March 14, 1944. H. F. MAY ET AL 2,343,989

REGISTERING SYSTEM

Filed May 31, 1940 7 Sheets-Sheet 1

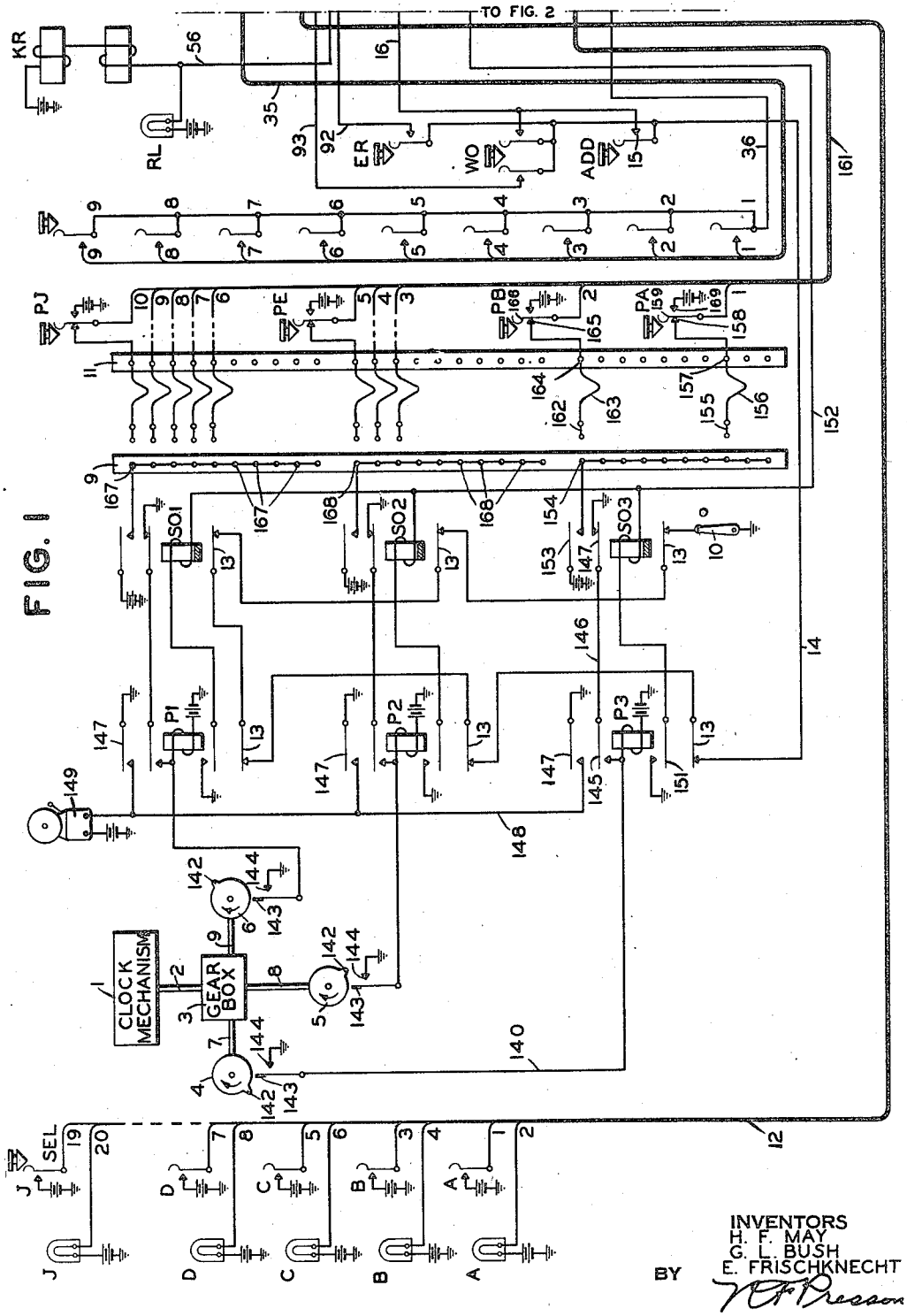


FIG. 1

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REGISTERING SYSTEM

Filed May 31, 1940 7 Sheets-Sheet 2

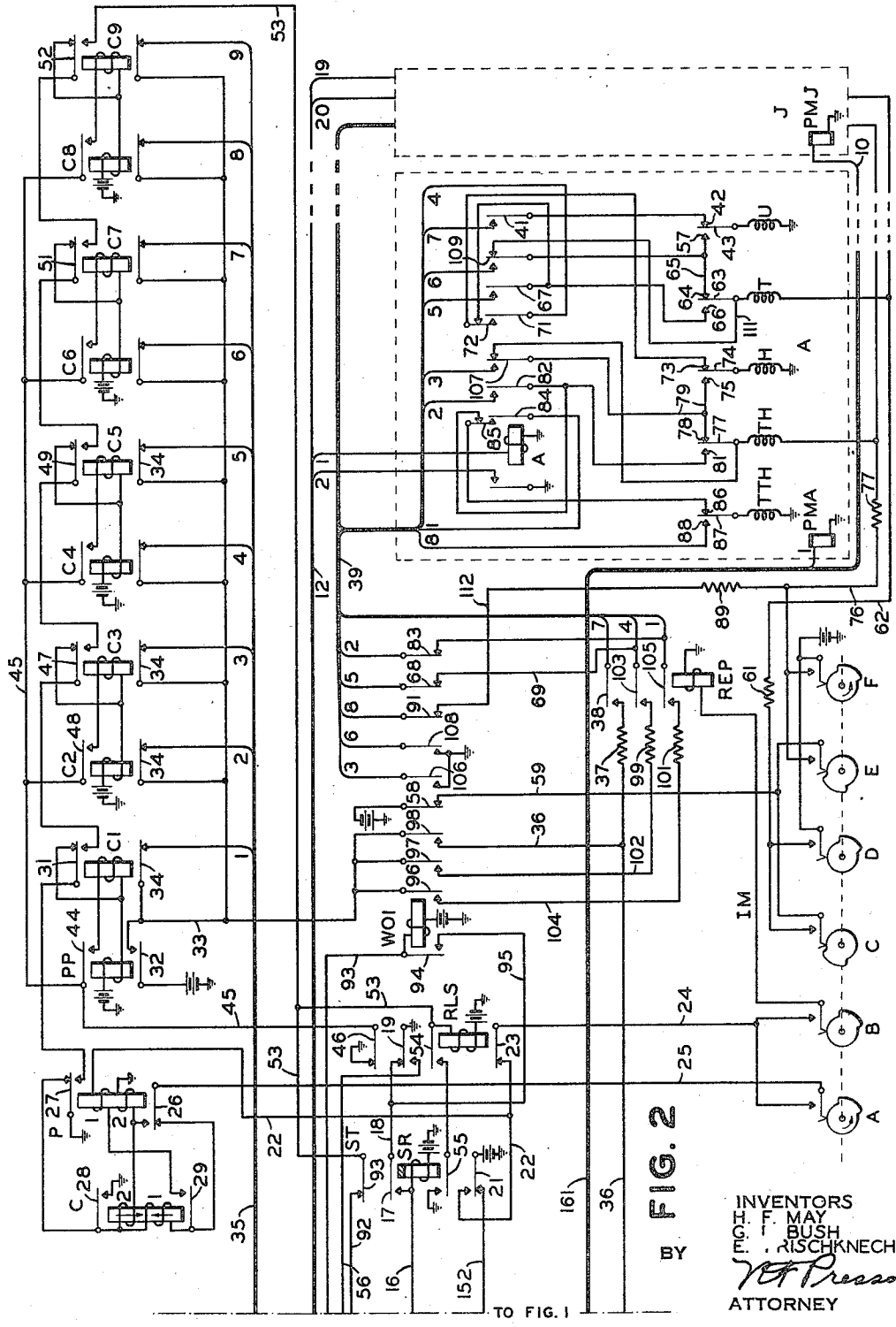


FIG. 2

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REGISTERING SYSTEM

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FIG. 3

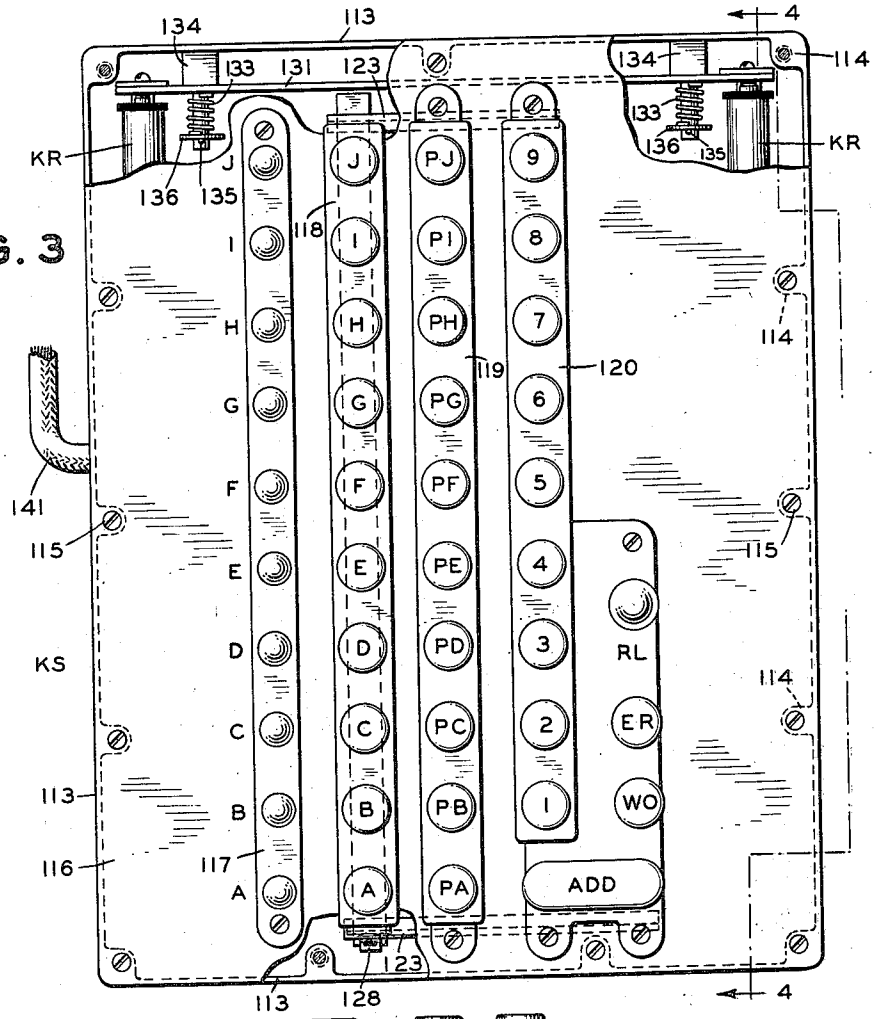
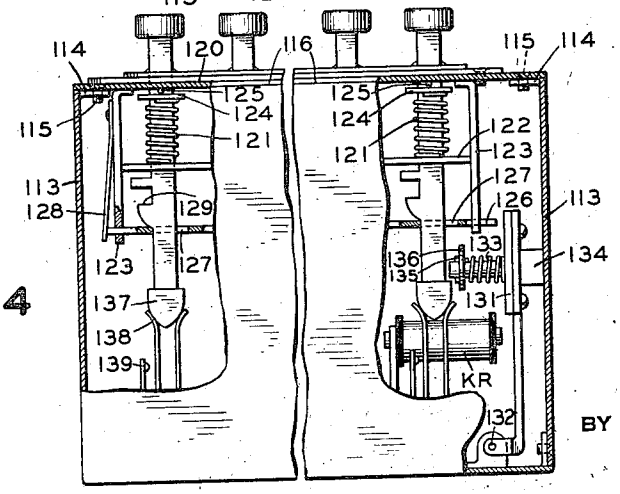


FIG. 4



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REGISTERING SYSTEM

Filed May 31, 1940 7 Sheets-Sheet 4

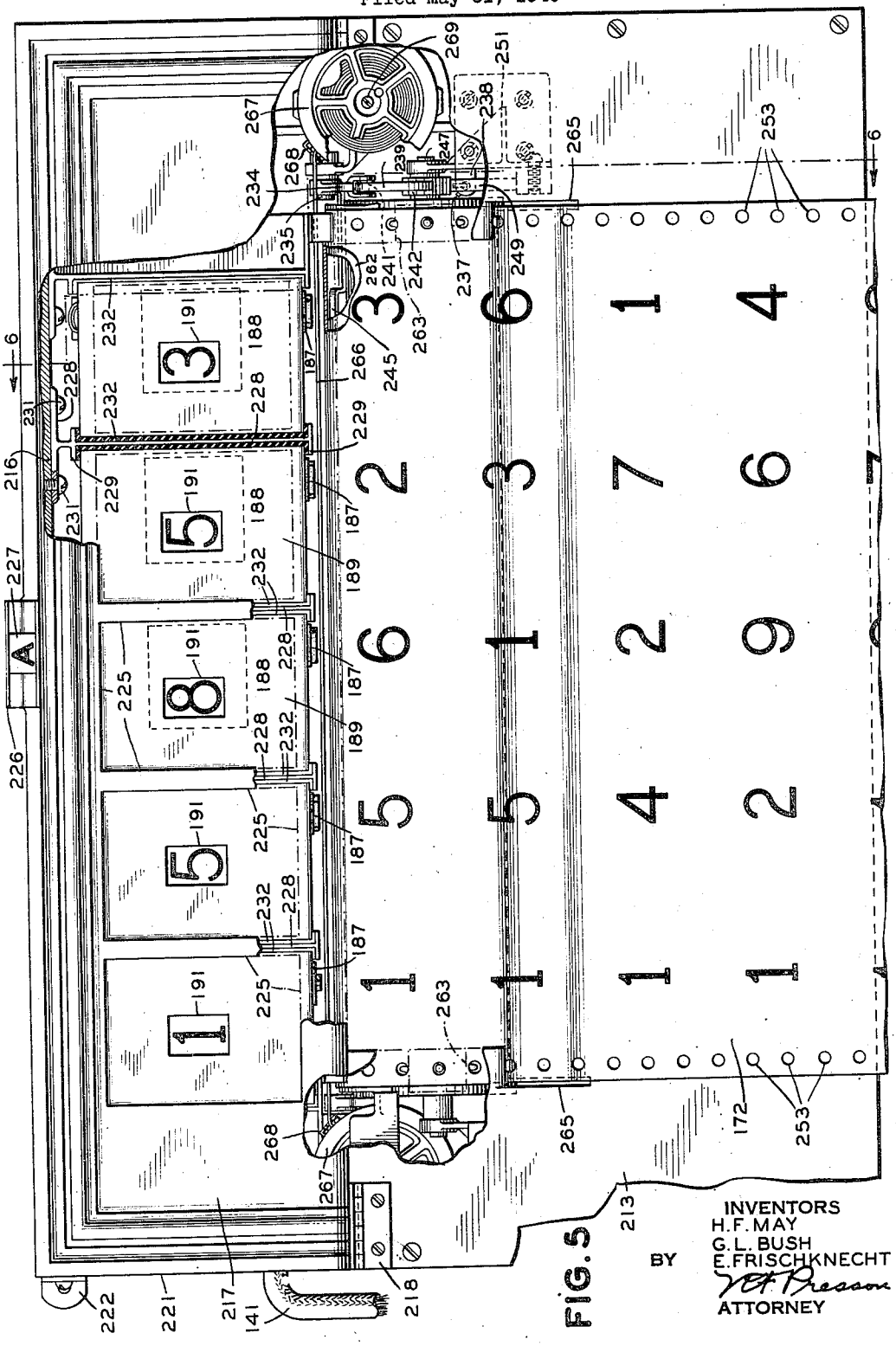


FIG. 5

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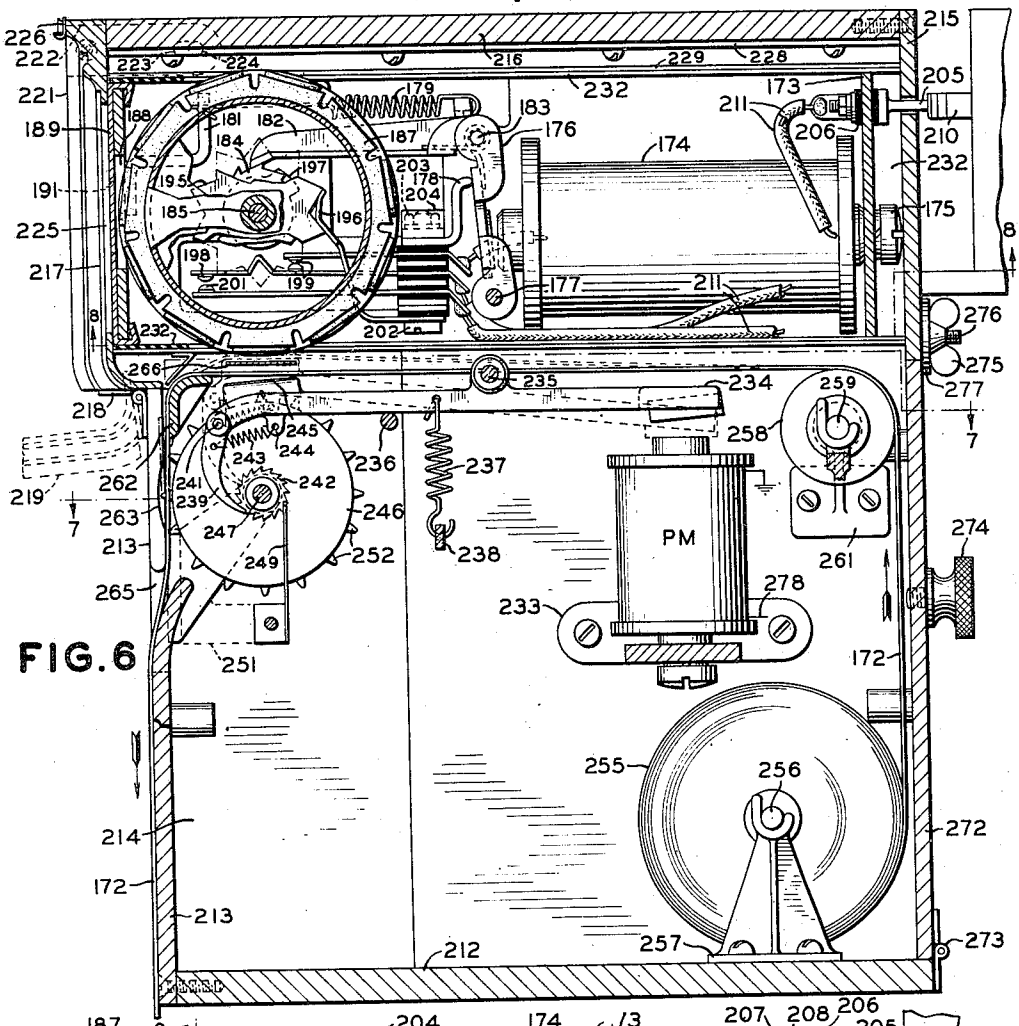


FIG. 6

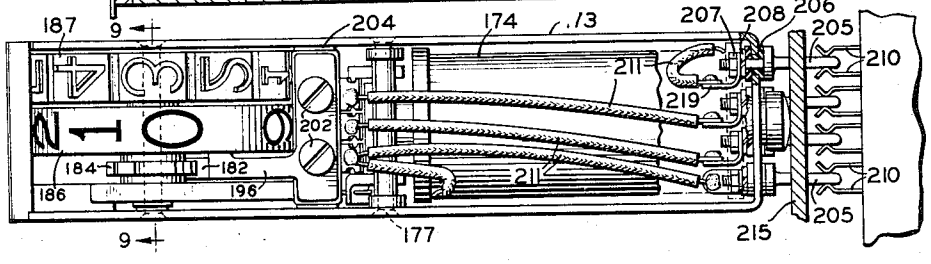


FIG. 8

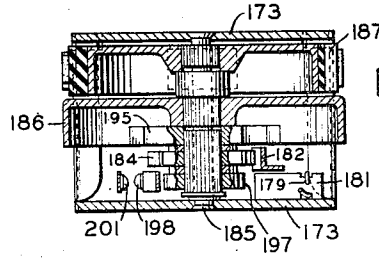


FIG. 9

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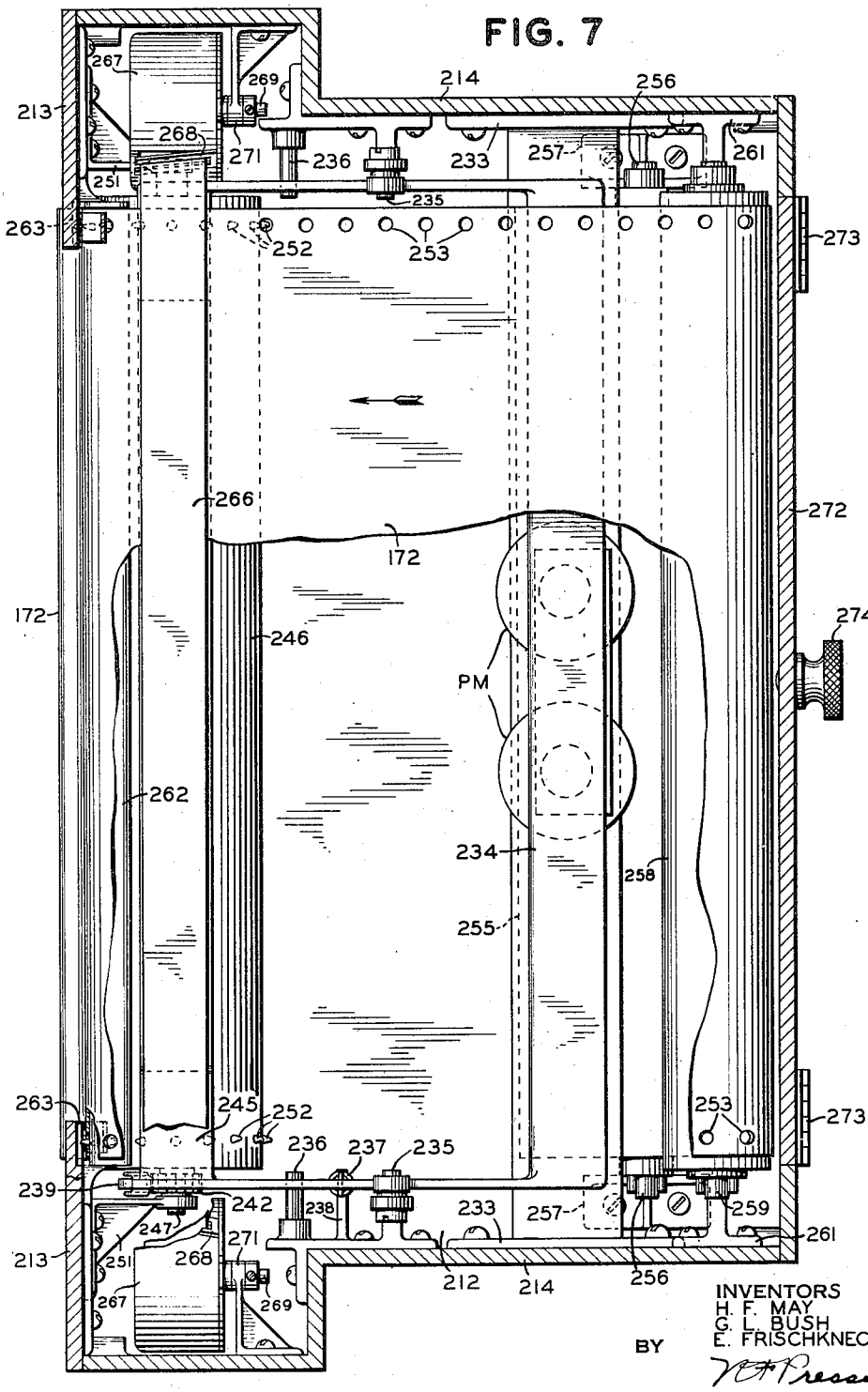
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FIG. 7



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REGISTERING SYSTEM

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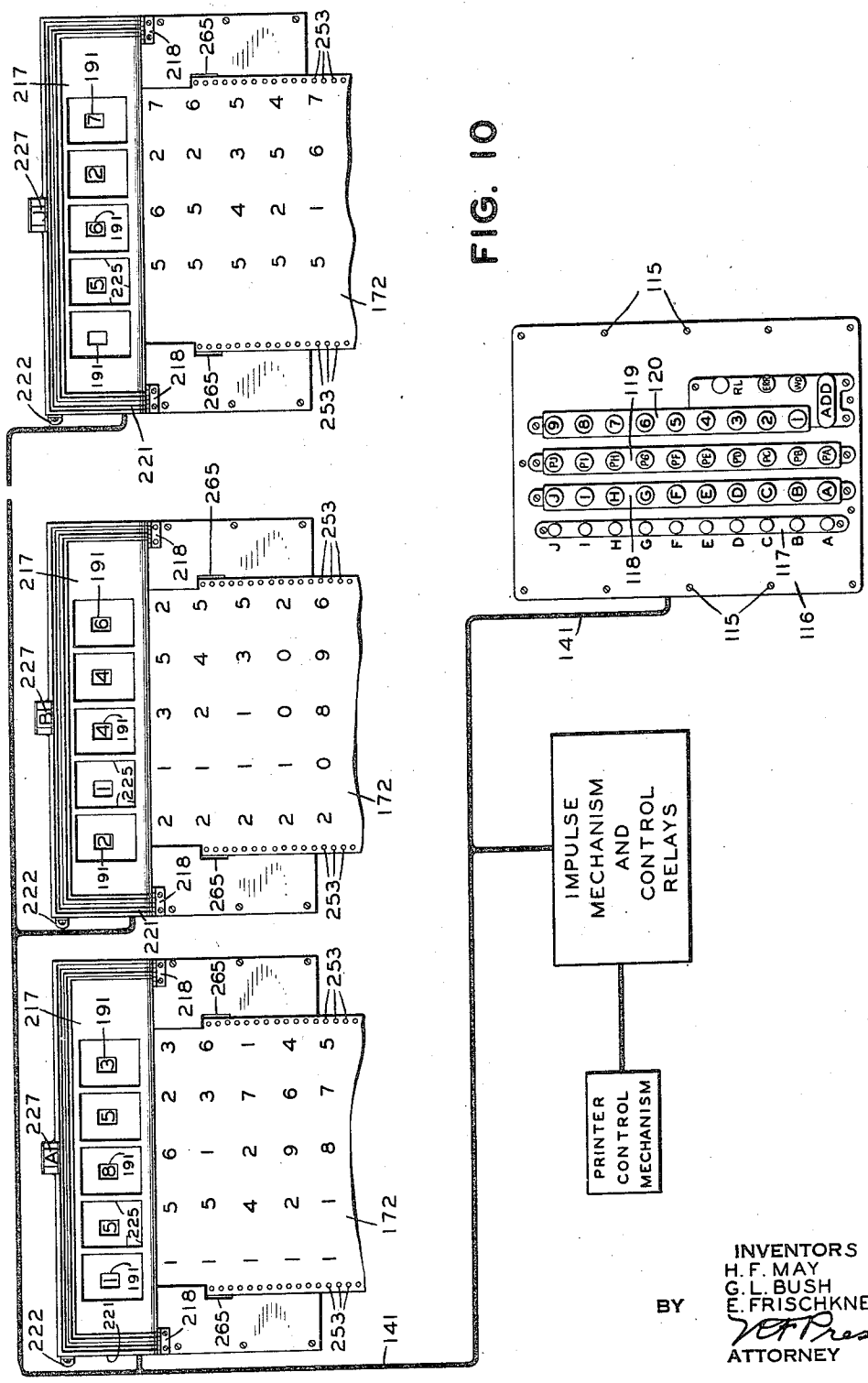


FIG. 10

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Patented Mar. 14, 1944 2,343,989

UNITED STATES PATENT OFFICE

2,343,989

REGISTERING SYSTEM

Harold F. May, Valley Stream, George L. Bush, Flushing, and Ernest Frischknecht, Jackson Heights, N. Y., assignors to The Teleregister Corporation, New York, N. Y., a corporation of Delaware

Application May 31, 1940, Serial No. 338,070

5 Claims. (Cl. 235—92)

This invention relates to a registering system and more particularly to a system for registering and recording information such as the amount of vehicular traffic along a highway at a toll station, the items of production in a manufacturing plant, the number of bets at sports events such as racing events and the like, wherein the total number of items of operations of different classes is automatically totaled, posted and recorded in tabular form.

An object of this invention is to provide an improved system of the character described, wherein messages originating at a main station are transmitted selectively to a plurality of receiving devices and posted by the receiving devices in accordance with the combined values of the messages received and the messages previously posted by the devices, the receiving devices including means for recording the total values posted by the devices at predetermined intervals of time.

In general this system provides an arrangement whereby an operator at a station, for example, a toll station, depresses the keys of his keyset thereby effecting registration of the total amount of vehicular traffic controlled by his station, the totalizing operation of the system being accomplished automatically by the keyset operation. The system also provides a printed record of the total amount of vehicular traffic of different classes at predetermined intervals of time, the printing operation being controlled by circuit closing mechanism operable at periodic intervals of time or by the operator as desired. When employed as a registering system at a sports event as, for example, a racing event wherein bets are placed on the various contestants in the race, the keyset may be stationed at the betting office and operated as each bet is received, thereby causing a group of associated registers of different classes to operate and display the total bets placed in regard to each of the classes. The total amount of betting displayed on each of the registers is recorded at predetermined intervals and means are provided for preventing a change in the settings of the registers after the race has started. When applied to the production of a manufacturing plant, for example, the system enables an operator to register the different items of production in accordance with the completion of the different stages in the process of manufacture of the items, and of the items as completed, whereby total amounts are registered according to different classifications and a printed record is made of these amounts at predetermined intervals of time.

Another of the objects of this invention is the provision of improved means for transmitting signals representative of the value of a number and causing this number to be combined with the number previously posted by a selected device, and the sum of these numbers to be automatically posted by the device.

A further object resides in the arrangement of simplified apparatus and circuits therefor for causing a number set up at a transmitting station to be combined with a number posted by an indicating device and the combined number to be posted by the indicating device by impulses controlled from the transmitting station.

A further object of the invention is the provision of a system for automatically adding numerical values set up at a transmitting station and posting the results of such addition on a selected indicating device and sending a signal back to the transmitting station as each sum is posted.

A still further object of the invention resides in the provision of a plurality of devices for recording values of items, classified according to one of the characteristics of the item, at different periodical intervals and means operable at will for changing the periodicity of the information recorded by any of the recording devices.

Still another object is a system of the character disclosed having means whereby indicators of a conventional construction heretofore extensively employed in stock quotation systems, and which have a greater number of display positions than those required for posting the information transmitted in the present system, may be employed, thereby enabling such indicators to be used in the present system and obviating the necessity of providing special indicators for this purpose.

With these and other objects in view, which will become apparent from the following description of one illustrative embodiment of the invention shown in the accompanying drawings, the invention resides in the novel system, elements of construction, devices and combination of parts in cooperative relationship, as hereinafter more particularly pointed out in the claims.

In the drawings:

Fig. 1 shows, in diagrammatic form, certain transmitting and printer control apparatus suitable for use with the system,

Fig. 2 shows, in diagrammatic form, the posting and recording devices and control apparatus therefor adapted to be controlled by the apparatus of Fig. 1,

Fig. 3 is a view, partly broken away, of the keyset of Fig. 1,

Fig. 4 is a view in elevation, partly broken away, of the keyset of Fig. 3 taken along the line 4—4 of Fig. 3,

Fig. 5 is a front view of one of the recorder devices of Fig. 2,

Fig. 6 is a view in section taken along the line 6—6 of Fig. 5,

Fig. 7 is a view in section taken along the line 7—7 of Fig. 6,

Fig. 8 is a view in section taken along the line 8—8 of Fig. 6,

Fig. 9 is a view partly in section taken along the line 9—9 of Fig. 8, and

Fig. 10 is a view, in diagrammatic form, of the entire system.

The operation of the system will best be understood by reference to Figs. 1 and 2 of the drawings on which is shown, in diagrammatic form, the entire system. Referring specifically to Fig. 1, there is shown thereon a group of selection keys and associated signal lamps designated A to J for selecting for operation the register recorder units A to J of Fig. 2. The group of digit keys, Fig. 1, designated 1 to 9 is employed to cause the selected register of Fig. 2 to post a number of higher denominational value than the number previously posted by the device by an amount corresponding to the value of the number represented by the operated digit key. The key designated ADD is employed to set the receiving apparatus of Fig. 2 into operation to add the number represented by the operated digit key to the number posted by the indicator register selected by the operated selection key and post the arithmetical sum of these numbers on the selected register. The row of keys designated PA to PJ is employed for actuating the print magnets PMA to PMJ of the recorder units of Fig. 2 thereby selectively printing in tabular form the information posted by the recorders. The key designated WO is employed to wipe out the settings of the indicator registers and restore them to their normal or zero positions. The key designated ER, when depressed, causes the operation of the release magnet RLS of Fig. 2 thereby restoring the indicator control equipment of Fig. 2 to its normal position. The selection keys and digit keys of the keyset remain in their operated positions until released by the key release magnet KR.

There is also shown on Fig. 1 a clock mechanism 1 connected by a shaft 2 to a gear box 3 for actuating the cams 4, 5 and 6 by means of the shafts 7, 8 and 9 respectively at different rates of speed, according to the gear ratios employed within the gear box, the cam 4, for example, making one revolution an hour, the cam 5 two revolutions and the cam 6 four revolutions an hour. These cams are employed to control the operation of relays P1, P2 and P3 thereby controlling the operation of relays SO1, SO2 and SO3 respectively in accordance with the released condition of the indicator control apparatus of Fig. 2 to cause the indicators of Fig. 2 to record their settings periodically at predetermined intervals of time. There is also shown a plug and jack arrangement comprising the jack strip 9 and a plurality of plugs and flexible conductors connected to the terminal strip 11 for changing at will the periodicity of operation of the printing mechanism of each of the recording devices.

Referring now to Fig. 2 there is shown thereon an impulse machine IM having a plurality of contact closing elements actuated by the cams A to F for generating control impulses and indicator actuating impulses. A start relay SR is provided with means for applying battery to the contacts of cams A and B when a start signal has been received, thereby actuating the counting chain comprising relays C, P, PP, and relays C1 to C9. A release relay RLS is provided for restoring the control equipment of Fig. 2 to normal when the counting chain has completed its cycle of operation. A pulse repeating relay REP has one end of its winding connected to ground and the other end of its winding connected to the circuit closing elements of cam B and is employed to repeat the indicator operating impulses generated by cam B of the impulse machine. A wipe out relay designated WO1 is provided for controlling certain circuits whereby the indicators are restored to their normal or zero positions.

A plurality of register indicators each comprising five indicator units designated TTH, TH, H, T and U is employed for displaying and recording the digits of the numbers posted by the indicators. Each indicator mechanism comprises a plurality of indicating drums having typewheels associated therewith and a printing mechanism including a print magnet, such as the print magnet PMA for the indicator A, for printing the numerical values of the numbers posted by the indicator and set up on the type wheels. Each indicator register has a selection relay associated therewith controlled by the selection keys of the keyset such, for example, as the relay A associated with the indicator A, for selecting the indicator for operation to a new setting.

The indicator may be of any well known construction suitable for the purpose, such, for example, as the type disclosed in Patent No. 2,189,581, granted February 6, 1940, to Raymond M. Hicks and Merton L. Haselton for Indicating device, or an indicator of the type disclosed in patent to M. L. Haselton, No. 2,049,499, granted August 4, 1936, may be employed with the system of the present invention. Each of the indicators comprises a rotatable drum settable to eleven positions for displaying the indicia 0, 1 to 9 and having a blank position intermediate the digits 9 and 0. The indicator includes a switching mechanism operable as the drum moves from position 9 to the blank position to connect the winding of the indicator operating magnet to a first contact closing element and switch the end of the winding of the operating magnet to a second contact closing element as the indicator drum is advanced from the blank position to position 0. The electrical connection to the various switching elements and the operating coils of the indicators are shown on Fig. 2.

Now let it be assumed, by way of example, that the register indicator A has the number 15853 set up thereon and the operator desires to add the digit 1 to this number. The manner in which this is accomplished will now be described.

The operator depresses the selection key A, digit key 1 and key ADD of his keyset. Keys A and 1, it will be recalled, remain in their operated position until released by the key release magnet KR. Key ADD, however, does not lock but releases when the operating pressure has been removed therefrom by the operator. The operation of key A applies ground battery by way of conductor 1 of cable 12 to the winding of the relay A and thence to ground, thereby causing relay A to operate and select the register indicator A for operation.

With the switch 10 in closed position, the operation of key ADD closes a circuit from ground at break contact and armature 13 of relay SO3 from whence the circuit is continued by way of break contacts and armatures of relays SO2, SO1, P1, P2 and P3, conductor 14, contacts 15 of key ADD, conductor 16, winding of start relay SR and thence to battery, and ground, thereby causing relay SR to operate and lock by way of its make contact and armature 17, conductor 18, break contact and armature 19 of relay RLS to ground.

The operation of relay SR at its armature 21 and make contact thereof applies battery by way of conductor 22, break contact and armature 23 of relay RLS and conductor 24 to the contacts associated with cams A and B of the impulse machine. When cam A closes its contact, battery is applied by way of conductor 25, armature 26 and break contact of relay P, winding 1 of relay C and thence to ground at the break contact and armature 27 of relay P, thereby causing relay C to operate and lock by way of its armature 28 and make contact to ground. The operation of relay C at its armature 29 and make contact thereof applies battery to one end of winding 1 of relay P. Relay P, however, does not operate as battery is applied by way of armature 21 and make contact of relay SR, and conductor 22 to the other end of the winding 1 of relay P. When the impulse contacts of cam A open, battery is removed from conductor 25, and ground at armature 28 of relay C is extended by way of winding 1 of relay C and armature 29 and make contact thereof, winding 1 of relay P and thence to battery on conductor 22 thereby causing relay P to operate in series with relay C. The contacts associated with cam B of the impulse machine are closed immediately following the operation of the contacts of cam A, thereby applying battery to the repeating relay REP and causing it to operate each time the B contacts are in closed position.

The operation of relay P at its armature 27 applies ground by way of its make contact, armature 31 and break contact of relay C1, winding of relay PP and thence to battery, thereby causing relay PP to operate and at its armature 32 and make contact thereof apply battery to conductor 33 extending to the armatures 34 of relays C1 to C9 and to armatures 96, 97 and 98 of relay WO1.

When cam A causes its contacts to be closed during the second revolution of the cam, battery is applied by way of conductor 25, armature 26 and make contact of relay P to the winding 2 of relay C from whence the circuit is continued by way of armature 28 and make contact of relay C to ground thereby setting up a flux within the core of the magnet of relay C in opposition to the flux set up by the operating winding 1 thereof and causing relay C to release. Relay P, however, remains operated by battery at armature 26 and make contact of relay P, causing the energization of its locking winding 2.

The operation of relay REP in response to the second closure of cam B completes a circuit from battery at armature 32 and make contact of relay PP, conductor 33, armature 34 and break contact of relay C1, conductor 1 of cable 35, contacts of digit key 1, conductor 36, resistance 37, make contact and armature 38 of relay REP, conductor 1 of cable 39, make contact and armature 41 of relay A, contacts 42 and 43 and winding of indicator U and thence to ground, thereby causing indicator U to operate. As contacts at cam B are disengaged, relay REP releases and at its armature 38 interrupts the circuit to the winding of indicator U thereby causing indicator U to release and advance the indicating drum and typewheel thereof to position 4.

When the contacts of cam A open, battery is removed from conductor 25 and relay P releases. The release of relay P at its armature 27 removes ground from one end of the winding of relay C1, thereby causing relay C1 to operate in series with the winding of relay PP over the following circuit: battery, winding of relay PP, winding of relay C1, make contact and armature 44 of relay PP, conductor 45, armature 46 and break contact of relay RLS and thence to ground. The operation of relay C1 at its armature 34 interrupts the operating circuit for the indicator U thereby causing the indicator U to remain set in position to display and print the digit 4 and be unresponsive to additional operations of relay REP during subsequent revolutions of the cam B.

The closure of cam A during the next succeeding revolution of the cam applies battery by way of conductor 25, armature 26 and break contact of relay P, winding 1 of relay C, break contact and armature 27 of relay P to ground, thereby causing relay C to operate. When the contacts of cam A open battery is removed from conductor 25 thereby causing relay P to operate in series with relay C. The operation of relay P at its armature 27 and make contact thereof applies ground by way of armature 31 and make contact of relay C1, armature 47 and break contact of relay C3 to the winding of relay C2, thereby causing relay C2 to operate and at its armature 34 remove battery from conductor 2 of cable 35 extending to the contacts of the digit key 2. Relay C2 locks by way of its make contact and armature 48, conductor 45, armature 46 and break contact of relay RLS to ground.

Relay C3 does not operate at this time for the reason that ground is applied to both ends of its winding by armature 27 of relay P and armature 46 of relay RLS respectively.

When the contacts of cam A close again during the fourth revolution of the impulse machine, battery is applied by way of conductor 25, armature 26 and make contact of relay P to winding 2 of relay C, thereby causing relay C to release, relay P remaining operated by current flowing through its winding 2. When cam contacts A open, battery is removed from armature 26 of relay P, thereby interrupting the flow of current through its winding 2 and causing relay P to release. The release of relay P removes ground from armature 47 of relay C3 thereby causing relay C3 to operate in series with relay C2 to ground at armature 46 of relay RLS.

In a similar manner relays C and P are caused to operate and release successively during the fifth, sixth, seventh, eighth, ninth and tenth revolutions of the impulse machine thereby operating the relays C4 to C9 in succession, all of the relays PP and C1 to C9 locking to ground at armature 46 and break contact of relay RLS. The operation of relay REP during these revolutions of the cam B is without effect for the reason that the circuits including armature 34 and break contacts of these relays are open at the contacts of the associated digit keys of the keyset.

The closure of cam A during the eleventh revolution of the impulse machine causes relay C to operate and close a circuit to winding 1 of relay P. When cam A opens, relay P operates in

series with relay C and applies ground by way of its armature 27 and make contact thereof, armature 31 and make contact of relay C1, armature 47 and make contact of relay C3, armature 49 and make contact of relay C5, armature 51 and make contact of relay C7, armature 52 and make contact of relay C9, conductor 53 and thence to the winding of relay RLS, causing relay RLS to operate and lock by way of its armature 54 and make contact, armature 55 and make contact of relay SR to ground. The operation of relay RLS at its armature 46 removes ground from conductor 45 thereby releasing relays PP and C1 to C9 The operation of relay RLS applies ground at its armature 19 and make contacts thereof to conductor 56 extending to the key release magnet KR of the keyset and to the lamp RL thereby operating the key release magnet and causing the selection key A and the digit key 1 of the keyset to release The lamp RL thus provides a signal that the keyset and associated equipment has been released.

The release of the selection key A removes battery from conductor 1 of cable 12 thereby releasing relay A and extinguishing the lamp A. As armature 19 of relay RLS moves out of engagement with its break contact, ground is removed from conductor 18 thereby causing relay SR to release. When relay SR releases, ground is removed from its armature 55 thereby interrupting the locking circuit of relay RLS. With relay SR in a released condition and relay P released at the termination of the twelfth impulse from cam A, relay RLS releases and removes ground from conductor 56 thereby releasing the key release magnet KR and extinguishing the lamp RL. The number 15853 previously posted by the indicator recorder A has been combined with the digit 1 set up on the keyset and the number 15854 is now posted by the indicator recorder A.

In a similar manner any digit may be combined with the number posted by any of the indicator recording devices by a single keyset operation and the sum of the numbers is automatically posted by the selected device, the relay counting mechanism operating meanwhile to interrupt the impulse operating circuit to the selected device when sufficient impulses have been transmitted thereto to step the indicator mechanism ahead by an amount corresponding to the numerical value of the digit key operated.

Description of the carry-over feature

As is well known in the art of adding numbers, whenever the sum of two digits of the same denominational value of the numbers to be added is greater than 9 it becomes necessary to carry over the digit one and add it to the sum of the digits of higher denominational value disposed adjacent to the first named two digits. The manner in which this is accomplished by the system of the present invention will now be described.

The description of this feature of operation will best be understood by consideration of a specific example. Assume, by way of example, that the indicator recorder A is set to display the number 39997 and the operator desires to add the digit 5 to to this number. The operator depresses the following keys of his keyset: Selection key A, digit key 5 and key ADD. The operation of the selection key A causes relay A to operate thereby selecting the register recorder A and causing the lamp A of the keyset to be lighted. The operation of key ADD causes relay SR to operate and lock under control of relay RLS. With relay SR operated battery is applied to the impulse contacts A and B, the cam A causing relays C and P to be operated in succession during successive revolutions of the cam A, and the relays PP and C1 to C9 to be operated in succession.

The operation of relay PP applies battery by way of armature 34 and break contact of relay C5, conductor 5 of cable 35, contacts of digit key 5, conductor 36, resistance 37 and thence to the make contact associated with armature 38 of relay REP. With relay PP operated, the first closure of impulse contacts B causes relay REP to operate and bring its armature 38 into engagement with the make contact thereof, thereby applying battery to conductor 7 of cable 39 from whence the circuit is continued by way of make contact and armature 41 of relay A, contacts 42 and 43 and winding of indicator U to ground thereby operating indicator U. When cam B opens its contacts relay REP releases and removes battery from conductor 7 of cable 39 thereby causing the indicator U to release and advance the drum and type-wheel thereof to position 8. The release of relay P as a result of the removal of battery from its winding 2 at cam A of the impulse machine causes relay C1 to operate and at its armature 34 remove battery from conductor 1 of cable 35.

The closure of cam B during the next succeeding revolution of the impulse machine causes relay REP to operate and apply battery to the winding of indicator U thereby operating the indicator and causing it to step ahead to display the digit 9 as relay REP releases. The closure of cam A causes relay C to operate and operate relay P when cam A opens its contacts. The operation of relay P at its armature 27 causes relay C2 to operate and remove battery from conductor 2 of cable 35. When cam B again closes its contacts, relay REP operates thereby causing the indicator U to be stepped ahead to its blank position and the switching element 43 thereof to be disengaged from contact 42 and brought into engagement with contact 57. A circuit is now completed from battery at armature 58 and break contact of relay WOI, conductor 59, impulse contacts of cam C, resistance 61, conductor 62, winding of indicator T and switch contacts 63 and 64 thereof, conductor 65, contacts 57 and 43 of indicator U, winding of indicator U to ground thereby causing indicators T and U to be operated in series when cam C closes its contacts. The interruption by the impulse cam C of the circuit just described causes the indicators T and U to be stepped ahead to positions blank and 0 respectively. As indicator T moves into its position blank, switch contact 63 thereof moves away from contact 64 and into engagement with contact 66. As indicator U moves from its blank position to position 0 the switch element 43 thereof is disengaged from contact 57 and brought into engagement with contact 42.

When cam B again closes its contacts relay REP operates and applies battery to conductor 7 of cable 39, make contact and armature 41 of relay A, contacts 42 and 43 of indicator U, winding of indicator U and thence to ground thereby energizing the winding of indicator U and causing it to step ahead to position 1. When cam D closes its contact, battery is applied by way of resistance 61, conductor 62 and thence

to the winding of indicator T, the circuit being continued through contacts 63 and 66 of indicator T, armature 67 and make contact of relay A, conductor 5 of cable 39, armature 68 and break contact of relay WO1, conductor 69, conductor 4 of cable 39, armature 71 and contact 72 of relay A, contacts 73 and 74 of indicator H and thence to ground thereby operating indicators T and H in series. When impulse contact D opens, battery is removed from the windings of indicators T and H thereby causing indicator T to be stepped ahead to position 0 in which position the switch element 63 is disengaged from contact 66 and brought into engagement with contact 64 and indicator H to be advanced to its blank position with the switch element 74 thereof moved away from contact 73 and brought into engagement with contact 75.

While indicator U was being stepped ahead to its position 2 under control of cam B, a circuit is closed from battery at the impulse contacts of cam E by way of conductor 76, resistance 77, winding of indicator TH and contacts 77 and 78 thereof, conductor 79, contacts 75 and 74 of indicator H, winding of indicator H and thence to ground, thereby causing indicators TH and H to be stepped ahead to positions blank and 0 respectively. As indicator TH moves into its blank position, switch element 77 thereof is moved away from contact 78 and brought into engagement with contact 81. As indicator H moves into its position 0, switch element 74 is moved out of engagement with contact 75 and into engagement with contact 73.

When cam B again closes its contacts, relay REP operates thereby applying battery to conductor 7 and causing indicator U to be stepped ahead to its position 2, the circuit including, as will be recalled, operated contacts of digit key 5 and break contact and armature 34 of relay C5. When this indicator operating impulse has been completed, cam A opens its contacts thereby releasing relay P and causing relay C5 to operate and at its armature 34 interrupt the operating circuit for indicator U thereby rendering indicator U unresponsive to additional operations of relay REP as cam B continues to apply battery impulses to relay REP.

As cam F closes its contacts, battery is applied to conductor 76, resistance 77 and thence to the winding of indicator TH and switch contacts 77 and 81 thereof, armature 82 and make contact of relay A, conductor 2 of cable 39, armature 83 and break contact of relay WO1, conductor 1 of cable 39, armature 84 and contact 85 of relay A, switch contacts 86 and 87 of indicator TTH and thence to ground, thereby causing indicator TTH to be stepped ahead from its position 3 to position 4 and the indicator TH to be advanced from its position blank to position 0. As indicator TH moves into position 0 the associated switch element 77 is moved out of engagement with contact 81 and into engagement with contact 78. The digit 5 has now been added to the number 39997 previously posted by the indicator register A, the register A now posting the new number 40002. It will be noted that, during the foregoing circuit operations, the indicator U receives impulses through resistance 37 and a carry-over impulse on a circuit including resistance 61 and the winding of indicator T in series with the winding of indicator U. The employment of resistance elements 37 and 61 provides a circuit arrangement whereby the winding of each indicator receives substantially the same strength of current flow irrespective of whether the indicator operating impulses are significant digit impulses or carry-over impulses.

When sufficient impulses have been received from cam A, relay C9 operates thereby causing the operation of relay RLS by the subsequent operation of relay P. The operation of relay RLS releases relays C, P, PP and C1 to C9 and causes the key release magnet KR of the keyset to operate and release keys A and 5. The release of key A causes relay A to release. The operation of relay RLS also causes the start relay ST to release thereby removing ground from armature 55 of relay ST extending by way of make contact and armature 54 of relay RLS to the winding of relay RLS thereby releasing relay RLS.

When, as the result of a carry-over operation, the indicator TTH has been advanced from position 9 to its blank position with its contact element 87 disengaged from contact 86 and brought into engagement with contact 88, a circuit is closed from battery at contacts of cam E of the impulse machine by way of conductor 76, resistance 89, conductor 112, break contact and armature 91 of relay WO1, conductor 8 of cable 39, contacts 88 and 87 of indicator TTH, winding of indicator TTH and thence to ground, thereby causing indicator TTH to be stepped ahead from its blank position to position 0, and contact 87 to be disengaged from contact 88 and brought into engagement with contact 86.

An error key ER is provided to enable the operator to release any of the selection and price keys of the keyset which may have been depressed in error, provided the error is discovered prior to the operation of the start relay SR. When the error key is operated, a circuit is completed from ground at switch 10, break contact and armature 13 of relay SO3, break contact and armatures of relays SO2, SO1, P1, P2 and P3 in series, conductor 14, contacts of error key ER, conductor 92, break contact and armature 93 of relay SR, conductor 53, winding of relay RLS and thence to battery, thereby causing relay RLS to operate and at its armature 19 apply ground to conductor 56 thereby operating the key release magnet KR of the keyset. The operation of the key release magnet causes the selection and price keys to release. The release of key ER releases relay RLS and the key release magnet thereby restoring the keyset to normal. The error key is rendered ineffective during the time a selected register recorder is being actuated to a new setting by interrupting the circuit from the winding of relay RLS to the contacts of the error key at armature 93 and break contact of relay SR.

Description of the wipe-out feature

The number posted by any of the registers A to J of Fig. 2 may be canceled or wiped out by a single keyset operation. The manner in which this is accomplished will best be understood by consideration of a specific example. Assume, by way of example, that the information posted by the register A is to be canceled. The selection key A and wipe-out key WO of the keyset are operated thereby causing relay A to operate and select the indicators A for the wipe-out operation, the key WO applying ground to conductor 16 and causing the operation of the start relay SR which locks under control of relay RLS. The operation of key WO also applies ground by way of conductor 93 to the winding of relay WO1 thereby causing relay WO1 to operate and lock

by way of its armature 94 and make contact thereof, conductor 95 to ground at the break contact and armature 19 of relay RLS. The operation of relay SR at its armature 21 applies battery to cam contacts A and B thereby causing relays C and P to operate and set the counting chain into operation. The operation of relay PP at armature 32 thereof applies ground by way of conductor 33 to armatures 96, 97 and 98 of of relay WO, the circuit at armature 98 of relay WOI being continued by way of its make contact and conductor 36, resistance 37 to the make contacts of relay REP associated with armature 38 thereof. When relay REP operates in response to the closure of cam contacts B, the circuit is continued by way of conductor 7 of cable 39, make contact and armature 41 of relay A, contacts 42 and 43 and winding of indicator U to ground thereby causing the operation of indicator U. In a similar manner the circuit from armature 97 of relay WOI is continued by way of its make contact, conductor 102, resistance 99, make contact and armature 103 of relay REP, conductor 4 of cable 39, armature 71 and contact 72 of relay A, switch contacts 73 and 74 and winding of indicator H and thence to ground thereby operating indicator H as relay REP operates in response to the closure of the impulse contacts B. The operation of relay REP also completes a circuit from battery at armature 96 and make contact of relay WOI, conductor 104, resistance 101, make contact and armature 105 of relay REP, conductor 1 of cable 39, armature 84 and contact 85 of relay A, contacts 86 and 87 and winding of indicator TTH to ground, thereby operating indicator TTH. The indicators TTH, H and U thus receive an operating impulse each time relay REP operates in response to closure of the cam contacts B until sufficient impulses have been received to advance these indicators to their blank positions at which time the switching elements 87, 74 and 43 are moved out of engagement with contacts 86, 73 and 42 and into engagement with contacts 88, 75 and 57 respectively.

The operation of relay WOI at its armature 58 removes battery from conductor 59 extending to contacts C and E of the impulse machine and at its armature 106 applies ground by way of conductor 3 of cable 39, make contact and armature 107 of relay A, contacts 78 and 77 and winding of indicator unit TH, resistance 77, cam contacts F and thence to battery. A circuit is also closed from ground at make contact and armature 108 of relay WOI, conductor 6 of cable 39, make contact and armature 109 of relay A, conductor 65, contacts 64 and 63 and winding of indicator T, conductor 62, resistance 61, cam contacts D and thence to battery. The operation of cam contacts D and F as the impulse machine continues its operation, causes the indicators T and TH to be advanced to their blank position with their contact elements 63 and 77 moved out of engagement with contacts 64 and 78 and brought into engagement with contacts 66 and 81 respectively. When sufficient impulses have been received from the impulse cam A, relay C9 operates thereby causing the operation of relay RLS. As armature 19 of relay RLS moves away from its break contact, ground is removed from armature 17 of relay SR and armature 94 of relay WOI, thereby causing relays SR and WOI to release. The operation of relay RLS also causes the key release magnet KR to operate thereby releasing the selection key A and removing battery from the winding of relay A which releases and completes a circuit from ground at the winding of indicator U, switch contacts 43 and 57 thereof, armature 109 and break contact of relay A, conductor 111, winding of relay T, conductor 62, resistance 61, extending to impulse cam contacts C and D and thence to battery. The impulse machine at the contacts of cam C applies battery to indicators T and U in series causing these indicators to be advanced to their position 0 and the switching elements 63 and 43 thereof to be disengaged from contacts 66 and 57 and brought into engagement with contacts 64 and 42 respectively. In a similar manner a circuit is completed from ground through the winding of indicator H and switch contacts 74 and 75 thereof, conductor 79, armature 82 and break contact of relay A, winding of indicator TH, resistance 77 to battery at the contacts of cam E of the impulse machine. The operation of the impulse machine causes battery to be applied to the windings of indicators TH and H in series advancing them from their positions blank to positions 0 with the switch elements 77 and 74 disengaged from contacts 81 and 75 and brought into engagement with contacts 78 and 73 respectively. Indicator TTH is advanced from its position blank to position 0 over the following circuit. Ground, winding of indicator TTH, contacts 87 and 88 thereof, conductor 8 of cable 39, armature 91 and break contacts of relay WOI, conductor 112, resistance 89 to battery at the contacts of cam E of the impulse machine. With indicator TTH in its position 0, the switch element 87 is disengaged from contact 88 and brought into engagement with contact 86. The number previously posted on indicator A has now been canceled and the wipe-out operation is completed, the indicator now being set to its normal or zero position. It will readily be understood that each of the remaining indicators B to J may be restored to its zero setting in a similar manner by merely operating the appropriate selection key and the key WO of the keyset.

Description of keyset

There is shown on Figs. 3 and 4 of the drawings, a keyset KS suitable for use with the system disclosed on Figs. 1 and 2 of the drawings. Referring specifically to Fig. 3, the keyset KS comprises a casing 113 having a top portion 114 upon which is mounted by means of the screws 115, a panel 116 to which is affixed the lamp strip 117 comprising the selection signal lamps A to J. The strips of keys 118 and 119 are also attached to the panel 116, each of the strips comprising ten keys designated A to J and PA to PJ for selecting the indicator recorders and causing the recorders to print the numbers registered thereon respectively. A numerical key strip 120 comprising the digit keys 1 to 9 is also mounted on the keyset panel 116 and is employed to control the receiving apparatus of Fig. 2 in accordance with the numerical value of the digit key depressed. The keyset also comprises the keys ADD, WO and ER and the release lamp RL.

Each of the keys comprising the key strips 118, 119 and 120 is normally held in a raised position by the spring 121, Fig. 4, having one end thereof in engagement with the bearing plate 122 secured to the frame members 123 supported by the panel 116. The upper end of the spring

122 rests against a washer 124 held in position by the pin 125 passing through the key.

A locking member 126 is slidably mounted on the frame members 123 and is provided with a plurality of apertures 127 through which the keys extend. A spring 128 normally urges the locking member 126 against the keys. Each key is provided with a notched portion 129 adapted to be engaged by the locking member 127 when the key is depressed. One locking member 127 is provided for each of the strips of keys 118, 119 and 120. An electro-magnet KR comprising an armature 131 pivoted at 132 is provided for actuating the locking elements 126 when the magnet is energized thereby releasing the operated keys of key strips 118, 119 and 120. When the key release magnet KR is deenergized the armature 133 thereof is restored to its unoperated position by the retractile spring 133.

Two studs 134 are secured to the casing 113 and provided with shoulders thereon against which the armature 131 normally rests. The studs are provided with pins 135 passing therethrough and washers 136 for maintaining one end of the spring 113 in position whereby the spring 113 holds the armature 131 against the shoulders of the studs 134 with the magnet KR deenergized. Each key is provided with an insulated end 137 for causing the contact springs 138 and 139 to be brought into engagement with each other when the key is operated and thus set up circuits for controlling the operation of the system. A cable 141 is provided for connecting the keyset to the associated equipment, the cable having a sufficient number of electrical conductors therein to establish the electrical connections to the keyset.

Description of the printing feature

The numbers posted by the register recorder devices A to J of Fig. 2 are automatically recorded at periodic intervals controlled by the timing mechanism of Fig. 1 and the released condition of the register control apparatus of Fig. 2. The manner in which this is accomplished will now be described. The cams 4, 5 and 6 of Fig. 1, it will be recalled, are connected by means of gears within a gear box 3 to rotate at different rates of speed. A source of power such as a clock mechanism, electric motor or other constant speed device connected to the gear box by the shaft 2 maintains the cams 4, 5, and 6 in operation at their respective speeds. Each cam is provided with a lobe 142 adapted to engage the spring contact 143 as the cam rotates thereby deflecting the spring contact 143 in a direction away from the grounded contact 144. As the cam continues its rotation, the lobe 142 is moved out of engagement with spring contact 143 thereby causing the contact 143 to be released and swing into engagement with grounded contact 144. When this occurs in the case of cam 4, for example, ground is applied by way of conductor 140 to the winding of relay P3 and thence to battery causing relay P3 to operate and lock by way of its make contact and armature 145, conductor 146, armature 147 and break contact of relay SO3 to ground. The operation of relay P3 at its armature 13 removes ground from the contacts of keys ER, WO and ADD of the keyset thereby rendering these keys ineffective to initiate a change in the settings of the register recorders A to J until relay P3 releases. The operation of relay P3 at armature 147 thereof applies ground by way of conductor 148 to the signal device 149, illustrated as an electric bell on Fig. 1, and thence to battery thereby causing the signal device to operate as an indication to the operator that an automatic printing operation is about to occur and the keys ER, WO and ADD of the keyset are at this time rendered ineffective.

The operation of relay P3 at its armature 151 applies ground to the winding of relay SO3 from whence the circuit is continued by way of conductor 152 to the break contact associated with armature 21 of relay SR. When relay SR releases, battery at armature 21 thereof is applied by way of its break contact to conductor 152 thereby causing relay SO3 to operate. Relay SR is slow to release and relay SO3 is sufficiently slow to operate to prevent the operation of relay SO3 until all carry-over operations of a previously selected indicator register have been completed.

The operation of relay SO3 at armature 153 thereof applies battery to jack 154 of the jack strip 9 and thence by way of plug 155 inserted therein, flexible conductor 156, terminal 157 of terminal strip 11, contacts 158 and 159 of key PA, conductor 1 of cable 161, winding of print magnet PMA of the register recorder A and thence to ground thereby causing the print magnet PMA to operate and record the number posted on the indicator register A. If it be assumed that the plug 162 is inserted into another of the jacks 154, the operation of relay SO3 applies ground by way of plug 162, flexible conductor 163, terminal 164 of the terminal strip 11, contacts 165 and 166 of key PC, conductor 2 of cable 161 and thence to the print magnet PMB associated with the register recorder B thereby operating the print magnet PMB and causing the setting of the register B to be recorded.

The operation of relay SO3 at its armature 147 removes ground from conductor 146 thereby causing relay P3 to release and remove ground from conductor 148 thus interrupting the operation of the signal device 149. The release of relay P3 at armature 13 thereof closes in part a circuit to the contacts of keys ER, WO and ADD. The release of relay P3 at armature 151 thereof removes ground from the winding of relay SO3 thereby causing relay SO3 to release and at armature 153 thereof remove battery from the windings of the print magnets PMA and PMB causing the print magnets to release and feed the associated paper strips ahead to display the numbers printed thereon by the joint operation of their respective print magnets and the settings of the associated typewheels of the respective indicators. The release of relay SO3 at armature 13 thereof applies ground to the contacts of keys ER, WO and ADD thereby rendering the keyset effective to control the operation of the register recorders A to J to new settings. The operation of relays P2 and SO2 under control of cam 5 and the relay SR, and the operation of relays P1 and SO1 under control of cam 6 and relay SR is similar to the operation of relays P3 and SO3 and for this reason will not be described in detail. Relays SO1, SO2 and SO3 are slow operating relays, relay SO1, when operated, applying battery to jacks 167 and relay SO2 applying battery to jacks 168.

If it be assumed that the plugs associated with conductors 3, 4 and 5 of cable 161 extending to the print magnet of indicator registers C, D and E are inserted into the jacks 168, the operation of relay SO2 causes the numbers set up on the indicator registers C, D and E to be simultaneously recorded by the operation of the associated print magnets. In a similar manner, if

the jacks associated with conductors 6 to 10 of cable 161 are inserted into the jacks 167, the operation of relay SO1 causes the numbers set up on the indicator recorders G, H, I, J and K to be recorded as relay SO1 operates in response to the closure of the snap contacts of cam 6.

The flexible conductors connected to the terminals of terminal strip 11 are of sufficient length such that any of the plugs thereof may be inserted into the jacks 161, 168 or 164 whereby the indicators A to J may be arranged in different groups in accordance with the desired frequency of recordation of the information posted by the recorder registers.

In addition to the automatic recording feature just described, a group of keys designated PA to PJ is provided whereby the operator, by merely depressing the appropriate printing key may cause the associated register recorder to print the number posted thereon. With this arrangement the operator may, if desired, obtain a printed record of each number posted by the register indicators.

Assume, for example, that the operator desires to record the number just posted by the indicator register A. The completion of the posting operation is indicated by the extinguishment of lamps RL and A of the operator's keyset. The operator merely depresses key PA thereby moving spring 159 thereof out of engagement with contact 158 and into engagement with contact 169. As spring 159 of the key PA is disengaged from contact 158, the winding of print magnet PMA is disconnected from the windings of all other print magnets associated with relay SO3 and as spring 159 moves into engagement with grounded contact 169, battery is applied by way of conductor 1 of cable 161 to the winding of relay PMA thereby causing print magnet PMA to operate and record the number posted by the indicator register A. As key PA releases, ground is removed from conductor 1 of cable 161 thereby releasing print magnet PMA and stepping the associated paper strip ahead to display the number last printed.

Description of the indicator recorder

Referring now to Figs. 5 to 9 of the drawings, there is shown thereon in detail, one of the indicator registers of Fig. 2 comprising five indicators for displaying the ten-thousandths, thousandths, hundreds, tens and units digits respectively of the number to be posted and recorded, disposed in single alignment within a casing having a paper web 172 issuing therefrom upon which are printed numbers corresponding to the settings of the indicators at predetermined intervals of time. Each indicator unit comprises a frame 173 having an electro-magnet 174 secured thereto by the screw 175. An armature 176 pivoted at 177 is held against the backstop 178 by the retractile spring 179 secured to the armature and to the adjustable member 181. A pawl 182 is pivotally mounted on the armature at 183 and adapted to engage the ratchet wheel 184 by the action of the retractile spring as the armature releases. The ratchet wheel 184 is provided with eleven teeth corresponding in number to the number of positions or settings of the display and printing elements of the unit. The ratchet wheel 184 is attached to a shaft 185 having secured thereto the indicating drum 186 and a typewheel 187. The drum and typewheel are both provided with the characters 0, 1 to 9 and a blank space intermediate the digits 9 and 0 such that, for each character displayed by the indicating drum, a corresponding character of the typewheel is in the printing position, the two series of characters being shifted with respect to each other by an angle of 90 degrees. The frame 173 is provided with an aperture 188 in the front end thereof through which the selected digits on the indicating drum are selectively displayed. A mask 189 is fitted to the front of the unit and provided with an aperture 191 somewhat less in size than the aperture 188 for displaying the selected digit. The aperture 188 also provides a clearance for the typewheel 187 whereby the typewheel may be set to different settings without obstruction of the movement thereof by the frame 173.

A jockey wheel 195 is secured to the shaft 185 and cooperates with the jockey spring 196 to assist in operating the indicating drum and typewheel and maintaining the drum and typewheel positively positioned in any of their selected positions. A cam element 197 of Bakelite or other insulating material is secured to the shaft 185 and adapted to move the contact spring 198 out of engagement with the contact spring 199 and into engagement with contact spring 201 as the indicator moves into its blank position. As the indicator moves from its position blank to position 0, the contact spring 198 is disengaged from contact 201 and brought into engagement with contact 199. The contacts 198, 199 and 201 are electrically insulated from each other by suitable strips of insulation and held securely in position by the screws 202 and nuts 203 thereby clamping the spring assembly, the jockey spring and the backstop 178 to the member 204 secured to the frame 173 of the unit.

Four plugs 205 are provided at the rear of the unit and insulated therefrom by the insulators 206, the plug being securely held by the nuts 207 and washers 208. A terminal connection 209 is assembled beneath each of the nuts to which are attached the wires 211 extending to the electro-magnet 174 and the contact springs 198, 199 and 201. The plugs 205 are engaged by the jack springs 210 with the unit in the position shown on the drawings, thereby providing an arrangement whereby the unit may be readily inserted into the casing and quickly withdrawn therefrom for inspection, if desired.

The casing hereinbefore referred to comprises a lower portion 212, a front portion 213, end portions 214, a rear portion 215, and a top portion 216. A front panel section 217 is secured to the front portion of the casing 213 by the hinge 218 whereby the panel 217 may be pivoted about the hinge to the position indicated in dashed outline on Fig. 6 of the drawings by the numerals 219, in which position the indicators may be readily removed from the casing. A moulding 221 is secured to the panel 217 and provided with a spring 222 having an aperture 223 therein for engaging the pin 224 secured to the casing 214 thereby providing means for maintaining the panel 217 in the closed position shown on Fig. 5 of the drawings whereby the panel may be readily lowered by disengaging the spring from the pin 224.

With the panel 217 in closed position the indicator units are securely held in their operative position within the casing. The panel is provided with apertures 225 through which the settings of the indicators are displayed. A cardholder or designation strip 226 is provided for mounting a card or ticket 227 bearing a desig-

nation such, for example, as the letter A representative of the type or class of information posted and printed by the device.

A plurality of supports 228 having projecting portions 229 thereon are secured to the upper part of the casing 216 by the screws 231 thereby providing channel sections within which the indicators are disposed. Suitable strips 232 of insulating material are secured to the supports 228 thereby providing a structure wherein the indicators are detachably mounted and insulated from each other and from the supports. With the indicator fully inserted within the channel section, the head of the screw 175 is brought into engagement with the rear portion 215 of the casing which may be made of wood, Bakelite, rubber or any other suitable non-conducting material. If conducting material is employed the insulation 232 may be extended between the screw 175 and the portion 215 to maintain the insulated relationship between the respective units.

Referring now specifically to Figs. 6 and 7 of the drawings, there is shown thereon a printing magnet PM supported by the bracket 233 secured to the ends 214 of the casing by suitable screws. An armature 234 pivoted at the bearings 235 is normally held against the stops 236 by the retractile spring 237 having one end thereof secured to the member 238. A pawl 239 is pivotally mounted on the armature at 241 and urged against the ratchet wheel 242 by the spring 243 secured to the pawl and to the armature at 244. The armature is provided with a printing bar 245 extending beneath the type wheel 187 and adapted to cause the settings of the indicators to be recorded as the armature 234 is operated by the print magnet PM.

The ratchet wheel 242 is connected to the paper feed roller 246 by the shaft 247 mounted on the bearing supports 248. A ratchet spring 249 supported by the bracket 251 is adapted to engage the ratchet wheel in any of the set positions of the feed roller 246. The paper feed roller is provided with a plurality of pins 252 for engaging the perforations 253 of the paper web 172 issuing from a roll 255 supported on a shaft 256 rotatably mounted on the bearing supports 257 secured to the lower portion 212 of the casing. The paper web passes over a roller 258 supported at 259 by the brackets 261 secured to the portions 214 of the casing. The paper also passes over a paper guide strip 262 secured to the casing 213 and thence past a cutout portion 263 of the casing 213 where it is engaged by the pins 252 of the feed roller, the paper web thereafter passing through slots 265 in the front portion of the casing 213. An inked ribbon 266 carried by the spools 267 passes between the type-wheel of each indicator unit and the printing bar 245, the ribbon wheels 267 being arranged to advance the inked ribbon as the printing mechanism operates as is well known in the printing telegraph art. The spring clips 268 are provided to maintain the inked ribbon in a taut condition. The ribbon spools are mounted on shafts 269 carried by the bearing supports 271 secured to the end portions 214 of the casing.

A hinged section 272 at the rear of the casing is mounted by the hinge 273 and provided with a knob 274 attached thereto whereby the section 272 may be opened to provide for the replenishment of the paper roll 255 and facilitate threading the paper over the roller 258 and thence into engagement with the feed roller. A wing nut 275 is threaded upon a stud 276 secured to the casing 215 and having a washer 277 intermediate the wing nut and the upper end of the hinged section 272 whereby the section 272 is maintained in closed position at all times except when it becomes necessary to replenish the supply of paper to the device.

One end of the winding of the print magnet PM is connected to ground, the other end thereof terminating in conductor 278. When battery is applied to the conductor 278 by the timing device of Fig. 1 or by a print key of the operator's keyset, as the case may be, the print magnet operates and attracts its armature 234 thereby causing the print bar 245 to be operated to the position indicated by dashed outline on Fig. 6 of the drawings and print a number on the paper web 172 corresponding to the number displayed at the time by the indicator units. As battery is removed from conductor 278 the print magnet releases thereby causing the armature 234 to be moved against the backstop 236 by the spring 237, the pawl 239 thereof engaging the ratchet wheel 242 and advancing the paper feed roller and the paper web sufficiently to cause the number just printed thereon to be brought into view substantially in the position illustrated for the number 15623 of Fig. 5.

It will be understood that the number 15623 shown on Fig. 5 is the number last printed by the device, the printing operation having occurred at a time when the indicator units associated with the web 172 were set to positions representing the number 15623, the number 15853 posted by the indicator units of this indicator recorder device representing the arithmetical sum of the number 15623 and the numbers corresponding to numerical signals subsequently received by the device.

While the invention has been described in detail with respect to a certain preferred example thereof which gives satisfactory results, it will be understood by those skilled in the art to which the invention pertains, after understanding the invention, that various modifications and changes may be made without departing from the spirit and scope of the invention and it is intended, therefore, in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a system of the character disclosed, means for generating and transmitting signals including selection signals, numerical signals and a start signal, receiving means comprising a plurality of electro-responsive indicators, means controlled by said selection signals for selecting one of said indicators for operation, a counting chain of relays, a first impulse generating means, means including a start relay controlled by said start signal for rendering said first impulse generating means effective to actuate the counting chain of relays through a cycle of operations thereof, a second impulse generating means operating in timed relation with said first impulse generating means for generating indicator operating impulses, and means controlled jointly by said counting chain of relays and said second impulse generating means for causing the selected indicator to post the arithmetical sum of the number previously posted by the device and the number represented by the numerical signals received by said receiving means.

2. In a numerical posting system, means for transmitting signals representative of a number,

receiving means including an electro-responsive posting device which is selectively settable to a plurality of different positions respectively for posting the digits of a number and settable to a non-posting position, means responsive to said signals for generating a series of actuating impulses representative of said number transmitted and for generating additional actuating impulses interspersed with certain of the impulses of said series, and means including circuit connections and switching means therefor operative in accordance with the position of said posting device during actuation thereof for causing said posting device to be actuated jointly by said series of actuating impulses and said additional interspersed actuating impulses to cause the posting device automatically to be actuated past said non-posting position when it has reached such position, and post a number different from the number previously posted by said device by an amount corresponding to the number transmitted by said signals.

3. In a numerical posting system, means for transmitting signals representative of a number, receiving means including a plurality of associated electro-responsive posting devices each of which devices is selectively settable to a plurality of different positions respectively for posting the digits of a number and each settable to a non-posting position, the devices collectively posting a desired number, means responsive to said signals for generating a series of actuating impulses representative of said number transmitted and for generating additional actuating impulses interspersed with certain of the impulses of said series, and means including circuit connections and switching means therefor operative in accordance with the position of said posting device during actuation thereof for causing said posting devices to be actuated jointly by said series of actuating impulses and said additional interspersed actuating impulses for causing the posting devices automatically to be actuated past said non-posting positions when they have reached such positions, and post a number different from the number previously posted by said devices by an amount corresponding to the number transmitted by said signals.

4. In a numerical posting system, means for transmitting signals representative of a number, receiving means including a group of associated electro-responsive indicators each of which is selectively settable to a plurality of different positions respectively for displaying the digits 1 to 9 and 0 of a number and each settable to a blank position, the indicators collectively displaying a desired number, means responsive to said signals for generating a series of indicator actuating impulses representative of said number transmitted and for generating additional indicator actuating impulses interspersed with certain of the impulses of said series, and means including circuit connections and switching means therefor operative in accordance with the position of said posting device during actuation thereof for causing said indicators to be actuated jointly by said series of actuating impulses and said additional interspersed actuating impulses to cause the indicators automatically to be actuated past said blank positions when they have reached such positions, and post a number different from the number previously posted by said indicators by an amount corresponding to the number transmitted by said signals.

5. In a numerical posting system, means for transmitting signals representative of a number, receiving means including a group of associated electro-responsive indicators each of which is selectively settable to a plurality of different positions respectively for displaying the digits 1 to 9 and 0 of a number and each settable to a blank position, the indicators collectively displaying a desired number, means responsive to said signals for generating a series of indicator actuating impulses representative of said number transmitted and for generating additional indicator actuating impulses interspersed with certain of the impulses of said series, and means including circuit connections and switching means therefor actuated by said indicators for causing said indicators to be actuated jointly by said series of actuating impulses and said additional interspersed actuating impulses to cause the indicators automatically to be actuated past said blank positions when they have reached such positions, and post a number different from the number previously posted by said indicators by an amount corresponding to the number transmitted by said signals.

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