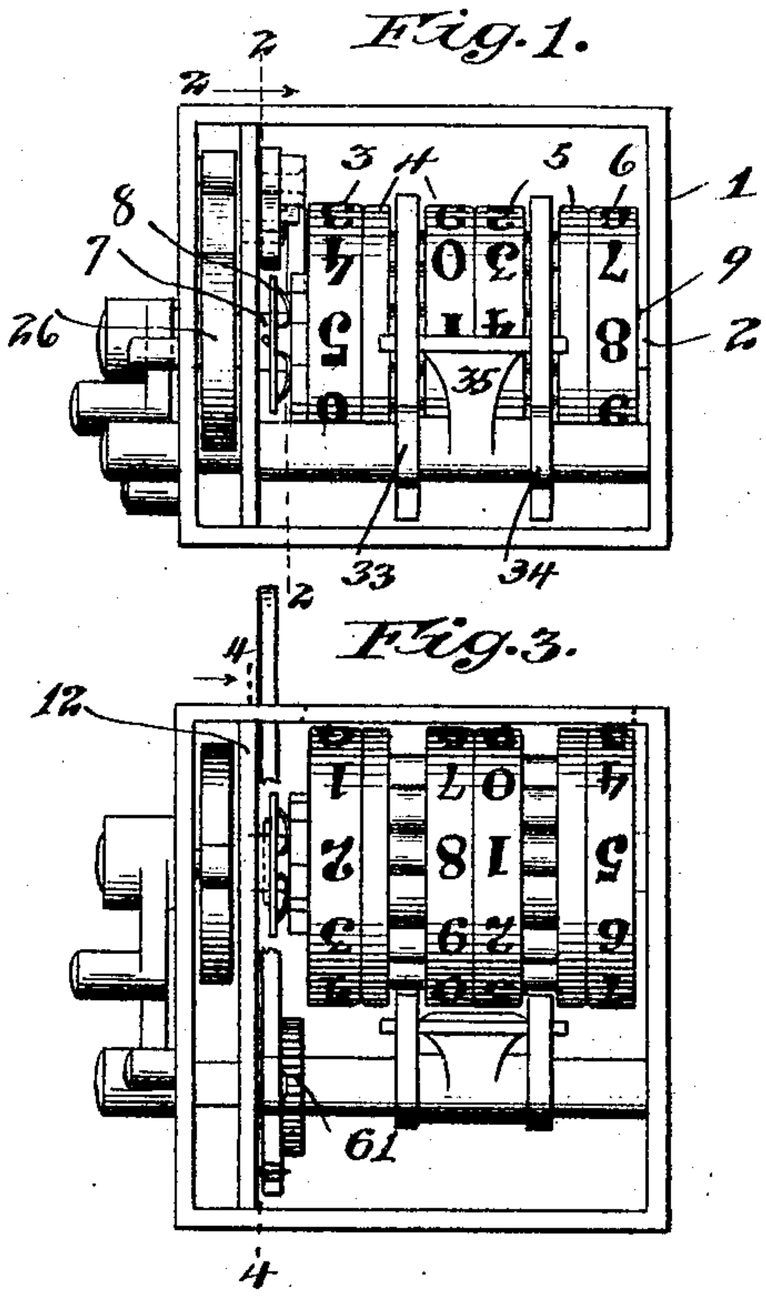


Fig. 2.

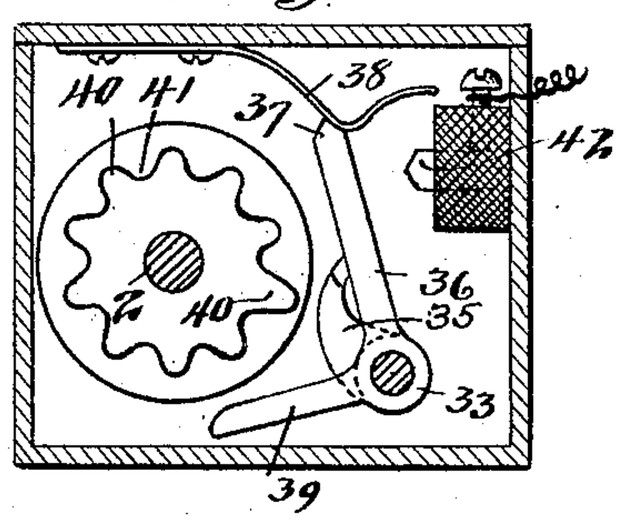


Fig. 3.

Fig. 4.

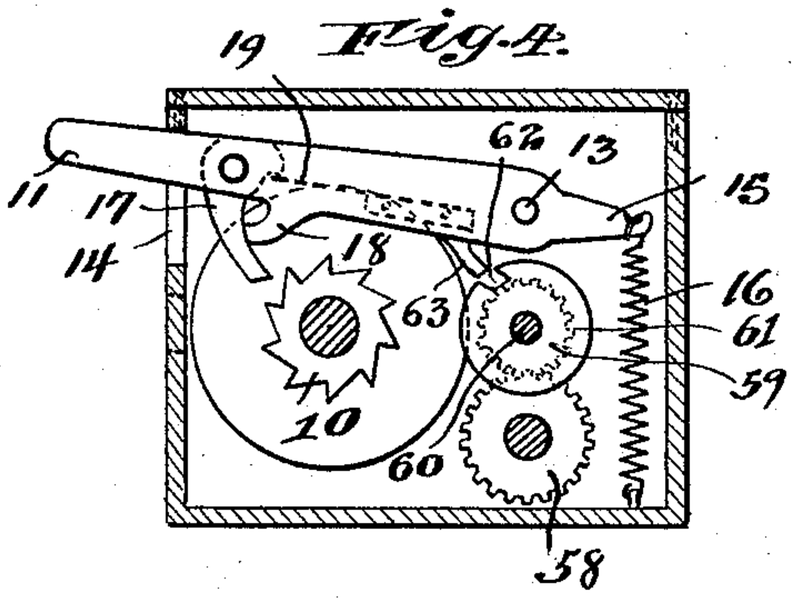


Fig. 5.

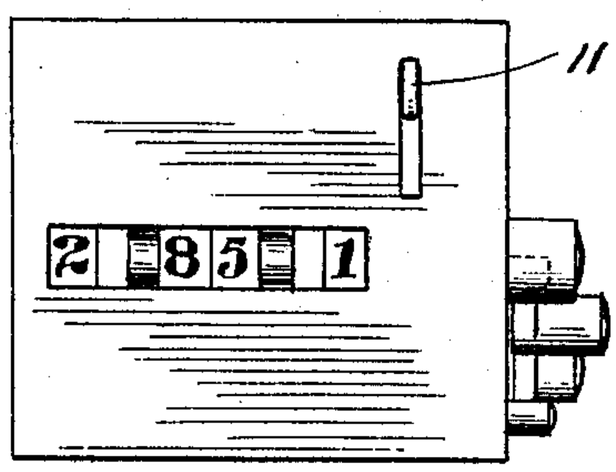


Fig. 6.

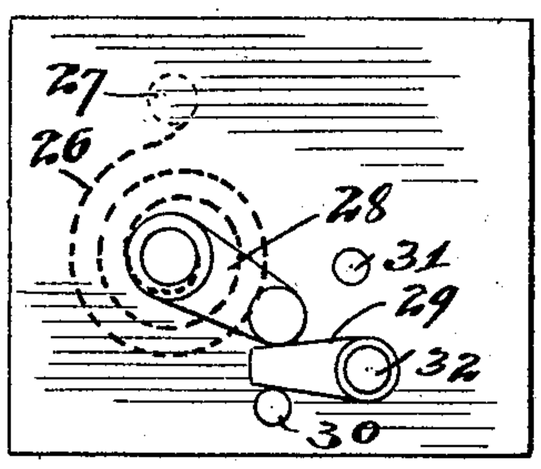


Fig. 7.

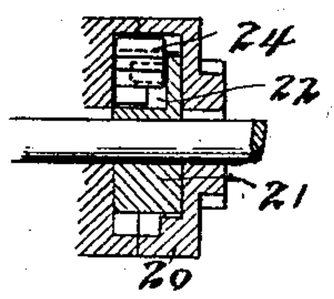


Fig. 8.

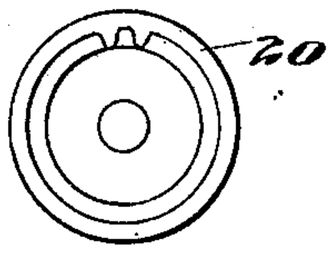


Fig. 9.

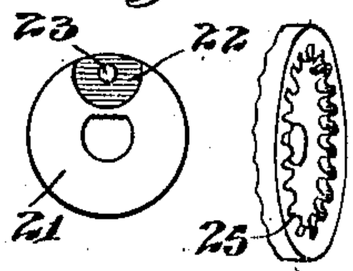
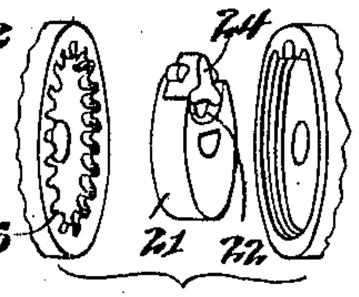


Fig. 10.



Witnesses,
L. D. Mann,
A. N. Graves.

Inventor;
Louis A. Schmidt
By Offield Towler Linthicum,
Attys.

No. 775,408. PATENTED NOV. 22, 1904.

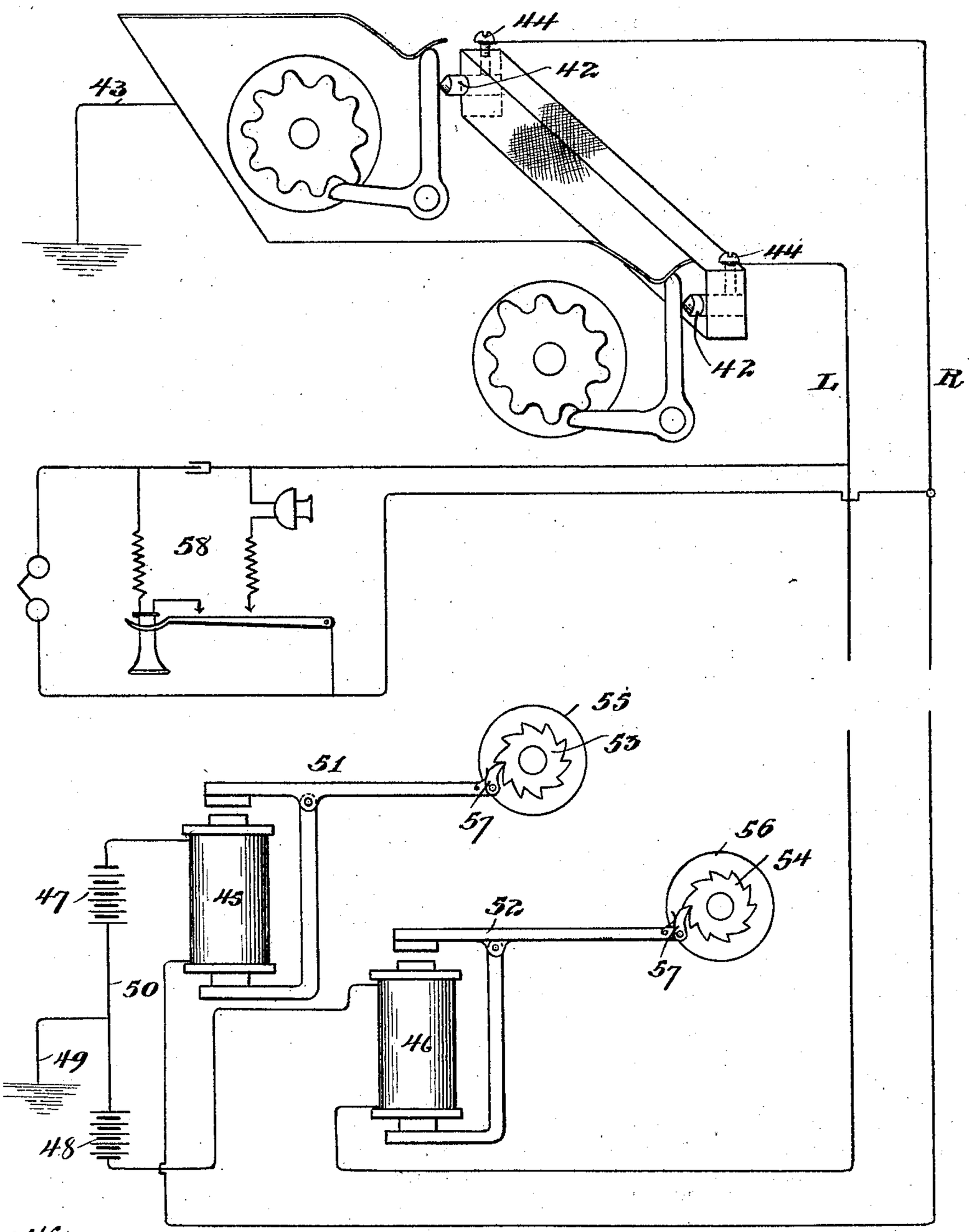
L. A. SCHMIDT.

ELECTRICAL REGISTER AND SYSTEM THEREFOR.

APPLICATION FILED FEB. 6, 1904.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 11.



Witnesses,
F. D. Mann,
A. L. Graves

Inventor,
Louis A. Schmidt,
By Offield Towle & Linthicum
Atty's.

No. 775,408. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

LOUIS A. SCHMIDT, OF CHICAGO, ILLINOIS.

ELECTRICAL REGISTER AND SYSTEM THEREFOR.

SPECIFICATION forming part of Letters Patent No. 775,408, dated November 22, 1904.

Application filed February 5, 1904. Serial No. 192,216. (No model.)

To all whom it may concern:

Be it known that I, LOUIS A. SCHMIDT, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electrical Registers and Systems Therefor, of which the following is a specification.

This invention relates to improvements in electrical registers and system of electrical connections therefor, the register being particularly adapted for use in connection with telephones, although not by any means limited to this particular application.

Among the salient objects of the invention are to produce a register of the utmost simplicity and correspondingly inexpensive character, which is at the same time thoroughly reliable as to its operation; to provide a register comprising a counting-train and means for taking a reading of the positions of the several counters and transmitting the same electrically, such means operating in such manner as to preserve the several positions of the counters, so that the count is not lost when the reading is taken; to provide a register of the character referred to in which in a series of counters representing the first four orders of numerals it is necessary to take a reading of only two of said counters in order to determine the reading of the whole; to provide, in conjunction with a register of the character last referred to, connections with the two main lines or limbs of a metallic circuit, whereby the two counters which are actuated are operated by the respective right and left lines without the interposition of any shunt or circuit-switching mechanism, thereby reducing the circuit connections and mechanism to a minimum and increasing the certainty of operation; to provide in such a system of electrical connections means whereby both limbs of the circuit may be in operation at once for taking a reading without liability of interference with each other or of producing an incorrect reading; to provide a register in which the coöperation of the subscriber in taking a reading is of the simplest possible character, and in general to provide a simple and improved construction and system of the character referred to.

To the above ends the invention consists in the matters hereinafter described and more particularly pointed out in the appended claims, and the invention will be readily understood from the following description, reference being had to the accompanying drawings, forming a part thereof, and in which—

Figure 1 is a side elevation of the register with one side of the casing removed. Fig. 2 is a sectional detail taken on line 2 2 of Fig. 1 and looking toward the right. Fig. 3 is a top plan view of the register with the top casing removed. Fig. 4 is a sectional view taken on line 4 4 of Fig. 3 and looking in the direction of the arrows. Fig. 5 is a side elevation of the register with the casing intact. Fig. 6 is an outside end elevation of that end of the register to which the crank-handle is applied. Figs. 7, 8, 9, and 10 constitute a series of details showing the transfer mechanism or intergearing by means of which the movement of one counter of the train is transmitted to the next of higher order. Fig. 11 is a diagrammatic view of the system of electrical connections.

Referring to the drawings, 1 designates as a whole a suitable casing adapted to contain a counting-train, mechanism for actuating the same manually, and a spring-motor mechanism for moving the train.

2 designates a main shaft arranged to extend through the casing and journaled at its end within the same, a series of counters—four in the present instance—designated, respectively, 3, 4, 5, and 6, being loosely mounted on the shaft side by side. The several counters are frictionally held to rotate with the shaft under certain conditions, while each is capable of independent rotary movement upon the shaft when positively actuated. To this end the shaft 2 is provided adjacent to one end of the train—adjacent to the units-counter in the present instance—with an enlargement of collar 7, and between this collar and the contiguous face of the end of the counter 3 is interposed a star-shaped spring 8, which bears yieldingly against the counter. The members of the counting-train are in bearing with each other, and accordingly the single washer 8 holds the entire train yieldingly against ro-

tation, the opposite end of the train being confined against endwise movement on the shaft by means of a suitable collar 9.

The units-counter 3 is provided with a rigidly-connected ratchet 10, having a series of ten teeth adapted to be stepped forward by a push-lever 11, pivotally supported upon a cross-partition plate 12, as indicated at 13, in position to overlie the ratchet and to extend at its free end out through a suitable slot 14 in the case, all as clearly shown in Figs. 3 and 4. The push-lever is provided with a tail-piece or extension 15, to which is attached a contractile spring 16, which normally holds the lever uplifted, and it is also provided with a depending pawl 17, pivotally mounted upon the lever and normally held in bearing with a stop 18 upon the lever by means of a spring 19, which engages the tail of the pawl. In the uplifted position of the lever the end of the pawl is entirely outside the path of the teeth of the ratchet, so that the train of counters may be rotated without interference by the pawl. The arrangement is such, however, that when the lever is depressed the units-counter is stepped forward one tooth or step, the friction disk or spring 8 serving to hold the counters in whatever position they are moved into by the push-lever.

In the particular instance shown a movement from one counter to the next of higher order is transmitted by means of an internal gear mechanism comprising a gear rim or flange 20, having two teeth arranged to overhang or telescope upon the periphery of a disk-like pinion-support 21, which is immovably mounted upon the main shaft 2. The pinion-support is provided in one face at its periphery with a recess 22, carrying a stud 23, upon which is journaled a pinion 24, which, as best seen in Figs. 7 and 10, is essentially a double pinion, one half or side of which has six teeth, while the opposite side has three. The disk of next highest order is provided in its meeting face with an internal gear 25, having double the number of teeth that there are unit-spaces or digits upon the periphery of the disk, and the said pinion 24 is so disposed that its side having the six teeth intermesh with this disk of higher order, while its opposite sides, provided with the three teeth, intermesh with the annular rim 20 of the disk of lower order having but the two teeth. The triangular disposition of the three teeth of the pinion causes said pinion to coöperate with the untoothed overhanging portion of the flange of the disk of lower order to lock said pinion against movement except during the time its two teeth are operatively engaged with the pinion. It results that upon each rotation of the disk of lower order the pinion will be rotated one-third of a revolution, and will thereby rotate the disk of next higher order two teeth, or one-tenth of a revolution.

Describing now the mechanism whereby a movement is imparted to the group of gears moving as a unit for the purpose of taking a reading electrically, 26 designates a spiral watch-spring mounted in the casing concentrically with the main shaft 2 and having its upper end attached to a stud upon the interior of the casing, as indicated at 27, while its inner end is attached to the main shaft 2. Upon the outer end of the shaft—*i. e.*, outside of the casing—is attached a crank-handle 28, and adjacent to the path of movement of the handle portion of said crank is pivotally mounted a shiftable stop 29. The stop 29 has a limited oscillatory movement between two fixed studs 30 and 31, the width of the operative portion of the stop, the distance between the two studs 30 and 31, and the diameter of that part of the crank-handle which engages the stop being such that when the crank-handle is rotated nearly a revolution and engages the opposite side of the stop the latter is shifted over against the opposite stud and the crank-handle is positively arrested exactly at the end of a complete revolution. Obviously the crank-handle can be turned only in one direction, which direction is against the tension of the spring 26, and upon being released the spring immediately returns to its normal position, or that shown in Fig. 6. The shiftable stop 29 is rigidly fastened upon and operates a rock-shaft 32, which carries at a point within the casing a pair of contact-levers 33 and 34, loosely mounted upon the shaft, and an actuating-arm 35, rigidly mounted upon the shaft and underlying each contact-lever in such manner as to move the latter positively in one direction. Each contact-lever is approximately **L** shape, one member 36 thereof being arranged to extend upwardly and terminating in a **V**-shaped end 37, which engages a reversely-formed **V**-shaped spring 38, while the other end 39 extends toward the periphery of that one of the counters in transverse alinement with said lever. Each of the two counters 4 and 5 which are engaged by the corresponding contact-levers 33 and 34 is provided with a circumferential series of alternate projections or teeth 40 and recesses 41, one of the projections of each counter 40′ being considerably longer than the remainder of the series. The relation of the contact-levers to these projections or teeth 40 are such that when the end 39 of the lever is held yielding in engagement with the counter the lever will be vibrated slightly as each projection passes and will be vibrated to a considerably greater extent when the tappet-tooth 40′ engages the lever. Whenever the levers 33 and 34 are thrown into bearing with the cam projections the same movement carries the upper end of the levers past the **V**-points of the springs 38, so that the tendency of the springs is to hold the levers in bearing with the counters. An

electrical back contact, as 42, is arranged in rear of the arm 36 of each lever in such position that when the opposite arm of the lever is resting in one of the depressions between the cam projections the lever will bear against said electrical contact and be held in bearing by the spring 38. As each tooth passes, the lever will be oscillated away from the electrical contact and thus interrupt the circuit. When the long tooth 40′ engages the lever, the contact will not only be broken, but the lever will be oscillated far enough to carry its V-shaped upper end past the V-point of the spring, whereupon the spring will throw the lever back to its normal inoperative position.

It will be obvious from the foregoing that if at any time after a series of calls have been accumulated on the register the crank-handle be turned a revolution it will, as it approaches the end of its revolution, move the oscillating stop and, through the medium of the rock-shaft and actuating-arm 35 thereon, throw the contact-levers into operative position, whereupon when the crank is released and permitted to return under the action of its spring a series of makes and breaks will be effected between the contact-levers and their back contacts 42, each lever being thrown out of operation whenever the long tooth of the series of cam projections engages it. Accordingly the number of makes and breaks will correspond to the digit position at which the counter stands when it starts to return, which position will be identical with the position at which it stood before the crank was turned forwardly. Since the counters are held immovably upon the main shaft, both while the latter is turned forwardly by the crank-arm and while the shaft is returned, it will be seen that the reading operation will not disturb the position of the tumblers or disarrange the counts or tallies thereon.

Next describing the system of electrical connections and referring to Fig. 11, it will be understood that the back contacts 42 are mounted in insulating material, while the frame of the machine, and therefore the levers 33 and 34, are in electrical circuit with the ground connection, as indicated at 43. L and R designate the two ends of the metallic telephone-circuit extending from a central station to a subscriber's station, the lower half of the diagram representing the apparatus concerned in the present invention located at central and the upper half that located at the subscriber's station. The two ends of the circuit are at the subscriber's station respectively connected with the two contacts 42 by means of suitable binding-screws 44, while at the receiving-station or central each line extends to and through a magnet, as 45 and 46, thence to a battery, as 47 and 48, and thence to a common ground, as indicated at 49. The main lines are connected to the poles of like polarity at the batteries 47 and 48, and the opposite terminals of said batteries are connected by a conductor 50, from which the conductor 49 leads to ground, by means of which arrangement it will be seen the batteries are opposed to each other. Each magnet 45 and 46 is provided with an armature-lever, as 51 and 52, respectively, which armature-levers respectively act upon the ratchets 53 and 54 of counter-tumblers 55 and 56 through the medium of pawls 57. The ratchets 53 and 54 each have ten teeth, so that they are stepped forward step for step with the corresponding counter-tumblers 3 and 4 at the subscriber's station.

The subscriber's telephone set (designated as a whole 58) is shown in conventional form and as bridged upon the main line in the usual manner.

The operation of the system may be briefly described as follows: The subscriber, each time he asks for and receives a telephone connection, actuates the push-lever of his register, thus stepping forward the units-counter one step. A buzzer-circuit may be arranged in a well-understood manner to indicate to the operator at central when he has actuated his register, if desired. After a series of calls have been accumulated upon the register and it is desired to take a reading the operator at central simply requests the subscriber to turn the crank-handle of his register around until it is arrested and then release it. As the crank-handle approaches its limit of movement in the forward direction it oscillates the stop 29, thus throwing the contact-levers 33 and 34 into engagement with the back contacts 42 and closing the circuit from ground at central over both limbs of the circuit to ground at the subscriber's station. As the counters return under the action of the spring 26 they will, through their cam projections, vibrate the contact-levers and open the circuit a number of times corresponding to the number of cam projections intervening between the initial position and the long tooth 40′ of each tumbler, which long tooth 40′ will, as hereinbefore described, throw the contact-levers permanently out of circuit. The counters 55 and 56 at central will accordingly be stepped forward one step for each interruption of the line controlling them, respectively, and at the end of the reading will of course correspond in positions to the positions of the two counters at the subscriber's station.

In order to guard against the registers being manipulated either accidentally or purposely in such manner as to destroy the record thereon, I have provided means whereby the movement of the lever 11 to record a tally operates to lock the reading mechanism, so that the latter cannot be moved until the lever is returned to its normal position. To this end a gear 58 is rigidly mounted upon the shaft 32 and arranged to intermesh with a second

gear 59, mounted upon a suitable stub-shaft 60, seated in the partition member 12 of the casing. The gear 59 is rigidly connected with a disk 61 of larger diameter and in the periphery thereof is formed a notch 62, the remainder of the periphery being interrupted. Upon the under side of the lever 11 is arranged a lug or projection 63, formed to extend concentric with the pivotal axis 13 of the said lever and so shaped as to enter the notch 62 of the disk 61 when said disk stands in its normal position. The free end of the lug 63 normally stands just clear of the periphery of the disk, so that as soon as the lever begins to descend it begins to enter the notch 62, and accordingly locks the disk and with it the gears 59 and 58 and shaft 32 against rotation. Accordingly it is impossible to move the lever 11 downwardly, so as to engage the ratchet 10 except when the shaft 32 and connected gears stand in their normal position, and, vice versa, it is impossible to rotate the shaft 32 when the lever has been moved out of its normal position.

In using this system no readings are taken of the counters representing the units and thousands orders. The readings taken from time to time are written down in regular order, treating the number always as though it stood at an even 10—that is to say, the tallies represented on the units-counter are ignored, it being obvious that whatever units are thus ignored at one reading will appear in the next succeeding reading. As to the thousands-counter, this is provided chiefly for the convenience of the subscriber, since it will be obvious that no reading of this is ever transmitted to the receiving-station. This fact, however, is of little importance, since the operator can readily determine the number of thousands at any time by simply footing the aggregate of the readings which have been taken. The comparatively slight inconvenience of performing this footing is tolerated in order to secure the utmost simplicity of construction and certainty of operation.

While I have herein shown and described what I deem to be the best embodiment of my invention, yet it will be understood that the details of construction and arrangement may be modified without departing from the invention, and I do not, therefore, limit myself to these details except to the extent that they are made the subject of specific claims.

I claim as my invention—

1. In an electric recorder system, a register comprising a revoluble counter provided with a series of contact devices arranged concentric with its axis of rotation, means for registering thereon by units-tallies, means for taking and transmitting a reading of said counter comprising a transmitter mechanism located adjacent to the concentric contact devices, an electric circuit connected with, and controlled by said transmitter mechanism, means for shifting the transmitter mechanism and counter member relatively to each other whereby the transmitter mechanism is caused to perform a complete relative revolution around the counter member, a tactual reading of the counter thereby taken and the parts returned to the positions occupied before the taking of the reading, and means for throwing the transmitter out of functional operation when it passes the zero position of the counter.

2. In an electric recorder system, a registering device comprising a train of revoluble denominational counters, each provided with a series of contact devices arranged concentric with their axis of rotation, means for registering thereon by units-tallies, means for taking and transmitting a tactual reading of said counters comprising a transmitter mechanism located adjacent to the concentric contact devices of the counters, an electric circuit connected with, and controlled by, said transmitter mechanism, mechanism for rotating the counters together and without disturbing their relation to each other, and means operating to automatically interrupt the tactual reading coincidently with the passing of the zero position of each counter past the transmitter mechanism.

3. In an electric recorder system, a registering device comprising a train of revoluble denominational counters each provided with a series of contact devices concentric with its axis of rotation, transfer mechanism for operating the counter members of higher denominations from the units-counter, means for rotating the train of counters as a whole through an exact revolution and without disturbing their relations to each other, independently-operable vibratory contact devices arranged adjacent to the paths of movement of the respective series of concentric contact devices of the counters, electric circuits controlled by said vibratory contact devices and a tappet member connected with each counter and arranged to throw the corresponding vibratory contact device out of functional operation as the counter is rotated past its angular position corresponding to zero.

4. In an electric recorder system, a registering device comprising a train of revoluble denominational counters each provided with a series of contact devices concentric with its axis of rotation and comprising a single contact device for each digit position on the counter, means for registering upon said train of counters by units-tallies, transfer mechanism for operating the counter members of higher denominations from the units-counter, means for rotating the train of counters as a whole through an exact revolution and without disturbing their relations to each other, independently-operable vibratory contact devices arranged adjacent to the paths of movement

of the respective series of concentric contact devices of the counters, electric circuits controlled by said vibratory contact devices and a tappet member connected with each counter and arranged to throw the corresponding vibratory contact device out of functional operation as the counter is rotated past its angular position corresponding to zero.

5. In an electric recorder system, a registering device comprising a train of revoluble denominational counters each provided with a circumferential series of contact devices, means for registering thereon by units-tallies, transfer mechanism for operating the counter members of higher denominations from the units-counter, a shaft operatively connected with the counter members to rotate the entire train through an exact revolution and without disturbing their relations to each other, a stop arranged to arrest the rotation of the counters when they have been moved through an exact revolution, independently-operable vibratory contact devices arranged to coöperate with the contact devices of the several counters during the rotation of the same, means for throwing said vibratory contact devices into operative position, electric circuits controlled by the said vibratory contact devices, and means operating to automatically throw each vibratory contact device out of functional operation as the corresponding counter is rotated past its angular position corresponding to zero.

6. In an electric recorder system, a registering device comprising a main shaft, a train of revoluble denominational counters mounted upon said main shaft, means yieldably connecting said counters with the main shaft so that they may be rotated as a unit group therewith, means for registering upon the units-counter by units-tallies, transfer mechanism for operating the counter members of higher denominations from the units-counter, a hand-crank operatively connected with the main shaft, a stop coöperating with said crank to arrest the latter at either limit of a complete revolution, contact-levers arranged to coöperate with the contact devices of the counters, electric circuits controlled by said contact-levers, and means actuated by said crank for throwing said contact-levers into and out of operative position.

7. In an electric recorder system, the combination of a revoluble counter member, a circumferential series of contact projections, one for each digit position of the counter, a vibratory lever mounted adjacent to the contact projections of the counter and adapted to cooperate therewith, a spring arranged to yieldably hold said contact-lever both in and out of operative position, a tappet member upon said counter arranged to throw said contact-lever out of operative position at one point in the revolution of the counter, means for registering tallies upon the counters, means for rotating the counter bodily through a complete revolution in one continuous movement, a back-contact device coöperating with the contact-lever, and an electric circuit controlled by said contact-lever through the back-contact device.

8. In an electric recorder system for telephones, the combination with two telephone line-wires, of a registering device comprising a denominational counter for each line-wire, means for registering units-tallies thereon, transfer mechanism for actuating one counter member from the other, a transmitter mechanism, and means for taking a reading of each counter member and transmitting it over the corresponding line-wire through said transmitter mechanism.

9. In an electric recorder system for telephones, the combination with the two main-line wires of a telephone-circuit, of a denominational counter corresponding to the second order of numerals, a denominational counter corresponding to the third order of numerals, a units-counter, means for registering units-tallies upon the units-counter, transfer mechanism for actuating the two counters of higher order from said units-counter, said two counters of higher order being each provided with circumferentially-disposed contact devices, a tactual contact device arranged to coöperate with each of said counters of higher order, and severally arranged to control circuits over the respective main-line wires, means for rotating the train of counters as a whole through an exact revolution without disturbing their relations to each other, and tappets upon each of the two counters of higher order operating to respectively throw their coöperating tactual contact devices out of functional operation as the respective counters are rotated past angular positions corresponding to zero.

10. In an electric recorder system for telephones, the combination with two main-line wires, of a registering device comprising two counter members and coöperating transmitter devices connected in circuit with the respective main lines, means for effecting a relative movement of the counters and corresponding transmitter devices to take a tactual reading of the positions of the counters and transmit such reading over the main lines, and independently-operable responsive devices connected in circuit with said main lines at a receiving-station remote from the meter-station.

11. In an electric recorder system for telephones, the combination with two main-line wires, of a registering device comprising two counter members and coöperating transmitter devices connected in circuit with the respective main lines, means for effecting a relative movement of the counters and corresponding transmitter devices to take a tactual reading of the positions of the counters and transmit such reading over the main lines, and inde-

pendently-operable responsive devices connected in circuit with said main lines at a receiving-station remote from the meter-station, said main-line wires being connected together at the receiving-station at a point electrically beyond said responsive devices, a battery arranged in each main line, and a ground connection at the receiving-station leading from a point between the batteries.

12. In an electric recorder system, a registering device comprising a casing, a main shaft arranged therein, a train of denominational counters loosely journaled on said main shaft, a friction-clutch connected with the main shaft and operatively engaging the train of counters to rotate the latter with the main shaft, a ratchet operatively connected with the units-counter, an operating-lever arranged to engage and actuate said ratchet, a rock-shaft arranged adjacent to the peripheries of the counters, a pair of contact-levers loosely mounted on said rock-shaft each in transverse register with one of the counters, a circumferential series of cam projections on each of the two counters opposite said contact-levers, an arm rigid with said rock-shaft, and underlying at its free end the two contact-levers, a vibratory stop rigidly connected with the end of said rock-shaft at a point outside of said casing, a crank upon said main shaft adapted to engage and move said vibratory stop, fixed stops limiting the extent of vibration of the vibratory stop in each direction, an electrical back contact adapted to coöperate with each contact-lever, a spring tending to hold each contact-lever in either of two positions, either yieldably engaged with the back-contact device or yieldably free from contact with the latter, and a tappet projection adapted to cooperate with each contact-lever.

13. In an electric recorder system, a registering device comprising a casing, a main shaft arranged therein, a train of denominational counters loosely journaled on said main shaft, a friction-clutch connected with the main shaft and operatively engaging the train of counters to rotate the latter with the main shaft, a ratchet operatively connected with the units-counter, an operating-lever arranged to engage and actuate said ratchet, a rock-shaft arranged adjacent to the peripheries of the counters, a pair of contact-levers loosely mounted on said rock-shaft each in transverse register with one of the counters, a circumferential series of cam projections on each of the two counters opposite said contact-levers, an arm rigid with said rock-shaft, and underlying at its free end the two contact-levers, a vibratory stop rigidly connected with the end of said rock-shaft at a point outside of said casing, a crank upon said main shaft adapted to engage and move said vibratory stop, fixed stops limiting the extent of vibration of the vibratory stop in each direction, an electrical back contact adapted to coöperate with each contact-lever, a spring tending to hold each contact-lever in either of two positions, either yieldably engaged with the back-contact device or yieldably free from contact with the latter, a tappet projection adapted to coöperate with each contact-lever, and a motor-spring operatively connected with the main shaft and arranged to automatically return the latter to its normal position after it has been rotated through one revolution by the crank.

14. In an electric recorder system, a registering device comprising a casing, a main shaft arranged therein, a train of denominational counters loosely journaled on said main shaft, a friction-clutch connected with the main shaft and operatively engaging the train of counters to rotate the latter with the main shaft, a ratchet operatively connected with the units-counter, an operating-lever arranged to engage and actuate said ratchet, a rock-shaft arranged adjacent to the peripheries of the counters, a pair of contact-levers loosely mounted on said rock-shaft each in transverse register with one of the counters, a circumferential series of cam projections on each of the two counters opposite said contact-levers, an arm rigid with said rock-shaft, and underlying at its free end the two contact-levers, a vibratory stop rigidly connected with the end of said rock-shaft at a point outside of said casing, a crank upon said main shaft adapted to engage and move said vibratory stop, fixed stops limiting the extent of vibration of the vibratory stop in each direction, an electrical back contact adapted to coöperate with each contact-lever, a spring tending to hold each contact-lever in either of two positions, either yieldably engaged with the back-contact device or yieldably free from contact with the latter, a tappet projection adapted to coöperate with each contact-lever, and a stop operating automatically to lock the actuating-lever against movement when the crank and connected parts are moved out of normal position.

15. In an electric recorder system, a registering device comprising a revoluble counter member provided with a circumferential series of rounded cam projections and intervening recesses, one of said cam projections being extended radially to form a tappet, an angle-lever pivoted at its angle and having upon one arm a cam-surface adapted to engage said circumferential series of cam projections, a V-spring operatively engaging the end of the other arm of said angle-lever and arranged to hold it either yieldingly in engagement with the counter or entirely free therefrom, a relatively fixed back-contact device against which said spring tends to force the lever when the latter is in operative engagement with the counter, means for stepping said counter forward to register thereon,

means for rotating the counter through a complete revolution in a continuous forward movement to effect a reading, a spring arranged to return the counter to the position it occupied before the taking of the reading, and an electric circuit controlled by said angle-lever and back contact, said tappet being constructed and arranged to throw the angle-lever past the center of bearing of the spring thereon and out of functional engagement when the tappet engages and passes said lever.

LOUIS A. SCHMIDT.

Witnesses:
ALBERT H. GRAVES,
FREDERICK C. GOODWIN.