THE LETTER "S"

by

J. Gróh

Department of Drawing and Composition, Technical University, Budapest

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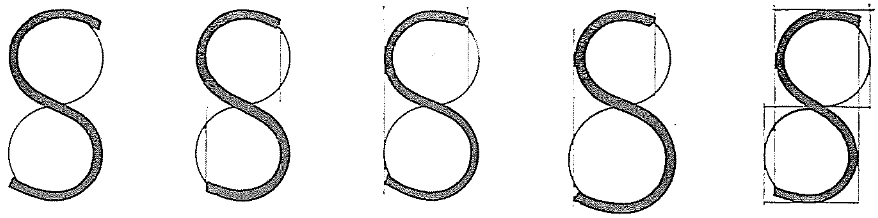
The characters *S* in "Hypnerotomachia Poliphili" printed in the shop of *Aldus Manutius* are excellent. Among patterns arisen in the first century of printing, the designs by *Vicentino*, later by *Cresci*, show a dynamic letter *S*. Construction of the letter *S* by *Dürer* is, however, faulty, the character falls backwards. In later periods, up to present, many good and bad examples are found, the difference between them slowly fading out.

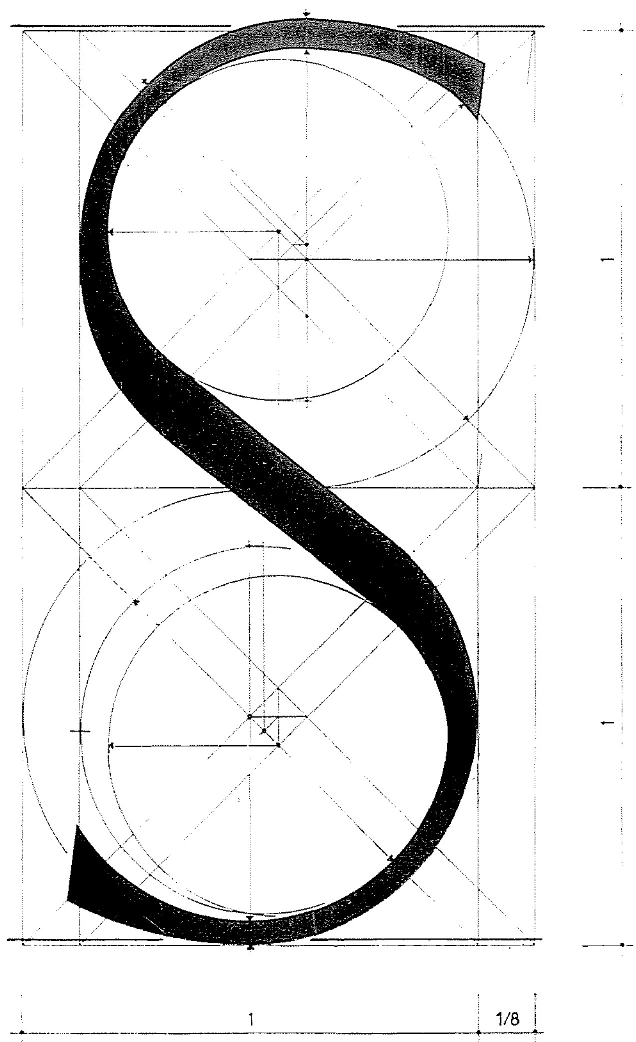
Forming of the letter *S* is unparalleled in our alphabet. The floating statics of the intertwining arcs makes it the most problematic character, ahead in difficulty of the construction of characters inexistent in the Roman alphabet therefore uneasy to be fitted into its form system.

It is well known that *S* forms (both capital and lowercase) are built of two superposed circles. The two circles are joined, opened on top and bottom, in general by applying a tangent arc (a). The obtained initial form is not bad. If, however, the letter is less wide than the circles, the character tips over; vertical chords adjusted to the endings make the cause of this phenomenon evident (b). The *S* tilts less to the left when only the upper part is shorter than the length of the diameter (c). Just as deficient a form results from enlarging the lower part for the sake of an apparent, optic equilibrium of the two parts; thus the character obtains a vertical tangent on the left but none on the right (d). The correct solution is evident; the upper circle has to be slid to the right (e). Even with identical circles, a balanced form tending to the right is achieved.



a b c d e

S varieties are easy to construct from joining identical circles slid on each other (Fig. 1). In drawing four squares, not only those enveloping the circles but also their reflections along the horizontal bisector, diagonals of the overlapping squares intervene in constructing the letter. They provide numerous points and refer to other ones suitable as centres for circular arcs to be composed at will. Thus the letter may be formed optionally to match the given alphabet. The construction is simplified by adhering to the enveloping circular arc for the outer arcs, rather than to join both circles by an arc, necessarily empoverishing the form. These letters have in common to always keep the statics of *S* and mostly also its impulse.



There is a perspicuous parallelity between the construction of the letter *S* and the law of picture composition. In either case inner lines of the two squares — spoken of as turning the shorter onto the longer side of the picture rectangle in picture composition — mark off the area to accommodate important forms. Intersecting diagonals are also of importance in picture composition.*

Let us turn to the source: the classic example of the Roman capital *S*. Attempt to discover the hidden geometry of this type.

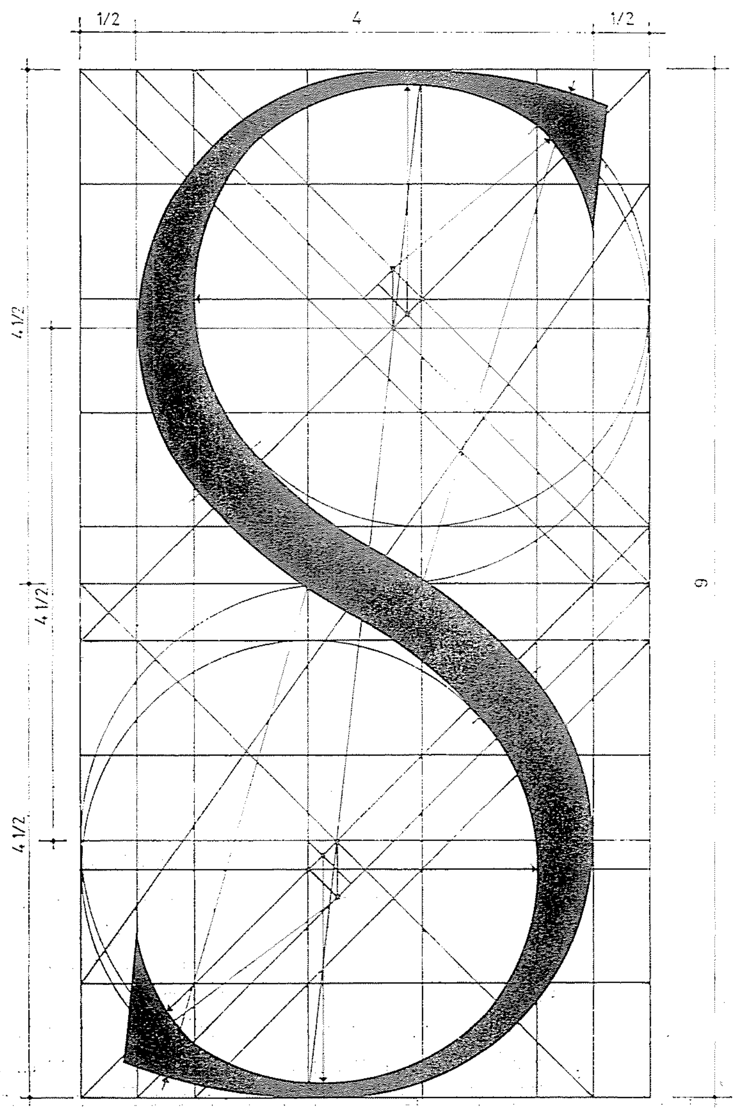
Contemplating the characters on the Trajan column, it appears that amidst the Roman capitals based on squares, *S* has the proportions of a half square, matching in width *E*, *F* and *L*, and related to both *P* and *R* where the vertical stem and the inner line of the arc correspond to the width of this character. Also the construction from two circles is apparent. All these are well known from theliterature. Proportions of these letters are seen to have been closely respected; their slight dimensional changes are partly due to free-hand layout of the characters, and partly to juxtapositions of the text.

On the Trajan column the proportion of the letter *S* is 9 : 4. The same proportion is observed for the letters *S* of the Via Appia inscription of amazing beauty where, however, the characters are much thicker. The proportion 9 : 4 results from applying two circles of four and a half units slid by half a unit on each other. Cutting half a unit from the upper circle in the right and from the lower circle from the left yields the actual enveloping form 9 : 4. Thus, the seemingly freely curving form of the letter is determined by a strict modular system. It follows from the construction of the letter that in addition to the circle diameters, the distance of four and a half units determines also the centre spacings. This strict but simple interior geometry of the letter *S* enabled the trained master to easily draw this letter of undoubtedly complicated form. The modular system of the Roman capital *S* has as concomitant the omission of optical equalization and the shape widening downwards. Therefore the upper part of the letter seems to be greater, more open than the lower one, even if seen upside down. This form, unusual to us, permits to keep the closed structure of the letter; in spite of its openness, *S* is a regular block organically related to letters *E*, *F*, *L* of similar width. It is essential to maintain the integer block of *S* in the alphabet of Roman capitals with greatly different widths, and marked "personalities" of single letters within affine letter groups.

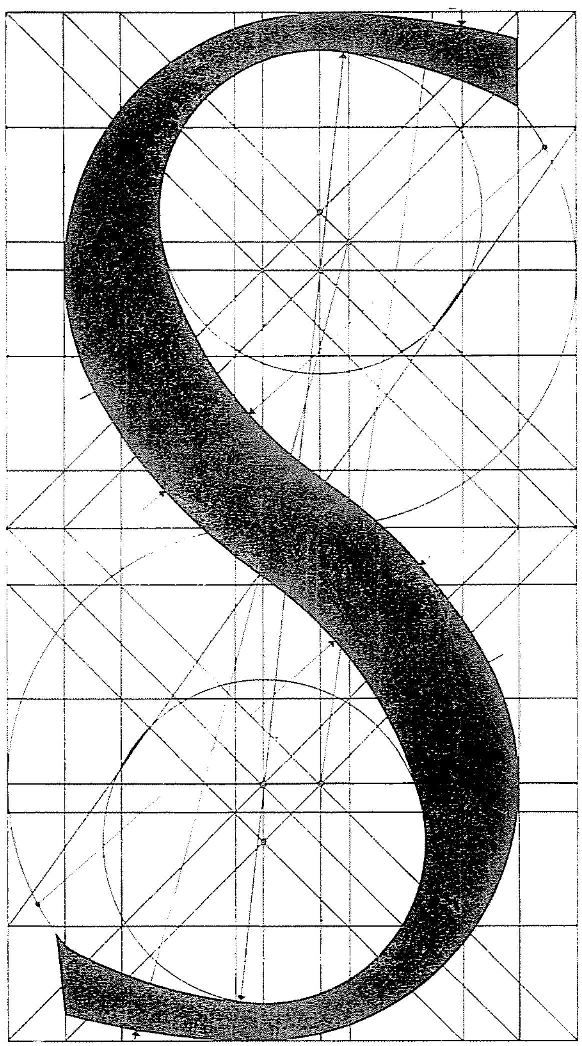
Proportions of printed letters aiming at lisibility rather than solemnity grew necessarily closer. The Romans themselves used different writing types depending on objective and tool. Sometimes even symmetry is omitted in forming the serifs of letters *S* in stone inscriptions, such as in the mentioned one of Via Appia. Knowledge of the construction of the classical form as starting point seems to be useful in designing the letter *S*.

* Ch. Bouleau: The Painter's Secret Geometry. Thames & Hudson, 1963.

Figure 2 is an analysis of the S of the Trajan column. Arising by pure construction, it is devoid of form subtleties resulting from freely developed curves.



A letter *S* of enhanced thickness, constructed according to principles in Fig. 2, is seen in Fig. 3; the simplified construction of the joining arcs (in the middle) avoids the letter to be thinner in the middle than its upper and lower parts.



Summary

Form design of the letter S is unique among the Latin characters, justifying its analysis. Correct statics of the S is only possible with arcs based on horizontally slid circles. The Trajan column and other examples prove that the hidden geometry of the *S* is built on a strict modular system. The proportion 9 : 4 developed by cutting off by a chord half a unit on the left and right sides of the initial circles, of 4,5 units each.

Dr. János Gróh, H-1521, Budapest