forty-seven books of which we are speaking. They are all without signatures, without initial directors, without hyphens, without catchwords, that is to say, without any of those characteristics which we see gradually, one after the other, come into almost general use from 1473 (if not earlier) to 1480. The four editions of the *Speculum* are all entirely printed anopisthographically, the woodcuts at the top of the pages as well as the explanatory text (in type i.) underneath, which would hardly be the case if the books had been printed after 1471, when the printing of woodcuts, together with text in movable types, had already been known for eleven years. Their types have nothing in common with any of those used in the Netherlands after 1473, but remind us in every respect of the earlier period of the Dutch block-books and MSS. They are all, so far as we know, without any colophon (except such a word as *explicit),* which would, for a collection of forty-seven books, be incompatible with a period after 1471, but not with the earlier period of the block-books and MSS. Moreover, out of the forty-seven books no less than thirty-five are printed on vellum, which is incompatible with a period after 1471, when printing on paper had become universal, but not with the earlier period of the MSS.

There is, therefore, no reason whatever to discredit Zell’s state­ment in the *Cologne Chronicle* of 1499, that the *Donatuses* printed in Holland were the models, the “beginning” of the art of print­ing, at Mainz, nor that of Hadrianus Junius in his *Batavia,* that printing was invented at Haarlem by Lourens Janszoon Coster. The two statements were made independently of each other. That of Zell must be regarded as a direct contradiction of the vague rumours and statements about an invention of printing at Mainz in Germany by Gutenberg, which gradually crept into print in and after 1468 in Italy and France, and which found their way into Germany about 1476, after Mainz and Germany had given the greatest publicity to the existence of the art in their midst for more than twenty-two years, but had been silent about an invention and an inventor. And, though Zell accords to Mainz the honour of having improved the art and having made it more artistic, he denies it the honour of having invented or begun it, and this latter honour was never claimed by that town before 1476. Junius’s account is the embodiment of a local tradition at Haarlem, the first written traces of which we have in a pedigree (testimony MM) of the family of the reputed Haarlem inventor, which must have ex­isted at least as early as 1520. His account has been indirectly confirmed by the finding of several fragments at Haarlem, all belong­ing to the groups of books mentioned above, but still more by the discovery of several fragments of the *Donatuses* printed in the *Speculum* type, all used as binder’s waste by Cornelis, the book­binder, the very man whom Junius alleges to have been the servant of Coster. As the case stands at present, therefore, we have no choice but to say that the invention of printing with movable metal types took place at Haarlem about the year 1445 by Lourens Janszoon Coster.

*Early Types and their Fabrication.*

We must now take notice of two theories or traditions which have been current for a long time as to some in­tervening stage between the art of block-printing and the art of printing with movable cast types.@@1 One theory or tradition would have it that the inventor of printing, after the idea of single, individual, movable types had arisen in his mind, practised his new invention for some consider­able time with wooden types, and that he came only gradually to the idea of movable types cast of metal.

Junius gives us to understand that in his opinion the Dutch *Speculum* was printed with such wooden types. Of Johann Guten­berg it was asserted that he printed his first Bible with wooden types. The Mainz psalter, printed in 1457 by Joh. Fust and Peter Schoeffer, was alleged to have been printed with wooden types, in which case the 4th edition, published in 1502, and even the 5th edition of 1516, would be printed with wooden types, the same being used for them as for the editions of 1457 and 1459. Theod. Bibliander was the first to speak (in 1548) of such types and to de­scribe them : first they cut their letters, he says, on wood-blocks the size of an entire page ; but, because the labour and cost of that way was so great, they devised movable wooden types, perforated and joined one to the other by a thread.@@2 Bibliander does not say that he had ever seen such types himself, but Dan. Speckle or Specklin (died 1589), who ascribed the invention to Mentelin, asserts that he saw some of these wooden types at Strasburg.@@3 Angelo

Roccha asserted in 1591 that he had seen at Venice types perforated and joined one to the other by a thread, but he does not say whether they were of wood or of metal.@@4 In 1710 Paulus Pater asserted that he had seen wooden types made of the trunk of a box-tree, and perforated in the centre to enable them to be joined together by a thread, originating from the office of Fust at Mainz.@@5 Bodman, as late as 1781, saw the same types in a worm-eaten con­dition at Mainz ; and Fischer stated in 1802 that these relics were used as a sort of token of honour to be bestowed on worthy apprentices on the occasion of their finishing their term.

Besides those who believed in these wooden types from the fact that the letters (especially in the *Speculum)* vary among themselves in a manner which would not be the case had they been cast from a matrix in a mould, there were authors and practical printers who attempted to cut themselves or to have cut for them some such wooden types as were alleged to have been used by the early printers. Some of them came to the conclusion that such a process would be quite practicable ; others found by experiment that it would, in the case of small types, be wholly impossible. Up to the present time no book or document has come to light which can be asserted to have been printed with such single, movable, wooden types. But nearly all the experiments to which we have alluded were made with the idea that the inventor of printing, or the earliest printers, started, or had to start, with as large a supply of type as a modern printer. This idea is erroneous, as it is hardly any longer denied that, for a good many years after the first appearance of the art, printers printed their books (large or small) not by quires (qua­ternions or quinternions) but page by page.@@6 Therefore, all con­siderations of the experimenters as to the impracticability of such wooden types, on account of the trouble and length of time required for the cutting of thousands of types, fall to the ground in face of the fact that the earliest printers required only a very small quantity of type, in spite of the peculiar forms (combined letters, letters with contractions, &c.) which were then in vogue.

The other theory would have it that between block­printing and printing with movable cast types there was an intermediate stage of printing with “ sculpto-fusi ” types, that is, types of which the shanks had been cast in a quadri­lateral mould, and the “ faces,” *i.e.,* the characters or letters, engraved by hand afterwards. This theory was suggested by some who could not believe in wooden types and yet wished to account for the marked irregularities in the types of the earliest printed books.

Gerardus Meerman, the chief champion of this theory, based it, not only on the words of Celtes *(Amores,* iii. 3), who in 1502 de­scribed Mainz as the city “quæ prima sculpsit solidos ære char­acteres,” but on the frequent recurrence of the word *sculptus* in the colophons of the early printers (for Jenson and Husner of Strasburg, see p. 681 above). Sensenschmid in 1475 said that the *Codex Jus­tinianus* was “cut” *(insculptus),* and that he had “cut" *(sculpsit)* the work of Lombardus, *In Psalterium.* Meerman also explained the account of the invention of printing by Trithemius @@7 as mean­ing that, after the rejection of the first wooden types, the inventors discovered a method of casting the bodies only of all the letters of the Latin alphabet from what they called matrices, on which they cut the face of each letter ; and from the same kind of matrices a method was in time discovered of casting the complete letters of sufficient hardness for the pressure they had to bear, which letters they were before—that is, when the bodies only were cast—obliged to cut.@@8 In this way Meerman explained that the *Speculum* was printed in sculpto-fusi types, although in the one page of which he gives a facsimile there are nearly 1700 separate types, of which 250 alone are e’s. Schoepflin claimed the same invention for Stras­burg, and believed that all the earliest books printed there were produced by this means. Both Meerman and Schoepflin agreed that engraved metal types *(literæ in ære sculptæ)* were in use for many years after the invention of the punch and matrix, mention­ing among others so printed the Mainz psalter, the *Catholicon* of 1460, the Eggestein *Bible* of 1468, and even the *Præceptorium* of Nider, printed at Strasburg in 1476. But the great difficulty con­nected with the process of first casting the shanks and afterwards engraving the faces of the types has become apparent to those who have made experiments ; and it seems more probable that the terms *sculpere, exsculpere, insculpere* are only a figurative allusion to the first process towards producing the types, namely, the cutting of the punch, which is artistically more important to the fabrication of types than the mechanical casting,—all the more as Schoeffer in 1468 makes his *Grammatica Vetus Rhythmica* say, “ I am cast at

@@@1 We do not allude to Tritheim’s assertion that the *Catholicon* of 1460 was printed from wooden blocks ; for this story, which he declares he had heard from Peter Schoeffer, if it were true, would belong to the history of block­printing. Nor need we speak of Bergellanus's verses (1541), in which he dis­tinctly alludes to carved blocks.

*@@@2 Commentatio de Satione Communi omnium Linguarum et Literarum,* Zurich, 1548, p. 80.

@@@3 *Chron. Argent.,* MS., ed. Jo. Schilterus, p. 442.

@@@4 *De Bibliotheca Vaticana,* Rome, 1591, p. 412.

*@@@5 De Germanise Miraculo,* Leipsic, 1710, p. 10.

@@@6 See, for instance, W. Blades, *Life of Caxton,* i. 39.

@@@7 *Annales Hirsaugienses,* ii. 421 : “ Post hæc inventis successerunt subtiliora, inveneruntque modum fundendi formas omnium Latini alphabeti literarum, quas ipsi matrices nominabant, ex quibus rursum æneos sive stanneos charac­teres fundebant, ad omnem pressuram sufficientes, quos prius manibus sculpe­bant.”

*8 Origines Τypographicæ,* The Hague, 1765, Append., p. 47.