No. 818,222. PATENTED APR. 17, 1906.

W. M. BRALY.

MACHINE FOR CALCULATING INTEREST AND PERCENTAGE.

APPLICATION FILED FEB. 15, 1905.

4 SHEETS—SHEET 1.

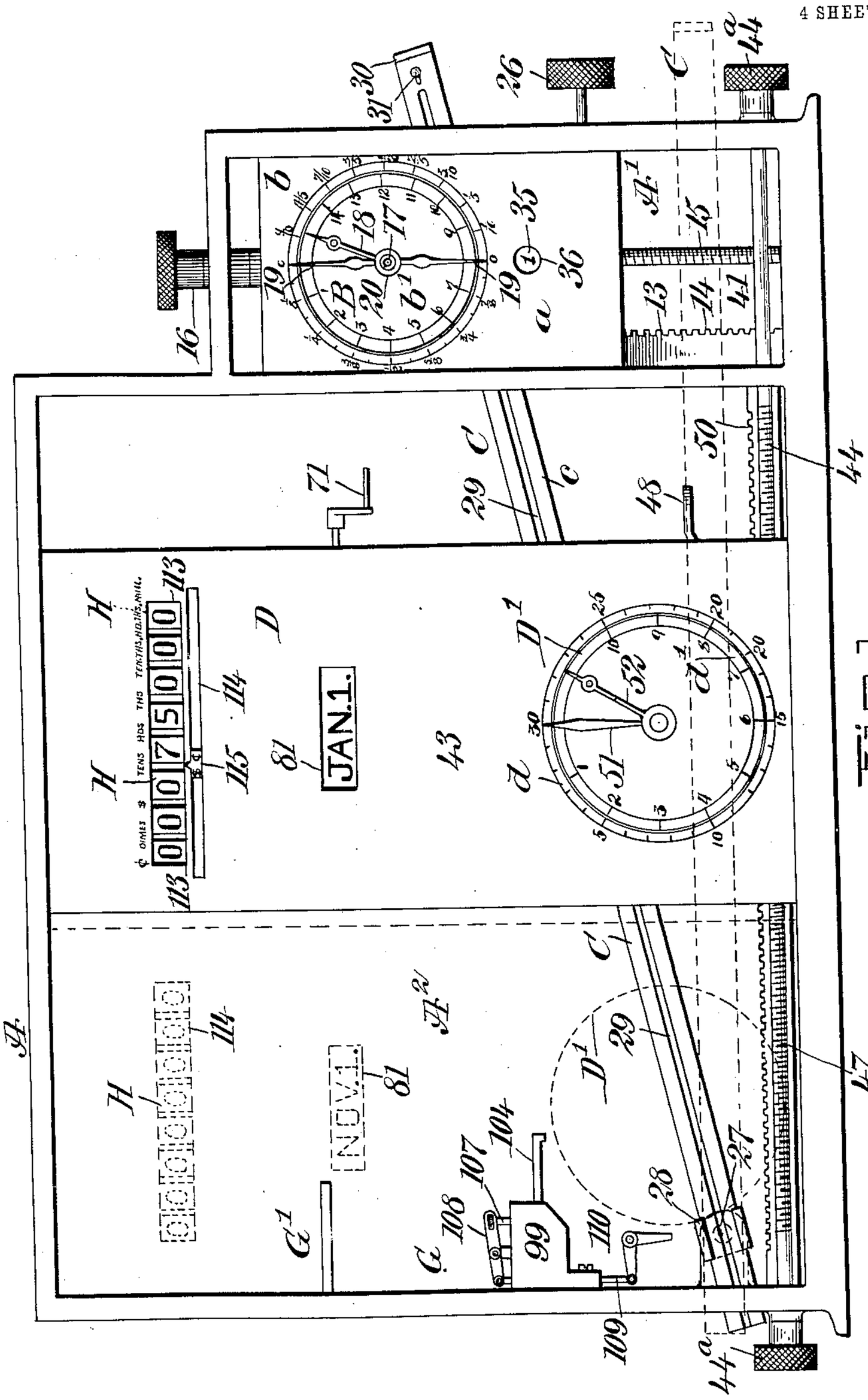


FIG. 1.

WITNESSES:
C. A. Jarvis.
[illegible]

INVENTOR
Walter M. Braly
BY [illegible]
ATTORNEYS

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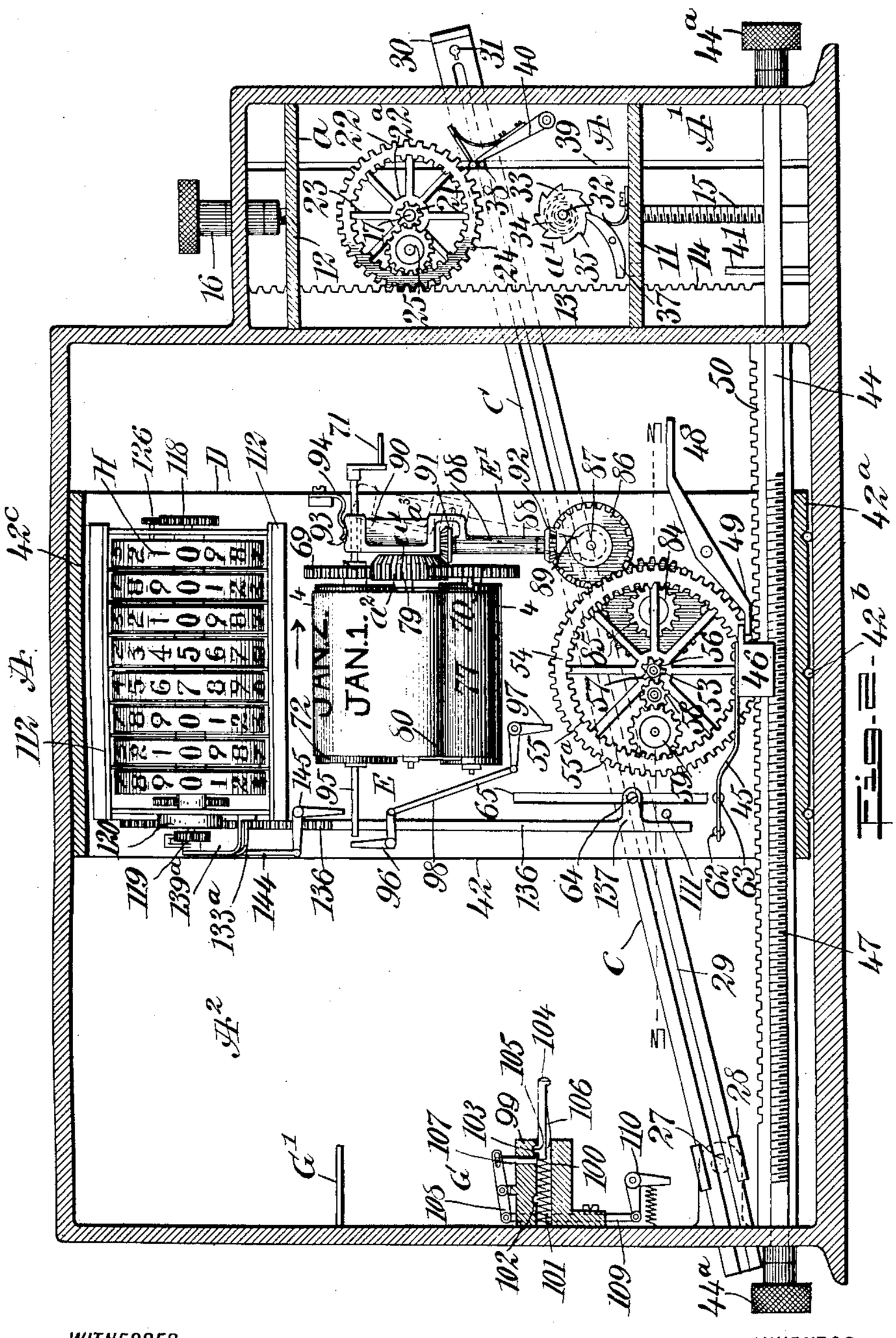


WITNESSES:
E. J. Jarvis.
H. E. Ackley

INVENTOR
Walter M. Braly
BY
ATTORNEYS

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W. M. BRALY.

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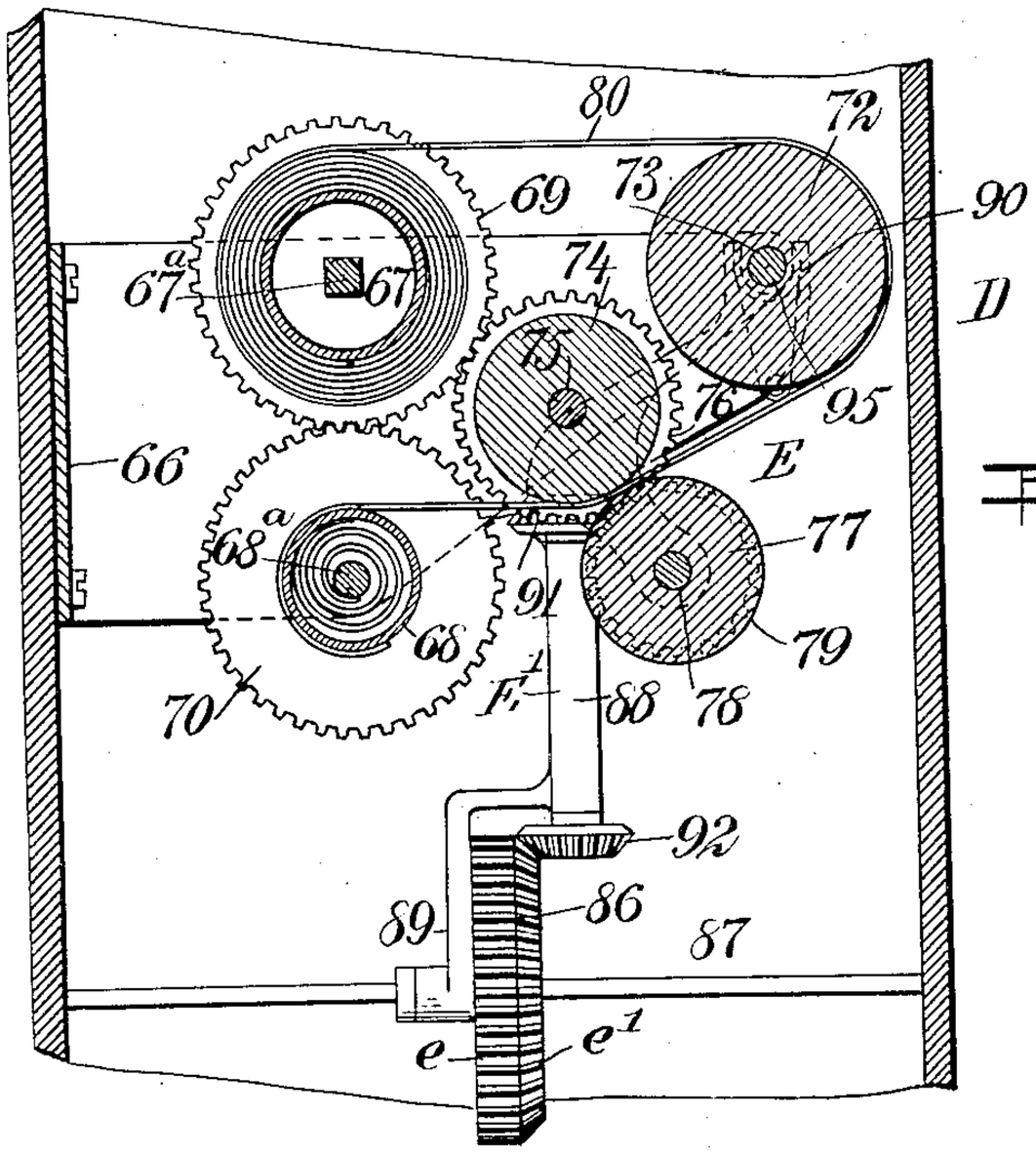


Fig. 4.

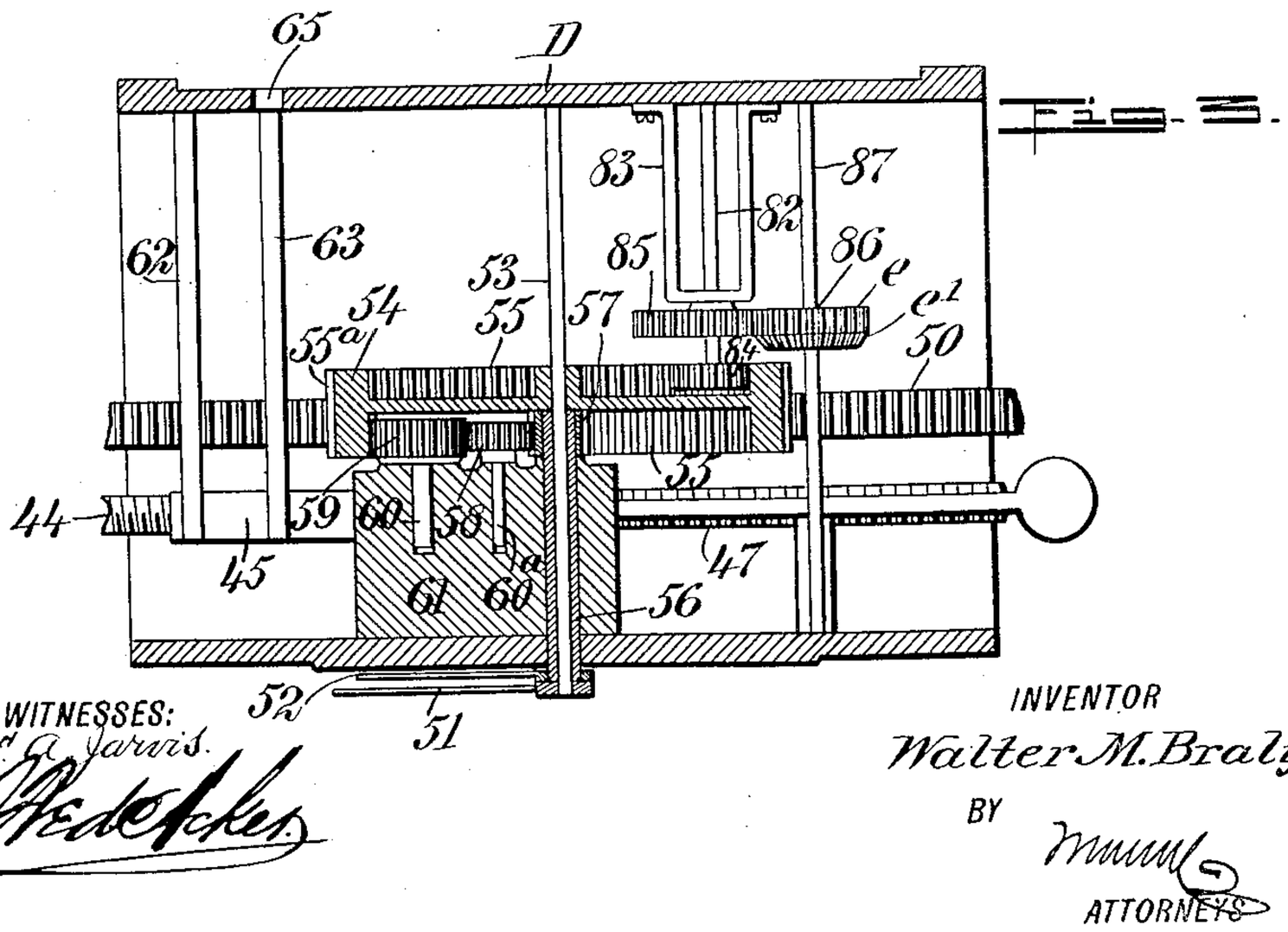


Fig. 5.

WITNESSES:
C. A. Jarvis.
J. Fred Acker.

INVENTOR
Walter M. Braly
BY
ATTORNEYS

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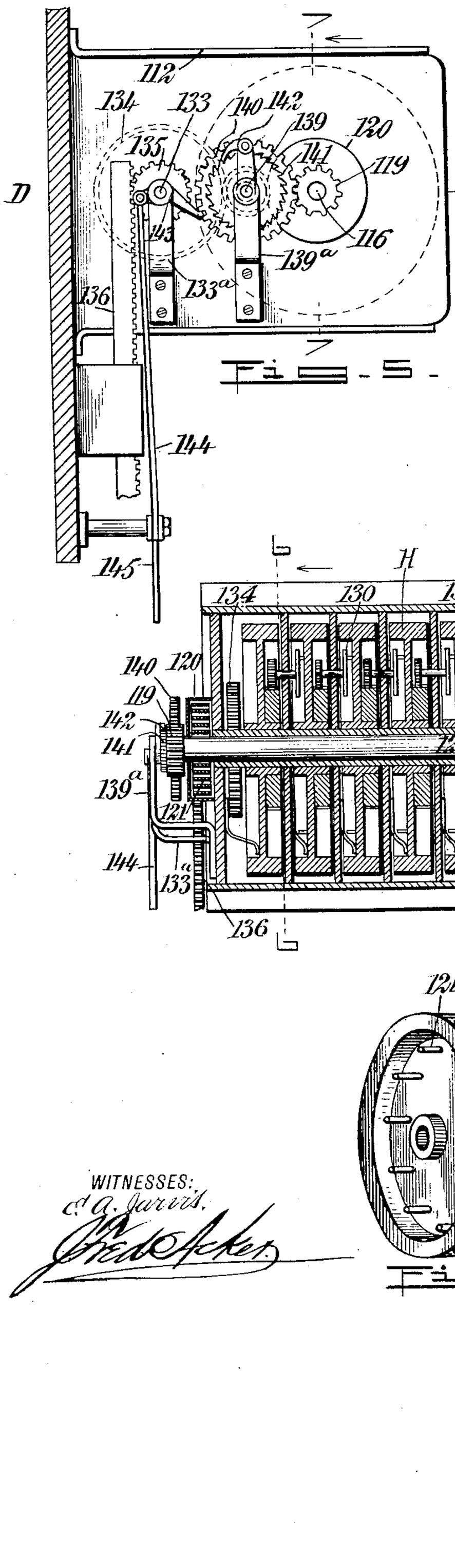


Fig. 5.

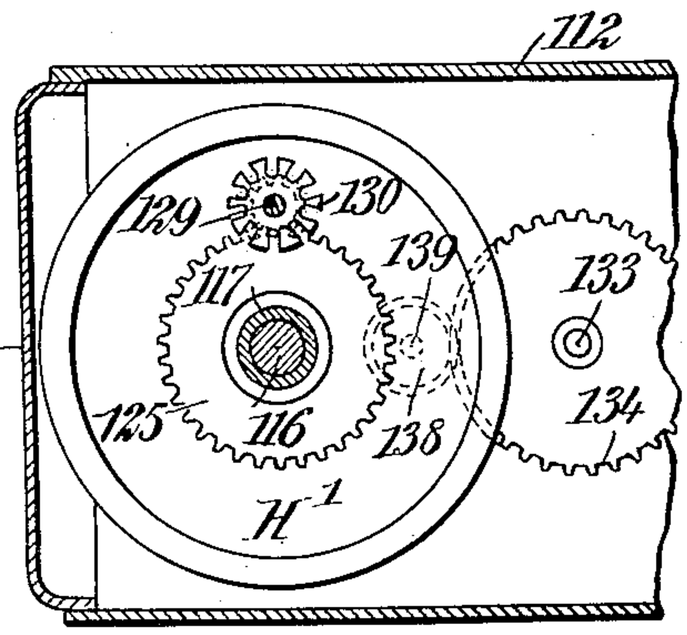


Fig. 6.

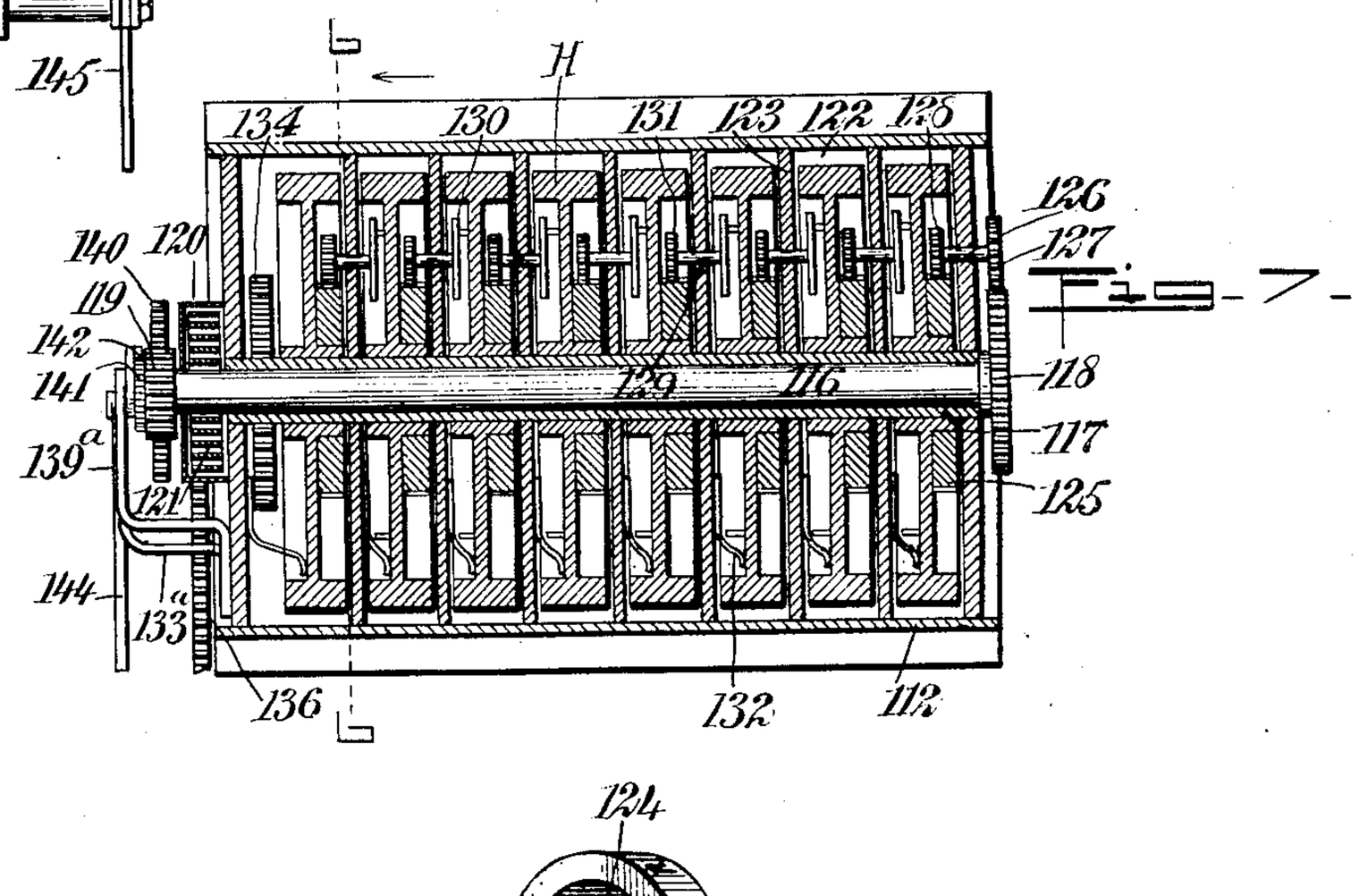





Fig. 8.

WITNESSES:
C. A. Jarvis.
Fred Acker.

INVENTOR
Walter M. Braly
BY
Munn & Co.
ATTORNEYS

# UNITED STATES PATENT OFFICE.

WALTER MARTIN BRALY, OF BLACKWELL, OKLAHOMA TERRITORY.

## MACHINE FOR CALCULATING INTEREST AND PERCENTAGE.

No. 818,222. Specification of Letters Patent. Patented April 17, 1906.

Application filed February 15, 1905. Serial No. 245,724.

*To all whom it may concern:*

Be it known that I, WALTER MARTIN BRALY, a citizen of the United States, and a resident of Blackwell, in the county of Kay and Territory of Oklahoma, have invented a new and Improved Machine for Calculating Interest and Percentage, of which the following is a full, clear, and exact description.

The purpose of the invention is to provide a machine adapted for calculating interest and percentage and which at the same time when set to a date from which interest is to be computed will automatically indicate date after date until when the example is finished the day and date to which the interest is computed, together with the time, rate, and amount, will appear in full view at the exterior of the machine.

Another purpose of the invention is to so construct a machine of the character described that it will be simple with respect to mechanism, readily understood, conveniently operated, and accurate in operation.

A further purpose of the invention is to improve upon and simplify the construction of a similar machine for which Letters Patent were granted to me September 20, 1904, No. 770,710.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of the improved machine. Fig. 2 is a longitudinal vertical section taken about centrally through the machine. Fig. 3 is a horizontal section taken through the time-dial mechanism practically on the line 3 3 of Fig. 2, the view being drawn upon an enlarged scale. Fig. 4 is a vertical section through the date-indicating mechanism, also drawn on an enlarged scale, the section being taken practically on the line 4 4 of Fig. 2. Fig. 5 is an end view of the casing containing the mechanism for computing the interest, the view being also on an enlarged scale. Fig. 6 is a transverse section through the interest-computing mechanism, also drawn upon an enlarged scale, the section being taken practically on the line 6 6 of Fig. 7. Fig. 7 is a longitudinal vertical section through the interest-computing mechanism, the section being taken substantially on the line 7 7 of Fig. 5; and Fig. 8 is a detail perspective view of one of the disks forming a portion of the interest-calculating mechanism.

A represents the case of the machine, which case may be of any desired construction. Preferably at the right-hand end of the case a chamber A′ is formed, extending from top to bottom of the case, and in this chamber a carriage *a* is mounted for vertical movement, comprising a front and a rear member and a bottom member 11 and a top member 12, together with a vertical partition *a′*, dividing the carriage into two compartments.

In the bottom member 11 and the top member 12 of the carriage corresponding openings are produced, through which openings a rack-bar 13 extends, being secured to the top and bottom of the chamber A′. The teeth 14 of the rack-bar are produced in its outer edge, or the edge facing the right-hand end of the case A, as is best shown in Fig. 2. A screw 15 is mounted to turn in the bottom of the chamber A′, and this screw extends loosely through the bottom 11 and the top 12 of the carriage *a* and out through the top of the case A, being provided at its outer end with a thumb-piece 16, whereby the said screw may be turned. The screw 15 passes through the rear compartment of the carriage *a*, and by means of suitable mechanism at the rear of the carriage *a* the said carriage may be readily raised and lowered; but the fine adjustment is made by means of the said thumb-piece 16.

I desire it to be understood that the adjusting mechanism for the carriage forms no portion of the present improvement.

A post 17 is mounted to turn in the front of the carriage *a* and in the partition *a′*, and this post extends out through the center of a dial B, produced or formed upon the front face of the said carriage *a*, as is shown in Fig. 1. This dial is a rate-dial and is of circular formation. It comprises an outer division *b* and an inner division *b′*, the outer division being pointed off in fractions and the inner division in full numbers, as is shown in Fig. 1. A pointer 18 is made to frictionally engage with the outer end of the post 17 and to travel over the inner division *b′* of the dial, while, preferably, a double pointer 19 is made to travel over the outer division *b* of the said

rate-dial B. This double pointer 19 is provided with a sleeve 20, adapted to turn freely on the post 17, as is shown in Fig. 1, and at the inner end of the said sleeve 20 a pinion 21 is secured, which pinion is located at the center of the hub $22^a$ of a double-faced wheel 22, said hub being secured to the post 17 in front of the partition $a'$ in the carriage $a$. The wheel 22 is termed a "double-faced" wheel, as its rim is provided with interiorly-located teeth 23 and exteriorly-formed teeth 24, the exteriorly-formed teeth being adapted for engagement with the teeth of the rack 13, as is shown in Fig. 2, while the interiorly-located teeth 23 engage with a gear 25, mounted to turn on a suitable pin secured to the front of the carriage $a$, and this gear 25 meshes with the pinion 21.

The knob 26 (shown in Fig. 1) is adapted to operate the quick-acting mechanism above referred to for raising and lowering a carriage $a$. As is shown and described in the patent above referred to, I employ an operating-lever C, constructed in two members, only one of which is needful to be shown in the present application—namely, the front member $c$. The lever C is fulcrumed by a pin 27, which carries a guide-sleeve 28, and the front member of the lever C has sliding movement in this sleeve. The member $c$ of the operating-lever C is provided with a longitudinal slot 29, and said member $c$ of said lever C passes through a vertical slot made in the right-hand side of the carriage $a$.

After the hands or pointers have been set on the rate-dial B, which is done by hand, the pointers are restored to their zero position by the downward movement of the carriage $a$, which is brought about by the bodily-downward movement of both of the members of the operating-lever C. The rear member of the operating-lever C is provided with a forwardly-extending flange 30 at its outer end, and a suitable form of latch 31 is provided at the outer ends of the members of the lever, whereby the two members may be moved together or one moved independent of the other.

Near the bottom of the carriage $a$ a horizontal post 32 is located, and this post has secured thereto a ratchet-wheel 33, occupying a position between the partition $a'$ of the carriage and its back. This post is controlled by a spring 34, as is shown in Fig. 2, and carries a dial 35, having numerals thereon, a numeral on which dial, as it is turned by the movement of the post, appearing at an opening 36 in the front of the carriage, as is shown in Fig. 1. The ratchet-wheel is engaged by a spring-controlled pawl 37, and said ratchet-wheel 33 is turned at the upward movement of the forward member $c$ of the operating-lever C, so as to indicate the number of times that the said member of the lever has been carried downward and upward. This movement of the dial at the upward movement of the forward member of the operating-lever C is brought about by securing a pin 38 to the front member $c$ of the operating-lever, which pin travels in a vertical slot 39, made in a strip which extends from top to bottom of the chamber A′ of the case A, and the said pin is adapted to engage with a dog 40 of angular formation, comprising a body member and a head member hinged to the body member and controlled by a suitable spring normally holding the head member at an angle to the body member, as is shown in Fig. 2, and the body member of the dog 40 will drop by gravity, and as the said member $c$ of the operating-lever C is carried upward the pin 38 engaging with the dog will force its head member against a tooth of the ratchet-wheel 33, turning the said ratchet-wheel one tooth, thereby presenting a different figure at the opening 36. When the carriage $a$ travels down to the bottom of the case A, a pin 41 will enter an opening in the bottom of the carriage $a$ and will trip the pawl 37, permitting the spring 34, controlling the movement of the post 32, to restore the ratchet-wheel to normal or zero position.

A second carriage D is located in the case A, being adapted to have lateral movement from the compartment A′ to the opposite end of the case. The said carriage D consists of a back section 42, a bottom section $42^a$, provided with friction-rollers $42^b$, which travel on the bottom of the case A, as is shown in Fig. 2, a top $42^c$, and a front section 43. The carriage is given motion through the medium of a screw-shaft 44, located at the bottom portion of the case A and extending through from end to end above the bottom portion of the said carriage D, as is also shown in Fig. 2. The said shaft 44 is provided with knobs $44^a$ at its end portions, whereby the shaft 44 can be turned by hand. A spring 45 is secured to the back of the carriage D, and this spring has a nut 46 attached to its free end, the under face of which nut is concaved and threaded and is normally in engagement with a thread 47 on the shaft 44, as is also shown in Fig. 2.

When it is desired to move the carriage D rapidly, the block 46 is lifted from engagement with the screw-shaft 44 through the medium of a lever 48, which extends beyond one side edge of the carriage, and the said lever is provided with a foot 49, which engages with the under face of a projection from the nut 46, so that by pressing down on the lever 48 the nut 46 is raised from engagement with the screw-shaft and the carriage D may be moved without interruption from one end of the main compartment of the case A to the other.

A rack 50 is secured to the bottom portion of the case or casing A, extending the length of the main chamber $A^2$, in which the carriage

D is located. This rack is instrumental in operating the hands of a time-dial D′, produced upon the outer face of the carriage D at its bottom portion, which time-dial has two divisions *d* and *d′*, the division *d* being pointed, however, to indicate the days of the month and the division *d′* the months of a year. As is illustrated in Figs. 1 and 3, two pointers 51 and 52 are employed, the pointer 51, which is the longest, being adapted to travel over the division *d* for the days, and the shorter pointer travels over the division *d′*, indicating the months of the year. The longer pointer 51 is attached to a post 53, mounted to turn in the carriage D, and this post is revolved by means of a master-gear 54, which has internal teeth 55 and external teeth 55ª, the external teeth 55ª being in engagement with the teeth of the rack 50. The shorter pointer 52 is secured to a sleeve 56, which turns loosely upon the post 53, as is shown in Fig. 3, the said sleeve at its inner end being provided with a pinion 57, which pinion 57 meshes with a second pinion 58, slightly larger in size, and the pinion 58 meshes with a still larger pinion 59, which pinion 59 in its turn meshes with the internal teeth 55 of the master-gear 54. The two pinions 58 and 59 are mounted upon spindles 60 and 60ª, carried by a support 61, attached to the front section of the carriage D, as is shown in Fig. 3, but other supporting means may be employed, and in said Fig. 3 the spindles 62 and 63 are shown, which carry the spring 45.

The operation of the master-gear 54 in moving to the right brings into operation a mechanism E or calendar-section for automatically displaying the names of the months and the days within the compass of the intended calculation of interest or percentage and may be termed the "calendar section or mechanism" of the machine. This mechanism E is shown in Figs. 2 and 4 and is supported by bearings 66, secured to the back of the carriage D and which extend in direction of the front.

At the rear portion of the bearings 66 two winding-rollers 67 and 68 are journaled, one above the other, the upper winding-roller being comparatively large and plain and the lower winding-roller being tension or spring controlled, and the upper roller 67 is provided with a gear 69, secured to its shaft 67ª at one end, which gear 69 meshes with a like gear 70, secured to the corresponding end of the shaft 68ª of the said lower or spring-controlled roller. That portion of the shaft 67ª of the upper roller 67 which passes through the roller is polygonal in cross-section, as is shown in Fig. 4, and at the right-hand end of the said roller-shaft 67ª a crank 71 is secured, so that the roller 67 may be manually operated.

When the master-gear 54 moves to the left, it partially restores the calendar-section E to normal or zero position until it is disconnected from the said calendar-section by the trip mechanism G, to be hereinafter described, whereupon the spring-controlled roller 68 will finish restoring the calendar-section E to its normal position.

A display-roller 72 is journaled in the bearings 66 at their upper forward portions, and the shaft 73 for the said roller is tubular. Between the rollers 67, 68, and 72 a guide-roller 74 is mounted to revolve, and at one end of the shaft 75 of said roller a gear 76 is secured, which meshes with the gear 69 on the shaft for the roller 67, and below and slightly in advance of the guide-roller 74 a second guide-roller 77 is mounted, the two guide-rollers being nearly in engagement. The shaft 78 of the lower guide-roller 77 is provided at one end with a double-toothed gear 79, (shown best in Fig. 2,) which gear is provided with straight peripheral teeth $a^2$ and beveled teeth $a^3$, the straight teeth being made to mesh with the gear 76, carried by the guide-roller 74, while the beveled teeth are employed in making the driving connection, to be hereinafter described, between the calendar mechanism and the operating mechanism for the time-dial.

The calendar mechanism is completed by the addition of a tape or apron 80, having produced thereon the names of the months of the year, the days in their order, and the names of the days of the week, if desired. This tape or apron 80 is secured at one end to the upper winding-roller 67 and at its other end to the spring-controlled roller 68, and said tape or apron passes over the display-roller 72 and between the guide-rollers 74 and 77, and a date produced upon the apron can be read at any time at the display-opening 81 in the front of the carriage D, as is shown in Fig. 1.

The driving connection between the calendar mechanism and the time-dial mechanism is as follows: A small shaft 82 is journaled in a suitable bearing 83 at the rear of the master-gear 54, as is shown in Figs. 2 and 3, and a pinion 84 is secured on said shaft, together with a gear-wheel 85. The pinion 84 meshes with the internal teeth 55 of the master-gear 54, and the gear 85 meshes with the plain peripheral teeth *e* of a double gear 86, mounted to turn upon a transverse shaft 87, said gear 85 being provided with beveled teeth *e′* on one side face at the periphery. An angular bracket E′, comprising a straight body-section 88, an L-shaped foot-section 89, and a forwardly and upwardly extending member 90, is pivoted, by means of its foot-section 89, on a shaft 87, adjacent to the double gear 86, as is shown in Fig. 4, and the said bracket E′ is capable of being swung at its upper end to and from the gear of the calendar mechanism E. A shaft is journaled in the straight

body-section of the said bracket E′, and this shaft is provided with a beveled gear 91 at its upper end and a beveled gear 92 at its lower end. The beveled gear 92 is adapted to normally engage with the beveled teeth *e′* on the double gear 86, and the beveled gear 91 is adapted for engagement with the beveled teeth $a^3$ on the double gear 79, carried by the shaft of the lower guide-roller 77. In this manner it will be observed that motion is communicated to the rollers of the calendar mechanism by the movement of the master-gear 54.

The upper end of the extension-section 90 of the bracket E′ is provided with a concavity 93, into which a suitably-formed spring 94 enters, which spring is secured in any suitable or approved manner to the right-hand side portion of the carriage D, and this spring serves to hold the bracket E′ in such position that its gears will be in mesh with the gearing for the calendar mechanism.

After the interest or percentage has been computed and the date to which it is computed appears at the sight-opening 81 the gearing on the bracket should be carried out of driving connection with the gearing of the said calendar mechanism, and this is accomplished by carrying the bracket E′ to the right at its upper end, as is shown by dotted lines in Fig. 2, thus taking the beveled gear 91 out of engagement with the double gear 79, and to that end a rod 95 is passed through the tubular shaft of the display-roller 72, and the said rod extends beyond both ends of this roller and at one of its ends is secured to the upper end of the bracket E′. Thus when the left-hand end of the rod 95 is pushed to the right the upper gear of the bracket E′ will be disconnected from the gearing of the calendar mechanism, and when the said calendar mechanism is to be set in motion it is simply necessary to push the upper end of the bracket to the left.

The mechanism for throwing the bracket E′ to the right to disconnect its gears from the gearing of the calendar mechanism is illustrated in Fig. 2 at the left of said calendar mechanism and consists of an upper elbow-lever 96, opposite the left-hand end of the rod 95 and adapted to engage the same, a lower elbow-lever 97 and a link 98 connecting the two levers. The lower lever 97 is moved by a trip mechanism G, located at the left-hand end of the main compartment $A^2$ of the case A, as is also illustrated in Fig. 2, and such action is brought about when the carriage D has been moved as far as possible to the left. At such time the lever 97 will be rocked upward, causing the lever 96 to be rocked downward, thereby bringing it into pushing engagement with the rod 95, connected with the bracket E′, thus forcing the said bracket to the right.

The trip mechanism G consists of a block 99, having a horizontal chamber 100 therein, containing a spring 101, and in the upper wall of said chamber two recesses are produced, an inner one 102 and an outer one 103. A pin 104 is held to slide in the chamber 100, which pin at its inner end is provided with a lug 105, adapted to enter the recesses 102 and 103. When the pin 104 is pressed inward, the spring 101 is placed under tension, and the lug 105 will be held in the inner recess 102 by the action of a spring 106, located below and attached at one end to the pin 104, the diameter of the pin being much less than the diameter of the chamber containing it.

When the pin 104 is in its inner position, it can be released to assume the outer position shown in the drawings by pressing a finger 107 downward on the pin, which finger has movement in the upper portion of the block 99 and is attached to one end of a lever 108, fulcrumed at its center on the block 99, the other end of the lever being pivoted to a link 109, and the link in its turn is pivoted to a spring-controlled elbow-lever 110. The lever 110 normally holds the finger 107 up out of the chamber 100; but the finger is carried downward to release the finger 104 when the carriage D is moved far enough to the left to bring a projection 111, extending forwardly from its back, into engagement with the said elbow-lever 110.

The computing mechanism is shown in Figs. 2, 5, 6, 7, and 8 and is located in a box-casing 112, open at the front, which casing is secured to the back of the carriage D at the upper portion of its inner face, and said mechanism is read at an opening 113 made in the front of the carriage D, as is shown in Fig. 1. Below this sight-opening 113 a second smaller and parallel opening 114 is made, through which a pointer 115 extends upward to the sight-opening 113. This pointer is mounted to slide transversely of the carriage D and bears the characters indicating dollars and cents. Above the sight-opening 113 the following matter appears, reading from the left: The character representing cents, the word "Dimes;" the character representing dollars, the word "Tens;" the abbreviation for hundreds, and the abbreviation for thousands, and then follows the abbreviations for thousands read decimally.

A shaft 116 is centrally journaled in the box-casing 112, and a sleeve 117 is mounted to turn on the said shaft. The said shaft is provided at its right-hand end with a gear 118 and at its left-hand end with a pinion 119, and also at the left-hand end of the shaft outside of the box-casing a drum 120 is located in which the shaft turns, and in this drum a spring 121 is located coiled around the said shaft, one end of the spring being attached to the shaft and the other end to the drum.

The box-casing is divided into a series of compartments 122 by means of suitable par-

titions 123, and in each compartment a disk or numeral-wheel H is mounted to freely turn, and each disk with the exception of the disk at the extreme left of the series is provided on its left-hand face with a series of pins 124. On the periphery of the disk numerals are produced at regular intervals apart reading from "0" to "9," and a pin 124 is opposite each numeral. At the right-hand side of each disk or wheel H a gear-wheel 125 is secured to the hub of the disk or to its right-hand face, and the peripheral surface of each wheel or disk H extends beyond both sides of its central or web portion.

A short shaft 126 is journaled in the right-hand end of the box-casing 112, as is shown in Fig. 7, and this shaft is provided at its outer end with a pinion 127, which meshes with the gear 118. At the opposite or inner end of the shaft 126 a smaller pinion 128 is secured, which pinion meshes with the gear 125 on the first wheel or disk H at the right-hand end portion of the said casing 112. A corresponding short shaft 129 is journaled in each partition 123, all of the said shafts 129 and 126 being above the main shaft 116. Each short shaft 129 is provided at its right-hand end with a star-wheel 130 and at its opposite end with a pinion 131. Therefore a star-wheel and accompanying pinion are located in adjoining compartments 122, and the teeth of a star-wheel in a compartment are adapted to receive between them the pins 124 on the disk or numbered wheel H in the same compartment, so as to transmit motion through the medium of the connected pinion to the disk or numbered wheel in the next compartment, and when one disk, commencing at the right, has made one revolution it will have moved the next disk to the left the distance of the space between two of the members on the periphery of the latter disk. The said disks are held from being accidentally moved by means of springs 132, preferably located below the main shaft 116, the springs being attached to the partitions 123 at one end and having bearing against the webs or body portions of the wheels or disks H at their free ends, as is also shown in Fig. 7.

A short shaft 133 is mounted in the end of the box-casing 112 and in a bracket $133^a$, and within said box-casing a gear 134 is secured to the shaft, while at the outside of the casing a pinion 135 is secured to the same shaft. The pinion 135 engages with the teeth of a rack 136, having suitably-guided movement upon the inner face of the back of the carriage D, and said rack extends down toward the bottom of the carriage, being provided with an extension 137, attached to the pin 64, having sliding movement in the slot 65 of the carriage, which pin enters the slot 29 in the operating-lever C, so that the rack 136 is vertically reciprocated at each operation of the operating-lever. The gear 134 within the casing 112 meshes with a pinion 138 also within the casing, which pinion is secured to a shaft 139, journaled in the left-hand end of the casing and in a bracket $139^a$. This shaft has frictionally mounted thereon a gear 140, and a ratchet-wheel 141, connected with the gear 140, is also frictionally mounted on the same shaft, being provided with a pawl 142, likewise mounted upon the shaft 139, and a dog 143 is pivoted on the shaft 133, which dog is normally in engagement with the teeth of the frictionally-mounted gear 140, as is shown in Fig. 5.

It may be remarked that when the operating-lever C is lowered to zero it will carry the pin 64, and thereby the bar 36, to normal or zero position also; but the disks H will not move at the downward movement of the operating-lever C, being held in position by the dog 143; but at the upward movement of the operating-lever C the disks H will be moved as much farther as they were previously moved, thereby causing twice the amount to appear at the opening 113.

It may be here remarked that the frictional contact between the ratchet-wheel 141 and the gear 140 and the shaft 139 is sufficient to overcome the resistance of the disks H in operation, but is not sufficient to overcome the resistance of the spring 121 when the dog 143 is raised from the gear-wheel 140.

It will be understood that the disks H are brought into action by the movement of the operating-lever C, and the special disks operated are controlled by the number of operations of said lever. As the disks H are turned to work out a problem the spring 121 is wound up, but when the result has been obtained the dog 143 is disengaged from the gear 140, and the spring then acts to reverse the disks and restore them to a reading at zero.

The tripping of the dog 143 is accomplished by connecting an elbow-lever 145, fulcrumed on the back section of the carriage D, with the dog 143 by means of a link 144. Thus when the carriage is pushed far enough to the left for the lever 145 to engage a pin G′ in the main compartment $A^2$ the lever is operated upon and the dog is lifted.

It will be understood that as soon as the bracket E′ is carried away from the gearing of the calendar mechanism the spring-roller 68 acts to rewind the apron or tape 80 thereon.

It will be observed from the foregoing description and by reference to Figs. 5 and 6 that the pinion 138, the shaft 139, and the pawl 142 may move in one direction—namely, backward—without turning the gear 140 or the ratchet 141, as the dog 143 will hold the gear 140 and the pawl 142 will slip over the teeth of the ratchet 141; but when the pinion 138, the shaft 139, and the pawl 142 are turned in the forward or working direction the pawl 142 will catch a tooth

on the ratchet-wheel 141, thus turning it and the gear 140, which will cause the different figures to show at the opening 113.

The object of having the dog 143 and the pawl 142 is to provide for multiplying by the use of the front member *c* of the operating-lever C. The dog 143 serves to hold the gear 140 while the said front member *c* of the operating-lever C is carried downward, thus preventing the figures at the opening 113 from changing, and the pawl 142 serves to operate the gear 140 in the forward or working direction by engaging a tooth on the ratchet-wheel 141 when the said front member *c* of the operating-lever C is raised, thus causing a different result to show at the opening 113.

In the operation of the machine supposing the problem is to take a principal of two thousand dollars from March 4 to June 26 at the rate of six per cent. To find the interest, first set the decimal-point 115 in the thousands place, then move the pin 104 into the chamber 100 of the device G, next turn the crank 71 until "March 4" appears at the opening 81 and push the crank in as far as it will go. Now raise the carriage *a* until "six per cent." is indicated on the rate-dial B, press down the lever 48, and move the carriage D to the right until "June 26" appears at the opening 81. The interest (nineteen dollars) on one thousand dollars will now be shown at the opening 113. Multiply this once by lowering the member *c* of the operating-lever C as far as it will go, and then raise the said lever. The figure "2" will now show at the opening 36 and 38 or the interest on the two thousand dollars for the given time at the given rate will show at the opening 113 and the number of days will show on the time-dial D'. When the carriage D is moved to the left as far as it will go, the element 111 will engage with the elbow 110, thus releasing the pin 104, which in turn releases the calendar attachment, and the element G' will strike the elbow-lever 145, thus raising the dog 143, whereupon the spring 121 will restore the disks H to zero.

When the carriage A is lowered, the pointer on the dial B will return to zero and the element 41 will trip the element 37 and the figure "1" will show at the opening 36.

In further explanation of the operation it must be understood that the calendar-section of the machine is intended for use in the calculation of what is termed "bankers' interest"—that is, counting the exact number of days, but counting each day as one three-hundred-and-sixtieth part of a year. Thus, as has been previously described in the specification, where the time is given as from March 4 to June 26, or by actual count a period of one hundred and fourteen days, by counting each day as one three-hundred-and-sixtieth part of a year the bankers' interest on one thousand dollars is nineteen dollars and the bankers' interest on two thousand is twice nineteen dollars, or thirty-eight dollars, as has also been described in the specification. If the exact interest is required, one seventy-third of thirty-eight dollars, or fifty-two cents, must be deducted from thirty-eight dollars, leaving thirty-seven dollars and forty-eight cents as the exact interest.

If it is so desired, a machine can be so made as to calculate exact interest direct without deducting one seventy-third of interest shown by the machine; but if a machine is so made one seventy-second of interest shown by the machine must be added for bankers' interest. If such a machine were used in the problems given in the specification, the figures "18.739" would appear at the right-hand side of the opening 113. The decimal-point 115 being set at thousands place would come between the figures "8" and "7", thus showing the exact interest on one thousand dollars for the given time to be "$18.739," which being multiplied once would show at the opening 113 "$37.478," or the exact interest on two thousand for the given time.

It may here be remarked that the rear member *c* of the operating-lever C is attached to the carriage A by means of a suitable pin, which cannot be conveniently shown on the drawings, but which forms a feature of my previous patent referred to. Thus it will be seen that when the carriage A is raised to indicate the rate of interest it carries the end of the operating-lever with it, and thus brings said lever to an angular position with respect to the main frame of the machine. Then when the carriage D is moved to the right the bar 136 is raised by means of the pin 64 working in the slot 29 of the operating-lever C. Thus the number wheels or disks are operated to indicate interest at the opening 113.

The decimal-point 115 is used to point off the dollars and cents. All of the figures at the opening 113 to the left of the decimal-point 115 are regarded as dollars, while all those to the right of the decimal-point indicate cents, mills, and fractions of mills, it being understood that if the principal upon which interest is computed is in cents, as $.01, $.02, $.03, the decimal-point 115 must be set at the cents' place, so marked in the drawings, Fig. 1. If the principal is in tens or dimes, as .10, .20, .30, or the like, the decimal-point must be set at tens. If the principal is in dollars, the decimal-point is set to the dollar-mark.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a machine for computing interest and percentage, a carriage, means for moving the carriage, a time-dial on the carriage, pointers for the same, a mechanism for operating the pointers by the movement of the carriage, a

computing mechanism operated by the actuating mechanism for the carriage, and a calendar-controlling mechanism operated by the operating mechanism for the said pointers.

2. In a machine for calculating interest and percentage, a casing, a carriage having vertical movement in said casing, a rate-dial carried thereby, pointers for the said rate-dial, and a mechanism for operating the pointers, operated by the movement of the carriage, a second carriage having movement in the casing at right angles to the first-named carriage, a time-dial located on the second carriage, pointers for the time-dial, mechanism for operating the said pointers, operated by the movement of said second carriage, a computing mechanism located in the second carriage, an operating-lever common to both of the carriages and adapted to impart movement to one carriage and the computing mechanism of the other, an operating connection between the said lever and the said computing mechanism, and a calendar-control mechanism located between the computing mechanism and the time-dial, also operated by the movement of the second carriage.

3. In a machine for calculating interest and percentage, a casing, a carriage having vertical movement in the said casing, a rate-dial carried thereby, pointers for the said rate-dial, and a mechanism for operating the pointers, operated by the movement of the carriage, a second carriage having movement in the casing at right angles to the first-named carriage, a time-dial located on the second carriage, pointers for the time-dial, mechanism for operating the said pointers, operated by the movement of the said second carriage, a computing mechanism located in the second carriage, an operating-lever common to both of the carriages and adapted to impart movement to one carriage and the computing mechanism of the other carriage, an operating connection between the said lever and the said computing mechanism, a calendar-control mechanism located between the computing mechanism and the time-dial on the second carriage, which mechanism consists of a plain winding-roller, a spring-controlled winding-roller, a display-roller and guide-rollers, and an apron carried by the rollers, gears carried by sundry of the said rollers, and a driving connection between the gearing of the rollers and the operating mechanism for the pointers for the time-dial.

4. In a machine for calculating interest and percentage, a casing, a carriage having vertical movement in the said casing, a rate-dial carried thereby, pointers for the said rate-dial, and a mechanism for operating the pointers, operated by the movement of the carriage, a second carriage having movement in the casing at right angles to the first-named carriage, a time-dial located on the second carriage, pointers for the time-dial, mechanism for operating the said pointers, operated by the movement of the said second carriage, a computing mechanism located in the second carriage, an operating-lever common to both of the carriages and adapted to impart movement to one carriage and the computing mechanism of the other, an operating connection between the said lever and the said computing mechanism, a calendar-control mechanism located between the computing mechanism and the time-dial on the second carriage, which mechanism consists of a plain winding-roller, a spring-controlled winding-roller, a display-roller and guide-rollers, and an apron carried by the rollers, a bracket pivotally mounted on the said second carriage, gears carried by the said bracket, adapted to establish connection between the driving mechanism for the pointers of the time-dial and the gearing of the rollers on the calendar-control mechanism, a lock for the said bracket, and means for automatically shifting the said bracket to break the driving connection between the said calendar-control mechanism and the driving mechanism for the time-dial pointers.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER MARTIN BRALY.

Witnesses:

CHAS. B. EDENFIELD,

JOHN R. MAY.