Width of Way and Construction.

Greenwich.—Retention of two wooden sheds of a temporary character at the premises of the Cheap Wood Company, No. 66, Deptford-green, Greenwich (the Cheap Wood Company).—Consent.

Lines of Frontage and Construction.

Islington, East.—The erection of a wood and glass time-keeper's box in front of the "Myddleton Arms" public-house, Canonbury-road, Islington (Mr. R. T. Kingham for the London General Omnibus Company, Ltd.).—Refused.

Formation of Streets.

Hammersmith.—That an order be issued to Mr. J. H. Richardson, sanctioning the formation or laying out of a new street for carriage traffic in continuation northward of Willow-vale, Uxbridge-road, Hammersmith (Messrs. Williams & Wallington).—Consent.

Wandsworth.—That an order be issued to Messrs. F. Newman & Blunt, sanctioning the formation or laying out of new streets for carriage traffic upon the Streatham Lodge Estate, Streatham Common-south, Wandsworth (Mr. C. H. Copley Du Cane for the Trustees of the Du Cane Estates).—Consent.

Woolwich.—That an order be issued to Mr. H. Busbridge, sanctioning the formation or laying out of a new street for foot traffic only, to lead northward out of Godfrey-street and Lower Pellipar-road, Woolwich, and in connexion therewith the erection of a Sunday-school upon the site approached by such street (for the Building Committee of the Pellipar-road Sunday-school).—Consent.

Lewisham.—A building on the land at rear of No. 43, Springbank-road, Hither-green, Lewisham (Mr. P. Roche).—Consent.

Wandsworth.—That the Council do consent to the application of Mr. F. Newman for an extension of the time within which the formation or laying out of new streets for carriage traffic on the Streatham Lodge Estate, Streatham High-road, Streatham, approved by the Council on April 29, 1902, was required to have been completed.—Consent.

Wandsworth.—That an order be issued to Mr. J. C. Radford refusing to sanction the formation or laying-out for carriage traffic of a street to lead out of the southern side of a proposed continuation of Chartfield-avenue, Putney.—Refused.

Space at Rear.

Hackney, South.—A modification of the provisions of section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of four shops and dwelling-houses on a site on the western side of Mare-street, Hackney, between the "Dolphin" public-house and No. 175, with irregular open spaces at the rear (Mr. D. Morris).—Consent.

Deviation from Certified Plans.

St. George, Hanover-square.—Deviations from the plan certified by the district surveyor, under section 42 of the Act, so far as relates to the proposed rebuilding of Nos. 22 and 23, Grosvenor-square (Messrs. Read & Macdonald for Messrs. Holloway Brothers).—Consent.

Cubical Extent.

Hackney, North.—Additional cubical extent to the Stamford Hill Brewery, Stamford-terrace, Hackney (Mr. C. G. Smith for Messrs. Michell, Goodman, Young & Co., Ltd.).—Refused.

Alterations of Buildings.

Strand.—An addition at the rear of Nos. 7 and 8, Rupert-street, Strand (Mr. R. H. Kerr for Mr. C. Manzel).—Consent.

The applications marked † are contrary to the views of the local authorities.

Archæological Societies.

BRITISH ARCHÆOLOGICAL ASSOCIATION.—The closing meeting of the session was held on Wednesday, the 20th inst., Mr. Compton, Vice-President, in the chair. A tea-caddy of a very ornate character, probably of the time of Queen Anne, was exhibited, but the allegation that it had belonged to Anne Boleyn obviously could not be entertained, as tea was not introduced into Europe until early in the XVIIth century, and Pepys in his diary mentions it as something new in his day. Mr. Patrick, Hon. Secretary, read, in the absence of the author, a paper by Mr. Richard Mann on "The Roman Residency at Darenth, Kent." This Roman villa, admittedly the largest ever discovered in England, was excavated in 1894 and 1895 by Mr. George Payne, F.S.A., at the expense of Mrs. Rolls Hoare under an agreement made by Mr. Clowes, her son-in-law, with the Ecclesiastical Commissioners, the owners of the property, and is fully described in "Archæologia Contiana," Vol. XXII. It has been suggested in some quarters that this vast building bears evidence in the curious system of tanks and drainage of having been a trading establishment, probably that of a "fuller or dyer," but Mr. Mann questions whether it may not with greater probability be described as having been the central station or headquarters of an official having control of the surrounding district, and in a very ingeniously arranged plan of the remains he showed how this may have been the case.—Mr. Patrick opened the discussion, and was disposed to agree with the author of the paper that the buildings were far too extensive to have formed the residence of a person engaged in the trade of a dyer or fuller, but were more likely from their position, adjacent to the Watling-street, and in the centre of a group of Roman buildings which extended over the surrounding neighbourhood, to have been the official residence of the governing authority of the district.—Mr. R. H. Forster did not agree with the early date attributed to the remains by Mr. Mann (early in the Roman occupation), and pointed out that the large building supposed by him to have been the quarters of a body of cavalry was more likely to have been the stables of a mansion or posting-house on the road to London. He also urged that the absence of any fortifications precluded the idea that the buildings were the residence of a military or civil governor, particularly at the early period assigned to them.

COURT OF COMMON COUNCIL.

A MEETING of the Court of Common Council was held at the Guildhall on Thursday last week, the Lord Mayor presiding.

Improvement of Gracechurch-street.—The Improvements and Finance Committee submitted for adoption an arrangement for acquiring so much of the premises Nos. 1 and 2, Gracechurch-street, as is needed to widen the public way thereat, for the sum of 2,200*l.*, to include all interests.—The Court approved.

The London Almshouses.—The Freemen's Orphan School Committee were authorised to accept the tender of Messrs. R. and E. Evans for repainting the exterior of the London Almshouses at the sum of 159*l.* 10s.

Southwark Bridge.—The Bridge House Estates Committee asked for authority to accept the tender of Messrs. E. Parry & Co., of 815*l.* per annum for cleansing, watering, gravelling, and repairing Southwark Bridge for three years from midsummer next.—This was granted.

Loan Exhibition.—The Coal and Corn and Finance Committee reporting on the reference of May 10, 1906, referring back for re-consideration the adverse Report of this Committee on the Reference of April 5, 1906, on the Report of the Library Committee as to holding a Loan Exhibition of Pictures in the Art Gallery in the summer of 1907, at a cost of 450*l.*, exclusive of insurance, recommended the adoption of the proposal of the Library Committee, and the holding of the exhibition accordingly.—The matter was referred to the Library Committee.

Pollution of the Thames.—Mr. William Henry Williamson moved that having regard to recent legal decisions on the question of sewage pollution, this Court is of opinion that the time has arrived when a conference of the various authorities interested in the subject of the purification of the estuary of the River Thames and elsewhere should be convened for the purpose of considering the existing situation, and with a view to taking such further action as may be deemed necessary in the interest of the public health, and that it be referred to the Port of London Sanitary Committee to arrange and hold such conference accordingly. Mr. Cloudsley seconded, and the motion was adopted.

METROPOLITAN ASYLUMS BOARD.

THE usual fortnightly meeting of the managers of the Metropolitan Asylums District was held on Saturday last week at the offices, Victoria Embankment, E.C.

Proposed New Central Laboratory.—On the recommendation of the Finance Committee, it was agreed to apply to the Local Government Board for an order authorising the expenditure of a sum not exceeding 9,090*l.* on the erection and fitting up of a central laboratory at Peckham Rye. The Works Committee submitted a report dealing with the same matter, in the course of which they recommended that Messrs. Fowler & Hugman be appointed to take out the quantities for the work. This also was agreed to by the Board. The architects' estimate for the building is 7,090*l.* Laboratory fittings will cost some 950*l.*, and the rest of the amount is made up of salaries, commissions, etc.

Joyce Green Hospital.—On the recommendation of the Finance Committee it was agreed to apply to the Local Government Board for sanction to the expenditure of 114*l.* 11s. 7d., on the provision of additional bathing, lavatory, and disinfecting accommodation at this hospital.

South-Western Hospital.—The Works Committee reported that they considered it desirable that bills of quantities should be taken out for the adaptation of two wards at the South-Western Hospital as cubicle wards, the cost of which adaptation was estimated at 1,730*l.* As the work was of a comparatively minor character it was recommended that the architects, Messrs. T. W. Aldwinckle & Son, should take out the quantities. This the Board agreed to.

Darenth Asylum.—The Asylums Committee submitted a report by the Chief Engineer on the exhauster and engines at the gas works at this Asylum, in which that officer pointed out that the working of the gas works was absolutely dependent upon the exhauster being capable of dealing with the make of gas, and that for this reason this particular portion of the plant should be doubled. During the last winter the present exhausters, which are capable of dealing with 5,000 cubic ft. per hour, had to be run faster than was desirable, and in the event of a greater demand for gas arising during the coming winter they would very likely be taxed beyond their capacity. Under the circumstances the engineer recommended that a new plant capable of dealing with 10,000 cubic ft. per hour should be provided in time to meet the coming demands. Dealing with this report the Committee stated that the Bryan Donkin Company had quoted the sum of 117*l.* for the supply of the new plant, an offer which had been accepted. The Committee's action was endorsed.

The Student's Column.

SOME MATHEMATICAL METHODS AND USEFUL DATA FOR ARCHITECTS.—XXV.

VARIETIES OF SLIDE-RULE.

IN this, the concluding article of the present series, we give a brief account of the chief varieties of slide-rule other than the type illustrated in Figs. 16, 17, and 18.

Faber Improved Calculating Rule.—This type of the Gravêt slide-rule, illustrated in Fig. 20, embodies the following features:—

(1) The body and the slide are about ⅛ in. longer at each end than in the ordinary type, this additional length being provided for the purpose of affording a firm hold for the cursor when this appliance has to be used near the extremities.

(2) Scales A and B are graduated 1—100, and not 1—10, 1—10, as in the ordinary manner.

(3) The body is fitted with a longitudinal spring, intended to cause the slide to work evenly and smoothly at all times.

(4) On the spaces provided by the extra length the inscription $\overset{+}{\longleftarrow}\ \overset{-}{\longrightarrow}$ is engraved at each end of scale A, and the inscriptions $\overset{-}{\longrightarrow}\ \overset{+}{\longleftarrow}$ QUOTIENT + 1, PRODUCT − 1, at the left-hand and right-hand ends of scale D respectively. These inscriptions enable the operator to fix the position of the decimal point at the end of any calculation, without the necessity for remembering the various rules given in Articles XXI. and XXII.

(5) The cursor is made with an extension of the metal frame, on which is engraved a semi-circular scale graduated from −6 to +6, and provided with a rotary pointer registering digits and movements of the decimal point during calculations.

(6) The spaces 1—2, 2—3, 3—4, and upwards, which are divided into ten parts each, are marked with decimal values, as 1·1, 1·2, 1·3, and so on. This graduation is optional, being considered superfluous by most operators.

(7) The special constants engraved on scales A, B, C, and D are as follows:—A and B:—$\pi = 3{\cdot}1416$; B:—$M = 100 \div \pi = 31{\cdot}83$; C:—$c = \sqrt{4} \div \pi = 1{\cdot}128$, and $c^1 = c \times \sqrt{10} = 3{\cdot}568$. By the aid of constant M the circumference and curved area of a cylinder can be read with only one setting.

(8) The left-hand slot at the back of the body is double the usual width, thus permitting the sines of angles to be read at both ends of the rule—a simple but most convenient improvement.

(9) The graduations on all the scales are incised, thus making them far more distinct than graduations which are impressed on the scales.

As may be gathered from the foregoing description, this is a well-arranged and very useful type of slide-rule for practical work.

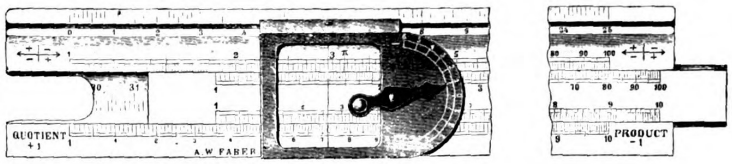

FIG. 20

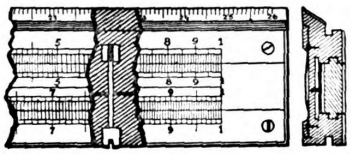

FIG. 21

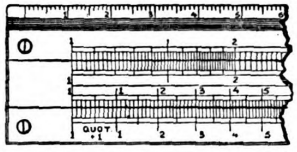

FIG. 22

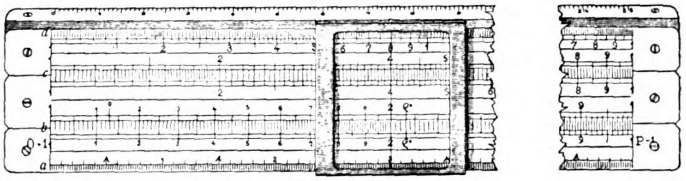

FIG. 23

Illustrations to Student's Column.

Davis Improved Slide-Rule.—To overcome the liability of the slide to become too tight in damp climates and too loose after a time when used in a dry atmosphere, Messrs. Davis, of Derby, have introduced a special slide-rule, having a spring steel back adjustable by three screws, as illustrated in Fig. 21. The ordinary rule of the same firm, Fig. 22, is similarly fitted with a steel back, but without the adjusting screws, and all their slide-rules are made with elongated ends, permitting the cursor to be used in any position without overhanging.

Sheppard Cubing Slide-Rules.—These are made in two forms, by Stanley, with decimal and duodecimal graduations respectively. In each variety the body is provided with two slides, on the back of which are marked lines of squares, square roots, and numbers, so that all powers and roots can be obtained. In using the rule for obtaining cubic dimensions, *length* is taken on the upper scale of the body, *breadth* on the upper slide, *thickness* on the lower slide, and the result is read on the lower scale of the body.

For many calculations which have to be performed by architects, quantity surveyors, and builders the duodecimal rule is extremely convenient, because results are given directly in feet and inches, but for general use the decimal rule is to be preferred.

Reitz Cubing Rule.—This slide-rule, made by Nestler, of Lahr, is similar to the ordinary type, but has two additional scales, as shown in Fig. 23. One of these, at the top of the rule, is a logarithmic scale from 1 to 1,000, divided by the figuring into three equal scales from 1 to 10. Therefore the cube of any number represented on scale D is found exactly above it on the upper additional scale, and, conversely, the cube root of any number represented on the upper additional scale is found exactly below it on scale D. The other additional scale, at the bottom of the rule, enables the operator to find the *log.* of any number on scale D. This variety of slide-rule is a most convenient instrument for all calculations where cubes and cube roots are frequently required. It is supplied by W. H. Harling, and can be obtained from other makers of mathematical instruments.

Universal Slide-Rule.—Another rule, made by Nestler, for all ordinary calculations, at the same time giving cubes and cube roots directly, and permitting various tacheometrical computations to be readily performed.

Logologarithmic Scales.—These, shortly termed "*log.-log.*" or "*logo-log.*" scales, are applied in conjunction with the ordinary logometric scales of a slide-rule for finding any power and any root of any given number.

The principle involved in the *log.-log.* scale will be readily understood by the following illustration:—

Suppose we have to find the value of $5^{2.5}$ by logarithms, the ordinary process is expressed.

log. (5) × 2·5 = 0·6990 × 2·5 = 1·7475.
antilog. 0·17475 = 14·95.

But by the logologarithmic method the operation is effected thus:—

log. (*log.* 5) × *log.* 2·5 = 0·8445 + 0·3979 = 1·2424.
antilog. (*antilog.* 1·2424) = 14·95.

Such is the principle of the *log.-log.* scale, which is graduated so that the divisions represent the logarithms of the logarithms of the numbers marked upon it, and when used in conjunction with the ordinary logarithmic scales of the slide-rule any powers and roots (within the limits of the scale) can be obtained with the greatest facility.

Some varieties of slide-rules having *log.-log.* scales are mentioned below.

Dunlop-Jackson Slide-Rule.—This is an ordinary slide-rule, as made by Davis, with a spare slide having *log.-log.* graduations from 1·07 to 2, and 2 to 1,000 on the front, and from 0·001 to 0·5, and 0·5 to 0·93 on the back.

Jackson-Davis Double Slide-Rule.—This is a slide-rule of the Davis type having clips for the attachment of the *log.-log.* scale against one edge without the necessity for removing the ordinary slide.

Perry Slide-Rule.—The essential feature of the logologarithmic rule as originally arranged by Professor Perry was the substitution of a *log.-log.* scale for the usual D scale. In the improved form of the rule made by Thornton this inconvenient feature is obviated by the retention of scale D and the provision of two *log.-log.* scales, one above scale A, ranging from 1·1 to 10,000, and the other below scale D, ranging from 0·001 to 0·93.

Faber Logologarithmic Slide-Rule.—In this instrument the measuring scale on the bevelled edge has been replaced by a *log.-log.* scale in two parallel sections, the first half ranging from 1·1 to 2·9 and the second half from 2·9 to 100,000. The cursor has a metal tongue, the end of which corresponds with the hair-line on the cursor glass, and serves as a marker for the *log.-log.* scale. At the bottom of the groove two logarithmic scales are substituted for the usual measuring scale; of the two scales, the upper is for calculating the efficiency and output of dynamos and electric motors, and the lower for calculating loss of potential and other results in electric circuits. While available for all ordinary computations, this type of rule is particularly suitable for mechanical and electrical engineers.

Hudson Beam, Girder, and Shaft Rule.—This instrument, made by Stanley, gives at sight safe loads for rectangular beams or flanged girders of iron and steel, dimensions of rectangular beams or flanged girders for given loads, safe loads for wrought-iron or steel shafts, diameters of wrought-iron or steel shafts for given loads, and the average tensile, compressive, shearing, torsional, and

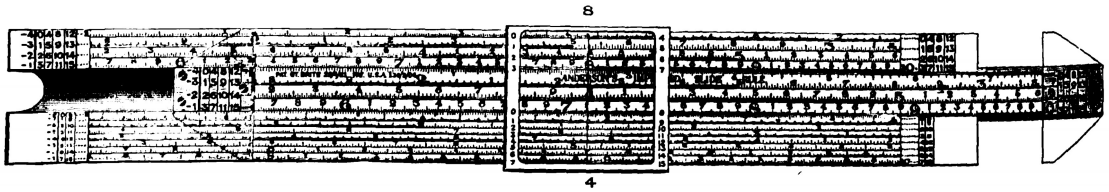

FIG. 24

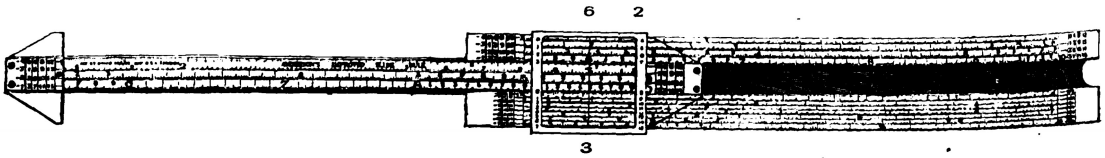

FIG. 25

Illustrations to Student's Column.

transverse strength of cast-iron, wrought-iron, and mild steel.

Hudson Pump Scale.—An instrument, made by Stanley, giving at sight the dimensions and discharges of pumps, the diameter of pipes for any given discharge, the velocity of flow through pipes corresponding with any given discharge, and the usual proportions of auxiliary pumps for boilers and engines.

Hudson Horse-Power Computing Rule.—A double slide-rule, made by Stanley, giving at sight the horse-power of engines from the usual data, the size of engine for any given power, and other results useful to the designer or user of steam engines.

Pickworth Power Computor.—A double slide-rule, made by Davis, giving at sight the horse-power of steam, gas, and oil engines, the size of engine for any given power, the speed of pulleys and belts, the speed ratios of pulleys and gearing, and other useful results.

Honeysett Hydraulic Slide-Rule.—An instrument, made by Stanley, specially arranged for calculating the flow of water in pipes.

Anthony Hydraulic Calculator.—A circular form of slide-rule, made by Stanley, for computing the flow of water in pipes canals, and other channels.

McPherson Hydraulic Slide-Rule.—A rule made by Thornton, and specially designed for calculations connected with waterworks, drainage, and irrigation practice.

Thornton Engine Indicator Slide-Rule.—An ordinary slide-rule, as Fig. 16, having on the bevel edge a scale of inches divided into tenths and fiftieths, and a cursor provided with a projection to serve as a pointer for the inch scale. This rule is also applicable to harmonic analysis.

Anderson Improved Slide-Rule.—The idea of arranging a long scale in parallel sections or lengths was suggested in a paper read by Dr. Everett before the British Association in 1866, since which year several slide-rules and calculating scales embodying the principle have been introduced. None of these have become popular, and apparently it was reserved for Colonel Anderson to devise a sectional length slide-rule, which is made by Casella, in such a form as to render the instrument of practical value in the everyday work of architects, engineers, and others. As shown by Figs. 24 and 25, the Anderson slide-rule is somewhat similar to the ordinary variety, but has only three scales, two on the body and one on the slide.

The upper scale, eight times the length of either half of scale A on the ordinary slide-rule, comprises four lines, with graduations as follows:—Line (0), 1 to 1·77+; line (1), 1·77+ to 3·16+; line (2), 3·16+ to 5·62+; line (3), 5·62+ to 10.

The lower scale, eight times the length of scale D on the ordinary slide-rule, comprises eight lines, with graduations as follows:—Line (0), 1 to 1·33+; line (1), 1·33+ to 1·77+; line (2), 1·77+ to 2·37+; line (3), 2·37+ to 3·16+; line (4), 3·16+ to 4·21+; line (5), 4·21+ to 5·62+; line (6), 5·62+ to 7·5; line (7), 7·5 to 10.

The scale on the slide comprises four lines graduated to correspond with the upper scale.

The lines are distinguished at each end of the scales and slide by positive and negative "line numbers" (L.N.), which serve the purpose of indicating different decimal multiples and submultiples of the numbers engraved on the scales. Only two columns of line numbers are engraved on the cursor.

Additional line numbers can be added mentally, but, as those on the rule give a range on the upper scale and slide from 0·1 to 1,000 and on the lower scale from 0·1 to 100, this course is rarely necessary.

To facilitate adjustments, each end of the slide is provided with a transparent index-arm extending over all the scales on the rule.

The graduation of the scales is simple and easily read. The whole numbers 1 to 10 are figured in red, the prime divisions are subdivided to tenths, which are figured in black, these are subdivided to hundredths, and these again to thousandths as far as their size permits. Hundredths and thousandths are not figured, but some of the main subdivisions are indicated either by dots or diamonds to guide the eye.

The following examples illustrate the advantage of the Anderson rule in giving results without the customary manipulation of the decimal point, and without the application of rules such as are necessary when the ordinary slide-rule is employed.

Example (1): (*a*) Multiply 2 by 4. (See Fig. 24.)

Set L.H. index of slide to 2 on upper scale (L.N. 1), bring cursor to 4 on slide (L.N. 2). As L.H. index is used, the result is read on the line whose L.N. is the sum of the L.N.s of the two factors. Hence the result is on (1 + 2) L.N. 3 = 8, and, L.N. 3 being in the first column, the answer is in units.

(*b*) Multiply 20 by 40. (See Fig. 24.)

Set L.H. index of slide to 2 on upper scale (L.N. 5), bring cursor to 4 on slide (L.N. 6). Read result on (5 + 6) L.N. 11 = 8, which must be taken as 800, because L.N. 11 is in the third column, and signifies hundreds.

Example (2): (*a*) Multiply 2 by 3. (See Fig. 25.)

Set R.H. index of slide to 2 on upper scale (L.N. 1), bring cursor to 3 on slide (L.N. 1). As R.H. index is used, the result is read on the line whose L.N. is one more than the sum of the L.N.s of the two factors. Hence the result is on (1 + 1 + 1) L.N. 3 = 6, and, L.N. 3 being in the first column, the answer is in units.

(*b*) Multiply 2,000 by 3. (See Fig. 25.)

Set R.H. index of slide to 2 on upper scale (L.N. 13), bring cursor to 3 on slide (L.N. 1). Read result on (13 + 1 + 1) L.N. 15 = 6, which must be taken as 6,000, because L.N. 15 is in the fourth column, and signifies thousands.

The foregoing examples show the direct and unfailing manner in which products can be correctly interpreted by aid of the line numbers. They are equally useful for settling the decimal values of all results obtained by other forms of calculation.

Apart from certainty of interpretation, the great advantage of the Anderson slide-rule is to be found in the high degree of accuracy obtainable by the extended scales, which give definite results to one decimal place further than the ordinary scales.

Special Cursors for Parallel Slide-Rules.

Faber's Digit Registering Cursor and the *Pointed Cursor* have already been described, and reference was made in Article XX. to the Dennert and Pape cursor. Others which deserve mention are the following:—

Broken Line Cursor, with interrupted hair-line permitting adjustment with greater certainty on any graduation.

Magnifying Cursor, with plano-convex glass in which the hair-line is set; also made with ordinary glass and hair-line, and a swivelling lense attached by arms to the cursor frame. Both of these devices are useful for minute readings.

Precision Slide-Rule.—An instrument, made by Nestler, having the scales divided into two parallel parts, so that the accuracy of a 20-in. rule is obtainable in a length of 10 in. This rule can be obtained through all dealers in mathematical instruments.

Goulding Cursor.—An arrangement by which small spaces on the scales can be mechanically divided, thus enabling results to be read up to seven figures.

Radial Cursor.—An ingenious attachment facilitating the direct calculation of any power and root by the ordinary slide-rule.

In addition to the slide-rules mentioned above, there are other logarithmic instruments, such as the Fuller and Fuller-Bakewell calculating rule with a spiral scale 500 in. long, the R.H.S. calculator with a spiral scale 50 in. long, and various forms of the Bouchier pocket calculator. All of these are valuable aids in certain branches of practical mathematics, but for general purposes are less serviceable than the parallel slide-rule, of which the more important types have been considered in this series of articles.

NATIONAL COLLECTIONS: RECENT ACQUISITIONS.—For the Gallery of British Art, Millbank, the trustees and director have bought out of the interest of the Clarke Bequest Fund the late Mr. C. W. Furse's "Diana of the Uplands"; Mr. J. Loewenthal has presented a bust of Mr. W. P. Frith, R.A., executed in marble by Mr. John Thomas, and Mr. J. W. Carlile has presented "The Last Load," by John Linnell. To the National Gallery the late Mr. C. Hartree's executors have presented "Sunny Days in the Forest," by N. Diaz; and Mr. S. W. Graystone has presented marble busts, by Sir Edgar Boehm, R.A., of Mr. and Mrs. Wynn Ellis.

ARMSTRONG COLLEGE, NEWCASTLE-ON-TYNE:

COMPLETION OF THE BUILDINGS.

THE site acquired in 1887 by the College of Science comprised 6 acres of land, and was then known at Laxs' gardens; it is situated between the Barras Bridge on the east, and the Leazes—a public common—on the west. A new road known as College-road now divides the site from east to west, and of the 6 acres two are occupied by the College buildings, and two as garden ground to be retained for possible future extensions, whilst the remaining two acres may be considered as saleable, and is partially covered by the Grand Hotel and assembly-rooms. The buildings forming the College have been erected at three periods, and form four sides of an irregular figure. The first block occupies part of the north and east sides of the quadrilateral; it comprises the physical and chemical laboratories, and was commenced in 1887. The second, to the east and south, accommodates the engineering laboratory, drawing and lecture rooms, and the school of art, and was erected between the years 1892-4. The third block just completed occupies the west side overlooking the Castle Leazes, and possesses (inclusive of the "Sir Lowthian Bell" tower) a frontage 100 yds. in length towards the new Queen Victoria-road; it also embraces at the rear, and projecting into the quadrangle, the great hall to accommodate 750 persons. The cost of the erection of the first and second blocks was each about 20,000*l.*, together they do not equal the floor area or the cost of the latest building scheme, which includes the administrative apartments, great hall, library, botanical and zoological laboratories, and will, with the boundary railing, carriage drives, etc., approximate 60,000*l.*

The buildings have been designed to provide the precise accommodation which experience has suggested to the staff and council as necessary to cope with the demands of the XXth century, and although the character of the old buildings erected nineteen years ago has not been allowed to dominate the latest scheme of the buildings, consideration has been given to ensure that the whole shall agree architecturally in style.

The south and west boundaries are enclosed by a tall wrought iron railing, that on the west being divided by panelled and moulded stone pillars, broken at two points by wide gates, over which is some ornamental cresting combining the College monogram. The carriage drive is semi-circular in form, and leads to the main entrance, which occupies the lowest stage of the "Sir Lowthian Bell" tower, and is placed in the centre of the west elevation. This entrance gives access to the spacious hall, which communicates by corridors with the north and south wings, with the principal staircase and the great hall. The outer entrance is placed under an open portico and the entrance hall, 23 ft. in width, is arranged in two bays with a semi-domical ceiling, carried on coupled columns of Hoptonwood marble with verde antique bases and carved Ionic capitals; the walls are lined to the height of the doors with red marble, having a green marble capping and skirting; whilst the floors are of marble arranged in circular form with radiating panels.

The staircase opposite the main doors is largely constructed of Hoptonwood stone with a massive balustrade, supported on a series of columns. Beyond the main staircase is the great hall for use during convocation and for examination and lecture purposes; it is 70 ft. by 50 ft., and has a small gallery at the south end. It is a lofty apartment, with a coved plaster ceiling supported by ornamental trusses with traceried and moulded panels, brackets, and pendants, and arranged in seven bays, in each of which are modelled figures in slight relief, representing "Practical" and "Theoretical" science, bearing suitable emblems, and enclosed by panels with modelled styles. Around the walls is a stencilled frieze formed of medallions containing the emblems of the various sciences taught in the College. The medallions are connected by festoons, and the roof timbers and other features are bordered with patterns in quiet colours. The dado is of panelled oak 10 ft. high, broken by pilasters, and at the frieze level by small shield-like panels to receive the names of prizemen. Over the chief entrance door is a balcony—opening off the staircase landing—with pilasters and circular pediment, and with carved scroll work and mantling enclosing the College arms.

The hall is lighted by a series of two-light windows, set over the dado and divided by two moulded transomes, the mullions being wrought in the shape of columns with moulded capitals and bases, the middle range of lights is intended to receive the arms of benefactors. On the north is a large seven-light window, the three centre ones contain the territorial coats of the district which contributes to the College, viz., Northumberland, Cumberland, Westmoreland, Durham, and Newcastle, and above them respectively the arms of the University of Durham and of the Armstrong College; three of the four side lights are filled with the arms and crest with suitable mantling of Lord Armstrong, Sir Lowthian Bell, and Mr. T. G. Gibson. From the