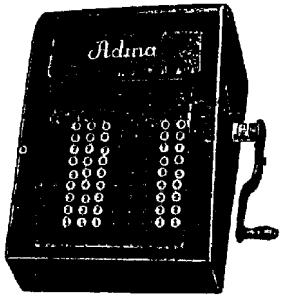

Figure 261

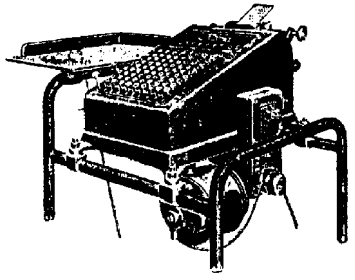

Figure 262

It has ten decimal places in both the result and the setting mechanism. The entered values may be checked for accuracy in the windows above the keyboard. The digits of the result mechanism are particularly large and distinct. Inaccurately set digit keys may be individually cleared by clearance keys located below the digit keys. If all depressed keys are to be cleared at once, the clearance key located to the left of the keyboard may be used. Transfer of the individual values into the result mechanism occurs by operation of a crank, which at the same time sets the digit wheels of the checking mechanism to zero and clears the keyboard. Resetting of the result mechanism to zero is done by a small crank located on the right side of the machine. Depression of a repeat key permits values that occur repeatedly in one addition to be totaled without need for entering the amount each time—the key is also very useful during multiplication. For smaller multiplications the Adma shows multiplier as well as multiplicand and product. Also subtractions and divisions may be carried out on the Adma with the aid of complementary digits.

Since 1921 the machine has been available with an electric motor (see figure 262).

Lehigh (1919)

The Lehigh. an imitation of the Triumphator, was first manufactured in Lehigh. It then was made in Newark from 1921 to 1923 but is no longer produced. In Europe the machine was imported from The Hague in Holland, but the number of machines sold was insignificant. The machine was manufactured in one model only with twelve decimal places in the setting mechanism, twenty decimal places in the result mechanism, and twelve decimal places in the revolution counting mechanism. Sales agency was the Lehigh Corporation, 25 West 43rd Street. New York.

Duco (1919)

In 1914 the Duco was ready to be put into production but, because of the war, it did not appear on the market until the autumn of 1919. Manufacturer is the Duco Adding Machine Company in St. Louis, Missouri. At the present time the machine is not being produced. It never was imported into Europe.

It has nine decimal places and, instead of setting levers or keys, it has indentations into which the fingers may conveniently be placed. The value to be entered is looked up, the finger is placed into the indentation, and the mechanism is pulled downward until it hits a stop. The set value may then be seen and checked in the checking window on the front panel of the machine. Corrections may readily be carried out by a reverse motion as long as the crank has not been moved, because that action transfers the amount set into the result mechanism. Printing of the result occurs by depression of the total key. Totals are printed in red ink. There is also a nonadd key. The weight of the machine is 17½ kg, the price is $150.00.

Addo (1920)

This is a miniature adding machine with rack setting. Manufacturer is A.B. Addo of Malmo. It is manufactured in three versions: model 2 is nonprinting, model 3 is for English currency and is nonprinting, and model 4 prints.

The amount set up may be checked for accuracy in the check mechanism

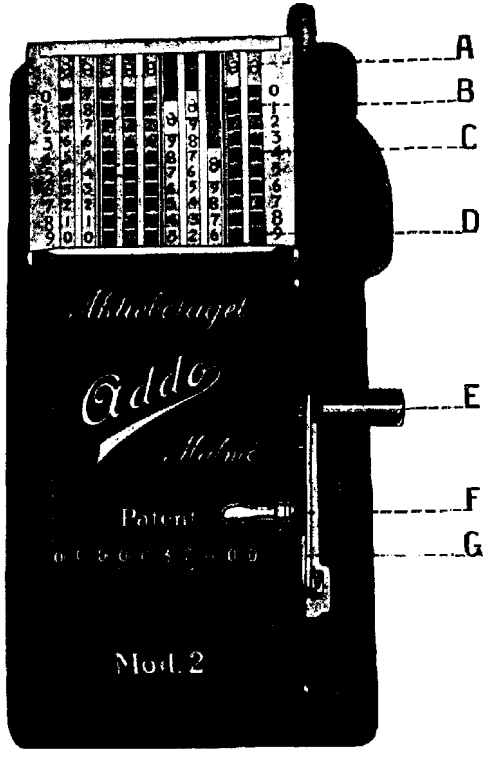

Figure 263

and is transferred into the result windows by operation of the crank E. The label **A** designates what are called resetting buttons with which corrections may be carried out, if necessary, before the result is transferred into the result mechanism. Zero setting of the result mechanism is performed by lever F. The machine has ten decimal places. The complementary digits, inscribed on the edge, serve for subtraction.

This description also applies to the printing Addo (1923) shown in figure 264. If the result is to be printed below, it must be set up with the aid of the racks. Then button M is pressed and lever I is moved. The roll of paper is located in the usual place behind the machine, the paper runs underneath a tear-off bar, and the paper advance occurs automatically. Inking occurs by means of a colored ribbon. The machine has visible printing. The price for the nonprinting machine is 160 crowns; for the printing machine it is 360 crowns.

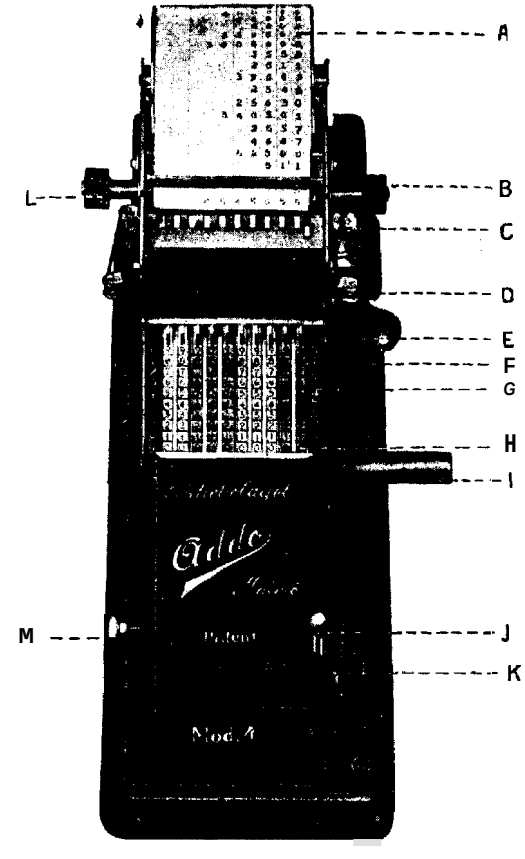

Figure 264
Addo with printing mechanism.

Urania-Vega (1920)

The Urania-Vega [named after Georg Freiherr von Vega—a famous Austrian military professor of mathematics (died 1802)] is the Urania typewriter with an attached adding and subtracting mechanism, like that of the Wahl Adding and Subtracting Device that has already been described in detail. With the Urania-Vega, as with the well-known American typewriters, several calculating mechanisms can be attached depending on the width of the carriage. Generally, one calculating mechanism is taken for one complete numerical field.

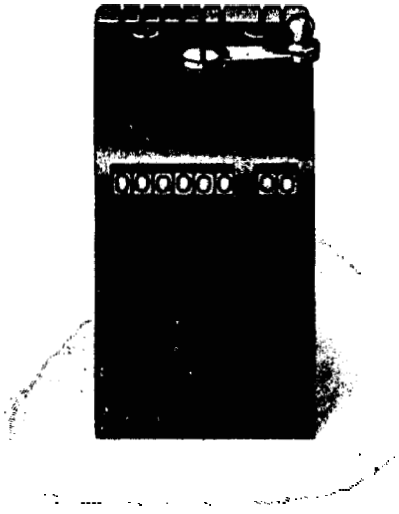

Figure 265
Nine-place calculating mechanism with separation.

But with the Urania-Vega there are also wider, compound calculating mechanisms for two and three columns of numbers.

The essential calculating drive mechanism is attached in the usual way above the uppermost row of keys and is connected to the digit keys of the keyboard. The calculating mechanisms sit on a toothed bar in front of the machine and can be moved to other places on the bar after turning the small crank sideways.

In order to add up values as they are typed, the button lever must be tightened—this connects the typewriter and the calculating machine together. Lever H must also be set on addition before the calculation can begin. The change from addition to subtraction is brought about by shifting lever H.[75]

As the respective digit keys are pressed, each value is added to the value already in the calculating mechanism. For the calculating mechanism to be brought to zero, the quantity found in it must be canceled. To do this, the machine is set for subtraction, and the quantity appearing in the windows is typed. Then zeros appear in all the windows.

The digit keys have two symbols, as is generally the case for every key on

75. The editors have been unable to locate a lever labeled H in any figure of the Urania-Vega.

Figure *266*

a typewriter with a simple shift mechanism. Thus each key has a digit and then another symbol, for example M, %, ¼, ½ (,), etc. It is therefore necessary to switch off the counting mechanism to type the nondigit symbols; otherwise the digit represented underneath the symbol is carried over into the calculating mechanism. This switching off of the calculating mechanism happens automatically in the Vega when the shift key is pressed.

When a calculation is being carried out, everything is much clearer if the end totals and subtraction items are marked in another color. The Urania-Vega is therefore always supplied with a double ribbon having both red and black sections. If the machine is adding, the numbers appear in black, and in red if it is subtracting. This change in ribbon occurs automatically when lever H is shifted from addition to subtraction, or vice versa (the typist not only is relieved of the attention and work of setting the ribbon color correctly by hand, but the machine shows him whether he actually added if he was supposed to add or whether he subtracted when subtraction was desired). It is also possible

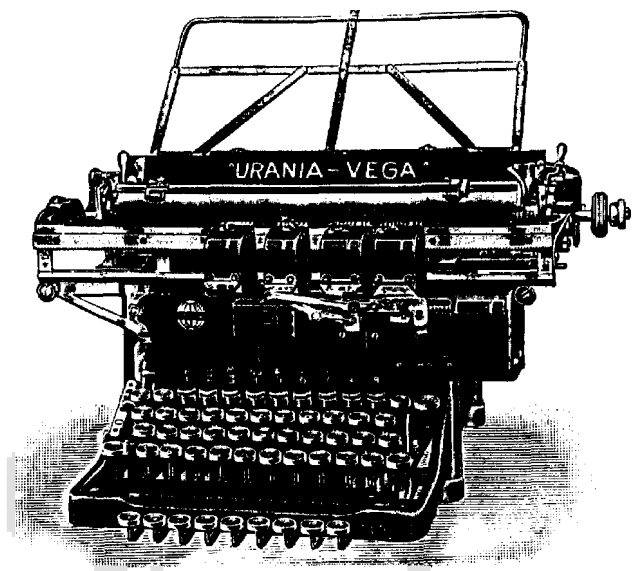

Figure 267
Machine with four calculating mechanisms and cross-adder

to change the ribbon color by hand. In this case, it is necessary to press both levers K and L together, before they are shifted. Separation of the levers is done by the small spiral spring placed between them.

With the calculating Urania, as with all key-set calculating machines, it is necessary to press down the individual keys as far as they can go during a calculation, so that their full value is transmitted into the calculating mechanism. This is also necessary because a key that has not been completely pressed down does not return back to rest position, but stays at the halfway point. This prevents errors that may come about by striking the keys too quickly. The design of the Urania-Vega offers a further insurance against errors of this sort by means of a digit key lock. If one of the digit keys is moving. then the other digit keys can not be struck but are locked in place. The digit keys are also locked if a calculating mechanism with separations (such as the comma or decimal point used in printing numbers) is located so that either the comma or decimal point is currently at the typing position. The digit keys are also locked before the first, and after the last, digit place. For example: if the number 1,842,763.95 were written with a nine-place calculating mechanism, then the digit keys would not be able to be struck before

and after the 1; and after the 2, 3, and 5. In this design, a series of warning symbols has been created for the typist to prevent errors that come about when digits are typed in the wrong place. If numbers, dates, and the like are to be typed in front of the calculation. the counting mechanism must be switched off.

Since 1925, the Urania-Vega has also been supplied with a device, which can be seen in figure 267, for cross addition. With this machine the entries can be printed and at the same time automatically included in other calculations, as was described during the discussion of the Wahl Adding and Subtracting Device. The Urania-Vega was the first German calculating machine of this type and, with justification, has created quite a sensation.

Manufacturer: Clemens Müller, A.G. Dresden N.

Arithmometre Electro-Mecanique Torres (1920)

The designer is Leonardo Torres y Quevedo of Madrid, a mathematician who became famous in Spain and France, and who also constructed the airship Astra-Torres. which the French used during the war. Another one of his inventions is the automatic chess player, which was shown in Paris in 1914. We are also indebted to him for various algebraic calculating instruments.

The Arithmometre Electro-Mecanique was first displayed by the inventor at the occasion of the Calculating Machine Exhibition of the Société d'Encouragement pour I'lndustrie Nationale in Paris (June 5–13, 1920) and it has been described in detail and illustrated by several drawings in the *Bulletin*, vol. 119, September and October issues of 1920.

The calculating machine proper is connected to any kind of typewriting machine by a number of electric wires. The two machines may be located in different places. They carry out the four basic calculations automatically.

For instance, if 345 is to be multiplied by 678, the problem is first typed on the typewriter, i.e., 3, 4, 5, then the spacebar, then the × sign, again the spacebar. then 6, 7, and 8. At this point the calculating machine, connected with the typewriter by the wires, calculates the problem whether the writer is present or not, then automatically writes an equal sign and the result on the typewriter and also leaves the necessary interline space for the next operation. It can, in a similar manner, carry out addition, subtraction, and division. In the latter case, remainders, if any, are automatically written beside the quotient without any action on the part of the operator, in other words, completely automatically.

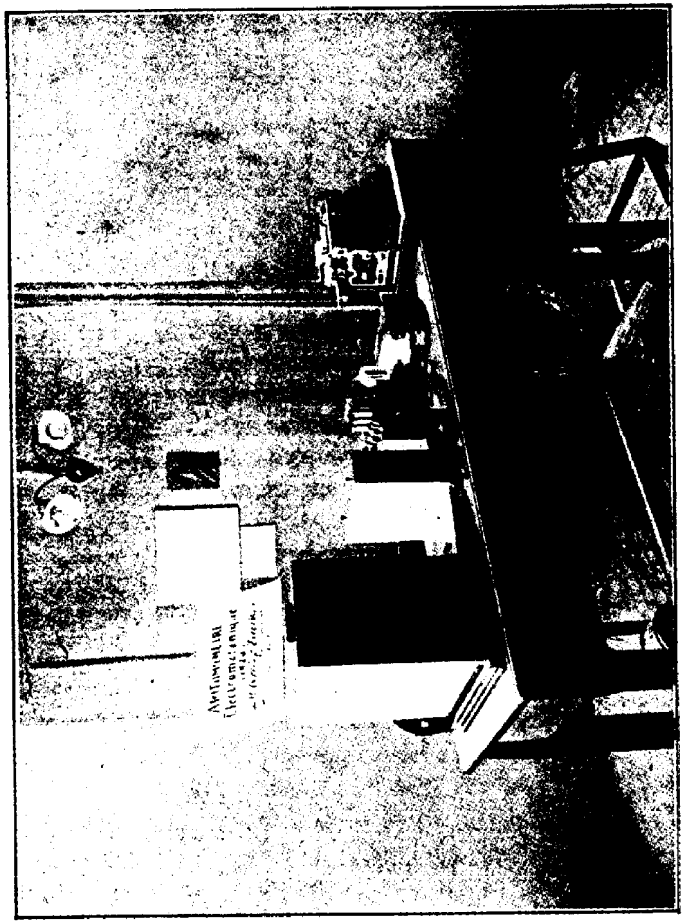

Figure 267a

This invention, if further developed, would enable the use of a single calculating machine by a larger number of participants whose typewriters may be connected with, or connectable to, the calculating machine. If a calculating problem is to be solved, the connection with the centrally located calculating machine may be established in the same way as we now have telephone connections established.

The machine illustrated in figure 267a has only six decimal places, but of course one could make them with a larger number of places. To our knowledge the manufacture of this entirely novel machine has not commenced.

Surot (1920)

The patent for this machine was issued to Oskar Rother and Karl Heindel of Dresden. Original Manufacturer: Schubert and Rother, Pillnitzer Strasse 62, Dresden A. As of 1921 it changed to Cosmos Buromaschinen, Berlin W.8, Leipzig Strasse 23 (at this time it was renamed the Addi-Cosmos). As of 1922 it passed to Bergmann Universal-Gesellschaft m.b.H, Berlin-Wilmersdorf, Landhaus Strasse 16. This firm named the machine B.U.G., although in 1924

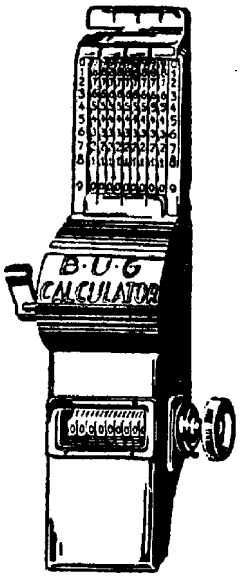

Figure 268

it stopped producing them, probably because they were also making another line of cheaper adding machines with hook tens-carry.

It is a small, nine-place adding machine with toothed rack setting. It is possible to check, in the setting control mechanism, if the amounts entered are accurate—only then are the toothed racks brought back to rest position by pressing a lever on the left side of the machine. This lever can be switched off when performing subtraction or multiplication. Resetting the result to zero is brought about by turning a knob on the right side of the machine. Subtraction requires the use of complementary digits.

Arithmograph (1920)

This is a product of the Rustringer Rechenmaschinenfabrik, Rustringer, Oldbg.. Göker Strasse 114. It is an adding and subtracting mechanism for all kinds of typewriters. Apparently, it has not yet reached the manufacturing stage.

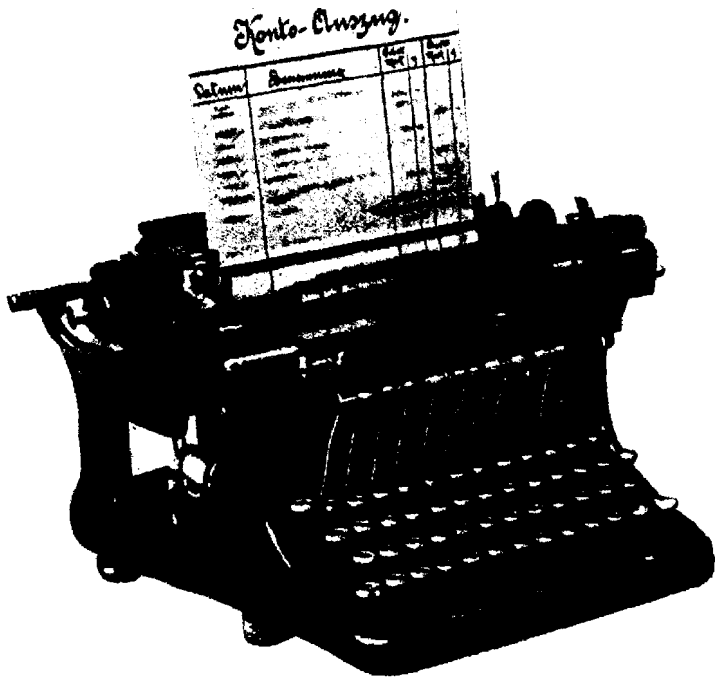

Figure *269*
Arithmograph.

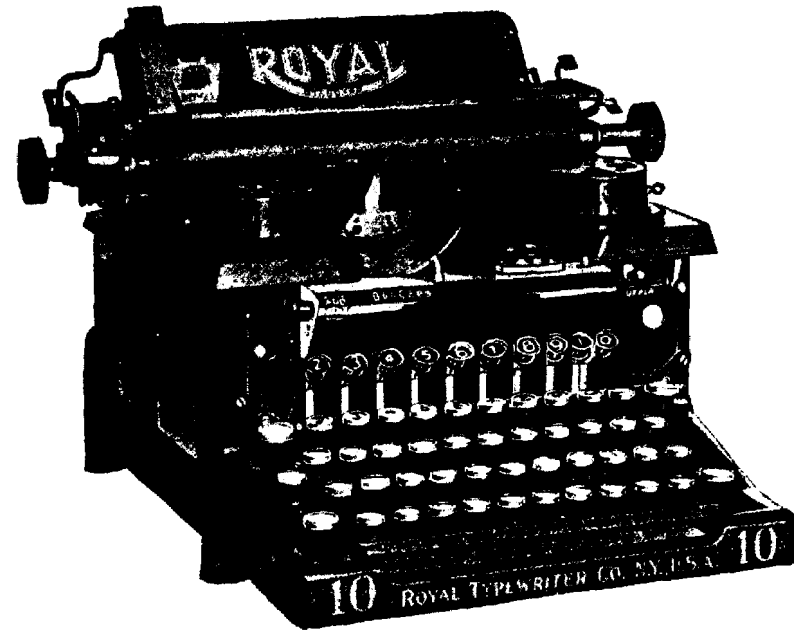

Figure 270

Type-Adder (1921)

The Type-Adder is an adding and subtracting machine that at first could only be attached to American typewriters. Designer: C. Hochman and Maurice Samburg, both in New York. Manufacturer: Type-Adder Corporation, Woolworth Building, New York. The Type-Adder can be fixed to any standard typewriter by means of a couple of clamps simply by removing two screws on the typewriter and using these same screw holes for mounting the machine. Any other changes to the typewriter need not be dealt with here.

The digit keys of the Type-Adder are used only if the digits typed are also to be added or subtracted. It is possible to type a series of items in a column, automatically adding them while typing, and then type the total in this or the next column, subtracting from this a credit item (provided the machine has already been set on subtraction, etc.). It is also possible to add and subtract numbers that have been printed horizontally. Resetting to zero is brought about by pressing a lever and subtracting. The machine has seven places. The result windows are to be found on the left side of the machine. In America it sells for $60.00. Its weight is approximately 0.5 kg. The firm W. Morgenroth,

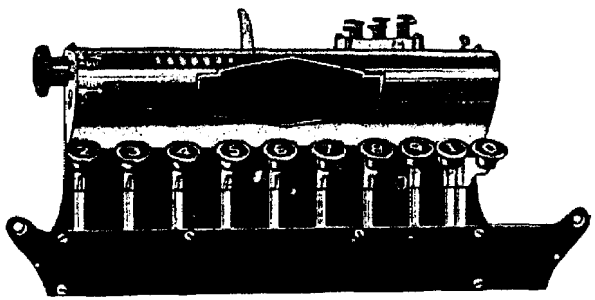

Figure 271

Arndt Strasse 3Oa, Berlin-Steglitz, is now manufacturing the device for German typewriters.

Arrow (1921)

This is a pinwheel machine manufactured and distributed by the Arrow Calculator Mfg. Company in New York. Production has now apparently ceased.

Summator (1921)

Manufacturer: Hans Sabielny, Dresden A 24, Bismarckpl. 1a.

This is a small, nine-place adding machine with toothed rack drive. It has an adjustable decimal point indicator on the result mechanism, a setting control mechanism, and a release key on the left side that allows the return of the setting racks to their normal position. The knob, which can be seen on the right side of the machine, is the zero-setting device. One short, even pull on it will return the result mechanism quickly to zero and it will then return automatically to its normal position. Subtraction is carried out with the aid of complementary digits and multiplication according to the multiplication table method. The price of the machine is 85 marks.

Calco (1921)

The Calco is the first Danish pinwheel machine. It is said to be no more expensive than the German Odhner machines. It has nine places in the setting

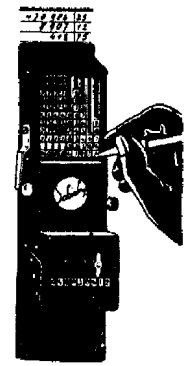

Figure 272

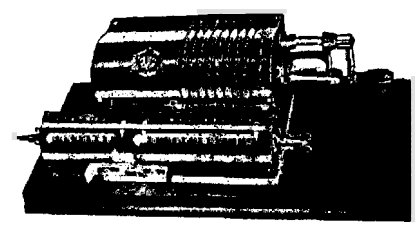

Figure 273

mechanism, thirteen places in the result mechanism, eight places in the revolution counter, and measures 30 cm × 16 cm with a weight of 4.5 kg.

The setting levers are rather long. They can be returned to their zero position by shifting the button to the left of the nine setting levers sideways and simultaneously turning the crank a quarter turn. Apparently there is also a model with continuous tens-carry in the revolution counter. Manufacturer: A. S. Nordisk Regnernaskinefabrik, Koldingg. 14, later St. Kongensg. 59 in Copenhagen. It seems that production has ceased for the moment.

Goerz (1921)

Designer: K Rauchwetter and Paul Riegel. Manufacturer: Optische Anstalt C. P. Goerz. A. G., Gerlin-Friedenau, Rhein Strasse 45/46.

This is a visible printing, full-keyboard adding machine with result win-

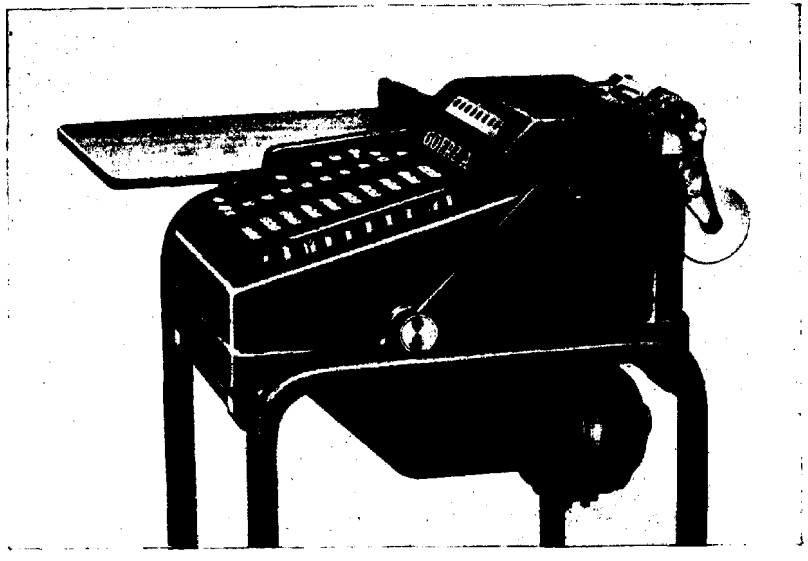

Figure 274

dows above the keyboard. It has nine places in the set up mechanism, ten places in the result mechanism, and the keys are colored in groups. It is self-correcting with red cancelation keys beneath the individual key columns. The auxiliary keys (total. subtotal, subtraction, subtraction release, repeat, non-addition. and general release key) are all on the left of the keyboard. The machine subtracts directly without the aid of any complementary digits. The slide on the left side of ihe keyboard is normally at position *E*, which results in the printing mechanism being switched on. If it is positioned at I, the printing mechanism is switched on, but the first row of keys on the left is separated from the rest of the keyboard. If it is set to 2, it means the first and the second rows; on 3, the first, second. and third rows; on *4,* the first four rows. Thus one has two adding machines that have been joined together. of which one is attached to the first five places on the left of the keyboard, and the other deals with the five places on the right of the keyboard. By exclusively using the right part of the keyboard in the addition of numbers from I to 5 decimal places, the left part of the machine can be used in numbering the items to be added from I to 9999. If the slide is positioned at the mark *A,* the printing mechanism has been switched off, and, depending on whether the subtraction key has been pressed down or not, the machine adds or subtracts without printing.

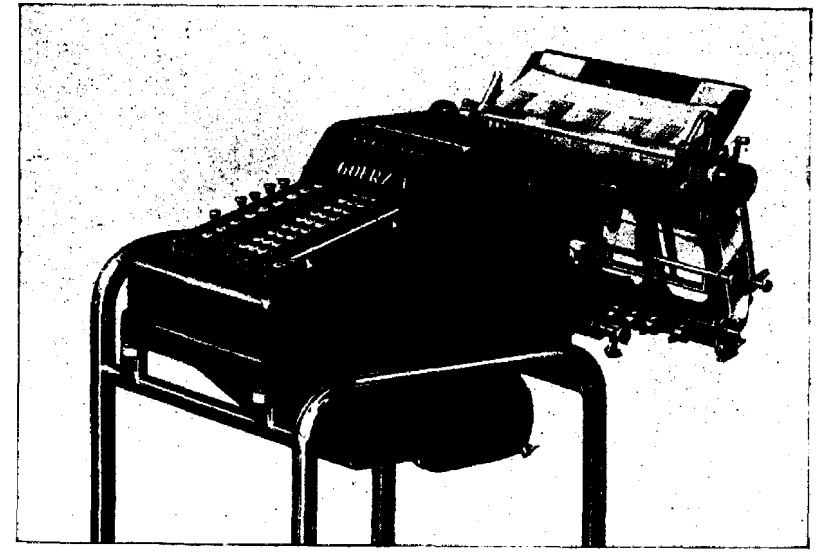

Figure 275

The Goerz **A** self-correcting adding and subtracting machine is manufactured today in only one model: model **II**. This is a machine with a subtracting mechanism, an additional device for printing without calculating and for calculating without printing, as well as potential division of the keyboard.

The machine can be supplied with three different carriages:

a-carriage: stationary, for rolls of paper up to 10 cm, with two line spacings.

c-carriage: with a printing width of 38 cm for printing forms and rolls of paper. If desired, it is possible to add a movable tabulator stop that adapts to each form, automatic carriage return with each pull on the crank, automatic item counter, line spacing release.[76]

d-carriage: like c, but 60 cm wide, with three different line spacings.

For the leather industry, a special model is available with fractions. On demand, the Goerz **A** can be fitted with an electric drive. External dimensions: 30 cm wide, 50 cm deep, 25 cm high. The price ranges from 1260 gold marks up to 2410 gold marks depending on the design.

76. This is the same device that. on typewriters. is usually called the "variable spacer" *or* the "platen variable."

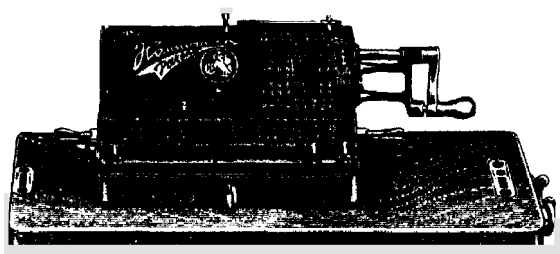

Figure 276
Model AK.

Hannovera (1921)

This is a pinwheel machine of the usual kind described in the introduction.

The Hannovera is at present manufactured in five designs:

Model AK: nine setting levers, thirteen-place result mechanism, eight-place revolution counter, automatic carriage movement. standard zeroing of the setting levers. This model has no tens-carry in the revolution counter.

Model **A:** the same number of places as in the model AK, automatic carriage movement, standard zeroing of the setting levers, device for easing addition. This model has tens-carry in the revolution counter and is equipped with a carry handle.

Model B: twenty setting levers, twenty-place result mechanism, twelve-place revolution counter, automatic carriage movement, standard zero position of the setting levers. This machine also has tens-carry in the revolution counter.

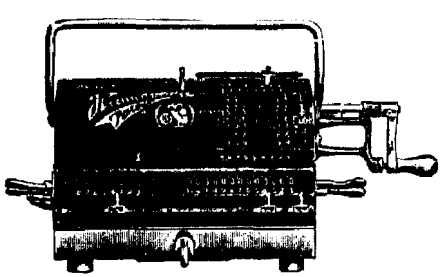

Figure 277
Model A.

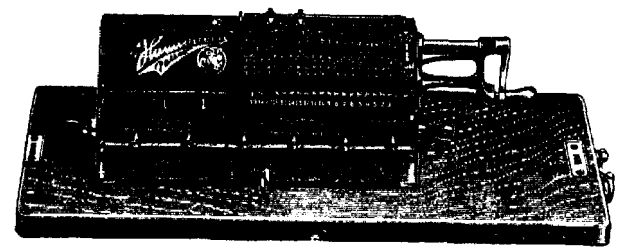

Figure 278
Model B.

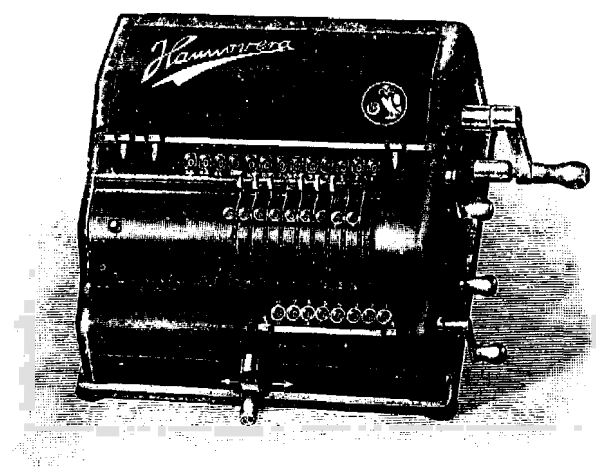

Figure 279
Model CK.

Model BK: Corresponds to model B, but without tens carry in the revolution counter.

Model CK: This model has its own system, which differs from the others in a number of respects. The thirteen-place result mechanism lies above the setup slots. The control windows are found between the individual setup slots. **At** the same time, the numbers inscribed next to the slots, which annoy so many operators, are missing. The eight-place revolution counter, without tens-carry, is attached underneath the setting levers. Both the result and rev-

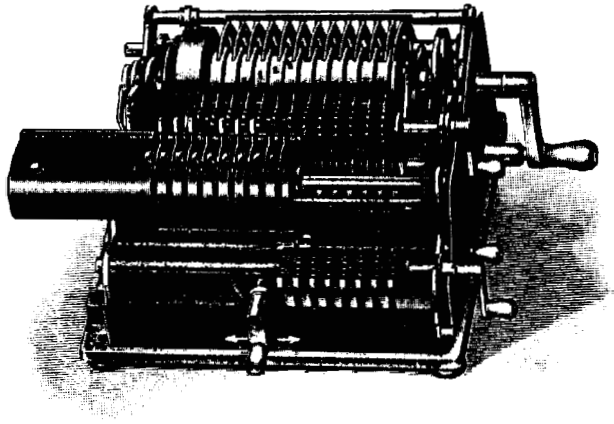

Figure 280
Interior view. Model CK.

olution counter mechanisms are stationary in this model; the calculating mechanism can be moved by turning the crank in either direction. Both calculating mechanisms are reset by turning the crank. The machine has large manual setting buttons that can be canceled automatically by means of a knob on the right side of the machine. The setup mechanism is cleared by turning the crank. All parts of the machine are replaceable. This newest model is considerably cheaper than calculating machines built according to the Odhner system.

Manutacturer: Hannovera Rechenmaschinenfabrik, Oventrop, Hcutclbcck und Co., Peine, Hannover.

Weiskopf (1921)

This is a ten-place, ten-key adding and subtracting machine measuring 25 × 12 x 9 cm. It consists of **only** 120 parts and weighs **1.5** kg. If, for example, 716.32 is to be entered, the decimal point slide must first be set at three on the scale below, as the number to be added is three places long (numbers after the decimal point do not count), The amount is then entered in the usual way from left to right. It is immediately transferred into the viewing windows, while the decimal point slide is simultaneously moved from place to place back to its starting position.

Since 1922 it has been possible to combine the machine with any typewriter

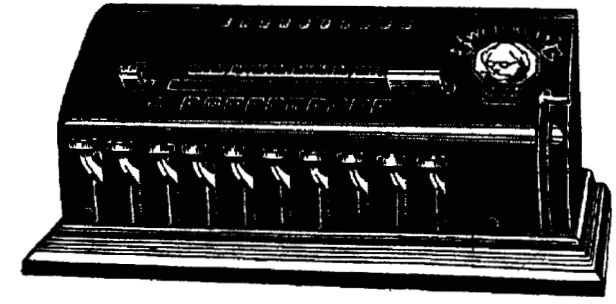

Figure 281

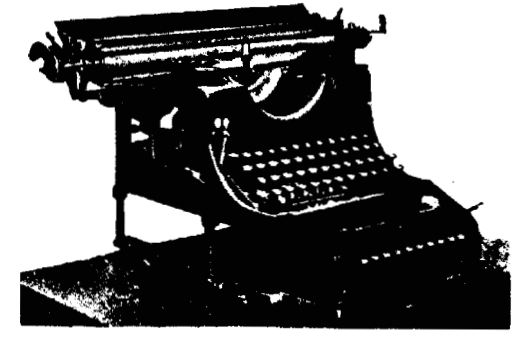

Figure 282

(with front striking action) by placing the typewriter on the base supplied with the adding machine and connecting the key levers of the typewriter digit keys with those of the adding machine. In printing calculations, the numbers to be added are typed with the aid of the keys of the adding machine. The total can be read from the viewing windows of the adding machine and entered with the help of the keys of the typewriter. Any numbers not to be added are typed with the keys of the typewriter. It is also possible to subtract amounts from the result. All that is required is to set the adding machine on subtraction and to type the amount to be subtracted with the keys of the adding machine. The adding machine can also be used without having ***to*** print the amounts that have been entered. Resetting to the zero position is achieved by pressing keys. The machine has been distributed overseas under the name of Addima.

Manufacturer: Weiskopf and Hetschko, Rechenmaschinenbau, A.G. Königswarter Strasse **44,** Fiirth i Bayern.

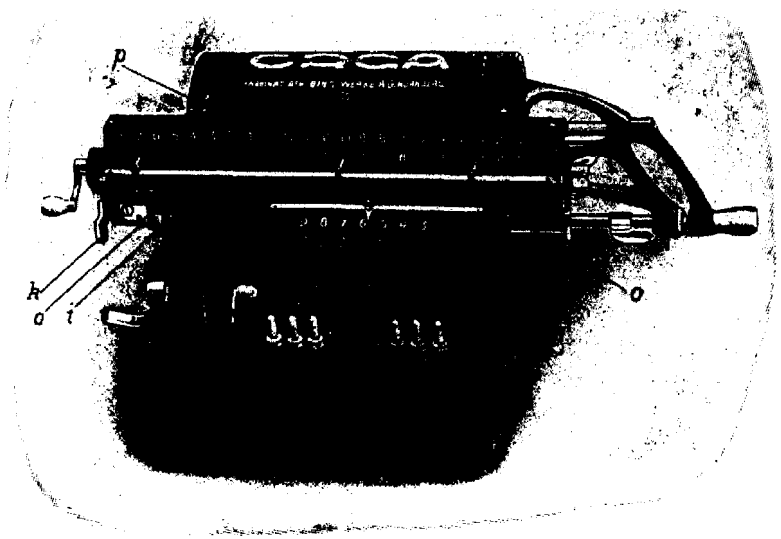

Figure 283

Orga-Constant (1921)

This machine was originally called Pythagoras and was manufactured and distributed by the firm Maschinenbau Koch, Berlin 0 17. Shortly afterward, the manufacturing rights were transferred to Bing-Werke **A.** G. in Nürnberg, which still builds them today. Sales are managed through their sales firm Orga **A.** G. in Berlin N. **W.,** 7 Schadow Strasse 1a.

This is a pinwheel machine (see the Introduction) with a nine-place setting mechanism, thirteen-place result mechanism, and an eight-place revolution counter. It differs, however, from the otherwise standard design insofar as the setting levers of the machine. Unlike all systems described so far (with the exception of the Teetzmann, in which the levers are arranged on a drum), here they extend in front of the machine and are much larger and therefore easier to handle than those of most other pinwheel machines. **A** locking device, found inside the machine, means that the setup buttons can be moved only if the crank is precisely in the resting position and the crank handle *c* is clicked into the engaging axle *d.* To position the crank handle in this way is possible, on the other hand, only if key *b* has been pressed down completely. When a setting lever has been positioned halfway between numbers, a locking

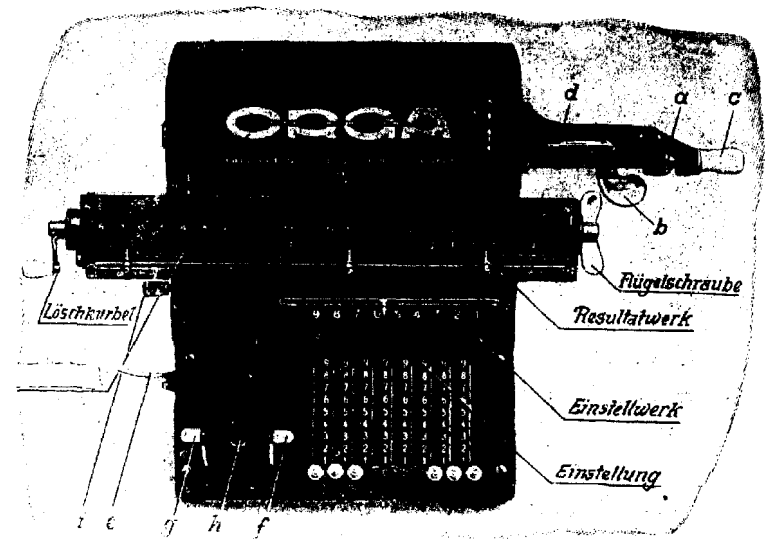

Figure 284

device prevents the crank from moving. This lock remains until the setting knob, which has been incorrectly positioned, jumps onto a whole number when the crank is lightly jolted. The operator may also manually shift the setting knob to the correct position. Only after pressing down key *b* is it possible to cancel the setup mechanism by moving the cancellation lever *e* forward. It is easy to read the entered numbers from the control mechanism situated above the sliding slots. The carriage lock, which consists of the three keys *f*, *g*, and *h*, is used for moving the carriage. By pressing down key *f*, on the right, the carriage moves to the right one place. In the same way key *g*, on the left, can be used to move the carriage one place to the left. Pressing down the middle key h allows the carriage to be moved manually in either direction, as many places as required. In this case it is up to the operator to take care that the carriage lock is clicked into the position he wants. It is possible to shift the carriage only when the crank is in the rest position. **A** wing screw is used to cancel values in the result mechanism, and zeroing of the revolution counter is achieved by means of a crank (wing screw and crank must always be brought into the designated rest position by inserting an attached detent into a notch). Dimensions of the machine are 31 x 23½ × 14 cm.

Another model of the Orga-Constant. which will have tens-carry in the revolution counter, is to appear in the near future. This model will also have the innovation that the total disconnection of the revolution counter can be done by means of a pin, so that in carrying over the dividend into the result mechanism, the marking of the rotation in the revolution counter does not take place.

There is also a key-set model in preparation.

Astra (1922)

This is one of the ten-key adding machines. It has, in addition to the usual digit keys, keys for 00 and 000, which speeds up any operation considerably.

Designer: John E. Greve. Manufacturer: Astrawerke. A.G. Chemitz, Sa.

The keyboard is visible in figure 285. The following auxiliary keys are available: nonaddition, repeat, total. and subtotal, as well as a lever for changing from addition-multiplication to subtraction-division and another for corrections. The latter is used to delete a number that has been incorrectly entered; in order to do this, the lever is pulled back as far as possible and then allowed to return. The incorrectly entered number is then canceled.

Addition: This operation is done in the usual way. First, the lever on the right side of the keyboard must be placed on addition. The first amount is entered and transferred to the calculating mechanism by turning the crank, etc. In order to print totals and subtotals, a dummy operation is necessary, the S or Z key must be pressed, and the crank turned again. Totals are characterized by ◇ and subtotals by +. Dates and other numeric items can be written, after they have been keyed in, by pressing the nonaddition key and then pulling the crank. These kinds of nonaddition items are also given a characteristic symbol to distinguish them.

Subtraction: The Astra subtracts directly. After the minuend has been entered, it is only necessary to set the lever on the right side of the keyboard on subtraction, after which the items entered are automatically subtracted; therefore, the machine works without complementary digits.

Multiplication: The amount to multiply is entered and the repeat key pressed. The lever is then pulled as many times as required by the units place of the multiplier. To change to the next digit position, the 0 key is pressed once, after which the lever is pulled as many times as the tens place of the multiplier requires, etc.

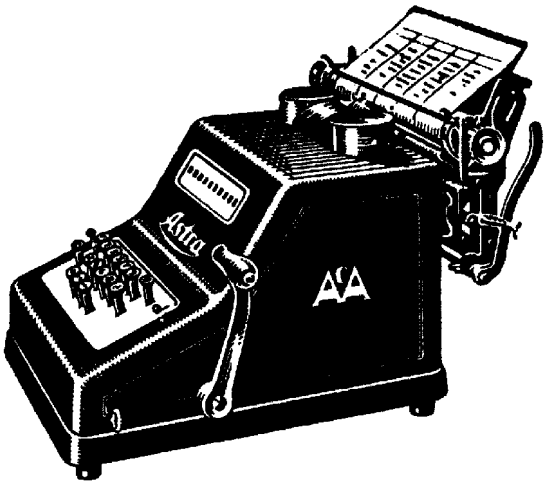

Figure 285

Division: The dividend is entered, and the divisor is entered underneath it. Zeros are then added so that the two numbers align with their most significant digits (provided that the dividend is larger, otherwise it would shift one place). The repeat key is then pressed, the lever placed on subtraction, and the entered divisor is deducted as often as possible by means of the crank. In order to proceed to the next position, the correction lever must be pulled forward. The procedure for division, from this point forward, is the familiar one that has already been described several times.

The Astra is able to take standard rolls and sheets of paper up to 25 cm wide. The carriage can, if necessary, be replaced by a wider one. The machine is the only ten-key adding machine with a fully visible calculating mechanism. The levers for freeing the platen and for spacing are on the left of the platen, and the carriage release lever is on the right of the carriage. It is possible to guard the machine against unauthorized use by means of a key.

Machines with electric drive are also available upon request. Coupling the machine to the stand containing the electric motor is automatic. All that is necessary is to switch on the current in order to be able to work with the machine.

Scribola (1922)

This is a small printing adding machine with chain drive. marginal scales for complementary digits used in subtraction, and a setup control mechanism. Addition and subtraction is carried out in the way described under the heading Small Adding Machines in the introduction. If the amount to be added has been entered, it can be checked by examining the setup control mechanism (lowest row of numbers). The printing key on the right side may then be pressed to cause the value to be printed on the strip of paper. After printing one item, the next item may be entered. If the result is to be printed, the calculating mechanism must be disengaged from the chains. This is achieved by pulling back the lever visible on the left side of the machine; if the chains are now moved, no addition will be carried out in the calculating mechanism. Now the result, which shows in the calculating mechanism, is entered and is printed by means of the printing key. By pulling the disengagement lever. the ribbon is automatically changed so that the total is printed in red and individual amounts in blue, It is also possible to print digits (for example, account numbers, dates. subtotals. etc.) in the same way as the result is printed and therefore not add them into the accumulating total (these are also printed in red).

In order to begin a new addition, the calculating mechanism must be reset to zero. To do this, the small arresting lever above the right marginal scale

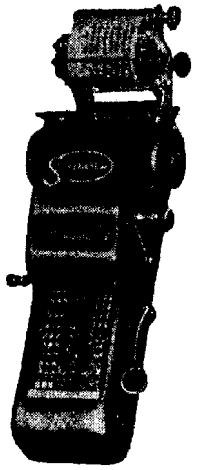

Figure 286

must be pressed down, and the zero position lever, outside the machine on the right, must be pulled forward until it can go no further, and the two levers must then be released. The clear sign (in this case a small circle with a dot in the middle) is automatically entered when the mechanism returns to zero. This symbol is printed on the right of the first item in the next summation. This machine also has a safety device to guard against unauthorized use.

As soon as one of the two ribbon spools has been completely used, the ribbon direction is changed by means of a control knob on the right side. It is very simple to change both ribbon and paper rolls. The width of the machine is 7 cm. the length, including paper carriage, is 31 cm, and its weight is 2.3 kg. Both ten-place and thirteen-place machines are available, costing *250* marks and 325 marks respectively.

Manufacturer: Ruthardt and Company G.m.b.H., Hack Strasse 77, Stuttgart.

Peters (1922)

This is a visible printing, full-keyboard adding machine. It has ten places in both the setup and result mechanisms. It has self-correcting keys arranged in

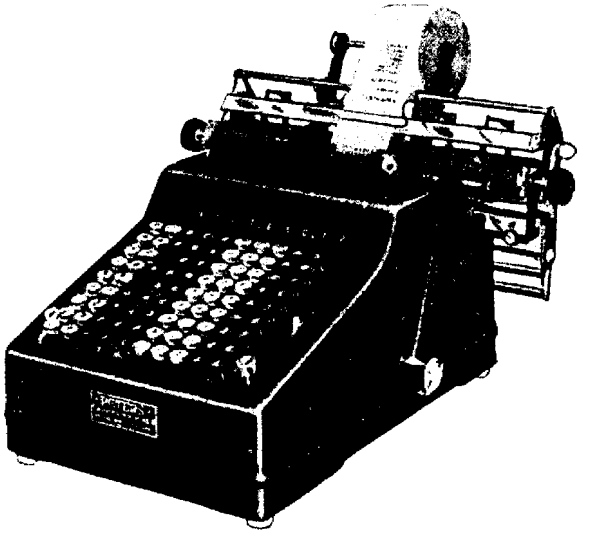

Figure 287

colored groups. The repeat, subtotal, key release, nonaddition, and total levers are all attached to the right side of the machine—so that the left hand is free for checking and to use the nonprinting lever. The paper carriage takes 30-cm-wide paper, and the carriage is shifted by hand. It is also equipped for rolls of paper. The machine has both single and double spacing and can also be used for cross addition.

The keyboard can be easily removed to provide access to the interior of the machine. There are special signs that mark totals, nonaddition items, subtotals, and zeroing of the calculating mechanism before the entry of the first item. The Peters is manufactured, for the time being, in only one model with dimensions 25 x 35 cm, and weight 16 kg. It can also be supplied with fraction keys (quarters and eighths) as well as a platen dividing device, which makes it possible to print with two columns next to one another, and with electric drive. The motor is fixed to the base, although at any time the machine can be detached and used on top of the desk with a hand crank.

Price: $250.00. Designer: H. C. Peters. Manufacturer: Peters-Morse Mfg. Company, Ithaca, New York. The designer was formerly with the Burroughs Company.

Britannic (1922)

This is a pinwheel machine.

Manufacturer: Guy's Calculating Machines L td., Truro Works, Truro Rd., Wood Green, London N22.

The setting levers are locked as soon as the crank leaves the rest position and are freed again when it returns. The carriage shifts sideways when the keys are pressed. All setting levers can be brought back to their zero position by means of a single lever. The dimensions of the machine are *33* × 16 cm and its weight is 5 kg.

Star (1922)

This machine was previously called Amco and was manufactured and distributed by the Accounting Machine Company Inc. in New York. At the beginning **of** 1922 both manufacturing and sales rights were transferred to the Todd Protectograph Company, Rochester, which then named the machine the Star.

At first it sold for $42.50, although recently the retail price has gone down to $37.50. The original design had seven and nine places, although the present model is only available with nine places in both mechanisms. At the front of the machine are the adding and subtracting digits. In order to transfer a number into the result mechanism, which is above the setup surface, a finger must be placed on the stub next to the required digit and then pulled down until it goes no further. After this, the setup device automatically returns *to* its starting position. With this machine it is possible to enter several digits at one time, provided that a tens-carry does not occur, otherwise the digits must be entered one at a time. The zero reset key is on the right side.[77]

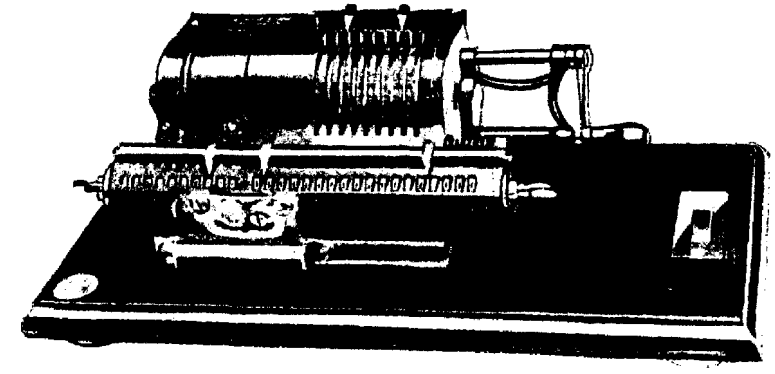

Figure 288

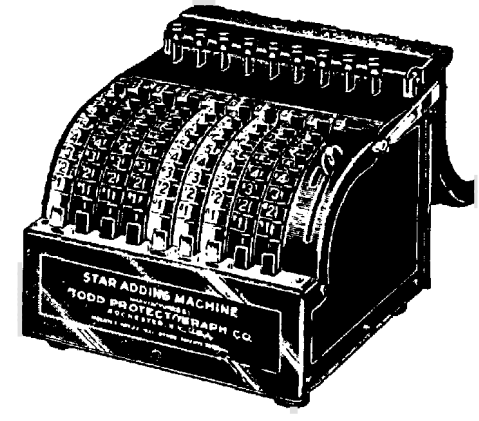

Figure 289

77. This is not **exactly** what Martin's **original says,** but the text **is more** than **usually confus**ing **at** this point.

The nine keys visible on top of the machine are used for subtraction. After the minuend has been transferred into the calculating mechanism, the key in front of the most significant digit place and all other keys to its left are pressed down and kept there. The subtrahend is now entered with the aid of the complementary digits, after which it is possible to read off the result.

In multiplication, the multiplicand must be entered as often as each decimal place of the multiplier demands. If, for example, any amount is multiplied by 95, it must be entered five times, then nine times — altogether fourteen times.

The newer machines are equipped with a carrying handle. If the machine must be left before a calculation has been completed, the carrying handle should be placed in front, over the setup surface — the handle clearly shows the words "Machine is in use! Do not touch anything!"

Dimensions: 14 x 17 x 16. Weight: 3.6 kg.

Bird (1922)

Designer: H. L. Bird. Manufacturer: Illinois Bird Adding Machine Company, First National Bank Building, Chicago.

This is an adding machine consisting of fewer than 100 parts. It can be supplied in combination with a cash till. It is not yet available in Europe and is really only suitable for small shops. Its price is $30.00.

Naumann (1922)

This is a visible printing, full-keyboard, adding and subtracting machine like those described in the introduction. It has nine places in the setup mechanism and ten places in the result mechanism. There is a lever for canceling individual columns of digits, found underneath the respective column of keys. There is a lever for changing from addition to subtraction, as well as a result lever and calculating mechanism shut off lever (for printing without calculation), which are all found on the left of the keyboard. Key release, as well as repeat levers (multiplication levers), are on the right of the keyboard. On the left side of the machine is a crank for resetting the mechanism to zero.

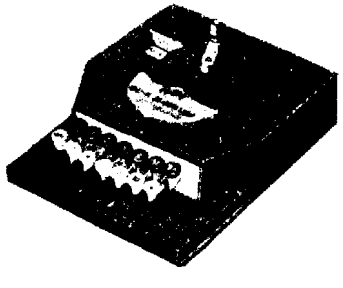

Figure 290

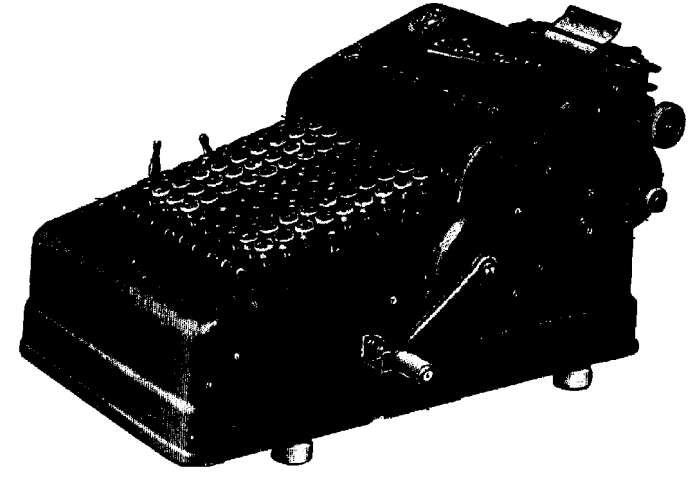

Figure 291
Manual drive.

At the beginning of each new calculation, an arrow appears to the left of the first value in order to show that the previous values are not part of the calculation now being carried out. The printing mechanism represents a completely self-contained subunit of the machine. It can be switched on and off completely arbitrarily. The machine therefore works with, or without, the printing mechanism. Ribbon reversal takes place automatically, provided that the particular ribbon designed for the machine is used. In other cases, it is possible *to* reverse the ribbon direction by hand. Subtraction items appear in red print, and final totals can be recognized by a star to the right of the value. The machine is supplied with a hand crank, pull lever, or electric drive.

Dimensions: 44 × 30 × 26 cm. Weight: The manual machines weigh approximately 15 kg and those with electric drive approximately 30 kg. The price varies from 1350 gold marks for electric drive to 1000 gold marks for manual machines.

Manufacturer: Aktiengesellschaft (formerly Seidel and Naumann), Dresden.

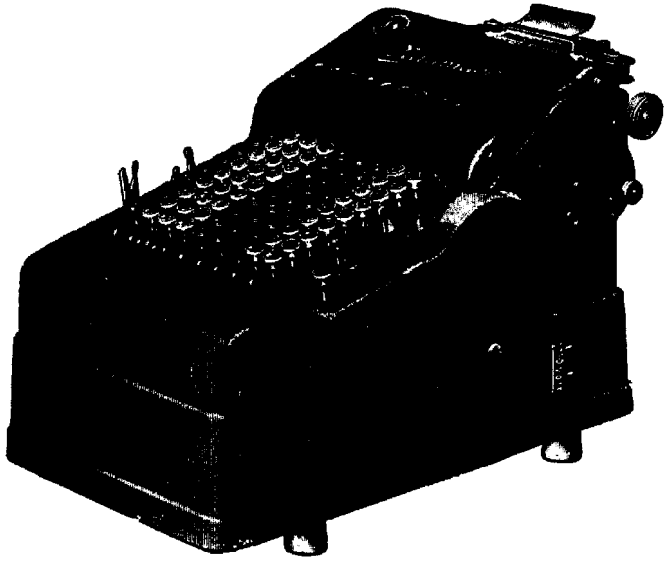

Figure 292
Electric drive.

Votam (1922)

This is a visible, full-keyboard adding machine from the firm Ehrich & Graetz, Berlin. It has ten places in both setup and result mechanisms and two viewing windows for numbers entered. The keys are colored in groups and are self-correcting. On the right of the keys is a zero reset lever. In order to print the total underneath a column of entries, the sum found in the viewing windows of the calculating mechanism must be reentered on the keys. The same procedure applies for subtotal printing as for totals: in this case the total, which has just been printed, is carried forward as the first item **of** the new calculation by setting it up again and pulling the lever. The strips of paper and the single-color ribbon move forward automatically. The machine can be used for the simultaneous addition of two columns.

This machine is smaller than most other makes. Only parts that have been stamped out are used in its construction; therefore, springs are hot to be found. Each of the ten columns of keys can be taken out by loosening two screws—this has the advantage that often-used columns of numbers (for example, the units digit column) that have suffered wear and tear can be exchanged with columns used less often. The machine is also considerably cheaper than rival makes.

Figure 293

The model to emerge in 1923 shows several improvements. For one, the crank is returned by means **of** spring power. There are also a number of safety features attached. and the ribbon reversal is automatic.

Add-Index (1922)

This is a visible printing, full-keyboard adding machine. There are viewing windows above the columns of keys. The machine has self-correcting keys and complementary digits for subtraction and division. The total, carry-forward, repeat, and correction keys are found on the right side of the keyboard, so that the left hand does not need to leave the digit rows. Nonaddition and nonprint keys are found on the left side of the keyboard. The machine does not add until the crank has returned to its rest position. The colored ribbon reverses automatically. Under the repeat key is a viewing window that shows the number of times the crank turns. The machine has adding keys in two colors. and the auxiliary keys are red.

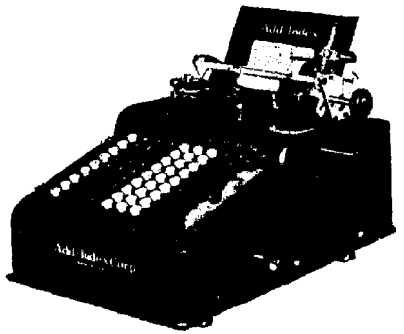

Figure 294

To reset to the zero position, the crank is pulled forward and is then left to return on its own. The total key is then pressed back with the thumb of the right hand while, at the same time, the crank is pulled up with the remaining fingers of the right hand—as soon as the crank finishes its travel the total key is released. This action prints the totals in red and resets the viewing windows of the result mechanism to zero. The first item in a list is always printed in red. This shows that the result mechanism previously contained zero. In addition, the totals and subtotals always appear automatically in red so as to be more distinct.

Even after the crank has begun to move, it is possible to correct mistakes by means of the nonaddition and nonprint keys. Amounts that are not to be added are automatically marked in some way on the list. This machine has not yet reached Germany.

Models:

671	seven places with a stationary 13-cm-wide carriage	$125.00
680	eight places with a stationary 13-cm-wide carriage	$150.00
690	nine places with a stationary 13-cm-wide carriage	$175.00
691	nine places with a 22-cm-movable carriage	$200.00

If specially ordered, each of the first three models can be provided with a movable carriage. The weight varies from 12 to 14 kg, and the surface area measures 25 × 35 cm.

Manufacturer: Add-Index Corporation, 120 Broadway, New York.

Figure 295

Portable (1923)

This machine has an area of only 18 × 28 cm and weighs 5.5 kg, hence the name Portable. It is a visible printing, full-keyboard adding machine with self-correcting keys. Printing is done by pulling a lever—the entire carriage is pressed against the raised, stamped calculating gears. There are no result viewing windows. Zeros are not automatically printed but like other digits must be individually entered. The machine is only equipped for rolls of paper and single-color ribbons. Ribbon reversal is automatic. The machine has a combined total and subtotal key, as well as nonprinting, correction, and repeat keys. It is only a seven-place machine and costs $65.00. As yet, it has not been introduced into Europe.

Designer: Glenn I. Barrett, who was also the designer of the machine by that name. Manufacturer: Corona Typewriter Company, Groton. Distributed by: Portable Adding Machine Sales Company, 208 S. La Salle St., Chicago.

Tim-Add (1923)

This is a full-keyboard adding machine with direct subtraction. The total, subtotal, nonaddition, and nonprinting keys are to be found on the left of the keyboard.

Figure *296*

On the right are the setting slides for addition and subtraction and also the general cancel and repeat keys. There are separate column cancel keys above the keyboard. The machines with a broad carriage are designed to add and print columns of numbers and, as a consequence, these machines have an item counter on the left side. The Tim-Add can also be fitted with a column device that makes it possible to print and add two separate columns simultaneously.

There are several other special advantages:

• The Tim-Add is completely built on a positive drive system, so even the letter types are gear driven. The Tim-Add does not, therefore, suddenly come to a halt, and any miscalculation caused by holding or pressing down the letter types, or by dirt getting in. is avoided.[78]

78. The editors believe this is correct. but freely admit that Martin's German is completely incomprehensible to them at this point.

• It is unnecessary to hold the subtotal and total keys for every dummy operation.

• It has self-correcting keys.

• The result and printing mechanisms are at eye level and visible at all times.

• There is an automatic ribbon reversal, and the ribbon is easily replaced.

• The Tim-Add is provided with an air brake, which overcomes the disadvantage of oil leaks that can occur with oil pumps.

Models:

1 nine places, with narrow carriage, total, subtotals, repeat, and general cancellation device

2 like model 1, but with large carriage and item counter

3 like model 2, but with nonprinting and nonaddition keys

4 like model 3, but with dividing device

5 like model 1, but with lever for direct subtraction

6 like model 2, but with lever for direct subtraction

7 like model 3, but with lever for direct subtraction

8 like model 4, but with lever for direct subtraction

13 thirteen places, otherwise like model 8.

All models are supplied with electric drive and are equipped for English currency.

Manufacturer: Gutschow and Company, G.m.b.H., Danzig, Weidengasse 35/38. General sales for Germany: Ludwig Spitz and Company, G.m.b.H., Berlin-Tempelhof, Cresburg Strasse.

Monos (1923)

This is a pinwheel machine, similar to the one described in the introduction, which at the moment appears in four models:

Model A: has tens-carry in the revolution counter.

Model B: does not.

Model A2: has tens-carry in the revolution counter and has an automatic adding device attached (this means that during the time when addition is tak-

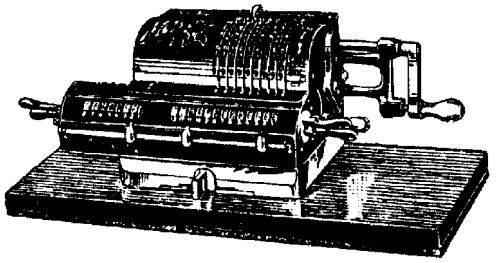

Figure *297*

ing place in the result mechanism, the setting levers are automatically returned to their zero position without any action on the part of the operator).

Model D: does not have tens-carry in the revolution counter. although it does have twenty places in the setting mechanism.

Model	Setting mechanism	Result mechanism	Revolution counter	Weight kg.	Price gold marks
A	9 places	13 places	8 places	**5.1**	525.00
A2	9 places	13 places	8 places	5.1	550.00
B	9 places	13 places	8 places	3.8	400.00
D	20 places	20 places	12 places	9.5	700.00

Dimensions:

Model A and A2 18 x 11 × 12 cm
Model B 13 x 11 x **10.5** cm
Model D 22 × 1.5 x 13 cm

One special advantage of this machine is that the zero positioning of the setting levers is not controlled by wing nuts but by pressing a button on the right side of the machine. There are the usual decimal point slides. During multiplication or division, the carriage moves to the next digit by pressing the carriage lock on the side. Production has stopped for the moment.

Manufacturer: Monos A. G. Braunschweig, Cammann Strasse 7.

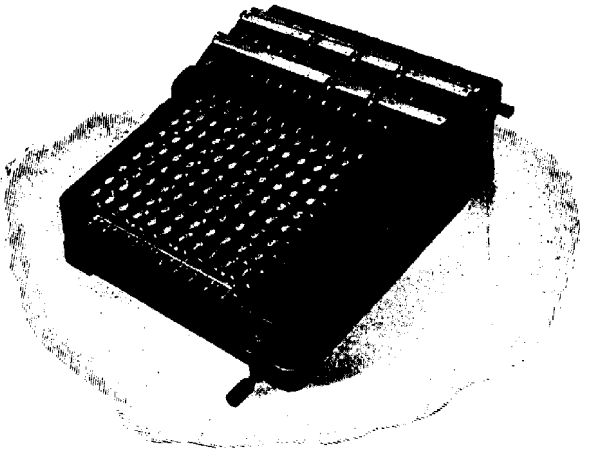

Figure *298*

Kuhrt (1923)

There are two keyboard calculating machines in existence with this name; they are manufactured and sold by the firm Deutsche Rechenmaschinewerke A. G. in Leipzig.

Kuhrt A: Ten decimal places in the setting mechanism, ten decimal places in the revolution counter and thirteen decimal places in the result mechanism, Shifting of the counter mechanism over its whole length of travel, or from decimal place to decimal place, occurs by simple lateral pressure without any inconvenient lifting operation. Addition and multiplication occur by rotation of the crank to the right, and subtraction and division occur by rotation of the crank to the left. The machine has positive protection against overthrow. The numeral drums may also be set manually. Both counter mechanisms can be set to zero by a half turn of a crank. Setting check windows are located above the uppermost row **of** keys.

Model AB: is the same as described above but possesses two counter mechanisms for results and has an arrangement by means of which computed results may automatically be transferred from the result counter mechanism into the keyboard, *so* that one may carry out a second, third, or further multiplication without new settings in the keyboard. The purpose **of** the second result

Figure 299

mechanism has already been explained in the introduction. Width 32 cm, depth 35 cm, weight 14 kg.

Kuhrt US: is a printing, keyboard calculating machine with manual or motor drive, eighteen decimal places in both the setting and result mechanisms, and twelve decimal places in the revolution counter. It combines the advantages of multiplying and dividing machines with the efficiency of the printing, full-keyboard adding and subtracting machines. All numerical items in all four types of calculations are printed. Setting the machine for the desired type of operation occurs by pushing the appropriate key. Setting windows are located above the individual columns of keys. Width 41 cm, depth 48 cm height 22 cm, weight 50 kg.

Addition: It is possible, simultaneously, to both set up the items to be added and enter numbers with the counting mechanism disengaged. Consecutive items may remain in the quotient mechanism, from which they have been printed. There are partition bars on the keyboard. The printing mechanism may be divided into columns as desired. The machine has a clearance signal; broad, automatic, spring-driven carriage, convenient adjustment of the tabulator stops, and adjustable decimal point slides. It also has automatic reversing of the ribbon, continuously visible straight line printing, automatic printing of the results without a dummy operation, horizontal and vertical addition in the storage mechanism, automatic addition of final totals, automatic transfer of final totals into the setting mechanism for the purpose of using them in a different calculation, a repeat key, and a small switch for the motor drive.

Subtraction: The machine allows direct subtraction without the use of complementary digits. Subtracted items are printed in red. There is automatic conversion of negative (complement) values (996978) into positive values (003022) by a sensing device and automatic setting of the debit and credit signs.

Multiplication: Each multiplier decimal place requires one key depression only. Other characteristics are no noisy multiplication of the continuous addition type; multiplicand, multiplier, and product may be automatically printed for checking; adding up of the individual results by storage of the subtotals; automatic transfer of the product into the setting mechanism in compound calculating problems; rounding off of decimal places; automatic shifting of the counting mechanism; and register clearance by a half turn of the crank.

Division: Each quotient decimal place requires only one depression of the key. Other characteristics are simple correction in case the quotient is overestimated, without the necessity to switch over to multiplication; manual adjustment of the numeral display drums; large, single-colored digits in the quotient mechanism; and automatic printing of dividend, divisor, quotient, and remainder. The quotient may be automatically transferred to the setting mechanism for multiplication; several quotients may be added without need for a new setting. The quotient may be automatically transferred into the result mechanism as a dividend for the purpose of continued division.

The printing Kuhrt US is also a bookkeeping machine and serves for the preparation of interest tables, foreign currency calculations, balance sheets, discount calculations, statistics, and the like. It operates with multiplication bodies similar to the machines by Bollée, Steiger, and Moon Hopkins.

C. B. R. (1923)

Designer: Continentale Buero-Reform, Jean Bergmann, G.m.b.H., Kaiser-Allee 215, Berlin W. 15. This machine resembles the well-known adding machines with hook tens-carry, however, it has automatic tens-carry (although this runs through only one place). Thus if the number 9 is in one of

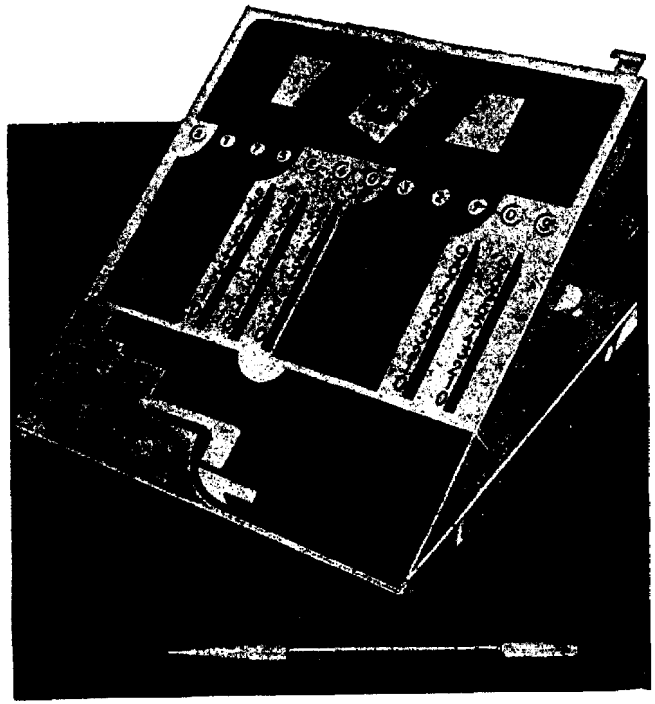

Figure *300*

the result windows and one adds 3 to it, the sum occurs in the usual way, that is, the tens-carry occurs automatically. If. however. 3 is added to 99, then the right window will show *2* while the left window shows a blank—this denotes 10. In this case the calculating stylus is set in the zero of the corresponding number slide and raised to the upper stop. **If** a blank result window appears, during addition, in the middle **of** a number, then the corresponding number slide is not to be raised, since the equivalent action occurs automatically in further calculations.

Subtraction: If the digit in the number to be subtracted is less than or equal to that in the result window of the corresponding column, then one places the stylus in the slot next **to** zero and raises it upward until it is next to the digit to be subtracted. If the digit being subtracted is larger, then the stylus is placed in the slot above the 9 and pulled down until it is next to this digit on the cover plate. One can perform additions and then subtractions or, if desired,

mix the operations. The machine has eleven places in the setting mechanism and twelve places in the **result** mechanism; therefore, it is most useful and can be divided. For example, one can enter debit posting on the left, enter credit items on the right, and subtract the smaller from the larger. Zeroing occurs when one pulls out the zeroing bar on the right of the machine.

The machine is 15 cm high, 15 cm wide. and less than 1 cm thick. It can be put in a pocket. It weighs about **I** pound and **is** provided with a stand that can be pushed down (for instance, if the machine should be put in **a** pocket) so that it is completely locked. Materials: strong sheet brass. Price: 25 marks.

Demos (1923)

The Demos (i.e., the people's calculating machine) is not one of the pinwheel machines. Its setup wheel (illustrated in figure **306)** is stamped out of a single piece of steel. It is therefore not subject, in the same way as the pinwheel, to wear and tear and, because of its simple design, is a fraction of the cost.

Figure **302** shows the wheel in its rest position. Lying opposite it is the Corresponding wheel of the result mechanism, also in zero position. Figure 303 shows the input wheel set on number 7. This is done by pulling down the attached lever. i.e., moving it forward seven teeth from its rest position. Figure 304 shows how both parts operate together after the crank has begun to turn. On contact, the totalisator moves forward, and the setup wheel rotates downward in the direction of the arrow and causes the corresponding wheel of the result mechanism to rotate 7/10 of a turn until it displays the number 7, Figure 305 shows the movement of the parts into their original position, which occurs when the crank has finished turning. With each turn of the crank. the entire setup mechanism (all the setup wheels together) makes only

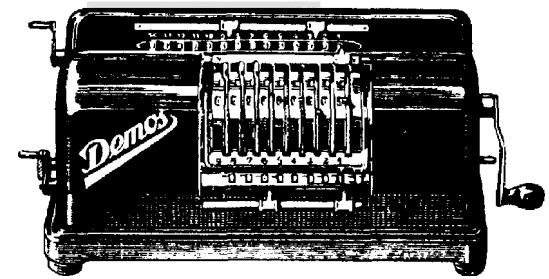

Figure 301

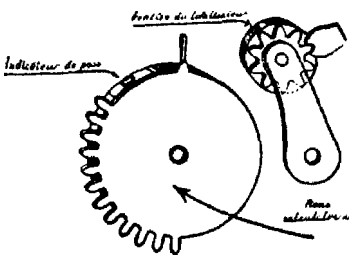

Figure 302

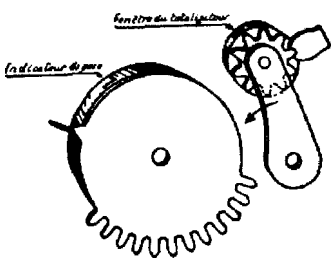

Figure 303

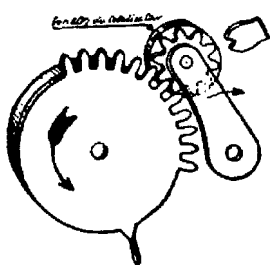

Figure 304

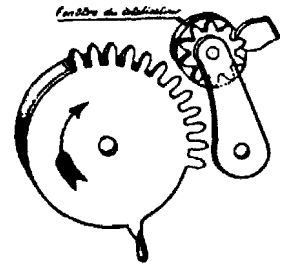

Figure 305

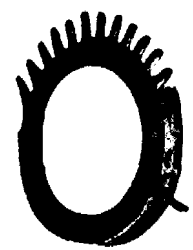

Figure 306

a slight movement to and fro, while the result mechanism makes a short swinging movement. Any sporadic or jerking action by the interlocking parts is therefore impossible, and consequently wear and tear is kept to a minimum. The tens-carry of the result mechanism is a positive one and can be considered an important safeguard against mistakes that can otherwise arise. There is also another safety device attached that, by blocking the setup wheels, makes any shifting movement during the calculation impossible. This safeguard comes into effect as soon as the crank begins to turn.

In the Demos, the setup mechanism can be moved. With the thumb and index finger of the left hand, one takes hold of the knob on the left of the carriage guide bar. When the knob is gently turned backward, the carriage becomes free and can be shifted at will by means of the bar. The two cranks on the left side of the machine are used to set the two calculating mechanisms to zero. Since the setup axle only has to make a quarter turn, it is possible to make the setup levers long and flat and therefore comfortable to hold. There are two rows of viewing windows between the slits for the setup levers—the adding numbers appear in black in the lower ones and the subtracting numbers

in red in the upper ones. The setup levers are positioned on zero by raising the zero position bar underneath the setup slits. Both calculating mechanisms are equipped with the usual decimal point slides. The setup wheels are blocked as soon as the crank begins to turn. Because the crank is always turned in the same direction for addition and subtraction, it is possible to carry out combined operations (such as the rule of three. etc.) on the Demos. Its main advantage is uninterrupted multiplication without stopping the rotation of the crank.

The machine is supplied with nine places in the setup mechanism. fourteen places in the result mechanism, and eight places in the revolution counter. It weighs approximately **5** kg and costs only about half as much as similar calculating mechanisms. The distributor is Theo Muggli, 93 Bahnhoff Strasse, Zurich 1.

Quentell (1923)

The Quentell is a printing adding machine of new design especially notable for its low price. In other respects, however, it is the equal of more expensive machines. In America the price is $89.00. The machine requires a surface area of 25 x 27 cm, and weighs 9 kg. The machine is sold through Quentell Sales Corporation, 342 Madison Avenue, New York. Although it has been introduced into Holland, it is unknown in other European countries.

There are nine places in both the entry and result mechanisms. Numbers are entered in the following way: in each of the nine setting slides are nine setting levers leaning to the left—a slight pressure on the appropriate surface suffices to enter the corresponding digit. **At** the end of each setting slide is a

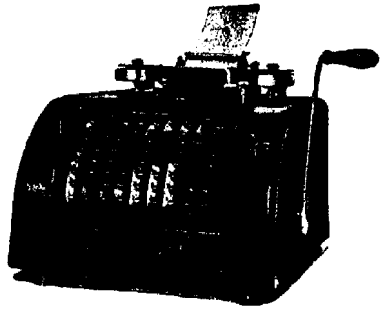

Figure 307

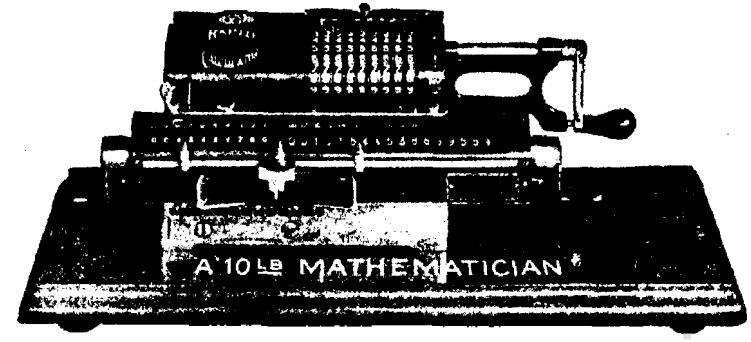

Figure 308

signal that is raised by the pressure on the setting surface, thus showing which digit has been entered. The signal remains in this position **to** allow checking of the entry before the crank is pulled. The crank action transfers the quantity into the result mechanism and causes the printing ***on*** a paper strip. Several digits can be entered at the same time. Total. subtotal, and correction levers are found on the right side of the setting slides. *so* that the machine can be operated entirely with the right hand, thus leaving the left hand free for making notes. **A** repeat key, found **to** the left of the entry mechanism, provides effective assistance in multiplication and division. The printing device uses a single-color ribbon, the pressure on the paper strips is light, and the printing is visible to the operator.

Rapid Calculator (1923)

Manufacturer: S. W. Allen Company, 20 South Eighteenth St., Philadelphia. The machine is said to have been manufactured since 1918. Reports of sales in larger numbers date from 1923. It is a pinwheel machine produced with either 8 × 9 × 13 places or 9 × 10 × 18 places. It weighs **4.5** kg.

Regina (1924)

The information obtained about the Regina is generally so useless to read that the design remains unclear (see the following), and one cannot gain an exact view of the way the machine works. Judging from the figure, it is a calculating machine with slide setting and a crank on the right side.

The numbers to be added are entered as in every(?) other machine, and the result immediately appears in the viewing windows without further work (for example, turning a crank)." A slide is easily changed for subtraction. The work proceeds as in addition. The number to be multiplied is entered in the multiplication mechanism(?), a slide placed on the multiplier, and the result read off. It should be mentioned here especially that the simplification of this mechanism places all existing systems in the shade, since one arithmetic number system entered on the cylinder saves every further mechanism and the assorted work(?!). Division is the simplest imaginable, since it is the reverse of multiplication. Zeroing follows through pressure on a locking latch and one turn of the crank.

The price of the Regina is 140.00 marks. Designer: Hebecker & Taessel, Muhlhaused, Thuer.

Rheinmetall (1924)

The Rheinmetall is a stepped drum machine (see the introduction for a general description) that is now available only with keyboard setting. It has eleven decimal places in the setting mechanism, seventeen in the result mechanism, and eight in the revolution counter. Manufacturers are: Rheinische Metallwaren und Machinenfabrik in Soemmerda. The sales agency is the Rheinmetall-Handelsgesellschaft m.b.H. in Berlin W. 8, Friedrichstrasse 56/57.

The machine has double stepped drum drives, reliable gear meshing conditions, and a tens-carry throughout, even in the revolution counter (i.e., no red digits). so that the machine is particularly suited for shortcut multiplication. The setup values may be read, in a straight line, from the windows above the keyboard. The reversing lever is located to the left of the keyboard. Depression of key R causes the carriage to shift by one decimal place in the direction of the arrow. Lever 9 serves for shifting the carriage to the right—particular attention is drawn to the fact that lifting of the carriage, such as is required in other machines, is no longer necessary. Keeping correction key C depressed while the crank is being turned compensates for extra revolutions of the crank without the need to reverse the machine to the opposite type of calculation, which would be done by lever 6. When individual items are to be added, lever 3, located to the right of the keyboard, is set to A. This adjustment releases the values set in the keyboard after each turn of the crank

77. The question marks were part of Martin's original publication but were. presumably. not part of the original quotation. As Martin indicates, the original information was quite confusing. and we are sure that our translation into English does not help the situation.

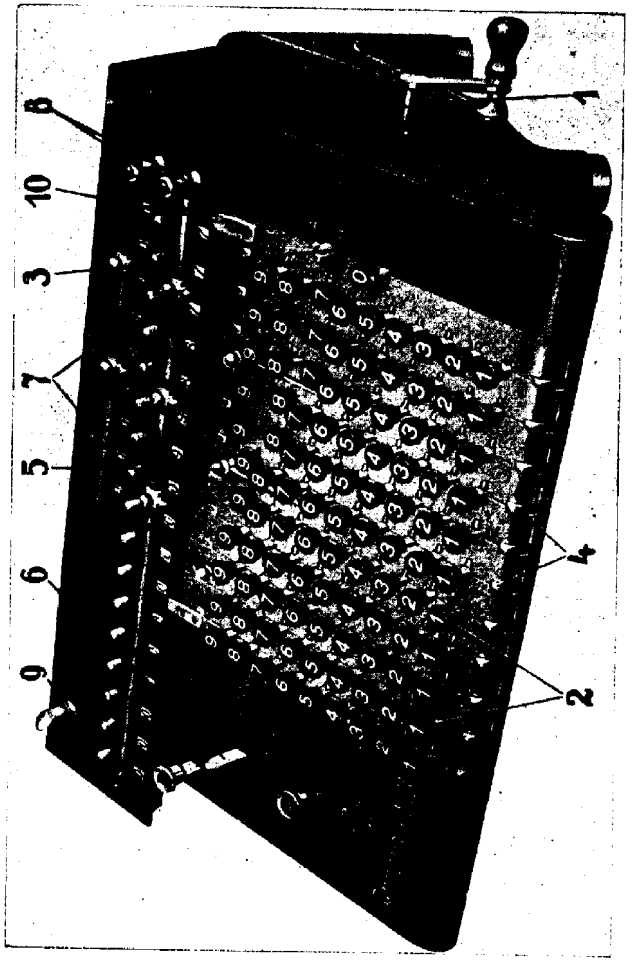

Figure 309

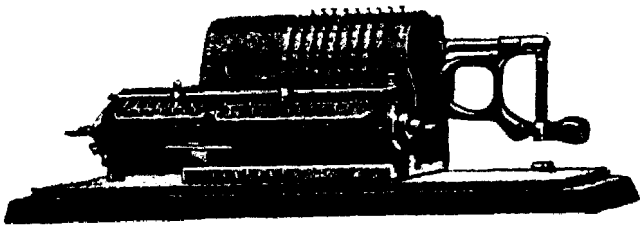

Figure 310

so that they do not need to be cleared by a separate operation. For multiplication and division, however, the lever is set to M so that the entered values may be maintained for the duration of these calculations. Depression of key **0,** which is also to the right of the keyboard, clears values entered in the keyboard. Any amount entered may also be cleared, in individual columns, by operation of lever **4.** The machine is also provided with the customary decimal point slides, with insertable decimal point plugs for grouping the keys, and with setting knobs located above the windows of the result mechanism—which can serve, as is well known, for setting up the dividend or for correcting (rounding off) the results. The sloping position of the keyboard and the large digits of the counting mechanisms permit very convenient reading of the results. The distance between the digits is only 18 mm.

Dimensions: 37 × **30 x** 8½ cm. Weight: **13.7** kg net without baseboard **or** cover.

Muldovo (1924)

The Muldovo is a miniature pinwheel machine of French origin. The name of the manufacturer is unknown to us. Weight: 3.5 kg dimensions: **30** × 15 cm.

Gauss (1924)

The Gauss calculating machine factory was founded in Braunschweig in 1923 **by E.** Hengstmann, H. Scharff, and R. Ulbrich.

It is a pinwheel machine with fourteen places in the result mechanism, ten in the setup mechanism, and nine in the revolution counter. Zero position of the setting levers is brought about by pressing the zero position key on the

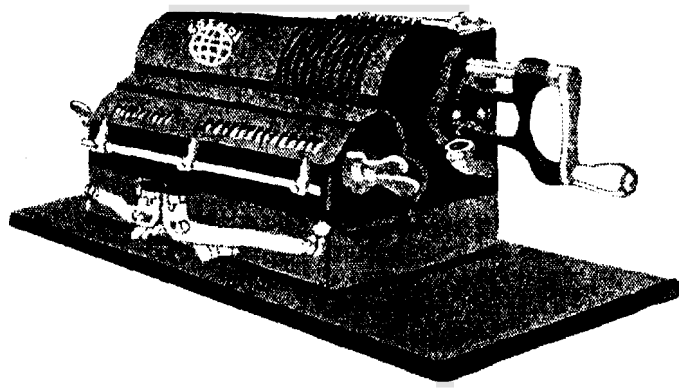

Figure 311

right side of the machine. The carriage is also shifted by means of keys. Only a few dozen machines were ever produced when, in October 1924, the production rights were transferred over to Hengstmann and Company. a factory for calculating machines situated at Mauernstrasse **4**l. Braunschweig. The machine is now called Cosmos. There is said to be a model under construction that has tens-carry in the revolution counter.

The Mercedes-Elektra Calculating Typewriter (1924)

This is a version of the well-known, electrically driven Mercedes typewriter, the Mercedes-Elektra. The calculating Mercedes-Elektra is provided with mechanisms for adding and subtracting digits. The numbers may be arranged under one another **or** next to one another in as many rows as are required; hence the machine is equipped for vertical as well as horizontal operations. The easily detached calculating mechanism, mounted at the front of the carriage, is used **for** the addition and subtraction of digits arranged underneath one another. The cross totaling mechanism, on the right side at the front, is used for horizontal addition and subtraction and also serves as the control calculating mechanism. The machine is provided with a decimal place tabulator, in front of which are ten keys for digits that can be used both for typing and calculating. **For** those numbers that need only to be typed, there are keys for that purpose in the fourth row of the actual typewriter keyboard. The use of these prevents numbers belonging to number statements, dates, and the like from entering the calculating mechanism.