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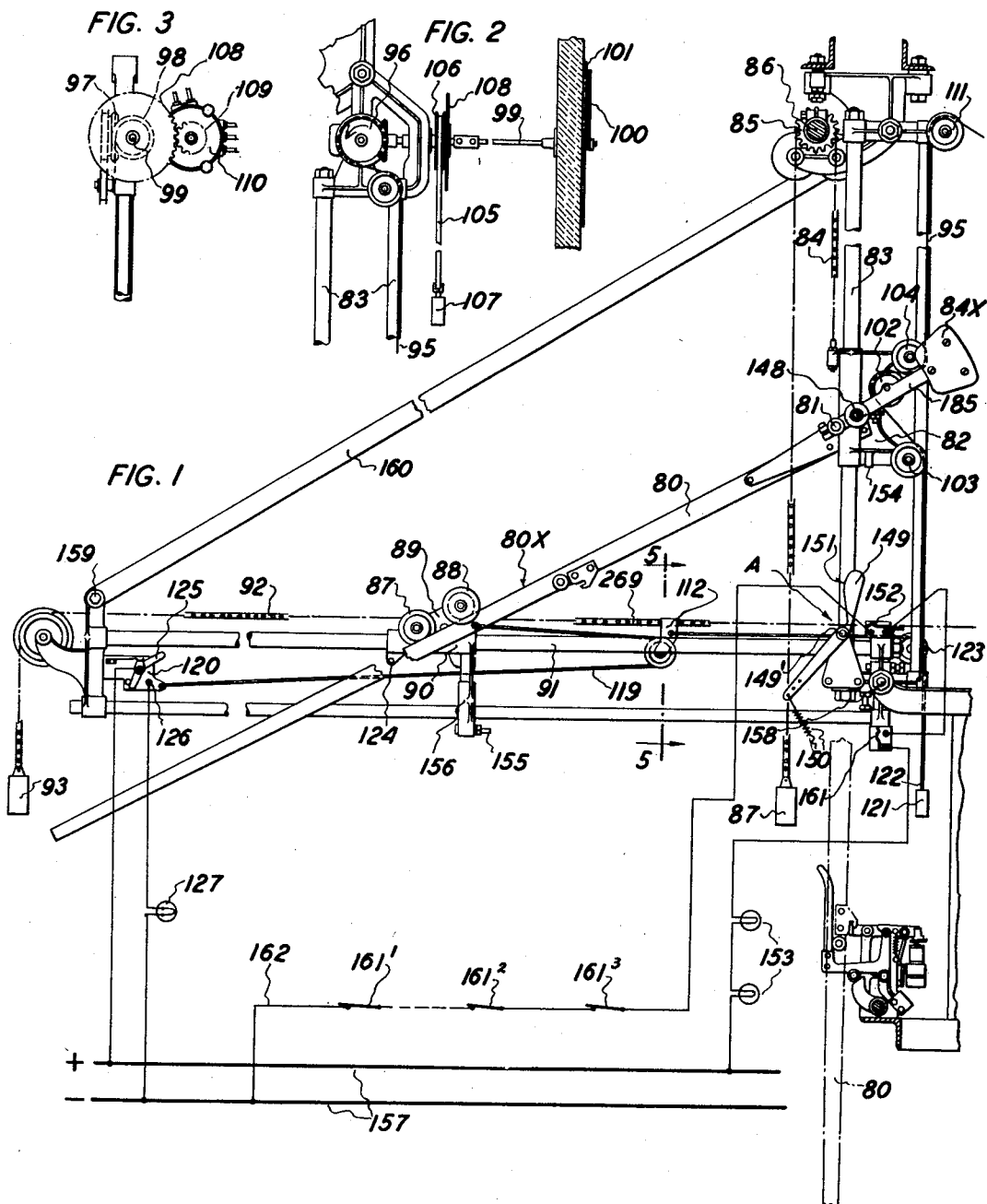
G. A. JULIUS ET AL

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ODDS INDICATOR TRANSMISSION MECHANISM FOR TOTALIZATOR MACHINES

Filed Aug. 3, 1932

3 Sheets-Sheet 1



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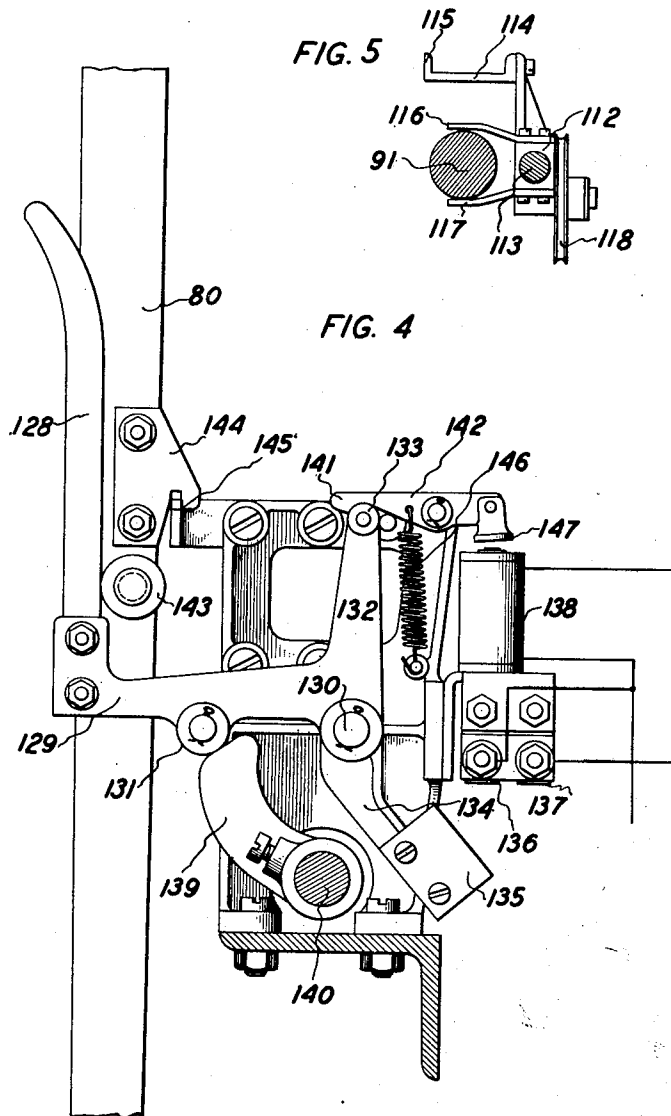
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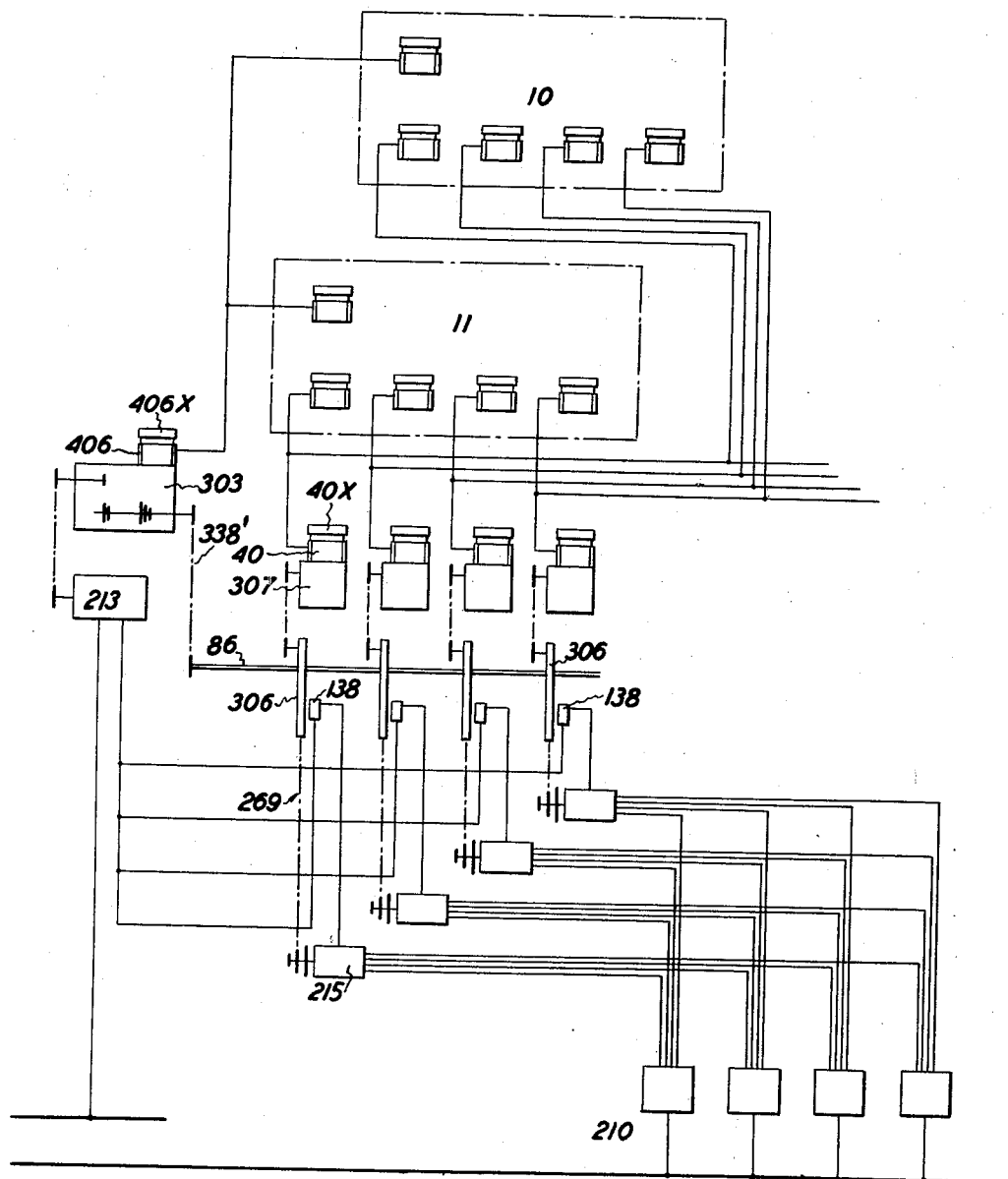
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FIG. 6



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UNITED STATES PATENT OFFICE

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ODDS INDICATOR TRANSMISSION MECHANISM FOR TOTALIZATOR MACHINES

George Alfred Julius and Awdry Francis Julius,
Sydney, New South Wales, AustraliaApplication August 3, 1932, Serial No. 627,370
In Australia August 19, 1931

5 Claims. (Cl. 235—61)

This invention relates to one unit of a totalizator assembly which is built up on an interconnected individual unit system. In such an assembly the first unit is a group of ticket issuing machines of which any number required to cope with the business in prospect is provided. These ticket issuing machines individually transmit their registrations of tickets for each horse to an escapement in the second unit. This second unit is a group of integrating mechanisms. One of these integrators sums up the grand total of all the registrations on the ticket machines, and the other integrators in the group respectively sum up the individual horse totals. An integrating mechanism of this type is the subject of our Australian Patent No. 3584, dated August 19, 1931.

The third unit is a gear box which is connected up to the grand total integrator abovementioned. In this gear box certain deductions are made from the grand total, and the remaining total is proportioned according to the required dividend system on which the betting is being conducted. A unit of this type is the subject of our Australian Patent No. 3586, dated August 19, 1931. The summation of the movements in the gear box is applied to a grand total indicator and also to the shaft of a master self-synchronizing motor. This motor is wired in series with a plurality of distant self-synchronizing motors, each of which respectively operates a distant grand total indicator.

The fourth unit is a group of ratio or odds computing and indicating devices in which the ratio of the adjusted grand total in relation to the respective horse totals is transformed into a mechanical movement and displayed as "odds". Each computer is connected up to one of the horse total integrators abovementioned, and all of them are connected up to the grand total gear box abovementioned. This unit is the subject of the present application.

The fifth unit of the series comprises a control station from which a plurality of distant indicators is operated as shown in our Australian Patent No. 3587, dated August 19, 1931.

One of the objects of the invention is to provide an efficient totalizator apparatus which is constructed in interchangeable units of moderate dimensions, adapted for rapid removal and re-erection, and adapted for interconnection with facility to form together a complete assembly, and also adapted for adjustment without mechanical change to vary their capacity and thus make them usable with equal advantage for

either a small volume of business or a large volume of business.

Hitherto totalizators of the type to which this invention belongs have consisted in effect of a number of ticket issuing machines connected up to a ponderous assembly of mechanism which was of such a character that when once erected it had to remain as a permanent installation. For this reason it was impracticable to provide an efficient totalizator for courses which call for its use only at long intervals and for short periods.

In particular, the present invention relates to ratio computing and indicating mechanism of the type generally described and claimed in our United States application Serial No. 540,734, and it consists in certain features of mechanical improvement and refinement which have been designed for effecting elimination of practical operating difficulties which have been encountered in the operation of the apparatus.

In ratio or odds computing mechanisms of the type to which the present invention relates one of the main operating elements is a quotient arm to which two motions are applied, one of these motions corresponding to the horse total registrations and the other (in right-angle relation) corresponding to the grand total registrations. The present invention includes improvements in the means for stabilizing the quotient arm at and near its zero position, and in the means for buffering its initial movements to prevent shock and mechanical injury to the apparatus. It also includes means for preventing operation of the system until all of the computers have been set at zero position, means for actuating a signal when all the elements are zeroized, and means for actuating an alarm if a moving element in any one of the computers in the system closely approaches the limit of its range of movement while registrations are still being received from the ticket issuers by the associated integrator. Means are also provided for ensuring accuracy in the transmission by preventing the sagging of the lines or chains by which the computers are geared to the horse total integrators.

The invention is illustrated in the accompanying drawings, in which:—

Fig. 1 is an elevational view of a computer incorporating the improvements which are the subject of the present invention;

Fig. 2 is a fragmentary elevational view partly in section showing the gearing by which the movements of the quotient arm are transmitted to an indicator dial;

Fig. 3 is a fragmentary elevational view taken at right angles to Fig. 2;

Fig. 4 is a side elevational view showing the stabilizing mechanism for holding the quotient arm at a vertical position when it is at the zero point, and for holding it latched until a certain predetermined number of movements have been applied to the grand total integrator, and showing also automatic mechanism for liberating the quotient arm for outward movement. This mechanism includes a re-setting cam by which a control guide is swung up to bring the quotient arm to the vertical position when the arm has nearly approached the zero point;

Fig. 5 is an enlarged vertical sectional elevation on the line 5—5, Fig. 1; and

Fig. 6 is a circuit diagram illustrating an installation of which the present invention forms one unit.

In Fig. 6 the ticket issuing machines are indicated at 210, and the horse total integrators at 215. 213 is the grand total integrator and 303 the grand total gear box which controls the grand total indicator 406* and self-synchronizing motor 406. 306 indicates the ratio computing mechanism which is the subject of the present application. Each of the computers 306 is connected by a chain belt 269 with one of the horse total integrators 215, and all of them are connected through a shaft 86 and chain belt 338' with the grand total gear box 303. Movement corresponding to the required ratio is transmitted from the computer 306 to a relay gear 307 which includes a self-synchronizing motor 40 and odds indicator 40* in a main control station from which distant indicator apparatus is operated as indicated at 10 and 11.

Referring to Fig. 1, the quotient arm 80 swings about a pivot 81 which is carried on a vertical carriage 82 which is slidable on vertical guide rails 83. The arm 80 carries a counterweight 84* on a tail piece 185. The tendency of this counterweight is to tilt the arm 80 upward so that its planed face 80* contacts with two rollers 87 and 88 which are carried on a rocking bearing 89 which is mounted on a carriage 90, this carriage being slidable along horizontal guide rails 91.

The vertical carriage 82 is moved upward along the guide rails 83 by a counterweighted line or chain 84 which runs over a sprocket 85 fixed on a shaft 86. This shaft is driven by or in synchronism with the grand total integrator 213, Fig. 6, and the carriage 82 on the rails 83 is therefore permitted to be raised by the counterweight 87 proportionately to the number of registrations on the grand total integrator. In practice, the grand total integrator 213, Fig. 6, is geared to the shaft 86 through a gear box 303 and chain belt 338'. This gear box automatically deducts certain percentages from the grand total and performs other selective functions bearing on the ratio which is to be computed. The horizontal carriage 90 is connected to the associated horse total integrator mechanism 215, Fig. 6 by a line or chain 269. The carriage is drawn along the horizontal guide rails 91 by a counterweighted line or chain 92 to which traction is applied by a weight 93, but this movement is controlled by the line or chain 269 which is released by the horse total integrator mechanism 215 proportionately to the horse total registrations. The angular position of the arm 80 is determined by the position of the horizontal sliding carriage 90 in relation to the position for the time being of the vertical carriage 82, and

the angle of the arm 80 consequently represents the ratio of the number of registrations on the grand total integrator in relation to the number of registrations on the horse total integrator.

The angular movement of the quotient arm 80 is translated into proportionate to-and-fro linear movement by means of a flexible line 95, one end of which (in one arrangement) is wound over a drum 96 (Fig. 2), which is geared by bevel wheels 97 and 98 to the spindle 99 of the pointer 100 of a dial indicator 101. The line 95 passes over a pulley 102 carried on the tail 185 of the quotient arm 80, and the movement of this arm causes the line 95 to be tensioned or slackened, as the case may be, consequent upon the inward or outward movement respectively of the pulley 102 relatively to two pulleys 103 and 104 which are carried on the carriage 82 but have no lateral movement, as has been fully explained in our prior United States application Serial No. 540,734. When the line 95 is tensioned, the rotation thus applied to the drum 96 is transmitted through the bevel gears 97—98 to the dial spindle 99, which moves the pointer 100 in clockwise direction on the indicator dial 101. At the same time a line 105 is wound on to a drum 106 which is fixed to the spindle 99. When the line 95 is slackened, a weight 107 causes the line 105 to unwind, thereby rotating the drum 106, the spindle 99 and the pointer 100 in anti-clockwise direction. The angular movement of the quotient arm 80 is thus translated by the line 95 and the drum 96 and spindle 99 to the indicator pointer 100, which therefore indicates continuously the changing ratio of the grand total in relation to the horse total, thereby giving observers the "odds". 108 is a sprocket wheel fixed to the drum 106 and meshing with a pinion 109 on the shaft of a self-synchronizing motor 110 to which a plurality of secondary self-synchronizing motors may be electrically connected in series for operating a plurality of distant dial indicators in synchronism.

Instead of actuating the dial indicator mechanism shown in Fig. 2, the line 95 may be run over a fair lead pulley 111 (Fig. 1) to actuate the main self-synchronizing motor 40 and relay gear 307, Fig. 6, by means of which distant indicator apparatus is operated, as indicated at 10 and 11 in Fig. 6.

If the chain 269 is allowed to sag, as happens in earlier types of this class of apparatus, the position of the horizontal carriage 90 on the rails 91 is rendered inaccurate, with consequent inaccuracy in the angular set of the quotient arm 80 and resulting inaccuracy in the indication on the odds indicator. This sagging of the chain 269 is particularly liable to occur when the carriage 90 is located at a position distant from the zero or starting point A. The present invention includes means for preventing this sag.

As shown in Figs. 1 and 5, a sliding carriage 112 runs on a rail 113, and carries a bracket 114 on which the chain 269 is supported, 115 being flanges for retaining the chain 269 on the bracket. The carriage 112 is prevented from tilting on the rail 113 by two fingers 116—117 which straddle the horizontal top guide rail 91 on which the carriage 90 slides. A sheave 118 is mounted on one side of the carriage 112, and a light flexible line 119, one end of which is fixed to the quotient arm carriage 90, runs over this sheave and is fixed at its other end to a bracket 120 on the frame. 121 is a counterweight on the fall end of a chain or line 122 which runs over a sheave

123 and is fixed at its other end to the chain sag carriage 112. As the quotient arm carriage 90 moves outward along the guide rails 91 towards the bracket 120, the chain sag carriage 112 trails behind it, the rate of movement of the chain sag carriage 112 being half the rate of movement of the quotient arm carriage 90. When the carriage 90 has made a full length movement on the rails 91, the carriage 112 will therefore be located at the mid position, and the sag of the line 94 will be taken up on the bracket 114. Consequently the movement of the carriage 90 will be held accurate in relation to the movement of the control line 269.

Means are provided for preventing mechanical disorder in the computer which might result if the quotient arm carriage 90 should reach the limit of its movement on the rails 91 while registrations are still being received from the ticket issuers by the horse total integrator to which the computer is connected. When the carriage 90 is near to this end position, a striker 124 which is fitted on the side of the carriage 90 engages a switch arm 125 on the bracket 120, and moves this switch arm on to a contact 126 which completes the operative circuit through an alarm lamp 127. There may be a buzzer or other audible signal wired in series with the lamp 127. When this alarm is given, it becomes the duty of a mechanic to open a driving clutch (not shown) in the transmission which normally connects the computer with the horse total integrator. When this clutch is opened, the movement of the chain 269 ceases, and the quotient arm carriage 90 is no longer moved. The vertical carriage 82 will however continue to move upward, as the shaft 86 by which it is actuated continues to be driven in synchronism with the grand total mechanism the shaft 86 being common to all the computers in the installation. When the movement of the carriage 90 ceases, due to the opening of the driving clutch above mentioned, the associated horse total integrator will continue to operate independently of the ratio computing mechanism, and the final horse total can be ascertained from a veeder counter associated with that integrator. In these exceptional circumstances, a negligible inaccuracy is introduced into the associated "odds" indicator which is displayed to the public, but the horse total which is registered on a veeder counter in the integrator will remain correct, and as the dividends are computed from this veeder counter, the minor inaccuracy in the indicator odds which are displayed to the public on the particular over-running indicator may be disregarded. This short-coming is possible only in very exceptional cases in which a phenomenally high investment has been made on a particular competitor.

Improved means for stabilizing the arm 80 when it is at the zero position are shown in Fig. 4. An upstanding guide finger 128, outwardly curved at its top end, is carried on the horizontal member of a bell crank rocking arm 129 which is pivotally mounted on the frame 130 and carries a tappet roller 131 on one side of it. On its vertical member 132 it carries a tappet roller 133, and on a tail member 134 it carries a contact plate 135. In one position, the plate 135 bridges two contact terminals 136 and 137 in the circuit of an electromagnet 138. A cam 139 is carried on a through shaft 140. This shaft has an operating lever (not shown) at one end of it. The shaft 140 is common to all the computers which are set up side by side in the installation, and when it is

rocked the cams 139 are moved round to contact with the rollers 131 thereby tilting the bell crank 129 into the position shown in Fig. 4. When the bell cranks are thus tilted up, each one is latched by engagement of its tappet 133 with a pawl tooth 141 on the end of a rock lever 142. The inner edge of the finger 128 then serves as a guide rail for a contact roller 143 which is carried on one side of the arm 80. When resetting the apparatus prior to the commencement of a race, the horizontal carriages 90 are run back to the zero position A, thereby moving the quotient arms 80 into the pendant vertical position. The vertical carriages are then moved downward to the zero position. As each carriage 82 is approaching its lowest position on the rails 83, the roller 143 runs along the inner edge of the finger 128, and the notch in a latch plate 144 which is fixed on the side of the arm 80 is brought to register with a fixed tooth 145 on the frame member. As the downward movement of the arm 80 proceeds, the notch in the latch plate 144 engages the tooth 145. The arm 80 is thus restrained from swinging movement while it is at the zero position.

The lever 142 is normally held down in engagement with the tappet 133 by a helical spring 146 in tension, and it is lifted out of this engagement when the armature 147 which is fixed on its back end is attracted by the electromagnet 138. The magnet 138 is connected in the main operating circuit as indicated in Fig. 6, and it is energized immediately the first ticket is issued on the particular horse to which the computer relates by any one of the ticket issuing machines 210 (Fig. 6), the issue of the ticket being followed instantly by operation of the grand total integrator 213 and horse total integrator 215 which results in the corresponding movement of the vertical carriage 82 and the horizontal carriage 90. Upon the release of the tappet 133 (the cam 139 having been previously retired by the mechanic), the bell crank 129 falls and the finger 128 drops clear of the contact roller 143. The bridging contact 135 then closes the circuit across the contacts 136 and 137 (Fig. 4), thus de-energizing the magnet 138 and allowing the pawl lever 142 to be restored to normal position by its spring 146, ready for the next re-setting movement of the bell crank. The finger 128 having fallen clear of the roller 143, the arm 80 is restrained from swinging from the vertical position until a few registrations have been made and the carriage 82 has been raised about $\frac{1}{8}$ " that is, until the latch 144 clears the latch tooth 145. When the carriage 82 has been thus raised, the arm 80 has sufficient stability to allow it to be swung outward so that it may bear gently against the contact wheels 87 and 88 on the horizontal carriage 90.

An improved arrangement for buffering the initial movement of the arm 80 is shown in Fig. 1. A tappet roller 148 is fitted to the counterweight tail 185 which extends rearward of the pivot 81 about which the quotient arm 80 swings. A buffering finger 149 which is disposed in the path of movement of this tappet roller 148 is carried on a bell crank which is pivoted on the frame at the point 149' and has one arm of it restrained by a spring 150. When the quotient arm 80 commences its vertical movement from the zero position, the curved edge 151 of the finger 149 bears more or less heavily against the roller 148, the bell crank being thus tilted and the spring 150 tensioned. Jerky or quick swinging movement of the quotient arm 80 is thus checked and the heavy bearing of the quotient arm 80 against the

rollers 87 and 88 on the rocking bearing 89 which is carried by the carriage 90 is relieved. This heavy bearing is due to the leverage of the pendent arm 80. As the movement of the vertical carriage 82 progresses and the short leverage of the quotient arm 80 against the rollers 87 and 88 is lost, the roller 148 moves clear of the buffering finger 149, and thereafter the freedom of the arm 80 is not constrained.

If the particular horse to which the computer is allocated should be "scratched", or if no registrations have been received by the associated horse total integrator, the magnet 138 is not energized and the pawl lever 142 remains set, with the result that the finger 128 remains held in the vertical position, as shown in dotted lines in Fig. 1 and in full lines in Fig. 4, and by reason of its contact with the roller 143 it prevents any oscillating movement of the arm 80 and consequent disturbance of the indicator. This is necessary, because vertical movement of the carriage 82 must take place notwithstanding that no registrations are being received by the associated horse total integrator. The grand total shaft 86 is common to all the computers in the system and therefore all the vertical carriages must operate in synchronism. As soon as the carriage 82 has been lifted a few inches by the grand total mechanism, the arm 80 will be in stable equilibrium and will no longer need steadying by means of the finger 128. It is only necessary, therefore, to make the finger 128 a few inches in length to ensure a safe operating condition.

It is important in these equipments that the apparatus shall not be put into operation until all of the computers in the installation have been set back to zero position. In each of the computers a switch 161 in a signal circuit or in a control circuit is closed when the carriage 90 is at zero position, and in one of the computers a switch 152 is closed when the vertical carriage 82 is in zero position. As all of the carriages 82 are moved together in synchronism with the grand total integrator 213 it is not necessary to have more than one switch 152 in the circuit. The switch 152 and the switches 161 are all wired in series and the closing of the signal or control circuit is indicated in appropriate places by signal lamps 153, and if desired also by audible signals. The switch 152 is closed by a push piece 154 on the carriage 82, and the switch 161 is closed by a push piece 155 which is carried on the steady arm 156 of the horizontal carriage 90. The serial arrangement of the wiring is suggested diagrammatically by the switches 161¹—161²—161³ of three other computers in the return line 162 to the main circuit 157.

For packing and transport the horizontal members of the frame may be folded up parallel with the vertical members of the frame, about the foot pivot 158 when the end fixing bolts 159 are removed from the diagonal stay bar 160.

What we claim as our invention and desire to secure by Letters Patent is:—

1. In a ratio computer of the kind in which the angular set of a quotient arm in a vertical plane is determined by the proportion between movements applied to it respectively by vertically and horizontally directed forces, and in which changes in the angular set of said arm are progressively communicated by a flexible line to other

apparatus, said arm being carried on a carriage which is movable on vertical guide rails and having a bearing on a carriage which is slidable on horizontal guide rails, means for eliminating incorrectness in the angular set of said quotient arm caused by sag of a trailing line by which its movement in horizontal direction is controlled, said means consisting in an auxiliary carriage slidable on a rail and adapted for supporting said trailing line rearward of its connection to the horizontal quotient arm carriage, a sheave on said auxiliary carriage, a flexible tractor line reeved over said sheave having one end of it fixed to the machine frame and the other end of it connected to the horizontal quotient arm carriage, and a flexible line connecting said auxiliary carriage rearwardly to a counterweight so as to maintain tension on said tractor line.

2. In a ratio computer of the kind herein described, means for restraining horizontal movement of the quotient arm while its pivot is located near the zero point, said means comprising a guide finger fixed on a tilting member positioned below the zero point and adapted to engage an offset member fixed on the quotient arm below the pivot of said arm.

3. In a ratio computer of the kind herein described, means for restraining horizontal movement of the quotient arm while its pivot is located near the zero point, said means comprising a guide finger fixed on a tilting member positioned below the zero point and adapted to engage an offset member fixed on the quotient arm below the pivot of said arm, a spring latch arranged for holding said tilting member with the guide finger in erect position, an electromagnet adapted for releasing said latch, and a device for manually resetting the tilting member at latch position.

4. In a ratio computer of the kind herein described, means for restraining horizontal movement of the quotient arm while its pivot is located near the zero point, said means comprising a guide finger fixed on a tilting member positioned below the zero point and adapted to engage an offset member fixed on the quotient arm below the pivot of said arm, a spring latch arranged for holding said tilting member with the guide finger in erect position, an electromagnet adapted for releasing said latch, a device for manually resetting the tilting member at latch position, a notch lug on the quotient arm, and a fixed staple engaging said notch lug while the quotient arm pivot is close to its zero position.

5. In a ratio computer of the kind herein described, means for buffering the initial outward movement of the quotient arm, said means consisting of a spring constrained tappet finger having a curved face disposed in contacting relation with a tappet roller offset on the side of the quotient arm tail member so as to bear against said roller and influence the quotient arm towards vertical position until the quotient arm pivot has been raised substantially above the zero position, and thereafter to release the quotient arm gradually for movement in horizontal direction.

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