A.D. 1851 . . . . . N° 13,504.

Calculating Machine.

DE COLMAR'S SPECIFICATION.

A.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, CHARLES XAVIER THOMAS (DE COLMAR), Chevalier de la Legion d'Honneur, of Paris, France, send greeting.

WHEREAS Her present most Excellent Majesty Queen Victoria, by Her Royal Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the Tenth day of February (One thousand eight hundred and fifty-one), in the fourteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Charles Xavier Thomas (de Colmar), my exors, admiors, and assigns, Her especial license, full power, sole privilege and authority, that I, the said Charles Xavier Thomas (de Colmar), my exors, admiors, and assigns, or such others as I, the said Charles Xavier Thomas (de Colmar), my exors, admiors, or assigns, should at any time agree with and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, and in the Islands of Jersey, Guernsey, Alderney, Sark and Man, and also in all Her said Majesty's Colonies and Plantations abroad, my Invention of "AN IMPROVED CALCULATING MACHINE, WHICH I CALL ARITHMOMETER;" in which said Letters Patent is contained a proviso, that I, the said Charles Xavier Thomas (de Colmar), shall cause a particular description

of the nature of my said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, to be inrolled in Her said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

NOW KNOW YE, that in compliance with the said proviso, I, the said Charles Xavier Thomas (de Colmar), do hereby declare the nature of the said Invention, and the manner in which the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, reference being made to the Drawings hereunto annexed, in which the same letters of reference marked thereon represent in the several Figures parts which are similar in each Drawing, that is to say :—

My Invention consists in constructing an improved machine for performing all the operations of arithmetic; namely, addition, subtraction, multiplication, and division; for extracting the square and cube roots; for calculating decimals, and all other arithmetical operations.

In Drawing I., Figure 1 is a plan or bird's-eye view of the machine when the lid is raised, showing the plates M, M, M, M, and F, F, F, F. Figure 2 of the same Drawing is an underneath view of the plate M, M, M, M. Figure 3 is a side elevation of the same plate M, M, M, M. Figure 4 is a section of the plan of the cylinder, the plate F, F, F, F, being taken off to exhibit the working of the several organs composing the mechanism of the cylinders Y, Y, Y, Y, Y^1, and H. Figure 5 is a side elevation of the cylinder H. Figure 6 is a side section of the cylinders Y, Y, Y, Y. Figure 7 is an horizontal elevation through the plate R, R. Figure 8 is a front plate, showing the rod *o*, *o*, *o*, and bevil wheels d^1, d^1, d^1, d^1, d^1. Figure 9 is a front and side view of the levers L, L, L, L. Figure 10 is a front and side view of the stops for the small levers k^1, k^1, k^1, k^1. Figure 11 is a front view of the rack E, wheel X^1, and indicator plate. Figure 12 is a front view and plan of the cylinder Y, and of the spring S.

In Drawing II., Figure 1 represents a plan of the double dial for quotient and multiplier. Figure 2 is a sectional elevation through A, B, of Figure 1; Figure 3 is a side elevation of cylinder and gear to obtain the quotient and multiplier; Figures 4 and 4^1 are a side and front elevation of fork lever F, F; Figures 5 and 5^1 are a front and side view of the lever Z, Z.

The mechanism for the multiplicant and multiplier can be inserted, as represented in the Drawing I., in a box having about 2in. $\frac{1}{8}$ in elevation, one

foot three inches in length, and 6 in. $\frac{1}{4}$ in width. It is composed of two plates, as represented in Figures 7 and 8 of the Drawing I., which said plates are united together by four pillars, seen in Figures 4, 5, and 6, and of another small plate carrying the guides G, G, G, in which the steel rod G¹, G¹, is sliding, as seen in Figures 2 and 3. The box is covered with a wrought iron or brass plate, which may be about 5 in. $\frac{1}{4}$ in width, and 1 ft. $\frac{1}{5}$ in length, as represented by the letters F, F, F, F, Figure 1. This wrought iron or brass plate is provided with an equal number of slits as there are figures for the multiplicant beside one more for the multiplier. It is in those slits which are in Drawing I., six in number, that the knobs A, A, A, A, A, Figures 1, 6, and 8, with their indicating hands, by which the figures of the multiplicant are pointed out, and the knob B¹, Figures 1, 5, and 8, with its double hand, indicate the figures of the multiplicator or devisor, are made to slide, as it will be herein-after described. The ten dials *c*, *c*, *c*, *c*, *c*, Figures 1, 2, 3, are separated from each other by about $\frac{3}{4}$ of an inch, and are fitted on another plate M, M, M, M, having about 1 in. $\frac{7}{8}$ in width, and 1 ft. $\frac{1}{8}$ in length. Each of these dials *c*, *c*, *c*, *c*, *c*, represent ten figures, from 0 to 9, which serve to indicate by means of openings cut, as shewn in the herein-before described plate M, M, M, M, the products obtained by the working of the machine. The above-described plate M, M, M, M, can be made to raise and to slide along the box upon the herein-before described steel rod G¹, G¹, Figures 2 and 3, which serves as a hinge to the said plate M, M, M, M, and by that contrivance it causes the line of the dials *c*, *c*, *c*, *c*, *c*, to be changed, which renders them successively independent of the mechanism when it is put in motion. I fix on the same plate M, M, M, M, but underneath each of the said dials *c*, *c*, *c*, *c*, *c*, the wheels D, D, D, D, Figures 2, 3, and 6, provided with ten cogs. Each dial carries a double inclined steel pin *u*, *u*, *u*, *u*, Figures 2, 3, which presses on the catching levers L, L, L, L, Figures 4, 6, 7, and 9, and disengages the catching each time the dials pass from 0 to 9, or from 9 to 0. The small flat wheels X¹, X¹, Figures 3 and 11, divided in ten equal parts, but with only nine cogs, are cast on every wheel D, D, D, D, of the dials *c*, *c*, *c*, *c*, *c*, as herein-before stated. These small wheels X¹, X¹, cause all the dials *c*, *c*, *c*, *c*, *c*, to be replaced at once to 0 by means of the rack *E*, E, E, Figures 2, 3, and 11, either by drawing the knob T, Figures 1, 2, and 3, or by means of any other suitable mechanism, giving to the wheel X¹, X¹, a rotative motion, as in Figure 11. When the dials *c*, *c*, *c*, *c*, *c*, are at 0, the said wheels X¹, X¹, are in the position represented by the said Figure 11. The cylinders Y, Y, Y, Y, seen in Figures 4, 6, and 12, are provided with nine graduated cogs cut

lengthway, in order to represent the figures of the multiplicant from 1 to 9. The teeth of the cylinders Y, Y, Y, Y, Figures 4, 6, and 8, catch with the small wheels A^1, A^1, A^1, A^1, A^1, of the same Figures. These wheels are provided with ten cogs, and they are put in motion by means of the fork P, Figures 6 and 8, with which the indicating knobs A, A, A, A, A, already described, are provided. The wheels A^1, A^1, A^1, A^1, A^1, slide over the square axes A^{11}, A^{11}, A^{11}, according to the motions of the fork P, and of the knobs A, A, A, A, by which they are conducted to the figures of the multiplicant. It is then that the herein-before described wheels A^1, A^1, A^1, A^1, A^1, catch their separate cogs with the section of the teeth cut, as herein-before described, on the length of cylinders Y, Y, Y, Y, which have the number of their cogs equal to that of the figure exhibited by the indicating knob A, A, A, A. When the cylinders Y, Y, Y, Y, perform a rotative motion, they cause the small wheels A^1, A^1, A^1, A^1, to turn the same number of cogs which the figure facing the indicating hand of the knobs A, A, A, A, points out, and the dials *c*, *c*, *c*, *c*, render visible the same figure through their opening on the moveable plate M, M, M, M, Figure 1. On the left of the cylinders Y, Y, Y, Y, Figure 4, another cylinder H, Figures 4 and 5, cut helically, is set, and a slit cuts in all its length, allows the lever B, seen in Figures 4, 5, and 8, and put in motion by the knob B^1, Figures 1, 4, 5, and 8, to regulate the number of revolutions the cylinders Y, Y, Y, Y, are to perform together, in order to represent one of the figures of the multiplier. Thus, for instance, when the hand of the knob B^1, Figures 1, 5, and 8, indicates the figure 9 of the left column, the multiplicant will be multiplied by 9.

All the herein-before described cylinders Y, Y, Y, Y, Figures 4, 5, 6, 7, 8, and 12 of the multiplicant, as well as the cylinder H of the multiplier, are provided at one of their extremities with bevil wheels *d*, *d*, *d*, *d*, having twenty cogs which catch with a similar number of bevil wheels d^1, d^1, d^1, d^1, set on the same axis *o*, *o*, *o*, Figures 4, 5, 6, and 8. On the right hand of the herein-before described axis *o*, *o*, *o*, is placed the bevil wheel d^{11}, which cogs with the wheel set on the axis of the crank arm N, Figures 1, 4, 6, and 8. Close to the other extremitiy of the cylinders Y, Y, Y, Y, of the multiplicant and of the cylinder H of the multiplicator, less however the cylinder Y^1 set on the right, I have placed a system of cogs Z, Z, Z, Z, to operate the catchings. The moveable pins set on the levers *k*, *k*, *k*, Figures 4, 5, 6, 7, and 12, cog only with the ten cog wheels Z, Z, Z, Z, Figure 7, when they are to operate the catchings. In order to obtain that effect the spiral springs S, S, S, S, Figures 4, 5, 6, and 12, placed between the levers *k*, *k*, *k*, and the cylinders

Y, Y, Y, Y, and H, as represented by Figure 12, act on the said levers *k*, *k*, *k*, and force them to meet during their circular motion the catch wheels Z, Z, Z, Z, Figure 7. This last movement takes place only when the dials *c*, *c*, *c*, *c*, *c*, have passed from 0 to 9, or from 9 to 0, because the small double inclined pins *u*, *u*, *u*, *u*, herein-before described, Figures 3 and 6, by pressing them on the levers L, L, L, Figures 7 and 9, allow the spiral springs S, S, S, S, to cause the descending motion of the levers *k*, *k*, *k*, Figures 4, 5, 6, 7, and 12, which action they would not perform otherwise, being kept by the small pin *b*, *b*, of the levers L, L, L, Figure 9. The spiral springs S, S, S, S, being distended and the small levers *k*, *k*, *k*, lowered, when the cylinders are made to turn by the action of the crank arm N, the small levers *k*, *k*, *k*, meet the catch wheels Z, Z, Z, Z, and compel them to turn one cog, which causes the dials *c*, *c*, *c*, *c*, *c*, to turn of one figure, then the small levers *k*, *k*, *k*, by continuing after their circular motion meet on their passage with the small inclined pieces I, I, I, I, Figures 5, 6, 7, and 10, fixed on the small plate, Figure 7. These small inclined pieces I, I, I, I, will cause the small levers *k*, *k*, *k*, to ascend again to their former position, and at that place they are maintained by the herein-before described small pin *b*, of the levers L, L, L, Figure 9. The aforc-mentioned small levers *k*, *k*, *k*, having thus returned to their usual position, as afore stated, if the cylinders Y, Y, Y, Y, are made to turn the said small levers *k*, *k*, *k*, will pass in front of the catch wheels Z, Z, Z, Z, Figure 7, without causing the said wheels to rotate.

I must explain here the reasons which have induced me to use only nine cogs on the cylinders Y, Y, Y, Y, Figures 4 and 8. It is absolutely necessary that each of the cylinders Y, Y, Y, Y, should receive the catchings after having produced its figure, and to perform that operation it is required that the holdings or catchings be produced in due succession one after the other. It was therefore indispensable that the tenths should be produced before the hundredths and the hundredths before the thousandths, and so on. For that reason I have necessarily placed the cylinders Y, Y, Y, Y, Figure 4, in such a position that they are able to cog with the wheels A^1, A^1, A^1, A^1, A^1, of the multiplicant figure one after the other, then the cylinders Y, Y, Y, Y, and their levers *k*, *k*, *k*, will be placed relatively to each other in the position as represented in Figures 4 and 7. The subtraction and division being the reverse rules of the addition and multiplication, to perform these last operations I have fixed on the square axes A^{11}, A^{11}, A^{11}, A^{11}, on which the wheels A^1, A^1, A^1, A^1, are made to slide, as herein-before described, two bevel wheels, having each of them ten teeth, which cause the dials *c*, *c*, *c*, *c*, *c*, to turn from right to left and from left

to right. The square axes A^{11}, A^{11}, A^{11}, A^{11}, on which the bevil wheels D, D, D, D, and D^1, D^1, D^1, D^1, are set, have their pivots jutting out, as represented in F^1, F^{1}, F^1, F^1, Figure 4, in order that they should be made to operate in the direction of their length without moving out from the plates into which their pivots are made to turn. Between the two bevil wheels D, D, D, D, and D^1, D^1, D^1, D^1, are set the plates with grooves having the same width than the band R, R, Figure 4. I cause all the bevil wheels D, D, D, D, and D^1, D^1, D^1, D^1, to recede or to advance together by means of the said band R, R, which passes in the grooves of the bevil wheels in order to have those of the front or back to cog with the wheels of the dials *c*, *c*, *c*, *c*, *c*. I obtain this change from the multiplication to the division, or that from the addition to the subtraction, and vice versa, by turning the wing nut E^1, Figures 1 and 4; in that manner its indicator points out the real operation to be performed. The large knob L^1, of Figures 1 and 3 serve to raise the plate of the dials *c*, *c*, *c*, *c*, *c*; the two knobs V^1, V^1, Figures 1 and 2, can be placed indifferently into the small holes V, V, V, of the dial plate M, M, M, M, when semicolons are required to separate the several aliquot parts or to divide the numbers in groupe of two or three figures and to extract the square or cube root of a number and also for fractions and decimals.

I can also obtain the quotient in the division and the multiplier in the multiplication by setting on the back of the first cylinder on the right, A, Figures 1 and 3, Drawing II., that is to say, on the back of cylinder Y^1, Figure 4, Drawing I., a cylindrical piece B, Figure 3, Drawing II., having about $\frac{7}{10}$ of an inch in diameter and provided with a groove *c*, *c*, Figure 3, being about $\frac{1}{10}$ of an inch deep. This groove *c*, *c*, cuts obliquely in two parts and in a contrary direction the cylindrical piece B, in order to give to a lever L, Figure 3, entering into the said groove, an alternate motion. The lever L, is moveable in an hinged piece S, Figures 1, 3, 4, and 4^1, set on the back plate, and is provided at its upper extremity (having also a hinge) with a fork F, Figures 1, 3, 4, and 4^1, the two arms of which are moveable, and commands a spiral spring T, Figures 1 and 4, having a tendency to cause the said arms to approach one from the other. The arms F, F, Figures 1, 3, 4, and 4^1, of the fork are bent inside and serve to put in motion a wheel R, Figures 1 and 3 having about $\frac{7}{16}$ of an inch in diameter, and this wheel R is provided with ten square teeth and is fixed to the dial plates. On its axis I set an indicating hand working on the openings plate and pointing out on a dial V, Figure 1, having a double row of figures, the number of rotations performed by the crank arm N, Drawing I. The red numbers on the dial V, Drawing II., indicate

the quotient, and the black numbers those of the multiplier. On the lower part of the small iron band Q, Q, Figures 1, 2, and 3, communicating with the wing nut E^1, of the Drawing I., is set a piece O, Figures 2 and 3, Drawing II., supporting perpendicularly a fork projecting towards the bottom of the apparatus. Between the two arms of the herein-before described fork a pin K, Figures 1, 2, 3, 5, and 5^1, is moving. The said pin K forms a part of the lever Z, Figures 1, 2, 3, 5, and 5^1, fixed to the back plate by means of a screw. The lever Z is ending in the shape of a fork Z, Z, Figures 1, 2, 3, 5, and 5^1, the arms being at angle and kept in between the two arms F, F, and the spring T, herein-before described. The small iron band *q*, *q*, Figures 1, 2, and 3, communicates a right or left motion to the lever Z commanding the back plate according to the motion given to the crank arm E^1, Drawing I., for performing either an addition or subtraction. The right or left hook Z, Z, Figures 2, 3, 5, and 5^1, of the lever distends the corresponding arm of the fork F, F, Figures 1, 3, 4, and 4^1, leaving the opposite arm to be alone in communication with the cog wheel R. Each revolution of the crank arm N, Drawing I., causes an alternate motion to the fork, the arm of which communicating with the wheel R, Figure 3, Drawing II., causes the last to turn of a cog from right to left or from left to right according to the arm which is acting on the said wheel R. I set on the dial plate V., Figure 1, the same number of cog wheels R, with their hands and double set of figure dials, as I have placed cylinders in the machine. The same fork F, F, Figures 3, 4, and 4^1, will act successively on the several wheels when put in communication either by carrying the plate on the right or on the left. The dial plate for the present arrangements have been increased of $\frac{5}{16}$ of an inch in length, the square axes A^{11}, A^{11}, A^{11}, and the pillars of back plate, Drawing I., of the machine have also been lengthened of the same quantity.

Modus Operandi of the Arithmometer.

The apparatus operates by following the elementary principle of the arithmetic, and its movements seem to follow and to indicate the judgment which is required to perform a scientific operation.

Addition.

I operate an addition by setting down with the knobs A, A, A, A, A, Figure 1, Drawing I., the numbers on which I am to make the operation, and by pushing for each number the knob B^1 of the multiplier, which is the last

on the left, I turn the crank arm N until it stops and the figures pointed out by the knobs A, A, A, A, A, are exhibited on the dials *c*, *c*, *c*, *c*, *c*, through the openings on the plate M, M, M, M. If I begin again what has been herein-before stated, I have all the numbers added one to the others, which is really making an addition, and the total will be exhibited on the dials *c*, *c*, *c*, *c*, *c*, through the openings as before stated instead of setting for every sum the multiplicant A, A, A, A, A, to one it is more preferable to push it to nought and to take no notice of it, the only thing required then being merely to have the crank arm N to perform one revolution.

Multiplication.

To perform the multiplication I operate in a manner similar to that herein-before described when speaking of the addition. However, instead of placing the multiplier B^1 to 1, I set it to the figure by which the operation of multiplying is to be performed; thus, for instance, if I have the number 35,695, to multiply by 2, I place the multiplier B^1 at 2, and I turn the crank arm N, until the hand of multiplier B^1 be forced to stop. If I had to multiply the above number 35,695 by the number 22, I would be obliged in the same manner, and as if I had to write the figures with a pen, to multiply again the same sum of 35,695 by the same number 2, therefore I take care to raise the plate M, M, M, M, of the dials *i*, *i*, *i*, *i*, and to push it off a notch from right to left in order that I should no longer operate on the units, which be then separated as a matter of course. If I had to multiply with hundreds I would have to operate in the same manner, that is to say, I would be obliged to disengage the tenths, and so on. For any other quantity, following the principle herein-before described, I would, according to what I have before stated when speaking of addition, perform the operation of multiplication without making use of the multiplier B^1 by placing it at nought and by giving as many turns of the crank arm N as the number 1 is found repeated in the sum which is to serve for the multipler. The apparatus can multiply by means of the same number of figures as there are contained in the multiplicant; I construct apparatus having eight and sixteen figures and I find no difficulty in constructing them with even a much larger number.

Subtraction.

I perform that operation in a manner similar to what I have herein-before described when speaking of addition. The only difference is that I turn the wing nut E for the subtraction, which causes the wheels D, D, D, D, and D^1, D^1, D^1, D^1, of the dial to cog in the reverse direction to that of addition.

DIVISION.

To perform that operation I operate by turning the wing nut E^1 in the same manner as I have herein-before described when speaking of subtraction. The dividend must be set down in the dial, and by writing the sum by means of the small knobs which are prepared for every opening, I write the division in the same manner as I wrote the multiplicant, by means of the knobs A, A, A, A, A. However, the operation is conducted in the reverse manner to that of the multiplication; that is to say, I begin to act on the figure placed on the left. Thus, for instance, if I wish to divide 625 by 25, I place 62 above 25 (according to the principle I have herein-before described (when speaking of the multiplication,) and I set the multiplier B^1 at the top of the slit, and I turn then the crank arm N until the figure of the dividend be less than that of the devisor. The knob of the multiplier B^1 will point out the number of times the sum is contained. For the above example $\frac{625}{25}$, I will obtain 2 for the first figure from right to left, and I operate on the remaining number as I have operated on the figure 62. I turn five times the crank arm N, and I will obtain nought; therefore the number 25 will be found to be contained 25 times in the number 625.

And having now described the nature of my said Invention, and in what manner the same is to be performed, I wish to be understood that I do not restrict myself to the precise details, proportions, or modus operandi I have described, provided the general features of the organs and arrangement of my Invention be preserved; but what I claim as my Invention, and intended to be protected by the herein-before recited Letters Patent, is,—

Firstly, the constructing and dividing cylinders as herein-before described, reference being had to Figures 4, 5, 6, 7, 8, or 12 of Drawing 1.

Secondly, the obtaining the products, as herein-before described, reference being had to Figures 1, 3, 4, 5, 6, and 8 of Drawing 1.

Thirdly, the changing from multiplication to division, and from addition to subtraction, as herein-before described, reference being had to Drawing 1 & 4, Drawing 1.

Fourthly, the mode of effecting the stoppings as herein-before described, reference being had to Figures 7 and 9 of the Drawing 1.

Fifthly, the method of replacing the numbers to 0 as herein-before described, reference being had to Figures 2, 3, and 11 of Drawing 1.

Sixthly, the arrangement for putting the machine in motion as herein-before described, reference being had to Figures 1, 4, 5, 6, and 8 of Drawing 1.

Seventhly, the arrangement for obtaining the quotient and multiplier as herein-before described, reference being had to all the Figures of Drawing II.

In witness whereof, I, the said Charles Xavier Thomas de Colmar, have hereunto set my hand and seal, this Seventh day of August, in the year of our Lord One thousand eight hundred and fifty-one.

CHARLES XAVIER (L.S.) THOMAS (DE COLMAR.)

Taken and acknowledged by Charles Xavier Thomas de Colmar (party hereto) at Paris, in the Republic of France, this 7th day of August 1851, before me,

THOMAS PICKFORD,

(Consul's Seal.) Her Majesty's Consul for Great Britain.

A.

This is the Specification marked A, referred to in the affidavit of Peter Armand le Compte de Fontaine Moreau, sworn before me, this 9th day of August 1851.

HENRY MOWBRAY.

I, PETER ARMAND le Comte DE FONTAINE MOREAU, of 4, South Street, Finsbury, in the County of Middlesex, Patent Agent, make oath and say, that I am acquainted with the manner and character of the handwriting of "Thomas Pickford," Her Britannic Majesty's Consul of Paris, in the Republic of France. And this deponent further saith that the signature "Thomas Pickford," set, subscribed, or written in the margin of the Specification hereunto annexed, marked A, and dated the Seventh day of August instant, and purporting to be executed by Charles Xavier Thomas (de Colmar), Chevalier de la Légion d'Honneur, of Paris, France, whereby it is stated that the Specification was acknowledged by him, the said Charles Xavier Thomas (de Colmar), before the said "Thomas Pickford, on the said Seventh day of August, at Paris aforesaid, is of the proper handwriting of the said "Thomas Pickford.

L' DE FONTAINE MOREAU.

Sworn at the Chancery Affidavit Office, Southampton Buildings, Chancery Lane, in the County of Middlesex, this 9th day of August 1851, before me,

HENRY MOWBRAY.

AND BE IT REMEMBERED, that on the affidavit of Peter Armand le Comte de Fontaine Moreau, the Specification aforesaid was enrolled word for word as above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

By Affdt.

Enrolled the Ninth day of August, in the year of our Lord One thousand eight hundred and fifty-one.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1857.

A.D. 1851. Feby 10. Nº 13,504.
THOMAS DE COLMAR'S Specification.

(2 SHEETS)
DRAWING 2.

FIG. 1

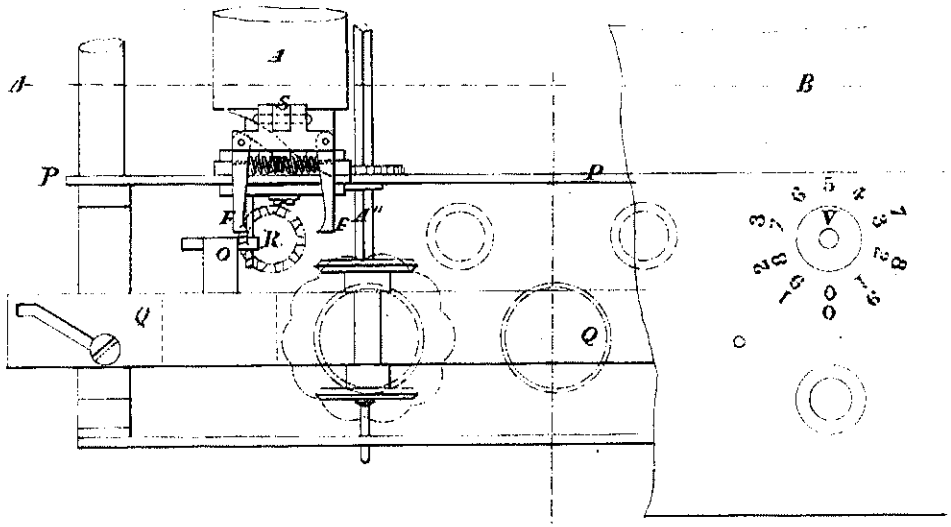


FIG. 5.

FIG. 5.

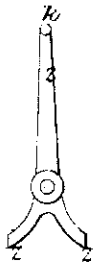


FIG. 4.

FIG. 4.

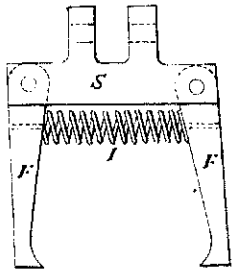


FIG. 3.

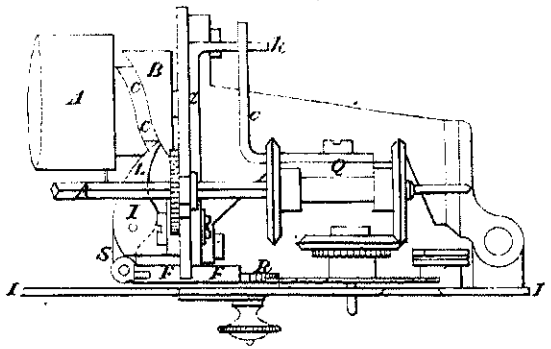
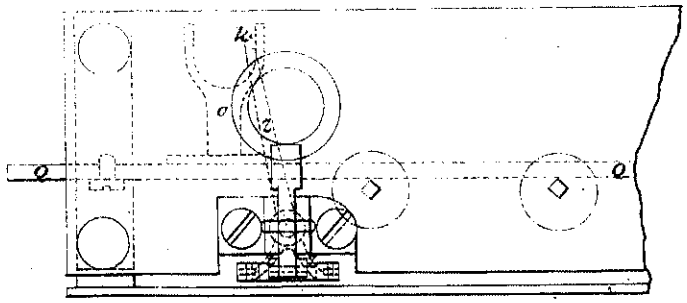


FIG. 2.



The enrolled drawing is partly colored.

Drawn on Stone by Malby & Sons.

LONDON: Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1857.

FIG. 1.

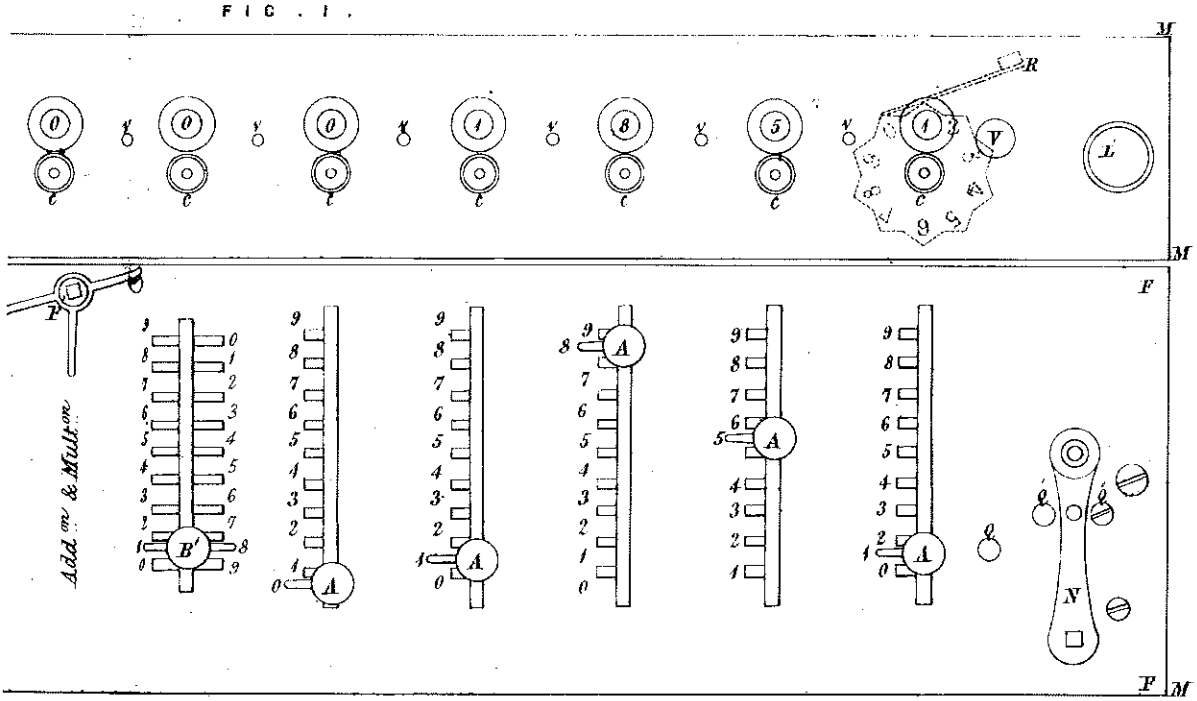


FIG. 2.

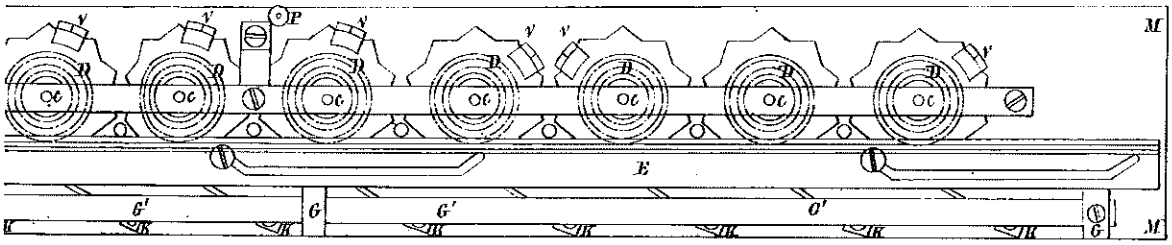


FIG. 3.

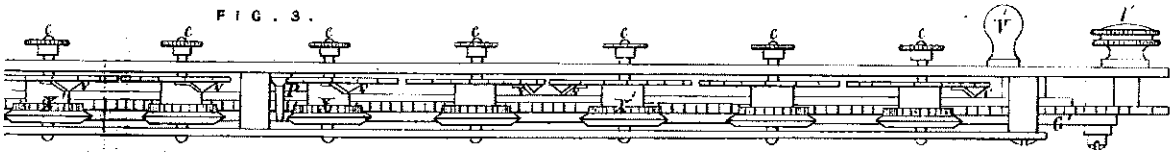


FIG. 4

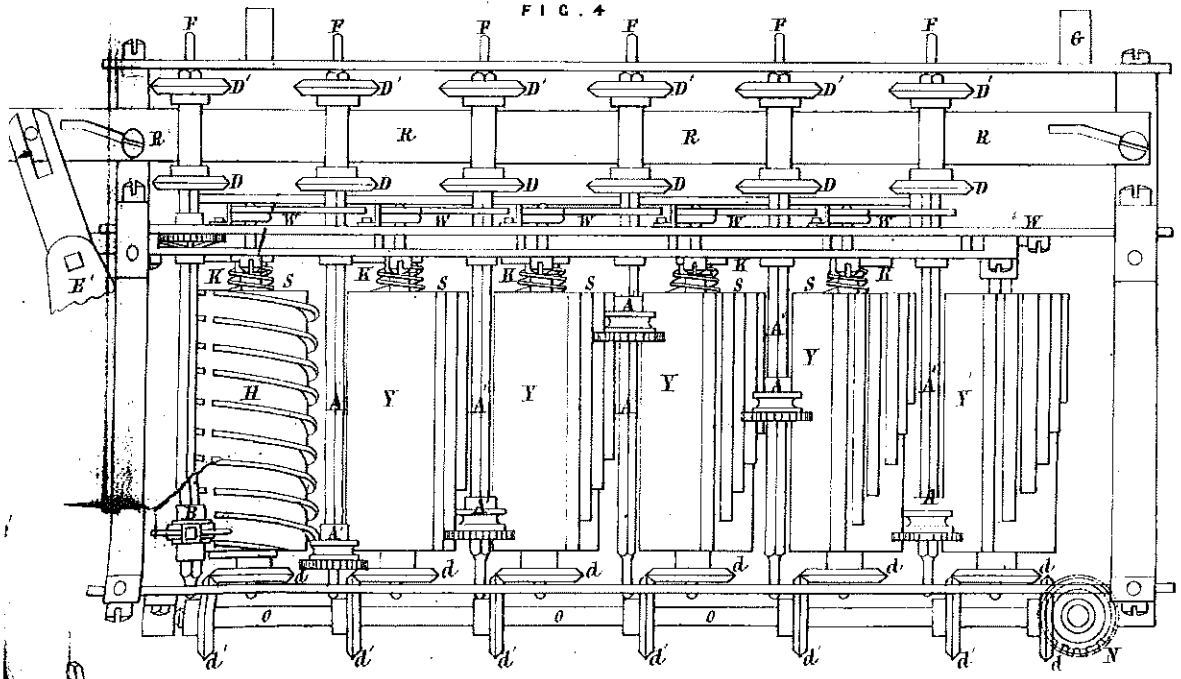
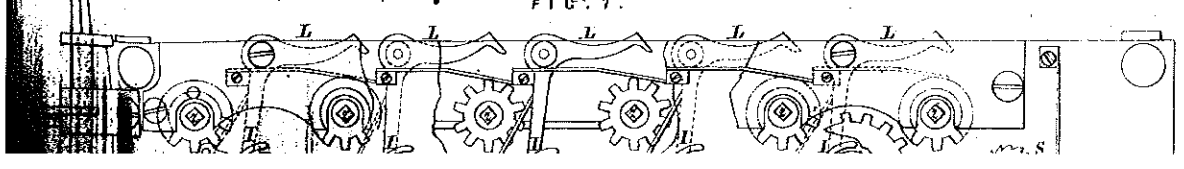


FIG. 7.



. 1851. Feb. 10 Nº 13.504.
De COLMAR'S Specification.

FIG. 1.

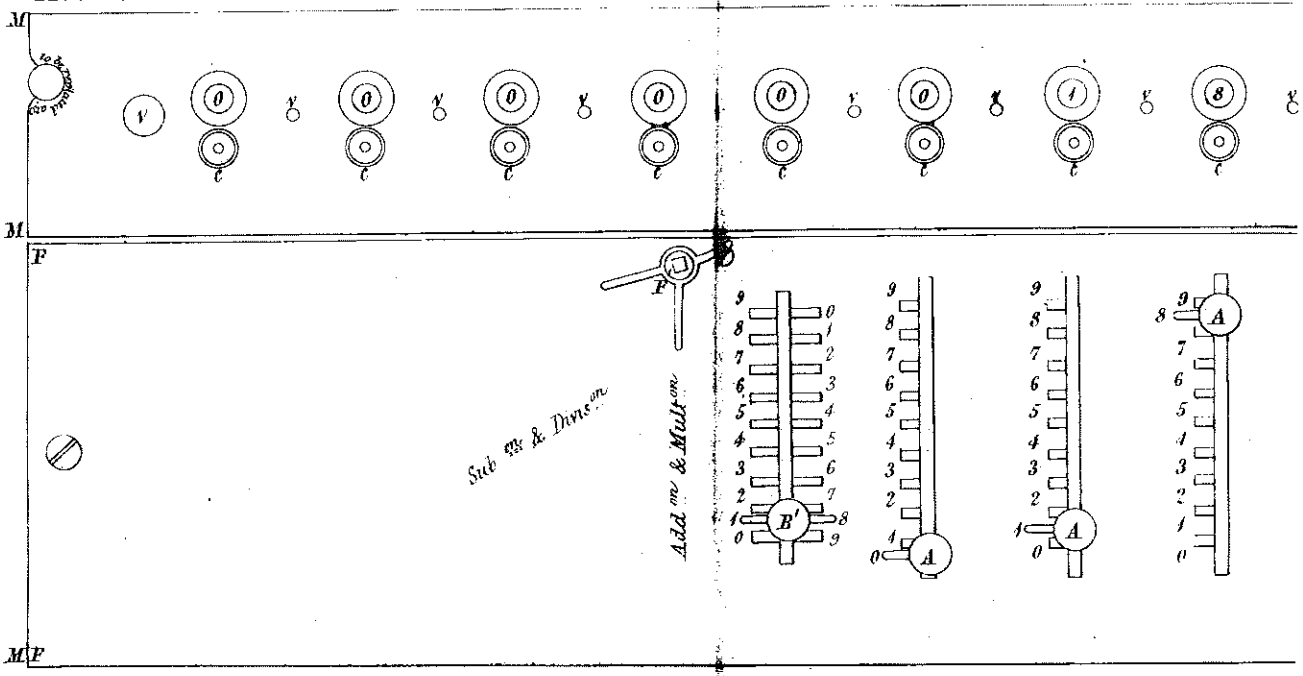


FIG. 2.

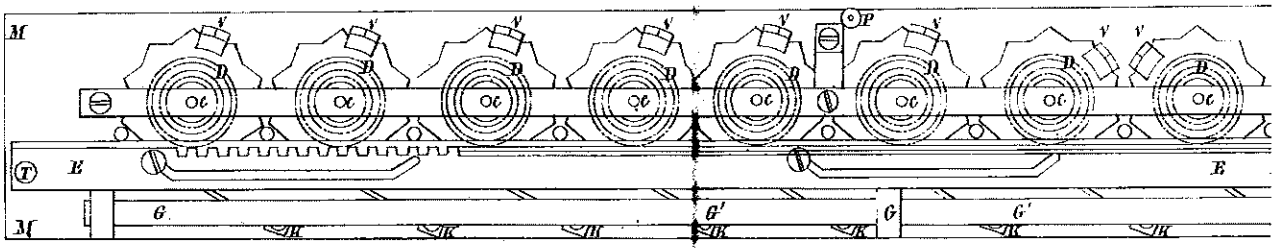


FIG. 3.

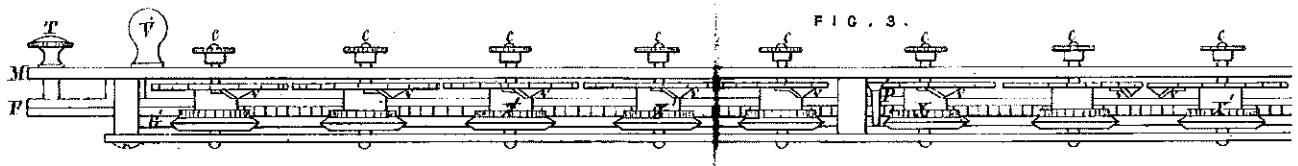


FIG. 6.

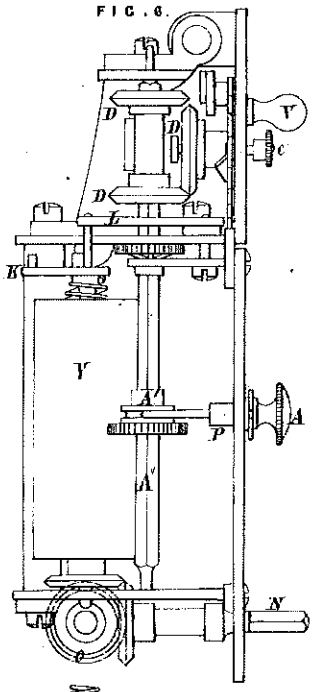


FIG. 5.

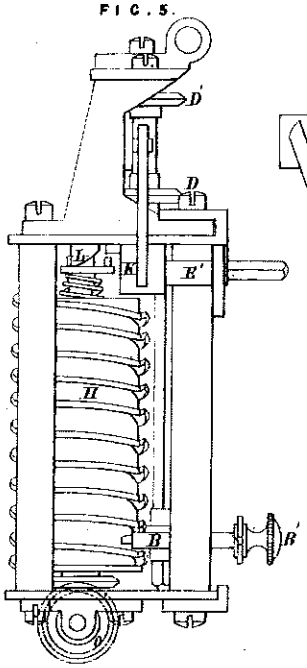


FIG. 4

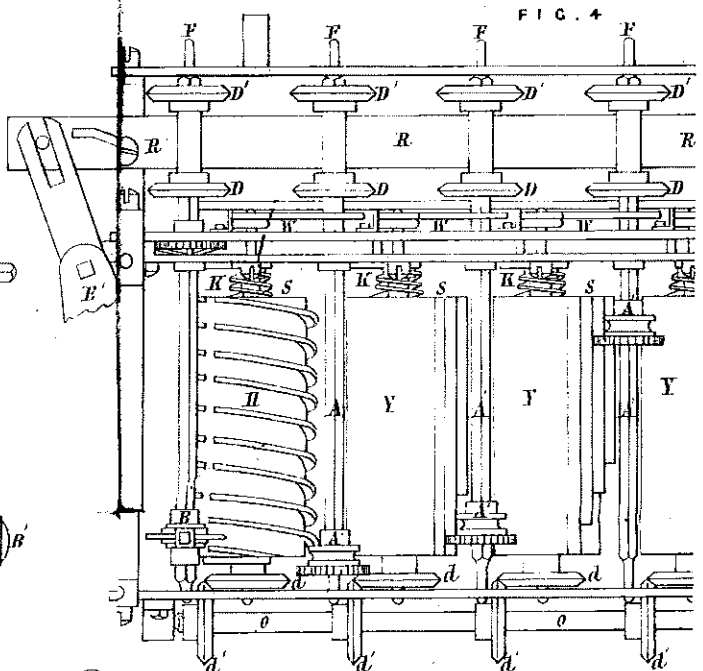


FIG. 12.

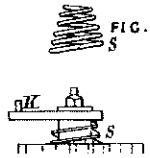


FIG. 9.

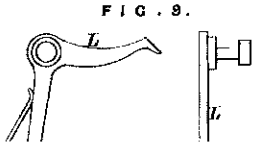
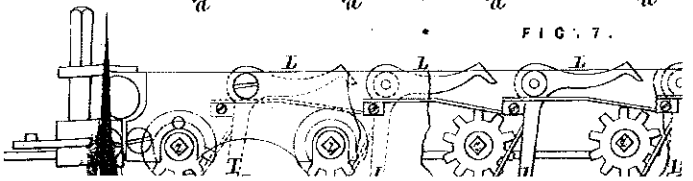


FIG. 7.



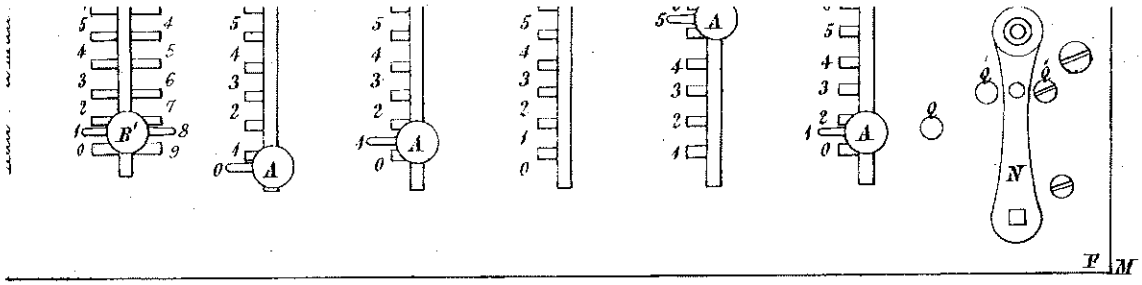


FIG. 2.

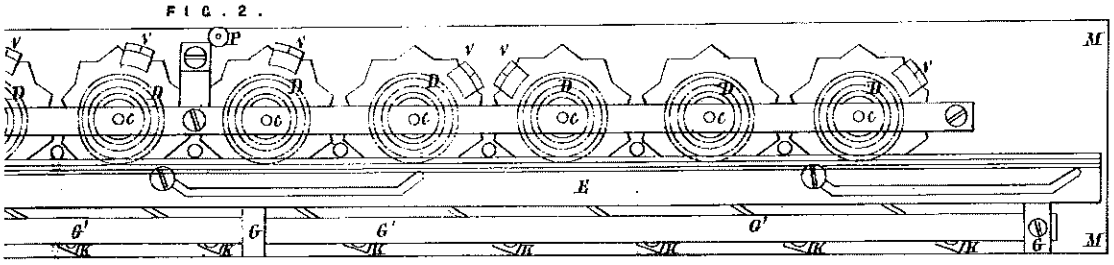


FIG. 3.

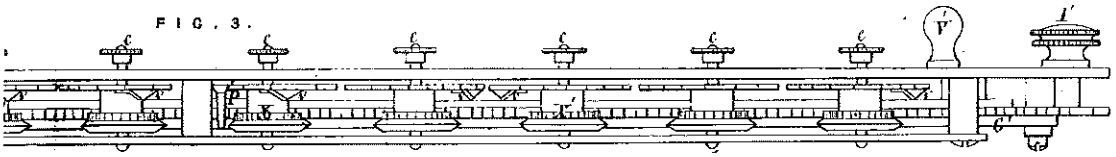


FIG. 4

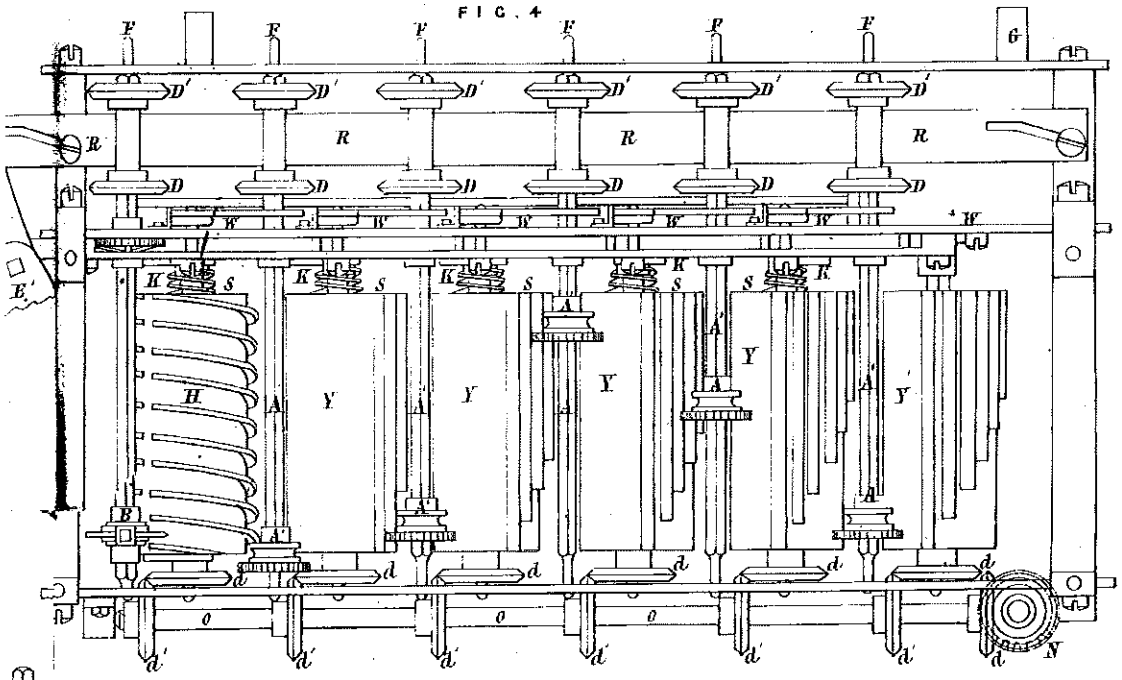


FIG. 7.

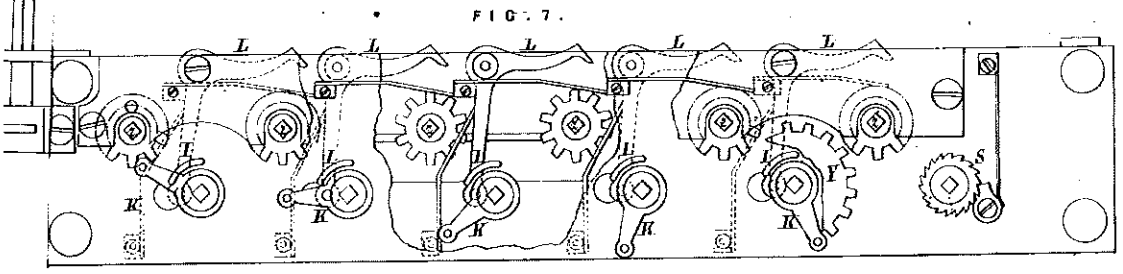
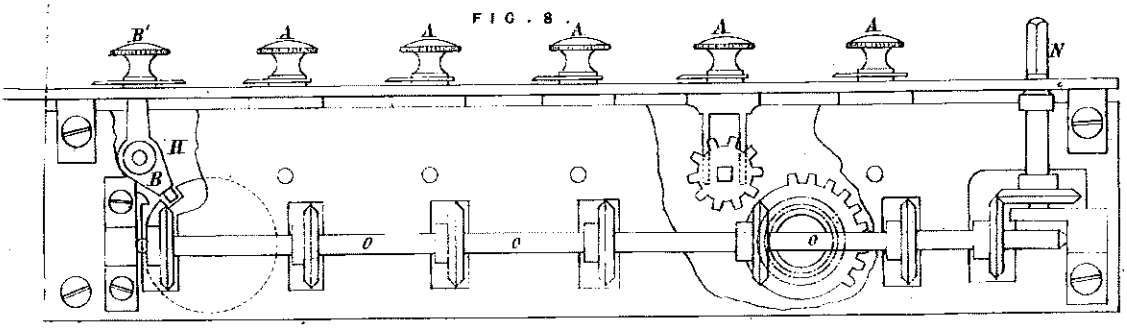


FIG. 8.



Drawn on Stone by Maltby & Sons

LONDON: Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queens most Excellent Majesty. 1857

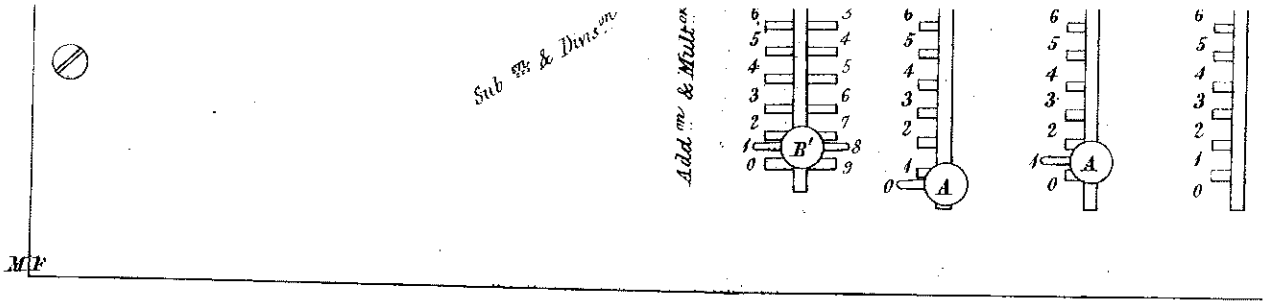


FIG. 2.

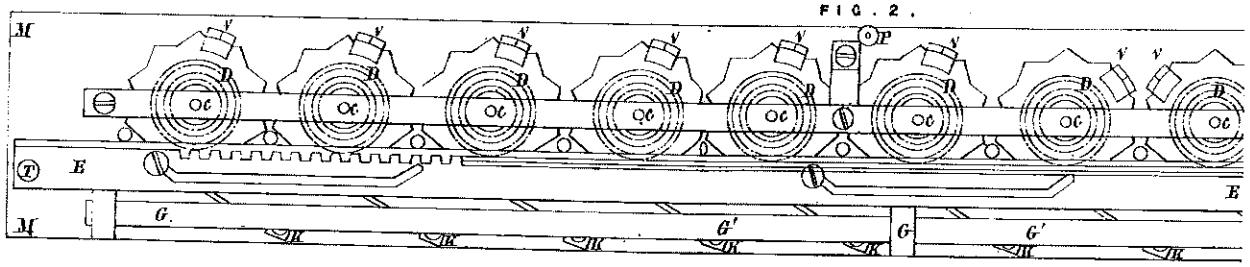


FIG. 3.

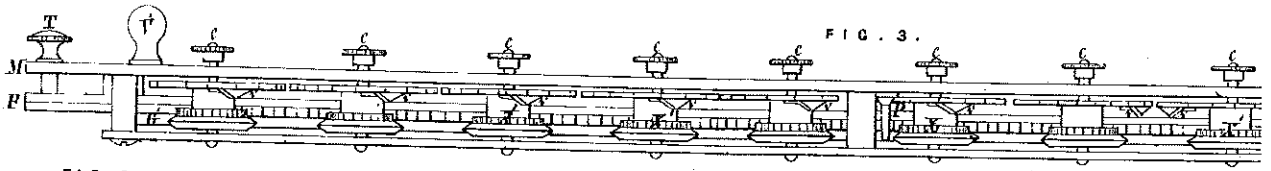


FIG. 6.

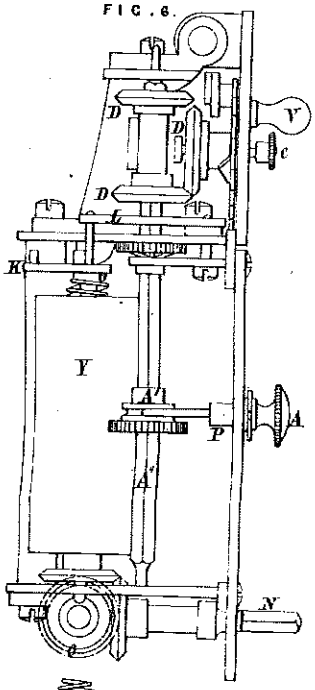


FIG. 5.

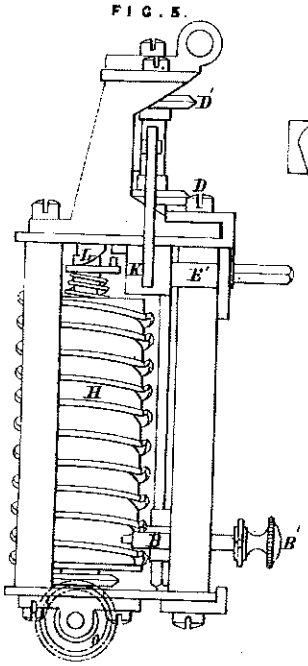


FIG. 4

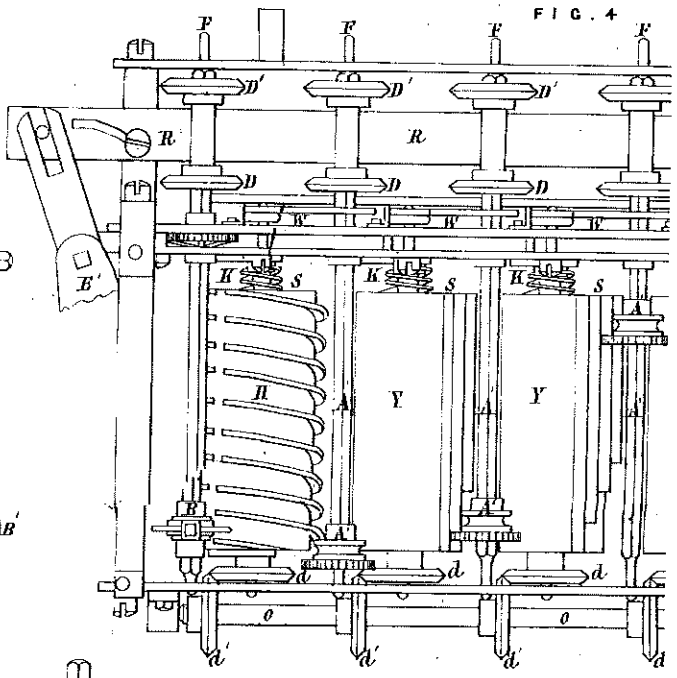


FIG. 12.

FIG. 9.

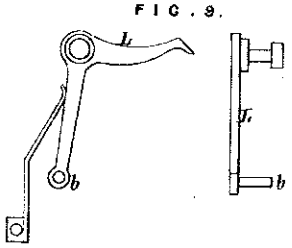
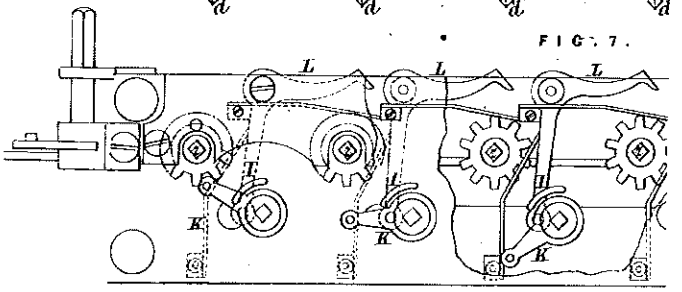


FIG. 7.



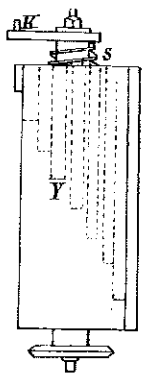


FIG. 10.

FIG. 11

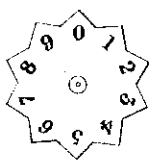


FIG. 8.

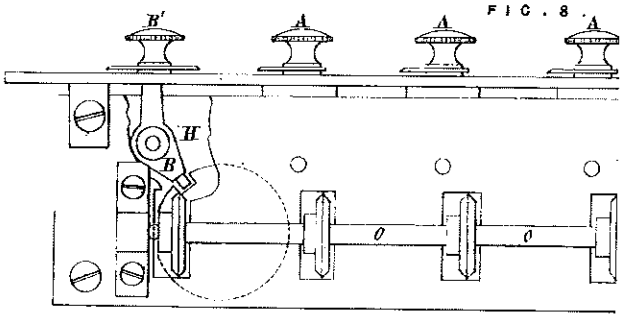
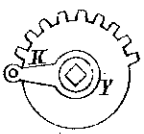
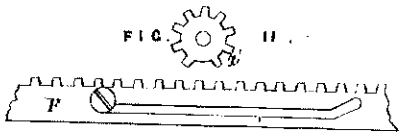


FIG. 13.





led drawing is partly colored.

LONDON: Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE, Printers to the Queen's most Excellent Majesty. 1857

Objectives	Figures	Description	Claims	Affidavits

A.D. 1851 . . . . . N^{O} 13,504.

Calculating Machine.

De Colmar's Specification.

A.

To all to whom these presents shall come, I, Charles Xavier Thomas (de Colmar), Chevalier de la Legion d'Honneur, of Paris, France, send greeting.

Whereas Her present most Excellent Majesty Queen Victoria, by Her Royal Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the Tenth day of February (One thousand eight hundred and fifty-one), in the fourteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Charles Xavier Thomas (de Colmar), my ex̃ors, adm̃ors, and assigns, Her especial license, full power, sole privilege and authority, that I, the said Charles Xavier Thomas (de Colmar), my ex̃ors, adm̃ors and assigns, or such others as I, the said Charles Xavier Thomas (de Colmar), my ex̃ors, ad m̃ors, or assigns, should at any time agree with and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, and in the Islands of Jersey, Guernsey, Alderney, Sark and Man, and also in

all Her said Majesty's Colonies and Plantations abroad, my Invention of "**An Improved Calculating Machine, which I call Arithmometer;**" in which said Letters Patent is contained a proviso, that I, the said Charles Xavier Thomas (de Colmar), shall cause a particular description of the nature of my said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, to be inrolled in Her said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Now know ye, that in compliance with the said proviso, I, the said Charles Xavier Thomas (de Colmar), do hereby declare the nature of the said Invention, and the manner in which the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, reference being made to the Drawings hereunto annexed, in which the same letters of reference marked thereon represent in the several Figures parts which are similar in each Drawing, that is to say: -

My Invention consists in constructing an improved machine for performing all the operations of arithmetic; namely, addition, subtraction, multiplication, and division; for extracting the square and cube roots; for calculating decimals, and all other arithmetical operations.

| Objectives | Figures | Description | Claims | Affidavits |

In Drawing I., Figure 1 is a plan or bird's-eye view of the machine when the lid is raised, showing the plates M, M, M, M, and F, F, F, F. Figure 2 of the same Drawing is an underneath view of the plate M, M, M, M. Figure 3 is a side elevation of the same plate M, M, M, M. Figure 4 is a section of the plan of the cylinder, the plate F, F, F, F, being taken off to exhibit the working of the several organs composing the mechanism of the cylinders Y, Y, Y, Y, Y^1, and H. Figure 5 is a side elevation of the cylinder H. Figure 6 is a side section of the cylinders Y, Y, Y, Y. Figure 7 is an horizontal elevation through the plate R, R. Figure 8 is a front plate, showing the rod *o*, *o*, *o*, and bevil wheels d^1, d^1, d^1, d^1, d^1. Figure 9 is a front and side view of the levers L, L, L, L. Figure 10 is a front and side view of the stops for the small levers k^1, k^1, k^1, k^1. Figure 11 is a front view of the rack E, wheel X^1, and indicator plate. Figure 12 is a front view and plan of the cylinder Y, and of the spring S.

In Drawing II., Figure 1 represents a plan of the double dial for quotient and multiplier. Figure 2 is a sectional elevation through A, B, of Figure 1; Figure 3 is a side elevation of cylinder and gear to obtain the quotient and multiplier; Figures 4 and 4^1 are a side and front elevation of fork lever F, F; Figures 5 and 5^1 are a front and side view of the lever Z, Z.

| Objectives | Figures | Description | Claims | Affidavits |

The mechanism for the multiplicant and multiplier can be inserted, as represented in the Drawing I., in a box having about 2 in. 1/8 in elevation, one foot three inches in length, and 6 in. 1/4 in width. It is composed of two plates, as represented in Figures 7

and 8 of the Drawing I., which said plates are united together by four pillars, seen in Figures 4, 5, and 6, and of another small plate carrying the guides G, G, G, in which the steel rod G^1, G^1, is sliding, as seen in Figures 2 and 3. The box is covered with a wrought iron or brass plate, which may be about 5 in. 1/4 in width, and 1 ft. 1/5 in length, as represented by the letters F, F, F, F, Figure 1. This wrought iron or brass plate is provided with an equal number of slits as there are figures for the multiplicant beside one more for the multiplier. It is in those slits which are in Drawing I., six in number, that the knobs A, A, A, A, A, Figures 1, 6, and 8, with their indicating hands, by which the figures of the multiplicant are pointed out, and the knob B^1, Figures 1, 5, and 8, with its double hand, indicate the figures of the multiplicator or devisor, are made to slide, as it will be herein-after described. The ten dials *c*, *c*, *c*, *c*, *c*, Figures 1, 2, 3, are separated from each other by about 3/4 of an inch, and are fitted on another plate M, M, M, M, having about 1 in. 7/8 in width, and 1 ft. 1/8 in length. Each of these dials *c*, *c*, *c*, *c*, *c*, represent ten figures, from 0 to 9, which serve to indicate by means of openings cut, as shown in the herein-before described plate M, M, M, M, the products obtained by the working of the machine. The above-described plate M, M, M, M, can be made to raise and to slide along the box upon the herein-before described steel rod G^1, G^1, Figures 2 and 3, which serves as a hinge to the said plate M, M, M, M, and by that contrivance it causes the line of the dials *c*, *c*, *c*, *c*, *c*, to be changed, which renders them successively independent of the mechanism when it is put in motion. I fix on the same plate M, M, M, M, but underneath each of the said dials *c*, *c*, *c*, *c*, *c*, the wheels D, D, D, D, Figures 2, 3, and 6, provided with ten cogs. Each dial carries a double inclined steel pin *u*, *u*, *u*, *u*, Figures 2, 3, which presses on the catching levers L, L, L, L, Figures 4, 6, 7, and 9, and disengages the catching each time the dials pass from 0 to 9, or from 9 to 0. The small flat wheels X^1, X^1, Figures 3 and 11, divided in ten equal parts, but with only nine cogs, are cast on every wheel D, D, D, D, of the dials *c*, *c*, *c*, *c*, *c*, as herein-before stated. These small wheels X^1, X^1, cause all the dials *c*, *c*, *c*, *c*, *c*, to be replaced at once to 0 by means of the rack E, E, E, Figures 2, 3, and 11, either by drawing the knob T, Figures 1, 2, and 3, or by means of any other suitable mechanism, giving to the wheel X^1, X^1, a rotative motion, as in Figure 11. When the dials *c*, *c*, *c*, *c*, *c*, are at 0, the said wheels X^1, X^1, are in the position represented by the said Figure 11. The cylinders Y, Y, Y, Y, seen in Figures 4, 6, and 12, are provided with nine graduated cogs cut lengthway, in order to represent the figures of the multiplicant from 1 to 9. The teeth of the cylinders Y, Y, Y, Y, Figures 4, 6, and 8, catch with the small wheels A^1, A^1, A^1, A^1, A^1, of the same Figures. These wheels are provided with ten cogs, and they are put in motion by means of the fork P, Figures 6 and 8, with which the indicating knobs A, A, A, A, A, already described, are provided. The wheels A^1, A^1, A^1, A^1, A^1, slide over the square axes A^{11}, A^{11}, A^{11}, according to the motions of the fork P, and of the knobs A, A, A, A, by which they are conducted to the figures of the multiplicant. It is then that the herein-before described wheels A^1, A^1, A^1, A^1, A^1, catch their separate cogs with the section of the teeth cut, as herein-before described, on the length of cylinders Y, Y, Y, Y, which have the number of their cogs equal to that of the figure exhibited

by the indicating knob A, A, A, A. When the cylinders Y, Y, Y, Y, perform a rotative motion, they cause the small wheels A^1, A^1, A^1, A^1, to turn the same number of cogs which the figure facing the indicating hand of the knobs A, A, A, A, points out, and the dials *c*, *c*, *c*, *c*, render visible the same figure through their opening on the moveable plate M, M, M, M, Figure 1. On the left of the cylinders Y, Y, Y, Y, Figure 4, another cylinder H, Figures 4 and 5, cut helically, is set, and a slit cuts in all its length, allows the lever B, seen in Figures 4, 5, and 8, and put in motion by the knob B^1, Figures 1, 4, 5, and 8, to regulate the number of revolutions the cylinders Y, Y, Y, Y, are to perform together, in order to represent one of the figures of the multiplier. Thus, for instance, when the hand of the knob B^1, Figures 1, 5, and 8, indicates the figure 9 of the left column, the multiplicant will be multiplied by 9.

All the herein-before described cylinders Y, Y, Y, Y, Figures 4, 5, 6, 7, 8, and 12 of the multiplicant, as well as the cylinder H of the multiplier, are provided at one of their extremities with bevil wheels *d*, *d*, *d*, *d*, having twenty cogs which catch with a similar number of bevil wheels d^1, d^1, d^1, d^1, set on the same axis *o*, *o*, *o*, Figures 4, 5, 6, and 8. On the right hand of the herein-before described axis *o*, *o*, *o*, is placed the bevil wheel d^{11}, which cogs with the wheel set on the axis of the crank arm N, Figures 1, 4, 6, and 8. Close to the other extremity of the cylinders, Y, Y, Y, Y, of the multiplicant and of the cylinder H of the multiplicator, less however the cylinder Y^1 set on the right, I have placed a system of cogs Z, Z, Z, Z, to operate the catchings. The moveable pins set on the levers *k*, *k*, *k*, Figures 4, 5, 6, 7, and 12, cog only with the ten cogs wheels Z, Z, Z, Z, Figure 7, when they are to operate the catchings. In order to obtain that effect the spiral springs S, S, S, S, Figure 4, 5, 6, and 12, placed between the levers *k*, *k*, *k*, and the cylinders Y, Y, Y, Y, and H, as represented by Figure 12, act on the said levers *k*, *k*, *k*, and force them to meet during their circular motion the catch wheels Z, Z, Z, Z, Figure 7. This last movement takes place only when the dials *c*, *c*, *c*, *c*, *c*, have passed from 0 to 9, or from 9 to 0, because the small double inclined pins *u*, *u*, *u*, *u*, herein-before described, Figures 3 and 6, by pressing them on the levers L, L, L, Figures 7 and 9, allow the spiral springs S, S, S, S, to cause the descending motion of the levers *k*, *k*, *k*, Figures 4, 5, 6, 7, and 12, which action they would not perform otherwise, being kept by the small pin *b*, *b*, of the levers L, L, L, Figure 9. The spiral springs S, S, S, S, being distended and the small levers *k*, *k*, *k*, lowered, when the cylinders are made to turn by the action of the crank arm N, the small levers *k*, *k*, *k*, meet the catch wheels Z, Z, Z, Z, and compel them to turn one cog, which causes the dials *c*, *c*, *c*, *c*, *c*, to turn of one figure, then the small levers *k*, *k*, *k*, by continuing after their circular motion meet on their passage with the small inclined pieces I, I, I, I, Figures 5, 6, 7, and 10, fixed on the small plate, Figure 7. These small inclined pieces I, I, I, I, will cause the small levers *k*, *k*, *k*, to ascend again to their former position, and at that place they are maintained by the herein-before described small pin *b*, of the levers L, L, L, Figure 9. The aforementioned small levers *k*, *k*, *k*, having thus returned to their usual position, as afore stated, if the cylinders Y, Y, Y, Y, are made to turn the said small levers *k*, *k*, *k*, will pass in front of the catch wheels Z, Z, Z, Z, Figure 7, without causing the said wheels to rotate.

I must explain here the reasons which have induced me to use only nine cogs on the cylinders Y, Y, Y, Y, Figures 4 and 8. It is absolutely necessary that each of the

cylinders Y, Y, Y, Y, should receive the catchings after having produced its figure, and to perform that operation it is required that the holdings or catchings be produced in due succession one after the other. It was therefore indispensable that the tenths should be produced before the hundredths and the hundredths before the thousandths, and so on. For that reason I have necessarily placed the cylinders Y, Y, Y, Y, Figure 4, in such a position that they are able to cog with the wheels A^1, A^1, A^1, A^1, A^1, of the multiplicant figure one after the other, then the cylinders Y, Y, Y, Y, and their levers *k*, *k*, *k*, will be placed relatively to each other in the position as represented in Figures 4 and 7. The subtraction and division being the reverse rules of the addition and multiplication, to perform these last operations I have fixed on the square axes A^{11}, A^{11}, A^{11}, A^{11}, on which the wheels A^1, A^1, A^1, A^1, are made to slide, as herein-before described, two bevel wheels, having each of them ten teeth, which cause the dials *c*, *c*, *c*, *c*, *c*, to turn from right to left and from left to right. The square axes A^{11}, A^{11}, A^{11}, A^{11}, on which the bevil wheels D, D, D, D, and D^1, D^1, D^1, D^1, are set, have their pivots jutting out, as represented in F^1, F^1, F^1, F^1, Figure 4, in order that they should be made to operate in the direction of their length without moving out from the plates into which their pivots are made to turn. Between the two bevil wheels D, D, D, D, and D^1, D^1, D^1, D^1, are set the plates with grooves having the same width than the band R, R, Figure 4. I cause all the bevil wheels D, D, D, D, and D^1, D^1, D^1, D^1, to recede or to advance together by means of the said band R, R, which passes in the grooves of the bevil wheels in order to have those of the front or back to cog with the wheels of the dials *c*, *c*, *c*, *c*, *c*. I obtain this change from the multiplication to the division, or that from the addition to the subtraction, and vice versa, by turning the wing nut E^1, Figures 1 and 4; in that manner its indicator points out the real operation to be performed. The large knob L^1, of Figures 1 and 3 serve to raise the plate of the dials *c*, *c*, *c*, *c*, *c*; the two knobs V^1, V^1, Figure 1 and 2, can be placed indifferently into the small holes V, V, V, of the dial plate M, M, M, M, when semicolons are required to separate the several aliquot parts or to divide the numbers in groups of two or three figures and to extract the square or cube root of a number and also for fractions and decimals.

I can also obtain the quotient in the division and the multiplier in the multiplication by setting on the back of the first cylinder on the right, A, Figures 1 and 3, Drawing II., that is to say, on the back of cylinder Y^1, Figure 4, Drawing I., a cylindrical piece B, Figure 3, Drawing II., having about 7/10 of an inch in diameter and provided with a groove *c*, *c*, Figure 3, being about 1/10 of an inch deep. This groove *c*, *c*, cuts obliquely in two parts and in a contrary direction the cylindrical piece B, in order to give to a lever L, Figure 3, entering into the said groove, an alternate motion. The lever L, is moveable in an hinged piece S, Figures 1, 3, 4, and 4^1, set on the back plate, and is provided at its upper extremity (having also a hinge) with a fork F, Figures 1, 3, 4, and 4^1, the two arms of which are moveable, and commands a spiral spring T, Figures 1 and 4 having a tendency to cause the said arms to approach one from the other. The arms F, F, Figures 1, 3, 4, and 4^1, of the fork are bent inside and serve to put in motion a wheel R, Figures 1, and 3, having about 7/16 of an inch in

diameter, and this wheel R is provided with ten square teeth and is fixed to the dial plates. On its axis I set an indicating hand working on the openings plate and pointing out on a dial V, Figure 1, having a double row of figures, the number of rotations performed by the crank arm N, Drawing I. The red numbers on the dial V, Drawing II., indicate the quotient, and the black numbers those of the multiplier. On the lower part of the small iron band Q, Q, Figures 1, 2, and 3, communicating with the wing nut E^1, of the Drawing I., is set a piece O, Figures 2 and 3, Drawing II., supporting perpendicularly a fork projecting towards the bottom of the apparatus. Between the two arms of the herein-before described fork a pin K, Figures 1, 2, 3, 5, and 5^1, is moving. The said pin K forms a part of the lever Z, Figures 1, 2, 3, 5, and 5^1, fixed to the back plate by means of a screw. The lever Z is ending in the shape of a fork Z, Z, Figures 1, 2, 3, 5, and 5^1, the arms being at angle and kept in between the two arms F, F, and the spring T, herein-before described. The small iron band *q*, *q*, Figures 1, 2, and 3, communicates a right or left motion to the lever Z commanding the back plate according to the motion given to the crank arm E^1, Drawing I., for performing either an addition or subtraction. The right or left hook Z, Z, Figures 2, 3, 5, and 5^1, of the lever distends the corresponding arm of the fork F, F, Figures 1, 3, 4, and 4^1, leaving the opposite arm to be alone in communication with the cog wheel R. Each revolution of the crank arm N, Drawing I., causes an alternate motion to the fork, the arm of which communicating with the wheel R, Figure 3, Drawing II., causes the last to turn of a cog from right to left or from left to right according to the arm which is acting on the said wheel R. I set on the dial plate V, Figure 1, the same number of cog wheels R, with their hands and double set of figure dials, as I have placed cylinders in the machine. The same fork F, F, Figures 3, 4, and 4^1, will act successively on the several wheels when put in communication either by carrying the plate on the right or on the left. The dial plate for the present arrangements have been increased of 5/16 of an inch in length, the square axes A^{11}, A^{11}, A^{11}, and the pillars of back plate, Drawing I., of the machine have also been lengthened of the same quantity.

Modus Operandi of the Arithmometer.

The apparatus operates by following the elementary principle of the arithmetic, and its movements seem to follow and to indicate the judgment which is required to perform a scientific operation.

Addition

I operate an addition by setting down with the knobs A, A, A, A, A, Figure 1, Drawing I., the numbers on which I am to make the operation, and by pushing for each number the knob B^1 of the multiplier, which is the last on the left, I turn the crank arm N until it stops and the figures pointed out by the knobs A, A, A, A, A, are exhibited on the dials *c*, *c*, *c*, *c*, *c*, through the openings on the plate M, M, M, M. If I begin again what his been herein-before stated, I have all the numbers added one to the others, which is really making an addition, and the total will be exhibited on the

dials *c*, *c*, *c*, *c*, *c*, through the openings as before stated instead of setting for every sum the multiplicant A, A, A, A, A, to one it is more preferable to push it to nought and to take no notice of it, the only thing required then being merely to have the crank arm N to perform one revolution.

Multiplication

To perform the multiplication I operate in a manner similar to that herein-before described when speaking of the addition. However, instead of placing the multiplier B^1 to 1, I set it to the figure by which the operation of multiplying is to be performed; thus, for instance, if I have the number 35,695, to multiply by 2, I place the multiplier B^1 at 2, and I turn the crank arm N, until the hand of multiplier B^1 be forced to stop. If I had to multiply the above number 35,695 by the number 22, I would be obliged in the same manner, and as if I had to write the figures with a pen, to multiply again the same sum of 35,695 by the same number 2, therefore I take care to raise the plate M, M, M, M, of the dials *i*, *i*, *i*, *i*, and to push it off a notch from right to left in order that I should no longer operate on the units, which be then separated as a matter of course. If I had to multiply with hundreds I would have to operate in the same manner, that is to say, I would be obliged to disengage the tenths, and so on. For any other quantity, following the principle herein-before described, I would, according to what I have before stated when speaking of addition, perform the operation of multiplication without making use of the multiplier B^1 by placing it at nought and by giving as many turns of the crank arm N as the number 1 is found repeated in the sum which is to serve for the multipler. The apparatus can multiply by means of the same number of figures as there are contained in the multiplicant; I construct apparatus having eight and sixteen figures and I find no difficulty in constructing them with even a much larger number.

Subtraction.

I perform that operation in a manner similar to what I have herein-before described when speaking of addition. The only difference is that I turn the wing nut E for the subtraction, which causes the wheels D, D, D, D, and D^1, D^1, D^1, D^1, of the dial to cog in the reverse direction to that of addition.

Division

To perform that operation I operate by turning the wing nut E^1 in the same manner as I have herein-before described when speaking of subtraction. The dividend must be set down in the dial, and by writing the sum by means of the small knobs which are prepared for every opening, I write the division in the same manner as I wrote the multiplicant, by means of the knobs A, A, A, A, A. However, the operation is conducted in the reverse manner to that of the multiplication; that is to say, I begin to act on the figure placed on the left. Thus, for instance, if I wish to divide 625 by 25, I place 62 above 25 (according to the principle I have herein-before described (when

speaking of the multiplication,) and I set the multiplier B^1 at the top of the slit, and I turn then the crank arm N until the figure of the dividend be less than that of the devisor. The knob of the multiplier B^1 will point out the number of times the sum is contained. For the above example 625/25, I will obtain 2 for the first figure from right to left, and I operate on the remaining number as I have operated on the figure 62. I turn five times the crank arm N, and I will obtain nought; therefore the number 25 will be found to be contained 25 times in the number 625.

| Objectives | Figures | Description | Claims | Affidavits |

And having now described the nature of my said Invention, and in what manner the same is to be performed, I wish to be understood that I do not restrict myself to the precise details, proportions, or modus operandi I have described, provided the general features of the organs and arrangement of my Invention be preserved; but what I claim as my Invention, and intended to be protected by the herein-before recited Letters Patent, is, -

Firstly, the constructing and dividing cylinders as herein-before described, reference being had to Figures 4, 5, 6, 7, 8, or 12 of Drawing I.

Secondly, the obtaining the products, as herein-before described, reference being had to Figures 1, 3, 4, 5, 6, and 8 of Drawing I.

Thirdly, the changing from multiplication to division, and from addition to subtraction, as herein-before described, reference being had to Figure 1 & 4, Drawing I.

Fourthly, the mode of effecting the stoppings as herein-before described, reference being had to Figures 7, and 9 of the Drawing I.

Fifthly, the method of replacing the numbers to 0 as herein-before described, reference being had to Figures 2, 3, and 11, of Drawing I.

Sixthly, the arrangement for putting the machine in motion as herein-before described, reference being had to Figure 1, 4, 5, 6, and 8, of Drawing I.

Seventhly, the arrangement for obtaining the quotient and multiplier as herein-before described, reference being had to all the Figures of Drawing II.

| Objectives | Figures | Description | Claims | Affidavits |

In witness whereof, I, the said Charles Xavier Thomas de Colmar, have hereunto set my hand and seal, this Seventh day of August, in the year of our Lord One thousand eight hundred and fifty-one.

Charles Xavier (L.S.) Thomas (de Colmar.)

Taken and acknowledged by Charles Xavier Thomas de Colmar (party hereto) at Paris, in the Republic of France, this 7th day of August 1851, before me,

Thomas Pickford,

(Consul's Seal.) Her Majesty's Consul for Great Britain.

A.

This is the Specification marked A, referred to in the affidavit of Peter Armand le Compte de Fontaine Moreau, sworn before me, this 9th day of August 1851.

Henry Mowbray.

I, Peter Armand le Comte de Fontaine Moreau, of 4, South Street, Finsbury, in the County of Middlesex, Patent Agent, make oath and say, that I am acquainted with the manner and character of the handwriting of "Thomas Pickford," Her Britannic Majesty's Consul of Paris, in the Republic of France. And this deponent further saith that the signature "Thomas Pickford," set, subscribed, or written in the margin of the Specification hereunto annexed, marked A, and dated the Seventh day of August instant, and purporting to be executed by Charles Xavier Thomas (de Colmar), Chevalier de la Légion d'Honneur, of Paris, France, whereby it is stated that the Specification was acknowledged by him, the said Charles Xavier Thomas (de Colmar), before the said "Thomas Pickford, on the said Seventh day of August, at Paris aforesaid, is of the proper handwriting of the said "Thomas Pickford.

L' de Fontaine Moreau.

Sworn at the Chancery Affidavit Office, Southampton Buildings, Chancery Lane, in the County of Middlesex, this 9th May of August 1851, before me,

Henry Mowbray.

And be it remembered, that on the affidavit of Peter Armand le Comte de Fontaine Moreau, the Specification aforesaid was enrolled word for word as above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

By Affdt.

Enrolled the Ninth day of August, in the year of our Lord One thousand eight hundred and fifty-one.

LONDON:
Printed by George Edward Eyre and William Spottiswoode,
Printers to the Queen's most Excellent Majesty. 1857.

Figures:

Drawing I. : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12;

Drawing II.: 1, 2, 3, 4, 4^1, 5, 5^1.

Notes:

1. Shouldn't **tenths** be **tens**, **hundredths** be **hundreds** and **thousandths** be **thousands** ? (back)
2. Again, shouldn't **tenths** be **tens** ? (back)
3. This English Patent was HTML'ized by Andries de Man from a paper copy in the library of the Bureau Industriële Eigendom, Rijswijk, The Netherlands. Some of the figures are slightly deformed because the brittleness of the paper didn't allow it to be completely unfolded. Thanks to the BIDOC staff for excavating this patent.

Andries de Man 10/1/1999