

May 26, 1942.

L. KOZMA ET AL
CALCULATING EQUIPMENT

2,283,999

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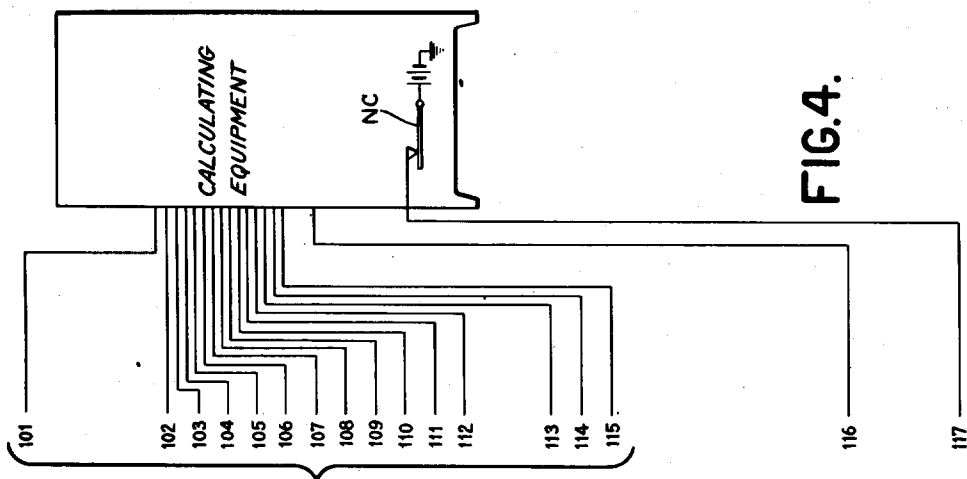


FIG. 4.

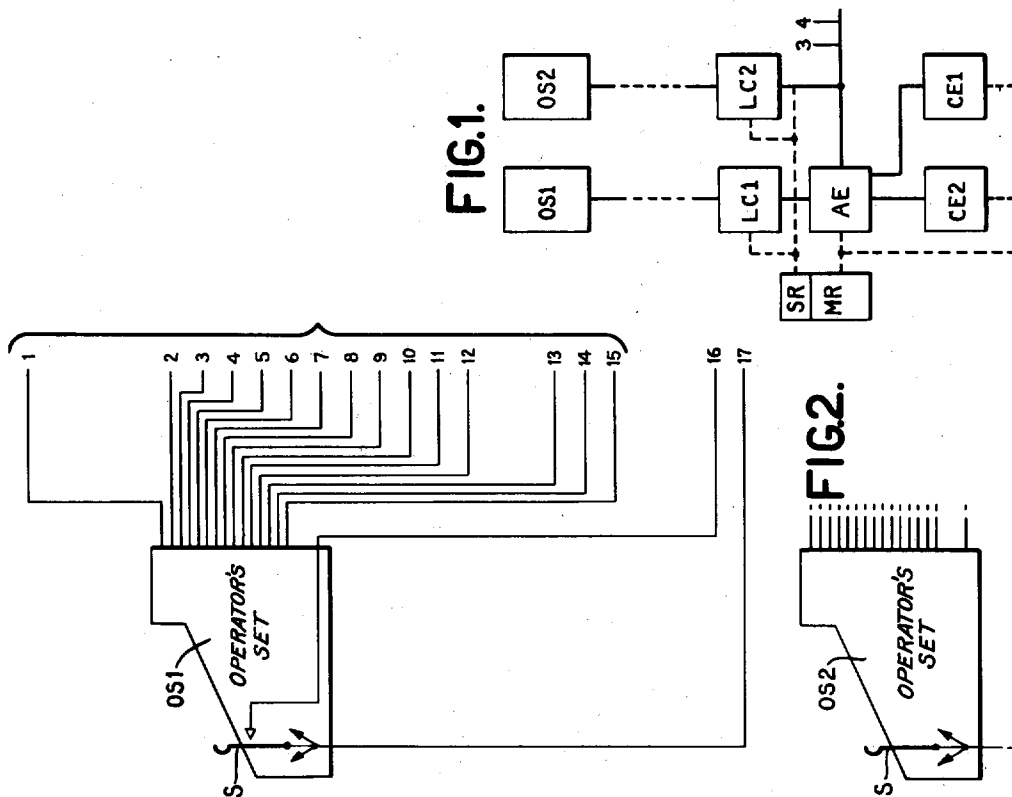


FIG. 1.

FIG. 2.

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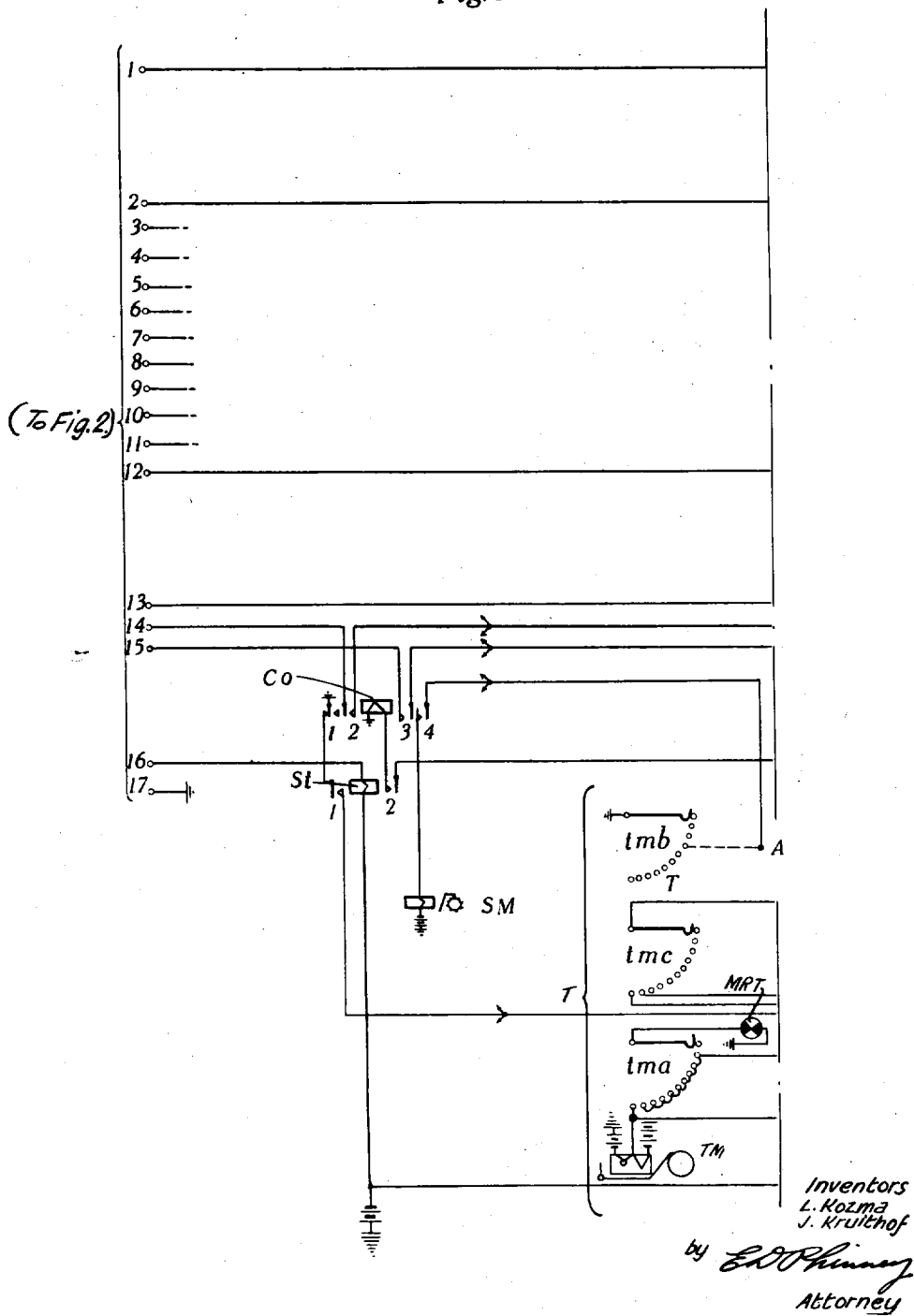
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Fig. 3.



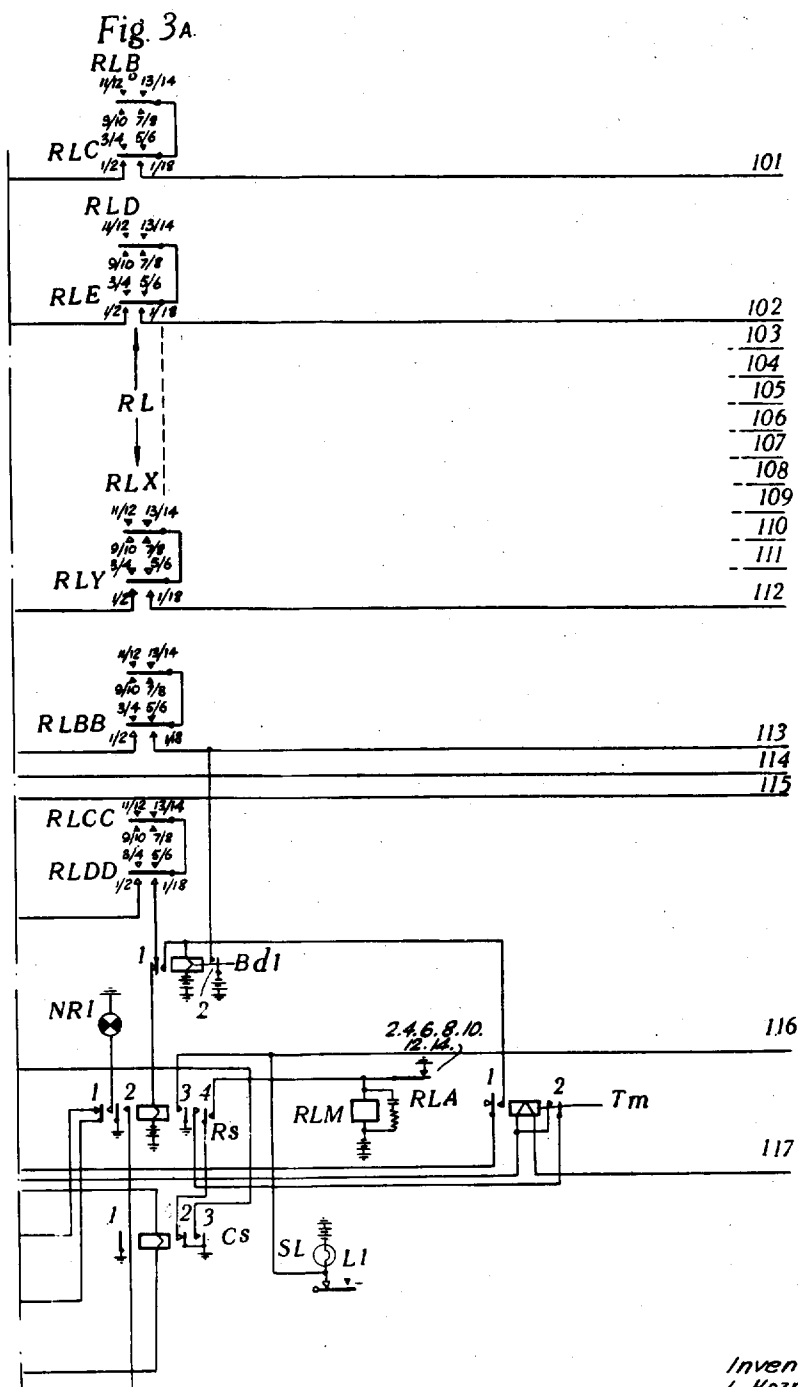
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UNITED STATES PATENT OFFICE

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CALCULATING EQUIPMENT

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In Great Britain October 21, 1938

4 Claims. (Cl. 235—61)

This invention relates to calculating equipment.

The object of the invention is to provide calculating equipment in an economical manner for a number of users each of whom only requires to use the equipment occasionally.

The calculating equipment may be of any desired type, mechanical, electro-mechanical, or electrical, for instance, but the communication between the equipment and the users' stations, or equipments, will be electrical.

It is to be understood that the principles involved can be applied to accounting and banking problems, for instance.

The calculating equipment may provide any desired calculations. The equipment can, for instance, perform addition, subtraction, multiplication and division, but of course any desired one or more of these and other calculating facilities may be provided in a calculating service for a number of operators.

According to the main feature of the invention a calculating service comprises at least one calculating equipment capable of receiving calculation problems, of performing calculations, and of transmitting results, a plurality of operator equipments each comprising problem transmitting means, result-responsive means, and means for indicating results to an operator, call-responsive means associated with the calculating equipments and connected by signal channels to the operator's equipments, so as to respond to a call signal from an operator and to connect an idle calculating equipment to said operator's equipment via a signal channel for use in making a calculation sent by the calling operator.

The invention will be clearly understood from the following description of one embodiment shown in the accompanying drawings in which:

Fig. 1 is a block schematic of a centralised calculating equipment involving the invention,

Fig. 2 is an operator's problem sending and solution printing set,

Figs. 3 and 3A when placed side by side show a line and access circuit for connecting electrical signal channels from operators' sets to calculating units,

Fig. 4 represents a calculating equipment.

Referring first to Fig. 1, operators' sets OS1, OS2, — are each connected by signal channels to individual line circuits LC1, LC2, —, which are associated with an access equipment AE through which any line circuit can be connected to a calculating equipment or any one of a plurality of calculating equipments CE1, 2 when idle. Two sets of all-mains rectifier equipment

are provided, a small equipment SR normally active for supplying the line circuits with current, and a large normally inactive equipment MR which is rendered active when a line circuit is operated to feed the calculator equipment.

Each of the calculator equipments CE1, CE2 may be of any known type which is controlled by electric signals representing a problem incoming over a plurality of conductors and is operative to transmit over a plurality of conductors signals representing the solution. Each of the operators' sets OS1, OS2 may comprise any known type of signal sending and signal receiving means that corresponds to the type of calculator equipments used, i. e., which is adapted to transmit the appropriate type of signals for representing a problem and to print or otherwise indicate the solution in response to the kind of solution signals transmitted by the calculator equipments. The preferred forms of calculator equipment and operators' equipments are those disclosed in British patent specification 525,330 accepted August 27, 1940, and published in printed form shortly thereafter as well as in U. S. application Serial No. 303,504, filed November 9, 1939, such apparatus requiring only 15 wires for the signals between an operator's set and a calculator equipment. Accordingly, the present invention is shown with a switching capacity of 15 wires between an operator's set and a calculator unit. The invention is, however, applicable quite generally to electric signaling equipment of all types, although its features are particularly advantageous for electrically controllable calculator equipments.

General description of equipment

The portions of the operators' sets OS1, OS2 and calculator equipments CE1, CE2, which particularly relate to the present invention are shown in Figs. 2 and 4 respectively. These portions include a start key 3 in each operator's set, and a contact NC in each calculating unit, which is associated with the mechanism of such unit so as to be opened each time a signal is received by said unit from an operator's position and to be reclosed only after the calculation (if any) which results from such signal has been performed. The function of the contact NC will appear from the detailed description of operation. The function of the start key 3 is to seize and hold a calculating unit equipment until the start key is finally restored, when the calculating unit is restored to normal and is available to another operator.

The access equipment is arranged for seven operators. As access apparatus a sequence switch RL, Fig. 3A, is used, which in its different positions 1/2, 3/4, —, 13/14 connects the operating and signalling wires from the different operator's sets to the calculator circuits.

Description of operation

When an operator wants to use the calculator, he has to throw the starting key S, Fig. 2. Relay St, Fig. 3, operates from ground via lead 17, key S, lead 16, winding of St, battery. In turn the common starting relay Cs energises via *col*, *st1*; thus energising the clutch magnet RLM via *cs2*, *rs4* back; therefore the sequence switch RL starts to rotate. When it reaches the calling position, which in the case shown is 1/2, Rs operates from ground via the winding of that Co relay associated with operator's set 1, *st2*, RLDD in position 1, *bd11* back, Rs winding. The above traced circuit of RLM is opened at *rs4* back, so that RL stops. Relay Co of the operator's line circuit energises in series with Rs. The operation of Co opens the above traced circuit of Cs at *Col* back, thus releasing Cs; switches-through the line wires 14, 15 to wires 114, 115; and connects service meter SM to a contact in arc *tmb* of marker switch T operable by magnet TM.

When the operator restores his start key S, relay St releases, followed by Co and Rs. Magnet RLM can now be operated by any other waiting call.

During all the time the calculator is kept occupied the marker T is advanced by the interrupter NR1, which closes about every 15 seconds, NR1, *rs1*, magnet TM. One revolution of T therefore represents 150 seconds and the service meter SM of the calling operator will be energised periodically in order to measure the occupation time.

If a call is originated, e. g. from operator's set OS1, whilst the calculator is engaged by another operator, e. g., at operator's set OS2, the manipulations of the employing operator at OS2 will be checked as follows to determine whether he is actively using the calculator.

The throwing of key S at OS1 to originate a call operates St which in turn operates Cs as in the case earlier described, but energisation of RLM to rotate switch RL does not immediately follow, since Rs is now held operated just as in the case earlier described, except that it is in series with that Co relay (not shown) which is associated with OS2.

Under such condition with Cs held by the attempted call by OS1 Tm will operate from battery NC Fig. 4, lead 117, winding of Tm Fig. 3, thence via *tmc*, *cs3* when wiper *tmc* reaches its last terminal, and will lock over *cs2*, *rs4*, *tm2*, Tm, wire 117, NC (assuming that a code-sending or calculating operation is not taking place at this very instance). When switch T reaches its tenth position relay Bd is operated via *tml*, *tmc*, *cs3*. The consequence of this will be that Rs releases because of the opening of its circuit at *bd11* back. The release of Rs permits RLM to be energised over *Cs2*, *Rs4* back and the sequence switch runs on to the other calling operator, e. g. to position 1/2. The line equipment of the disconnected operator becomes again in calling condition and the calculator will be connected back as soon as the second operator has finished his calculations.

The disconnection may be signalled to the operator to be disconnected by the printing of a

zero due to the operation of relay Bd, which connects earth to wire 13 to operate suitable printing means in OS2, before the sequence switch R moves. It is assumed that the energisation of wire 13 alone will cause the printing of zero in OS1, but if a different type of operator's set employed Bd1 may be modified to transmit correspondingly different signal—4, is operated Fig. 2, a zero is printed.

Earth via *rs3* and lead 116 operates lamp SI. Also the ground on lead 116 may serve to place the calculating equipment in condition for calculation if the latter is of the type requiring such preparation.

What is claimed is:

1. A calculating system comprising electrically controllable calculator means for performing computation and transmitting answer signal representing the result thereof, a first transmitting-and-receiving equipment for transmitting control signals suitable for controlling said calculator means and for indicating the result represented by the answer signals from said calculator means, a second similar transmitting-and-receiving device, first and second call signalling devices respectively associated with said first and second transmitting-and-receiving equipments, means responsive to actuation of said first call signalling device for connecting said first transmitting-and-receiving equipment to said calculator means, disconnect means for disconnecting said first equipment from said calculator means responsive to the condition that successive operations of said calculator means are separated by more than a predetermined time interval, said disconnect means being rendered operative responsive to actuation of said second call signalling device.

2. A calculator system according to claim 1 further comprising signalling means responsive to the operation of said disconnect means for transmitting to said first transmitting-and-receiving equipment a signal representing a forced disconnection.

3. A calculating system comprising electrically controllable calculator means for performing computation and transmitting answer signals representing the result thereof, a first transmitting-and-receiving equipment for transmitting control signals suitable for controlling said calculator means and for indicating the result represented by the answer signals from said calculator means, a second similar transmitting-and-receiving equipment, first and second call signalling devices respectively associated with said first and second transmitting-and-receiving equipments, a sequence switch having a plurality of cams and a plurality of groups of brushes wiping thereover a first group of leads connecting said calculator means to a group of said brushes each wiping over a different one of said cams, two further groups of leads respectively connecting said two transmitting-and-receiving equipments to two further groups of said brushes, said cams being formed to make connection from said first group of leads successively to one and then to the other of said two further groups of leads upon rotation of said sequence switch, first switch control means responsive to actuation of said first call signalling device for rotating said sequence switch to a position effecting the connection between said first transmitting-and-receiving device and said calculator, and further switch control means responsive to actuation of said second call signalling

device for rotating said sequence switch to a position effecting the connection between said second transmitting-and-receiving device and said calculator.

4. A calculating system according to claim 3 further comprising disabling means for disabling said further switch control means responsive to the condition that said first transmitting-and-

receiving device is connected to said calculator, and re-enabling means for re-enabling said second switch control means responsive to the condition that successive operations of said calculator are separated by more than a predetermined time interval.

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