

June 17, 1924.

1,498,027

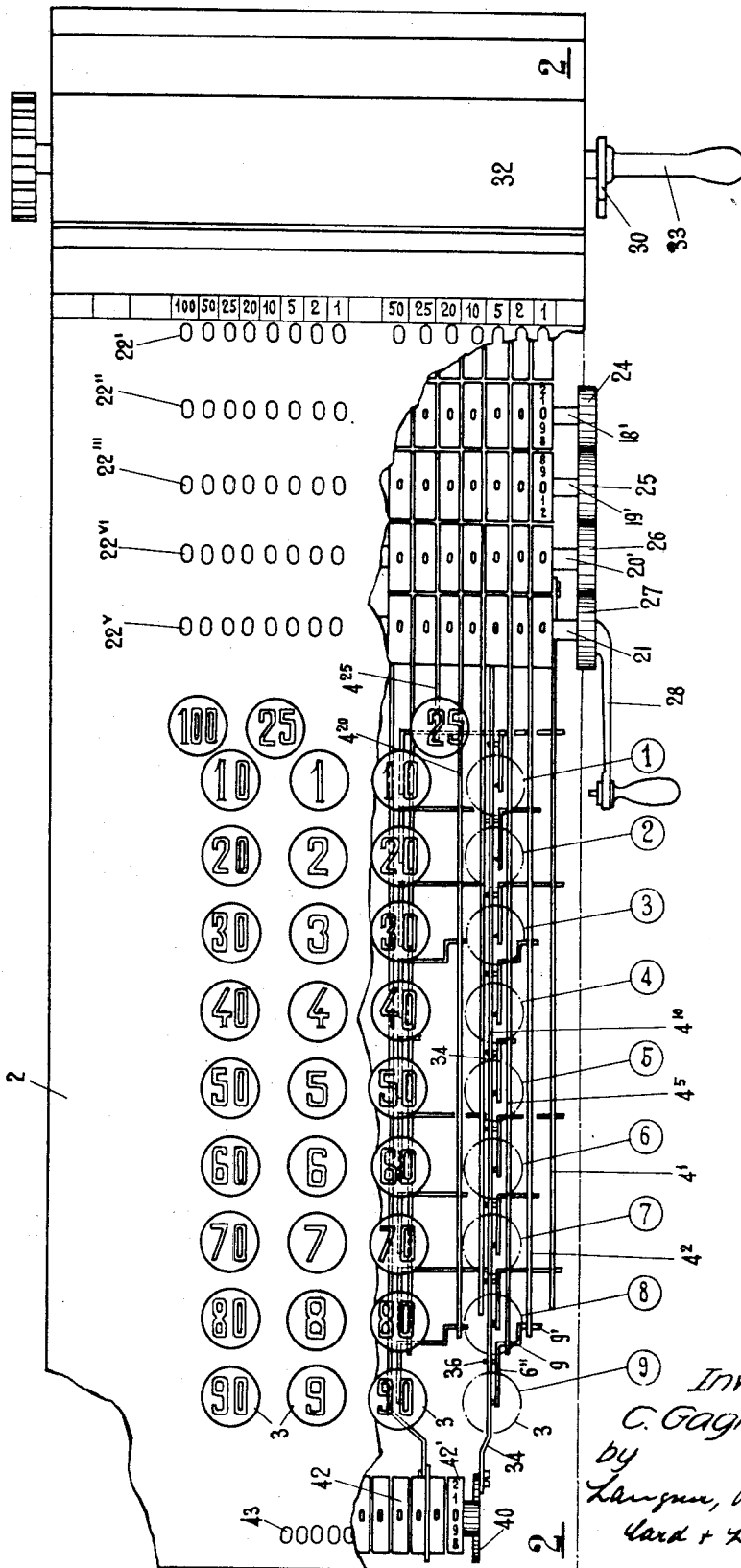
C. GAGLIAZZO

COMPUTING MACHINE

Filed March 8, 1923

3 Sheets-Sheet 1

FIG. 1



Inventor
C. Gagliazzo
by
Langmuir, Perry,
Hard + Langmuir
Attys.

June 17, 1924.

1,498,027

C. GAGLIAZZO

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3 Sheets-Sheet 2

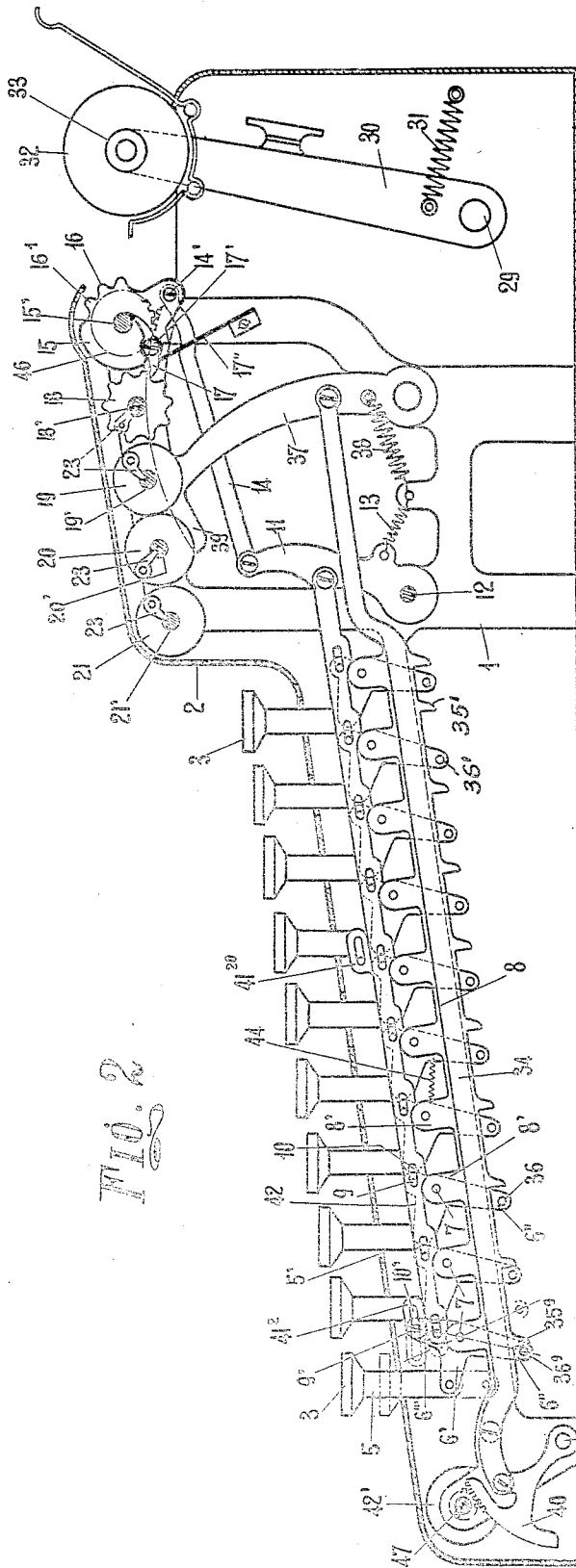


Fig. 2

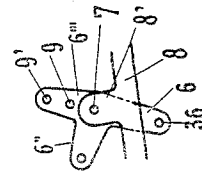


Fig. 3

Inventor
C. Gagliazzo
by
Langner, Perry,
Clark & Langner
Attys.

June 17, 1924.

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C. GAGLIAZZO

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3 Sheets-Sheet 3

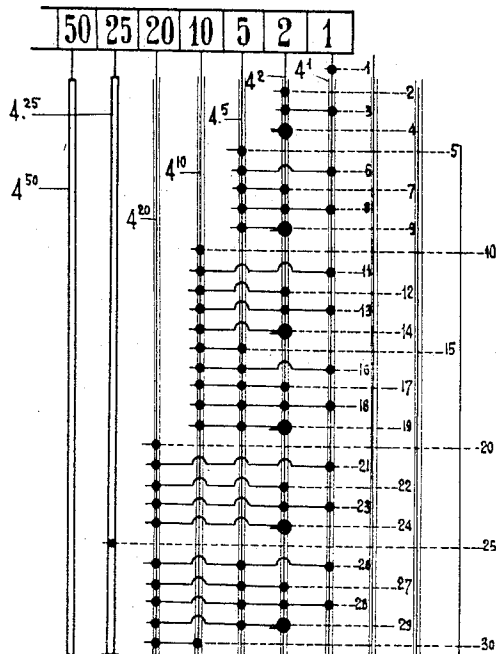


Fig. 4

Fig. 5

#	Name	Amount	\$								C.							
			100	50	25	20	10	5	2	1	50	25	20	10	5	2	1	
		167.95	1	1			1	1	1		1		2		1			
		82.50		1		1	1		1		1							
		146.78	1			2			1	1		1			1	1		

Inventor
C. Gagliazzo

by Langer, Perry, Card + Langer

Attys.

UNITED STATES PATENT OFFICE.

CARLO GAGLIAZZO, OF TURIN, ITALY.

COMPUTING MACHINE.

Application filed March 8, 1923. Serial No. 623,747.

To all whom it may concern:

Be it known that I, CARLO GAGLIAZZO, subject of the King of Italy, residing at Turin, Italy, have invented certain new and useful Improvements in Computing Machines, of which the following is a specification.

The present invention relates to apparatus for carrying out the decomposition of numbers in the figures of given predetermined values constituting them, and has for its object an apparatus of this class comprising a plurality of mechanical units each of which includes a member adapted to carry a type or types in printing position with respect to a platen to record the times each of said figures is included in the desired number or amount.

The apparatus comprises also means for setting up the number or amount to be decomposed, as well as a counting and printing device actuated by said means and comprising type drums whose types come in line of impression at the same time as the types of said units.

The apparatus according to this invention is thereby in condition to record the number or amount to be decomposed as well as the result of its decomposition.

The present invention further comprises the actuation of said units by means of parts each corresponding with a manipulating key or member, and acting to impart to a driven member a displacement proportional with the value of the numeral shown on its key, said driven member in turn actuating a counting device intended to give the sum of the numbers which have been decomposed.

The apparatus according to the present invention is particularly useful for giving the quantity of moneys as bank notes or coins of several predetermined values that is required to provide any desired amount, but it may be of use in any case when a number (which may represent a volume, a weight, etc.) must be decomposed according to any rule.

The apparatus according to the present invention is hereinafter described in an embodiment of the same particularly useful for determining how many notes or coins of different predetermined values are required to provide a given amount. The rule of division of the amount is dependent upon the series of values existing in the particular money system to be followed, and the ap-

paratus may comprise as many counting units as are the money values while the actuation of each manipulating key or member is caused to operate all the counting units corresponding with values in which may be decomposed the numerals corresponding with the same manipulating key or member.

On the annexed drawings is shown by way of example an embodiment of the present invention adapted for decomposing amounts comprising up to 199 unities and 99 cents in a decimal system comprising money values of 100, 50, 25, 20, 10, 5, 2 unities, 1 unity and 50, 25, 20, 10, 5, 2 and 1 cent.

In said drawing Figure 1 is a plan view of this apparatus with the casing partially broken away; Figure 2 is a longitudinal section of the same on line 2, 2 of Figure 1; Figure 3 shows separately a member hereinafter described; Figure 4 is a diagram of the interconnection of the several parts and Figure 5 shows a form of card for recording the results of the operations.

As shown by Figure 1, the apparatus comprises four rows of keys 3 on which are shown the respective values. The two left rows with their respective devices provide the set for the unity and unity multiple numerals, while the two right hand rows provide the set for the broken numerals. The two sets are identical with each other and therefore it is sufficient to describe one of them say the right hand set.

The apparatus is located on a frame 1 and enclosed within a casing 2 from which project the keys 3. Each key corresponds with a numeral being the unity or given multiples of unity as 2—3—5... 10—20—25 and so on, and the keys marked 1 to 9 are in a row and those from 10 to 90 are in a second row, while other keys as for 100 and 25 are suitably arranged on the apparatus, as shown by Figure 1. Of course this is the arrangement followed in the case of a decimal money system but it may be modified according to the particular system to be followed.

The counting device comprises a unit for each of the numerals 1, 2, 5, 10, 20, 25, 50 in the right set (cents), while it comprises numerals 1, 2, 5, 10, 20, 25, 50, 100 in the left set; each unit comprises a bar 4', 4², 4³, etc., adjacent to the row of keys from which it is to be operated, with an exception for the 25-bar which ends at its associate key.

The first right hand unit and bar 4' correspond with the numeral 1, the second ones 4² with the numeral or value 2, the third one 4⁵ with the numeral 5, the bar 4¹⁰ corresponds with 10, and so on.

Each key 3 is carried by a stem 5 moving through a slot 5' of the casing 2 and pivoted with one arm 6' of an angle lever 6 fulcrumed at 7 on a lug 8' of a stationary cross bar 8 solid with the frame 1; said lever 6 is held in its normal position by a spring 44 as usual, a single one of these springs being shown on the drawing for the purpose of clearness.

Each angle lever 6 comprises a pin 9 which is engaged in a slot 10 of that or those of the bars 4', 4², 4⁵ which correspond with the unitary figures providing the numeral shown on the key.

This is shown more clearly by the diagram of Figure 4 in which the horizontal row of figures 1—2—5—10—20—25—50 show the different values of moneys to be disposed of for the broken number of the amount to be decomposed, while the vertical row of numerals 1—9 represent the first row of keys and shows that the key 1 is connected with the bar 4', the key 2 is connected with the bar 4², key 3 drives the bars 4' and 4²; key 4 is connected with the bar 4⁵ imparting to it a double stroke this being conventionally shown by an encircled point and the construction of the parts being hereinafter described, and so on, while the 10-key is connected with the bar 4¹⁰ and so on; the diagram is made for values up to 30, and shows how the amount is decomposed in the numerals 1, 2, 5, 10, 20, 25 some of which may be taken two times, as in respect with the amounts 4—9—14—19—24—29 and so on. In other words the points at the crossing of the horizontal and vertical lines indicate that the bars corresponding with the heading figures are moved through a stroke when is manipulated the key corresponding with the numeral of the heading line, while the encircled points show that the respective bar is moved through a double stroke.

The engagement of each of the pins 9 with the several bars 4', 4², 4⁵ is provided by slots 10 made in said bars, the respective position and size of the slots and pins being such as each pin 9 may shift its co-operating bar or bars towards left (Figure 2) but the other bars are not moved and the same pin is not moved on said bar or bars being shifted toward left by another of said pins.

The bars 4² and 4²⁰ corresponding with numerals 2 and 20 provide extensions 41² and 41²⁰ having slots 10' in which are engaged pins 9' of the levers 6 connected with the keys of the numerals comprising two times the figures 2 and 20, respectively, that

is 4, 9 (this figure being assumed to be divided into 5 and 4), 40 and 90, this numeral being assumed to be divided in 50 and 40. Said pins 9' are located on an extension 6''' of the levers 6 at a distance from the fulcrum 7 twice that of the pin 9, as shown by Figure 3.

This arrangement is intended to produce, by the actuation of the keys for 4 and 40, a stroke of the bars 4² and 4²⁰ having twice the length of the stroke produced by the keys of 2 and 20.

Each bar 4', 4², etc., has one end connected with a lever 11 fulcrumed at 12 on the frame 1 and acted on by a return spring 13; the end of the lever 11 is connected at 14' by a rod 14 with a rocking quadrant 15 fulcrumed at 15' whose rim has a projection 16 provided with a numeral 1 which comes in line of printing when the cooperating bar is shifted. The member 15 connected with the bar of the numerals 2, or 20, has a further tooth 16' having the numeral 2 which is carried in line for impression when the associate bar 4² or 4²⁰ is shifted through a double stroke as herein-after described.

The rocking quadrant 15 imparts its oscillations through a pawl 17, fulcrumed thereon at 17' and acted on by a spring 17'', to the first pinion 18 of a counter which comprises also drums 19—20—21 the said pinion and drums being loose on their spindles 18'—19'—20'—21' and having on their rims the numerals 1 to 9 which are shown through openings 22^{II}, 22^{III}, 22^{VI}, 22^V provided in the casing 2. Through openings 22' are shown numerals carried by the sectors 15.

Each of the drums 18—19—20 is connected with the corresponding drums 19, 20, 21 in the manner usual in counters, by a tooth which moves the driven drum through one step when the driving drum has moved through ten teeth or steps. Therefore, in each row of corresponding openings 22^{II}, 22^{III}, 22^{VI} and 22^V there is in view the sum of the number of times each value 1, 2, 5, 10, and 20 is included in the decomposed amounts.

This mechanism is not particularly shown in detail and the connecting means between corresponding drums 18, 19, 20, and 21 are not illustrated, because these are well known devices usually embodied in counters, and are not particularly featured.

Each of the parts 18—21 loose on the respective spindle 18'—19'—20'—21' has a pawl 23 which may engage a notch of the respective shaft and on these shafts are fastened pinions 24—25—26—27 (Fig. 1) meshing with each other. On the last shaft 21' is keyed a crank 28 by whose operation through a single revolution all the drums of the counter may be carried back to zero,

while owing to the pawl engagement the said drums may rotate forward with respect to their shafts under the actuation imparted by the first pawl 17.

On the sides of the frame 1 are pivoted at 29 levers 30 (a single one of them being shown in Figure 2), acted on by springs 31 and carrying a paper platen carriage 32 which, on the levers 30 being oscillated by a handle 33, may be carried against the quadrants 15 to record the figures carried in line of impression by each of them. The platen roller 32 is rotatable in its supporting levers 30 for the line feeding motion of the paper carried on it. Conventional means, as a ribbon, not shown, are provided for the impression of the types on the paper.

For each row of keys 3 is mounted to move longitudinally a bar 34 provided with teeth 35 and each lever 6 has a depending portion 6'' carrying a pin 36 adapted to engage one of said teeth, there being between associate pin and tooth a lost motion inversely proportional with the numerical value of the figure carried by the associate key. In other words there is a maximum lost motion between the pin 36' of the 1-key and the associate projection 35' while there is no lost motion between the pin 36'' of the 9-key and the projection 35'' of the bar 34 and therefore when this latter 9-key is manipulated the bar 34 is shifted to full extent while on the 1-key being manipulated the lever 34 is shifted through one portion of its stroke which is 1/9 of this full stroke; for intermediate keys the lost motion has intermediate extents so as to shift said bar through 2/9, 3/9, 4/9 and so on; it is thus obtained to shift the bar 34 through a space in proportion with the figure carried by the key which has been depressed.

At one of its ends the bar 34 is pivotally connected with a lever 37 acted on by a return spring 38 and carrying a toothed quadrant 39 operating a counting drum 46 intended to carry on the same line of impression of the quadrant 15 the figures of the number set up by the manipulations of the keys; this arrangement provided for printing the amount in a column adjacent to that in which are shown the results of the decomposition of the same.

At the other end of the rod 34 is pivotally connected a toothed quadrant 40 fulcrumed at 41 and driving in a single direction through a pawl 47 the first drum 42' of a counting device 42 whose figures are shown through the openings 43.

By depressing a key, say the last key of the first right hand row (9 cents) the key produces the oscillation of its lever 6 which being connected by the pin 9 with the bar 4'' and by the pin 9' with the bar 4² produces a single oscillation of the quadrant 15 of the column 5 and a double oscillation of the

quadrant 15 of the column 2; thereby are carried in line for impression the numeral 1 of the column 5 and the numeral 2 of the column 2, so that on the platen 32 being oscillated, said numerals are printed in the respective columns of a card or the like carried by the platen 32, to denote that the given amount (9) is made of one money of five unities and two moneys of two unities.

The quadrants 15 which have been oscillated also impart a rotation to their respective counters 18—21 which advance through one or two steps respectively, and then in the openings 22 of each column the operator may read the sum of the figures given by the decomposition of all the numbers which have been decomposed.

At the same time the actuation of the key 3 has shifted the bar 34 through a full stroke said bar driving through the quadrant 39 the counter 46 through nine steps.

The quadrant 40 drives the counter 42 which carries under sight through the openings 43 the sum of the numbers which have been decomposed, while the quadrant 39 actuates the counter 46 which carries on the same line as the figures of the quadrants 15 the figures of the number under operation.

Then by manipulating the platen 32 is obtained on a card or paper band located on the platen roller (said card being not shown) the writing of the results of the decomposition and the number which has been decomposed.

Of course by lowering after each other a plurality of keys the operator may decompose any desired number within the limits of the construction of the apparatus; by way of example for decomposing the number 167.95 the operator depresses the keys 100 (at the top and right hand) 60 (in the first left row), 7 (second row), 90 and 5 in the two right hand rows, and then are actuated the counting drums 18/21 cooperating with the units 100, 50, 10, 5, 2 in the left hand set, and 50, 20 (twice) and 5 in the right set, in the respective columns being shown the numerals 1 . 1 . 1 . 1 . 1 . 1 . 2 . 1 this meaning that the amount of 167.95 comprises one coin of 100, one of 50, one of 10, one of 5, one of 2 unities, one of 50/100, two of 20/100 and one of 5/100. This notation is shown in the record card of Fig. 5, where the result of the decomposition of the amounts 82.50 and 146.28 is also given.

After several manipulations in one of the openings 22''—22^v are shown the numbers of the moneys of 100, 50, etc., respectively required, while in the opening 43 is shown the sum of the numbers decomposed, each operation being recorded separately on the card or paper band located on the platen 32.

Of course means may be provided, if desired, for recording on the card or paper

sheet the sum of the results that is the reading of the counters 18—21 as well as the reading of the counter 42 at which are added the numbers on which the decomposing operation has been effected.

The construction of the apparatus may be different it being only essential that the displacement of a key or similar manipulating part produces the operation of members similar to quadrants 15 each corresponding with one of the elements of the number to be decomposed, the bearing of the present invention being only confined by the appended claims.

The described apparatus is useful for decomposing any number in its elements of given values, as required in several circumstances say for preparing wage cards; for this purpose it is useful to use cards of the form shown by Figure 5 comprising columns for the name of the payee and other writings, a column for the amount to be decomposed and columns for the results of the operations.

What I claim as my invention and desire to secure by United States Letters Patent is:—

1. In a denominationalizing apparatus, a plurality of groups of units, each unit corresponding to a denomination, and each group corresponding to one of the numerals of the amount to be denominationalized, each unit comprising a bar positioned for endwise displacement, an oscillating sector connected with the bar, a row of keys for each of the unit groups, each key corresponding to a numeral and being connected with those of the bars corresponding to the denominations contained in the key numeral, a second bar, mounted for endwise displacement, for each row of keys, means connecting each key with the second bar to impart to it a displacement proportional to the value of the key numeral, and indicating and totalizing devices connected with the second bar.

2. In a denominationalizing apparatus, a plurality of groups of units, each unit corresponding to a denomination, and each group corresponding to one of the numerals of the amount to be denominationalized, each unit comprising, a bar positioned for endwise displacement, an oscillating sector connected with the bar, a row of keys for each of the unit groups, each key corresponding to a numeral, rocking levers having an arm connected with each key and another arm connected with those of the bars corresponding to the denominations

contained in the key numeral, a second bar mounted for endwise displacement, means connecting each key with the second bar for imparting to it a displacement proportional to the value of the key numeral, and indicating and totalizing devices connected with the second bar.

3. In a denominationalizing apparatus, a plurality of groups of units, each unit corresponding to a denomination, and each group corresponding to one of the numerals of the amount to be denominationalized, each unit comprising, a bar positioned for endwise displacement, and an oscillating sector connected with the bar, a row of keys for each of the unit groups, each key corresponding to a numeral, rocking levers having an arm connected with the keys, and another arm connected at a distance from the center of oscillation of the lever, with those of the bars corresponding to the denominations contained once in the key numeral, and at multiple distances from the center of oscillation, with those of the bars corresponding with denominations contained more than once in the key numeral, a second bar mounted for endwise displacement for each row of keys, means connecting each key with the second bar to impart to it a displacement proportional to the value of the particular key numeral, and indicating and totalizing devices connected with the second bar.

4. In a denominationalizing apparatus, a plurality of groups of units, each unit corresponding to a denomination and each group corresponding to one of the numerals of the amount, to be denominationalized, each unit comprising, a bar positioned for endwise displacement, an oscillating sector connected with the bar, a row of keys for each of the unit groups, each key corresponding to a numeral, rocking levers having an arm connected with those of the bars corresponding to the denominations contained in the particular key numeral, a third arm on the levers, a second bar mounted for endwise displacement for each row of keys, and means on the second bar positioned in the path of the third arm of the lever, each of the means being spaced from the third arm by a distance inversely proportional to the particular key numeral, when the parts are in inoperative position.

In testimony whereof, I have signed my name to this specification.

CARLO GAGLIAZZO.