it be the sepulchre of the "King of Men" (αναξ ανδρων), or the Treasury of his father, the bones of the one and the treasures of the other have alike disappeared, and the Grecian shepherds, with their flocks and herds, are now the only inhabitants of this magnificent abode of grandeur and of gloom.

Passing over two barrows of unrivalled interest—that of the Athenians on the Plain of Marathon, and that of Achilles on the Plain of Troy, both of which have attracted so much attention from all travellers that it would be impossible for me to add anything to their descriptions—let us proceed to cast a short glance on the tomb of Alyattes, which is situated in the Plain of Troy.

Sardis is about two days' journey to the N.E. of Ephesus, from which place I set out to visit it. On the second day we passed Mount Tmolus, an extensive range which runs through Asia Minor, parallel to the two seas. These hills are extremely wide at their summit, and are covered with a rich soft grass, and ornamented by trees not inferior to the finest to be met with in our English parks. As we descended on the northern side, the Pactolus with its golden sands, now an insignificant streamlet, murmured gently by our path, sparkling with the dazzling beams of an Asiatic sun, from which even the rich foliage which hung over was unable entirely to protect it. A sudden turn at length brought us full upon the narrow glen which contains the Temple of Sardis, the only existing remnant, except the Acropolis, of the ancient city of Crœsus. The Temple is a most beautiful specimen of the Ionic order; and though two only of the columns are now erect, yet the others are lying around so little injured, that they might without much difficulty be replaced in their original position. It was curious to see our Turkish attendant sauntering amid the ruined fragments, and endeavouring, with all the honest politeness of his nation, to sympathize with us in our admiration of their beauties; though evidently extremely at a loss to conceive what should have induced us to come so far, merely to gaze upon the fallen columns and scattered friezes of an ancient temple.

But the description of Sardis, however beautiful or striking it may have been, is not our present object. About a mile beyond the Temple the glen opens into a wide plain, in which the cavalry of Lydia were defeated by the elephants of Cyrus. It is a truly oriental scene—the plain is of vast extent, and is surrounded by hills on all sides: at one extremity stand the Lake of Gyges and the renowned Tumulus of Alyattes. The sun was setting as we caught the first glimpse of this lovely landscape; its lurid rays shone over the still surface of the lake, the habitation of innumerable swans; the black canvas tents of the Turcomans (a wandering Asiatic horde) were scattered in profusion over the plain; camels and goats were feeding tranquilly around them; and the wild figures and uncouth dresses of the shepherds might be seen hurrying to and fro, to call the cattle to their nightly quarters.

The Gygian Lake is a wide piece of water, by the banks of which on the side nearest to the town, are great numbers of barrows or mounds of earth, and among them the Sepulchre of Alyattes stands pre-eminent. Herodotus, I. xciii, who probably lived about 450 B.C., speaks of it as being, next to the works of the Egyptians and Babylonians, the most stupendous monument existing. It was constructed, he says, upon a foundation of stone, and afterwards completed with earth. It was erected by three classes of the inhabitants of Sardis, viz., the merchants, the artizans, and the public women. At the summit of it were fixed five *termini*, or small pillars with inscriptions, declaring the proportion of work executed by each class of the artificers. Of these there is now no vestige. In the time of Herodotus this monument was somewhat more than three quarters of a mile in circumference at the base, but at present it is considerably less. Unfortunately he does not mention its height, nor had I, when there, the means of measuring it, but it could not fall far short of 200 ft. Several attempts have been made to effect an entrance into the monument, under the idea that treasures would be found there; but hitherto little more has been done than to scratch the surface; and the interior construction of one of the most ancient sepulchres in the world, (B.C 560,) is still a secret.

Though there is less of mystery, there is scarcely less of interest, connected with this enormous barrow, than with the one at Mycenæ. We know beyond all doubt, that it is the monument of Alyattes, the father of Crœsus, and the king of Lydia. We know that it was erected by order of the wealthiest monarch of Asia, that it was described by Herodotus, and that it must have been visited by Solon; and there is surely enough of magic in these associations to awaken our warmest sympathies for this mighty relic of a people whose fertile empire is now a desert, and whose once formidable name is almost lost in the remoteness of past time.

Consult Pausanias' Homer; Sophocles' *Electra;* Euripides' *Electra;* Gell's Topography of the Morea; Leake's ditto; Leake's Journal in Asia Minor; Dodwell's Tour in Greece; Herodotus' *Clio;* Dr. Clarke's Travels; Dr. Chandler's Travels, p. 363; Cockerell.

DESCRIPTION OF THE CYMAGRAPH FOR COPYING MOULDINGS.

By R. Willis, M.A., F.R.S., Jacksonian Professor in the University of Cambridge, &c.

(With an Engraving, Plate IX.)

The purpose for which this instrument is constructed is to obtain exact drawings of the profiles of existing mouldings. The importance of doing this is well known; but the methods hitherto employed have appeared to me susceptible of improvement. The oldest and most usual is to measure a sufficient number of ordinates and their distances, and thus to lay down the mouldings by points. When the exact form is required, lead tape has been employed, or clay; but the best method of all is to lay the bed of the stone upon which the mouldings are carved upon the paper, and trace the outline, or else to make a saw cut transverse to the mouldings (or through a joint) and introduce paper into this cut, upon which the section of the moulding may be traced. But these latter plans, excellent as they are, can only be employed in dealing with ruins, neglected buildings, or buildings under repair. A few years ago I contrived an instrument which consisted of little more than the stylus of the present one, and which I then presented to the Institute of British Architects under the name of a Cymagraph. But I found it too troublesome to use with the necessary precision, and yet so useful that I have been induced to fit up a more complete and commodious machine, which is represented in the annexed figures, and to which I shall venture to apply the same name, Cymagraph. This was exhibited at a meeting of the Institute of British Architects, on May 16 last, and the instrument itself deposited in the hands of the secretary for the inspection of any person who might wish to copy it. The following description will, I hope, prove sufficient for the same purpose.

The instrument, when folded up, is 5¼ in. by 11½ in. and 1½ in. thick, and will travel in a carpet bag without injury.

Fig. 1 is a plan of the instrument in its working state, applied against a Gothic rib for the purpose of copying the mouldings.

Fig. 2 is a side view of the instrument corresponding to Fig. 1.

Fig. 3 a plan of the lower side, in which the cymagraph is represented as detached from the board, and folded into its place for convenience of carriage.

The principal piece of the machine is the stylus A B C, of which the portion A B is straight and B C curved. A B is mounted in a frame or carriage, having a pointed screw at A, and a collar at B, so that the stylus is capable of revolving, and the curved portion B C, which is nearly in the form of a semicircle, is terminated by a point at C, which must be exactly situated in the axis of rotation of the stylus, so that during the rotation of the latter the position of this point may remain invariable with respect to it and to its carriage.

A button D, either of hard wood or of brass, with a milled edge, is fixed to the stylus, and serves both to guide it in its motion along the surface of the mouldings and to turn it round its axis as required. The carriage in which the stylus is mounted has also a pencil holder E fixed to it.

If now the carriage with its stylus be moved parallel to itself over the surface of a drawing board, it is clear that any given point of the carriage will describe precisely the same path as the point of the stylus does, and since the pencil is attached to the carriage, this will also be true for it; so that if the tracing point C of the stylus be made to pass transversely across a series of mouldings, and the point be at the same time kept always in contact with their surface, the pencil will simultaneously describe upon the paper the exact form of the section of these mouldings of the same size as the original.

But the surfaces of mouldings are inflected in various directions to the right and to the left, and the tracing point of the stylus must therefore be capable of following such changes of direction. This it is enabled to do by its curved form combined with its power of rotation about its axis; for by turning it, it can be applied at various degrees of inclination, either to the right or left side of a moulded surface, as the form of the latter may require. And as the rotation has been shown not to affect the actual position of the tracing point C with respect to the carriage, so neither can it affect the truth of the section drawn by the pencil.

For example, at C the tracing point is applied to the right of the stone surface, but at X on the opposite side of the rib it is applied to the left of that surface, and is also turned into a different angular position to enable it to enter the hollow. But in passing from X to Y it must be gradually turned into the position shown by the dotted lines, to enable it to clear the projection at Z. In fact, during its progress across a rib of this kind, the point must be carefully watched, and the stylus turned into the best angular position that the momentary form of the moulding requires.

I have said that the carriage of the stylus is always to move parallel to itself, and will now describe the means by which this is compelled.

The base of the machine is a drawing board of mahogany F G (¾ in. thick), 10½ in. by 11½ in., and made to fold in the middle like a book, for the convenience of carriage. When in use it is kept open by a button R on the lower surface. The carriage is guided by a parallel motion somewhat resembling a double parallel ruler, but the proportion of whose jointed arms are altered to suit the different circumstances of its employment.

A plate H is secured to the board by a button-headed screw, K, having a milled headed nut below at L. As K merely enters a notch in the plate H, a single turn to right or left of this nut L is sufficient to detach or fix the plate, together with the instrument, while the slip of metal M, screwed to the board, serves to keep the plate in its proper position.

Two arms N N of equal length are jointed to the extremities of H, and also to an arm P of the same length as H; consequently P will be parallel to H in all positions. Two other arms Q Q, also of equal length, are jointed at one end to the arm P, and at the other to the carriage of the stylus, so that the latter will be parallel to P in all positions, and consequently to H. This arrangement enables the carriage to move freely and steadily from one side of the board to the other, and over every part occupied by the paper, and at the same time keeps it always parallel to the plate H. The paper T S, upon which the mouldings are to be copied, is secured to the board by a pair of spring catches V, W, of which the last is placed near the corner S of the paper, to prevent the latter from being caught and turned up by the arm N of the instrument during its motion.

It is absolutely necessary that the board of the instrument should be held steadily, in the same position, against the mouldings during the process of tracing. The two retaining pieces *a c*, *b d*, are provided for this purpose; these are attached to the lower side of the board by thumb-screws, *e*, *f*. In Fig. 3 they are shown in the position requisite for closing the instrument, but in Fig. 1 they are in the position for use. When the thumb screws are relaxed, either of the retaining pieces may be drawn out, and turned to the right or left so as to touch some convenient projection of the moulded surface, and thus when clamped fast, to retain the instrument in the same position so long as it is pressed into contact with the mouldings.

This adjustment of the retaining pieces must always be made previously to taking the profile of any mouldings; the board must then be grasped in the left hand at O, and held firmly against the mouldings. The button at D is managed by the right hand, which will be found sufficient as well to guide and turn the point of the stylus as to keep the pencil in contact with the paper, and to raise it off the paper when necessary, which the elasticity of the parallel motion will allow of easily.

Fig. 4 is a section of the edge of the board at W, to show the form of the paper springs. These, which are also seen at *h k*, *h k*, Fig. 3, are screwed to the lower side of the board in sunk recesses, and are released from the paper by pressing them at *k*. When the plate H, with the parallel motion and carriage, are detached from the board, they may be deposited in a recess sunk for the purpose on the lower surface, as shown at *l m*; the button R is then to be turned into the position shown by the dotted lines, and the board may be folded together, and secured by a hook in front. The recess at *n* receives the stylus, and those at *s*, *s*, *s*, receive the milled nuts *e*, *f*, L, respectively.

When a series of mouldings are to be copied which exceed the limits of the paper, they must be taken piecemeal, as shown at Fig. 5. This figure shows how the entire rib of Fig. 1 may be represented, which rib is too large to be entirely comprehended within the boundaries of the paper. In this and similar cases it is better to apply the instrument against the right and left faces of the rib in succession. In the first operation the mouldings from *o* to *p* (Fig. 1) will be taken, and in the next operation those from *q* to *v* (the same letters are employed in Figs 1 and 5).

Care being taken always to draw an overlapping portion of the mouldings in the successive drawings as in this case from *q* to *p*, there will be no difficulty in joining the separate pieces into one continuous line by tracing them on a larger sheet.

A small black-lead pencil and common paper may be used for the purposes of this machine, but as the point is very liable to break and become troublesome, I find it much more convenient to employ the *metallic* paper, which is prepared by Messrs. Harwood, 26, Fenchurch Street, and requires only a brass or other metallic point instead of black lead. Besides this advantage, the trace is indelible. The paper for the instrument should be cut to the proper size, and carried in a portfolio. By a somewhat different arrangement of the instrument, the paper might be made to remain always in its place on the drawing board in the form known by the name of a *block*, from which the sheets are to be detached as fast as the drawings are made. This would increase the size of the machine, however, by making it exactly as large as the paper, and the folding hinge would be placed in a direction transverse to that which it occupies in the present design.

This instrument requires no great accuracy of workmanship. The two essential points upon which the precision of its action depends are, 1st, that every pair of arms N N, Q Q, of which the parallel motion consists shall have exactly the same distance between their joint holes. This is easily secured by drilling them all separately, from a pattern arm made previously. Similarly the holes in the plates H, P, and the carriage, must be at the same distance respectively. 2nd, that the point of the stylus shall be in the axis of rotation. This is also easily effected, and is as easily verified at any moment by twirling the stylus in its carriage opposite to a fixed point.

The parallel motion may be made of thin slips of sheet iron rivetted together, but better of sheet steel. The hinges of the board must be so placed that when it is closed or folded, there may be room between its inside surfaces for the retaining plates *e f* and the button R, which must be made all of sheet iron or brass of the same thickness.

The length which I have given to the arms of the parallel motion, is just sufficient to allow the pencil to travel over the board. The limit of the motion to the right will be found to be that the arms Q Q will come into contact, and thus prevent farther motion in that direction; and similarly the limit to the left will be the contact of the arms N N. If the size of the instrument is increased, the same proportions must be preserved between the arms and board.

R. WILLIS.

Cambridge, June 10, 1842.

CYMAGRAPH.

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