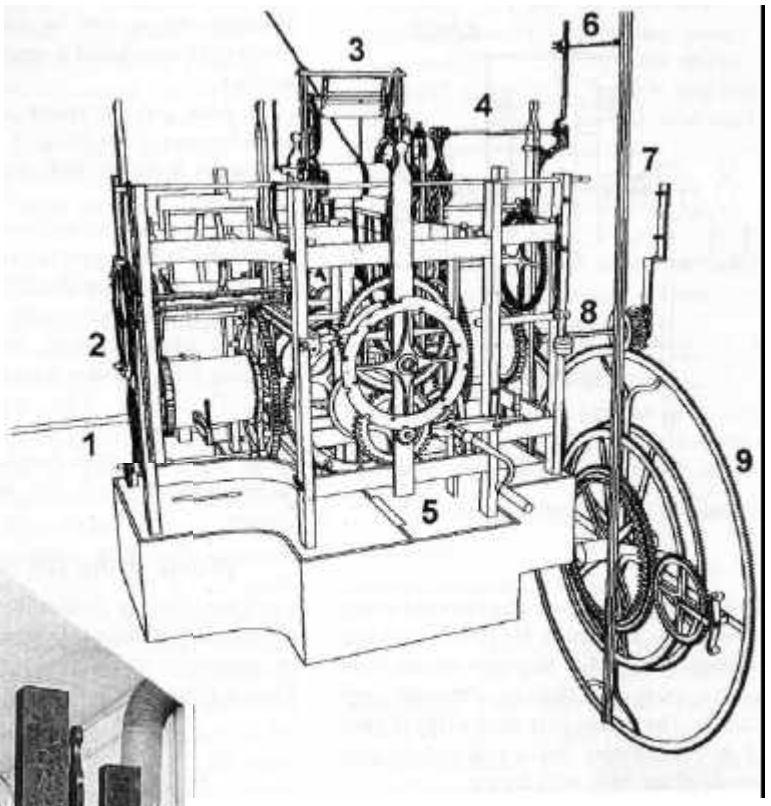
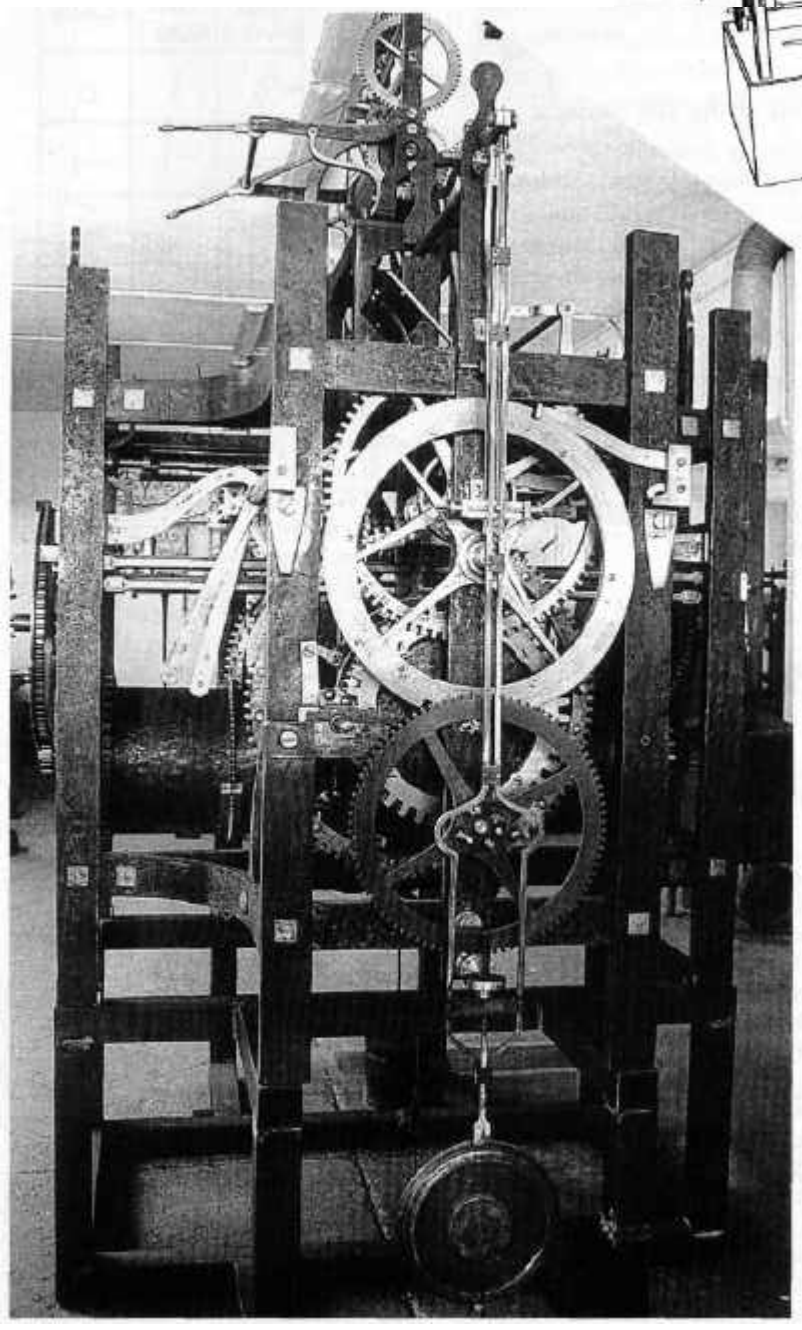
A Controversial Restoration

Renato and Franco Zamberlan discuss recent work on St Mark's Clock in Venice.

ON 18TH OCTOBER 1996, the Director of Venetian Museums, Giandomenico Romanelli, and the General Manager of Piaget International, Francis Gouten, signed an agreement for the restoration of the St. Mark's Clock in Venice. The Clock was indeed running, but needed a general overhaul. The project was to be sponsored by PIAGET, which, according to newspaper accounts contributed around £150,000 for the restoration.

Romanelli chose a historian, Giuseppe Brusa, to accomplish the task. Brusa selected Alberto Gorla, a blacksmith specialising in tower clocks, to carry out the work. Oddly enough, the Venetian authorities gave no other clockmakers or historians an opportunity to tender. This is the first time this has happened in the 500 year





*1. Above: The movement prior to the recent restoration, as it appears from a drawing made by Piaget. **1**, the subsidiary dial arbor, connected with the time train on the opposite side of the movement; **2**, the 132-blow strike train; **3**, the 5 minutes mechanism, added in 1858, to move the panelled wheels for digital time indication; **4**, The time train; **5**, The second Moor train (the first Moor train is not visible, opposite to this); **6**, The link from the escapement to the long wooden pendulum rod; **7**, The octagonal wooden pendulum rod, 13,6 ft long; **8**, The transmission arbor for main dial indications; **9**, Astronomical mechanism for the main dial.*

2. Left: The clock after the recent restoration.

history of the Clock. Mr. Romanelli said that Giuseppe Brusa was suggested by the British Museum, but Brusa has recently denied this. The reason for the choice is still not clear.

A Restoration Committee was formed. During an official press briefing held in Palazzo Ducale on 24th January 1997, Mr Mossetto, who is responsible for cultural activities of the Venetian Municipality, said that the committee included Giuseppe Brusa as the director, Alberto Peratoner (the last *temperatore**) and Alberto Gorla; chosen by the Venetian Municipality, and Gabriel Piaget and Francis Gouten; chosen by PIAGET.

Although Peratoner, who has the most direct long-term knowledge of the clock, was nominally involved in the Committee, he was effectively left out of this group. Most recently he was not included in the Restoration Committee as described in official press announcements by PIAGET and the Venetian Municipality. These listed the committee as Giuseppe Brusa, Alberto Gorla, Gabriel Piaget, Yves Piaget, Giandomenico Romanelli

* Custodian of the clock

(Director of Venetian Museums) and Daniela Andreozzi (Venetian Museum Architect). The Venetian authorities and PIAGET have never explained the reason for the exclusion of Alberto Peratoner.

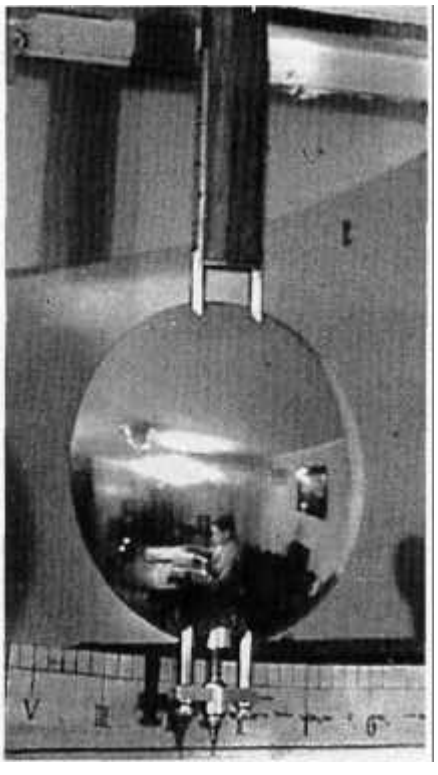
It is clearly documented that the restoration was to be conservative. As is common practice in modern restoration work, no additions or modifications to the movement were permitted other than the provision of an automatic winding mechanism. In a 1988 interview, published by the Italian magazine *Orologi*, Romanelli described the *temperatore* as a "difficult to replace cultural and human heritage", but the introduction of automatic winding would eliminate the role.

Recently, Brusa suggested that Alberto Peratoner has started a campaign against the restoration work because of the loss of his personal involvement with the clock (the *temperatore* lived and worked inside the Clock Tower, earning a wage for this).

The Clock

As we wrote in our previous article (January, p. 11), the current mechanism dates back to 1757-1759. It was heavily modified in 1858-1860, mainly with the addition of a digital time indication system. The Graham deadbeat escapement was replaced with a pinwheel and the pendulum was lengthened from a 1828bph to a 1800bph, a neat 2 seconds.

From that time to present, the clock was simply overhauled. Only minor repairs were carried out. All of its features worked, except for the 132-blow strike, which was deactivated during World War I for the curfew. Brusa has suggested that it stopped working due to the 1858 restoration, but elderly Venetians, alive during WWI, can remember that it was stopped for the curfew.



3. *The 1858 bob, signed by Luigi De Lucia, mirrors the scene in the room below the clock.*

The main parts of the clock are visible on the drawing, **1**. Not visible here is the Magi's carousel mechanism on the upper floor of the Tower.

The link between the Magi's mechanism and the main movement was usually disengaged. The hourly procession used to happen only during the two weeks surrounding Ascension Day and, recently, also on 6th January. At these times the *temperatore* engaged the mechanism early in the morning and disengaged it around sunset.

In our view two points are clear:

1) the clock must be considered as an 'antique' in all of its parts, the youngest of them date back to 1858;
2) it ran for 140 years from the last considerable interventions, so they must have been made in a quite correct manner.

The Restoration

Brusa decided that the 1858 interventions made by Luigi De Lucia were detrimental to the wonderful 1757 mechanism made by Bartolomeo Ferracina. He determined that the original 1757 situation had to be restored, even if this meant the replacement of some 1858 parts with newly made ones. In his opinion the clock was in such bad condition that it couldn't run any more without carrying out these substitutions; only the 1757 movement features could guarantee reliable operations.

As we'll see further on in this article, this is difficult to sustain. Almost all the changes made don't improve the performance of the clock. Nobody expects an antique clock to run like a quartz, but everybody wants it in a nearly untouched state. Instead of trying to return to an imperfectly known 1757 state, the 1858 modifications should have been preserved. The 1858 mechanism had given 140 years of uninterrupted operation.

The Changes Made

Here is how Brusa and Gorla carried out the restoration, **2**. They cleaned and polished all the parts, installed new bushings, burnished pivots, replaced fly-springs, etc... but many other interventions were also made.

Pendulum Length

They replaced the 2-second pendulum (1800 bph) made in 1858 (13.05ft. long, with an octagonal wooden rod and a polished lenticular brass bob engraved; "Luigi De Lucia", **3**, with a new one, 2600 bph (6.2ft. long iron rod; cast iron bob punched: "Alberto Gorla 1998", **4**). We think this is wrong not only from the conservation point of view, but also from the historical point of view.

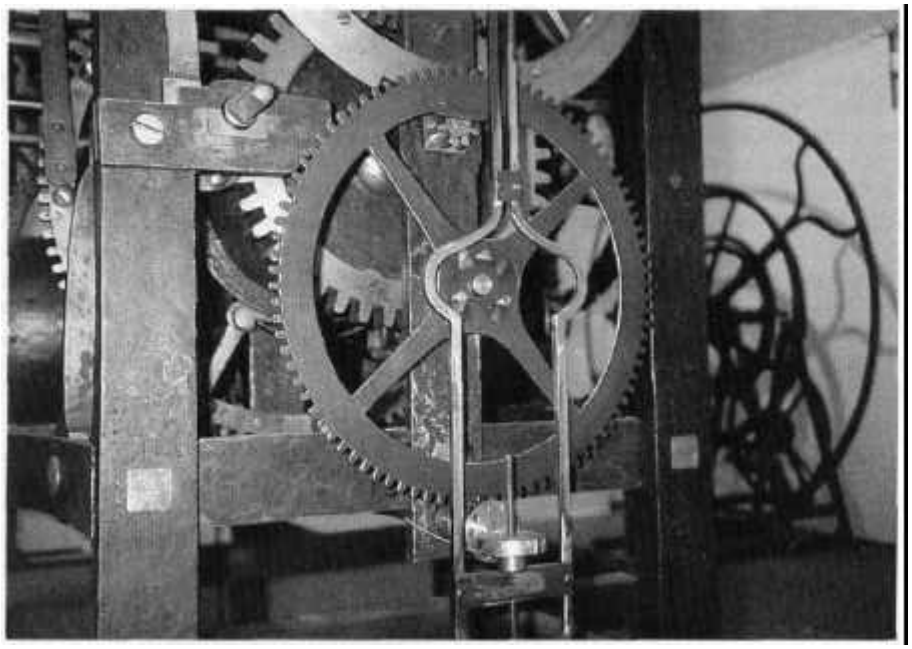
The reader will be asking how Brusa could know the exact beat rate of the 1757 pendulum.

Well, there is a book describing the clock as it was in the 18th Century: *Relazione storico-critica delta Torre dell'Orologio di S. Marco in Venezia* by Nicolo Erizzo. It is clearly stated that the pendulum made 1828bph. Brusa believes that this a typographical error and that it means 2828bph. He says that it is not logical that when De Lucia altered the escapement in 1858 he would have altered the pendulum rod by only a few inches (1828bph to 1800bph). The work required to modify the train would not have been justified by such a slight modification. He concludes that it must have been changed to accommodate a much longer rod. The logic of this is not clear especially because the new pendulum by Brusa and Gorla actually makes 2600bph, and not 2828 as we could expect if the typographical error was true. Where does the 2600 value come from?

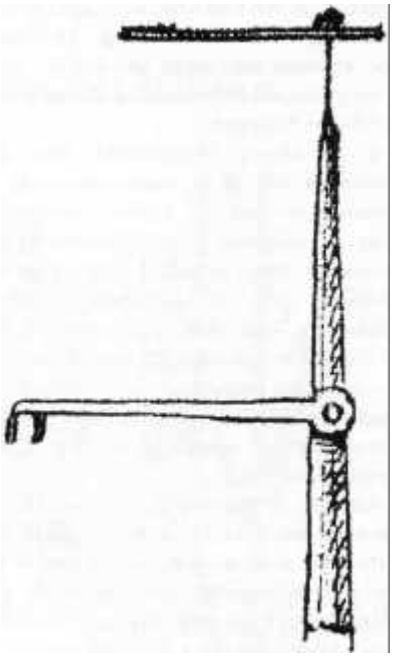
The escapement was changed from deadbeat to pinwheel, the escape wheel had to be remadso any desired rod could have been accommodated. It seems more likely, as the literature clearly indicates, that the clock already had a long pendulum which was simply modified to a more convenient beat.

There is another historical source to confirm how wrong this choice has been. As described in our previous article, the 1858, 2-second pendulum extended through a hole in the floor of the clock room; the 6.2ft. pendulum that Brusa says was fitted in 1757, being much shorter, would not. Such, a hole should work in 1857. Sebastiano Cadel has written, for the Venetian Municipality, a detailed account of the work done on the building at that time. There is absolutely no mention in this document of the need to make a hole in the floor. This suggests that the hole in the floor existed since Ferracina's time and is another confirmation that Ferracina's pendulum must have been about 13ft long.

4. The new bob. Not very elegant, in our opinion.



5. *In this photo the secondary dial arbor is not present, but it will be fixed to the three metric pitch steel screws seen on the black finish wheel hub. Note the roughly plugged holes.*



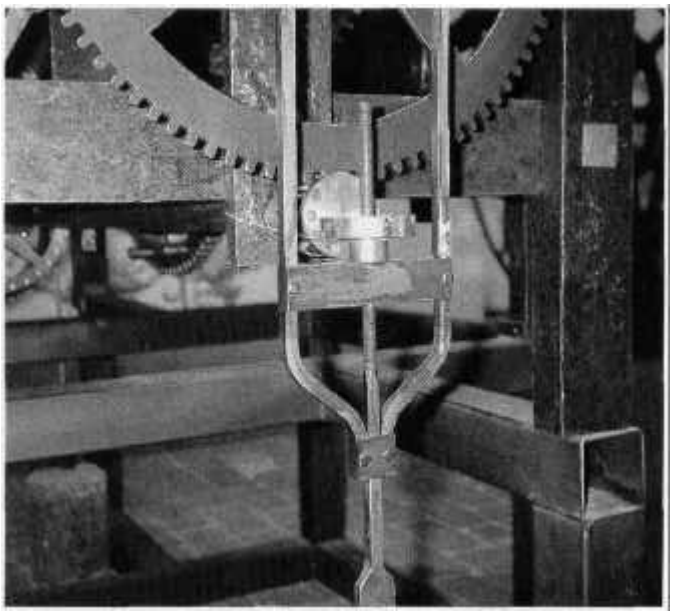
6. The sketch by A. Marini and G. Doria *showing the horizontal link to the pendulum predating the 1858 movement.*

Pendulum Position

Brusa and Gorla moved the pendulum suspension point from the time train side of the movement to the 132-blow strike train side. That is to say to the opposite side of the structure. This required an elongated arbor to bring the motion from the anchor to the crutch, now very far from the escapement.

The reason the restorers gave for making this change is the presence of four aligned holes on the clock frame where the arbor may pass through. Brusa and Gorla say that their presence is enough to show that in 1757 the pendulum was mounted on the opposite side of the time train. This may be so, but every clockmaker finds unused holes in antique clocks and without further supporting evidence it is not enough to start making new parts to fit them.

To accommodate the new long arbor required lifting the 5-minute mechanism, (3, on drawing, **1**). A steel structure was made for this purpose and we must say that it doesn't follow any antique style at all. It makes use of modern square tubing anyone can find at a local metal store. The main frame of the movement is made of beautifully forged iron. Brusa and Gorla repeatedly affirmed that: "The methods and materials used for restoration are the same stated by the most antique tradition in iron tower clocks".



7. Detail of the time regulating screw on the new pendulum.

Suspension Spring

The new suspension is of the leaf-spring type, while the 1858 one was a knife edge. Brusa and Gorla make no reference to the reason why they changed it and there is no source, to our knowledge, where it can be found that the 1757 suspension was spring-type, even if the principle of conservative restoration is disregarded.

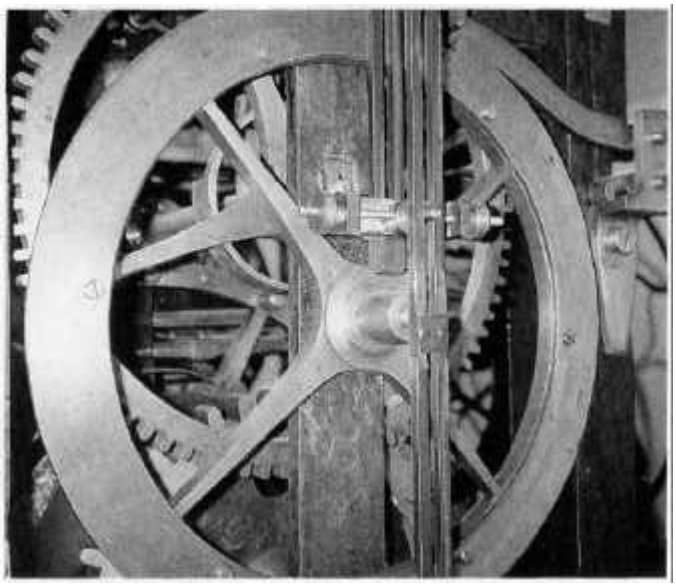
Suspension Attachment

The new point where the suspension is attached is exactly in the middle of the clock. Prior to the recent restoration it was placed to one side. The rod was connected to the escapement by a horizontal link (6, in drawing **1**) as is common on Comtoise clocks. This avoids interference with the transmission arbor (8, in drawing **1**), which carries the motion to the dial and protrudes from the middle of the movement.

Gorla placed the new pendulum on the other side of the mechanism but here too the secondary dial arbor protrudes from the middle. He solved this problem by fabricating a sort of 'open-frame' rod, through which the arbor can pass, **2** and **5**.

It is hard to imagine that a great clockmaker like Ferracina could conceive such a complicated solution when he made the clock. There is no historical record of a pendulum like this, of course, but once again Brusa and Gorla, facing a doubtful situation, decided not to leave thing as they were, as in conservative restoration, but to change them even if they didn't exactly know how.

A drawing taken from a technical brief by Annibale Marini (clock technician) and Giovanni Doria *(temperatore)* written for the Venetian Municipality on 22nd July 1856, before De Lucia's work, indicates that this is an illogical construction. This *"Relazione"* describes the clock and the works required for its repair. A sketch, **6**, shows the horizontal link to the pendulum, and the text says that "improvements to this part are needed, to enable the *temperatore* dismantling and cleaning it, being the actual part fixed". Brusa says this must be simply a proposal, because in the drawing the arm is facing left instead of right. We cannot however be sure of the viewpoint of the artist.



8. *Detail of the beat regulation device on the new pendulum.*

Is it possible that a 1757 pendulum had metric regulating screws or square cold rolled steel for its structure, as found in Gorla's reproduction, **7** and **8**?

Escape Wheel

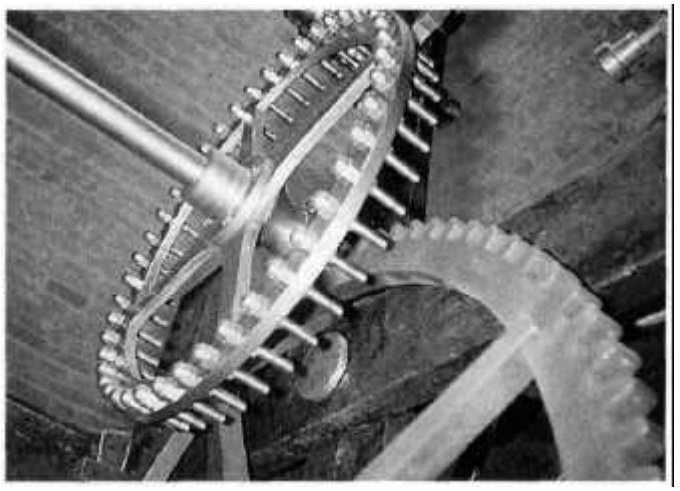
The modified beat rate of the new pendulum required the rebuilding of the escapement; the restorers replaced the existing anchor and pin-wheel with new ones. They retained the pinwheel, although they claimed to be returning the movement to the 1757 state. At that time, however, the escapement was a Graham dead-beat. Furthermore, they used stainless steel machine cap-head screws to form the pins, **10**.

5-Minute Mechanism

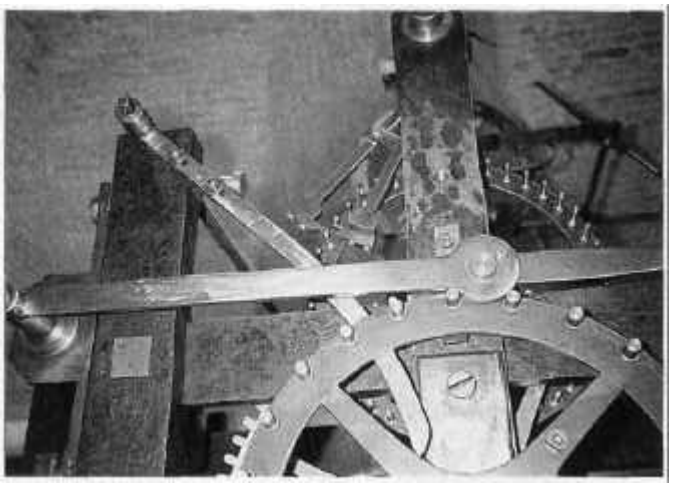
Brusa and Gorla changed the way in which the 5-minute mechanism driving the digital display is actuated. In the 1858 movement, the escape arbor carried a small wheel, engaging with another wheel carrying a pin acting on a lever connected to the 5-minute train. Not an ideal solution, but it was never a source of problems for the proper running of the clock. In the restoration a completely new set of levers, was made to actuate the mechanism from a lower wheel in the time train. Was this really necessary in a 'conservative' restoration?

Astronomical mechanism

The 18th Century astronomical indication mechanism was modified



10. The new escape wheel, the pins turned from cap-head screws.



9. The new wheel and levers made to actuate the 132-blow strike. Two pins on the spokes trip the diagonal lever to actuate the strike at noon and midnight. Note the unfinished grinding signs.

to allow easy adjustments for the normal shift of the indications in respect to the real sun and moon positions. This could have been a good idea if it was not achieved by drilling the hub of the original Ferracina wheels. Brusa said that the 1757 work was excellent, but in this case he damaged it to achieve a result that was not required by the restoration. Everybody can accept the accumulation of errors in astronomical indications in an 18th Century mechanism. Once again, brand new galvanised bolts, with stamped heads, were used throughout.

Other changes

All this could be quite enough to censure the restoration job, but there is much more. We visited the mechanism, now exhibited to the public in Palazzo Ducale in Venice, and the impression we had from it was simply horrible.

Not only can the work be condemned from an historical point of view, but also technically.

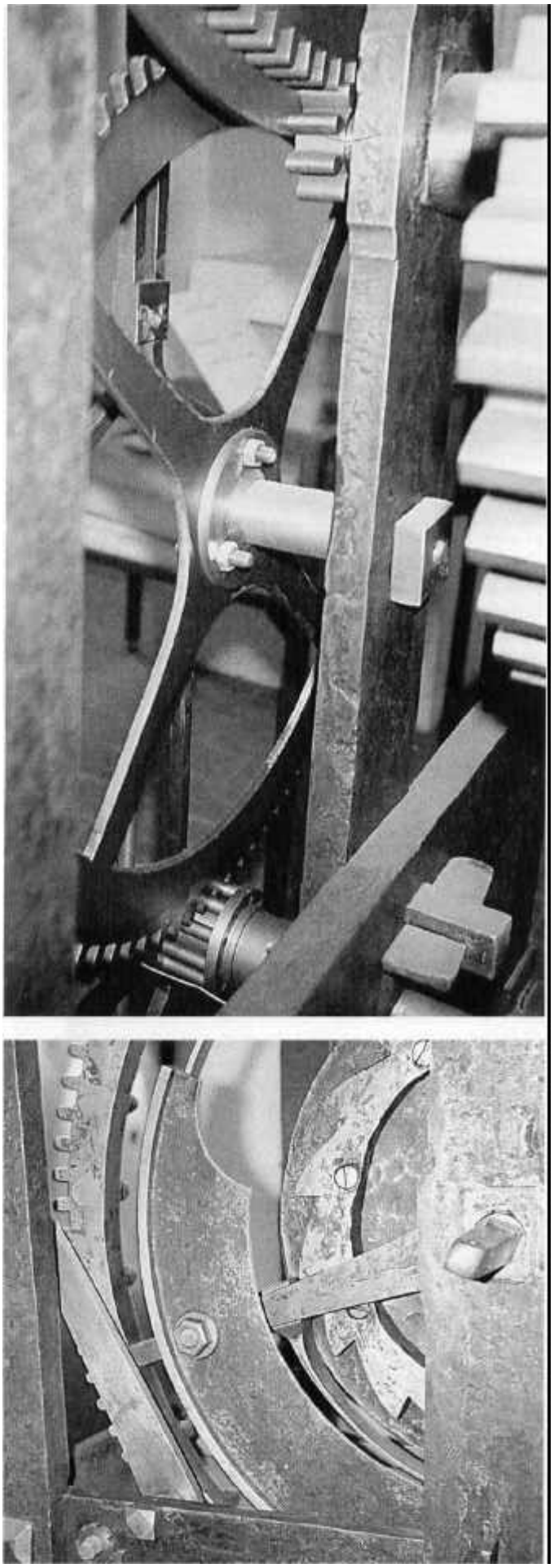
Using stainless steel cap head machine screws or hexagon galvanised metric nuts and bolts on a 18th Century movement, is simply wrong. We could also see a newly made wheel whose fixing holes were drilled out of place on the hub. John Wilding says it is not necessary to discard a wheel if the misplaced holes are plugged and plain finished to hide them, prior to making new ones. Gorla plugged the holes but he roughly ground the surplus metal away, with no regard to the black matte finish. The result is that the misplaced holes are still very visible on the dark surrounding, **5**.

On the pendulum itself, there are micrometric adjustment screws both for the time and for the beat, made with pieces of metric threaded rod, 7 and 8. Were these used in the 18th Century pendulum Brusa and Gorla wanted to reproduce?

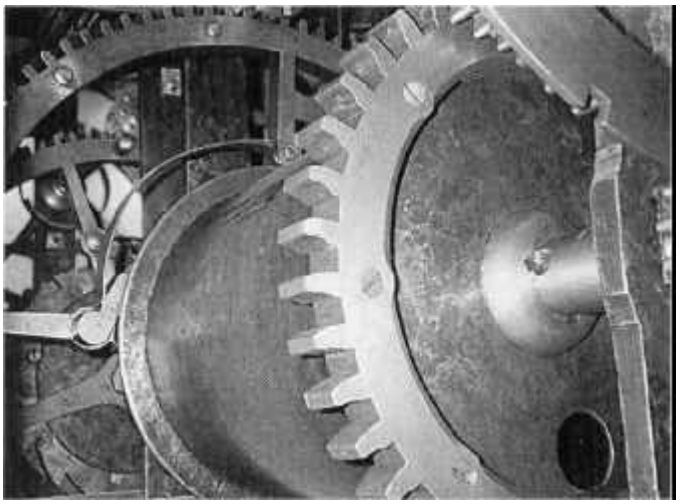
All over the clock, there are several signs of grinding, left unpolished, **9**. The level of the finish is more typical of large mechanical industrial clocks than antique clocks.

Hexagon nuts and bolts of the quality found in hardware stores have been widely used (see **11** for other examples). Was it too difficult or expensive to make them on a small lathe with the same proportions and materials used for the originals? Galvanized screws are simply ugly on a clock, not to speak of an 18th Century mechanism. We saw only a couple of screws that appeared to be made expressly for this clock: they were easily distinguishable from the old ones because the slots were not as neat as they should have been. They were clearly cut with a hacksaw, not with a cutter on the lathe.

All clock parts when dismantled were punched with a heavy hammer to identify them with figures. Was this really necessary? Why add other 20th Century marks to this mechanism? Some photos or sketches of the structure would have been equally effective.



11. Example of the use of hexagon bolts.



12. Unrestored winding wheel.

Conclusion

We have to remember that Giuseppe Brusa and Alberto Gorla are very well known in Italy, respectively as the most eminent horological historian and as a tower clock specialist. Alberto Gorla has restored several important tower clocks all over the country. We had never seen any of his work before. We were astonished when we saw the result of his interventions on the St. Mark's clock for the first time. We could not imagine that a renowned clockmaker was capable of a failure like this. Since that time, we asked some of our colleagues if they had seen other examples of his work. We found two clockmakers who confirmed that he usually works this way. This is not a unique case.

It is not a pleasant situation to describe a fellow craftsman's work as wrong. Normally it should not be done. In this case it also casts doubt on the work of Italian clockmakers. We repeatedly asked Giuseppe Brusa to provide a technical description of the work done on the clock. The Tower is public property, and under Italian law, the restorers should make a detailed report of the work freely available. It must include the reasons behind every intervention.

No account of the work was provided. We wonder if such a report exists. All we found on the Venetian Museums website (http://www.comune.venezia.it/museicivici/orologio/) is a weak reply from Brusa to Alberto Peratoner; the first to denounce what was done on the Clock.

Brusa says that PIAGET fully approved his work. We sincerely hope that it either didn't examine it in depth or didn't express this opinion.

It is worth noting that on the website there is a picture of a very worn wheel, shown to represent the bad condition of the clock prior to the restoration. This wheel (and another three like it) has not been restored. These are winding wheels that won't be used with the electrified system devised by Gorla to wind the clock, **12.**

May be there is a bright side in this sad story. The Venetian Museums Director, Giandomenico Romanelli, said that every part replaced in the clock has been preserved. If this is so, the clock could be almost completely brought back to its 1857 state.

The Clock Tower is in bad condition and needs important restoration work, which is yet to begin. In the meantime, the clock mechanism will remain on display in Palazzo Ducale. It is very well worth a visit for the 'horological tourist'. Since the movement has not yet been remounted in place, we hope it will be easier to find a remedy to the injuries it had received in the last few years of its half-millennium long life. The Venetian authorities and PIAGET cannot leave this situation unmodified. -