Scientific American.

THE ADVOCATE OF INDUSTRY, AND JOURNAL OF SCIENTIFIC, MECHANICAL AND OTHER IMPROVEMENTS.

VOLUME 6.] NEW-YORK, MAY 17, 1851. [NUMBER 35.

THE
Scientific American,
CIRCULATION 16,000.
PUBLISHED WEEKLY
At 128 Fulton, street, N. Y., (Sun Building,) and 13 Court street, Boston, Mass.

BY MUNN & COMPANY,

The Principal Office being at New York
A. T. Hotchkiss, Boston.
Dexter & Bro., New York City.
Weld & Co., New Orleans.
Stokes & Bro., Philadelphia.
Cooke & LeCount, San Francisco, Cal.
Courtenay & Wienges, Charleston, S. C
John Carruthers, Savannah, Ga.
Barlow, Payne & Parken, London.
M. M. Gardissal & Co. Paris.
Responsible Agents may also be found in all the principal cities and towns in the United States.

TERMS---$2 a-year---$1 in advance and the remainder in 6 months.

Rail-Road News.

Pacific and Mississippi Railroad.

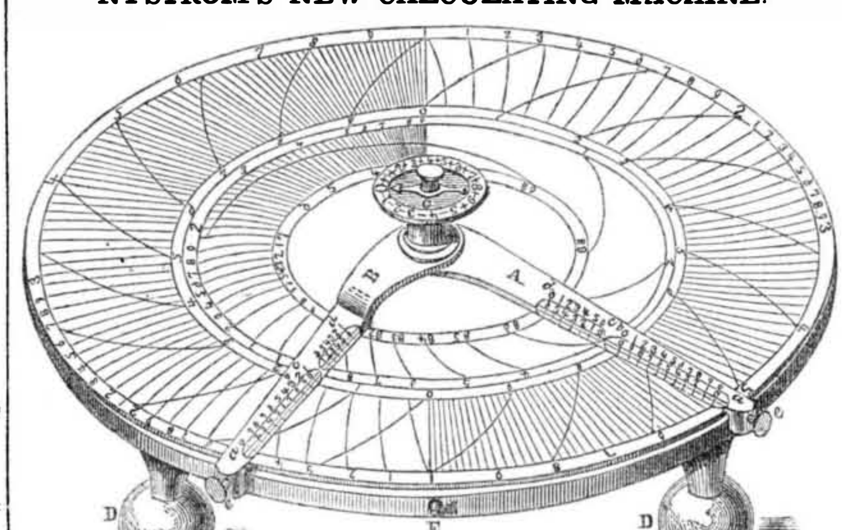
Professor Forrest Shepherd, in a letter to the New Haven Palladium says:—

"In relation to the projected railroad from the Mississippi River to the Pacific, that the road can be constructed from the Pacific to the Mississippi, without crossing any mountains, or encountering so much snow as between Boston and Albany. He says this route is from the head or southern portion of Pularo Valley, through Walker's Pass, thence to the Mejaree River, thence north-eastward to high grounds on the tributaries of the Rio Colorado, thence crossing the said river above the great Carion, thence east to Pilot Mountain near Sante Fe, passing Pilot Mountain on the north side, thence to Santa Fe and the Mississippi at Apple Creek below St. Louis, where there is a good landing and open navigation to New Orleans through the winter, and of course a road on the bank of the Mississippi to St. Louis. The route will be 600 or 800 miles nearer than any other, has wood and water nearly the whole distance, and abundance of stone and coal at Santa Fe. The above route will accommodate both North and South, New Mexico and California, and ocean steamers will soon render a trip from San Francisco and Astoria as light a matter as at present from Buffalo to Chicago or Mackinaw. The route further north is very objectionable on account of the snow ever on the table lands on the head waters of Feather River. I have travelled over snow apparently undrifted, vary- from 12 to 20 feet in depth, in the month of June. Fine specimens of native silver, reported, too, to be abundant, have been brought to me from the line of the Southern route."

He adds:—

"I have now explored California for nearly two years, and I can truly say it is a land of wonders. There are fresh flowers every month in the year, and Winter now wears the bloom of Spring. I have found water falls three and four times as high as Niagara, natural bridges of white marble, far surpassing in beauty that of Rockbridge in Virginia. Some thousands of gold bearing veins, inexhaustible quantities of iron and chrome ores, lead, bismuth and quicksilver, most beautiful porcelain clay, and in short almost everything that can bless an industrious and enterprising people. In one valley I found more than forty springs of a temperature over 100° Fahrenheit. In another valley sixteen geysers, like the famous one in Iceland. In this famous abode of Vulcan the rocks are so hot that you can stand upon them but a short time, even with thick boots on. The silicious rocks are bleached to snowy whiteness, and breccia-ted and conglomerate rocks are now actually orming. The roar of geysers at times may be heard a mile or more, and the moment is one of intense interest as you approach them.

NYSTROM'S NEW CALCULATING MACHINE.



This machine is the invention of Mr. J. W. Nystrom, of Philadelphia, and was patented in March last. The inventor is a learned and very ingenious engineer, and this machine is the most important one ever brought before the public. We cannot even give all the examples of its powers we would like, for want of room, rather because of the extent of its operations, but after a description we will present a few.

The Calculating Machine represented in the accompanying engraving, consists of a round disc of metal or other suitable material, mounted upon three feet, D D; it has two graduated arms, A and B, on which are marked *a b c d*, representing the four different figure circles on the disc. In the centre of the disc is a screw, C, to clamp the two arms, A and B, together; when clamped they can be momoved freely around the disc. The circle *a* (marked on the arms) contains the numbers for Multiplication and Division; the circle *b* contains the numbers for Addition and Subtraction, and also the Logarithms for the numbers in circle *a*. The circles *c* and *d* are for Trigonometrical calculations, of which the numbers in circle *c* are an angle—the numbers in circle *a* showing the length of its sines; the numbers in circle *d* are the complement angles for circle *c*, and circle *a* its cosines.

The large figures in the circle *a* represent the first figure of a question, the small figures the second; the third figure will be found on the arms, and the fourth between the figures on the arms.

In the accompanying engraving, the arm, B, is set on 1449, (circle *a*), its logarithm=3·16106 (circle *b*). The arm shows an angle =8° 20′ (circle *c*), which sines=0·1449 (circle *a*). The complement angle=81° 40′ (circle *d*), which cosines=0·1449 (circle *a*).

The calculation with this instrument is based upon the principle of logarithms, though the logarithm in general cases need not be observed, but when the number of figures in the result is uncertain a correct account must be kept of the index of the factors; for that purpose there is a small hand on the top of the screw, C, which is to be moved by hand for each operation with the arms. Also any power or roots of numbers can be easily extracted. The most difficult or simple calculation may be computed, from the simple addition and subtraction of numbers to the most complicated business accounts, and the higher branches of mathematical trigonometrical equations, are alike easily calculated.

At the end of each arm is a screw, *e*, to fasten the arms in any particular point of the disc.

MULTIPLICATION.—Rule 1.—16×12=192. Set the arm, A, on the factor 16 (circle *a*) and the arm, B, on 1; fasten the two arms with the screw, C; move them until the arm B comes to the next factor, 12, the arm, A, shows the product=192. If more than two factors are to be multiplied together, consider the product of two factors as a new factor, and continue the multiplication by the next factor, as aforesaid.

DIVISION.—Rule 2. 365 : 15=24·33. Set the arm A on the dividend, 365, and the arm B on the divisor, 15; fasten the arms with the screw, C; move them until the arm B comes to 1; the arm A shows the quotient=24 33. If the dividend contains more than one factor, multiply them as in rule 1, the product is the dividend. If, also, the divisor contains more than one factor, consider the quotient of the dividend and the first factor in the divisor as a new dividend, and continue the division by the next factors, as said in rule 2.

PROPORTION.—Rule 3. $a : b = c : d$. Set the arm, A, on the first term, *a*, and the arm B on the second term, *b*, fasten the arms with the screw, C; move them until the arm A comes to the third *c*, the arm B shows the fourth term, *d*. If the third term, *c*, is unknown, set the arm, B, on the fourth term, *d*, and the arm, A, will show the third term, *c*. If the arms be moved to any position on the disc, the numbers within the same will still remain in the same propertion as *a* : *b*. This fact makes it convenient to manage vulgar fractions.

EXTRACTING ROOTS.—Rule 4. $n\sqrt{m}=x$.—Divide the logarithm (circle *b*) for the number, *m*, by the index of the root, *n*: that is to say, the index for the logarithm is kept with the small hand on the screw, C, and the mantissa on circle *b*, and the number *m* on circle *a*—the quotient (circle *b*) is the logarithm for *x*, (circle *a*). [The mantissa is the decimal part of a logarithm.]

TRIGONOMETRY.—Rule 5. Sin. $C=\frac{c \text{ sin. } A}{a}$ Set the arm A on the number *c*, and the arm B on the number *a*; fasten the screw, C; move the arms until the arm B comes to the angle A (circle *c*); the arm A shows the angle C (circle *c*). These operations are done in a few seconds, without having recourse to tables of the trigonometrical lines or logarithms; the answer gives not only the sine C, but also the angle C itself, expressed in degrees, minutes, and seconds, and in the operation sine A need not be observed, merely use the angle A. Any of the trigonometrical lines will be found on the machine—for instance, the area of a right angled triangle, $Q=\frac{c^2 \text{ cot. } C}{2}$ only the value of *c* and C is given; the operation on the machine is done in a moment.

Example 1.—What is the "pitch" of a propeller 9 feet 3 inches in diameter, the angle of the blades in the circumference being 53° 45′? Pitch$=3{\cdot}14\times9\ 25\times\frac{\text{cos. } 53^\circ\ 45'}{\text{sin. } 53^\circ\ 45'}$=21ft. 6 in. Set the arm A on 3 14, the arm B on 1 (circle *a*); fasten the arms with the screw, C; move them until the arm B comes to 9·25; fasten the arm A with the screw *e*; loosen the screw C, then move the arm B to 53° 45′ (circle *c*); fasten the arms with the screw, C, then loosen the screw *e*, and move the arms until the arm B comes to 53° 45′ (circle *d*),—the arm A shows the pitch=21·49 (circle *a*).

Example 2.—What is the angle V of the blades in the circumference of a propeller with a pitch=2½D? Cot. $V=\frac{P}{\pi D}=\frac{2{\cdot}5D}{\pi D}=\frac{2{\cdot}5}{3{\cdot}14}$ Set the arm A on 2·5, the arm B on 3·14 and fasten the arms with the screw C; move them until the arm B shows the same angle on circle *c* as the arm A shows on circle *d*, and it will be found that the angle V=51° 30′.

A Calculating Machine for general business use will be about 9 inches in diameter; those for astronomical and the more particular branches, where a greater number of figures are required, will be about 2 feet in diameter, and the engraving of course will vary. Another, for approximating calculations, intended to be placed in pocket-books, will be about 3 inches in diameter, printed on paper, the arms also being made of paper.

It is intended to publish a book to accompany the machine, containing numerous examples and directions that will enable any person to use the same. This instrument was exhibited at the Annual Exhibition at the Franklin Institute, in 1849–50.

The inventor, not having the time to spare which this instrument deserves to have devoted to it, offers it to any person who will undertake the manufacture of it, or will buy the patent right; especially to any person engaged in the new art of Electrotyping: such persons will find it of great utility, as they can electrotype the disc, and thus save the expense of engraving it and by saving this it will enable the manufacturer to sell it at a greatly reduced rate, and bring it within the reach of every business man. Direct letters to J. W. Nystrom, 31 Union street, Philadelphia.

To Analyse an Alloy of Silver and Gold.

Laminate the alloy, and treat it by nitric acid, till nitrous gas ceases to be disengaged; the residium well washed, and heated red, gives the quantity of gold. Next pour hydrochloric acid into the solution to throw down the silver, wash the precipitate, dry and weigh it; 100 parts of chloride of silver are equivalent to 75·5 of silver. If the proportion of silver in the alloy be very small, the nitric acid will only effect its partial solution; in that case add as much silver to the alloy by fusion as will make it at least equal to three-fourths of the mass. Account must be taken of the quantity of silver thus added at the end of the operation.

To Analyse an Alloy of Silver and Copper.

Dissolve the alloy in nitric acid, and dilute the solution with water, throw down the hydrochloric acid, and filter the liquor, washing the precipitate till ammonia ceases to produce a blue color; then mix the washings with the filtered liquor, reduce it by evaporation, and add an excess of hydrate of potassa or soda to separate the deutoxyde of copper, from which the quantity of copper in the alloy is ascertained, as that of the silver is learnt from the chloride.