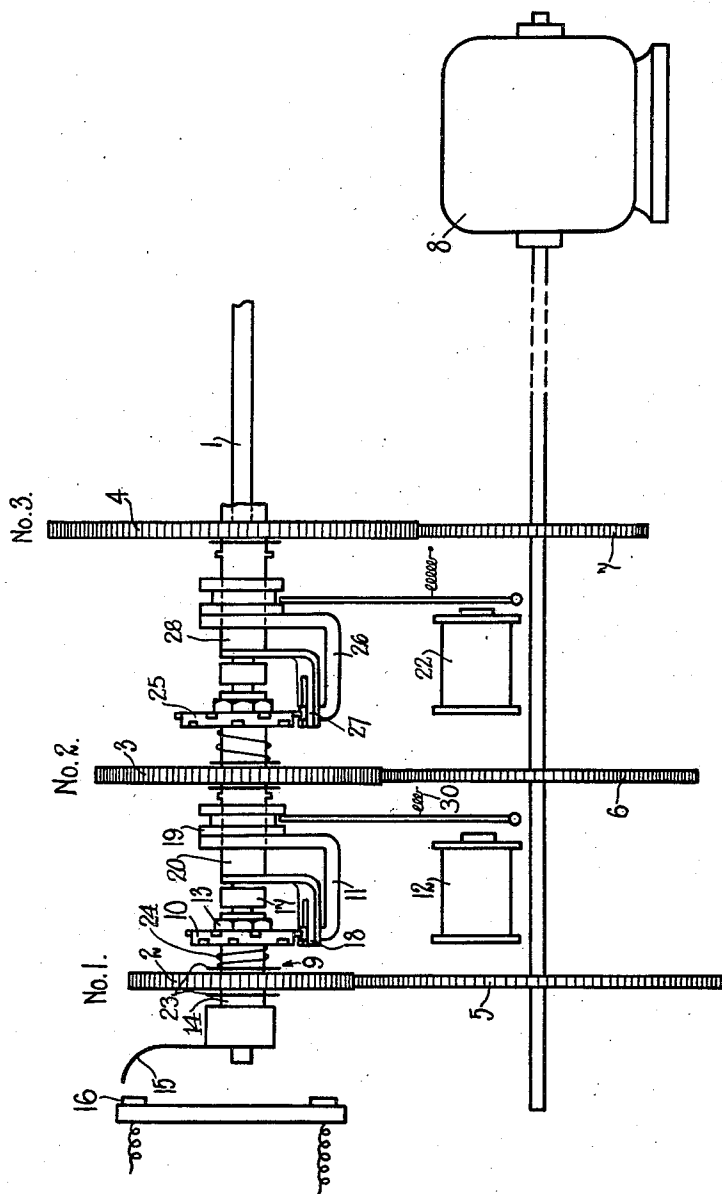


April 20, 1937.

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ELECTRIC TOTALIZATOR
Filed Jan. 27, 1934

2,077,902



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2,077,902

ELECTRIC TOTALIZATOR

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Application January 27, 1934, Serial No. 708,534
In Great Britain February 27, 1933

5 Claims. (Cl. 235—92)

The present invention relates to electric totalizers of the fully automatic type suitable for use on racecourses and the like and may be considered as a development of the arrangement described in the British Patent No. 342,261, granted April 15, 1931. The chief object of the invention is the provision of an improved electro-mechanical adding machine by means of which a substantial increase is achieved in the speed of issuing tickets from a number of ticket machines, and in which reduced first cost is secured by replacing a portion of the electrical apparatus by less costly mechanical apparatus.

It will be recalled that in the arrangement disclosed in the prior patent an increase in the speed of ticket issuing was obtained by the employment of rotating collecting switches adapted to collect signals of different values simultaneously, and these were subsequently directed into the appropriate channels leading to the associated adding machine. Moreover in the case where very heavy demand for tickets of certain values was to be anticipated, storing relay groups were introduced between the collecting switch and the totalizer and these served to register separate incoming signals up to the value of the next or next but one higher denomination and thereupon effected transfer of these stored signals to the correct section of the totalizer. This arrangement although effecting an important increase in the speed of ticket issuing compared with what was previously known was subject to the limitation that the individual totalizers into which the collecting switches discharged their signals could only register signals of any particular value one at a time, and this was in fact fundamental to the type of apparatus employed.

Recent investigations into the conditions in situations where the invention would be used have shown that this limitation is a serious obstacle to the handling of a large volume of ticket selling by the totalizer between successive events, since no matter how quickly the signals of any particular value are collected from the ticket machines all are caused to traverse a common channel one at a time to be registered on the totalizer. The present invention aims at overcoming this disadvantage by providing a totalizer which as regards incoming signals of any particular value is operable over a number of channels simultaneously without risk of the separate signals becoming confused.

According to one feature of the invention in an electro-mechanical adding arrangement or machine including a rotatable member operated

in accordance with the sum of a plurality of signals received simultaneously, the appropriate movement of the rotatable member is produced by the use of a series of escapement mechanisms in cascade in conjunction with slipping clutches and a continuous drive.

According to another feature of the invention in an electro-mechanical adding arrangement comprising a series of rotatable members adapted to be driven from a common source of power through slipping clutches, the gearing connecting the members to the driving shaft is so proportioned that the speed at which the members would rotate if no slipping took place increases progressively along the series.

A further feature of the invention is that in an electric totalizer an electro-mechanical adding arrangement or machine comprises a series of rotatable sleeves mounted on a common shaft, each adapted to be driven through a slipping clutch and carrying an escapement wheel co-operating with the preceding sleeve and an escapement member co-operating with the succeeding sleeve, each escapement member being rotatable with the sleeve but movable axially thereon so as to permit its associated escapement wheel to rotate step-by-step owing to the effect of the drive through the slipping clutch.

The invention will be better understood from the following description of one method of carrying it into effect, reference being had to the accompanying drawing which is intended to apply to the circuit disclosed in the prior application.

Considering first the arrangement described in the prior application, it will be remembered that use was made of 8-wiper horse collecting switches designated HCS provided with 25 point contact banks, and adapted to rotate continuously during the ticket selling period to collect bet signals of all values in respect of a particular horse from all ticket machines. These ticket sales markings were thereupon extended to the associated totalizer either over a direct route or by way of storing relay groups depending upon the amount of selling for the ticket value concerned. The totalizer itself comprised a group of rotary switches of similar construction to the horse collecting switch and provided one for each digit of the total amount to be collected. The electrical circuits of the totalizer were particularly designed to ensure that the signals were registered one at a time, and in case two signals were received at the same time, due for example to a direct ticket sale to a transferred amount from the next lower value, then the acceptance

of the transferred amount was delayed until such time as the direct ticket sale was satisfactorily registered. By means of the on and off wiper arrangement on the horse collecting switch HCS, it could generally be arranged that while sales of tickets of one denomination were being collected, the wiper associated with ticket sales of the next higher denomination was out of engagement with the bank contacts thereby temporarily suspending the collection of ticket sales markings of this value. This arrangement to some extent alleviated congestion during transfer but at the same time involved a delay in the acceptance of the signals. With the present invention however, such delays cannot occur since all the separate elements of the totalizer are adapted to register simultaneously signals either from the direct source or arising from transfer from one denomination to the next higher denomination.

Considering now the changes necessary to the arrangements of the prior patent to fit them for use with the new arrangement, in the first place it will be desirable to equip the horse collecting switches with double-ended wipers throughout, so that they shall be enabled to establish as many connections as possible with the bank contacts during rotation. The storage relay groups, stored unit collecting switch SUC, and transfer switch TP may be dispensed with and each wiper of the collecting switch HCS will now connect with a separate channel leading direct to the totalizer.

Referring now to the drawing which is in simplified form, this shows two complete escapement units of an adding machine and a portion of a third. It will be understood however that all the units with the exception of the first and last of the series are identical and that from purely mechanical considerations the maximum number which could be provided is practically unlimited and is dependent only on the power of the driving motor and the space available. In practice the number employed will of course depend on the number of ticket-issuing machines in the installation and will clearly be related to the number of wipers on the associated horse collecting switch.

Essentially the machine comprises a fixed shaft 1 on which are loosely supported a plurality of gear wheels 2, 3 and 4 arranged to be continuously driven from a similar plurality of gear wheels 5, 6 and 7 fastened to the shaft of the motor 8. It will be noticed that the gear wheels are provided in progressively graduated sizes and the significance of this arrangement will be more fully appreciated as the description proceeds. Coupled to each gear wheel on the fixed shaft through a clutch such as 9 (comprising for example two fibre washers 23 and a compression spring 24) is an escapement wheel such as 10, normally prevented from rotating by means of a locking stop 11 controlled from the magnet 12.

Dealing with the No. 1 unit in detail, it should be explained that the escapement wheel 10 is rigidly clamped by means of a nut 13 to a sleeve member 14 which is free to rotate on the fixed shaft. The opposite end of the sleeve carries the registering wiper 15 which co-operates with the contact bank 16, while the gear wheel and clutch referred to are supported at the centre of the sleeve. The escapement wheel of the No. 2 unit is fastened to a similar sleeve member 20 which is separated from the former by means of a collar 17 and has fastened to its left hand end an angle bracket 18 terminating in a forked portion between the limbs of which is trapped the locking

stop 11 for the first escapement unit. The locking stop 11 also takes the form of an angle bracket fastened to a grooved collar 19 which is mounted loosely on the sleeve 20 of escapement No. 2 and is free to slide axially thereon under the control of the armature of the magnet 12.

Normally in the absence of ticket selling all escapements will be locked in the manner described and consequently slip will take place at all the clutches in the series. The locking stop for the final escapement unit is of course keyed to the fixed shaft so that it forms an anchor for the complete assembly.

If it is assumed that in response to the sale of a ticket magnet 12 is energized, the locking stop 11 will be moved to the left under the control of the armature so as to free the escapement wheel which thereupon rotates until the adjacent tooth comes up against the locking stop in the new position. Subsequently at the end of the signal, the magnet will de-energize and permit the locking stop to restore to its original position under the control of a spring such as 30, thereby enabling the escapement wheel to make a further movement until the next tooth comes up against the stop in the normal position. This results in the movement of the registering wiper from one contact to the next. The zig-zag arrangement of the teeth on the escapement wheel ensures that the wheel will always move through the same distance regardless of the duration of the signal.

Similarly in case a signal is registered on magnet 22, the associated escapement wheel 25 will be caused to take a corresponding movement, and by reason of the forked member 18 attached to the end of the sleeve 20 carries with it the locking stop 11 for escapement No. 1. Escapement wheel 10 of unit No. 1 thereupon makes the same movement as escapement wheel 25 of unit No. 2 and the registering wiper is accordingly advanced on the next bank contact. Moreover in case a signal is registered on the magnet of unit No. 3 not shown, the associated escapement wheel is released in the manner described and its movement is repeated through the escapements of units Nos. 2 and 1 in order that the registering wiper shall be moved a further step.

If it is now assumed that signals corresponding to ticket sales are received simultaneously on magnets 12 and 22, both locking stops 11 and 26 will be moved to the left to release the escapement wheels but as regards escapement wheel 10 it will be seen that this is released in a twofold manner, since the locking stop is not only moved out of the path of the tooth, but is also rotated away from it under the control of escapement wheel 25. It is for this reason that the graduated gear wheels are provided since it will be readily apparent as regards the escapements of units Nos. 1 and 2 that if both gear wheels were of the same size they would revolve at the same speed and consequently when simultaneous signals were registered the movement of the locking stop of unit No. 1 would be ineffective until the locking stop of unit No. 2 came to rest since the former would be rotating at the same speed as its escapement wheel and both would therefore retain the same relative position. Clearly then in the case of simultaneous ticket sales, it is desirable that the escapement wheel should always lead its locking stop by an amount sufficient to ensure the required displacement without undue loss of time and this is accomplished by the provision of graduated gears driven from the same motor. It will be understood that the pre-

cise gear ratio is not of great importance so long as there is a progressive increase in the angular velocities of the gear wheels towards the registering wiper end of the assembly.

5 Conveniently an escapement assembly similar to that described and illustrated will be provided for each value of ticket the sale of which is to be registered and possibly four such assemblies could be mounted round the driving shaft so that all four were driven from the same motor.

10 In the case of tickets of value intermediate between the values for which complete assemblies are provided, which would normally be decimally related, sales of such tickets could be registered direct on the escapement assembly serving the next lower value by operating a plurality of magnets simultaneously, assuming, as would generally be the case, that the ticket values are integrally related. Alternatively if it were found
20 more satisfactory use could be made of escapement wheels provided with a smaller number of teeth.

Transfer of accumulated ticket sales markings of lower value to the next higher value will preferably be done electrically by means of cam-operated contact springs or over the registering wiper in a particular position, by completing the circuit of a magnet associated with the escapement assembly of next higher value.

30 I claim:—

1. For use in an electric totalizer, an electromagnetic adding arrangement including a common shaft, a series of rotatable sleeves mounted on the shaft, a common drive, a slip clutch for each sleeve for linking it to the common drive,
35 an escapement for operating each sleeve and a magnet for operating each escapement to permit rotation of its associated sleeve by the common drive, the pawl of each escapement member mounted on the preceding sleeve and rotatable therewith, the pawl of each escapement also movable axially on the sleeve upon which it is mounted, by its magnet, to rotate the sleeve which it controls step by step, and each pawl
40 movable in a rotary direction to rotate two sleeves together.

2. In an adding arrangement, a rotatable element and means for driving said element comprising a series of rotatable sleeves mounted on a common shaft, each sleeve linked to a source
50 of power through a slip clutch, an escapement wheel on each sleeve, an escapement member for each escapement wheel mounted on the adja-

cent sleeve, means for moving an escapement member in one plane to cause step by step movement of its sleeve, said escapement member movable in another plane with the sleeve on which it is mounted to cause all rotation of that sleeve
5 to be communicated to the sleeve which it controls.

3. In an adding arrangement, a driven element, a common shaft supporting a series of rotatable sleeves, a wheel linking each sleeve to a
10 source of power through a slip clutch, an escapement wheel on one sleeve, an escapement for said wheel having a member mounted on an adjacent sleeve, means for moving the escapement member endwise on said adjacent sleeve to cause step
15 by step movement of said one sleeve, means for causing rotation of the adjacent sleeve, and a member on the adjacent sleeve linked to the escapement member for moving said one sleeve each time the adjacent sleeve is moved.

4. An electromagnetic adding arrangement comprising a shaft, a series of rotatable sleeves mounted on the shaft, a common source of power, a slip clutch on each sleeve linking its
25 sleeve to the power source, a driven element on one sleeve and movable therewith, an escapement wheel mounted on each sleeve, an escapement member on certain of said sleeves controlling the escapement wheel on the succeeding sleeve, means for operating said member axially
30 to permit escapement of the succeeding sleeve through its escapement wheel, and means on each sleeve carrying an escapement member for rotating said member when the sleeve is rotated to cause corresponding rotation of the succeeding
35 sleeve.

5. In an adding arrangement, a shaft, a series of rotatable sleeves mounted on said shaft, a driven member carried by one of said sleeves, an escapement wheel on each sleeve, a source of
40 power, a slip clutch linking each sleeve to the power source and normally tending to rotate the sleeves, an escapement member on one sleeve for permitting step by step operation of the succeeding sleeve through the medium of the escapement wheel thereon, a magnet for operating the
45 escapement member axially to cause said step by step movement and a link on said one sleeve for rotating both the wheel and escapement member simultaneously when said one sleeve is
50 rotated.

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