
NoBingAI - Rellotge d'aigua - Ripoll

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/f. 87r/...

habeat. Cuius uiroque in capite lamine compaginantur ferreae celerisque sunt in rotis grossitudine et latitudine aliquanto eminenciores, Longitudo autem earum est dimidium palmi aut aliquantulum amplius. Interea ab utroque unius lamine capite brachia procedunt rotunda minimum in longitudine habencia digitum. Quod similiter in utroque istius rotundi ferri capite, id est. utraque parte columnne est inuenire.

Verum antequam per columnnam illud inducatur ferrum iungitur ex parte una unius prephate lamine medio. Et ne ultra mensuram ualcat illud per columnnam intrare ferrum, fit iti sui formatione secundum supradictam mensuram nodus.

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Altera nero parte post columnnam in foramine quod in ipso est ferro clauus includitur ferreus. Quod tamen ira debet fieri, ut late queat illud ferrum in columna uolui.

Preterea in uno istorum brachiorum capite, non quidem in his que uiciniora sunt columnne. sed in quolibet aliorum. excrescit quasi rostrum paruissimum aliquantulum ferri accuti et rotundi tante quidem subtilitatis, ut tenuis fili laqueus possit ibi apte subsistere.

Est itaque in predictis peruidendum laminis, ut cum ferro copulantur rotundo, una earum iaceat prona, altera semper suis cum brachiis stet erecta.

Dicamus igitur de columna una quod a uertice

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usque ad foramen quod est infra columnnam ita directim perforatur terebro. ut ad foramen quod in ipsius est ferri medio absque ulla ueniat inflexione uel dilacione. Postremo in huius ferri foramine. conligato fune, et per medium columnne capitis inmisso, facies alciolem aecclesiae trabem conscendere, indeque semper eodem modo descendere al lampas et ascendere, ita tamen ut habeat in capite plumbeum peditem qui tanti sit ponderis, ut soluto supradicto ferro queat inde funis cursu uelocissimo descendere. Cum uero eleuatur

ad alcioni, inuoluitur ferro ubi est conligatus funis, et quousque ad ima rcdeat, laqueo fili in quolibet supradictorum

brachiorum detinetur. Quod quidem filum econ-tra in clauo ligneo in ipsa firmatur columna.

In altero uero clauo ligneo et in alierà parte columnae est quidem filum quod minores amplectendo dispicit pedites. Et quando ipsi pedites ad schillas preparantur sonan-das, tunc siquideni laqueus qui in isto est filo aderet illo paruissiimo rostro ferreo quod ex quolibet brachiorum, ut diximus superius. excrescit. ut cum plumbeum pedi-tem lamina superioris rote demerserit ad terram laqueus continuo soluatur a ferro et funis cum suo quod sursum est plumbo impetu ueniat magno, sonantibus interim schillis, a brachiis quae diximus ferreis

/f. 89r/ ictu fortissimo atque continuato utra-que parte tintinnabulis percussis. In columne itaque unius capite utraque uidelicet parte contra brachia que sunt de subtus ferrea coaptantur in suo foramine singuli baculi lignei pedem in longitudine unum uel plus habentes. In quibus nimirum schil-1e singillatim in suis corrigiis ansis earum insertis dependentes sustentur ita. ut ferro ubi funis est inuolutus soluto tintinnabula schillarum queant brachia de subtus a quibus instantissime percuciantur attingere ferrea.

Pandamus igitur qualiter pedites ad schillas per quaslibet oras sonandas stabi-liantur. In illa quidem columne parte

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qua rostrum ferreum a quolibet excres-cit brachiorum clauo in ligneo firmatur filum quod in capite per foramen iniectum continet in summo plumbeum peditem. In quo denique filo fit tali in loco laqueus, ut rostrum ferreum ualeat sursum attingere et ita in sumo tenere, ut cadente pedite continuo et absque ulla mora soluatur laqueus inde.

Horis autem quibus fuerit uelle schillas sonare laminas peditum in foraminibus que contra oras quas uclis fuerint inmittes. Postremo peditem in sinistra lamine parte et in ipsa lamine ora pones ita. ut ueniente desuper lamina superioris rote queat inde ab

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ipsa leuissimo tactu deici. Cuius casu soluto a rostro ferreo lacu deuolui-tur a ferro ubi fuerat inuolutus, infra columnam funis, et descendit cum plumbo suo ad terram sonantibus eo, quo diximus superius, modo schillis.

Est igitur scire de inferiori rota quod antequam excauetur in lineis IIII per centrum diuiditur. Quarum quidem in una que ad hostium est scrinii incipiunt diei ac noctis hore. In quarum VI et XII et XVIII est semper mensura uidere quo distet equa-liter iam dicta a scrinio rota.

Hac enim dimensione et uasis in quo est aqua

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legitima sessione debet ita omnino peruideri, ut uas ad excipiendam aquam desuper pendens in medio consistât aquae, non tangens quicquam ulla in parte iam dictum uas aquae.

Si uero postquam bene uoluitur rota uoluendi difficullas euenerit. euenit hoc, aut pro foramine caldarie clauso, aut pro aqua .sordida, aut corrigii inuoluti ariditate uel siccitate. aut edam nimia si fuerit in ipso corrigio superfluitate olei. aut pro foramine quo fccrum uoluitur oleo carente, aut pro interiore corrigii parte si adeserit ferro, aut rota supcriore non distante equaliter a scrinio. Haec enim omnia sunt

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dili-genter inspicienda ne impediantur ullo modo in supradicta uolucione.

Principio igitur uolucionis quocunque uoluatur modo transeundo uidelicet V aut VI aut amplius oras per duos aut tres aut per dice VIII nichili pcnditur. Verum cotidie mane et uespere aut amplius manum super manum super rote ferrum ponendo ac fortiter premendo atque ila utraque parte aliquid uoluendo postque edam inuoluto corrigio. manu ut deuoluatur trahendo, aptabis ita cotidie ad uoluendum usque quo bene uoluatur.

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De pauimento uero illius loci ubi ponendum est scrinium est omnino perui-dedum, ut omni ex parte sit equale totum. Similiter etiam de ipso est sciendum scri-nio quod in longitudine uel altitudine nullam aliqua in parte habeat in equalitate, ut dum rota fuerit ibi posita, inueniat toto in ambitu sessionem rectam. Pedites namque quos instar lampadis alcio-rem aecclesiae trabem conscendere et descendere diximus fiunt hoc modo. Fuste aut quolibet ferro accuto fit in terra fouca de foris quidem lata, intus uero angusta. In qua si quidem fouea clauum ferreum habentem in capite anu-lum firmabis intus ita. ut ipse anulus sit subtus terram totus et desuper stet erectus clauus. dehinc plumbo calido im-

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pietà fouca inuenies ita factum plumbeum peditem unum. quem, si fuerit necesse. emendabis cum cultro et firmabis in ipso anulo unius columnae funem et facies postea sicut in superioribus liquet.

Foramen ergo quod prope rotam in ferro quo uoluitur rota ad detinendum fit corri-gium contra sextam et XVIII debet respicere horam. Ipsam dico horam quae est dici ac noctis.

Domus namque orologi i habet in unaquaque parcium cubitus VI et palmuin unum. Et si fuerit uelle. poterit etiam

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maior esse. Est tamen scire quod ita debes esse ut unus inter columnas et scrinium queat spaciose transire homo.

Igitur columnae exceptis hoc quod in parte oralis intronmittitur petris habent in longitudine usque ad schillarum loca palmos VI. Schillarum autem locus est palmus unus aut dimidium pedis.

Scrinium itaque in longitudine habet palmos V. Et de his est unus ab inferiori inchoatione (inchoatione) usque ad postev In latitudine autem habet in unaquaque par-cium palmos de foris II et dimidium pedis.

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Ostium denique scrinii habet in longitudine palmos II et dimidium pedis. Et in latitudine quantum scrinii est latitudo.

Libet igitur de scrinio dicere quod debet poni in rotunda aut quadrata petra, quae in sui superficie sit equalis tota et bene cum regula plana atque etiam in ipso chopo-nilur (compo-) pauimento, ita circino coaptata ut omni in parte equa omnino repe-riatur mensura. In circino nempe isto in superiori uidelicet capite, ita unum conuexum est filum. ut quando in loco consistit aequali per ligni medium quod utrumque tenet pedem ueniat in directum iam dictum filum plumbi in capite habens aliquantulum.

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In rotunda et plana equaliter petra circulos eque latitudinis in quibus ut sunt pares quae-ant describi menses XII facies. VI remanente in medio spacio ad gnominem (-mo-) centro in ipso firmandum eius ut umbra pateant totius diei hore. Erit autem tante lon-gitudinis gnomon iste ut totam petram queat eius ambire umbra. Designatis namque VI, ut diximus, circulis, diuides totam per medium petram ut per centrum ipsa ueniat linea. Dehinc in leua in ipsa uidelicet quae noctis est parte et in circulo qui uicinus est centro mensis designatur lunius et econtra post ipsam lineam qua tota diuiditur

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petra designatur in dextera lulius. In II° autem circulo, Madius in leua et Augustus in dextera. In 111°, Aprilius in leua et September in dextera. In 1111°, Marcius in leua et October in dextera. In V°, Februarius in leua et Nouembcr in dextera. In VI°, Ianuarius

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To each end of this, iron plates (lamine) are joined, somewhat thicker and broader than the others which are on the wheels (rotis). Their length is a half a span (palmi) or a little more. Round arms (brachia rotunda), a small finger (digitum) in length, come out from each end of one plate. A similar arrangement is to be found at either end of the round piece of iron (rotundi ferri), that is, on either side of the column (columnne).

But before the iron rod (ferrum) is taken through the column, it is joined on one side to the middle of one of the aforesaid plates. And in order that the rod (ferrum) cannot enter the column too far (ultra mensuram) there is a knob (nodus) in its

design according to the aforesaid measurement (*supra dictam mensuram*).

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On the other side, behind the column, an iron nail (*clavus ferreus*) is put into a hole which is in the rod. This must be done in such a way that the rod can be turned extensively in the column.

Moreover, on one end of the pair of arms, not those which are nearer the column, but on either one of the others, there projects a kind of very small hook (beak or lip - *rostrum*) of fine, rounded iron, so fine that a thin noose of cord (*fili laqueus*) can lie there neatly.

One must be careful in the case of the aforesaid plates that, when they are joined to the round iron rod, one of them lies flat while the other always remains upright with its arms (*suis cum brachiis stet erecta*).

Therefore let us speak about the column,

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which is pierced by an auger (*terebro*) from the top to the opening, which is inside the column, so true that it (the auger?) comes without any deflexion or widening to the hole in the middle of the rod. Finally, when a rope (*fune*) has been tied to the hole in this rod and has been put up through the middle of the head of the column, you will make it go up over a high beam of the church, and go down from there and ascend always in the same way, like a lamp. But it must have at the end a lead weight (*plumbeum peditem*) which is so heavy that when the aforesaid rod is freed the rope can come down very quickly. When, on the other hand, it is raised aloft, the rope is wound round the rod where it is tied and, until it comes down again, it is held by a noose of cord (*laqueo fili*) in some one of the aforesaid arms. And this cord is held fast in a wooden nail (*clavo ligneo*) in the column itself.

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On another wooden nail and in another part of the column, is a cord which gathers together the smaller weights (*minores pedites*). When the weights are set for sounding the bells (*schillas*), then the noose in that cord is attached to that small iron hook which sticks out from one of the arms, as we have said above, so that when the plate (or blade? — *lamina*) of the upper wheel has brought the lead weight down to the ground the noose is instantly freed from the iron rod, and the rope with its own lead weight (*plumbo*) which is above, comes down with great force, while the bells sound, on their being struck on either side by a strong and sustained blow from the iron arms which we spoke of above.

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On either side, at the head of a column over against the iron arms which are underneath, are fitted, in their socket (*foramine*), single wooden sticks (*baculi lignei*), a foot (*pedem*) or more in length. On these the bells are hung one by one, hanging with their loops (*ansis*) inserted into latchets (*corrigiis*) so that when the iron rod is let go, and the rope is wound up on it, the bells may be able to touch the iron arms below them, by which they may be immediately struck. /f. 89v/

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Let us explain, then, how the weights are set for sounding the bells. In that part of the column where the iron hook sticks out from one of the arms, a cord is fixed to a wooden nail, which holds a lead weight at the top. In this cord, a noose is made in such a place that the iron hook can reach up and hold it at the top, so that when the weight falls, the noose is instantly freed.

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With the slightest touch, it can be dropped. When it falls, the noose is released from the iron hook, and the rope, which was wound around the iron, unwinds within the column and descends with its lead weight to the ground, causing the bells to sound as described above.

It is important to know about the lower wheel that before it is hollowed out, it is divided into four lines through the center. On one of these lines, which faces the door of the cabinet, the hours of the day and night begin. At the sixth, twelfth, and eighteenth hours, it is always possible to see the measurement of how far the wheel is from the cabinet.

With this measurement and the vessel in which the water is placed,

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it must be ensured that the vessel hanging above to catch the water is positioned in the middle of the water, not touching the sides of the water vessel at any point.

If, after the wheel has been turned well, there is difficulty in turning it, this may be due to the hole in the boiler being closed, dirty water, dryness or lack of moisture in the wound strap, excessive oil on the strap, or the hole where the iron turns lacking oil, or the inner part of the strap adhering to the iron, or the upper wheel not being equally distant from the cabinet. All these things must be

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carefully inspected to ensure they do not impede the turning in any way.

At the beginning of the turning, whichever way it is turned, passing through five or six or more lines for two or three or even eight days, nothing is considered. However, every day, morning and evening, or more often, by placing one hand over the other on the iron of the wheel and pressing firmly, and thus turning it on both sides, and then pulling the wound strap by hand to unwind it, you will adjust it daily for turning until it turns well.

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As for the floor of the place where the cabinet is to be placed, it must be ensured that it is completely level on all sides. Similarly, it must be ensured that the cabinet itself has no inequality in length or height in any part, so that when the wheel is placed there, it finds a straight position all around. The weights, which we said ascend and descend like a lamp over a high beam of the church, are made in this way. A hole is made in the ground with a sharp stick or any iron tool, wide on the outside and narrow on the inside. In this hole, you will firmly place an iron nail with a ring at the top, so that the ring is completely below the ground and the nail stands upright above. Then, pouring hot lead into the hole,

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you will make a lead weight. If necessary, you will trim it with a knife and attach a rope to the ring of one column, and then proceed as described above.

Therefore, the hole near the wheel in the iron where the wheel turns to hold the strap should face the sixth and eighteenth hours. I mean the hour of day and night.

The clock house has six cubits and one palm in each part. And if desired, it can be

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larger. However, it must be ensured that a person can pass comfortably between the columns and the cabinet.

Therefore, the columns, except for the part inserted into the base, have a length of six palms up to the place of the bells. The place of the bells is one palm or half a foot.

The cabinet has a length of five palms. Of these, one is from the lower beginning to the top. In width, it has two palms and half a foot on each side from the outside.

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The door of the cabinet has a length of two and a half palms. And in width, it is as wide as the cabinet.

It is worth mentioning that the cabinet should be placed on a round or square stone, which should be completely level on its surface and well aligned with a flat ruler, and also on the floor itself, so that it is perfectly measured in every part. In this circle, at the top, there is a convex thread, so that when it is placed in an equal position through the middle of the wood, which holds both feet, the aforementioned lead thread comes straight to the top.

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In the round and equally flat stone, you will make circles of equal width in which the twelve months can be described. Six will remain in the middle space for the gnomon to be fixed in the center so that its shadow shows the hours of the whole day. This gnomon will be of such length that its shadow can encompass the entire stone. Having marked the six circles, as we said, you will divide the whole stone through the middle so that the line comes through the center.

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Then, on the left side, which is the part of the night, and in the circle closest to the center, the month of June is marked, and on the right side, July is marked. In the second circle, May is on the left and August on the right. In the third, April on the left and September on the right. In the fourth, March on the left and October on the right. In the fifth, February on the left and November on the right. In the sixth, January.

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(. . . habeat). To each end of this, iron plates (lamine™) are joined¹, somewhat thicker and broader than the others which¹⁴ are on the wheels (rotis). Their length is a half a span (palmi) or a little more. Round arms (brachia . . . rotunda)^{b>}, a small finger (digitum) in length, come out from each end of one plate. A similar arrangement is to be found at either end of the round piece of iron (rotundi ferri^f, that is, on either side of the column (columnne) a).

But before the iron rod (ferrum)^c is taken through the column, it is joined on one side to the middle of one of the aforesaid plates. And in order that the rod (ferrum) cannot enter the column too far (ultra mensuram) there is a knob (nodus)^e in its design according to the aforesaid measurement (supra dictam mensuram).

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On the other side, behind the column, an iron nail (clavus . . . ferreus)^o is put into a hole which is in the rod. This must be done in such a way that the rod can be turned extensively in the column.

Moreover on one end of the pair of arms, not those which are nearer the column, but on either one of the others, there projects a kind of very small hook (beak or lip — rostrum)^{*'} of fine, rounded iron, so fine that a thin noose of cord (fili laqueus^{v1}) can lie there neatly.

One must be careful in the case of the aforesaid plates that, when they are joined to the round iron rod, one of them lies flat while the other always remains upright with its arms (suis cum brachiis stet erecta).

Therefore let us speak about the (literally ' a ') column, which is pierced by an auger (terebro) from the top to the opening, which is inside the column, so true that it (the auger?) comes without any deflexion or widening to the hole⁰ in the middle of the rod. Finally, when a rope (funne) has been tied to the hole in this rod and has been put up through the middle of the head of the column, you will make it go up over a high beam¹⁰ of the church, and go down from there and ascend always in the same way, like a lamp. But it must have at the end a lead weight (plumbeum peditem)⁹ which is so heavy that when the aforesaid rod is freed the rope can come down very quickly. When, on the other hand, it is raised aloft, the rope is wound round the rod where it is tied and, until it comes down again, it is held by a noose of cord (laqueo fili)^M in some one of the aforesaid arms. And this cord is held fast in a wooden nail (clavo ligneo)^w in the column itself.

On another wooden nail?) and in another part of the column, is a cord which gathers together the smaller weights (minores . . . pedites). When the weights are set for sounding the bells (schillas)^{nl}, then the noose in that cord is attached to that small iron hook which sticks out from one of the arms, as we have said above, so that when the plate (or blade? — lamina)^{0'} of the upper wheel has brought the lead weight¹ down to the ground the noose is instantly freed from the iron rod, and the rope with its own lead weight (plumbo) which is above, comes down with great force, while the bells sound, on their being struck on either side by a strong and sustained blow from the iron arms which we spoke of above. On either side, at the head of a column over against the iron arms which are underneath, are fitted, in their socket (foramine), single wooden sticks (baculi lignei)[^], a foot (pedem) or more in length. On these the bells are hung one by one, hanging with their loops (ansis) inserted into latchets (corrigiis) so that when the iron rod is let go, and the rope is wound up on it, the bells may be able to touch the iron arms below them, by which they may be immediately struck.

Let us explain, then, how the weights are set to sound the hours on the bells. In that part of the column where the iron hook sticks out from one of the arms, a cord is fixed upon a wooden nail['] or m) which has one end thrust through the opening (foramen) and has a lead weight at the other end. In this cord, there is a noose in a certain place, so that it can touch the iron hook above, and hold it up in such a way that when the weight falls the noose is freed instantly.

At the hours at which you want to sound the bells, insert the blades (laminas) of the weights in the openings over against

the hours that you want. Finally, put a weight in the left hand part of the blade and on the actual edge (? or 'hour') of the blade (in ipsa lamina ora) so that when the blade of the upper wheel comes down from above, it (i.e. the first mentioned blade) can be struck down by it (the upper blade) with the lightest touch. And when the noose has been freed from the iron hook by its (i.e. the blade's) fall, the rope inside the column is uncoiled from the iron rod (ferro) where it has been coiled and comes down with its weight to the ground, and the bells sound as we have said above.

You must know, regarding the lower wheels), that before it is hollowed out in four lines it is divided by a hundred (quod antequam excauetur in lineis IIIIo' per centum dividitur¹⁵). In one of these [lines] which is at the opening of the case (ad hostium . . . scrinii), the hours of the day and night begin. By measuring the 6, the 12, and the 18 of these [hour lines], you can always see that the wheel is an equal distance from all parts of the aforesaid case.

As regards the size and the appropriate position of the vessel (vasis) in which the water is, you must arrange everything so that the vessel which hangs down to receive the water stands in the middle of the water, not touching the aforesaid water vessel in any part.

If after the wheel has turned successfully, there should occur any difficulty in turning, this arises either from the opening of the jar (foramine caldarie) being closed up, or from the water being dirty, or from dryness (ariditate vel siccitate) of the coil (corrigii), or even from too much oil in the coil, or because oil is lacking in the hole in which the iron rod rotates, or from the inside of the coil sticking to the iron rod, or from the upper wheel not being an equal distance from [all parts of] the case. All these [parts] must be carefully inspected, so that there may be no impediment to their revolution.

At the start of its revolution, it does not matter how it revolves in passing through 5 or 6 or more hours over a period of two or three or eight days. But daily, morning and evening, or even more often, by placing hand over hand on the iron rod of the wheel and pushing it hard, and thus turning it a bit on either side, afterwards with the coil wound up also so that it is uncoiled by pulling it with the hand, you will thus every day enable it to turn smoothly.

You must see that the pavement of the place where the case is to be placed is level on all sides. Similarly you must see, that the case has no inequality¹⁶ of length or height in any part, so that, when the wheel has been placed therein, it may sit straight all round (toto in ambitu sessionem rectam).

The weights which we have said ascend and descend from a high beam of the church like a lamp, are made in this way. With a stick¹⁷ or sharp piece of iron (ferro accuto) is made a trench in the ground, broad on the outside (i.e. the upper part), narrow on the inside (i.e. the lower part). In this trench you will fix an iron nail, which has a ring (anulus) in its head, in such a way that the ring is entirely above ground and the nail stands erect below this. Then on the trench being filled with molten lead you will find your weight made. If it is necessary you will trim it with a knife (cultro), and you will fix the rope of a column in the ring and then do as shown above.

The hole (foramen) which is made near the wheel in the iron rod by which the wheel is turned, must face the 6th and 18th hours.

I mean the hour of day and night. The clock housing (domus . . . orologii) has on each side £ length of six cubits and a span (palmum). If you like, it can be even larger. But you must know that it must be such that a man can pass comfortably between the columns and the case (scrinium).

The columns, with the exception of that which is set into rocks which have been pierced, are six spans (palmas) long to the part where the bells are. The area where the bells are is one span, or half a foot.

The opening of the case (ostium ... scrinii) 1 is two spans and half a foot long, and its) breadth is that of the case.

The case is five spans in length, and of", this length one span is from the lower end up to the door posts. In breadth its external measurement is two and a half feet for each of its parts.

We must mention, regarding the case, that it ought to be placed on a round or square stone, which has a surface made plane with a rule (regula), and is set on the pavement, fixed by compasses (circino) so that every side of it may be found to be level. There is tied to the top end of the compasses a cord so that when they stand on level ground the cord, with a small lead weight on the end, comes down straight through the piece of wood which joins both feet

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In rotunda et plana equaliter petra circulos eque latitudinis in quibus ut sunt pares que-ant describi menses XII facies. VI

remanente in medio spacio ad gnominem (-mo-) centro in ipso firmandutn eius ut umbra pateani tocius diei hore. Erit autem tante lon-gitudinis gnomon iste ut totam petram queat eius ambire umbra. Designatis namque VI, ut diximus, circulis, diuides totam per medium petram ut per centron ipsa uciat linea. Dchinc in leua in ipsa uidelicet quae noctis est parte et in circulo qui uicinus est centro mensis designatur lunius et econtra post ipsam lineam qua tota diuiditur

/f. 94v/ petra designatur in dextera Iulius. In II" autem circulo, Madius in leua et Augustus in dextera. In 111°, Aprilius in leua et September in dextera. In 1111°, Marcius in leua et October en dextera. In V", Febroarius in leua et Nouembcr in dextera. In VI", Ianuarius