Mr. J. Taylor. Mr. Taylor said, that in the session of 1842, he had given a statement * of the average performance of a number of wheels, employed in pumping from some mines in Devonshire, and it was found to be 63·3 per cent.

Mr. Glynn. Mr. Glynn stated, that the general work of good overshot wheels, might be taken at $\frac{2}{3}$rds of the water employed to turn them, supposing that the water was required to be raised again to its original level. This included the friction of the pumps, rods, &c.

No. 613. "Description of a Water-Meter." By P. Carmichael, (Dundee).

Water-Meter. This meter is stated to have been used for some time, for the purpose of supplying the three steam boilers of an engine of 80 horse power, and by it, the evaporative powers of the boilers, which were of different forms, and the value of various kinds of fuel, have been carefully tested.

Its action is thus described; within a closed box which will contain 50 gallons of water, a copper float is placed, so as to move up and down freely, on a hollow spindle between two stops; by means of levers and a spanner, which are acted upon by the float, two conical valves are alternately opened and shut, as the box is required to be filled, or its contents to be allowed to pass to the boiler. The float ascends above the top, and descends below the bottom of the box, in cavities arranged for the purpose, by which means, only a given quantity of water is passed through the box at each descent of the float. It is found by practice, that each discharge contains exactly the same quantity of water.

The communication is illustrated by three detailed drawings (Nos. 3524 to 3526,) showing the construction of the machine.

No. 665. Mr. Wertheimber exhibited several modifications of the "Automaton Calculator," invented by Dr. Roth, and exemplified their practical use, by performing with great rapidity, calculations in all the simple arithmetical rules.

Calculating Machines. The machine for performing addition, multiplication, and subtraction, consists of a narrow oblong box, with a metal plate on the top, which is divided into nine indexes, and semicircular notches; the first six, from left to right, serve for the numbers, from hundred thousands to units; the three last are appropriated to shillings, pence, and farthings. Round each index are engraved figures, from 0 to 9, and the semicircular notches contain teeth, which correspond with the

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* Vide Minutes of Proceedings, 1842, p. 97.

figures. Under each notch is a circular hole, and in these, the result of the calculation appears, at the end of the operation.

The mode of using the instrument is very simple; it is performed by inserting a metal point in the teeth of such figures in the indexes, as are required to be brought into action, and drawing each one down to 0; the result is then read off from the circular opening in which it appears recorded.

The machine for division, and for performing more complicated calculations, is circular and much more bulky.

Mr. Wertheimber showed the interior of the machine, and explained, that its action was produced by a simple combination of toothed wheels and springs, so contrived as to render an error in the result impossible.

He then gave a short historical sketch of the various attempts at constructing calculating machines, noticing;

First, the Abăcus of the Romans, and the calculating boxes of the Chinese and the Russians.

Secondly, The calculating rods, two of which, being each divided into equal parts, from 0 to 100, were used for addition of two numbers, by placing the first number on one scale opposite 0 on the other, and opposite the second number would be the result of the calculation. The operation of subtraction was directly the reverse of that for addition. Several modifications of these scales were introduced by Perrault, in 1720; Poetius, in 1728; Perègre, in 1750; Prahl, in 1789; Grüson, in 1790; and Güble, in 1799.

Thirdly, The inventions of Napier, the "Virgulæ Napernianæ," the "Multiplicationis promptuarium," and the "Abacus Arcalis," in 1617; then the plans of Caspar Scott, in 1620; Demeam, in 1731; Lordan, in 1798; Leopold, Petit, and others.

Fourthly, The improvements in Gunter's scale by Wingate, in 1627, which were modified by Milburne into the present sliding rule, in 1650, and still further improved by Seth Partridge, in 1657.*

These contrivances gave rise to the formation of the more important machines of Blaise Pascal, in 1640; Sir Samuel Moreland, in 1666; Lepin, in 1725; Hillorin, in 1730, and Gersten, in 1735; this latter was presented, like that of Leibnitz, to the Royal Society of London.

Several other attempts at calculating machines, most of which were failures, were then noticed, until 1821, when Mr. Babbage undertook his large machine, which he completed as far as forming a progression up to five figures.†

* Vide "Treatise on the Steam Engine," by John Farey, vol. i., page 536.

† This machine is now in the Museum of King's College, London.

Upon these examples Dr. Roth is stated to have worked, and the result is shown in the simple instrument which he has produced, and which has been extensively used in public offices and banks, where it is found to be very useful.

It has also been adopted as a counter, or register of the number of strokes, or of rotations of machines, and answers very well for that purpose.

Mr. Farey. Mr. Farey presented a copy of a scarce work by Sir Samuel Morland, entituled, "The description and use of two Arithmetick instruments, &c." 12mo. London, 1673. Three of the plates were missing, but Mr. Farey had inserted fac-similes of them, made from a copy of the same work in the library of the British Museum.

No. 664. Mr. B. Albano exhibited a collection of specimens of a new material for architectural decoration, which was called the 'Cannabic' composition; its basis, he explained, was hemp, which, after being amalgamated with resinous substances, and undergoing careful preparation, was worked up into sheets of considerable dimensions. The ornaments were produced in very high relief, and with great sharpness in the details, by subjecting these sheets to compression between metal dies under powerful presses; they were thin, were less than half the weight of papier-maché ornaments, and possessed an amount of elasticity, which was advantageous in adapting them to the walls of houses; yet they were so hard as to bear the blow of a hammer, and resisted the action of heat and cold and of the weather, without change of form. The composition had even been used on the continent for covering roofs, and in those situations had remained uninjured.

The invention was of Italian origin, and had only recently been so extensively brought into use, as to justify its being introduced to the notice of the Institution.

Mr. Albano promised on a future occasion, to give a full account of the machinery used in the process, as soon as it should have been brought into active operation in this country: at present, the ornaments were imported from France, but even with that disadvantage, their price was from ten to twenty per cent. under that of any other material used for a similar purpose.

Mr. Ponsonby. Mr. Ponsonby* said that he had employed these ornaments very extensively for cornices, for panels, and centres of ceilings, for look-

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* 32, Regent Circus, Piccadilly.