

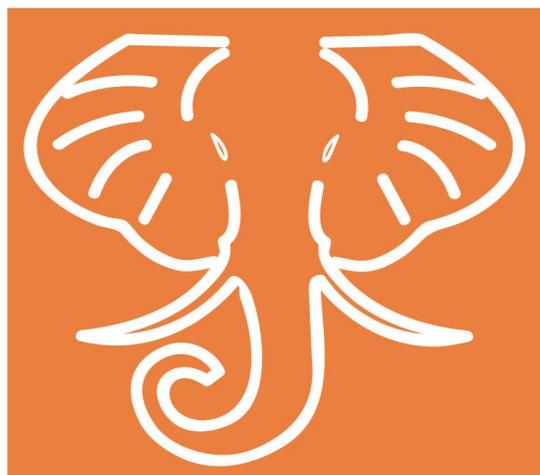
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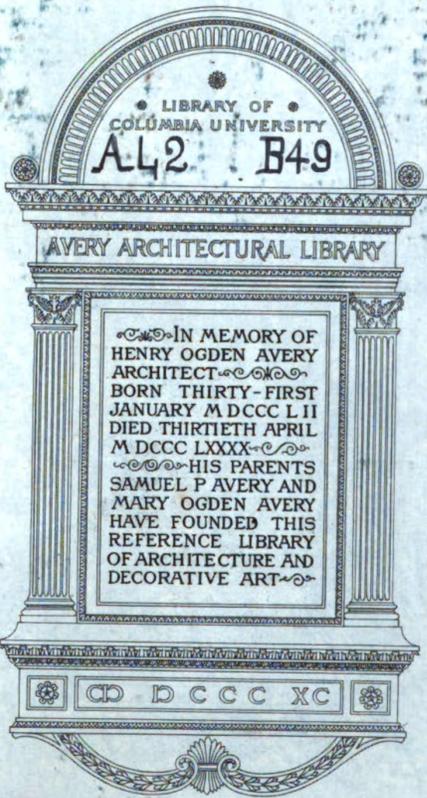
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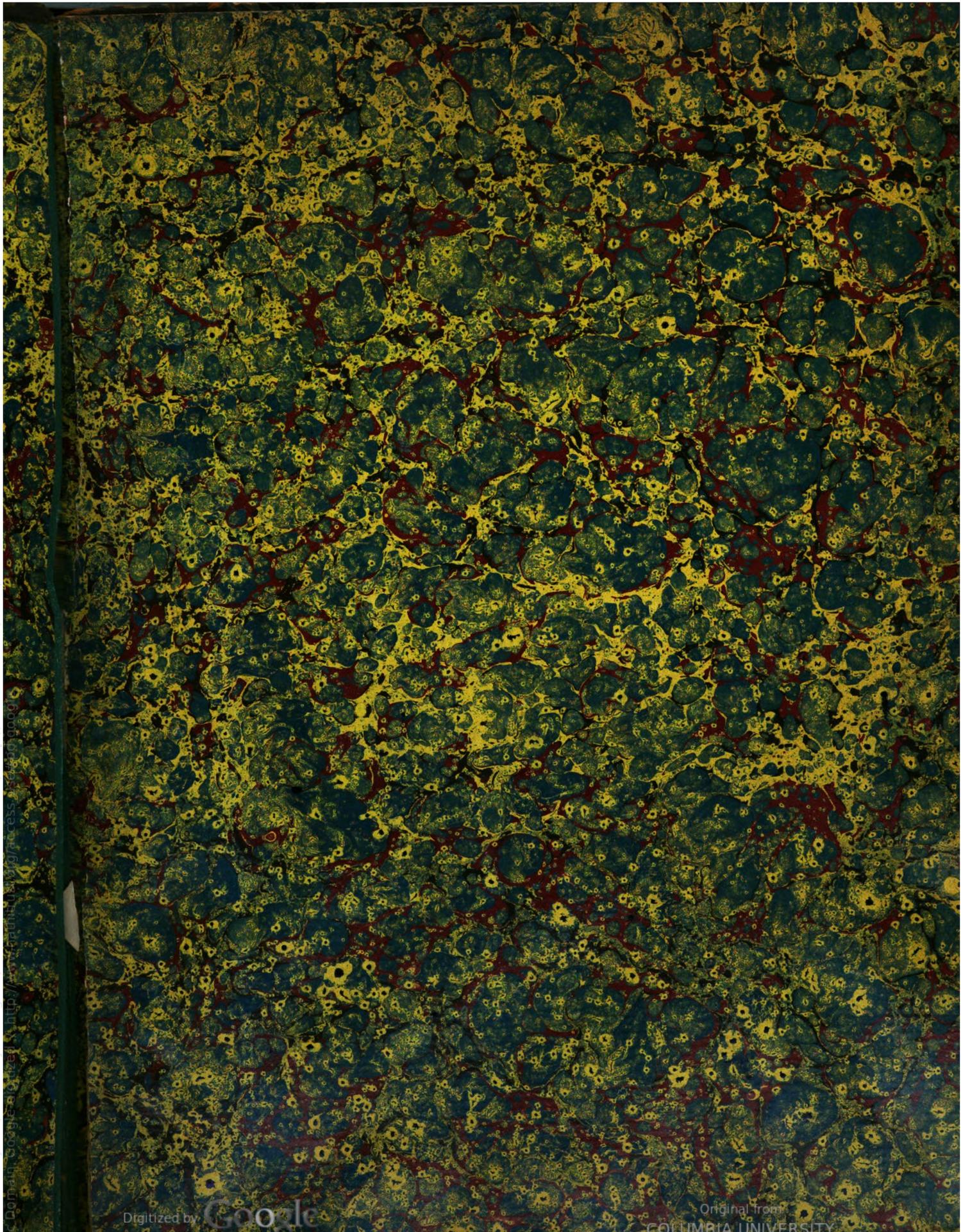
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THE INFINITY

OF

GEOMETRIC DESIGN

EXEMPLIFIED

"Where order in variety we see.
And where, though all things differ, all agree."—POPE.

"Similitude in dissimilitude."—WORDSWORTH.



THE INFINITY
OF
GEOMETRIC DESIGN
EXEMPLIFIED

BY
ROBERT WILLIAM BILLINGS
ARCHITECT

HONORARY MEMBER OF THE SOCIETIES OF ANTIQUARIES OF SCOTLAND
AND NEWCASTLE-ON-TYNE

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THE series of Illustrations, to which the following ESSAY is prefatory, has FIVE DISTINCT OBJECTS :—

The FIRST is to carry a diagram to what would appear the possible limits of its varying power ; and this has been exhibited in a hundred designs. But it is evident that the task of exhausting that power is impossible ; for, like the power of letters in producing languages, or of notes forming musical combinations, it is illimitable. This part of the subject is illustrated by the first Twenty Plates.

The SECOND is to exhibit the formation of a certain amount of designs upon diagrams belonging to old Tracery, as confirmatory of a proposition, “That upon any diagram an endless combination of design may be produced.” Thirteen Plates illustrate this portion of the subject.

The THIRD relates to the mere change of parts in a given design producing new combinations. This is exemplified in Plates 38 and 39.

The FOURTH is to show the power of varying form by colour ; illustrated by Plates 27 and 35. And

The FIFTH is to demonstrate the possibility of varying form without the alteration of any part of its original framework. See Plate 26.

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LIST OF ENGRAVINGS.

- 1 to 20. One hundred Designs for Tracery Panels, having a common diagram of four equal disconnected Circles.
21. Six Panels, having four equal connected Circles for a foundation.
- 22, 23. Twelve Panels, each having three equal disconnected Circles.
24. Five circular Panels, founded upon an old Diagram.*
25. Five circular Panels, founded upon another Diagram.*
26. Ten Variations of one Pattern by Form.
27. Three Variations of the last-named Pattern by Colour, and five Rustic Seats traced from the foregoing Panels.
28. Five square Tracery Panels, founded upon an ancient Diagram.*
29. Five circular Do. Do.*
30. Six square Panels, each inclosing the same pointed Arch.*
31. Six square Tracery Panels, with four Varying Circles whose centres are on a fixed position.*
32. Eleven Illustrations, of the Branching of Tracery Skeletons, from examples in the first twenty Plates.
33. Five Tracery Head Panels for Screens ; all having the same leading forms.*
34. Eight various patterns, within the lines of the Ogee.*
35. Eleven Changes of one Diagram, by Colour.
- 36, 37. Five Tracery Pear-shaped Panels of highly varied design, and their Diagrams, showing all their Curves to have their root upon the same Series of Squares.*
- 38, 39. One square Tracery Panel, and its variations by separation. Three Changes of the same Design by the separation of its Parts.
40. Title Plate containing the Diagram of the first hundred Designs.

* The ancient Tracery Panels on which these Plates are founded have been given in the Author's Illustrations of Geometric Tracery from Carlisle Cathedral and Brancepeth Church.

THE INFINITY

OF

GEOMETRIC DESIGN

THERE is a natural tendency in the human mind to turn with aversion from the necessarily somewhat dry labour essentially requisite for a thorough mastery of first principles, and to leap at once from these to their practical application, in however imperfect a degree the preliminary knowledge may have been attained. Few, indeed, are the exceptions to this rule of dislike, which applies equally to painting, to poetry, to music, and to general knowledge,—for men commonly prefer to paint, to compose, to design, and to write books imperfectly, rather than to wait for that mastery of acquirement requisite for doing these things well. The records of Art, from its revival towards the latter part of the eighteenth century, and even down to the present times, sufficiently prove the position just stated. These but too uniformly evidence, that the primary elements of composition, and the great groundwork of all perfection—outline—have been made subsidiary, nay, sacrificed to the more seductive and showy charms of mere effect,—gaudy colouring having been preferred to the more difficult study of form.

Not a few of our greatest artists are, in fact, absolutely unlearned in the laws relative to perspective ; and this ignorance, it must be allowed, may be said to be fostered by the public, whose patronage is extended much more to the showy picture, than that distinguished for perfection of form. It is not wonderful, therefore, that the painter should persist in that line which leads to a more immediate popularity ; and thus the evil is perpetuated from generation to generation, even almost without hope of change. Our school

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of ornamentation has essentially partaken of this baneful character, and, in most cases, we see the lamentable result of deficient design—or rather we have a mere mechanical copying from natural objects, without the benefit which even a moderate study of the simple geometric forms, abounding throughout nature, could not have failed to impart.

Fixed geometric forms, rather than mere fancy, as the foundation of composition, are ever to be preferred as of the utmost importance to the designer, if he wishes or intends to arrive at a successful result ; and the perfect artist needs not to be told the value of elegant and faithful forms as the groundwork for his picture ; for, like the great musical composer, he would never think of proceeding to elaborate and finish, without having satisfied himself about the sufficiency of his starting points. Let the workman, as in some degree ignorant of the first principles of art, be instructed to preserve a specified and well-defined mechanical foundation in any design he is directed to realise—a foundation which shall predominate over the minor details—and the result will be, that, in ninety-nine cases out of a hundred, the scrutiniser will fail to observe the working of the details altogether. Of this position we have abundant evidence in numerous examples of old tracery,—for the roughly-formed and imperfect mouldings, the frequent inartistic execution of foliage, and of other ornaments, would utterly condemn the whole, were not the defects hidden by the masterly predominance of mind displayed in the main framework of the structure.

Numberless have been the attempts to define the origin of the pointed arch ; and, without doubt, we have had an abundance of essays on Gothic architecture generally. None, however, point to the origin of tracery and its ramifications, most probably because the matter seemed tolerably clear ; but this is so only by jumping at once through all the early history of the world, to alight upon a period of our annals when its first appearance is, indeed, clear enough. In Norman architecture, everything was massive ; and the solids almost predominated over the voids. The windows of this style were small, seldom exceeding three or four feet in width, and hence the framework of glazing was sufficient for the space. This last feature prevailed in the succeeding style, known as early English, lancet, or first-pointed architecture ; although, by placing a number of windows side by side, the architects frequently succeeded in producing the effect of one large window.

By degrees, however, as the styles changed, the open spaces became larger, the solids smaller ; and buttresses were thrown out, not only as feelers for strength, but for the purpose of balancing the great weight of stone groins, which then came into general use. The spaces went on increasing, until at last they became gigantic, (in several instances

exceeding forty feet,) and a construction of stone framework became absolutely necessary. This framework, as we find in examples of the early decorated period, was at first unornamented—mere piers or mullions below, with segmental curves, crossing each other, to fill the arch. But by degrees these curves changed their character, and assumed all the infinite variety we now know under the term tracery. From great windows, this class of decoration descended to the minor parts of buildings; and at last, we find that light, fragile screenwork—the great depository of this species of knowledge.

It is surely not unphilosophical to hold, that every man's career should have a distinct aim; and that he should not allow himself to be diverted from this aim, if he expects that success is ultimately to crown his labours. The author's own course has been the study of architecture itself, not in the routine office fashion, but in the great school of practical art itself—in our magnificent cathedrals, and in the antique buildings of every other sort, with which our counties are covered, and of which Britons are so justly proud, as embodiments of the talent of their own forefathers. In following out this selected plan of study for himself, and of information for others, he has not hesitated in attempting to realise Napoleon's plan—of making a war pay its own expenses—in reference to his publications. He has been patiently endeavouring to gain the secret of the wonderful facility of design, apparent on the very face of works executed by men denominated "Goths," and whose productions are, in their variety of power, almost infinite. The results of his study in one branch of this mighty tree of design, the author here brings forward in the shape of mere tracery panels; and he confidently appeals to all interested in the subject, to consider what might be done for furthering and perfecting the present state of architecture, were the accumulations of individual study upon other branches to be resolutely brought forward.

The multiplied peregrinations of the author, in search of architectural antiquities for delineation and publication—peregrinations continued through a series of years—have led him deeply to consider the productions of individuals who gave their minds to one engrossing object, and consequently approached perfection (as nearly as mortals can do) in what they undertook. If it be admitted that he has caught a share of their spirit in his own design, his endeavours have not been altogether in vain. Standing aloof, as the author of this work has done, from the practice of his profession, it appears to him that architecture is the solitary branch of the great tree of knowledge which is not only not allowed to grow, but which is systematically kept stunted; for it cannot be denied that architectural design,

according to the dogmas of certain banded amateurs, reached its limits of excellence long, long ago ; and the result is, that professed architects, whose practice and prosperity too frequently depend on the worldly influence of such associations, are literally not permitted to design for themselves at all. They are chained down to copy from existing authorities ; and, no matter whether these types be good or not, antiquity is the sufficient guarantee for imitation.

While architects, as a body, continue to bend before these self-constituted tribunals, there is no hope for the progression of their art ; for, according to them, the man who can patch together, in one jumble, the largest number of old parts into a new building, is the greatest architect, the most finished artist. In other words, it is only saying that the greatest copyist has the highest and most original talent—a *reductio ad absurdum* certainly ; or, to use the language of analogy, that the man who borrows his light from an old lamp ought to shine brighter in the temple of fame than the genius who illumines the temple by the radiance of his own creations. It is an attempt to make imitation triumph over original conception, such as no profession, save architecture, has ever for a moment submitted to ; and it is time, surely, that the architect and the mere builder should cease to be synonymous.

We look and, until very recently, look in vain, among the enormous bulk of books published on medieval architecture during the last half century, for anything resembling an elucidation of principles. We have representations of buildings beautifully rendered, it is true, but they are without precepts ; we have the body, *minus* the soul of science. And why ? The modern artists who executed these works were merely the tools of book-makers, and not interested in the matter, farther than in being remunerated for their employment. The results of practice alone, or, in other words, of accomplished design, were thus given to the public ; but the theoretical principles which regulated or originated that practice were utterly overlooked ; for no sooner, probably, was the building delineated, than the principles which had guided the artist in his development were carelessly thrown aside, and for ever lost to the world of art. Augustus Pugin, (the elder,) who, in his scientific labours, followed John Carter, as the great reviver of Gothic architecture in Britain, stands out as an honourable exception to this showy, anti-theory school ; for his works not only contain much of principles, but it is evident that he and his pupils not only knew, but aimed at, and gave out more than the world was prepared to appreciate. Had other artists, like Pugin, exhibited an interest in the working out of the principles they have developed in their pro-

ductions, we might not have had to regret that architectural science has been withheld from the world ; for it is impossible that any man can really study the ancient buildings of our country without observing that their geometric laws are staring him full in the face. In short, these laws press themselves on the conviction of the artist, and, without their aid and application, no direct delineation can be given of these works of our ancestors.

Often, indeed, has this subject been forced upon the writer's attention by the numberless every-day instances of slight changes upon a common groundwork producing new designs. The works of our forefathers were formed, undoubtedly, upon the most patent of all geometric foundations ; and prove that architects had progressed to that point of merit, which enabled them frequently to impart even extrinsic beauty to productions that were never in any case deficient in picturesqueness or quaintness of character.

Once it was universally affirmed, and indeed it is still so maintained by the great bulk of both architects and amateurs, that our predecessors, before the Reformation, had exhausted the field of geometric combination so far as regards tracery ; and true it is, that their magnificent windows, and the wonderful combinations exhibited in their masses of gorgeously decorated screen-work, afford very strong grounds for such belief. But this idea is not really founded in truth ; for the ground is open to a far wider field of design than our medieval progenitors ever ventured to work in ; in fact, a field, whose productiveness it would be impossible to exhaust. More singular still than this is the fact, that, until recently, it was denied that the Goths recognised any geometric laws at all ; and ridicule was heaped on every one hardy enough to adhere to such a belief. This is not mere assumption, for such indeed was the fate of the author himself, when, a few short years since, he ventured to announce that his study of the construction of tracery had resulted in the production of a diagram of a series of squares, as the foundation-lines of the great bulk of that class of design.

The square, as a foundation for proportioning designs, was used in Norman buildings long before the art of tracery was thought of ; but upon this subject it is not our present province to enlarge. The author, however, may refer the curious in the matter to his illustrations of Durham Cathedral, where will be found the plan of one of the clustered Norman shafts, delineated upon the architect's old diagram-board of a series of squares.

Nor was the square the only form used, for the medieval architects undoubtedly had recourse to various diagrams, upon whose lines the centres of the tracery curves were placed.

This has been abundantly proved with regard to the *skeletons* both of the foliated and linear ornament; but, in the result of their work,—that is, in their *completed* panel or window, as the case may be, these lines *did not appear* at all, having, in fact, been only the means to an end.

In the present series of designs, it has been the object of the author to take certain fixed forms as a diagram, and to retain these in the finished pattern. Now, strange and contradictory as it may appear, the adherence to the old principle, of losing the diagram in the completed work, finds a limit sooner or later; while, on the other hand, the fetter, as it so might seem, of a compulsory form being shown in the result, opens up an unlimited source of inventive combination, and clearly illustrates the principle of progression by antagonism.

To many it will assuredly be a matter of surprise that such a strange variety of design, as is here exhibited, should emanate from the same figure; but a more intimate investigation of the subject will gradually dissipate this astonishment, for art is as varied as nature. With nature's boundless powers of change, all are conversant; and experiment will show that equally unlimited are those of geometric art, in the production of combinations from a given groundwork. Many of the examples, illustrative of our position, may indeed remind us of older designs; but such as exemplify ancient tracery, so far from being less valuable on that account, are, in fact, so many strong proofs in our favour.

The cathedral of Carlisle, and the parish church of Brancepeth, in the same vicinity, contain numerous examples of ancient tracery. As the delineations of these were the first-fruits of the author's devotion to this particular class of ornament, and as their framework is frequently of peculiar formation, he has made use of several of them here, as confirmatory of this position,—that any diagram may be made to yield an endless variety of combinations. Respecting exemplars in the last-named building, it may be stated briefly, that they are to be taken as studies rather than as mere copies; for they were executed at a period when the species of architecture to which they belong was rapidly declining; but, not the less on that account, their admirably picturesque framework entitles them to rank as equal to the previously executed, and certainly purer works of a similar stamp in the cathedral. One feature is peculiar to the Brancepeth examples,—a series of circular tracery panels, upon whose diagrams are founded those exhibited in plates 24, 25, and 29. These combinations of wheel or circular tracery, where one form is apparently on the continual chase after another, are of the most interesting, lively, and even playful description,

exhibiting at once unbounded facility of design and picturesque combination of character ; and, while the effect produced is that of extreme complexity, an almost cursory examination of the diagram will be sufficient to show the very great simplicity of the foundation on whose curves the ramifications are engendered.

In examining the century of designs on the first twenty plates, many combinations will be found to rest upon particular forms, in addition to the four primary circles, which are in every case exactly one-third of the diameter of the enclosing circle. Thus Nos. 17, 18, 20, 21, are, by their diagonal crosses, clearly relations. Numbers 22, 23, 24, are doubly related—first, by the central crosses, and second, by the general tendency of lines towards the centre. Numbers 50, 52, 53, are in their main lines purposely identical. The square form cutting through the circles in Nos. 56, 57, and 58, show their affinity ; and the general curves of 62, 63, 64, 65, leave no doubt as to their common origin. The same may be said of the square cut lines of Nos. 68, 69, 70, 71, and of the lines from the centre of one circle to the circumference of its neighbour, exhibited in the examples figured 73, 74, 75, 76, and 77. Should any one feel inclined to doubt the identity of figures 91, 92, 93, 94, let them copy mechanically, and they will soon be undeceived. In considering many of these designs, (unless directed to the fact that the four circles stand palpably before the eye,) we frequently lose sight of the original groundwork ; and it is natural that we should do so, because it continually occurs that the combination of form, subsequently introduced about a primary outline, is equal to it in importance. Nay, often, indeed, the forms introduced are considerably larger in dimensions than the diagram itself upon which the design is founded ; or else they may be so extremely opposite in their nature to the curves, that thus the minor lines become frequently entirely forgotten or overlooked.

Passing from farther consideration of our first twenty plates, we come to another diagram—four equal circles enclosed within one. Of this we have six varieties in plate 21 ; but the range of design is here as unlimited as the previously developed diagram of a hundred.

Equally capable of extension with the last described diagram is the subject-matter of plates 22 and 23, twelve designs founded upon a diagram ; having one circle, with three minor ones enclosed, equidistant from each other, and one-third of the original diameter. The designs resulting from this arrangement are literally upon the equilateral triangle, and naturally partake of its form ; and the grace these display in no way detracts from the merit of geometric designs within that perfect figure. It may be added that the last remark upon plate 21 applies, with increased force, to the groundwork of the triangle.

In all the examples on plate 28, we find a main figure, consisting of the repetition, within a square, of one curve, whose centre is on the boundary line of the square, and whose radius is determined by its diagonal.

The framework of the arched tracery, in plate 30, will be found among the old panels we have quoted as examples. A careless examination of this diagram might lead to the belief that it was hardly available for the purposes of geometric design; but here it figures through a short series, without any diminution of the interest which attaches to the original groundwork.

But perhaps the most singular illustration we have given of the power of geometric design upon an unpromising form, stands forth upon the pear-shaped figures in plate 36. Not only are all the curves of the varied tracery here figured clearly geometric, but all are upon a common foundation of squares, and may easily be delineated by reference to their diagrams on this plate, and on plate 37.

Those who are curious in the variations of form will find an ample scope for consideration in the diagram used in plate 31,—a series of sixteen squares, with four circles placed upon the intersections of the alternate inner squares. Now the main lines springing from these circles are essentially the same, but the mere enlarging or reduction of the size of these circles compels a difference of design, if the equality of the tracery is to be preserved.

Of all the primary forms used for tracery, that capable of the greatest variation is produced by circles of equal radius lying against each other, and whose combined curves are known to workmen by two quarters round as the ogee, but to the artist as the line of beauty. In all collections of ancient tracery, the architect made evident use of this form, and we have (see plate 34) added eight designs to the common stock. At the foot of this illustration, one of the patterns will be seen transformed into three borders.

Plates 38 and 39 illustrate the power of changing the parts of our design. In the first plate we have the complete design, and below it the four central figures transformed into a border. In the second plate, we have (No. 1) the external points of the same four inner squares, turned to the centre, where they produce another design. No. 2, on the same plate, is simply the four triangles at the corners of plate 38; and No. 3 is another pattern, produced by merely placing two of these corner-pieces together. The example marked 4 on plate 39 is another design of this changing character. By cutting this into four, and placing the angles to the centre, we have the combination No. 5; and by cutting this last pattern in half, and placing the main semicircles back to back, we have No. 6. Thus

there are three distinct designs produced without the alteration of one line. In these mere changes of position, it is curious to note the effect produced. Thus No. 5 appears a much more crowded design than No. 4, and simply from the elongated quatrefoils in the centre of the last-named being cut in half, and transferred to the outer boundary of the design No. 5. If the architectural student has been fortunate enough to sketch for several days at a time, without finding his work done two or three times over, why then he has been more guarded than the writer of these lines ; but *experientia docet*.

To mere tracery examples, we do not intend at present calling further attention. The primary forms of these, however, open entirely new ground, as their skeletons are frequently exceedingly beautiful. Let the reader look for confirmation of this point to the examples displayed on plate 32, and he will possibly incline to the opinion, that the flowing foundation lines of tracery are more beautiful than the results, and that geometric lines and curves resolve themselves into the most graceful of all forms. It was within geometric skeletons as a foundation, that Gothic architecture first displayed its foliated ornament, even before tracery was invented. We here allude to the early English trefoil and quatrefoil, filled with leaf-work—a class of ornament frequently occurring in isolated positions in the buildings of the thirteenth century.

The skeleton forms of tracery present a wonderful range for future study, and one which would amply repay any amount of consideration ; but if, for the sake of further argument, suppose we could for an instant believe that the field of design, as regards tracery and its skeleton forms, was completely exhausted, would not another subject instantly present itself by the mere power of black and white ? For instance, refer to No. 4 on plate 22, and then turn to its skeleton on plate 35. The same lines stand before us as eleven distinct patterns ; and this diagram is capable of being carried to an extent far, very far, beyond these. Imagination working upon form is boundless in fecundity, and thus, when the author designed the panel numbered 3 on the last-named plate, he had not the slightest notion that the three rustic seats, figured on plate 27, were to be traced from its lines.

There is yet another class of design which has opened upon us from the consideration of tracery, and the assertion of which appears rather paradoxical. It is changing form by form, by the easy process of making one part of a diagram stronger than another. Plate 26 illustrates this matter beyond doubt, and in plate 31 we have three combinations of the same diagram by colour.

The illustrations of form delineated in the present work are the mere expositions of an

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individual, and, though carried to a considerable extent, it is a matter of great anxiety to him, that other minds should also be at work on the same subject, but more especially to the department of it,—that of changing forms as applied to other branches of ornament,—in order that we may ultimately possess a British School of Design. Let him who has not studied tracery, and who can command the patience and industry, follow out mechanically each of the present series of patterns, and we trust he will from this gain sufficient knowledge of the subject as a starting point. Undoubtedly there is a point where the mechanic ends and where the artist begins, and no man is entitled to overlook the dry, plodding, calculating labour, which must ultimately help him on his way. With rare exceptions, all who have attained to the higher excellences of art, are such as have been obliged to ferret out their own way by personal exertion and research; for, if they do not this for themselves, it is impossible that any one should do it for them. Even in these railway days, no “royal road to learning” has been as yet discovered. Let the student only follow the principles and practices of the old artists, and he will attain the results which they did in the production of new and excellent designs; and, assuredly, he is unworthy of their spirit who remains contentedly a mere servile copyist.

It is not in complexity that the real merit of design lies; for the perfection of art consists in the most judicious use of the least possible amount of *materiel*, and some of the most successful tracery here brought forward has only two curves. Let the student, in designing or adapting tracery, keep the spaces as nearly as possible equal; for wide, staring openings in one part of a composition, and excessively diminutive holes in others, is largely the secret of the wretchedly ineffective monstrosities we behold in many of the poverty-stricken churches of the present age. This remark always makes the exception in favour of large openings for the gaining of particular objects in a design, and in such cases the artist must prove his power of surmounting a difficulty. In the composition of the class of design we have been considering, there is really but little of the abstruse; and the same remark applies to the bringing back and developing old examples—of making the ancients retrace their diagrammatic steps by their own works.

We have strictly kept our designs in this attempt to those subject to geometric analysis, and they may be somewhat tedious to the general reader on that account. Easier, indeed, would it have been to make thousands of free designs by the no principle of “rule of thumb;” but these are not the landmarks to guide the student, who will do well not to fancy himself an artist before he has conquered the mechanical principles of art. Inartistic

colouring upon a correct outline is always capable of being amended ; but an ignorant and incorrect sketch can never result in a good picture, can never be worked into one, any more than a substantial and permanent building can be raised on a foundation of shifting sand. No tailor could make Richard the Third an Adonis : he might decorate *ad libitum*, but in vain ; for he wants the framework.

A few words in conclusion. Some of the travelled detractors from our national inventive ability have accused the author of dipping freely into the fountains of the French, and more especially of the German school of tracery. A vast and very interesting magazine of design most unquestionably belongs to each of these nations, but he takes his stand on the fact, that art appertains to no country in particular : it is cosmopolite. He is not aware of having appropriated any of the *materiel* which these nations peculiarly lay claim to ; yet this not from any disinclination not to pursue the matter farther, but for the most simple of all reasons, his inability to devote to it the time necessary for the accomplishment of such a laborious task. Added to this, he fears that the interest taken by such as himself in such a subject, may be reckoned an undue one, and might fail in awakening, with the many, that interest ever expected by the sanguine projector, when he has got astride of his hobby.

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Illustrations of Gothic Geometric Tracery Paneling, from the CATHEDRAL CHURCH of CARLISLE, and from BRANCEPETH, near Durham; containing Forty-two Plates, with Descriptions of the system upon which the Panels are composed. Medium Quarto, £1, 7s.; Imperial Quarto, £2, 5s.

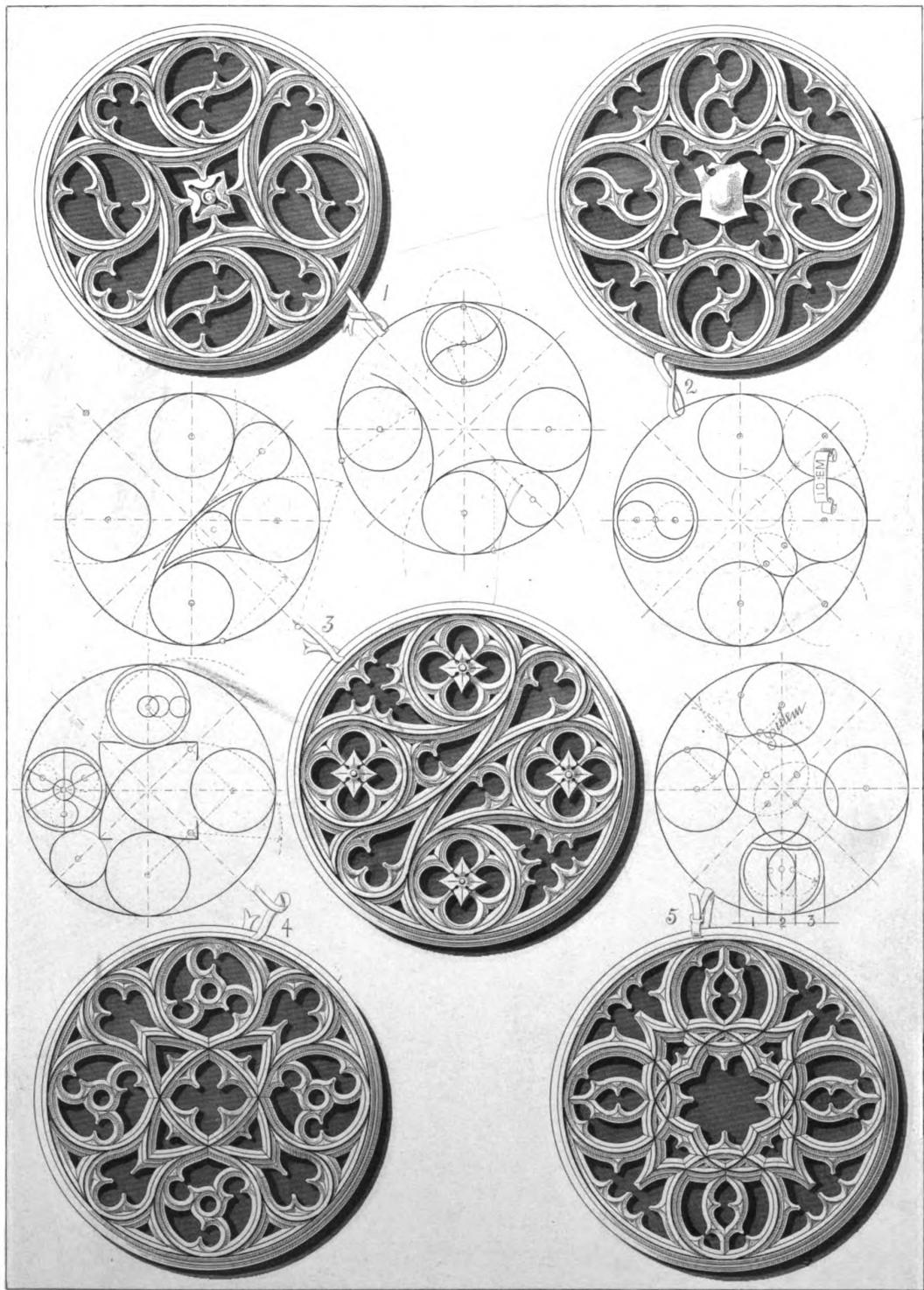
An Attempt to define the Geometrical Projection of Gothic Architecture, as exemplified by the Cathedrals of Carlisle and Worcester. Illustrated by Five Plates. Medium Quarto, 5s.; Imperial Quarto, 10s. 6d.

Architectural Illustrations and Description of the Temple Church, LONDON. This Work contains Thirty-one Plates, illustrative of the most interesting Examples of the Lancet, or first Pointed Architecture in this country, wholly Drawn and Engraved by the Author. Medium Quarto, £2, 2s.; Imperial Quarto, £3, 3s. The Plates of this Work are destroyed, and a very few copies remain for sale.

Architectural Illustrations of Kettering Church, Northamptonshire. With Twenty Plates, and Two Sheets of Letterpress. Medium Quarto, 10s. 6d.; and Quarto Proofs on India Paper, £1, 1s.

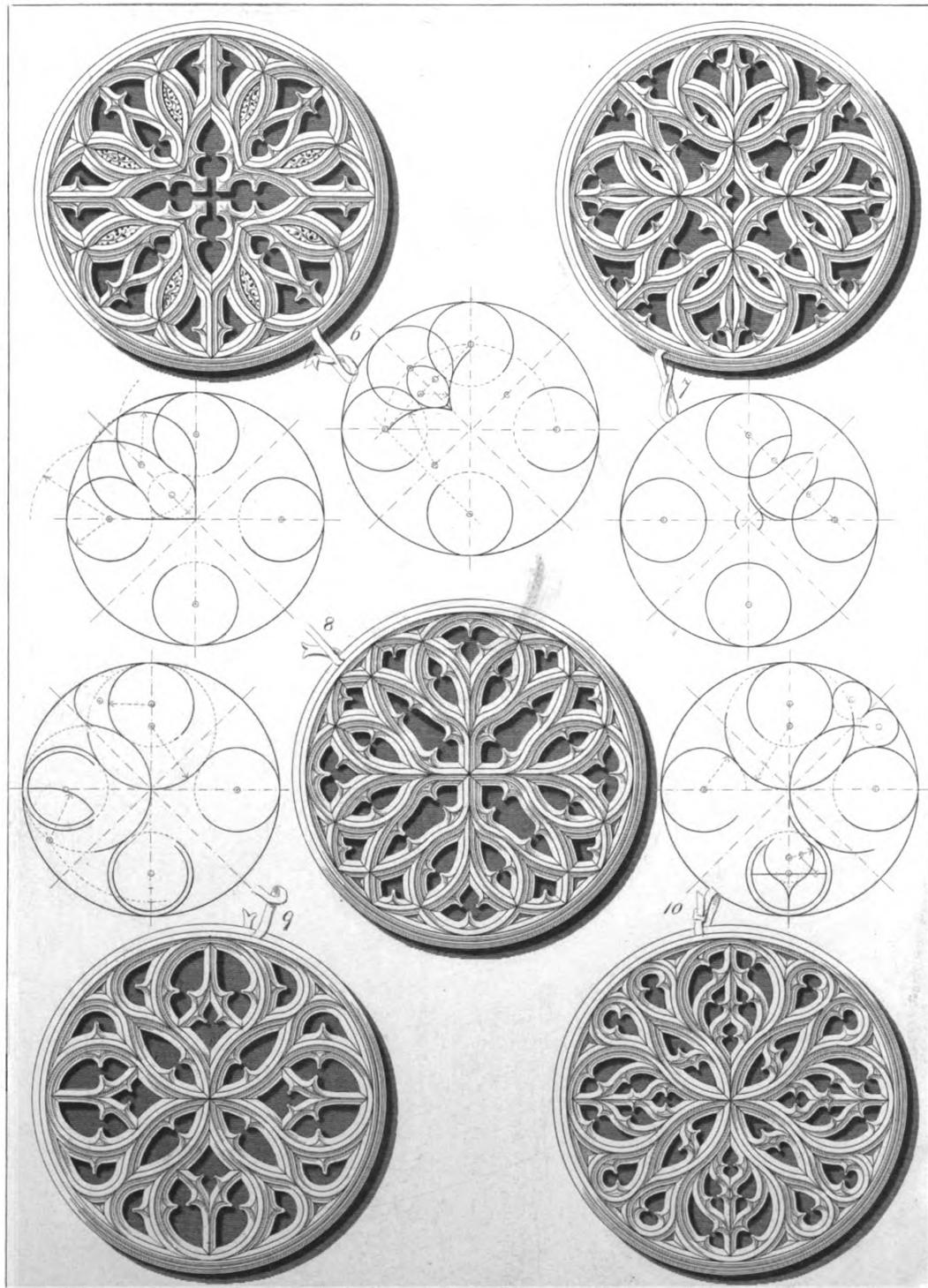
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WILLIAM BLACKWOOD & SONS, EDINBURGH; T. & W. BOONE, LONDON;
AND GEORGE ANDREWS, DURHAM.



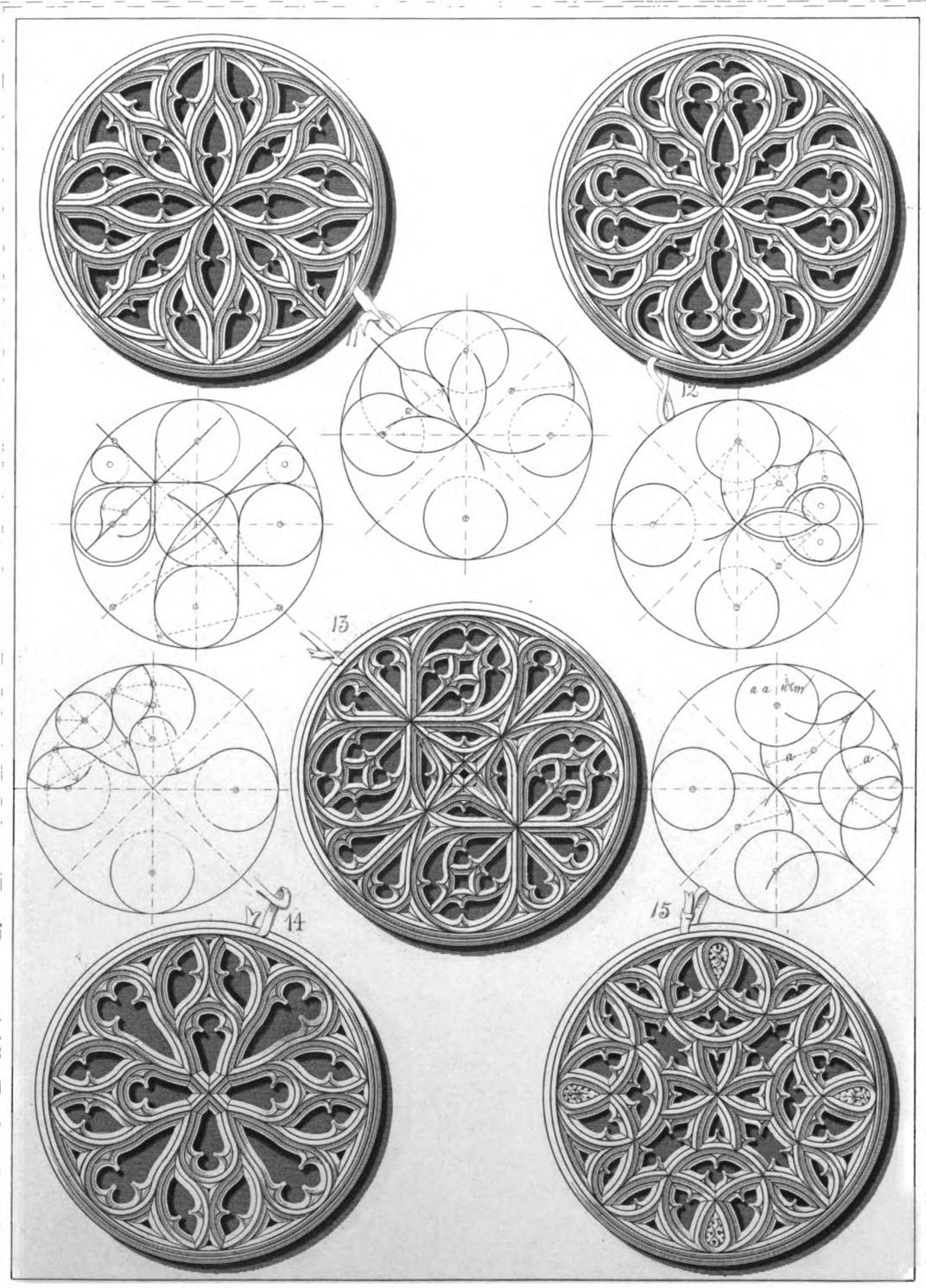
Designed and drawn by J. B. Billings

Engr'd by G. Smith



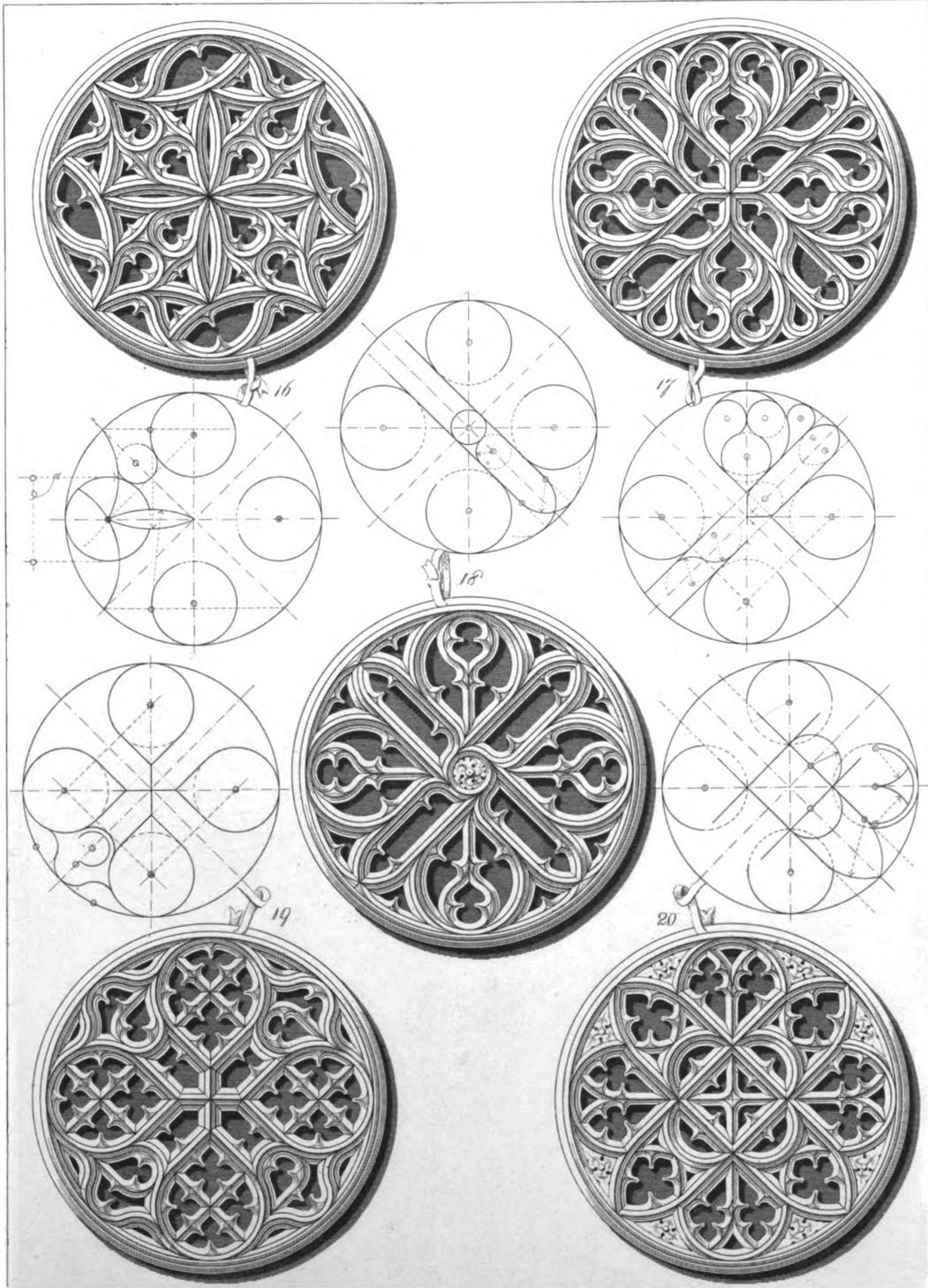
designed and drawn by P.W. Billings

Eng^d by G.J. Smith



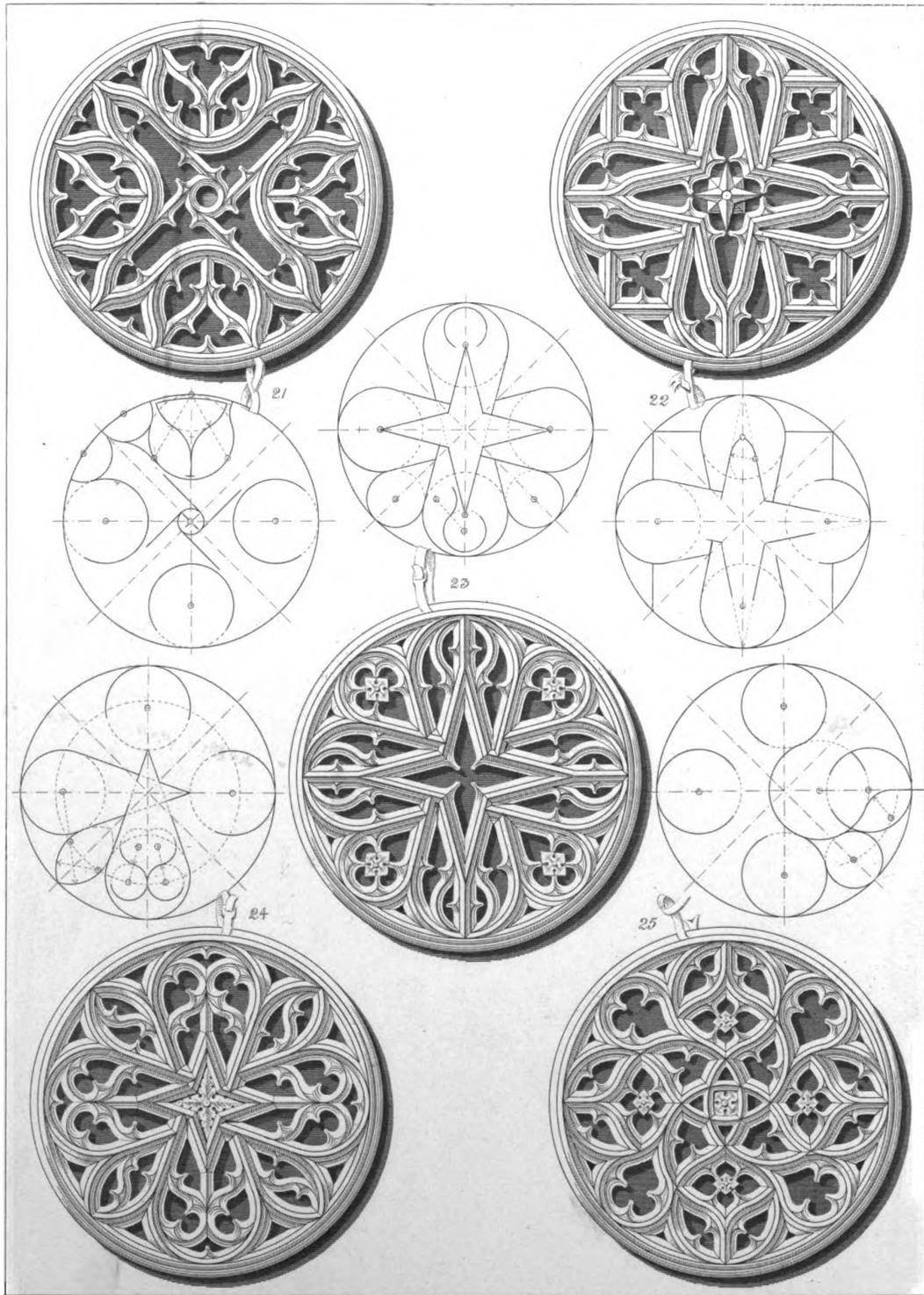
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Engd by G. B. Smith



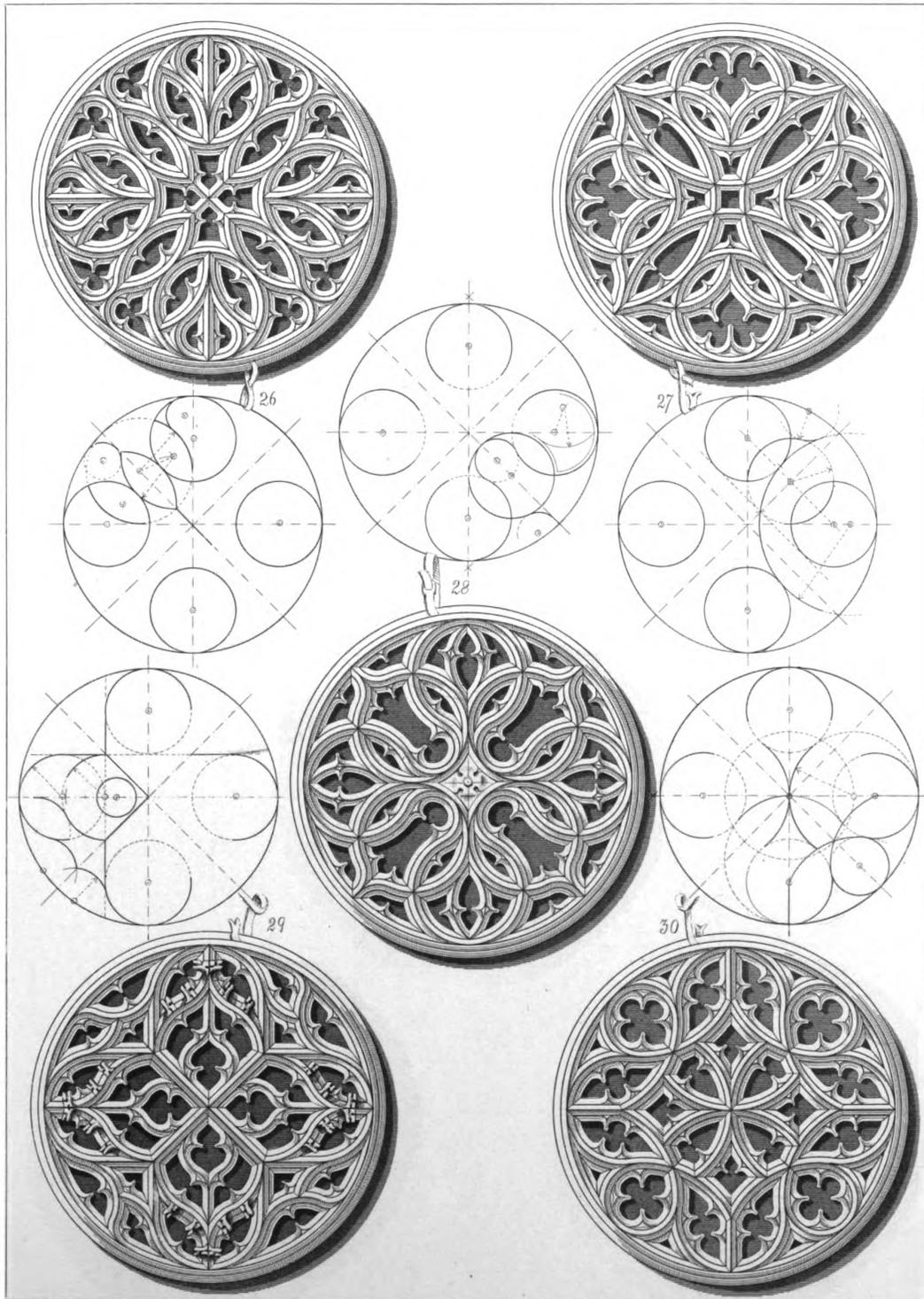
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eng'd by G.R. Smith



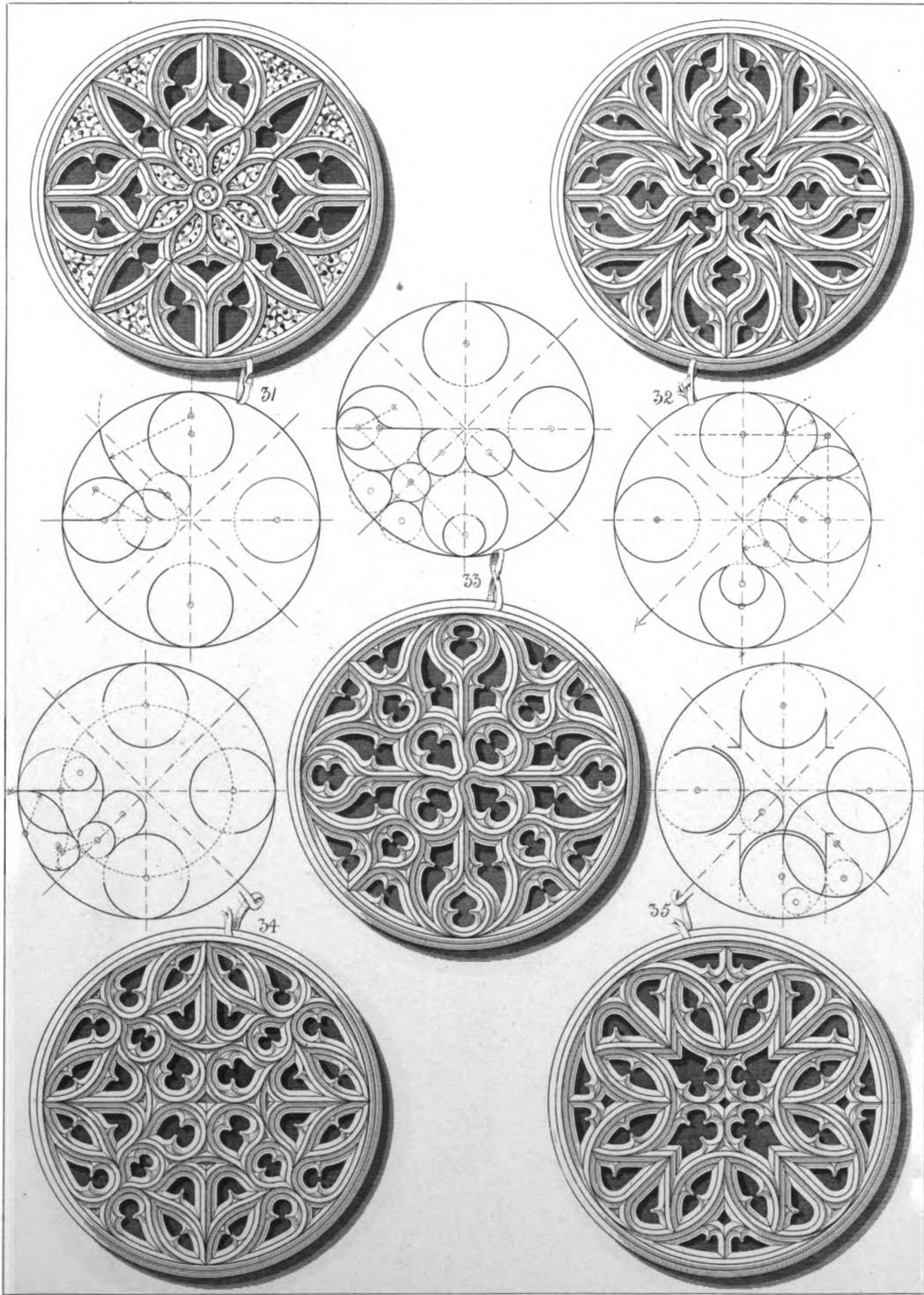
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eng'd by J.S. Smith



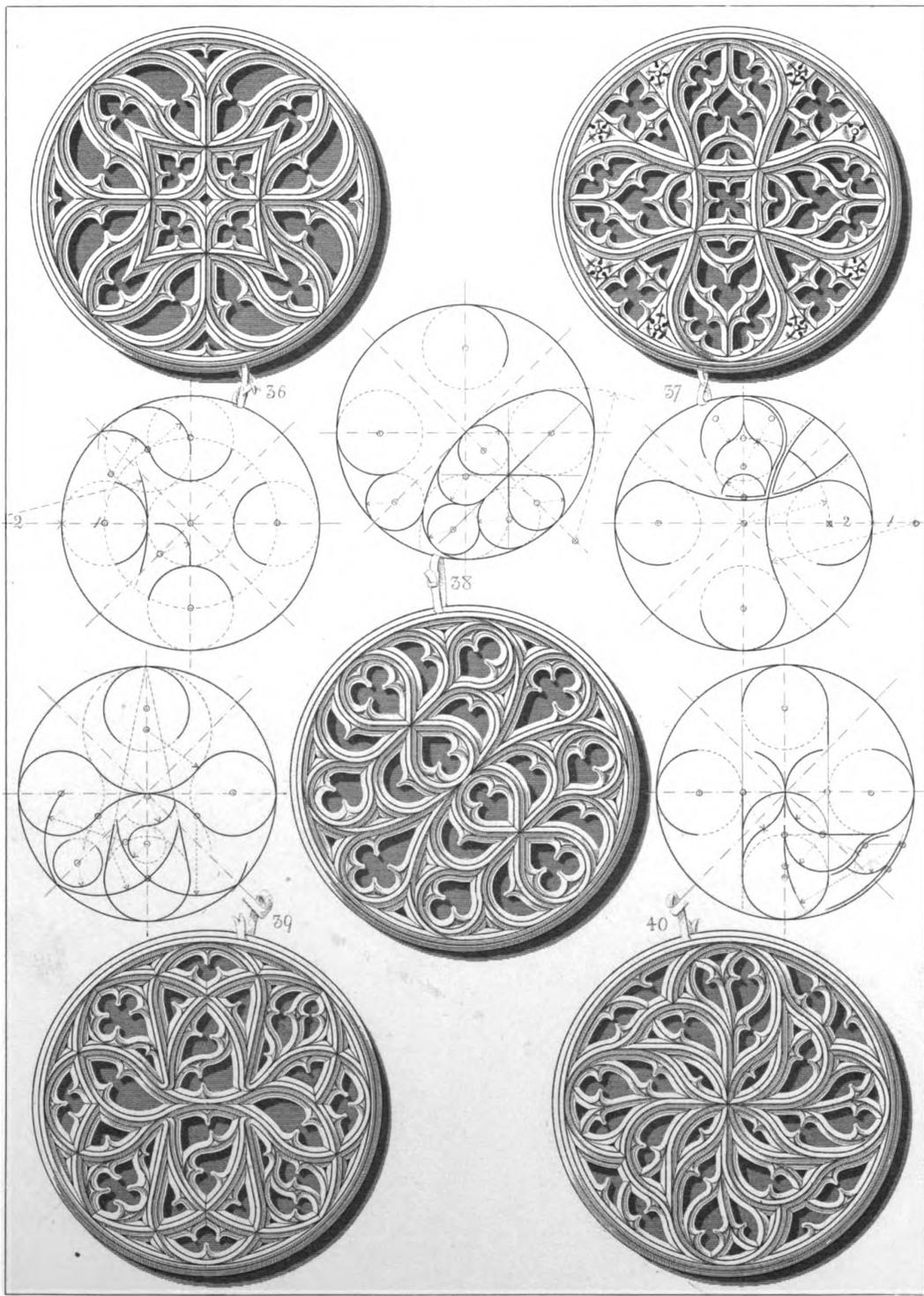
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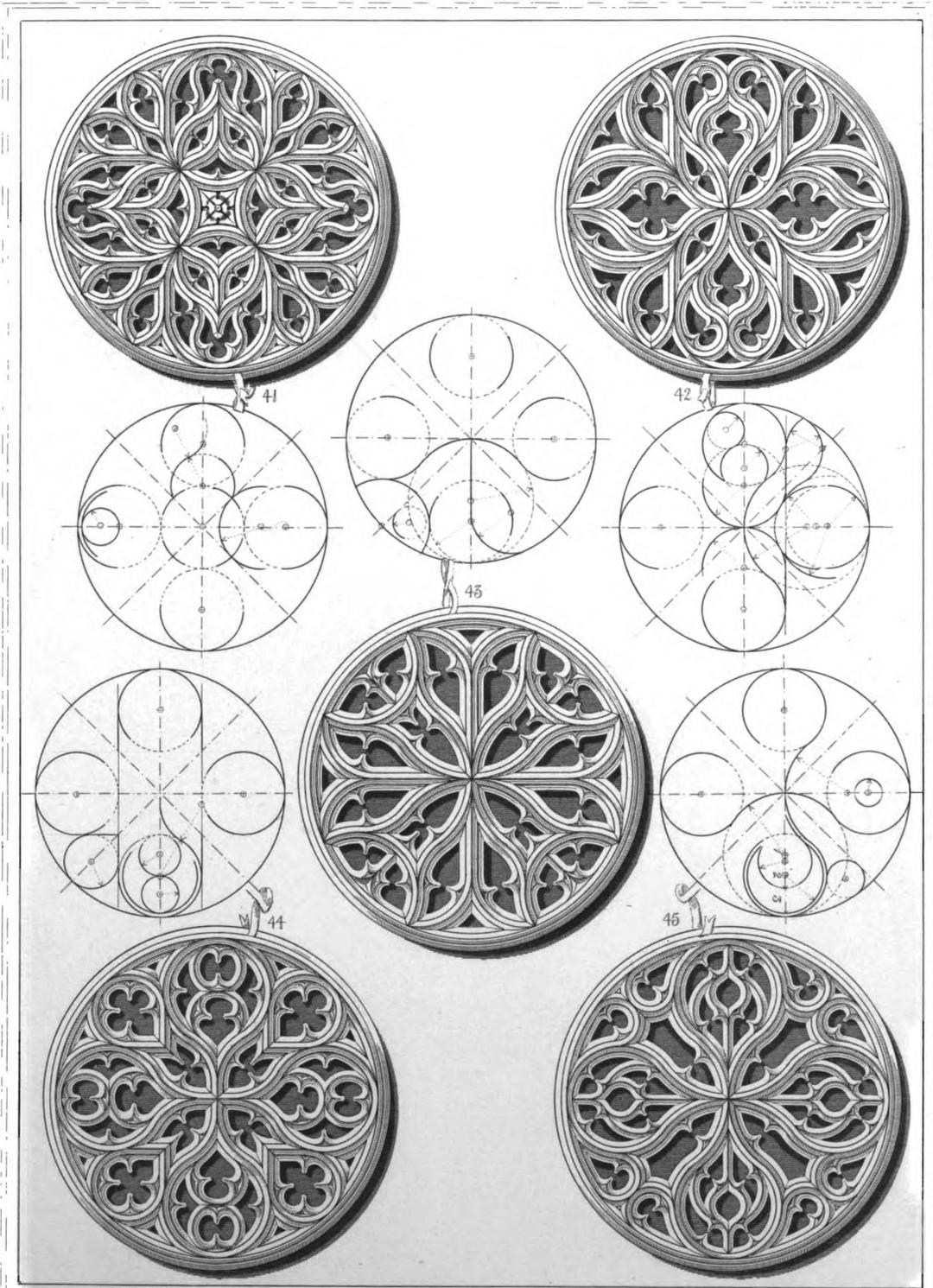


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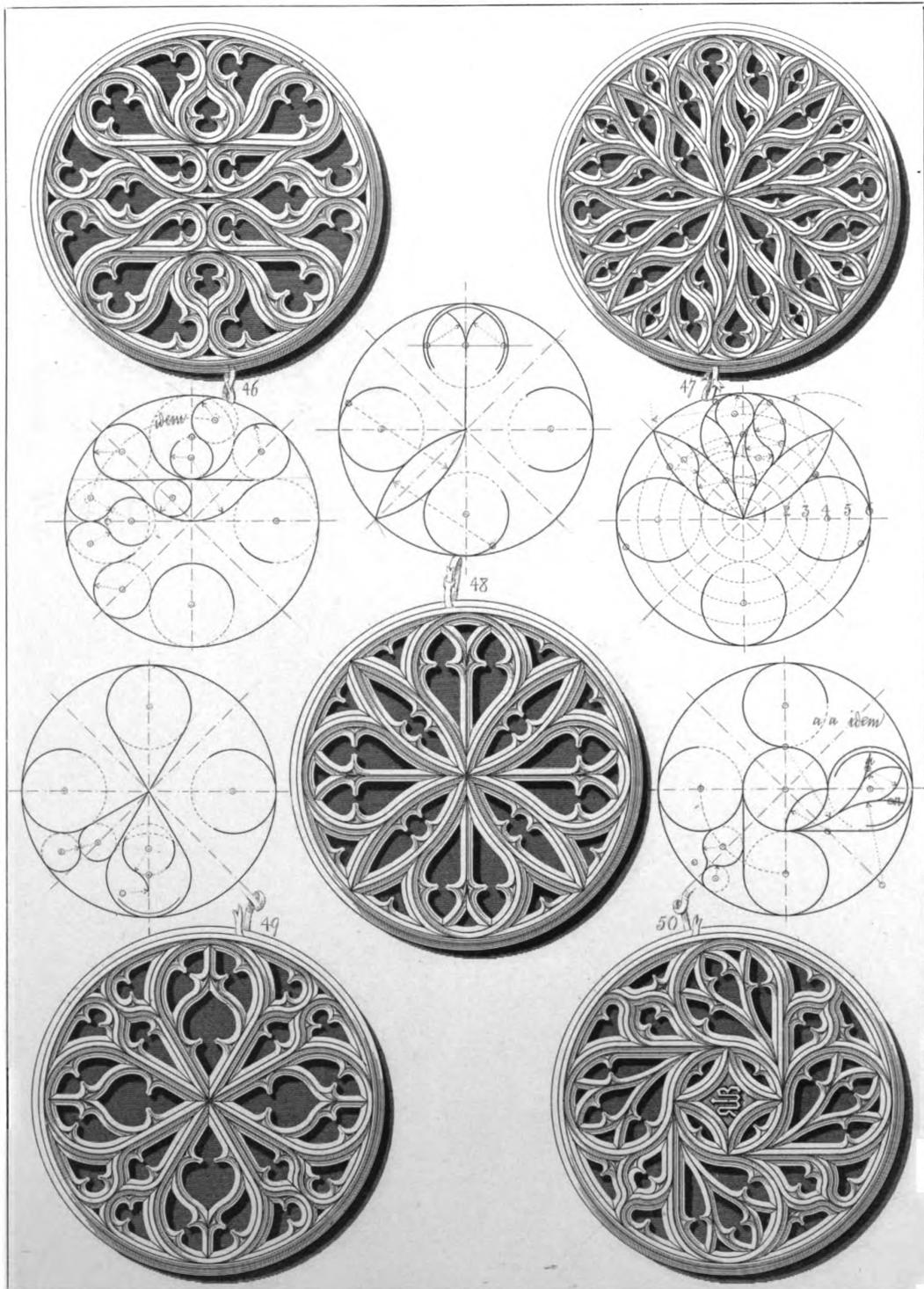


Designed and drawn by R. C. Colburn.



designed and drawn by P.M. Billings

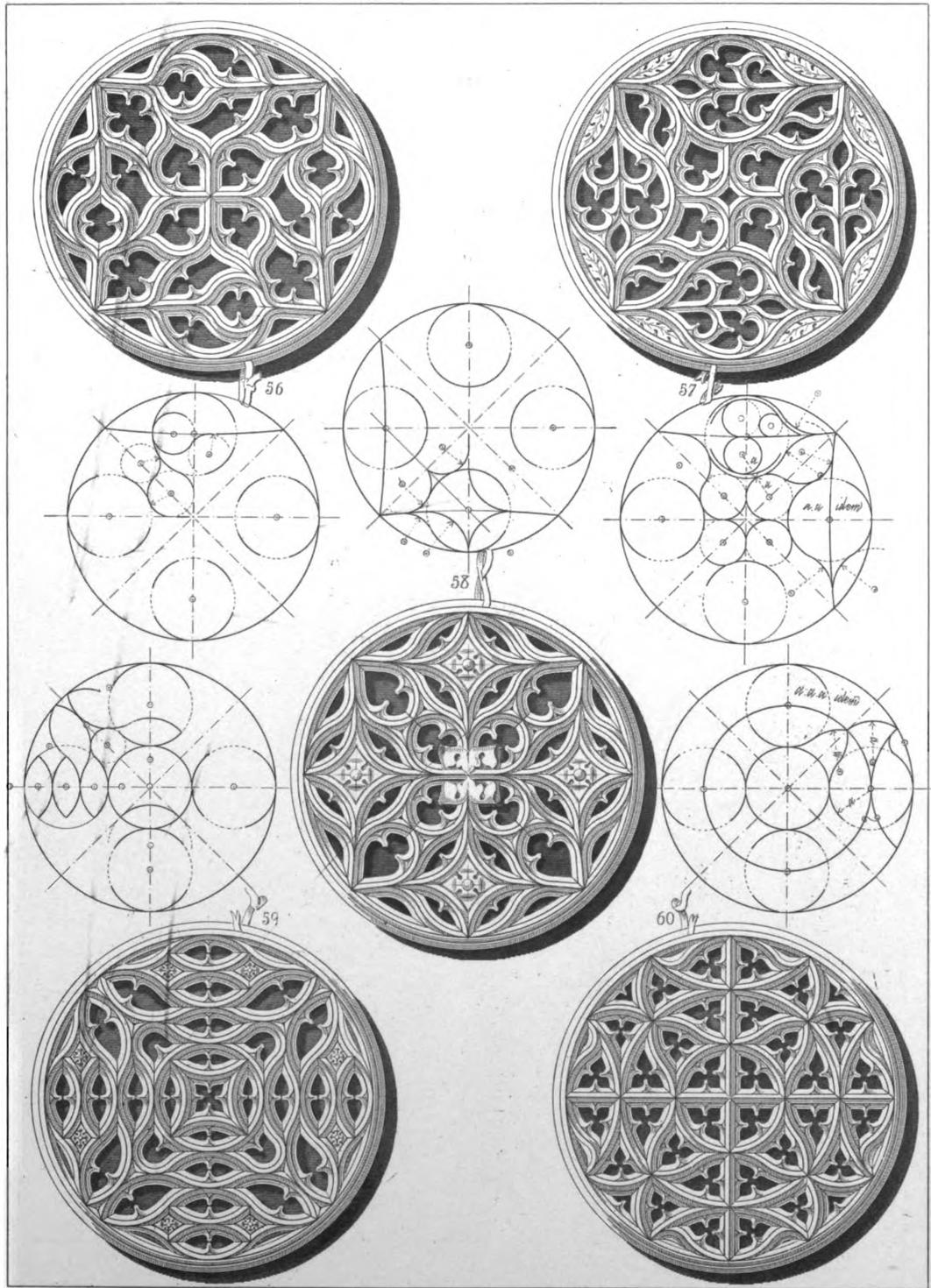
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designed and drawn by R. W. Billings

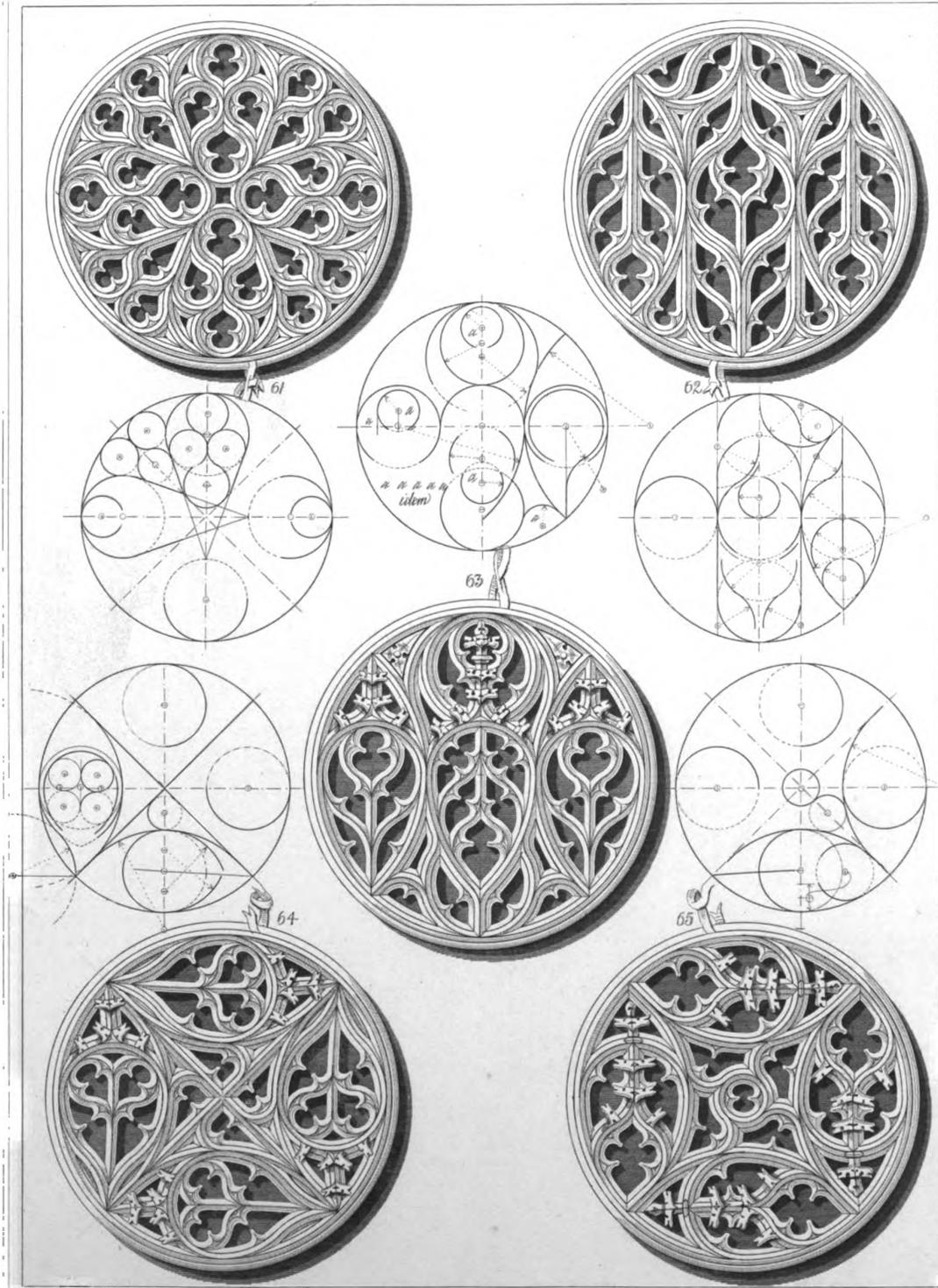
Engr'd by G. R. Smith

Plate 12



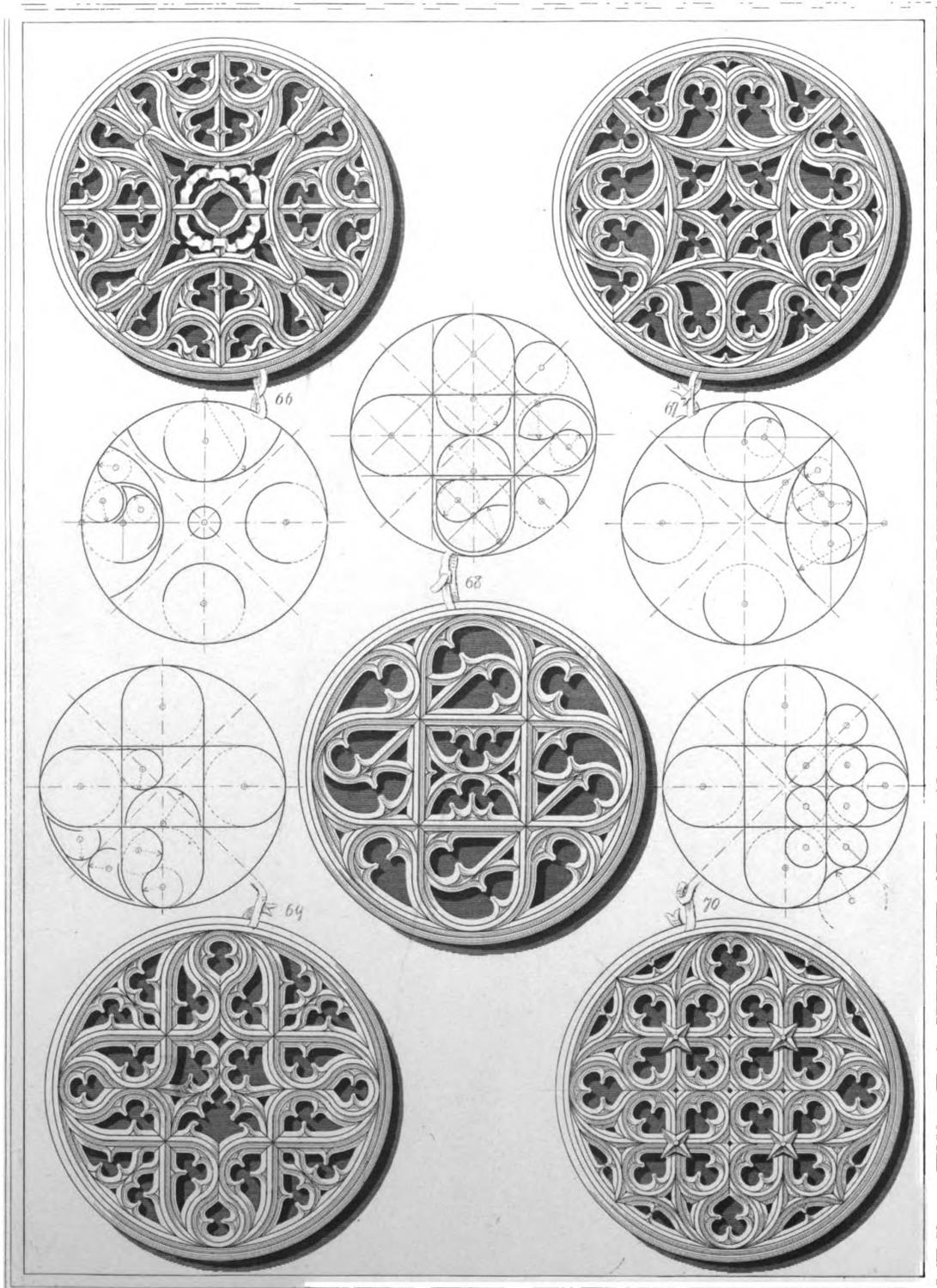
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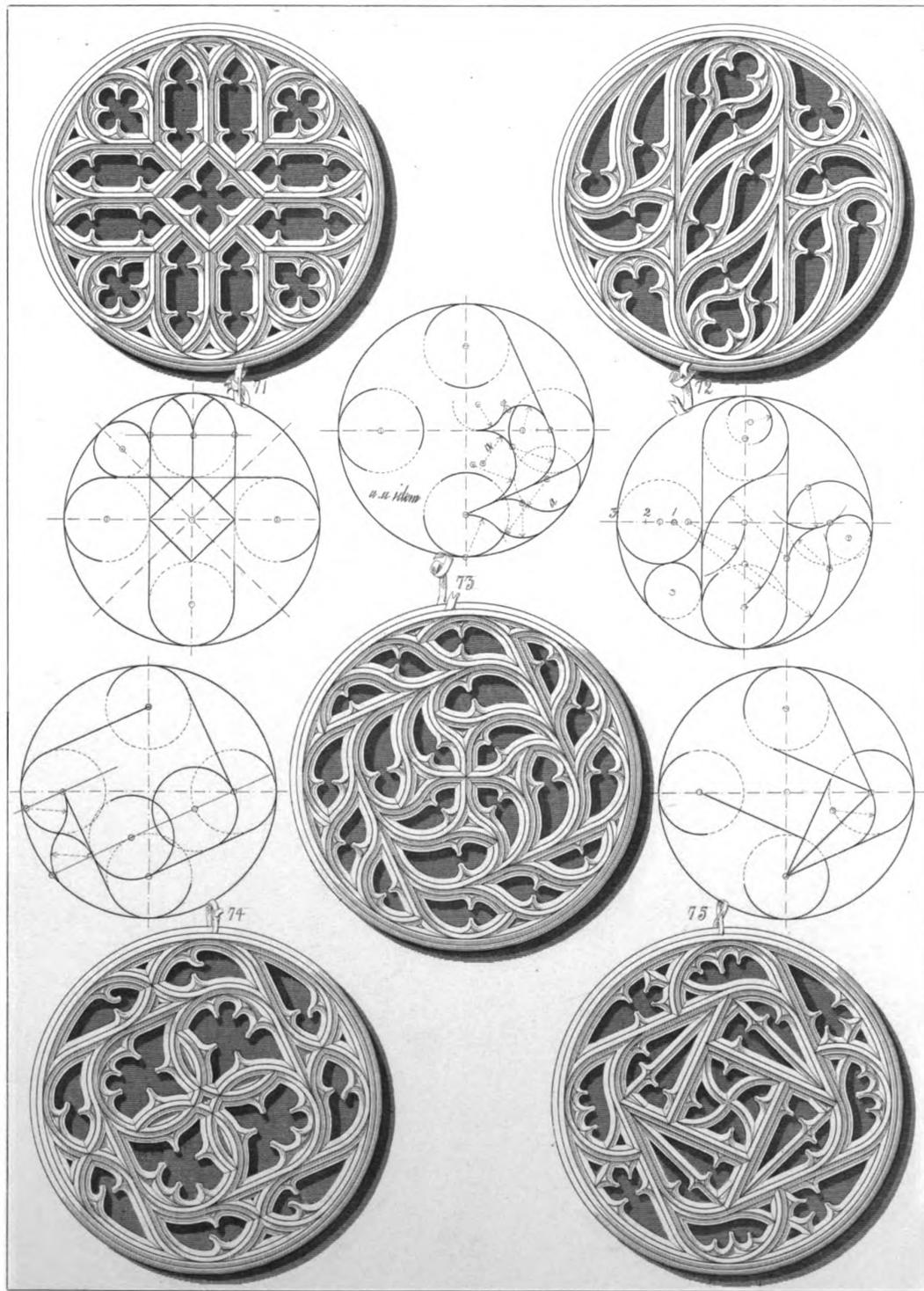
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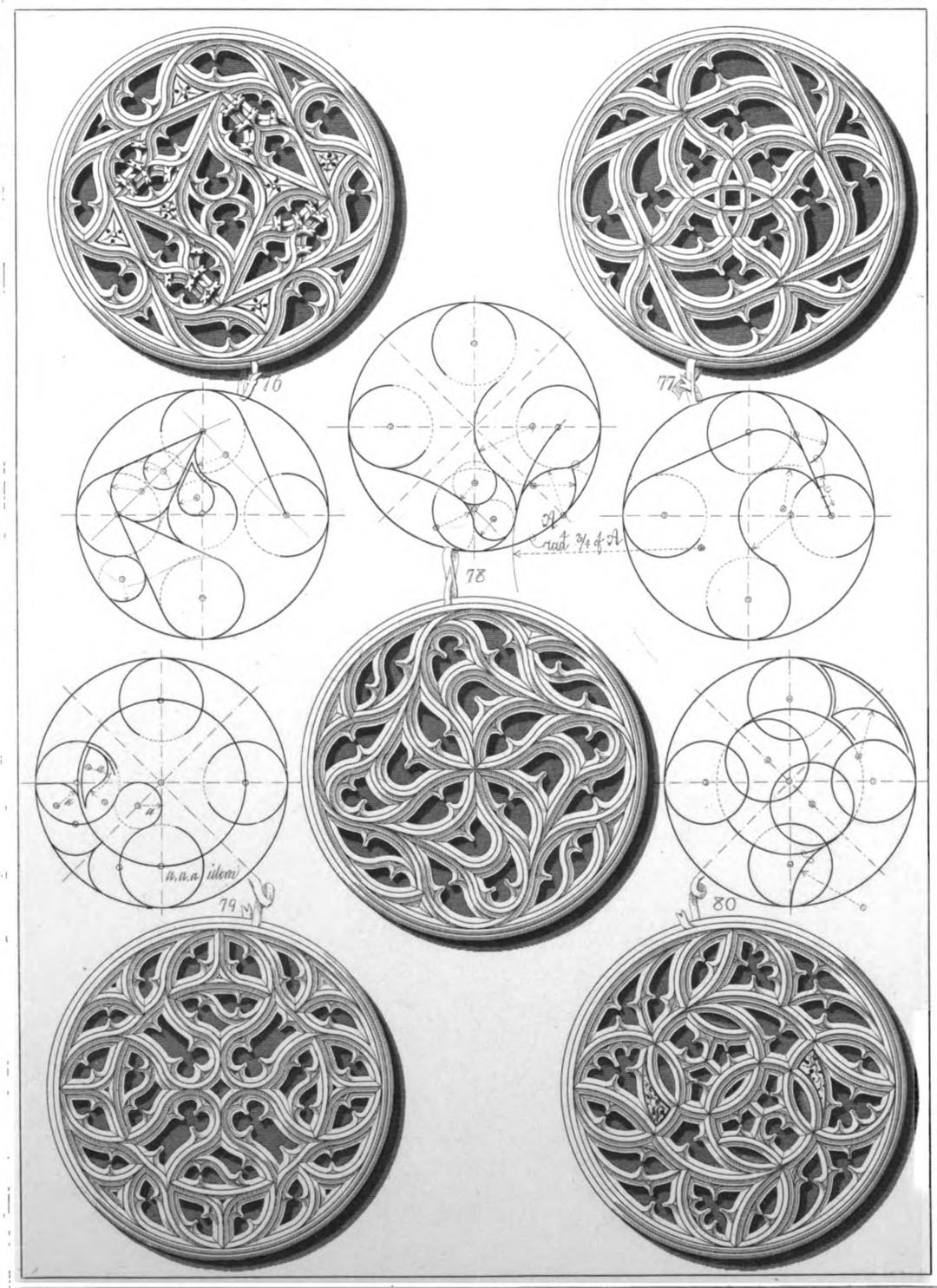
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Engr'd by E.S. Smith



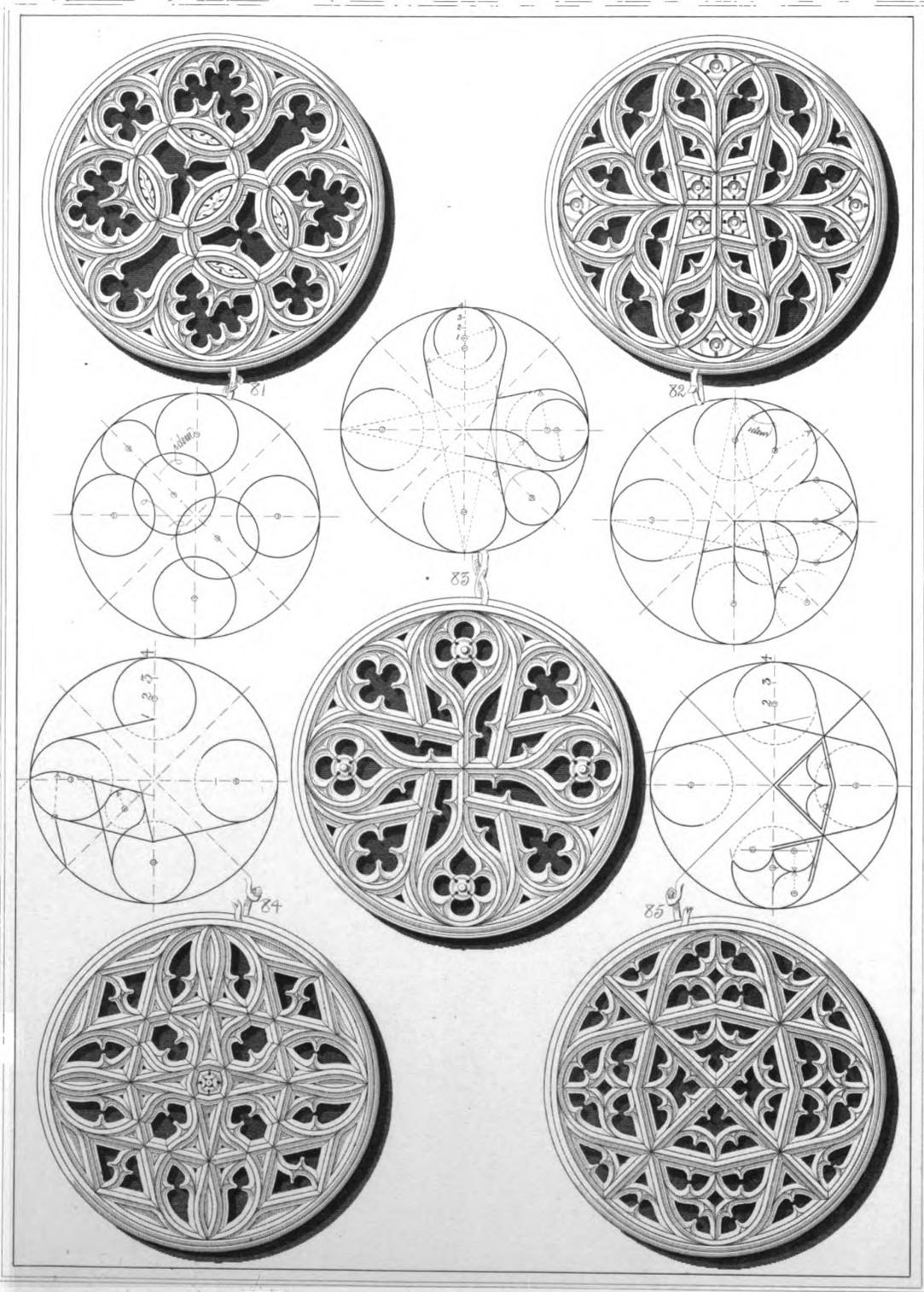
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eng'd by J.S. Smith



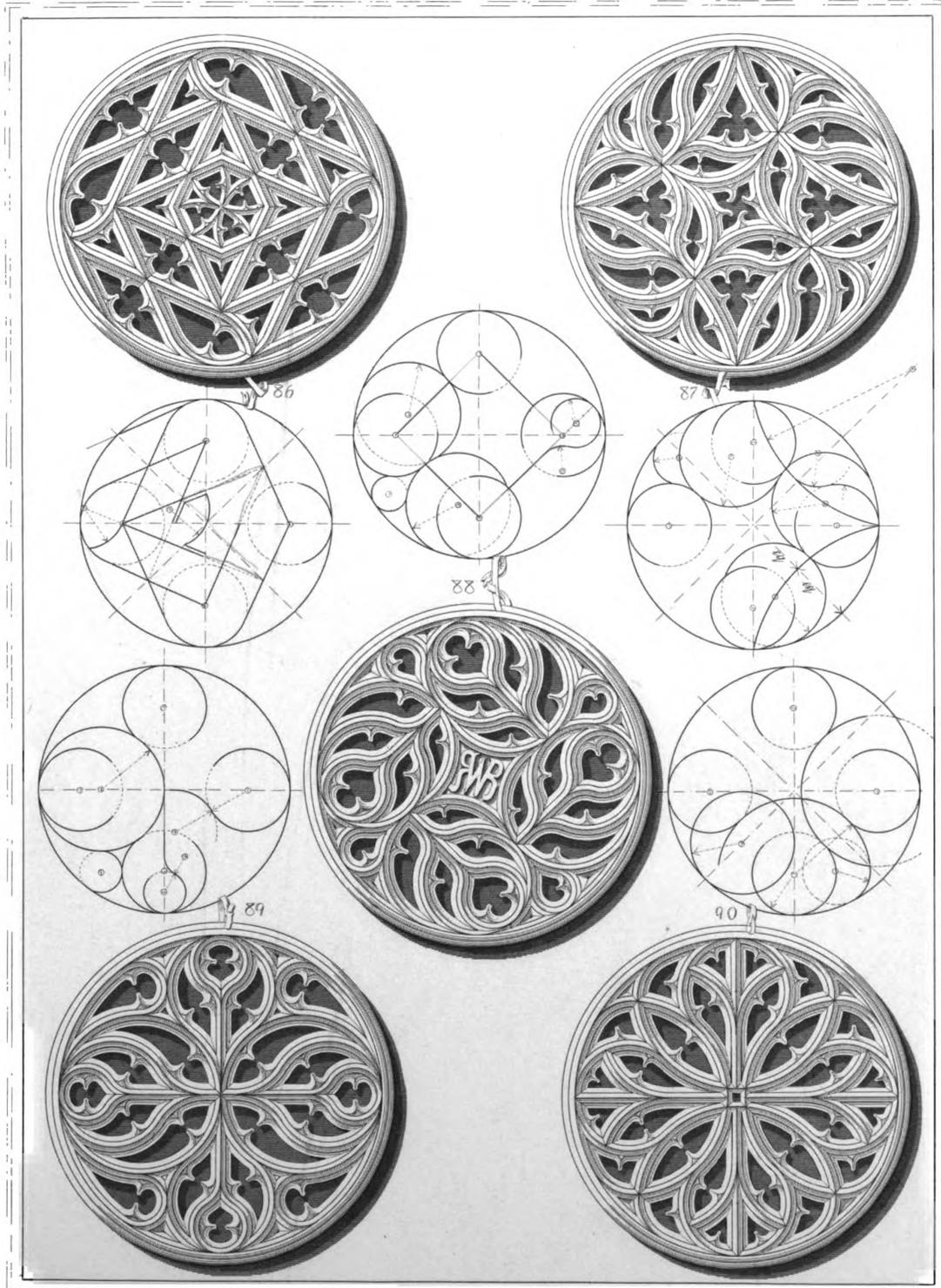
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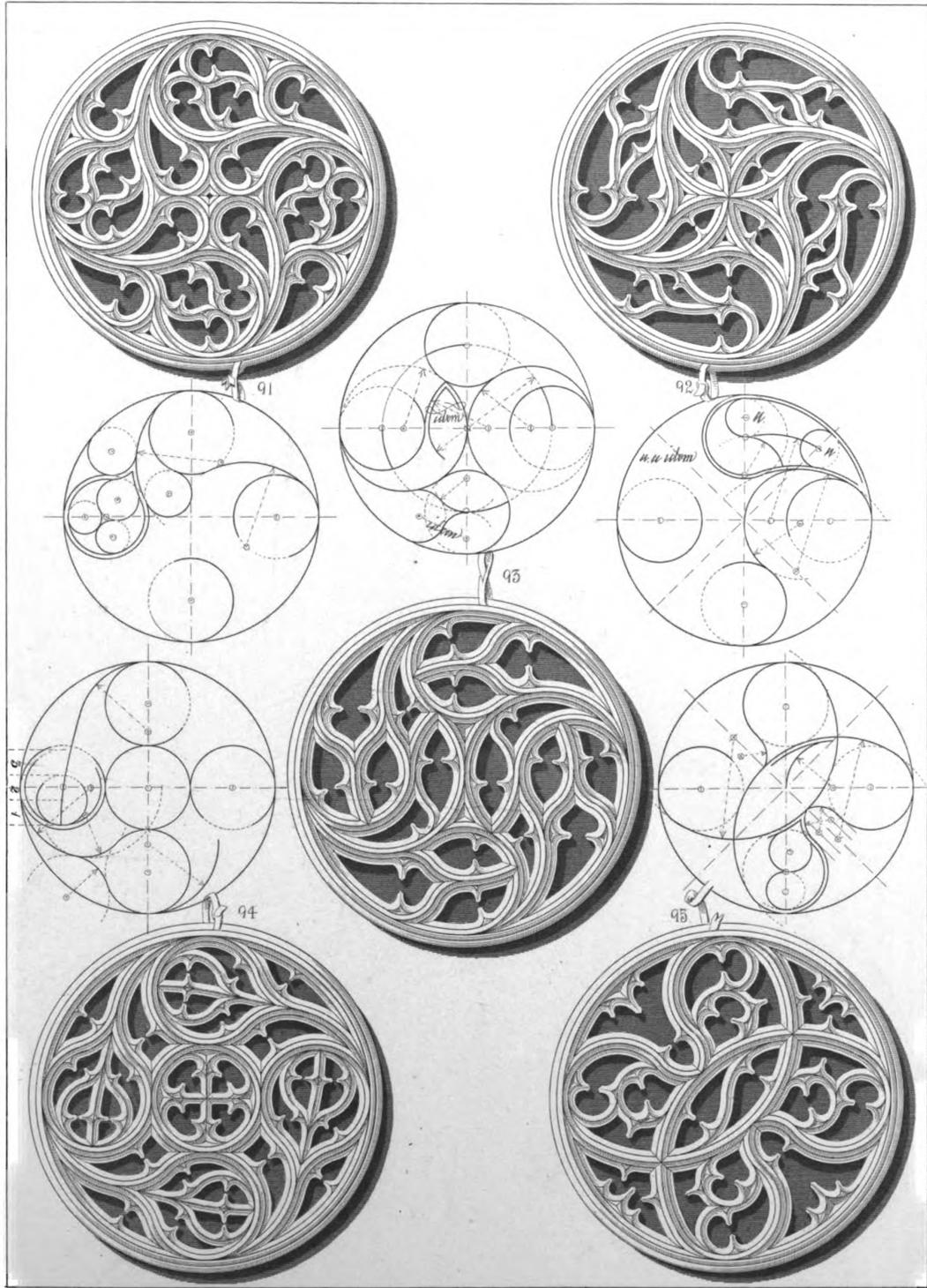
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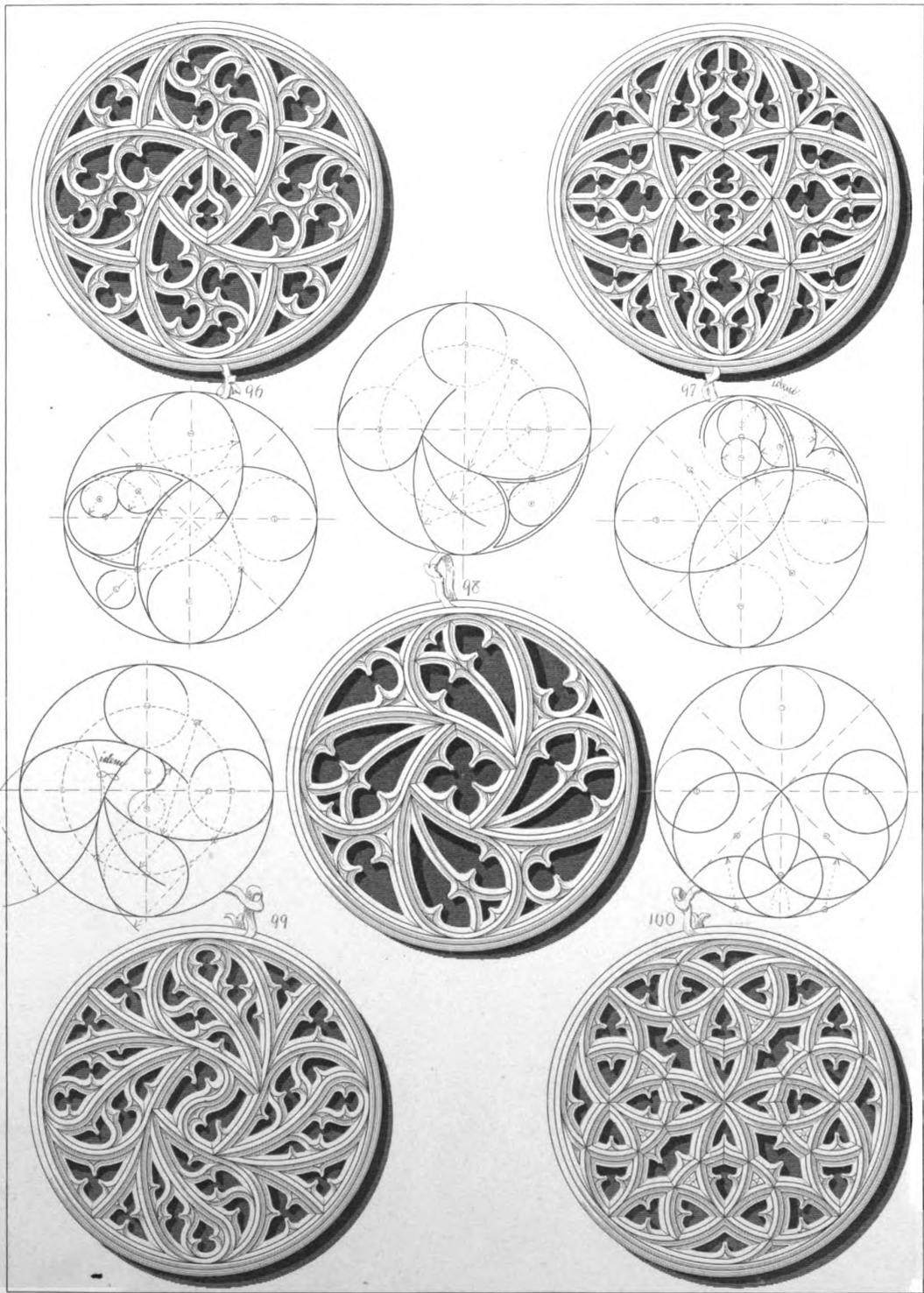
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Engd by LBSmith



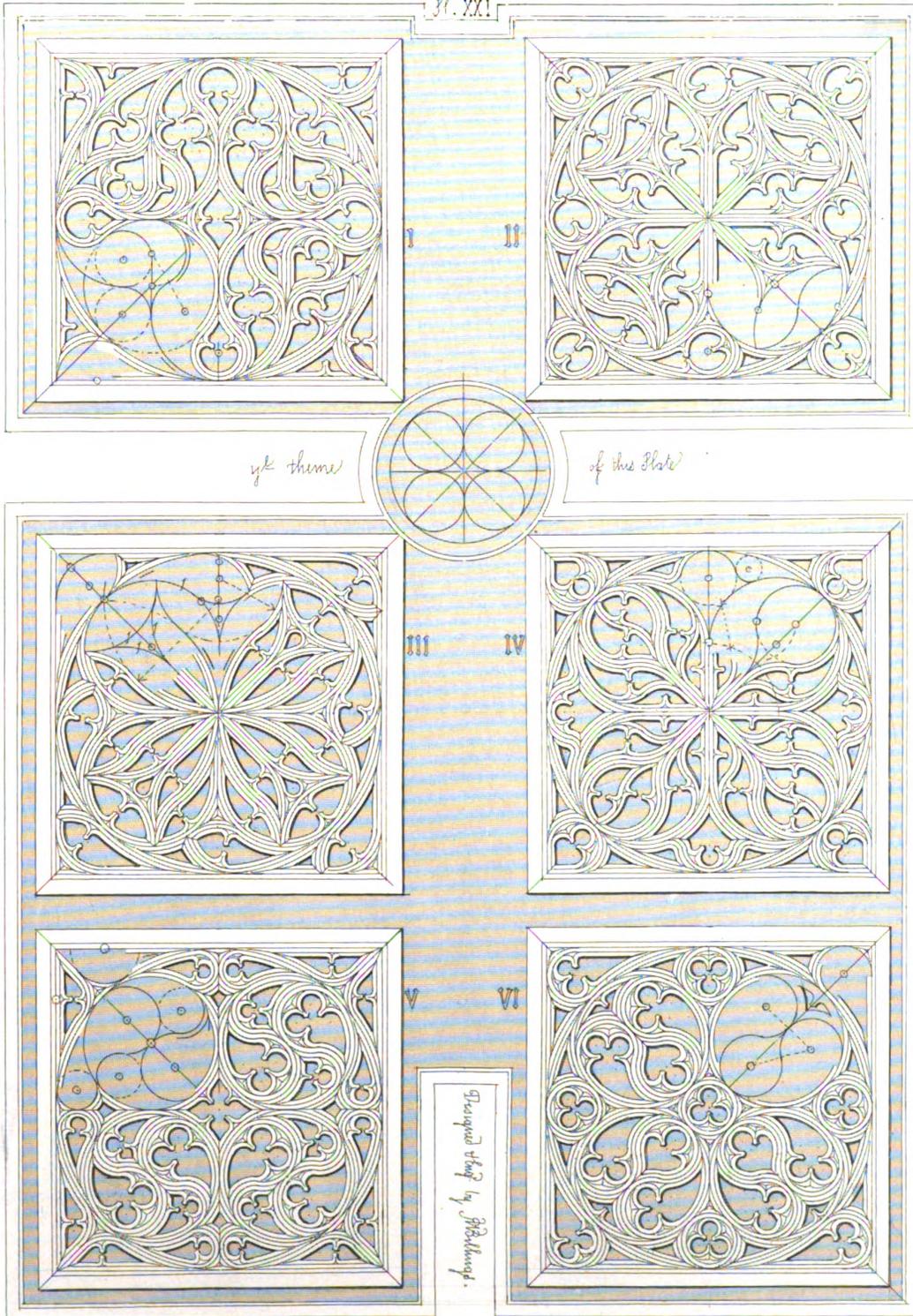
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Engd. by G.B. Smith



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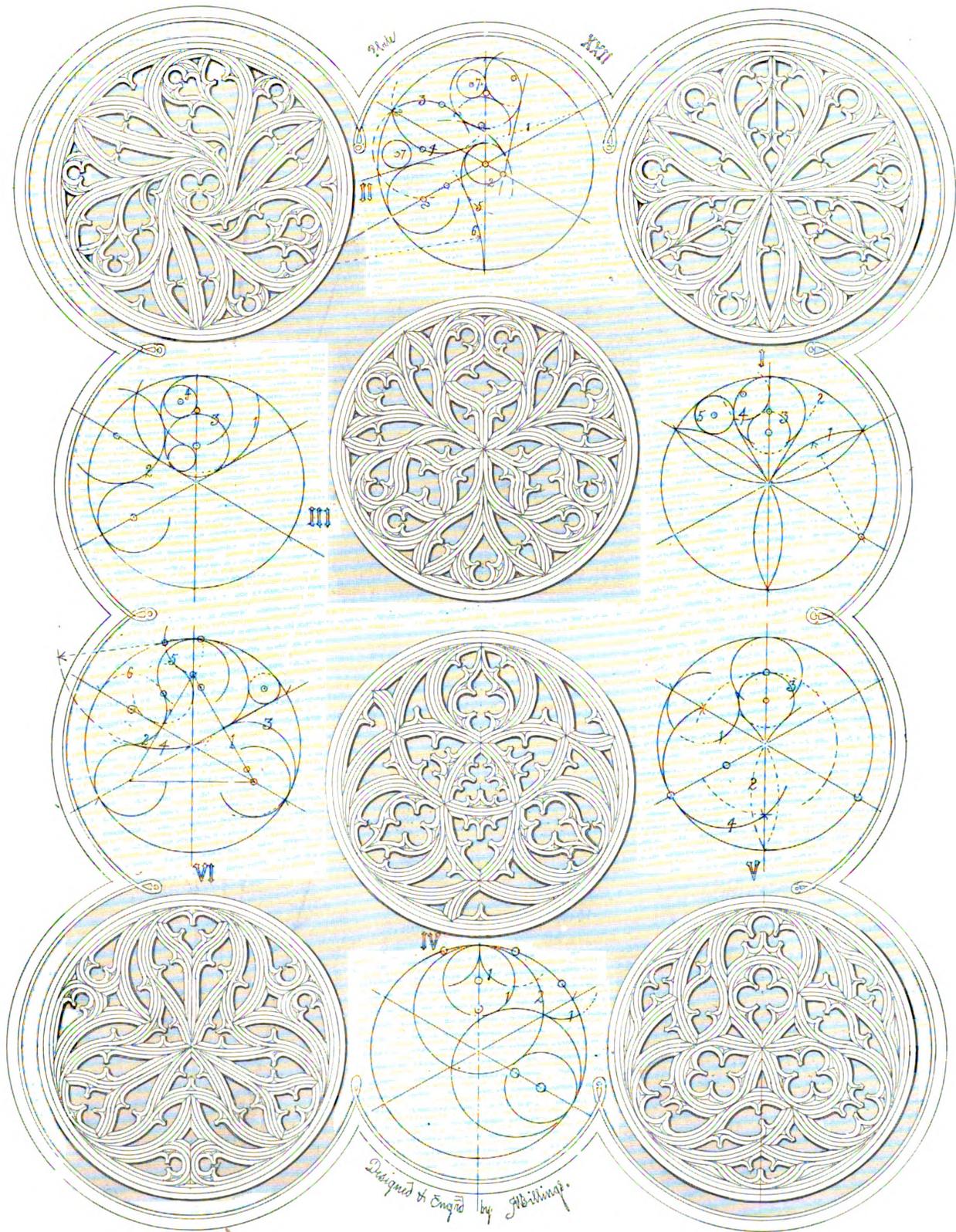
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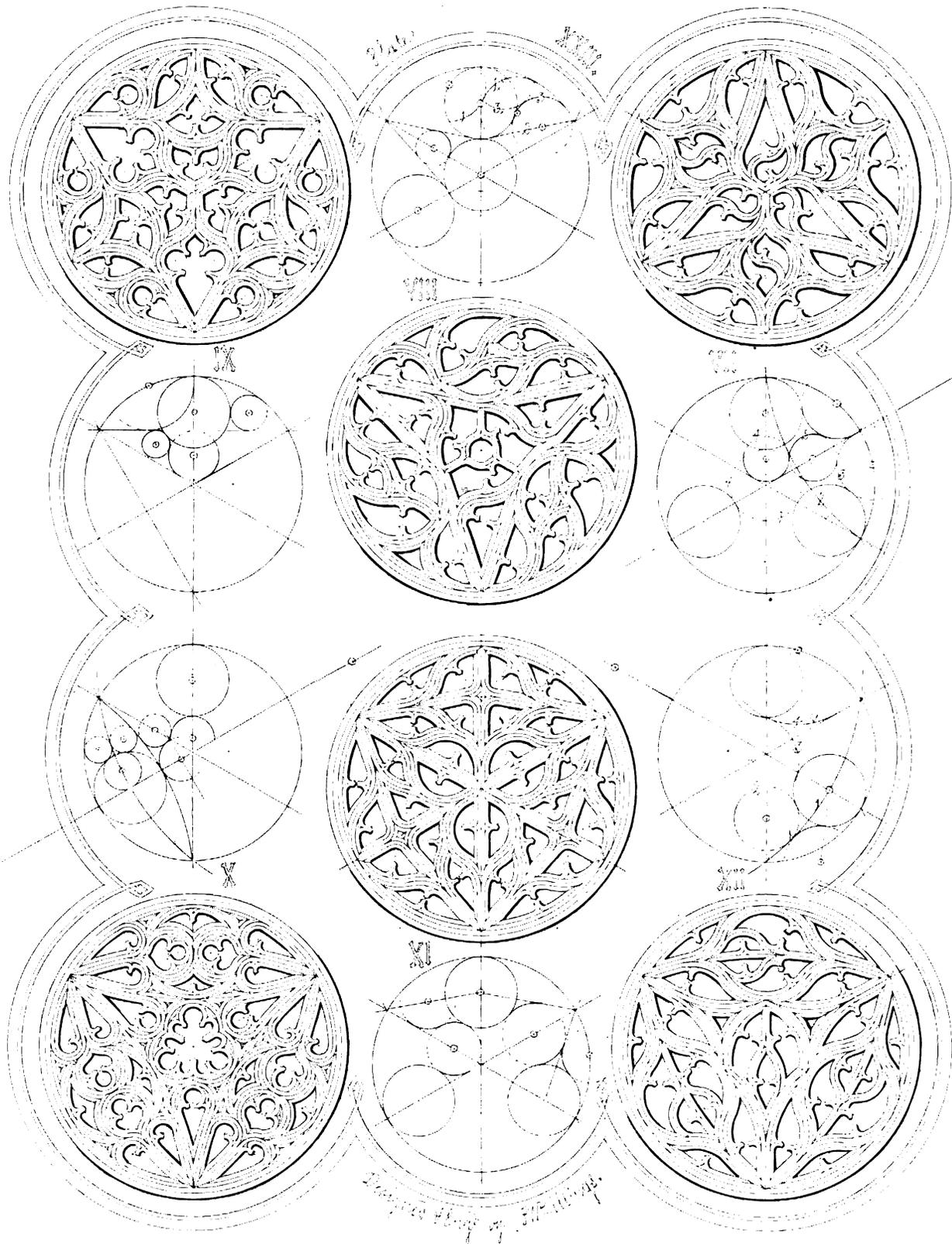
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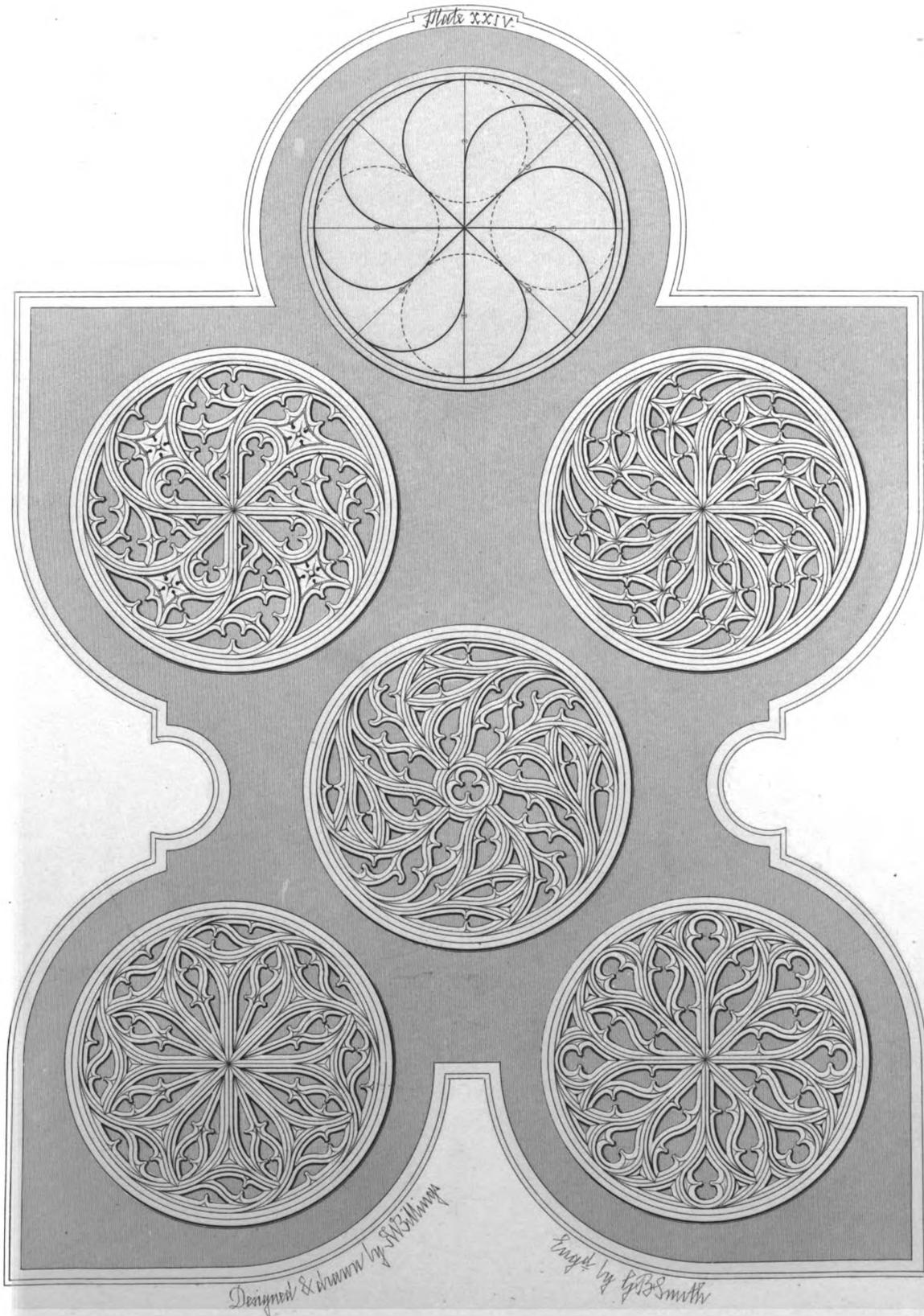
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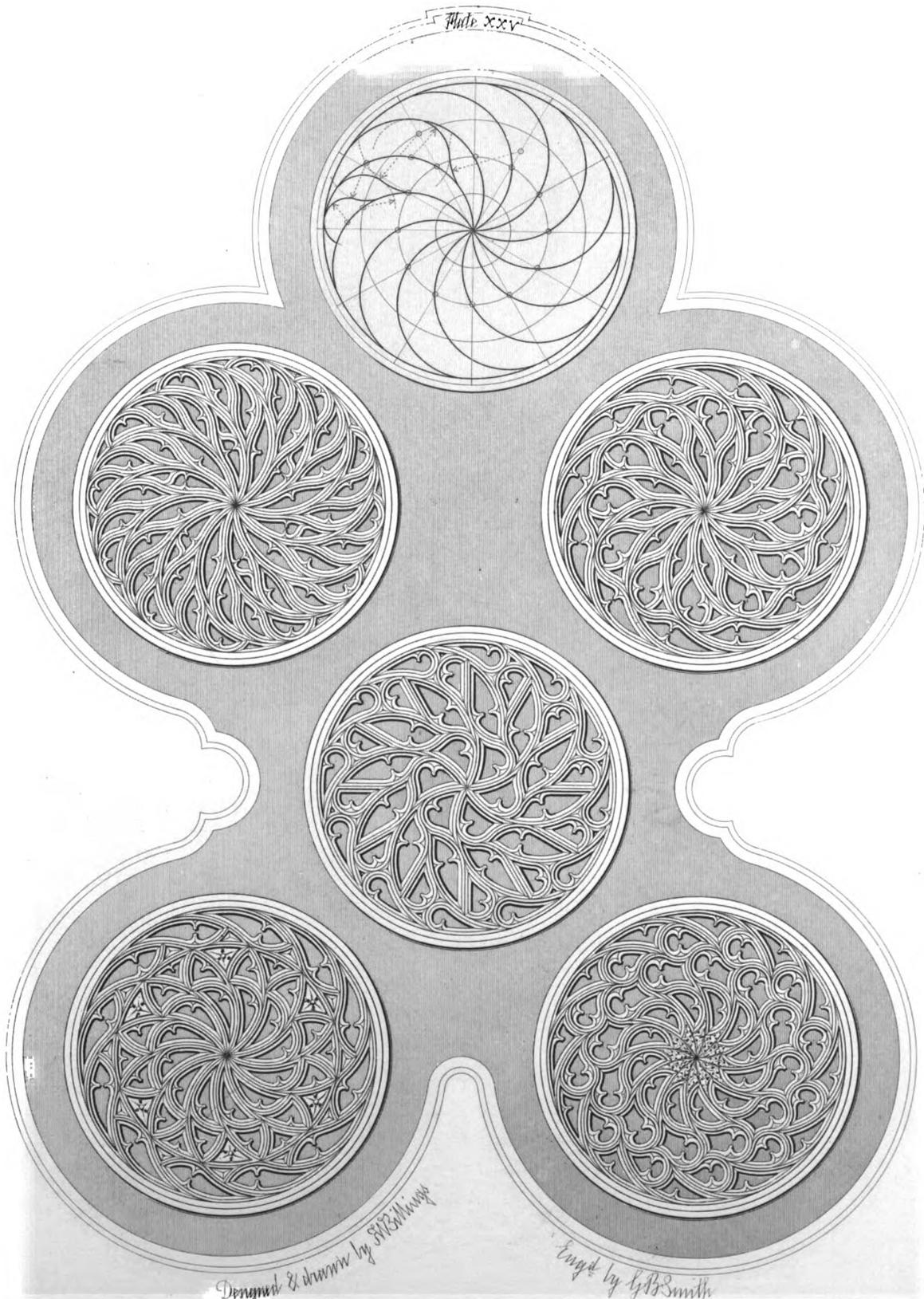
Abhängig von Erythraea



Designed & Engr'd by H. Billings.

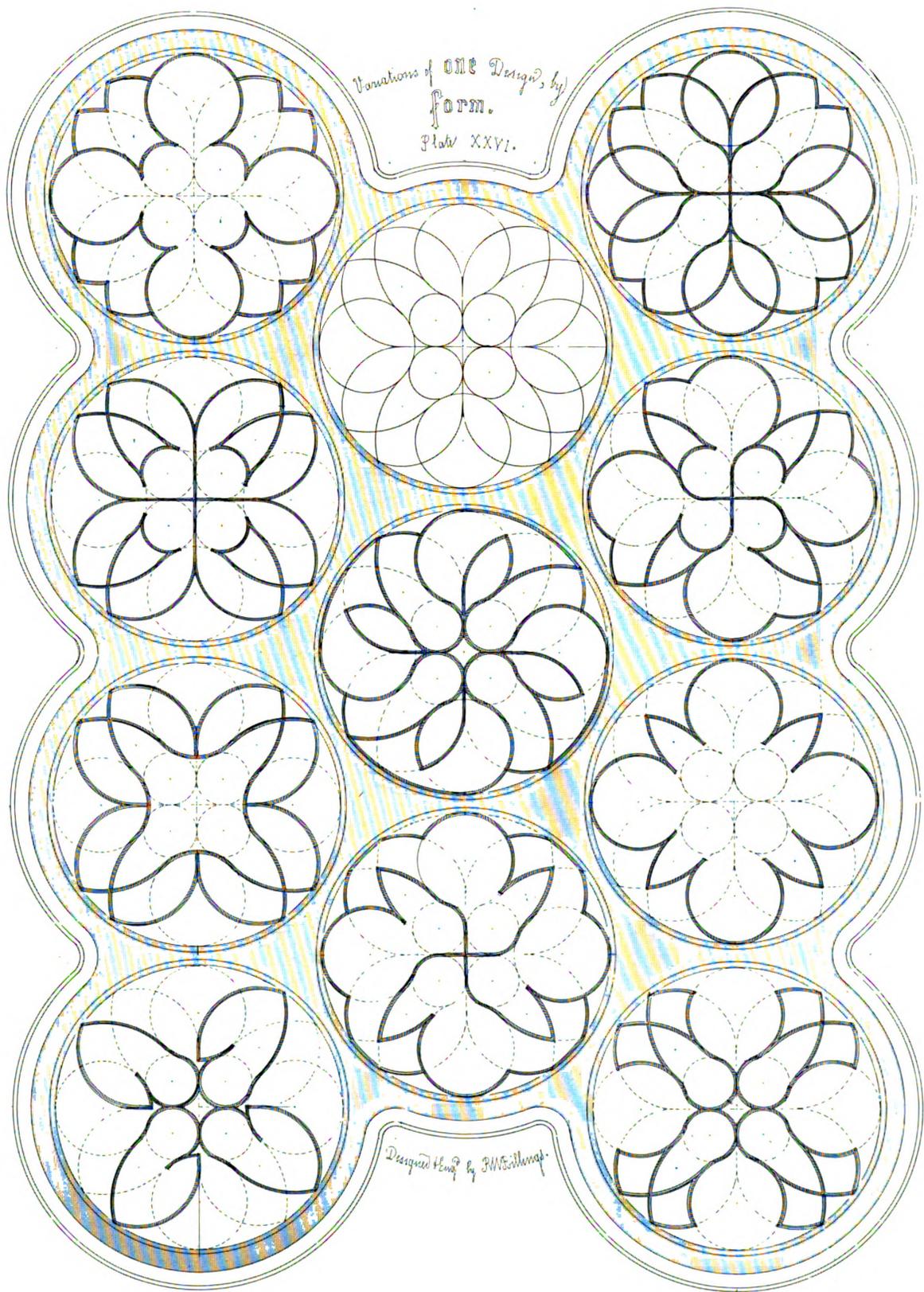


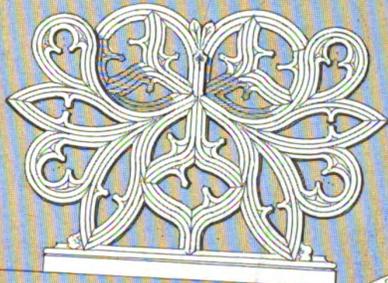




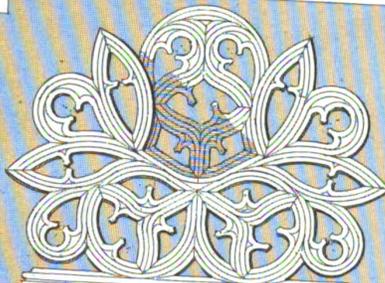
Designed & drawn by S. B. M. M. M.

Engd by L. B. Smith

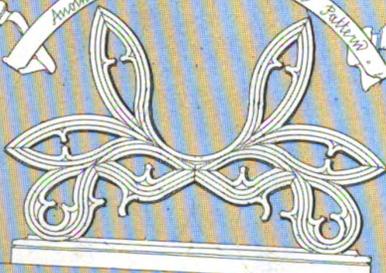




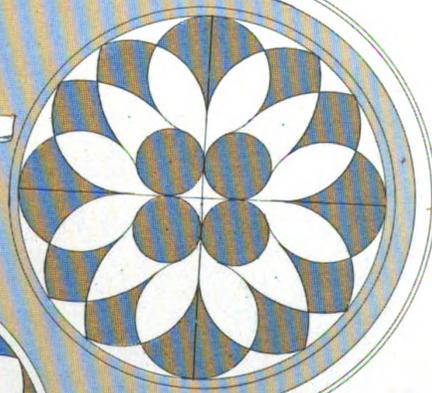
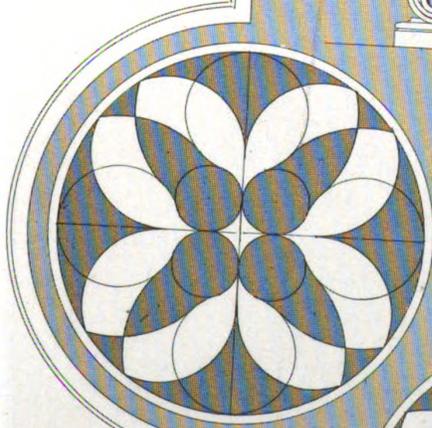
A Seat. Traced from No 3 on Pl. 22.



A third Seat, from the same.



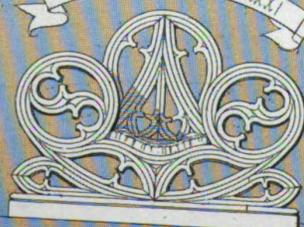
Changes by Colour. See Pl. 26



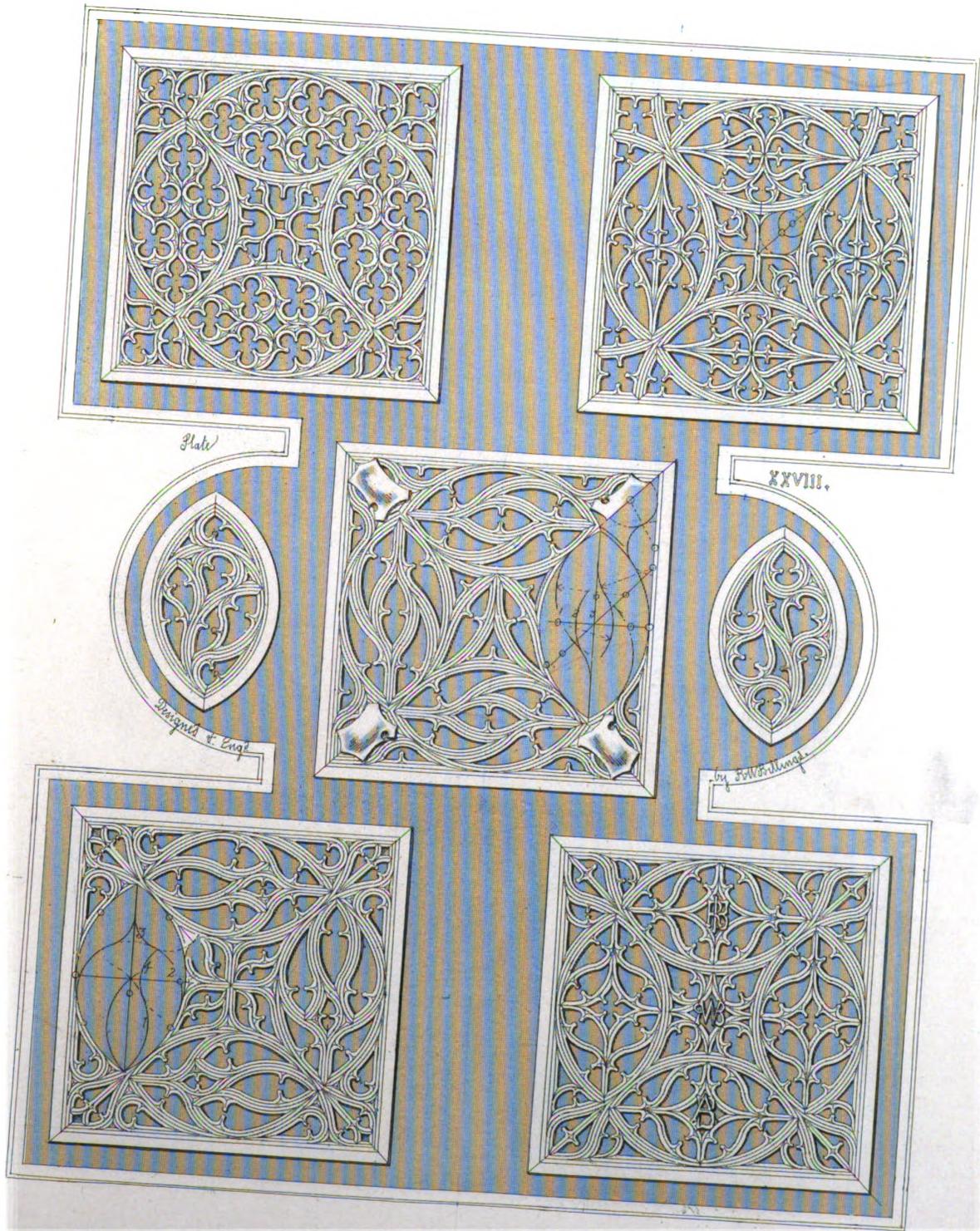
A tracing from Pl. XXXI

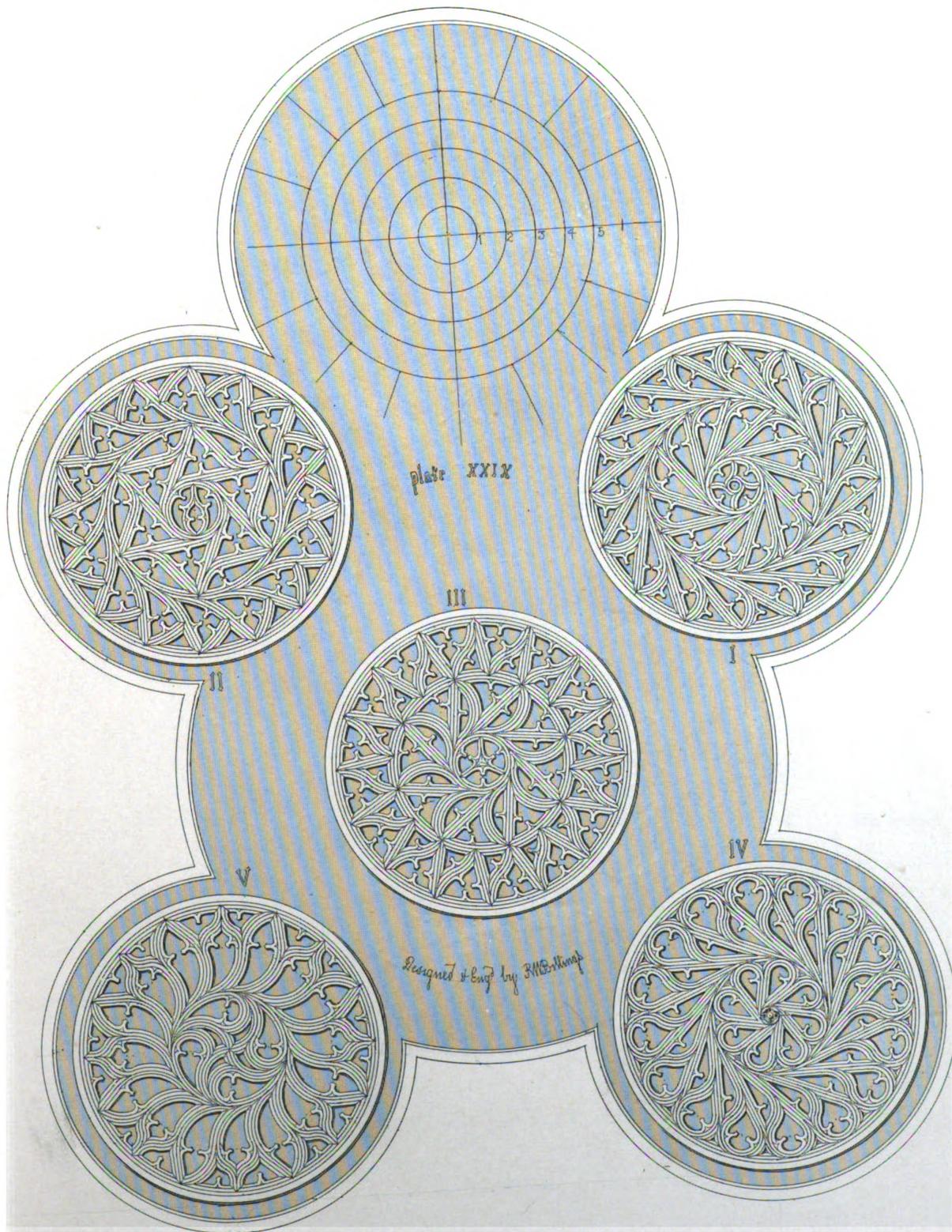


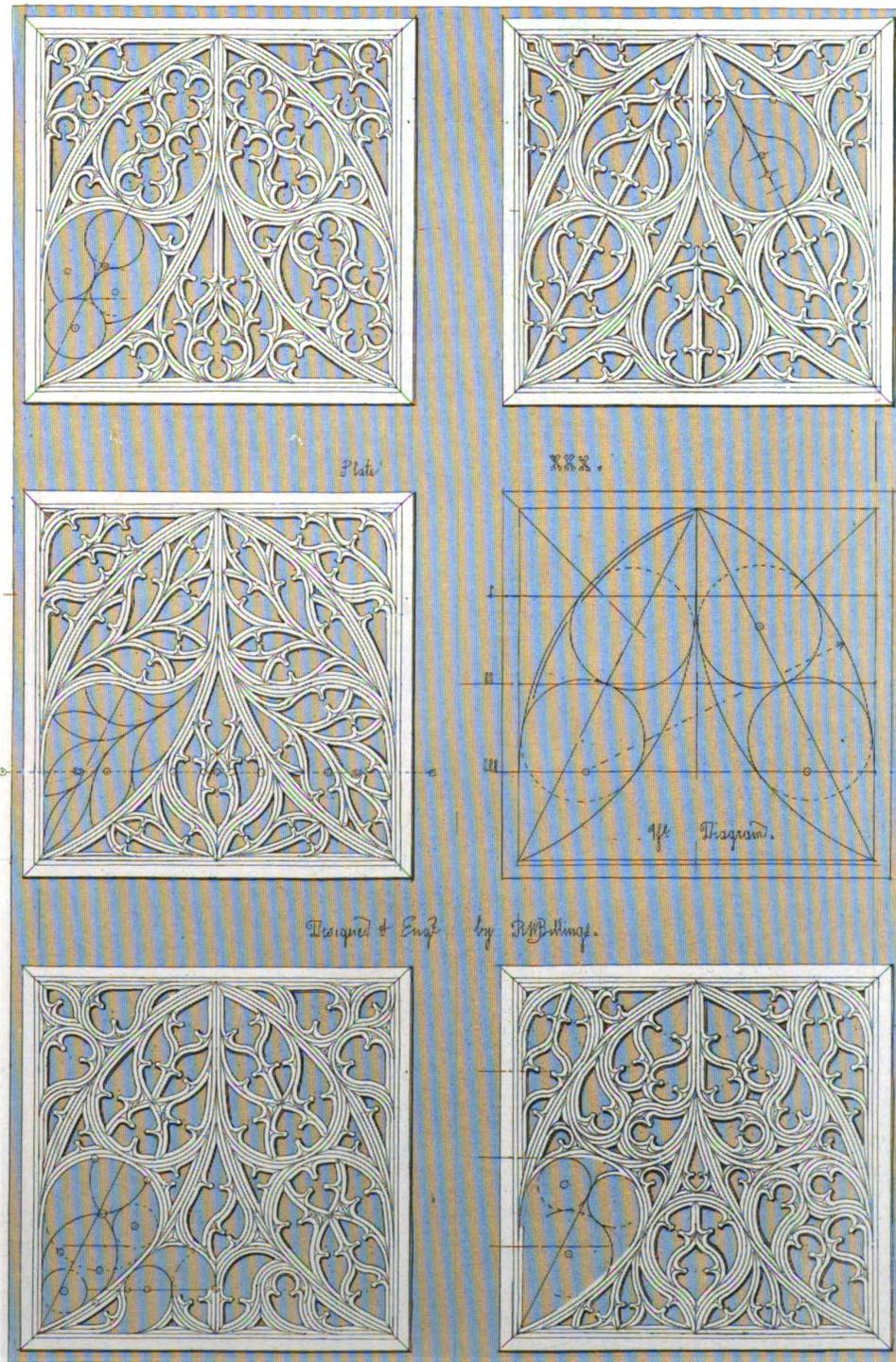
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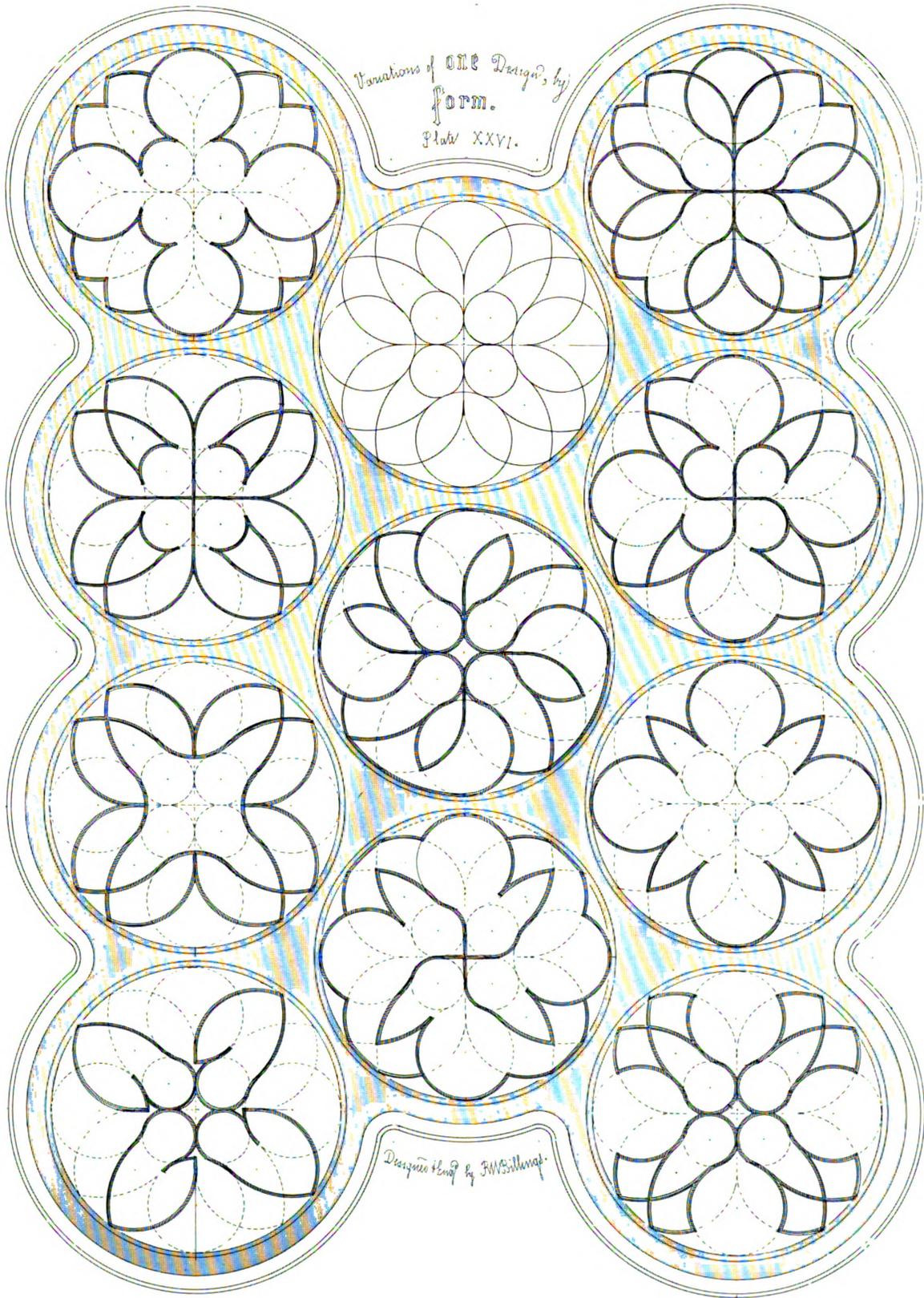
Designed & Engd by M. Billings.





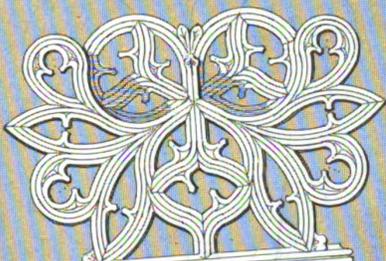


Variations of ONE Design, by
form.
Plate XXVI.



Designed and by J.W.S. Millar.

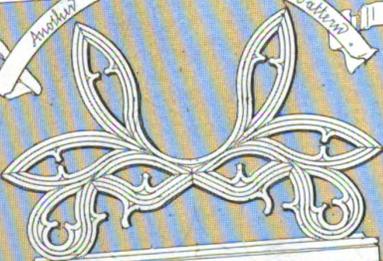
Pl. XXVII



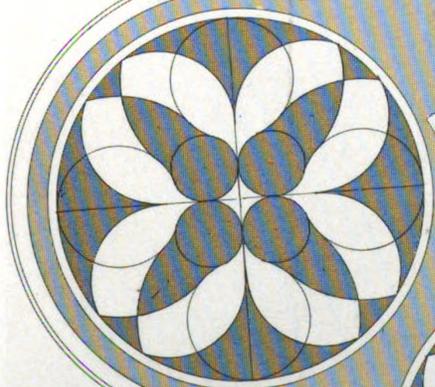
A Scroll. Traced from No. 3 on Pl. 22.



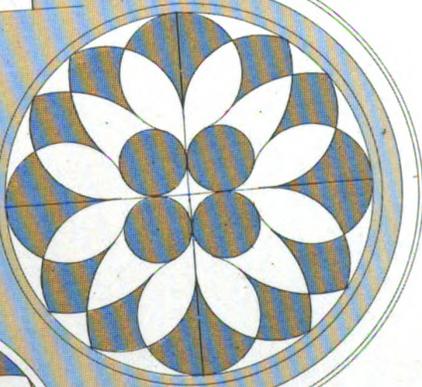
A third Scroll, from the same.



Another Scroll, from the same pattern.



Changes by Colour. See Pl. 26



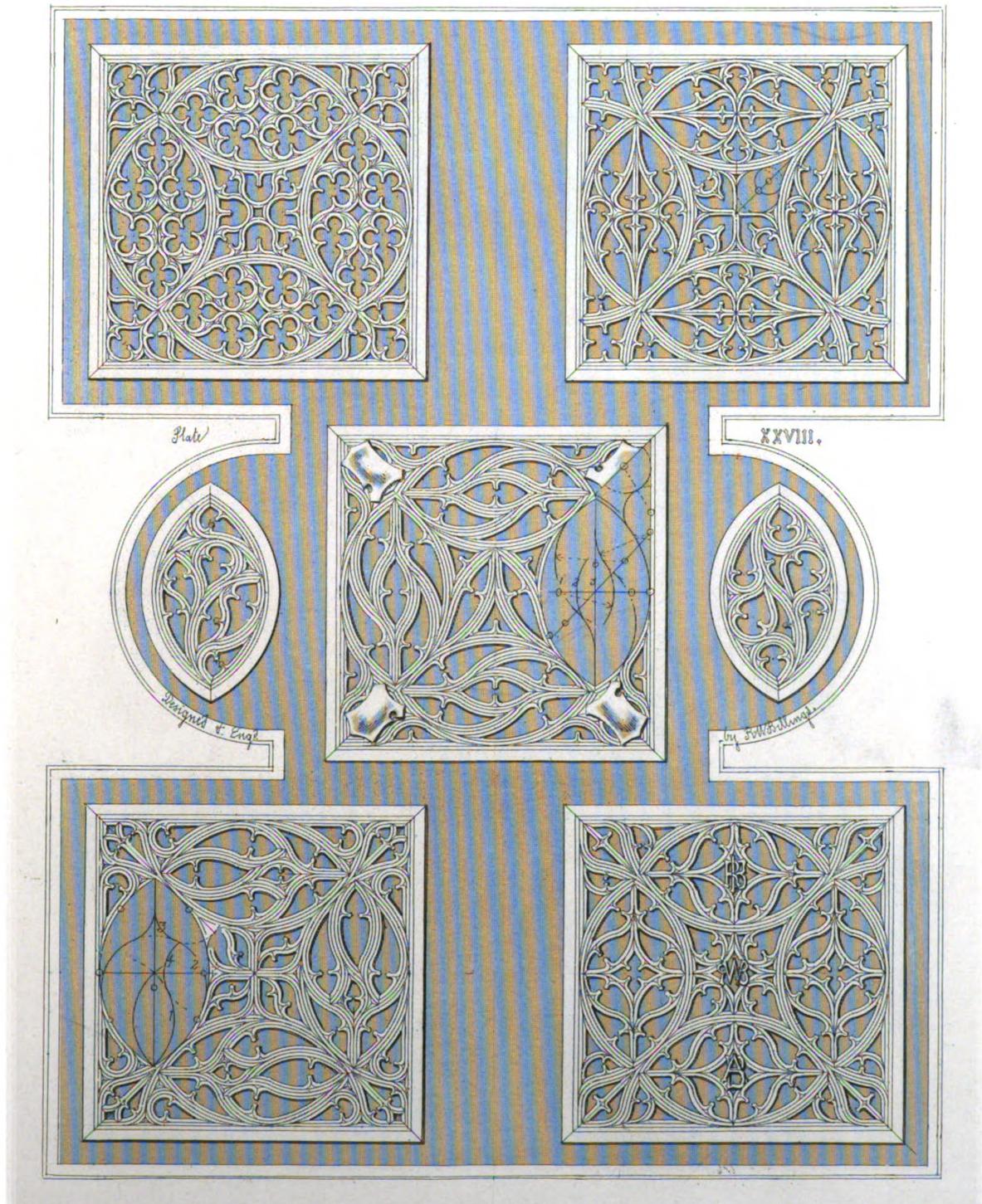
A Tracing from Pl. XXXI

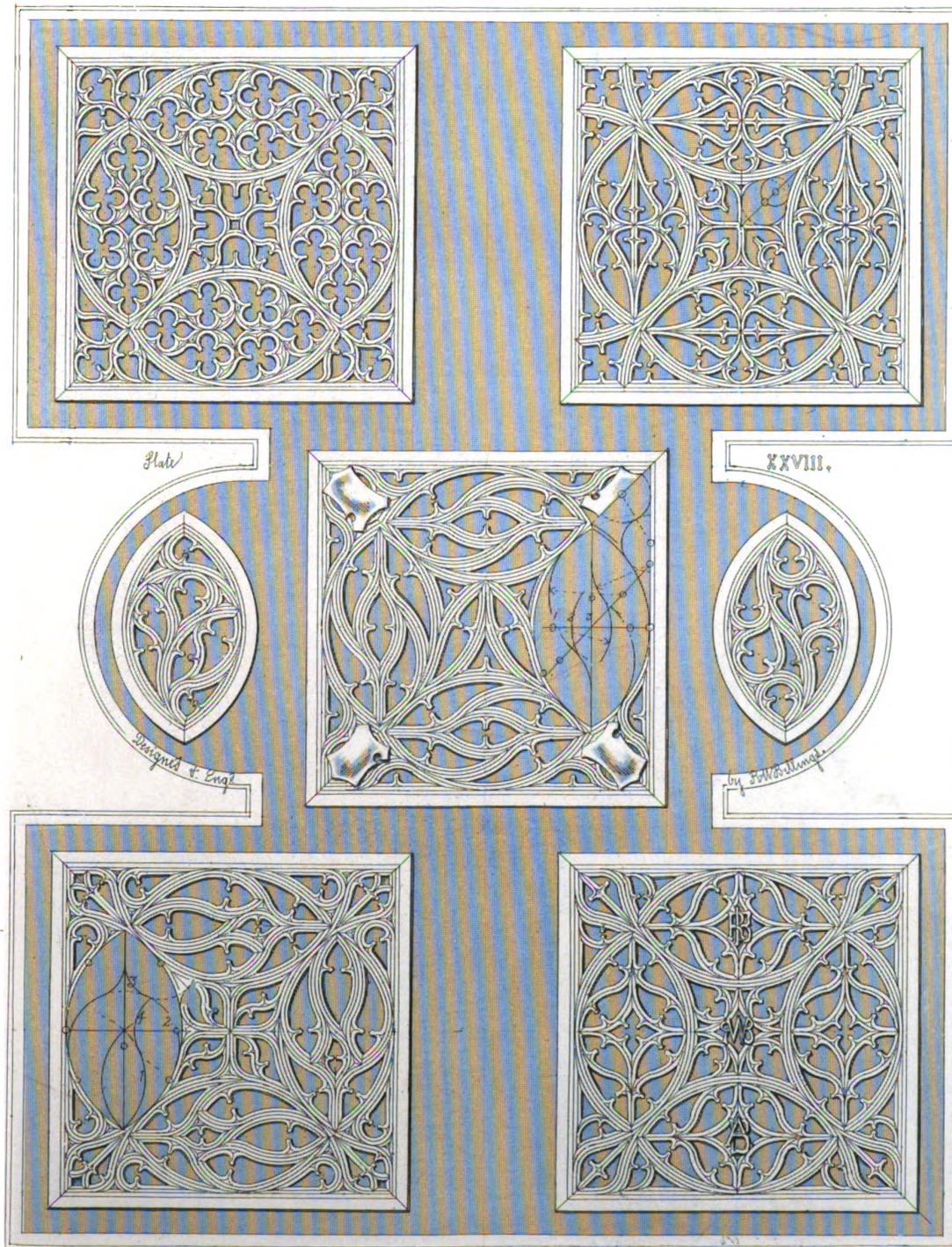


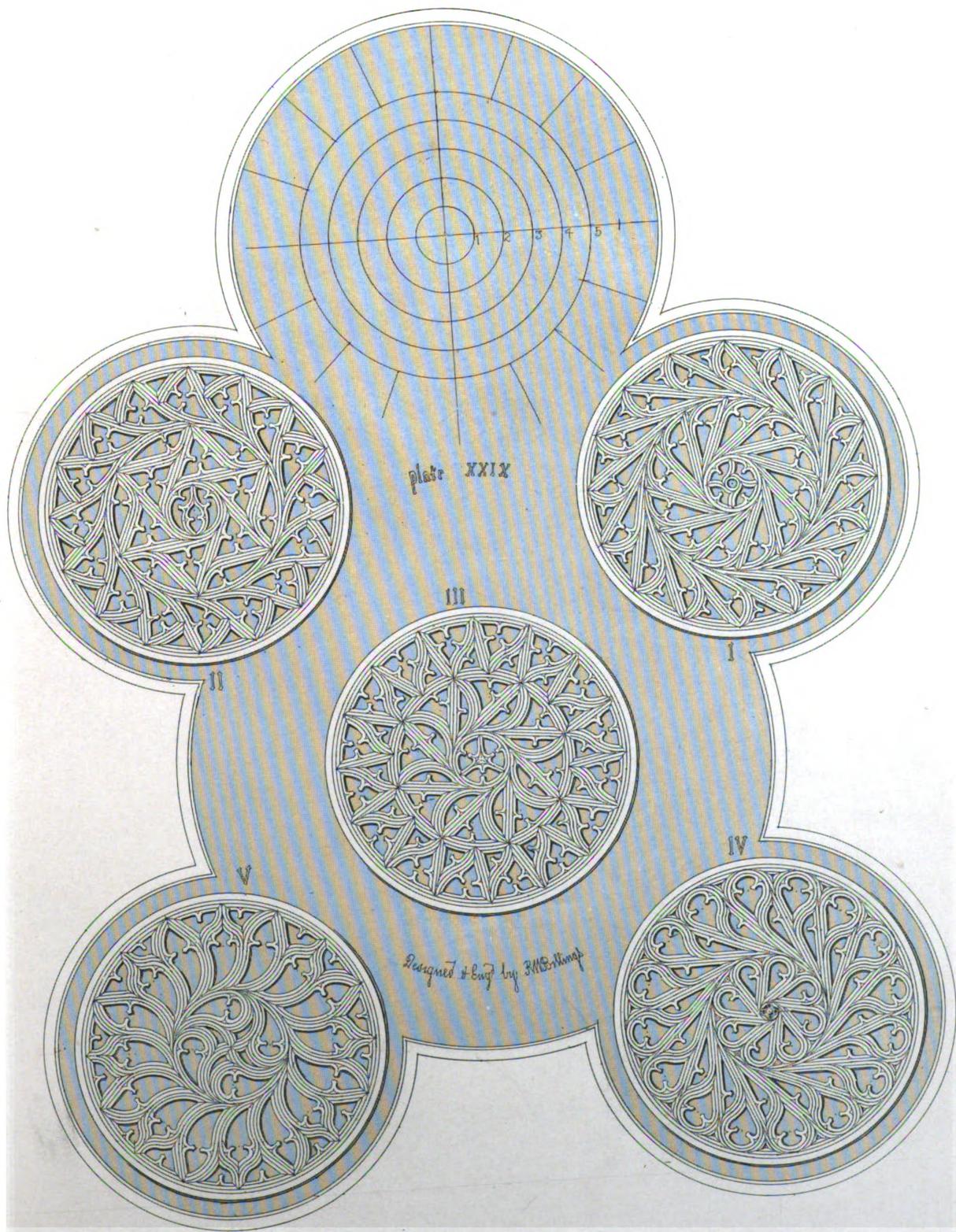
A Tracing from Pl. XXXI

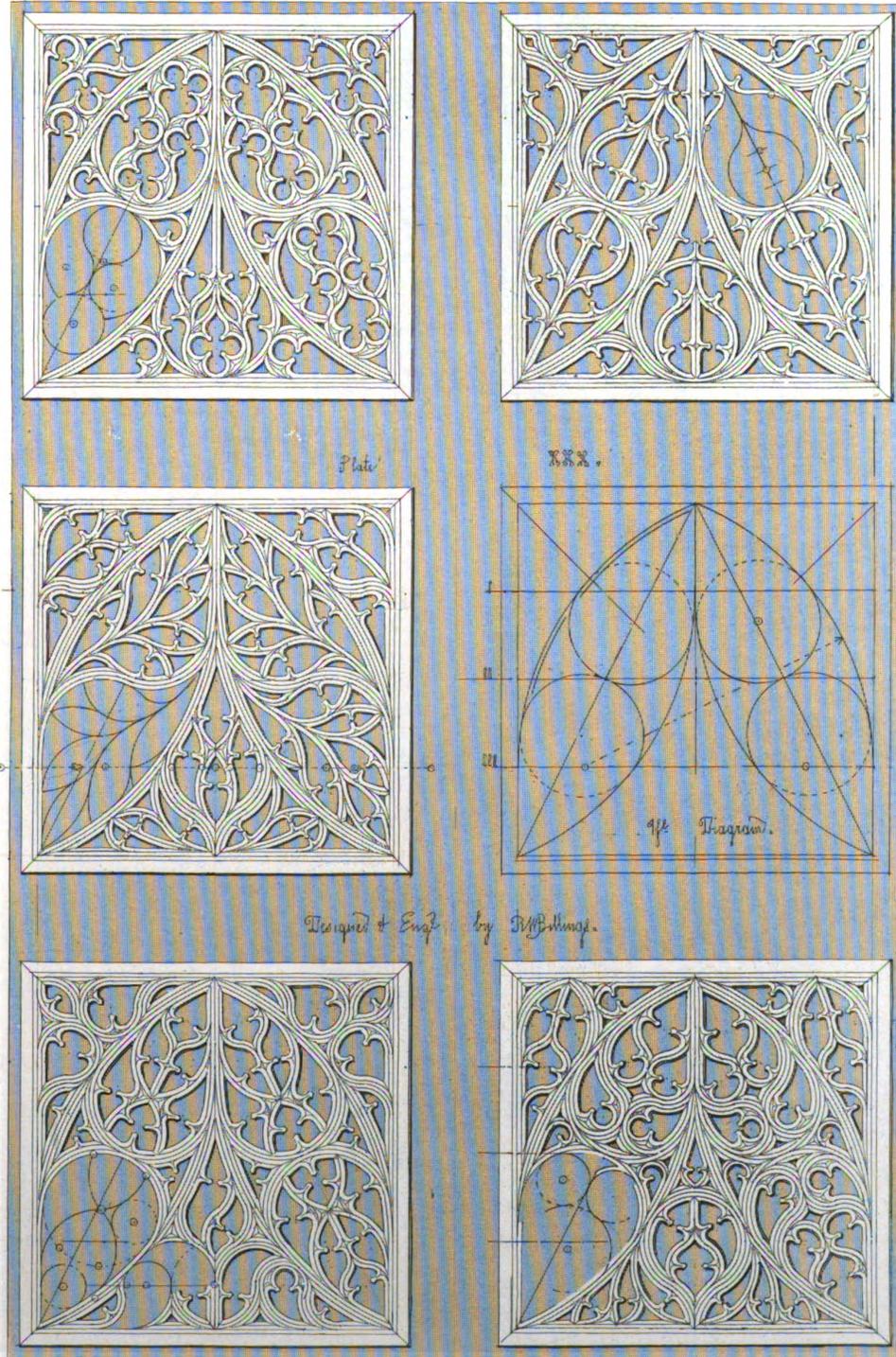


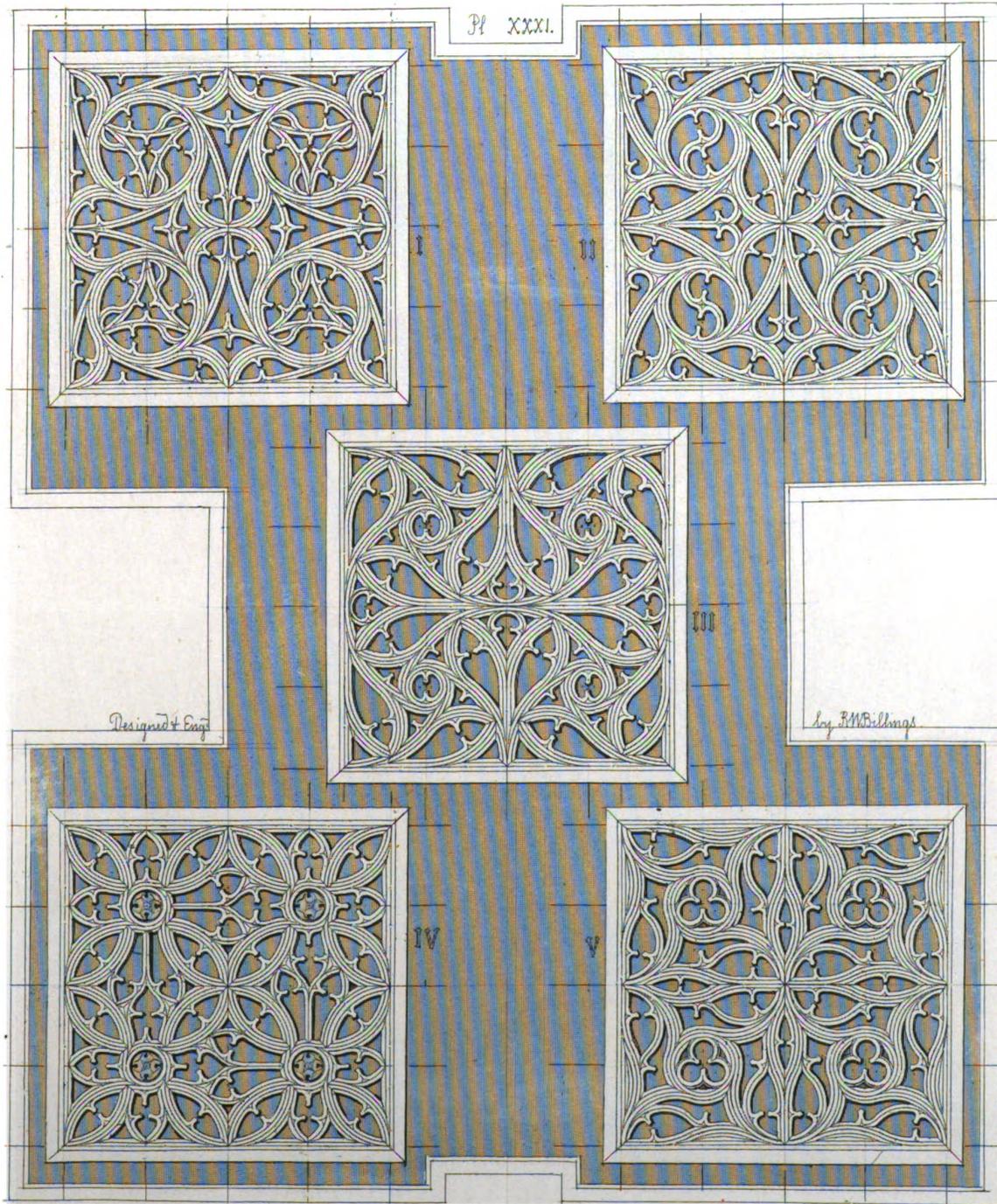
Designed & Eng'd by J.M. Billings.

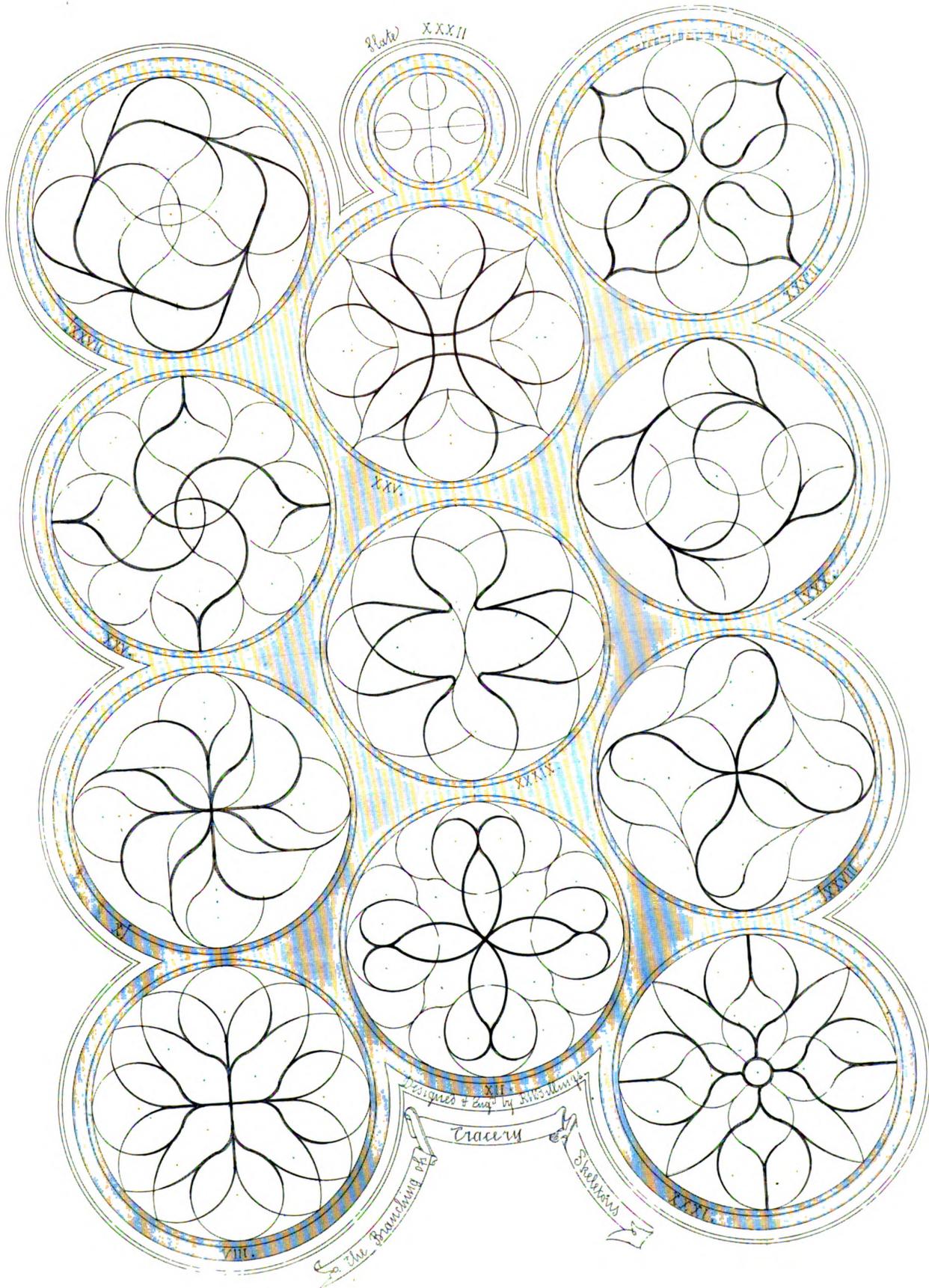


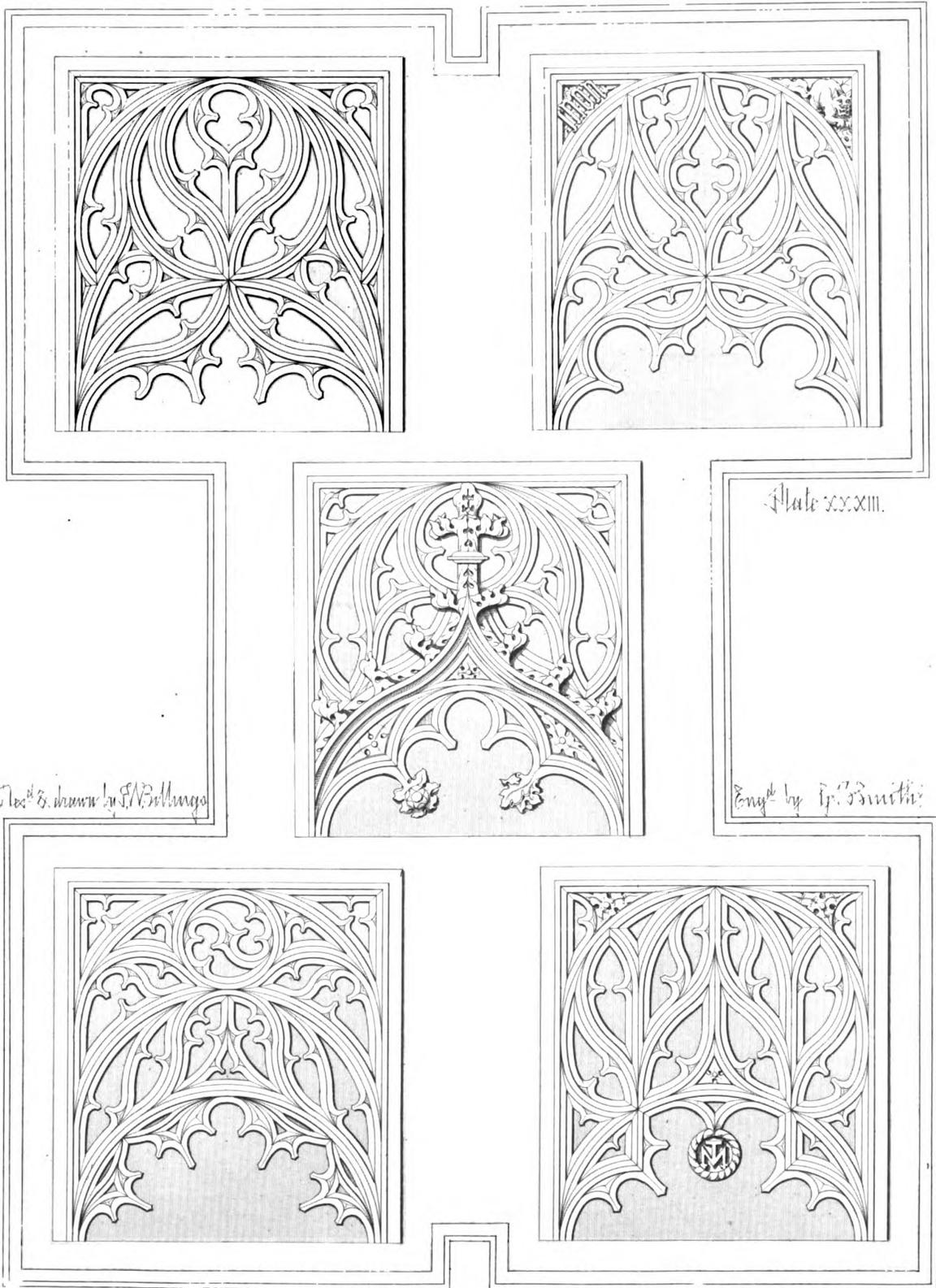


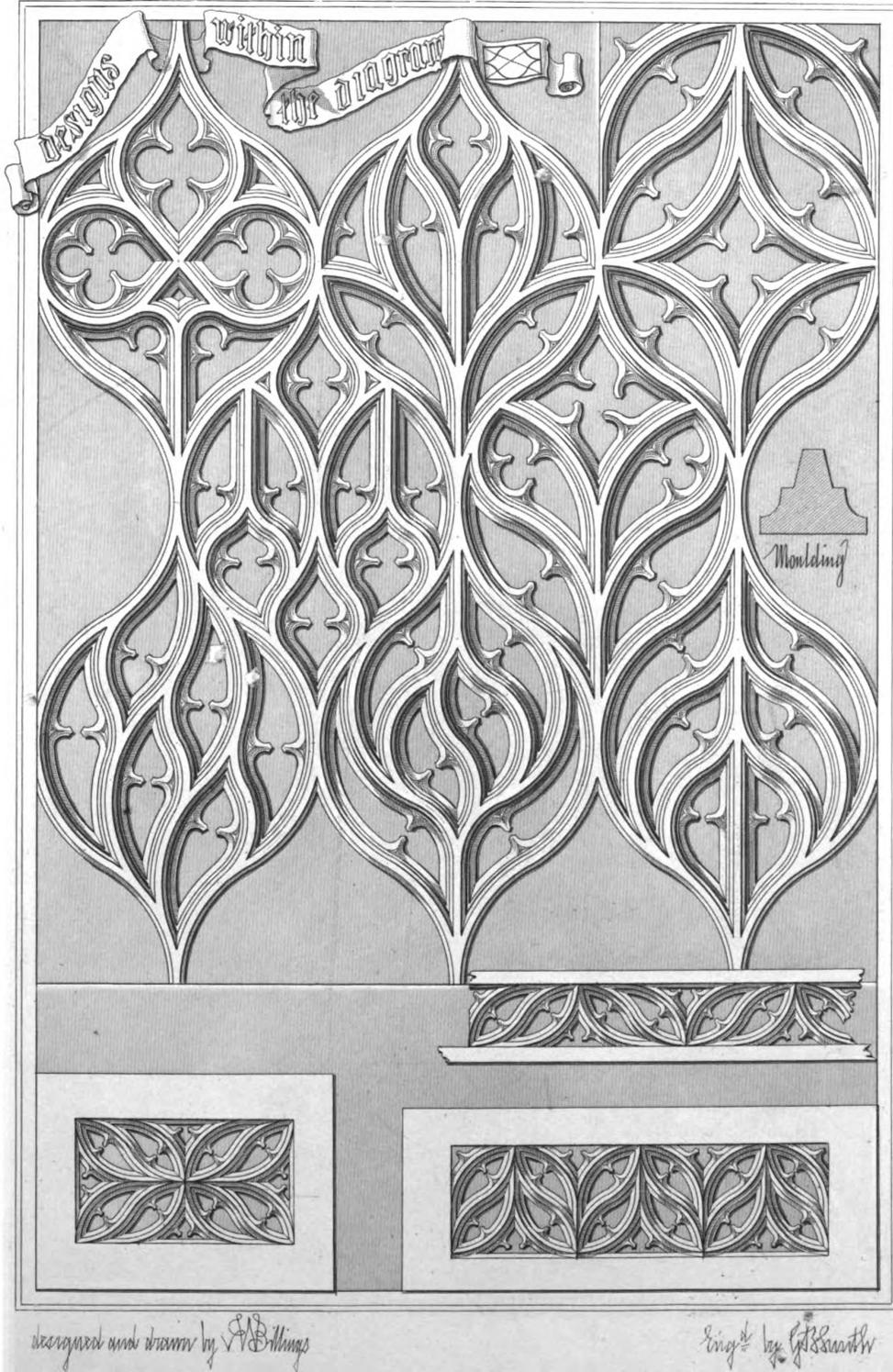


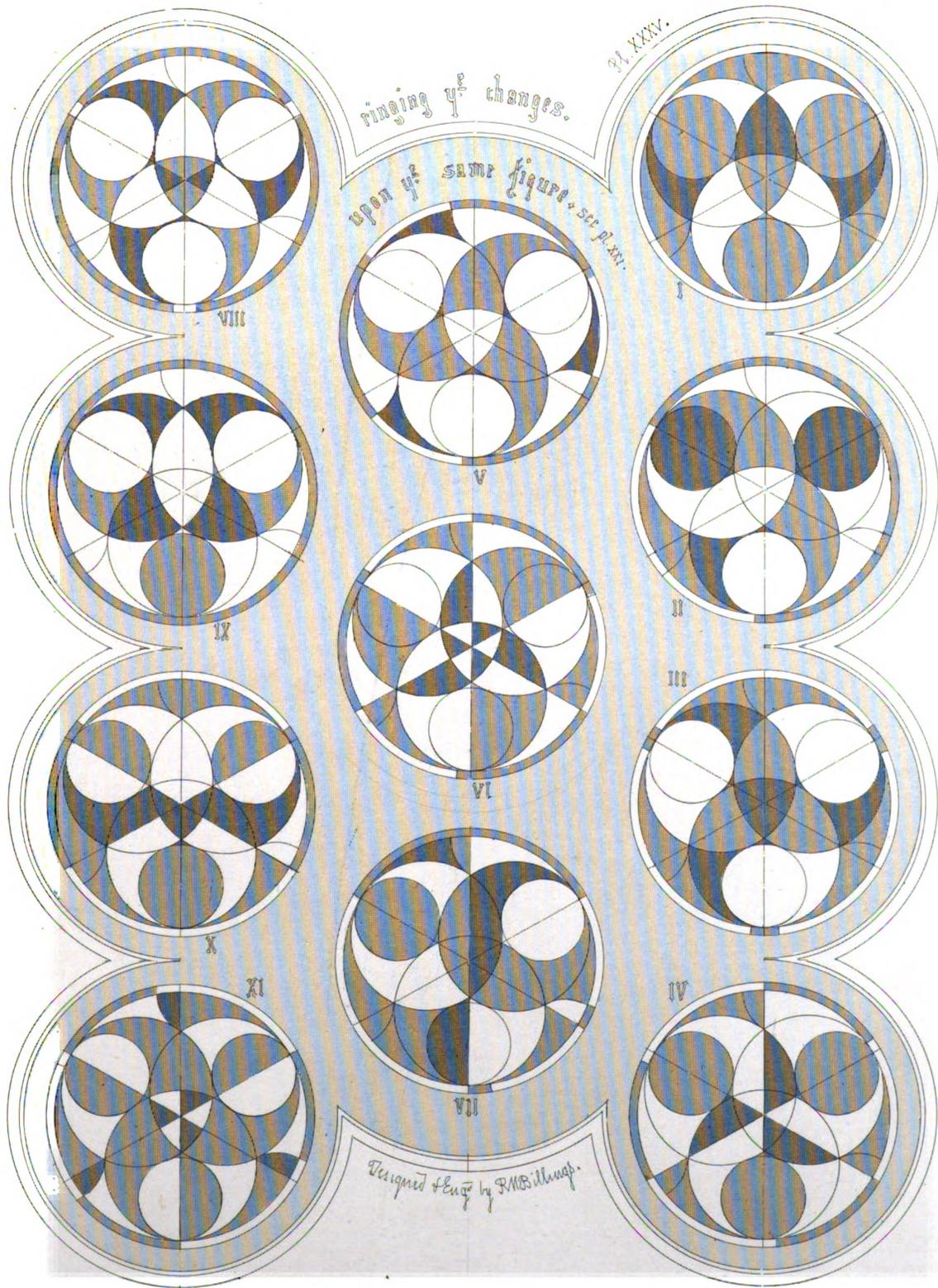


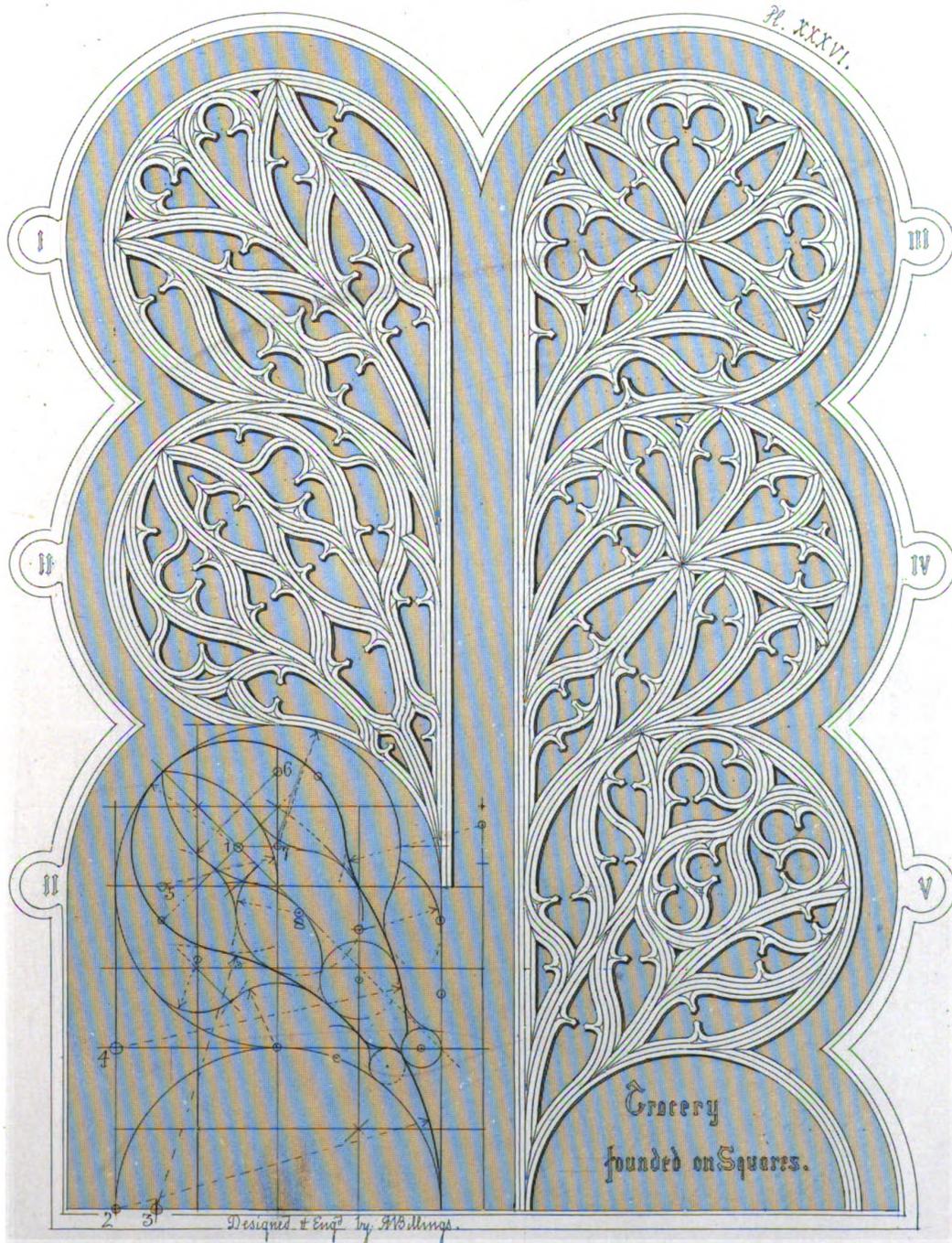






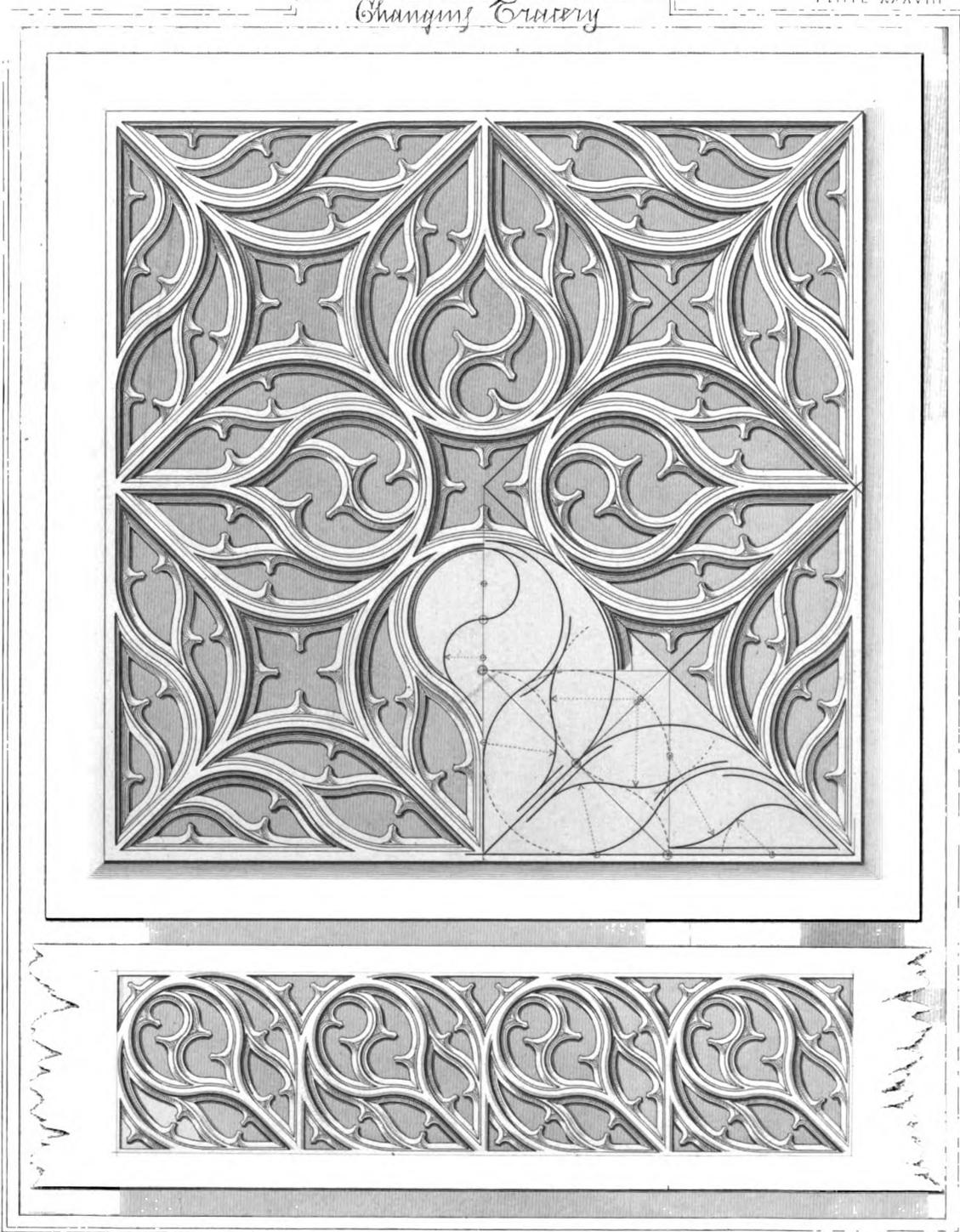






Changing Grate

PLATE XXXVIII



designed and drawn by J. B. Collins

engr. by G. B. Smith

