

MEMO THURET [327]: "A Royal 'Haagseklok'" Appendix 3, Open Research.

Reviewed by Keith Piggott

Isaac Thuret, (c.1630-1706, active 1662-1694). His clock shows a mix of features, making exact dating problematical. Dr. Plomp suggests, '*not earlier than 1665 and not later than 1675*'. Hans van den Ende suggest '*1670-1673*'; being a vibrant period of invention! **Pendule Religieuse**: repoussé brass cartouche signed '*J Thuret AParis*', scratched '*327*' on reverse, (a unique identity, first recorded). **Special features**: A front winding '**split-barrel**'; 4-wheel trains with 3-spokes; the Strike to **IX** side; hour/half-hour strike; vertical hammer post on brass false-plate; numbered count-wheel with pointer; velvet covered fixed iron dial-plate with pins and turnbuckles; gilded chapter-ring screwed to the dial, each minute is scribed; pierced engraved gilded hands; doors front and back; eyelets to hang case; external bell. Case of ebony and tortoiseshell veneers, ebonised mouldings, pewter inlaid patera and stringing. [*Piggott Archive 1983*].

Bibliography: Dr. Reinier Plomp's perceptive articles on Franco-Dutch pendulum story; "*Early French Pendulum Clocks 1658-1700 known as Pendules Religieuses*" ('*Pendules*', private publication 2010); "*The Dutch Origin of the French Pendulum Clock*", ('*Origins*', Antiquarian Horology, Dec.1972); "*Dutch Influences in French Clockmaking and Vice-Versa in the Latter Half of the Seventeenth Century*", ('*Influences*', AHS, Op.Cit, Dec.1974); "*Dutch spring-driven pendulum clocks 1657-1700*", ('*Pendulums*', Interbook 1979); "*The Prototypes of Hague Clocks and Pendules Religieuse*", ('*Prototypes*', Antiquarian Horology, June 2007); "*The earliest DUTCH and FRENCH Pendulum clocks, 1657-1662*", ('*Chronology*', [HF](#). 2008). Hans van den Ende Sr., and son Hans Jr., kindly provided access to their unpublished '*Archief Pendules Religieuses*' (2010). This review cannot be a substitute for authority, nevertheless I submit my perspectives on this typical example by Isaac Thuret to define the merits of *Pendules Religieuses* in those contexts that fascinate us, each clock's unique place in the history and chronology of French '*Pendules*'.

MemoThuret outlines general and typical problems faced in dating this or any *Pendule Religieuse*; from their Hague origin in 1657 with Christiaan Huygens' *patentee* Salomon Coster's early association with the French clockmakers Claude Pascal, Nicolas Hanet. Whereas Coster exported, they also adapted! They retained Huygens' pendulum and Coster's layout, his box-case, his hinged dial covered in velvet, but, in France, Dutch boxes were applied with mouldings, friezes, pediments, crestings, mounts, to fashionable French tastes, (Reinier Plomp, '*Influences*', Op.Cit., Figs 5-8). Whereas, in Paris, Pierre Sauté's simple small box timepiece, (Plomp *F2*), is a true *Pendule Religieuse*. Nicolas Hanet, Giles Martinot, Thuret, and others, began to produce pendulum clocks that now exhibited *French taste* in their cases and having new *French features* in their Hague-like movements.

Bases, friezes, pediments, crests, also mounts, soon became integral; i.e. not *added* to Hague clocks. Pascal's output of striking '*Haagseklokken*', (*DII*, also '*Pendulums*', nrs.87, 88, 89, 93), followed Oosterwijck's *RH layout*; with a front-plate hammer, and large bell set on the inner dial. Pascal next introduced the vertical posts to external bells, (Plomp, nr.94), that became the Dutch standard, taken up by the French, who also adopted simple *going-barrel*, then the *split-barrel* for strike-work; and often transposed strike train to the **IX** side, like Thuret's #327 ~ (used advisedly to identify this clock, not as Isaac Thuret's chronology). Thuret #327 is a first period 'Pendule Religieuse' of the basic type produced between 1658-1670. (Dr.R.Plomp, '*Chronology*' Op.Cit. Ch.2).



Isaac Thuret (327) Pendulum Clock with Strike

One aspect of '*Pendules Religieuses*' that always intrigued me, but which is no aid to dating, is their much higher quality of workmanship than contemporary Dutch counterparts. Wheels and pinions are cut and finished to a degree which often is amazing, teeth even outlined or undercut, (see page 11). George Curtis used to say, "*English clocks are a work of craft, French clocks are a work of art!*" I concur! Recently, Dr Reinier Plomp's '*Pendules*' resolved my intrigue, in his introduction; "*production [of clocks] had come to a standstill at the end of the sixteenth century. No clocks made between 1600 and 1660 are shown by Edey (1967), Tardy (1981) and Kjellberg (1997) in their books on French clocks*". (Plomp, Op.Cit. p.7). Here, I suggest that French talents had simply transferred into making the superb jewel-like watches and coach-clocks which many public collections can attest to, and it was this skill and attention to detail the French quickly brought to bear in 1660, "*resulting in an 'explosion of clock making in France'*." In this respect, Thuret's subject movement is outstanding; its dial and case are only *fashionable outer garments*.

**DESCRIPTION: ISAAC THURET (PARIS 'PENDULE RELIGIEUSE' (#327)
CONSTRUCTION and DIMENSIONS: 'Ø' original parts '®' replacement parts**

Dimensions Thuret 327's Pediment Case Ø

External	H. 39.75	W. 26.5	D. 13.4	cm
Pediment	H. 8.5	W. 23.7	D. 2.5	cm
Total Height	H. 42.75 cm. (incl. Finials)			
Internal	H. 29.5	W. 21.2	D. 8.3	cm

Door Frame	H. 26.75	W. 23.4	cm
Dial Reveal	H. 20.2	W. 16.6	cm
Door Stiles	W. 3.0	T. 1.4	cm
Total Depth,	D. 13.2 cm (incl. Moulding)		
Side Walls	T. 1.0 cm (incl. Veneer)		
Back-Door	H. 24.0	W. 17.0	T 0.75 cm
Rebated back-door and case form a dust seal.			

The Case Construction is conventional:

Lapped joints reveal the basic construction.
Tortoiseshell* veneers mitred at door corners.
Brass hinges and lock-plate are left exposed.
*minor degradations evident in the pediment.

Views: Back, Front (the finials when found)



Isaac Thuret 327

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Ebony veneers to front and sides, ebonised mouldings. The carcass is Oak (normally softwood) but *fruit-wood* is used for the rear-door and stiles. The Dutch practice of '*windmill*' veneer lapping does not apply.



Wrought iron '*eyelets*' attest to it being a wall clock, like its Hague counterparts, (NL. *Haagse klokken*).



There is **no** evidence of feet ever being fitted to this wall-clock. The Base and Top Boards reveal the framed *dove-tail* construction of Thuret's case. Distinctive *medullary rays* of Oak are here visible. Holes in the top board are for the Bell-stand (centre) and the rising stem of the Clapper to the Bell. Note the fruit-wood rear door, external hinges, typical French '*hook and eye*' latch; also note the eyelet '*hangers*' to wall.



Thuret 327

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Above:: the '*winder-key*' door lock

Finials now replaced with ones appropriate to the size and style of this small case with large presence. Hans van den Ende holds that centre finials were not fitted then; that any finials on cases like 327 are the exception; more often later fashion added to existing cases; being substantiated in the van den Endes' invaluable '*Archief*'.



The classic Pediment with pewter '*patera*' in tortoiseshell.



The winder-key in the case lock.

Hans van den Ende bases his 1670-1673 date on style of case, with line-stringing to tortoiseshell panels; substantiated in the '*Archief*', also in Reinier Plomp's '*Pendules*', (Op.Cit). This case defines '*Fashion*' when the clock was prepared for Isaac Thuret's richer clientele, no doubt emulating a superior taste.



Thuret Paris

ISAAC THURET (327): TYPICAL "PENDULE RELIGIEUSE" DIAL: (Ht. 222 mm W.181 mm)
Showing the vertical Hammer-Post, also the upper Pins and lower Turnbuckles that secure the Dial



Thuret 327

HANDS (REVERSE): Minute, Radius 8.5mm Total 10.5mm. **Hour,** Radius 5.8mm Total 8.1mm

Thuret's vivid red-tortoiseshell and pewter front is very much of the late first period; having shallow base and frieze mouldings, round-arch pediment, two finial up-stands, side-windows with arch top (not slides), the front door opened with a *winding key*, rear door held by simple *latch*. Dr.Plomp dates comparables to 1662-1675, (*'Pendules'*, Figs.55,66,74*,118-119 the latter two being fully developed *brass* marquetry). *Fig.74 by Antoine Gaudron, Paris, c.1672, indeed seems to be from the same case maker's stable as 327, though Gaudron's case like Claude Raillard's (p.20) reverts back to a *furniture key*; **327** uses winder key.

Thuret 327 has an iron dial-plate, covered in black velvet, with small pendulum access hole. The reverse has a brass '*false-plate*' bearing the vertical hammer post, also studs on which to mount the movement. The dial, without hinges, is fitted from the front of the case, pinned into the top stile and secured by two lower turn-buckles fixed internally behind the lower stile.



Fixed Iron Dial, ø (222.5 by 181 mm., 1.3 mm. thick). The vertical Hammer-Post to the external bell is sited on the false-plate. The Access-Hole to restart the pendulum is untypically small, (just 12 x 18 mm).

The Movement is pinned onto four 13mm studs set in a brass '*False-Plate*' bearing the Hammer-Post. The studs are twice the length used by Coster or Oosterwijck. The False-Plate first appeared on metal dials, but was ideal for wood dials. Archive images (right) show the cut-out recess for prominent cock of the '*reverse minute wheel*'.

The Iron Dial sits in rebated stiles behind the door, held by two pins inserted into the upper stile, secured by two brass turn-buckles latched inside. This movement must be mounted and demounted from the front of the case. Thuret's dial is smaller than either of Coster's striking clocks and compares with Coster's first timepieces.

The Vertical Hammer-Post is fully detached from the movement. Similar arrangement is noted by Dr. Plomp (*'Pendules'*, Op.Cit., p.28, fig.19). This was short lived, hammer posts soon moved onto the movements, usually set on the front-plate, only very rarely on back-plate.



Note: Thuret ignores established Dutch practice of hinged dial and movement. Had his first exposure to Coster's work been one with fixed-dial, like 'D2', having doors to front and back? [Samuel Berckmann in Augsburg also adopts a fixed but open dial, with a rear-door, [Memo-Berckmann](#)]. Whereas, Coster 'D1' has a hinged iron dial, opening forwards - more practical in a *wall-clock*. Stranger is Thuret's initial use of wooden dial-plates; in exchanges Dr.Plomp informs me, "*in documentation of eight Thuret clocks of the early type, all have fixed wooden dial plates, six having lifting side windows*". The lifting-slide was short-lived, briefly adopted by Ahasuerus Fromanteel. Wood had been Thuret's first choice for dial-plates, therefore his '*false-plate*'. [Note: wood dials persisted; Daniel Marot's baroque console case, c.1690, still had a [wood dial](#) to mount Johannes van Ceulen's most outstanding repeating movement, probably for his Royal patrons, its movement-studs are fixed directly into the wooden dial-plate, without a false-plate].

Isaac Thuret 327, Chapter Ring: *Single Minutes 1-9 Part-Scribed Through; Inner Line, No Quarters.*



Thuret's Dial (222.5 x 181 mm.), is smaller than most Coster dials (refer [matrix](#)), but his Chapter Ring (165 x 100 mm with annulus of 32.5 mm) is wider than a contemporary Dutch maker would have used.

Thuret's gilt-brass Chapter-Ring (p.5) is closest to my '*Second-State*' pattern, seen on Coster 'D2', (again D2!). Roman Numerals mark ordinal Hours; Half-hour marks are small Crosses; there is an inner line but no Quarter marks; in an outer ring every Minute is marked, the minutes **1-9** are partly scored through (cf.Coster *D1* and *D5*). However, its proportions are wider than the contemporary Dutch chapter rings.

An early, typical '*French-made*', feature is Thuret's method of fixing the Chapter-Ring to his metal dial, by 4-screws from the reverse, (see above). Whereas, Coster at first had riveted his chapter-rings, then, for eminently practical reasons, he adopted pinned-studs; which method also suited Thuret's wood dials. Screwed chapter-rings are first noted on Giles Martinot's '*F1*' and Pierre Saudé's '*F2*', the first *French made* pendulums mimicking Coster's designs, (Dr.Plomp, '*Chronology*', Chapter ring - fastening). I will suggest hypothesis that the iron-dial with screwed chapter-ring was added to an earlier *batch* movement.

Gilt Brass Hands, finely pierced and engraved:

Minute Rad. 8.5 L.10.5mm
Hour Radius 5.8 L.8.1 mm

Pendules Religieuses hands between 1665 to 1685 are hard to date, due to variety of ornate piercings and the fact that no didactic study has been published. Tardy's 'Les Aiguilles' is little help

in dating, (Tardy, 'La Pendule Francaise', Vol.1, p.112, Aubenas 1949). Thuret 327 hands appear to belong to the late first period 1665-1675, but similar patterns are found in later periods, even to 1690.

Thuret 327's hands are typically thick, ornately pierced, carved, engraved and gilded. Each extends beyond its respective sector-line rather more than this purist likes. Might these hands be substitutes? Examining Dr.Plomp's 'Pendules' (Op.Cit.), also the Hans van den Endes' 'Archief' 'Pendules Religieuses' (Op.Cit.), it appears that hand proportions did vary, no fast Rule prevailed. Alternatively, but less likely, clock hands were changed as often as the Parisian seasons' fashions! These hands are their own evidence.

Thuret's signature Cartouche is a fully developed repoussé shield, having scroll supports to an oval boss with Ribbons and foliate Laurel swags. The vacant pin-hole might locate a stud-grip, for lifting the plate? It is far removed from simple flat Shields of Coster, Pascal, Hanet, even Oosterwijck's repoussé [Dolphin Shield \(D9, 'Huygens' Legacy', p.34\)](#). 327 pattern is rare, especially in repoussé. Hans van den Endes' extensive images database records five, four by Isaac Thuret, ('Archief', Pendules Religieuse, Thuret 03, 29, 37 and this as 39). Dr Plomp does not record this pattern. Hans van den Ende says Parisian makers never used repoussé work for mounts, crests, or decorative signature cartouches, which they preferred to cast in ormolu ~ accounting for their common patterns. Dr.Plomp identified Parisian case makers Pierre Golle' also André-Charles Boulle, the latter being the pre-eminent brass founder of those later patterns.



View: Repoussé Cartouche, signed "J Thuret A Paris". Wire hinges enable pendulum access. H v/d Ende 'Archief' records five examples; Thuret 03, 28, 37, 327 as 39; and Cremestorff at Edam. Hans van den Ende confirms only the Thuret 327 cartouche is repoussé, it being "a great exception".



View: Cartouche flipped to show 'scribed number 327.

Nb. This Cartouche bears a 'scribed number '327': not observed before, and still being considered. Reverse has a halo of bright gold ~ bleeding around all edges, as the Cartouche was fire-gilded. Other cartouches should now be examined closely. Here I use #327 simply to identify Thuret's clock, but if taken at its face value, to represent a chronology, at *one timepiece movement per three weeks**, as John Fromanteel is said to have made Coster, or a *striker in six weeks*, then *Dial #327* represents **4-5 years** output! *Clockmaker Laurence Harvey suggests

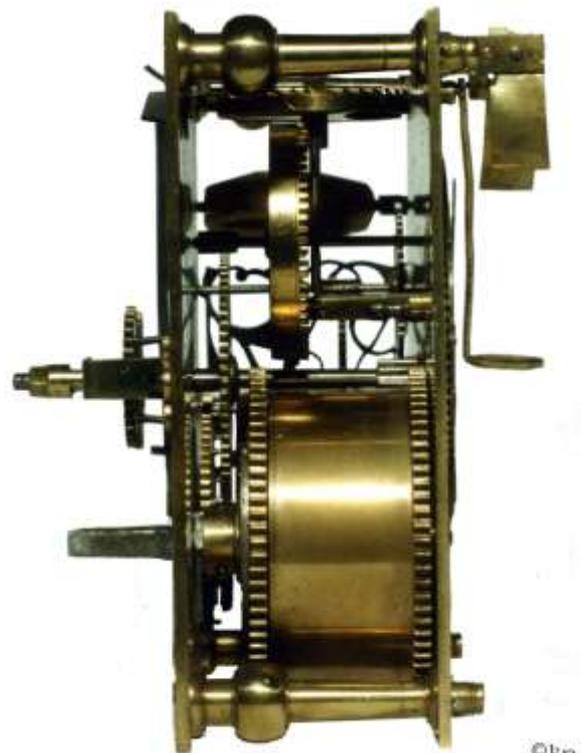
those timings, if testing be included, are unrealistic. Thuret's output was prodigious, but despite Huygens' early contact in Paris, and despite his *prototype* regulator to Huygens' design, (discovered by J.C.Sabrier, described by Sebastian Whitestone, Op.Cit), Isaac Thuret's name does not appear among the first French-made pendulums cited in Dr.Plomp's '*Chronology*', (Op.Cit.). Isaac Thuret is recorded from 1662, so a number **327** might suggest a date circa 1666/1667. Examinations of Thuret cartouches may well reveal similar inscribed numbers, whatever any numbering might mean. Thus are Thuret 327's '*fashionable outer garments*' disposed of.

ISAAC THURET (PARIS (#327) : HIS GOING AND 'FRENCH-STRIKING' MOVEMENT.

The first indication this is a French movement is Going and Strike Trains are planted on opposite sides to Dutch clocks. Plate edges lack Dutch 'tekens', (scribing-out <<), that always seem superfluous, even when marked often ignored at assembly, (see *RH*). The '*French-striking*' adds a single blow at the half-hours.



GOING (IX): Oosterwijck, *Royal Haagseklok*



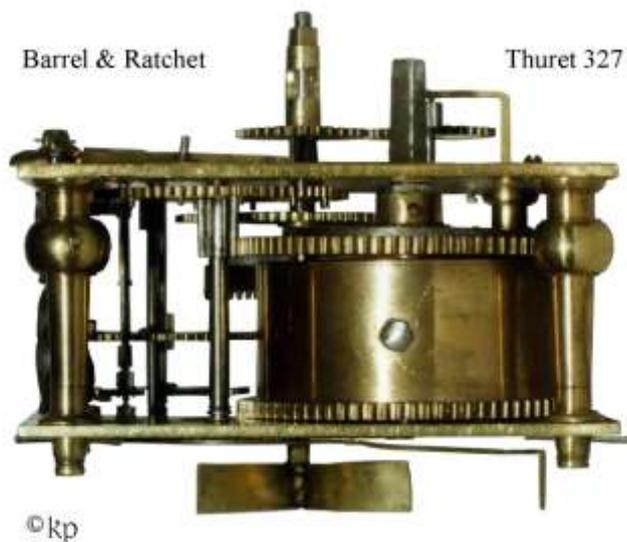
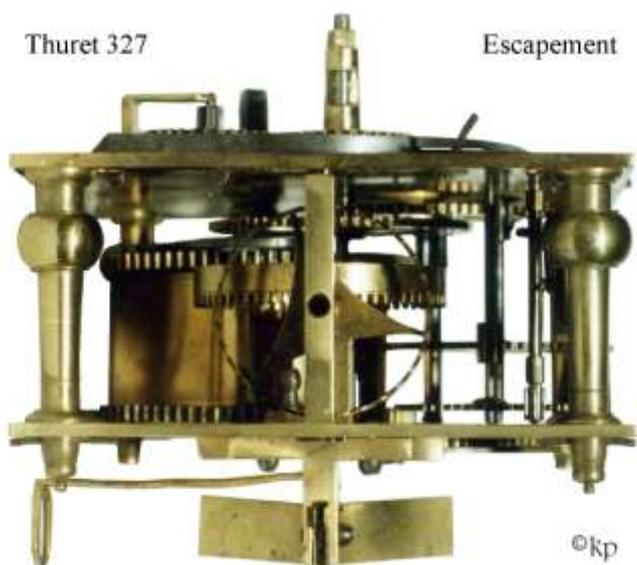
Thuret 327

GOING (III): Thuret, *Pendule Religieuse* (327).

Otherwise, Thuret's small striking movement follows much like the Dutch equivalent, especially in its use of Huygens' layout of the ancient verge escapement, having Huygens' patent '*crutched-verge*' also Huygens' patent '*suspended-pendulum*' and Huygens' new '*cycloid-cheeks*'. Thuret's four French style pillars are riveted to the front-plate and pinned at the back-plate; exactly like Coster, Oosterwijck, etc. Further like its Hague originals, Thuret uses 4-wheel trains with each wheel having 3-spokes. Finally, Isaac Thuret has also adopted the '*split-barrel*' combining the going and strike trains on a single main spring-barrel, a saving of labour - even if intrinsically flawed, (*'A Royal Haagseklok'*, Part I, p.17).

Top: Dutch style Verge and Potence Block

Bottom: Split-Barrel with Ratchet at Front

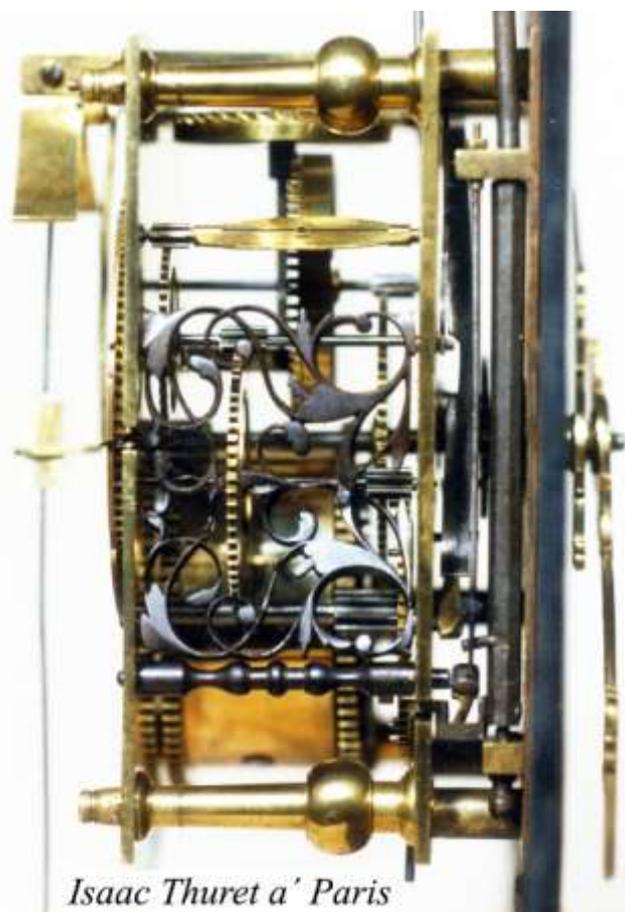


Nb. The 35mm Potence is riveted to the Back-Plate, the one-piece Back-Cock combines verge-pivot and Huygens' cheeks - fixed into '*chops*' by one screw.

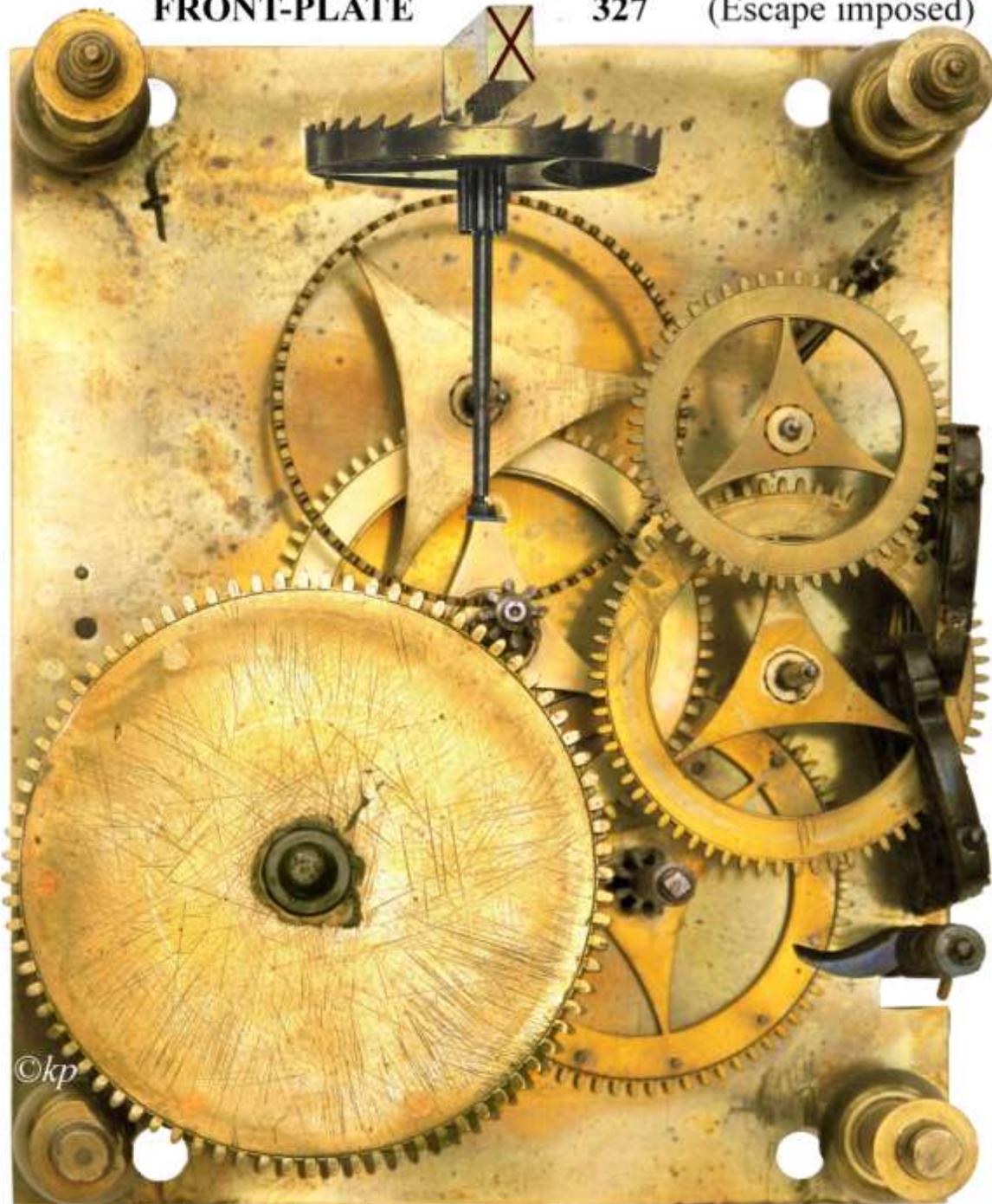
Nb. two lower pillars have '*nipples*' filed-off, evidently to clear the closely-set pendulum.

Turning Thuret's movement to the IX side, one sees the strike side; with now elaborate '*warning*' and '*locking*' detents, usually called "*gates*".

Note. In early pendulums *plainer* usually means *earlier*; (see Part I, cf. Oosterwijck *RH* with Coster *D8, D10*). Comparing Thuret 327 with his own early wooden-dials and simple gates; frames, pillars, layouts, mainly concur. His earliest has simpler hands, a plain locking-plate, with no numerals, and no pointer; dated c.1662 in Dr. Plomp's '*Pendules*', (Op.Cit. p.41, fig.52). His next example, (see [Thuret@Science Museum](#)), has numbered locking-plate with delicate pointer matching 327, yet that case already has repoussé brass crest and door-mounts, also a curious *skeletonised* fly, given circa 1670? Thuret movement 327 shares its construction with these fine early movements, so probably its '*batch date*' falls between 1665 and 1670. Around 1670, Thuret uses separate barrels for the greater durations, and more even running, of separated trains.



Thuret 327, Strike Train, Gates, Dial Hammer-Post.

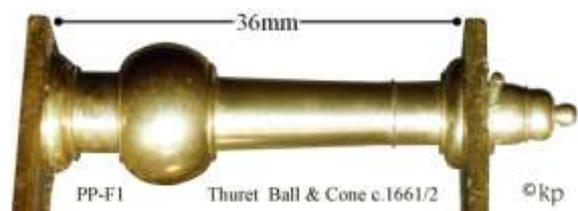


The Split-Barrel, 4-Wheel, 3-Spoked, Going and Strike Trains

The Split-Barrel is offset from the vertical Going Train. The offset Strike Train goes across, then diagonally up, the IX side, making for compact layout, 108mm x 88mm. Compare: Oosterwijck *RH* (115 x 94); Coster *D8* (120 x 98), and see Plomp, '*Pendules*', *D10*, (p.31, fig.30). Here, the *wheel to collet fitting* is evident. The pinned stud at top left is the long spring planted across Front-Plate down to Lifting-Piece, (see page 14).

Thuret's 'Ball and Cone' Pillar, (PP-F1).

This pillar shape is widely used by the French makers, (and some Dutch). Note finely turned 'nipple', not always present, 327 lower nipples have been reduced to clear the pendulum arc. Plate separation is 36mm, (Coster *D1*, 37mm; Oosterwijck's *RH*, 38mm; his *D9*, 39mm).



Thuret's 'pendule' 327 has a small *Split Barrel*, (going and strike), having short duration. **Part II** proposes a new originator for Dutch 'going' versions of Burgi's split-strike-barrel, namely Severijn Oosterwijck in his *Royal Haagseklok*, (see Part II, §4, Secret Constructions, pp.25-29). Notwithstanding the identity of the split going barrel's originator, its first use appears to be in 1657/8, with first exports to Paris in 1660. Yet its use in France was rather short-lived. Again, Dr.Plomp informs me, "As far as I can see, the Paris clock makers, Thuret included, started to use separate barrels around 1670; they became almost standard after 1675". Therefore, still having the split-barrel, is a reliable aid to latest date of Thuret's clock #327.

Dr.Plomp identifies a "first generation" of French pendulum clocks, that changed rather abruptly at the same time as adoption of two separate trains; now having 5 wheels in the going-train and 6 wheels in the strike-train, together with their simultaneous adoption of more advanced case styles. He was not able to be specific but infers the *first generation* ended between 1670-1675. (Dr.R.Plomp, '*Influences*', p.37).

Thuret 327's strike train, vertical hammer post pivoted on a false-plate (not on the movement), his fly and pillar shapes, are all comparable with his earliest wooden-dial movements, (see Dr.R.Plomp, '*Pendules*', Op.Cit. p.31, Fig.31). However, 327's strike-gates (detents) are the more ornate, so providing a clue to its chronology*. Thuret's *basic* movement 327 may be dated between 1662-1665, if as seems probable the three *movements* originated at a similar time, perhaps as a 'batch' in Thuret's first *oeuvre*. *Method used to date Oosterwijck's *RH*, against probably later Hague striking clocks bearing the signature cartouches of Coster, Visbagh, Pascal, even Oosterwijck himself. It is my justification for our "open research" project.

The superior quality of French work, Thuret's in particular, vis a vis early Dutch work, is proven by such normally unseen details of hidden count-wheel teeth and his delicate locking-plate engraving of Vine leaves, Numerals, and exquisite Hour Pointer; (see Locking-detent in the slot at 90 degrees to right).



Thuret 327 Count-wheel and Locking-Plate, Quality of Thuret's work is evident, even in teeth of Count-Wheel - hidden beneath Locking-Plate.



Thuret's attention to detail is also revealed in other hidden components, that no owner was expected nor able to see, e.g. the '*Click*' to Ratchet-Work (Right). Such detail reveal Thuret's perfectionist nature, fully justifying Christiaan Huygens' confidence in him, and recommendation of him by Constantijn Huygens Sr. as "*better than any clock maker in The Hague*".

NB. Thuret's spring clock was intended to be fixed onto a wall, with all such details never to be seen!

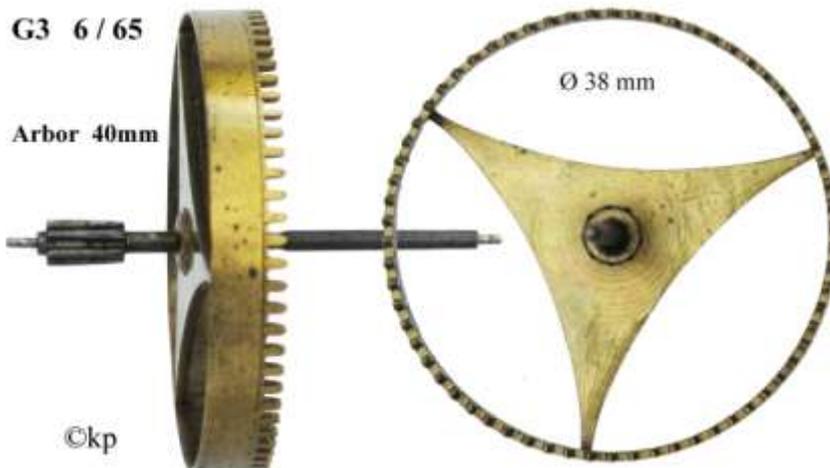
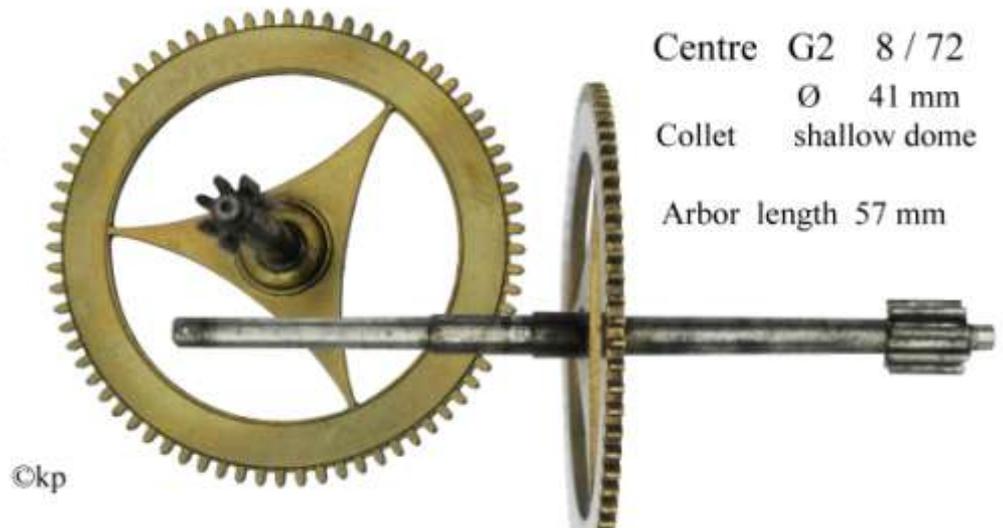


SPLT-BARREL: French clockmakers all adopted the seminal '*split going and strike spring-barrel*' of Oosterwijck's *RH*, here having bold steel '*Ratchet-Work*' at the front, but notably with no '*Stop-Work*'! That must be anticipated, (see **Part II**, §4, *Secret Constructions*), though French reasoning for its general omission is not known; a most surprising omission if Coster or Huygens had ever owned its "*Invention*". The steel ratchet-work has a scrolled '*click*', a broad flat spring, and a thick flat '*ratchet-wheel*' of 25 teeth. Fixed to the ratchet-wheel is a sturdy brass cylindrical boss pinned to the barrel arbor, of sufficient length to create a necessary depth for the underlying '*Centre-wheel*' at the front-plate, also the '*Pin-wheel*' driven from **S1**, (80 teeth, 2.2mm thick). Note: The barrel was not demounted to investigate the '*main-spring*'.



THE GOING TRAIN:

The Centre Wheel G2 is set forwards on the arbor* (like *RH*), with a shallow-domed collet set on the rear face. The Pinion set at the back in the manner of Coster's. This arbor has not *RH* relief for strike train. * *Pendules* are said to imitate Coster's model, Thuret 327 does not!



Contrate Wheel G3 is conventional with 3-spoked wheel also a shallow domed collet at the forward face.

The pinion, also, is at the front, as the escape-wheel is mounted in the potences from the back-plate.

I can see no evidence of a seam, to show that teeth were cut in-line then rolled to make a join. Probably it is cast, then finely turned-off.

The Verge Escape Wheel G4.

The escape wheel is conventional, but having an unusually high count, **35 teeth** and **6-leaf** pinion, Hague clocks are typically 25-29 teeth, to **5-leaf**. English clock makers also preferred the 6-leaf pinion. But see Thuret motion-pinion of **5** (p.14).

However there are unusual features, seen here in its potences. The lower potence is conventionally planted on the back-plate with a single elongated screw, being visible through the side windows.



This cocked 18mm potence supports the *escape arbor* upon a *steel-shim* slotted into the potence, **not** a *wedge in a dovetail*, (cf. Coster, cf. **RH**).

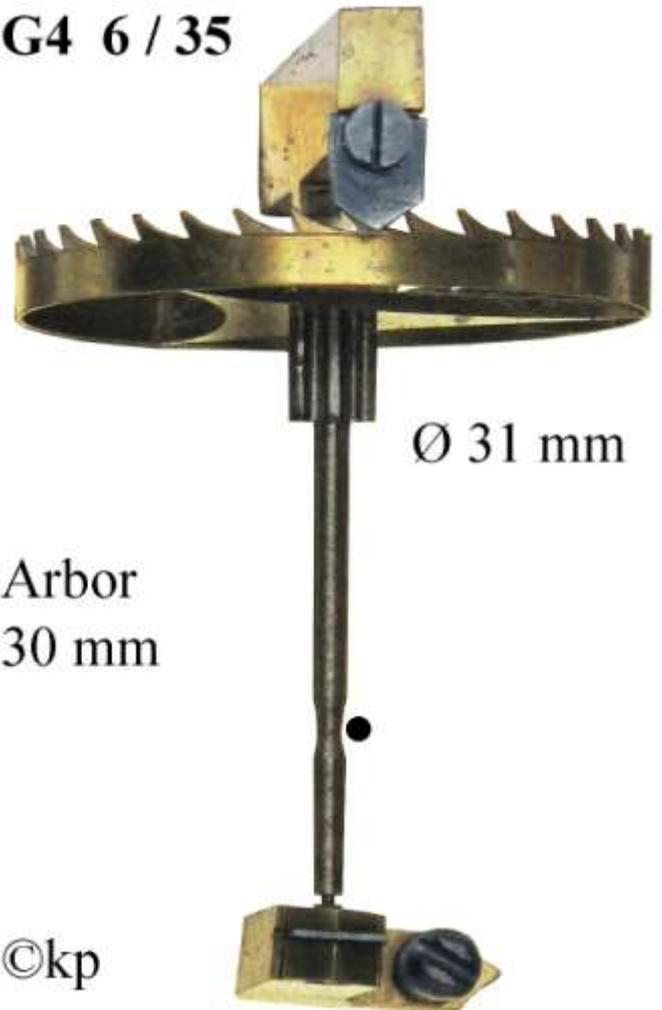
The longer upper potence, goes almost across the plates, being *riveted* into the back-plate. A central block accepts upper pivot of the vertical escape arbor. At its forward end, the verge pivot-hole has a steel endplate fixed by a screw; a refinement not seen in Dutch verges. The arbor has a tapered relief to clear the contrate arbor, (marked by a dot, see page 10).

Huygens' Suspension Cheeks:

The angular one-piece back-cock is located by two steel pins and screws, i.e. Thuret's *standard* pattern. [Similar cocks are now seen on a number of Dutch movements, marking long sojourns in France?]



G4 6 / 35



Arbor
30 mm

Ø 31 mm

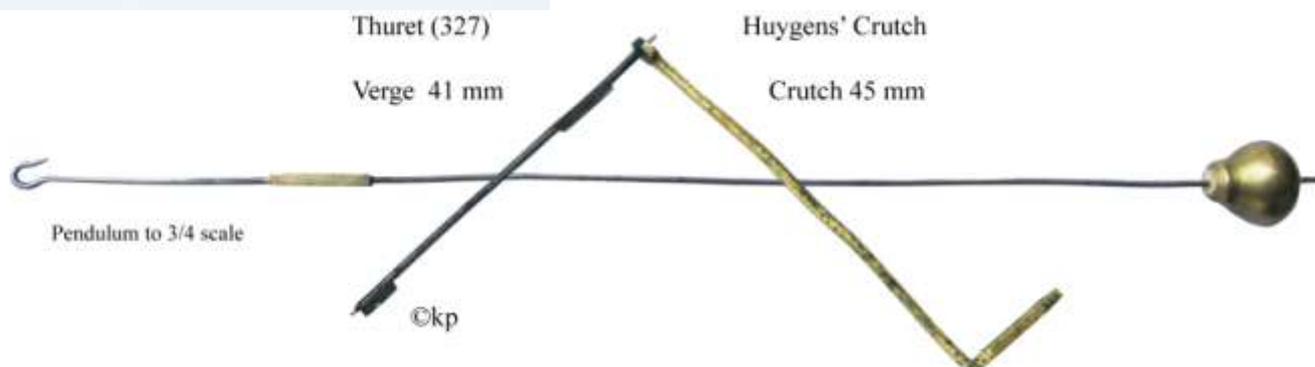
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Huygens' now 'Cycloid-Cheeks' are clamped into integral 'chops' extending out from the back-cock, secured by a single screw that also bears the silken pendulum-suspension shown here, far too short for purpose to work as Huygens intended.

The long Verge's rear pivot-hole in the dropped extension, is conventional; having no form of refinement such as practiced in England, nor even the front pivot-hole's end-plate.

Huygens' patent 'Crutched Verge' is conventional, having a small *loop* (F.manivelle, L.deorsum) for the pendulum, like Coster, unlike Oosterwijck's open fork to *RH*. Original gilding remains visible on the brass crutch - squared onto the verge.



Huygens' patent 'Suspended Pendulum', 16.5cm. long (6.5 inches), having a brass 'anti-banking plate' fitting the *Crutch's* closed *loop* (like Coster), also a pear-shape brass *Bob* held to its screw-end by a wood plug; *Boxwood*? It meets expectations, but probably is not the original pendulum; the *hooked end* is too long, leaving the suspension *too short* to wrap along the cheeks to work as Huygens intended, (see p.18).

MOTION WORK: ø
Minute-wheel 32 teeth
 Diameter 20 mm. **2 Pins**
 for Hours and Half-hours.
 Its *friction-fit* Minute Pipe
 is sectioned. (Conversely,
 so is Treffler's *frictionless*
[Seconds' Pipe](#)).



Reverse-Minute 32 teeth
 Diameter 20 mm. **Pinion 5***
 Cock recesses in False-Plate

Hour-wheel of 60 teeth [$60 \div 5 = 12$ hours per rotation]
 Diameter 38 mm. The Hour-wheel, here detached for clarity,
 is shown with the hour hand fitted to a plain round 'Cannon'.

***Thuret's Reverse Pinion** of **5 : 60** is the first encountered in *open research matrix*, where **6 : 72** is the universal standard. [Investigate Thuret motion work, also early French watches?]



STRIKE TRAIN:

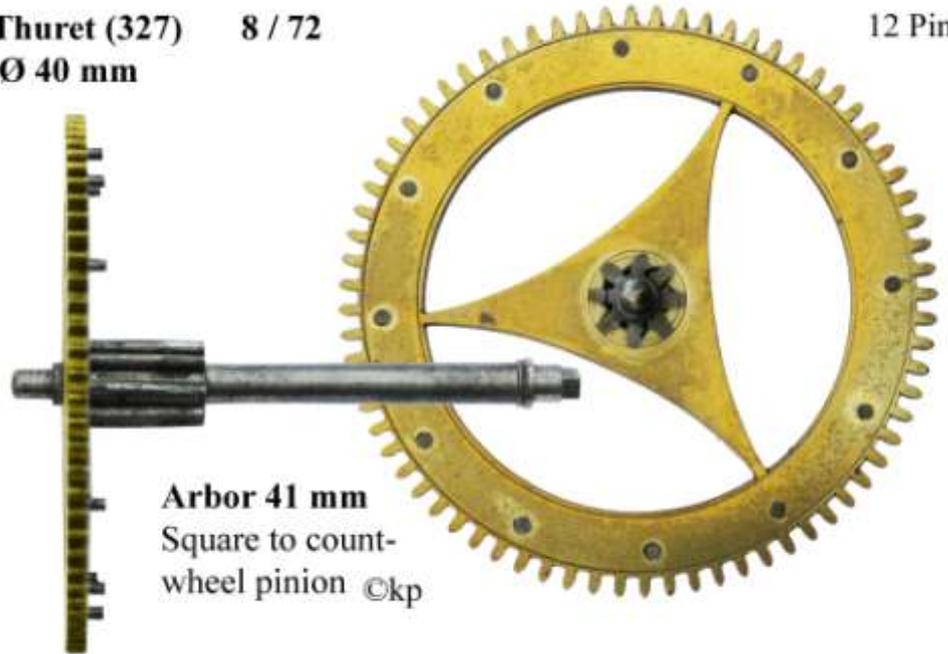
Conventional 4-wheel strike train, 3-spoked in the Dutch manner.

The 'pin-wheel' S2 fixed to pinion against the front-plate, planted beneath the barrel. The rear arbor spreads into a shallow 'collet' form, in manner of Coster centre arbors. The squared end bears the 12-leaf pinion to the count-wheel.

The warning-wheel S3 also has shallow domed collet on its front face.

Thuret (327) 8 / 72
Ø 40 mm

12 Pins

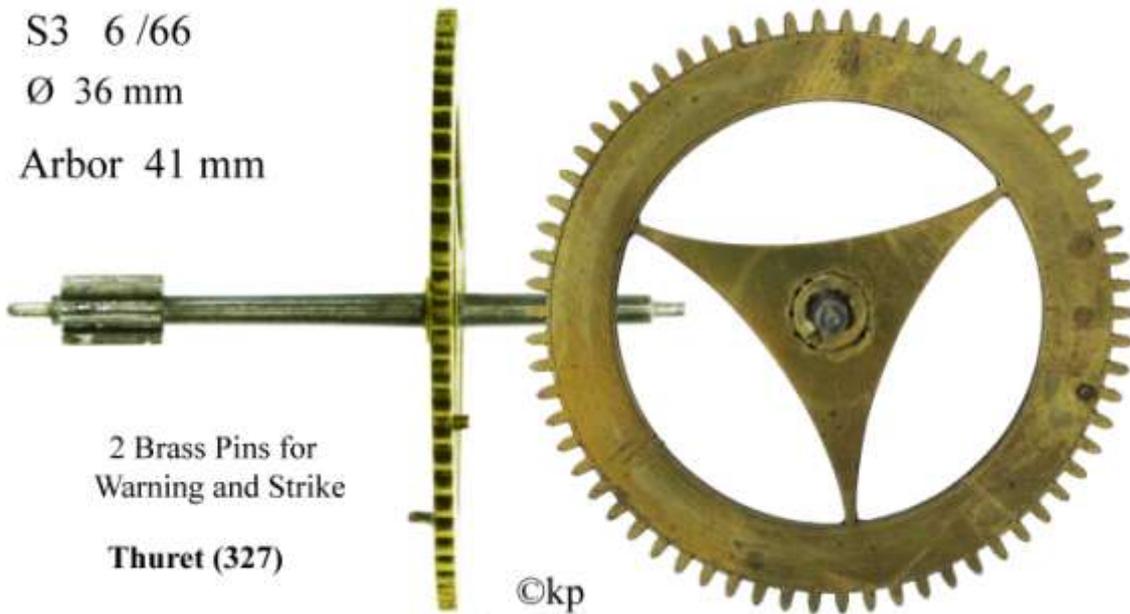


Arbor 41 mm
Square to count-wheel pinion ©kp

S3 6 / 66

Ø 36 mm

Arbor 41 mm



2 Brass Pins for Warning and Strike

Thuret (327)

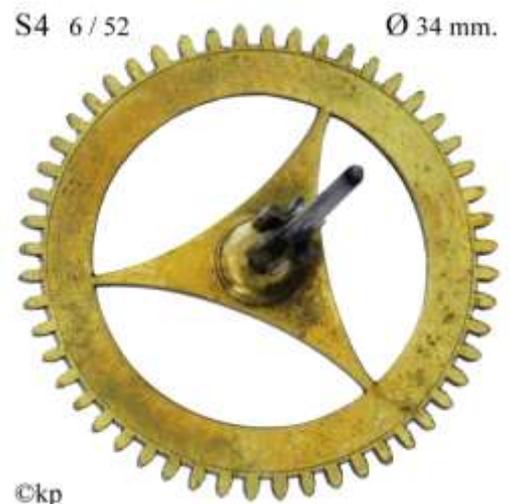
©kp

The Intermediate S4, penultimate to the 'Fly' (see p.16), also has Thuret's shallow domed collet on the front face of the 3-spokes, plugged into the wheel like S3 and S2 (above). The arbor and pinion are otherwise plain.

Note. The going and strike trains appear to be original throughout. Wheels have the fine shallow domed collet with step reliefs, mounted to the arbors in the identical fashion, all teeth are identically hand-cut and are well finished, (see detail of the count-wheel teeth at page 9).

S4 6 / 52

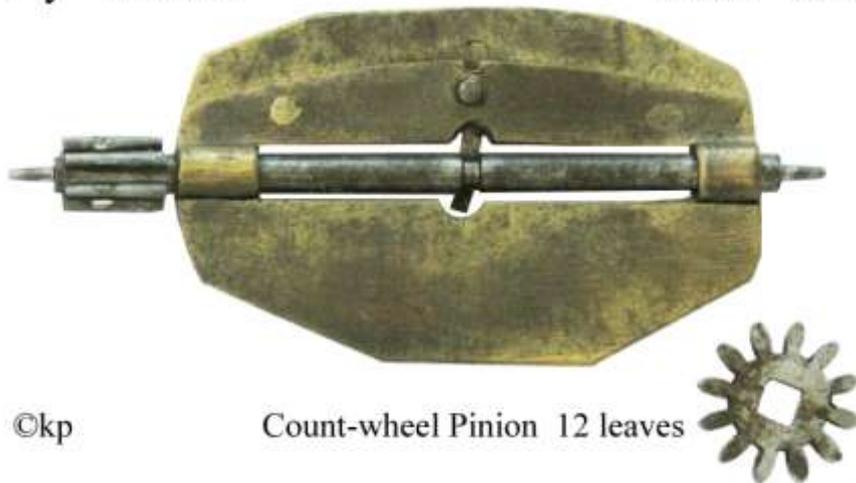
Ø 34 mm.



©kp

Fly Pinion 6

Arbor 40mm



©kp

Count-wheel Pinion 12 leaves

Left: The small Fly of two thin-plates lapped together by rivets, having a simple spring. Fly Arbor is 40 mm. Thuret uses Fly-Pinion of 6, whereas 5 is Dutch practice.

Below: The Count-Wheel Pinion, 12 leaves, loosely fits onto the square at the rear of the Pin-wheel arbor. [Note. *RH, D9*, have rare 10 leaves and 10 pins]

STRIKE WORK: ø

The Strike-Lever on front-plate, (see page 14), tripped every 30 minutes by pins on *Minute-Pipe*, pivots at its lowest point, having a 'wedge' to set-off the strike. A 'spur', on the decorated arbor below the 'warning detent', rotates the arbor with a 'cam' at the front-plate engaging with the 'crook' of the vertical 'hammer-post'. The vertical hammer-post pivots on the brass 'false-plate' fixed to the iron dial. The 'clapper' fitted on the squared end of the hammer-post rotates to strike the superior bell mounted behind the pediment on top of the case. Note the *bodkin-like* wire hammer spring, and cut-out front-plate slot for the 'crook' of the hammer post - which engages a 'trip' on the front-plate strike-lever, activated by the pin-wheel.

Strike Gates ø (Below)

Ornate steel scrolling detents are pivoted across the plates, see plain reverse and carved obverse faces. The 'crooked' hammer 'trip' (right) engages a 'spur' on the decorated lower arbor tripped by the pin-wheel.



'Nipples' reduced to clear pendulum



The brass 'finger' on the upper gate (above left) is a repair to the *locking-detent* (above centre) in the rear slot adjacent to the locking plate. The original 'detent' would have been steel, an integral part of the upper strike gate. It is but a minor blemish on an otherwise original train.

The Octagonal Steel Hammer Post (above right) rises behind the dial plate, having a detachable clapper on a stem though the top of the case, exiting to the superior Bell, mounted behind the Arched Pediment.

THE BELL: ø [Diameter 80.1 mm., Height 25.1 mm., 2.0 mm Thick]

The single bell is positioned externally, above the case and behind the Arched Pediment, (see page 2).

The Bell-Stand is 7mm square section nail ending in a hand-cut wood-screw, which is plugged right through the uppermost board of the Case.

The bell is fixed with a nut, 10 mm. square Height *in situ*, 42 mm.

Typically later *bells-stands* are more robustly mounted onto the case, by a platform fixed by nails or screwed fast.



THE COUNT-WHEEL AND ITS LOCKING-PLATE.

The rear end of the Pin-Wheel Arbor exits through the back-plate, having a square onto which is loosely fitted a Pinion of 12 leaves (p.16), held in place by the Locking Plate. The large Count-wheel, riveted behind the locking-plate, is driven by that pinion. Each pin of the **12-pin** Pinwheel allows the **12-leaf*** rear pinion to turn one tooth per blow. In twelve hours, the sum of ordinal hour blows is 78, plus a single blow at each half-hour; making 90 blows per 12-hours; 90 being the number of teeth in this Count-wheel. [*12 is *universal standard*, after Oosterwijck's seminal *RH* and *D9* having **10** pins and **10** leaf pinions].

STRIKE: Count-Wheel and Locking-Plate ø

The Locking Plate (Diameter 62 mm) has 12 unequal detent slots for the ordinal hours **I-XII**. Wider than usual detent slots permit single blow at each of the half-hours. (nb. scuff mark at **I**).

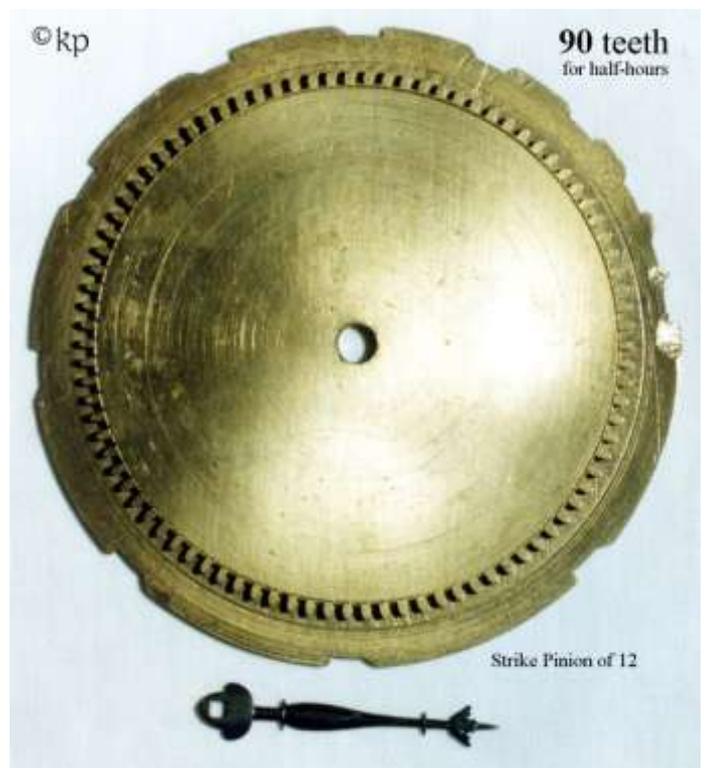
The Count-Wheel (Diameter 54 mm) having 78 hour blows + 12 half-hour blows = **90** teeth.

Drive Pinion (p.14) 12 leaves on pinwheel arbor.

Blued Steel Hour-Pointer ø: Length. 26 mm.

View: Count-Wheel and Steel Pointer:

The quality of Thuret's work is evident, even the teeth of the Count-wheel hidden under Locking-Plate - in a clock to be hung on a wall! (See the Locking-Plate obverse at page 11).



Isaac Thuret (327) - Back-Plate (obverse)



©kp

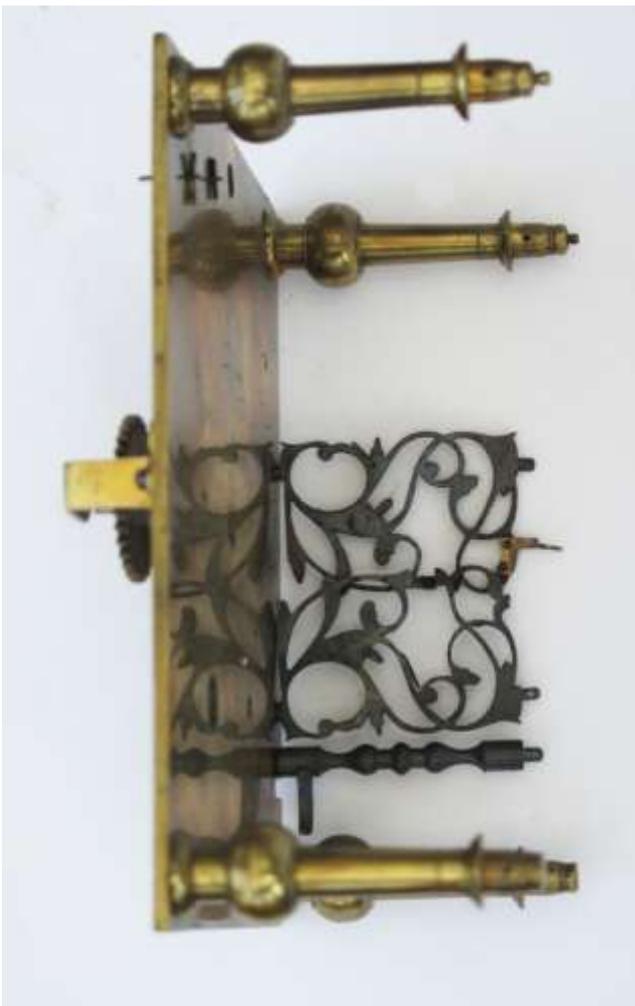
,Original 'Fire-Gilding' with blemishes. Minor pivots bushed, two large pivots are 'bumped'.

Isaac Thuret (327) - Back-Plate (reverse)



©kp

Plate 108 mm x 87.5 mm



The Front-Plate ready for 'mating' to the Back-Plate. The prominent Motion-Cock recesses into False Plate.



Huygens' Pendulum and Cheeks. (Silk suspension here is too short to wrap to and along the Cheeks, to modify length with amplitude, to avoid 'Circular Error').

DIMENSIONS: ISAAC THURET (PARIS - SPRING MOVEMENT WITH STRIKE (#327)

MOVEMENT PLATES: ∅ The plates retain much of the original 'fire gilding'.

Back plate 110 x 89 mm (pinned) 2.0 mm Thick Front plate 111 x 89 mm 2.0 mm Thick
Pillars (4) 36 mm between plates, 5.5-13 mm Thick Cone & Ball section [Pattern [PP-F1](#)]
Cf. Oosterwijck **RH** 119 x 94; Oosterwijck **D9** 117 x 95; Coster **D8** 120 x 98; Pascal **D11** 111 x 90.

SPLIT (Going & Strike) BARREL: ∅ ('A Royal Haagseklok', Part II, §4, Secret Constructions),

Barrel: ∅ Diameter 48 mm Width 22.5 mm **Arbor** ∅ Length 63 mm **Square** 4 mm.

Ratchet work FRONT, circumferential Spring, Click, Ratchet-wheel, 25 teeth, diam. 30 mm

Great Wheels: FRONT, **Strike 1 80** teeth diam. 60 mm REAR, **Going 1 80** teeth, diam. 58 mm

Centre Arbor Length **57.0 mm** diam. 4.0 mm **Pinion** (at back) **8** Leaf diam. 10 by 17 mm.

The Centre-Wheel is planted at Front-plate, like **RH**, (unlike Coster); Centre Pinion set at Back-plate.

Stop-Work: As must be expected in any French pendulum, there is no evidence for '**Stop-Work**'.

GOING TRAIN: ∅ The original 4-wheel train of 3-spoke wheels (G2-G4) is typical of Hague clocks, also of early *Pendules Religieuse* pendulum clocks. All wheels have teeth demarked by punched-lines (see page 11), the train-wheels have matching shallow domed collets.

Wheel Count: 72/6 x 65/6 x 70/60 = 152 beats Nominal Pendulum = 15.6 cm (Actual 16.5 cm)

G4 Escape wheel p. **6 / 35** teeth diam. 31.0 mm Pinion 3.7 mm 3 Spokes, domed collet

G3 Contrate-wheel p. **6 / 65** teeth diam. 38.0 mm Pinion 3.5 mm 3 Spokes, domed collet

G2 Centre-wheel p. **8 / 72** teeth diam. 41.0 mm Pinion 4.82 mm 3 Spokes, domed collet

G1 First-wheel **80** teeth diam. 58 mm 2.0 mm thick.

Potences: Top, depth 35 mm riveted to back-plate; Bottom, depth 18 mm, steel shim, screwed to BP.

MOTION-WORK: First recorded with Pinion 5 to Hour-Wheel 60 (60÷5=12). Refer [matrix](#).

STRIKE TRAIN: ∅ The original 4-wheel train of 3-spoke wheels (S2-S4), already planted to the movement's **IX** side, typical for Pendules Religieuses - but by no means an absolute rule.

SF Fly p. **6 / 2** vanes **30 x 18** mm Pinion 3.6mm Steel friction spring.

S4 Fourth-wheel p. **6 / 52** teeth diam. 34 mm Pinion 3.7 mm 3 Spokes, domed collet

S3 Warning-wheel p. **6 / 66** teeth diam. 36 mm Pinion 4.9 mm 3 Spokes, collet, **2 brass pins**

S2 Pin-wheel p. **8 / 72** teeth diam. 41 mm Pinion 5.2 mm 3 Spokes, collet, **12 steel pins**

S1 First-wheel **80** teeth diam. 50 mm 2.2 mm thick.

DIAL-PLATE AND CASE ∅ (The 'fashionable outer garments' of the movement proper)

Dial (Iron) H.222 mm W 181 mm 1.3 mm Thick Brass False-Plate 110 mm by 88 mm.

Case External H. 39.75 W. 26.5 D. 13.4 cm

Case Internal H. 29.5 W. 21.2 D. 8.3 cm

Pediment H 8.5 W. 23.7 D. 2.5 cm

Total Height H. 42.75 cm. (incl. Finials)

Door Frame H. 26.75 W. 23.4 cm

Dial Reveal H. 20.2 W. 16.6 cm

Door Stiles W. 3.0 T. 1.4 cm

Back-Door H. 24.0 W. 17.0 T 0.75 cm

Total Depth, D. 13.2 cm (incl. Moulding)

Side Walls T. 1.0 cm (incl. Veneer)

Rebated back-door and rear case stiles form a dust seal.

Isaac Thuret was followed by his son, Jacques Thuret (1669-1739), the uncle of engraver Suzanne Silvestre, (on the following page is her portrait of her uncle).

ANNEX "PENDULES RELIGIEUSES" ~ EVOLVING TO 'SECOND PERIOD' 1670-1680; SEPARATE (OFTEN ASYMMETRIC) BARRELS ~ CASES BECOME MORE REFINED:

As Dr.Plomp observes, around 1670 the French began to drop the Tandem (*Split*) Barrel, then preferring independent barrels for each train, also improving durations to one week. Anyway, in so far as power delivery for a precise timekeeper, the **split barrel** was a *Chimera*, (see **Part I, First Assessments**, p.23). By 1675 this change was general in France; in England a decade earlier; the Dutch only follow suit later. Often the new strike barrel was eccentrically placed between IX and XI. (Ahasuerus Fromanteel planted his barrels symmetrically at XII and VI; then by 1665, he adopted his universal standard at V and VII).

Dr.Plomp's "*characteristic properties*", already losing favour in France, were swept aside by new cases. Thuret continued to use the fixed wood-dial, whereas, Claude Raillard I still used the pivoted brass dial. Their illustrated cases still have eyelets to suspend on walls, cases still have full-frame doors, still shallow base mouldings, now more elaborate side windows, and now exhibiting more ornately decorative styles.



Isaac Thuret - c. 1675

Isaac Thuret, Paris, circa 1675.

nb. Sides also veneered in Tortoiseshell



nb. Count-Wheels move down to lower corner, due to an additional wheel in an *inverted* strike train.

nb. Thuret is still using Wood Dials, now veneered or having an ebony line-inlay.

nb. the rare 'boat-shape' Bob, (to minimise air-friction and concentrate vertical mass).

Isaac Thuret
(Piggott archive 1983)

Right: Claude Raillard (Piggott archive 1975)

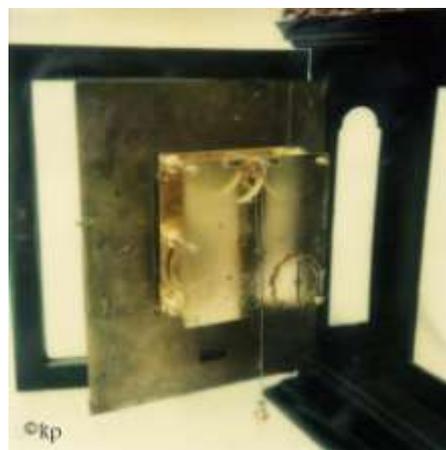
Provenance: Dr Reinier Plomp, my first Pendule Religieuse. The unfortunate fashion for polished plates was at its height.



Claude Raillard Paris

Claude Raillard I, Paris, circa 1675.

nb. ornate metal spandrels begin to appear, brass moulding to door reveal, furniture key.



Pivoted brass dial-plate. **nb.** superb finish to Claude Raillard's seven-day movement.

**ANNEX "PENDULES RELIGIEUSES" ~ EVOLVING TO 'THIRD PERIOD' 1680-1690;
SEPARATE AND SYMMETRICAL BARRELS ~ CASES BECOME ARCHITECTURAL:**

By 1680, French cases were adopting English-led architectural features, but in more florid styles, using more extravagant materials to decorate the exteriors of their enlarged cases. Full-frame doors disappear; gaining pilasters, capitals, columns, plinths, friezes, and caddies. By 1690, cases developed out-swept free columns (even ivory) on stepped bases, with finest marquetry, ormolu or silver. Dr.Plomp illustrates the riot of artists' talents employed in making cases. Marquetry of pewter and brass in tortoiseshell came forth, from workshops of Pierre Gollé also André-Charles Boulle who also cast the finest mounts. These became more elaborate, with figurative Classical themes; Atlas, Bacchus, or Chronos on dials; Herms and Caryatids supporters; with miniature sculptural triumphs surmounting new caddies. Fashionable Rheims was at the forefront with Guillaume Vandestric's beautiful clock, circa 1677. Of interest, G.Vandestric moved his strike work back to the **III** side in Dutch manner, he achieved superb matt and polished gilding effect to chapter ring: *Sadly his clock is now vandalised!* Daniel Marot's unique baroque carved, gilded, *Royal* case with console went to the famous Johannes van Ceulen at the Hague. Hans van den Ende confirms Amsterdam Huguenots made *3rd period 'French' cases* for Carel Meijbos, Joseph Norris, etc..

Guillaume Vandestric A Rheims

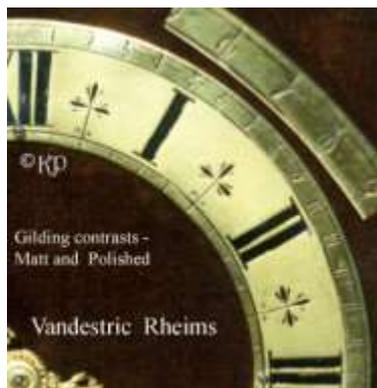


Movement
at restorer >

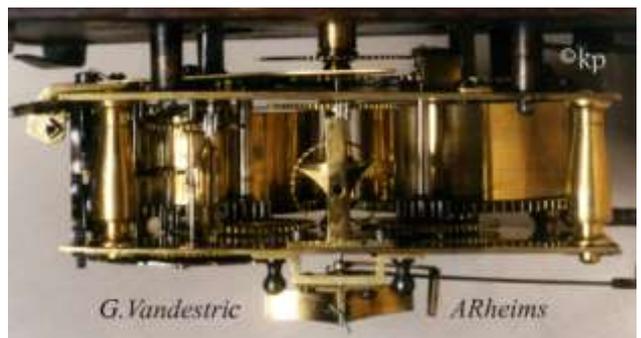
Carel Meijbos Amsterdam (d.1695)
(Courtesy of a private collector)



<note 'feet'>



< Contrasting Matt and Polished Chapter-Ring; fixed at cardinal points by external screws; the minutes 1-9 'scribed through, like Coster's DI and D5, (i.e. First State, Pattern PCR1), but having inner-ring marking the Quarters. (Piggott archive 1983)



NB. Strike train on Dutch side, vertical hammer.

ANNEX "PENDULES RELIGIEUSES" ~ EVOLVING TO 'FOURTH PERIOD' 1690-1700; FURTHER DEVELOPMENTS AND ORIGIN OF "REGULATEURS DU PARQUET".

Dr.Plomp marks the dénouement of 'Pendules Religieuses' by the disappearance of velvet on dials, and the appearance of enamel cartouche numerals, in metal mounts, also lambrequins to fronts of cases, etc. That is true of fashionable Paris and Rheims, but less so in *provincial* areas like Lyon also Mezere where local adherence to baser forms and to simpler pewter or brass marquetry persisted, (*see below right*).



Anon, c.1695. Hans v/d Ende identified this provincial case as typical of the '*Lyon*' region. This pewter on ebony design is repeated in the *Pendule* signed '*Pierre Nourry a Lyon*', (H v/d Ende, '*Archief Nourry 01*').



Guyet
Mezere



French forms of *Quarter-Repeating* became popular for bedrooms. Clock cases too had to meet the lavish standards of other furniture; i.e. *mirrors, commodes, bureaux Mazarin, etc.* **Charles Chastelain** achieved that spectacularly. (Piggott archive 1983)



THE HIGH-POINT OF BOULLE-CASED, FOURTH-PERIOD, PENDULES RELIGIEUSES.
Images of this superlative clock, by François Rabby of Paris, are the copyright of Mr David Kelly.



Rabby A Paris



François Rabby married the widow of Corneille Godefroy in 1686. He moved from Rue de Harlay to Place Dauphin, in Paris, and became a Master in 1717.

This 3-colour marquetry and tortoiseshell case, clearly, is from the workshop of André-Charles Boulle, c.1690, being the apotheosis of its type and closely related to the case of Antoine Gaudron's astronomical solar clock, (Plomp, *'Pendules'*, Op.Cit., p.83, Fig.148). Late split-barrel movement has extra feature of a pull-quarter repeat on 3-bells, but at some time in its life it lost the cycloid cheeks. The dialplate has 12-piece enamel numerals, pinnedfast, also a very rare signature mount - perhaps one Boulle reserved for his use?



Fine Pierced Steel Hands, (reverting to an earlier style).



Restoration by Paul Shrouder