

# A Royal 'Haagseklok', Appendix Three, Open-Research, Memo-Treffler: Johann Philipp Treffler's 1657/8 Pendulum Timepiece (DØcopy).

Reviewed by Keith Piggott

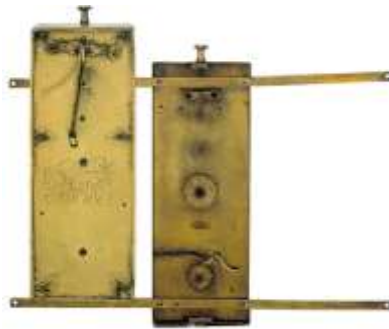
Johann Philipp Treffler of Augsburg (1625-1698), an early pendulum movement circa 1657/8, fully signed "*Gio filippa Treffler Augusto*", made for Grand Duke Ferdinand II de Medici, Florence. Treffler purportedly copied Salomon Coster's new pendulum, sent by Senor Tito L. Burratinij on September 23rd 1657. (Istituto e Museo di Storia della Scienza - Institute & Museum for the History of Science, Florence; inventory 3557). [Ref: Dr. Maria Luisa Bonelli, "Di un Orologio di '*Gio. filip Treffler*' di Augusta", *PHYSIS* 1960, Vol.II, Part 2, pp.242 etc., editor Leo S. Olschki, Fierenze; also Silvio A. Bedini, "*Agent for the Archduke, Another Chapter in the Story of Johann Philipp Treffler, Clockmaker of Augsburg*" - *PHYSIS* 1961, Vol.III, Part 2, pp.137-158; Dr. R.Plomp, "*Spring-driven Dutch pendulum clocks 1657-1700*", (*Pendulums*) pp.15-16, Interbook International b.v., Schiedam 1979].

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*Gio filippa Treffler Augusto*

View (L): Treffler's Medici Pendulum Timepiece [68V Treffler]. Florence's 1966 floods destroyed this Germano-Italian tabernacle case. (Image origination © Keith Piggott. Courtesy of the Museum of the History of Science, Florence). [Tabernacle](#) cases, of wood, already were a long established Continental practice. Whereas, England's earliest wooden cased spring-clock probably was in 1649, for Ahasuerus Fromanteel's Solar Musical grande-sonnerie minute-striking audience clock made for Mr Dudley Palmer of Grey's Inn.



View: Treffler's Pendulum Movement, 1658. [69V Treffler2] A protective box surrounds the movement, secured at front plate. Two bars secure the movement to the door and hold the dial-plate. Wound at the back. (Image origination © Keith Piggott, Courtesy of Istituto e Museo di Storia della Scienza, Florence).

Probably, other than his *Patent* model of 16th June 1657, Coster's earliest dateable Hague clock (NL 'Haagseklok') is a timepiece which Senor Burratinij sent to [Ferdinando II de' Medici, Grand Duke of Tuscany](#) (1610-1670), on September 25<sup>th</sup>, 1657. [His brother, also Ferdinando de' Medici (1617-1675), a Cardinal and noted antiquarian]. Burratinij's gift, probably, was Coster's own work, yet being already some three weeks after his September 3rd Contract, John Fromanteel, possibly could have made it. Coster's timepiece is described in a 1690 Medici inventory as "*having a short pendulum, in an ebony case with a wavy cornice*", (see Plomp R, '*Pendulums*', Op.Cit. pp.15,16). A wavy cornice, like contemporary Dutch picture frames, is a first exception to Dr. Plomp's '*Characteristic P2*', (plain flat doors). Presuming it to be a *spring clock*, and using Dr.Plomp's '*Chronology*', (Op.Cit), I named it '*DØ*'.

**Treffler's 'Copy'**. The whereabouts of Coster '*DØ*', Senor Burratinij's gift to Ferdinand de Medici, is now unknown. Fortunately, late in 1657, the Grand Duke ordered his clockmaker Johan Philipp Treffler of Augsburg to make a '*copy*'. That movement survives, therefore I have named Treffler's timepiece, '*DØcopy*', (Invent. 3557, Istituto e Museo di Storia della Scienza, Florence). Its tabernacle case was destroyed in Florence's 1966 great flood. Treffler's timepiece has a short pendulum suspended between cheeks, like all Costers, but it also shows '*seconds*'! (Plomp R, '*Pendulums*', Op.Cit. p.16, Figs.9,10, 11). Leaving aside Treffler's claim, *to priority for the pendulum*, I reason that he probably followed Coster's *short-pendulum* train, although he adds the Augsburg fusee. It is presumed that Coster '*DØ*' was spring-driven, whereas Huygens' patent timepiece '*DØIW*' was weight-driven. Nb. **Bedini's** commentary asserts that Treffler had completed Galileo's pendulum Timer in 1656, (Silvio Bedini, '*Giuseppe Campani, Discorso 1660*', Polifilo edition, Milan, 1983, p.LX). However, Sebastian Whitestone pointed out to me that Bedini's assertion has never been substantiated.

**The Grand Duke Ferdinando II de' Medici (1610-1670)**

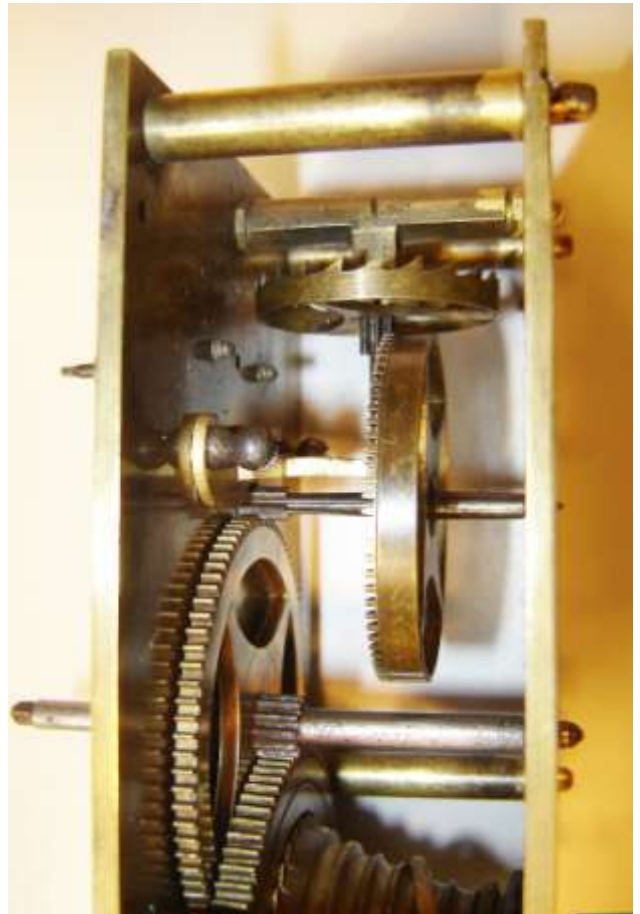


I am grateful to the **Istituto e Museo di Storia della Scienza, Firenze**, [The Institute and Museum of the History of Science, Florence, recently renamed *Museo Galileo*], expressly **Senor Giorgio Strano (Curator)** and **Professor Andrea Palmieri (Independent Conservator Horologist)** for acceding to my requests to remove this unique early pendulum movement from display, then to make a thorough examination of it, to provide the dimensions and wheel counts also new images for this review. Herein, with their consent, I have condensed Prof. Palmieri's Power-Point presentation of his conservation, in Italian, and I have added my own observations ~ to provide for '*open research*'. All images and KP originations by courtesy of Museo Galileo, being the copyright of Professor Andrea Palmieri.

**Right: Johann Philipp Treffler's 4-Wheel Train, with Fusee and Huygens-Coster Pendulum Escapement.**  
Prof. Palmieri regards the wheel train as being original.

**Train: 120 Beats per Minute. Pendulum 24.9 cms.**  
**Fusee 96 Centre 12/90 Contrate 6/80 Escape 7/21**

**KP.** Might this train be one Huygens-Coster employed, or is this Treffler's own train? Evidence collated in the *open research matrices* show no similar Coster train; Huygens' own sea-clock is closest (120, 8/96, 6/80, 5/17), but drawn in 1663 and intended for longitude. Are Treffler's numbers perhaps an earlier Huygens' design, which Coster had used before John Fromanteel had joined him? Unless that is so, it rather confounds a belief that Treffler had made a '*copy*' of Coster's timepiece movement that Sr. Burratinij sent to Grand Duke Ferdinand II de' Medici on Sept.23rd 1657.



**Left: Original 4-Wheel Train Planted onto Front-plate; the back-wound 7-turn Fusee (Augsburg shallow cone), the Fusee- Stop mounted on the back-plate (see p.6).**



**"Particolari del meccanismo"**

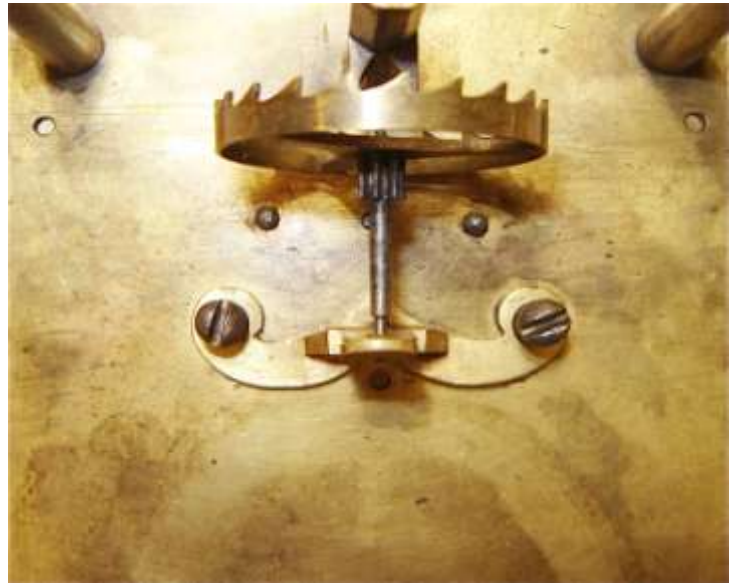
**KP.** The upper potence is, in fact, an *octagonal* seventh pillar, having a pivot block attached to its inferior side. The lower potence has a double-footed cock fixed with internal screws so the escape-wheel cannot be removed without separating the plates; i.e. like most Coster's, but unlike Oosterwijck *RH* (and unlike Fromanteel's). Arbors have no taper, the centre-wheel is fixed onto its pinion, like all Coster's, but set against the front-plate, unlike Coster's. Three wheels have four spokes, yet the escape has just three - like all Coster movements. Whereas in Hague Clocks the standard for Escape and Contrate is three spokes, having different spoke numbers is unusual.

**However**, like Thuret's rediscovered Regulator, Treffler's *crutched-verge* and *curved suspension cheeks*, were assuredly the intellectual property of Christiaan Huygens, i.e. not of Johann Philipp Treffler. This point is made here because Treffler, and Grand Duke Ferdinand II on Treffler's behalf, claimed he invented a pendulum clock independently of Christiaan Huygens. **That premise is not evident here!**



**View: Treffler's Escape-wheel (7/21) with his Distinctive Potences and Octagonal 7th Pillar.**

**KP.** Three in-line holes on the front-plate, just below the escape-pinion, are for screws to a small front-bridge with Seconds-pipe, the central pivot-hole for the Seconds' hand pinion/arbor, driven by minute-wheel off contrate-arbor. Here it is pertinent to ask whether the Octagonal 7th pillar was Treffler's own model, or was inspired by Coster's timepiece? If so had Severijn Oosterwijck assisted Coster, or saw Burratinij's clock perhaps with Octagonal pillars? Prior to this new information, it was believed that the Octagonal pillar was unique to Severyn Oosterwijck's '*Royal Haagseklok*'. [Note. Italian archives might yet reveal that Coster '*DØ*' still exists; might Burratinij's '*Medici Coster*' be endowed with octagonal pillars?]



**"La ruota scappamento montata"**

**View: Huygens' type Crutched-Verge  
"L'asta e la forchetta dell' ancora" ?**



**"La leve dell' ancora"** (Image origination by author).

**KP** Being pre-1660 Huygens' cheeks as copied by Treffler, should be of empiric form, then not Huygens' *cycloids*. [Prof. Palmieri suggests cheeks are modified]. Fire-gilding of all the visible parts is evident in Treffler's movement, unremarkable because it was intended for **The Medici Prince of Florence**.

Again, notwithstanding the far removed place but similar date, there is no doubt that these '*suspension-cheeks*' were intellectual property of Huygens' - not Treffler. Again, I deduce that Treffler had had before him an early Coster pendulum clock. Was it pre-Contract movement of Coster's own making, or made by John Fromanteel after 3rd September 1657?

**By all these features, the Coster link is established, Huygens' intellectual property is proven, I proceed to examination of the component parts.**

**KP.** The long steel verge with untypical pallet shapes, appears to be the original, as does the short brass crutch which had sustained some minor damage; (bent in the 1966 floods, then subsequently reinforced with a plastic tube). Of interest is the crutch's closed loop to accept the pendulum rod, i.e. like all of Salomon Coster's, but unlike Oosterwijck's *Royal Haagseklok*.

Notwithstanding the far removed place, but the contemporary date, there is no doubt that this '*crutched-verge*' was the intellectual property of Christiaan Huygens' - not Treffler. Therefore, one may deduce that Treffler had had before him an early Salomon Coster pendulum clock.

Was *DØ* a 'pre-Contract' movement by Coster himself, perhaps, assisted by Severijn Oosterwijck? Or was movement *DØ* contracted by John Fromanteel between the 3rd and 23rd September, 1657?

**View: Huygens' type Suspension Cheeks.  
(Image origination by the author).**

**"La cicloide"**

Original Left Cheek, Obverse and Reverse



Original Cock of Right Cheek.

**View: Treffler's Original, Engraved and Gilded, Back-Cock.**



**"Il ponte dell' ancora"**

**KP.** The shaped feet bear a resemblance to the Trifid cock on Coster 'D3', which Berry van Lieshout considers to be the only true 'Coster-Coster' and probable the antecedent to Coster *DI*, like Burratinij's Medici gift.

**"Le cicloidi" Back-Cock and Cheeks, (right cheek is a museum reconstruction).**

**KP:** The pendulum suspension loop is as Huygens intended, i.e. long enough to work to wrap itself to, and along, the laminae, thus to alter the evolute of the pendulum arcs with all amplitudes, to reduce *circular error*, which others had observed, but Huygens first discovered the cause, and an empiric solution to in 1657, by his curved Cheeks; i.e. before his Cycloid construction (1660) and geometrician's proof published in '*Horologium Oscillatorium*' (1673). It seems likely that these cheeks have been reshaped at some time, perhaps even by Treffler. The original cock of the broken right cheek, has received a new *prosthetic* cheek; a '*museum reconstruction*' to denote a new part, to maintain the integrity of the original cock for future researchers.

**NB.** In these two essential respects -the pendulum-crutch and the pendulum-suspension- there is no doubt that Johann Philipp Treffler used the *Medici Coster* - a gift of Senor Burratinij on 23rd September, 1657- as the working model for this, his earliest known pendulum clock. This evidence casts all previous claims, by Treffler and also by his patron The Grand Duke Ferdinand II de' Medici on his behalf, for his independent invention of the pendulum as being without any foundation. [Silvio Bedini's claim is presently unsubstantiated]

**KP.** Treffler's '*Augsburg*' fusee is significant, being his movement's first obvious difference to Coster's **extant** timepieces. The fusee was a product of the German guild system controls; even then the fusee was ancient. Both Coster and Treffler trained as watch and clockmakers using the indispensable fusee. Huygens even mentions the fusee in "*Horologium*" (1658), describing it, in Latin, as '*pyramide*', (whereas '*conus*' would have been more apt). The fusee is based on mechanical principles of '*levers*'; the charged spring tensions the gut line to the smallest radius of the cone, as it unwinds the radius, thus leverage, increases the mechanical advantage to compensate for reducing spring power; to maintain an equal force to any wheel train it drives. It seems curious to me that Coster would drop it, prematurely, at least not until Going and Split Barrels were proven to his also to Huygens' satisfaction. However, as I said elsewhere, before his Contract to John Fromanteel, we have no evidence to know that Salomon Coster had never applied the fusee to his first pendulum spring-clocks..

**Treffler's '*Augsburg*' Fusee with Ratchet.**



**"Il conoide"**



**View: Treffler's Timepiece Movement (Oblique Right).**

**KP.** Whilst the Train, now, appears conventional, that was not so in 1657/8; and its extraordinarily novel Seconds' display is highly individual. [See *RH*, Part II, Oscillatorium, §6, The Seconds' Hiatus] Might it be Treffler's own design, or Huygens', or even one produced by Coster in some *pre-Contract* movements before *John Fromanteel*, perhaps one being Burratinij's gift to **Grand Duke Ferdinand II de' Medici**?

**Description:** the Fusee arbor drives Motion-work; a small hour wheel ( $z=40$ ,  $\text{Ø } 30 \text{ mm}$ ), which drives a larger Hour Cannon ( $z.60$ ,  $\text{Ø } 37.30 \text{ mm}$ ). The conventional Centre arbor extends through the Hour Canon to the *novel* Minute hand. An extended Contrate arbor drives the small Minute-wheel ( $z.60$   $\text{Ø } 30\text{mm}$ ), driving a Seconds' Pinion ( $z.=15$   $\text{Ø } 8\text{mm}$ ) pivoted on the front-plate under a small Bridge, its arbor extends through a cannon to *unique* Seconds' Hand.

Protruding from top and bottom of the front-plate are two rectangular studs, tapped for screws to secure a protective dust-cover - a hollow-box surrounding the movement.

Perelli's 1770 drawings of Treffler's '*Medici*' pendulum movement is observed with great attention to every detail. (Dr.R.Plomp, '*Pendulums*', Op.Cit. p.16, fig.9; Dr. M.L.Bonelli, *Physis* 1960, Op.Cit, pp.247-8, fig.4-5).

[Nb. Treffler's arrangement might resolve constructions of Bruce's extant [sea-clocks](#) back-dials ~ on Contrate arbors; his English made longitude clock has a **60 Seconds** back-dial; whereas Severijn Oosterwijck's '*copy*' is wrongly said to have a **4-Minutes** back-dial; putatively for sidereal time?]

**View (L): Seconds' Bridge with Cannon and Seconds' Pinion.**

**"Particolare del rocchetto secondi"**



Studs under the Seconds' Bridge have no apparent purpose - collecting swarf?.

**KP.** Wrought brass Bridge is fabricated from parts. The Seconds' arbor, cannon, and pinion, ( $z = 15$   $\text{Ø } 8.0 \text{ mm}$ ) are visible. So is a 'bumped' pivot-hole for the Contrate's extended arbor, driving the new 'Minute' wheel to the Seconds' Pinion. Also seen are two screw-holes and a central locating stud for an internal potence to bear the escape wheel.

**"La minuteria"**

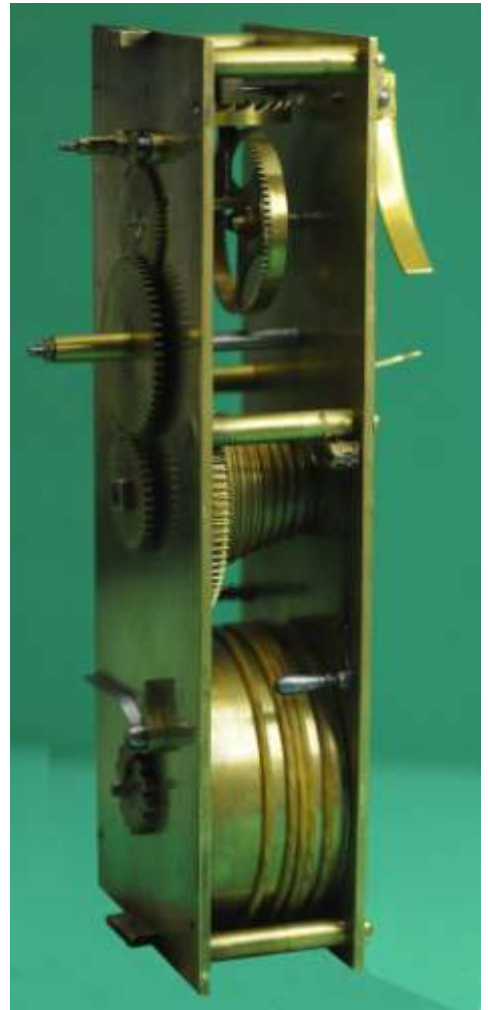
**"La ruota ore"**



**Right: The New Contrate Minute-Wheel, ( $z. =60$   $\text{Ø } 30 \text{ mm}$ ) drives the Seconds' Pinion (Left and above).**



**KP.** Dr. L.M. Bonelli's article in *Physis* showed Perelli's original 1770 drawing of the front-plate (Table 1, Fig.2), having *four-spoke* Contrate-Minute wheel driving the Seconds'. [Note. This wheel was lost in the 1966 floods. Rather than reproduce the original crossings, the museum restorer has replaced it with a solid wheel, yet another aspect to *museum reconstructions* ~ ethics unfortunately lost in many commercial restorations today].



**TREFFLER'S TRADITIONAL AUGSBURG MOTIVE POWER**

**KP.** Unlike extant Coster timepieces, this Augsburg clockmaker J.P.Treffler uses the traditional German flanged Spring-Barrel -having more spring-coils than seem strictly necessary ~ connected by a gut-line driving a shallow profile, deeply-grooved brass Fusee having *seven* turns. The external, front-plate mounted, set-up ratchet (p.8) allows the long spring to be set-up for its mid-range even Torque ~ further equalised by the classic German Fusee.



**View (L): Barrel and Fusee.**  
**"Componenti da cambiare oppure da ricostruire"**

**KP.** The German Clockmakers' Guilds rightly regarded the ancient Fusee as indispensable, so it is no surprise that Treffler set one into his Timepiece, purportedly as a *copy* of Sr.Burratinij's Coster *DØ*. (see *RH*, Part II, Oscillatorium, §4, 'Secreet' Construction, p.26, also p.28) But did *watchmaker* Salomon Coster ever do so? If he did, it would have antedated John Fromanteel contracting to Coster on 3 Sept.1657, to make standard 'going-barrel' Hague timepieces, i.e. Coster's *D1-D5*.



**Left: The Narrow Barrel, with Long Main-Spring.**  
**"Molla e barile"**

- Barrel
- Ø = mm
- Depth = mm
- Arbor
- Length = mm
- Ø = mm
- Main-Spring
- L = mm
- W = mm
- T = mm

**Below: The Fusee Stop is mounted inside Back-plate.**



**The Augsburg Fusee/Ratchet "Il conoide"**

- Fusee - Stop
- Ø = mm
- ø = mm
- Turns 8
- Duration 7x40/60x12= 56hrs
- Main Wheel
- Z = 96
- Ø = 55.40 mm
- T = mm
- Arbor
- L = mm
- Ø = mm



**Main-wheel G1. La ruota del conoide (z = 96)"**

**"La leva del blocco della camma del conoide"**





**MOVEMENT OPEN - ON FRONT-PLATE**  
**"Particolari del meccanismo"**

Front Plate: Height c.190mm. Width c.60mm.  
 (recorded as 190 x 90) **Awaiting new data**  
 Addition of a Fusee accounts for longer plates  
 than Coster needed with going/split barrels.

Riveted to Front-Plate, Pinned at Back-Plate  
 6 Pillars having a plain round section.

1 Pillar & Potence of octagonal section.  
 Spacing Between Plates - 36 mm.

Typical Dutch/French Spacing;  
 Coster's *DI*, 37 mm.  
 Oosterwijck's '*RH*' 38 mm.  
 Oosterwijck's *D9* 39 mm.  
 Thuret's #327 36 mm.

The vertical 4-wheel train:

*Escape-wheel* (21) Ø 26.3 mm. 3-spokes  
*Escape-pinion* [7] Ø 3.80 mm.

*Contrate-wheel* (80) Ø 37.7 mm. 4-spokes  
*Contrate-pinion* [6] Ø 4.00 mm.

*Centre-wheel* (90) Ø 46.7 mm. 4-spokes  
*Centre-pinion* [12] Ø 7.00 mm.

Fusee with *Main-wheel* (96) Ø 55.4 mm.  
 Fusee of 7 Turns - Stop-snail at the rear.  
 Duration - 56 hours (96 x 7 ÷ 12)  
 Fusee Stop and Spring on the Back-Plate  
 Wound at the Back-Plate

Internal Fusee Ratchet: (below)



Spring barrel Ø c. 60 mm.

Barrel Caps -

Rear: Flat, 'scribed line

Front: ditto

Rims to retain Gut line.

Arbor - squared front to  
 Ratchet having 13 Teeth

**"La ruota a criccio impendendo"**



## TREFFLER'S GOING TRAIN WHEELS.

### View (R): Treffler's Centre Wheel G2.

"La ruota maestra"

#### Centre Wheel

Z = 90  
Ø = 46.70 mm  
T = mm

#### Centre Pinion

z = 12  
Ø = 7.0 mm  
L = mm

#### Arbor

L = mm  
Ø = mm



### View (L): Treffler's Contrate Wheel G3.

"Ruota caterina o di riscontra"

#### Contrate Wheel

Z = 80  
Ø = 37.70 mm  
T = mm

#### Contrate Pinion

z = 6  
Ø = 4.00 mm  
L = mm

#### Arbor (extended to 'Minute' wheel at front-plate)

L = mm  
Ø = mm

### View (R): Treffler's Verge Escape Wheel G4.

"Ruota scappamento"

#### Escape Wheel

Z = 21  
Ø = 26.30 mm  
T = mm

#### Escape Pinion

z = 7  
Ø = 3.80 mm  
L = mm

#### Arbor

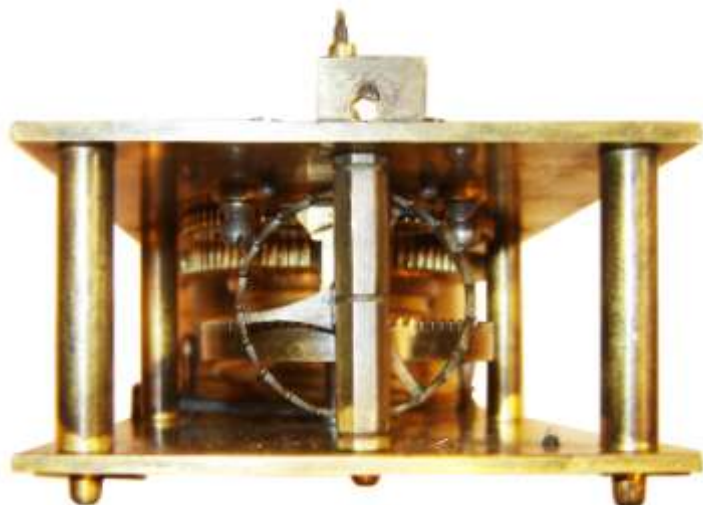
L = mm  
Ø = mm





Notwithstanding Treffler's adoption of the Huygens-Coster system of suspended pendulum in a crutched verge, his component parts and overall design appear to be uniquely his own, being well designed and all being made in a workman-like manner, even if not to the standard of the best Parisian clockmakers, (see [MemoThuret](#)).

**Below: The Verge Escape Wheel in Upper Potence, Formed by the Octagonal 7th Pillar.**



**Below: Lower Escape Potence (underside).** There is no steel wedge, (or shim), supporting the vertical escape arbor, cf. Coster potences.



**"Ponte inferiore della scappamento a forma di "E" orizzontale"**

**Treffler's 'Equal Train' Beating Half-Seconds : NB. Contrate Arbor Turns in 4 minutes (240 Seconds).**

Extant train	Treffler 1658	Nr. Teeth	Pinion nr.	Beats per Minute	Turns per min	Turns per hour	Rotation Secs.	Rotation Mins.
Escape wheel	G4	21	7	120	2.857142857	171.4285714		
Contrate wheel	G3	80	6	Pendulum cms	0.25	15	240	4min 0 sec
Centre wheel	G2	90	12	24.9	0.016666667	1		
Fusee	G1	96						

**The Upper Front-Plate - Seconds' Bridge and Arbor.** (The Motion-Work shown at p.5)



**"Particolare del rocche secondi"**

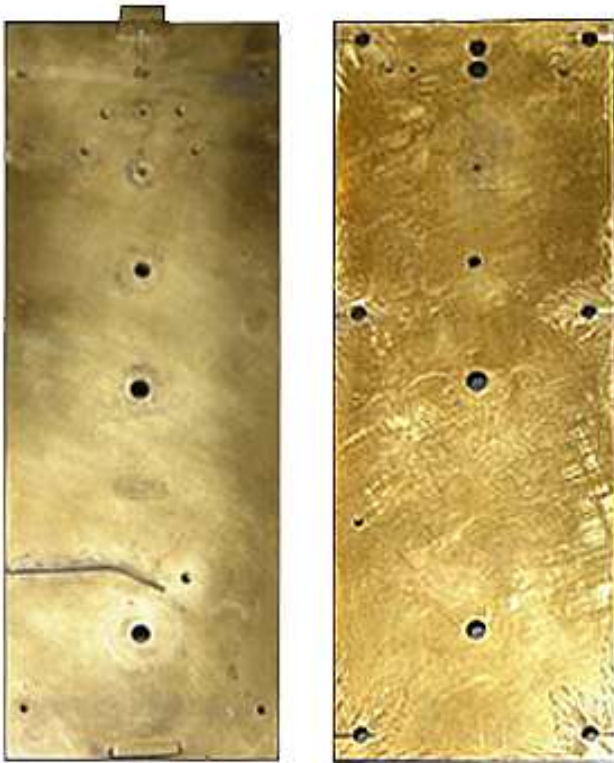
**Treffler's Seconds' Reduction Gear to Convert Contrate 240 Seconds into 60 Second's at Dial.**



**"Il ponte dei secondi"**

I find it rather remarkable that Treffler has assumed the Dutch pendulum concept to well that he had the confidence to construct so many things in a completely individual and novel way. No doubt some of these constructions might hark back to Augsburg practices - perhaps found in balance-wheel table clocks. The advantage of presenting components in isolation is to alert enthusiasts perhaps to other similar clocks previously overlooked.

**TREFFLER'S LONG MOVEMENT PLATES, HAVING A PROTECTIVE BOX DUST COVER.**



**Left: Tall Narrow Plates for Fusee with Barrel.**  
**"La platine smontate"**

**FRONT-PLATE (L):**

Height = **mm** (190?)  
 Width = **mm** (90?)  
 Thickness = **mm**

Click-spring mounted to left side on **2 studs**.

**BACK-PLATE (R):**

Height = **mm**  
 Width = **mm**  
 Thickness = **mm**

**PILLARS: 6 Round 1 Octagonal as Potence**

Length T = **mm** Overall  
 Length t = **36 mm** Spacing between Plates  
 Diameter Ø =

**KP.** Treffler's timepiece is significantly larger than all of Coster's timepieces, typically 109 mm by 58 mm., and Coster's strikers are typically 120 mm by 98 mm. So the difference is not merely to fit the added Fusee. Treffler's clock had to be grander for his Medici patron.



**View: Barrel Ratchet, Click, Click-Spring.**  
**"Il sistema di arresto di carica"**

**KP.** Perelli's 1770 drawing shows this correct *orientation* of the Click. The 1966 image (p.1) shows the click wrongly orientated. With the Click correctly seated a curved outer-tail holds an unpinned Ratchet-wheel on squared arbor, the tail's deeply undercut inner-face forms the Click proper. I am grateful to Prof. Andrea Palmeiri for his explanation.



**View: Treffler's Protective Box-Cover to Movement.**

**KP.** Whilst this 'Dust-Cover' or Box seems innovative, i.e. compared to Coster naked movements, it must be borne in mind that the German table clock was always cased in a protective cover, whether square, round, or polygonal. Treffler, naturally, would have carried over his usual practice; indeed it is curious that Coster did not. Perhaps Coster, then, was seeking new cost and time savings to expedite his clocks to the eager markets around Europe. Certainly it is a nice feature that saved a fine movement from greater damage in the floods that destroyed its case.



TREFFLER'S DIAL, SHOWING 'MINUTES' AND NOVELTY OF 'SECONDS'.



Above: "**Il quadrante**" Polished Gilt-Copper Rectangular Dial-plate, Pewter Chapter-Ring (distressed), Fine Counterpoised Looped Hands, replaced Silvered Seconds' Ring.  
 Right: The Copper Dial-plate is gilded everywhere except beneath the annulus of pewter chapter-ring, thereby conserving valuable gold. [Ahasuerus Fromanteel did likewise]

[KP. The original counterpoised hands are outstanding. Prof. Palmieri describes the Seconds' Ring as an 18th Century replacement. It is curiously inscribed, like pre-pendulum Minute rings, having I, II, III, IIII markings at the Quarter points. Nevertheless, the going train is original,  $120 \cdot 60 / 42 \cdot 7 / 80 = 15$ . Original reduction gearing for Contrate-Seconds' motion work,  $15 \cdot 60 / 15 = 60$  Seconds'].

**Dimensions:**

<b>Dial-Plate</b>		304 mm	by	258 mm	Brass, fire-gilding to front, except annulus
<b>Chapter Ring</b>	Ø	290 mm	by	mm	Pewter - now distressed, (screwed from front)
<b>Seconds' Ring</b>	ø	mm	by	mm	Brass - studs
<b>Minute Hand</b>	Radius	mm			plus Counterpoise
<b>Hour Hand</b>	Radius	mm			plus Counterpoise
<b>Second Hand (new)</b>	Length	mm			

**Fixing to Case:** Long brass straps screwed to the movement front-plate, extend outwards beyond the movement plates to door stiles and screwed fast. (see page 1, also Museum Galileo display page 12).

**FLORENCE'S MUSEO GALILEO: NEW DISPLAY OF TREFFLER'S 'MEDICI' TIMEPIECE c.1657/8**

**The Conserved Movement. "L'orologio restaurato"**



**The crisply engraved Acanthus Back-plate.**



**Formerly, the long straps secure the movement, with dial attached, to the door of the lost Tabernacle case.**



**"L'orologio restaurato" - MUSEO GALILEO - The Newly Displayed Movement**





Unlike its Hague-clock counterparts, Treffler's back-plate is relieved by stylised Acanthus leaf engravings, at the pillars and cocks, and his movement back-plate is also proudly signed in full, for his great Medici Patron.

*"Gio: filipp Treffler Augusto".  
"L'autore dell' orologio"*

The winding-square exits above "*filipp*". [Nb. Hague clocks are front wound, (Van Ceulen's [Planetarium](#) is the exception); Hague back-plates were not signed until circa 1661, probably first by Pascal or Oosterwijck].

## MEMO TREFFLER - HISTORICAL ASSESSMENTS AND NEW CONCLUSIONS:

Silvio Bedini's assertion that J.P.Treffler had completed Galileo's pendulum Timer in 1656 is uncorroborated†. Even if true, I should not regard that in any way as pre-empting Huygens' pendulum, seeing that Treffler had Vincenzo Galilei's conceptual [drawings](#), (taken at Galileo's dictation in 1642 when he was blind), the uncompleted '*Timer*' when Vincenzo himself died in 1649, also their artisan Vincenzo Viviani's recollections; thus enabling Treffler, perhaps, to complete another's invention. [Note. We do not have corroboration, of the 18th century clockmaker Thomas Grignon's claim, that in 1642 Richard Harris had completed a pendulum conversion to a London church clock, but Harris then would have no such advantages]. † Sebastian Whitestone's *caveat*.

Galileo not only had invented a '**pivoted-pendulum**' before 1635, also a wholly new '**saw and pin-wheel detent escapement**' by 1642, (actually a '*dead-beat*', only lacking a *detent-spring* to be a true *Chronometer* a Century before its time). Whereas Huygens never invented escapements; he, Coster and Treffler, all kept the ancient and inefficient *crown and verge* escapement. Huygens' only invented ways to utilise the old crown-wheel to drive his *suspended pendulums* with his pivotal invention, the '*crutched-verge*'. Therefore, unless the old Medici Palace [turret-clock](#) pendulum *conversion* can positively be dated pre-1657, and also positively be ascribed to Treffler, I believe his claim to priority for '*inventing the pendulum-clock*' was unfounded.

*Johan Philip Treffler's* pendulum movement, circa 1657/8, made in Augsburg for noble patron the **Grand Duke Ferdinando II de Medici in Florence**, is evidenced by the surviving relic; a *Christiaan Huygens'* type pendulum, in a spring-clock that beat half-seconds yet counted Seconds' at its dial. Huygens' 1657 patent weight-clock showed and beat Seconds'; his 'OP' design beat half-seconds but showed the Seconds *and* was published in '*Horologium*' (Sept.1658). So, Treffler's timepiece beating '*equal time*', but not having the OP design, poses new questions about the unrecorded construction of *Salomon Coster's* pendulum (spring?) clock which *Senor Burratinij* in the Hague sent to the **Grand Duke** in September 1657; i.e. just three weeks after *John Fromanteel* had signed the notarised '[Akte](#)' (Contract) with *Salomon Coster*, on 3rd September 1657, at the office of *Notary Putter* of The Hague. After an absence of three centuries, might Burratinij's Coster '*DØ*' still exist in Italy? Or was it too, like *De Dondi's* great astronomical masterpiece, looted by Napoleon's army and now lies forgotten in France?

This early Medici spring-timepiece is not Treffler's intellectual property. Its crown and verge escapement was already ancient; and its seminal *crutched-verge, pendulum-suspension* and *cheeks* assuredly are the inventions of Christiaan Huygens. Nevertheless, Treffler added several novel features of his own;

- Treffler's movement is back-wound - (*Coster's are all wound from the front, through the dial-plate*)
- Treffler's movement has a fusee - (*extant Costers all have going-barrel, none with fusee extant or recorded*)
- Treffler's movement has indirect seconds hand driven from contrate's arbor - (*extant Costers omit seconds*)
- Treffler's movement has brass protective cover fitted snugly around the plates - (*Coster abandoned covers*)
- Treffler's movement is fully signed on the back-plate - (*none of Coster's movements are signed on BP*)
- Treffler's movement has six pillars, pinned at back-plate - (*Coster's all have four pillars, pinned at BP*)
- Treffler's movement has a double-footed back-cock - (*Coster's originally possessed single foot cocks*)
- Treffler's verge-staff goes right across the plates - (*Coster's verge-staff is truncated by his potence block*)
- Treffler's top potence is octagonal pillar riveted to front-plate - (*Coster's potences all screwed to his BP*)
- Treffler's Contrate has 4-spokes, his Escape 3-spokes - (*Coster's have 3-spokes to each of the wheels*)
- Treffler's back-plate and back-cock are finely engraved with stylised Acanthus - (*Coster's are all plain*).

Keith Piggott 29th April 2011

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*Gio silippa Trefler Augusto*

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