

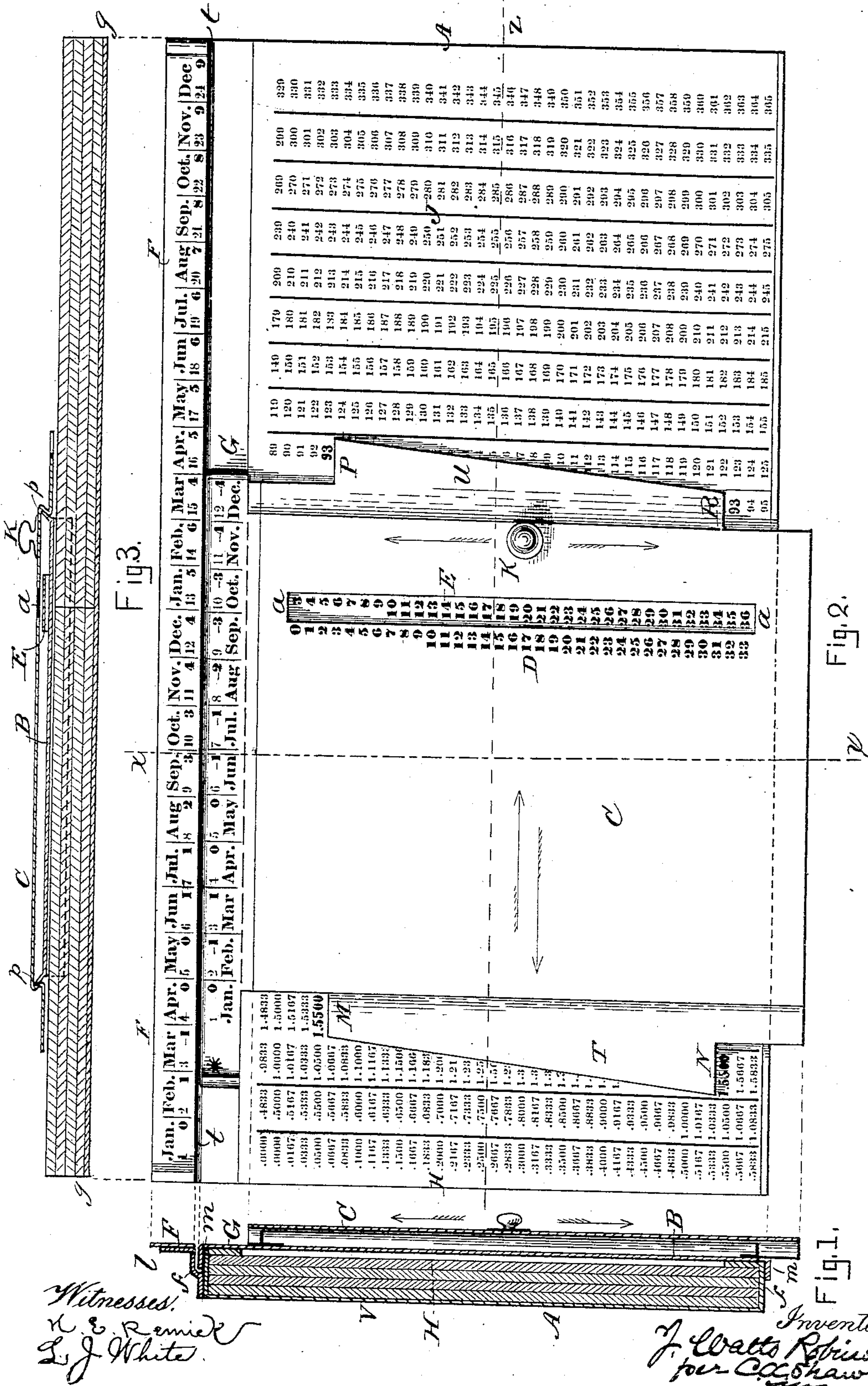
(No Model.)

J. W. ROBINSON.

MACHINE FOR COMPUTING INTEREST.

No. 294,079.

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UNITED STATES PATENT OFFICE.

J. WATTS ROBINSON, OF BOSTON, MASSACHUSETTS.

MACHINE FOR COMPUTING INTEREST.

SPECIFICATION forming part of Letters Patent No. 294,079, dated February 26, 1884.

Application filed December 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, J. WATTS ROBINSON, of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Machines for Computing Interest, Averaging Accounts, &c., of which the following is a description, sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical transverse section taken on line *x* in Fig. 2; Fig. 2, a top plan view, and Fig. 3 a vertical longitudinal section taken on line *z* in Fig. 2.

Like letters of reference indicate corresponding parts in the different figures of the drawings.

My invention relates to a means for computing interest, averaging accounts, &c.; and it consists in a novel construction and arrangement of the parts, as hereinafter more fully set forth and claimed, by which a more effective device of its character is produced than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation:

In the drawings, A represents the body of the machine; B, the carriage, and C the slide.

The body consists of an elongated box, composed of tin or any other suitable material, open at the top, and having the sides *f*, bottom *v*, and ends *g*. A bracket, *l*, projects from one side of the body, and extends its entire length, as best seen in Fig. 2.

The carriage B is adapted to slide longitudinally on the body A, being provided with two downwardly-projecting lips or flanges, *m*, one of which works in the groove *t*, between the side of the body and the bracket *l*, the other overhanging the opposite side of the body, as best seen in Fig. 1.

The slide C is mounted on the carriage B, and adapted to move transversely thereon, or at right angles to the line *z*, being supported and secured on the ways *p*, which project upwardly from the carriage. The carriage is provided on its upper side with a scale or col-

umn of figures, E, in numerical order, from 0 to 36, arranged in parallelism to the line *x*, the slide C being provided with a corresponding slot, *a*, through which the scale may be seen. In the drawings a portion of the scale, or from 0 to 3, is represented as covered by the slide C. The slide C is also provided with a scale or column of figures, D, in numerical order, from 0 to 33, arranged at one side of the slot *a*, and in parallelism therewith, the two scales D E being brought into proper positions in respect to each other by moving the slide C back and forth on the carriage B in using the machine.

The bracket *l* is provided with a scale, F, which has the names (abbreviated) of all the months running through two years, together with two series of figures, the figures of one series being larger than those of the other, as seen in the drawings, to some of which larger figures is prefixed a dash (—) or minus-sign. The carriage B is provided with a similar scale, G, consisting of the abbreviated names of months, of larger and smaller figures, and of a star, (*), the months on this scale extending through only a single year. The scale G is employed in varying combinations with the scale F in using the machine.

A portion of the body A serves as a receptacle to hold and store tables of interest-computations, peculiarly arranged at the various rates per cent. called for, a section of one of which tables (marked H) appears in the drawings in position for use. These tables of interest are of uniform size, and are held in position by the sides *ff* of the body A, and by abutting against other tables of figures placed in the other receptacle or opposite end of the body A. The table which relates to the rate of interest desired is placed at the top of the pile of tables in the left-hand receptacle, and is replaced by others, as occasion requires. The right-hand portion of the body A serves as a receptacle for another series of tables of interest, similar to those in the left-hand receptacle, and also for a table of figures running from 1 to 365, peculiarly arranged, as hereinafter explained, the figures thereon representing days. A portion of this last-mentioned table appears in the drawings, and is marked J.

The slide C has a knob or projection, K, for

convenience in moving the slide, and also the carriage B, or either, as desired. The slide C is provided on its sides with laterally-projecting flanges T U of peculiar and suitable shapes, as shown in Fig. 2 of the drawings, the flange T being provided with the square end M and shoulder N, and the flange U with the end P and shoulder R, these being used to indicate the interest or days, as explained in the examples hereinafter given.

The object of the machine is, first, to show mechanically, and in a ready and simple manner, the interest on one dollar at any rate per cent., and for a period between any two dates within a year of each other, using either three hundred and sixty or three hundred and sixty-five days to the year basis, and counting either thirty days to the month or the actual number of days between the dates, and without computing or even necessarily knowing the length of time; secondly, to show the interest at any rate per cent. on the same amount, without regard to dates, for any number of months of thirty days each, plus the odd days, or for the actual number of days, with but little or no computation, as will be shown in the accompanying examples; thirdly, to show the interest on any number of dollars less than three hundred and sixty-five, or on multiples of any number of dollars less than three hundred and sixty-six, by ten, one hundred, one thousand, or ten thousand—as, for example, \$275, \$2,750, \$27,500, \$275,000, or \$2,750,000—without any computation whatever; fourthly, to ascertain mechanically, in a simple and ready manner, for any purpose whatever, the time either in months of thirty days each, plus days, or in actual number of days between any two dates.

The machine may be made to show interest at any two desired rates per cent., simultaneously and by the same operation, by placing one of the rates on top in the left-hand receptacle or end of the body, and the other on the top in the right-hand receptacle or end of the body, or to show interest at any one rate, and also the length of time between dates, simultaneously and by same operation, by arranging the tables so as to show the table of interest on top at the left and the table of days on top on the right of the body A.

The operation is as follows:

First, to show, simultaneously and by the same mechanical operation, the interest on one dollar between any two dates, (counting each calendar-month as thirty days, or the twelfth part of a year, and each of the odd days as the three-hundred-and-sixtieth part of a year,) and also the time between the same two dates, (counting time in same manner,) place the table of interest at the required rate on the top of the other tables in the left-hand receptacle and the table of days on top in the right-hand receptacle, as represented in Fig. 2 of the drawings. Then move scale G so that the month of the first date thereon shall be directly below the month of last on scale

F. Then move the slide C so that the date in the first month on the scale D will be exactly opposite to date in last month on scale E, and the figures representing the interest will be seen directly above the end M or below the shoulder N of the flange T; or at both of these points. (There can be no mistake made in referring to these points, for wherever figures appear at both points at the same time the figures so appearing will be exactly alike.) By the same operation the number of days, counting time in the same manner, between the dates will be seen directly above end P or below shoulder R, or at both points, of the flange U.

Secondly, if interest is to be shown for the actual number of days from date to date, exactly the same process is performed; but afterward the slide C is moved down or up a distance equal to that of a number of spaces on the scale E equal to the positive or negative sum, respectively, of the two large numbers situated on scales F and G, and between the first and last months between which interest or time is desired. If the sum of these two numbers be a minus quantity, the slide C is moved up as many spaces as there are units in this sum, and if the sum be a plus quantity the slide C is moved down as many more spaces as there are units in the sum, (or, the sum of the two numbers on scales F and G, as just mentioned, may be added to or subtracted from the last date, according as this sum is a plus or minus quantity,) and the first date on scale D be brought directly opposite this increased date or scale E. In either case the interest or time will be shown, as explained above.

Example: To show interest on one dollar at six per cent., (this table being represented in drawings as being on top and marked H,) from March 4 to June 7, (thirty days to the month,) move the carriage B so that "Mar." on scale G will be directly below "Jun." on scale F, and move slide C so that "4" on scale D will be exactly opposite "7" on scale E, and the figures "1.5500" immediately either above the end M or below the shoulder N of the slide C, represent the interest required, in cents and decimals thereof, for the time given, as shown in Fig. 2 of the drawings. At the same time the figures "93," immediately above the end P or below shoulder R of the flange U, represent the number of days between above dates, counting each calendar-month as thirty days. If interest for the actual number of days (each day being counted as the three hundred-and-sixtieth part of a year) or time (on the same basis) is required, move the slide C down two spaces more, (equal to the sum of the large figures "1" and "1," situated on scales F and G and between "Mar." and "Jun.") and the interest will be shown at the points M and N, and the time (actual days) at the points P and R. By substituting a table calculated on the basis of three hundred and sixty-five days to the year for the one calculated at three hundred and sixty days to the year, interest for

the actual number of days from one date to another on this basis may be obtained in a similar manner. To find interest on ninety-three dollars for one day, move the carriage B and slide C so that the shoulder P will be directly below or the end R directly above the figures 93 on the right-hand table, J, as shown in Fig. 2 of the drawings, and the interest will be indicated both above the end M and below the shoulder N to be 1.5500 cents. For nine hundred and thirty dollars it would of course be 15.500 cents. For nine thousand three hundred dollars, 155.00 cents, and so on by simply changing the position of the decimal point; and the same rule will hold for all amounts of dollars less than three hundred and sixty-six dollars or multiples of any of them by ten, one hundred, &c. By substituting for the table of days (now on the right in Fig. 2) any one of the tables of interest, either on the basis of three hundred and sixty or three hundred and sixty-five days to the year, interest will be shown in the same manner at two rates simultaneously by one and the same mechanical operation. In case interest is required to be shown at only one rate at a time, and the table of days is on top at the right, (as now represented in Fig. 2 of the drawings,) the shoulder P is brought directly below the given number of days on the table of days J, and the interest on one dollar will be shown directly above the end M. So, in like manner, if the interest is required for ninety-three days, bring the shoulder P (where it is represented) below 93, and the interest will be shown at M. To show interest for any number of months of thirty days, plus the odd days, disregarding dates, bring the star (*) on scale G directly under the small figure which represents on scale F the number of months, and the zero (0) on slide D opposite the number of odd days on scale E and the interest is shown, as before explained. For instance, taking the machine as represented in Fig. 2 of the drawings, the interest for three months and three days is shown, the star on scale G being below the small figure 3 on scale F, and the zero (0) on scale D exactly opposite 3 of scale E, as it would be arranged for interest at that time. When interest is required for a longer time than one year, by adding to the unit-figure of the interest, as shown on tables for the time, (not counting the whole years,) a number equal to the rate per cent. multiplied by the number of whole years between the dates, and annexing the decimal part, the interest is obtained on one dollar for the time, or between the dates, without regard to time, abstractedly, or its length between the dates. For example, when the machine is adjusted as represented in the drawings, to find interest on one dollar from March 4, 1880, to June 7, 1883, it has already been found that the interest from March 4 to June 7 of any year on the basis of thirty days to the month is equal to 1.5500. Now, if $18=3\times 6$, or the years multiplied by the rate is added, the sum will be 19.5500 cents as the interest from March 4,

1880, to June 7, 1883. In the same manner, by adding to the number of days contained in the odd months and days, or in the time between the first and last dates, as the case may be, (disregarding the whole years,) a number equal to three hundred and sixty-five multiplied by the number of the whole years, and it will give the actual number of days for the time, or between the dates; but for each time February 29 is passed one more unit must be added. When February 29 comes between the dates, or within the time, the slide C is moved down so that the first date on the scale D will be opposite the number on scale E, which is one greater than it otherwise would be.

The utility and value of the machine as an aid in computing interest on any amounts at any rate for any length of time, and on any basis of calculation, is demonstrated by the fact that whenever the interest on one dollar is ascertained the interest on any required amount may be readily determined. Of course, the interest on one dollar being expressed (as it is in the tables) in cents and decimals of a cent, it is only necessary to multiply this interest by the dollars of the principal in the ordinary way, and the interest on the whole amount will be shown; but the process may be shortened and the number of figures in the calculation very much lessened with equal accuracy by proceeding as follows: Use the interest as the multiplier, but place its figures in inverse order under the multiplicand, (principal,) the unit-figure of the former being directly under the unit-figure of the latter. Then multiply each figure of the multiplier into the figures above and to the left of it, as in ordinary multiplication; but place the right-hand figure of each partial product directly under the right-hand figure of the multiplier, and place the others to the left in succession, as usual. For exactness, although it is not necessary to make use of the whole product of any figure of the multiplier by any figure standing on its right in the multiplicand, the tens-figure of such product (increased by one if its unit-figure is five or greater) should nevertheless be carried to the product of the two figures, which stand under and above each other.

In order to exemplify the above, I give the following two examples, which will explain the difference between the facility of using what I denominate the "long way" and the "short way:"

<i>Long Way.</i>	<i>Short Way.</i>	
\$573	\$573	
4.286	6824	
3438	2292	125
4584	115	
1146	46	
2292	3	
\$24.55878	\$24.56	130

In both of these examples the principal is \$573 and the interest on \$1 is 4.286 cents. The

figures representing interest are used, under the heading "short way," as multiplier, but are reversed, as seen, and the whole 573 is multiplied by the 4, the product being 2292.

5 The 57 is multiplied by the 2, carrying 1 for the 6 units (carried as one ten from multiplying the 3 by 2) making 115. The 5 is multiplied by the 8 (carrying 6 from the product of the 8 by 7) making 46, and 3 is

10 carried from the product of 6 multiplied by 5 (there being no figure above the 6,) making 3, which partial products are added, as seen in the example under heading "short way," the result being \$24.56, or the same as by the

15 "long way," but produced with much fewer figures and in less time. It will also be seen that it is necessary to use only as many of the decimal figures of the interest as there are places of figures in the principal.

20 The flanges U T are widest at the shoulders P N, or so constructed as to cover two columns of figures on the tables at that point, the ends R M being narrow or covering but one column, this form facilitating the working of the machine, as the correct figures are thereby more

25 readily ascertained.

I do not confine myself to using the scale G on the carriage only, as it may be mounted

on the slide and perform substantially the same functions.

Having thus explained my invention, what I claim is—

1. In a device for computing interest, substantially such as described, the body A, provided with the tables H J and scale F, the carriage B, provided with the scales E G, and the slide C, provided with the slot *a*, scale D, and flanges T U, combined and arranged to operate substantially as set forth.

2. In a device for computing interest, substantially such as described, the body A, provided with the bracket *l* for the scale F; and with the groove *t* for receiving the flange *m* of the carriage B, and thereby preventing the carriage from moving longitudinally, substantially as specified.

3. In a device for computing interest, substantially such as described, the flange U, having the wide shoulder P and narrow end R, and the flange T, having the wide shoulder N and narrow end M, said flanges being arranged substantially as shown and described.

J. WATTS ROBINSON.

Witnesses:

C. A. SHAW,
L. J. WHITE.