

XI

The Antechamber of the Portcullis

.
If you have got here, you should have an idea of the kind of solutions that I have to offer.

These are not simple things, but I promised reasonable explanations and I think I have kept my word.

We leave now the Grand Gallery to enter the Antechamber of the Portcullis.

This is the part of the pyramid that gave me a harder time than anything else.

I realized eight different theoretical models before this, which I hope is the right one.

Not for a moment did I doubt the double purpose of this device. Even when everything seemed to be falling apart, I continued to have confidence in my initial idea.

At this very moment, I have got a satisfactory solution to share with you.

Meanwhile, I built a 1:10 scale model using wooden remnants from my hobby workshop. I chide myself for the poor quality of the material, especially considering the working hours dedicated to it. But even if the aesthetic appearance leave much to be desired, the accuracy is 1mm in the model (1cm in the real size) and everything works as I imagined.

Let us take a look at this very complicated section. Barely as big as a closet in size (just 6c, a little more than three meters, long), it is divided into two parts by a granite partition consisting of two overlying blocks inserted, and mortared, within two vertical guides, carved into the granite of the side walls (figs.**D01**, **D02**, and **D03**).

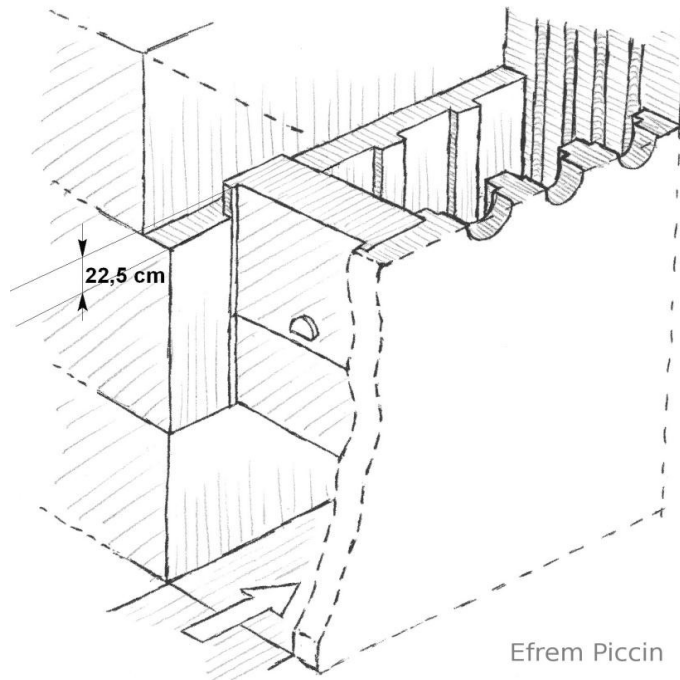


Figure 9: The Antechamber of the Portcullis, Side View

The partition does not reach the ground (nor the ceiling). A man can crawl under and proceed. The goal is not to impede the passage, because the ground clearance (112cm) is the same size of the passage coming from the Grand Gallery and the next going to the King's Chamber.

I want to remember that granite only was used in the Antechamber of the Portcullis, the King's Chamber and the Zed (except for a tiny important detail) (?...!).

The small vestibule north side is only 55cm long ($1c + 1\frac{1}{2}$ digit) and allows a man to stand facing the double-block partition.

Its ceiling, on the other hand, is 289cm high but, for reasons I tell you shortly, I want to divide this height into three parts, giving the measurements in the original units, just to reiterate what I said about the "standardization" of the original project. Measuring up from the floor to bottom edge of the partition block there are 112cm ($2c + 1p$) and 1 more palm is the depth of 6 small pits carved laterally into the floor: the sum is $2c + 2p$.

Next we have $2c + 6p$ (151cm) height from here to the top of a small side wall, east side, just beyond the partition, and from thence yet $2c + 2p$ (119cm approximately) to get up to the ceiling.

The three parts measure: $(2c + 2p)$; $(2c + 6p)$; $(2c + 2p)$.

The total is $6c + 10p = 7c + 3p$.

We'll soon see the importance of it all.

Also at the west side, beyond the vestibule, there is something or rather, the remains of something.

That is another granite wall, $3p = 22.5\text{cm}$ higher than the east one, having the top shaped with three semicircular saddles ($r = 3p$).

Just one saddle has been preserved intact. The other two are destroyed, as the six granite ribs, three on each side, originally bordering the corridor, whose width was estimated by Dormion equal to 103.5cm .

I believe this value coming from measuring the width of the paving stones. Checking instead the distance between the guide relics, I'm sure it would be 2 cubits (105cm).

The error, in my opinion, consists in assuming that the width of the paving stones also corresponds to the distance between the walls.

Both the sidewalls, south of the partition (fig **D02**), have a thickness of 21cm .

I would expect it to be exact $3p$ (22.5cm .) But the difference of a centimeter and a half on each side (about 1 digit) should have allowed the lowering of three granite portcullises, a cubit thick and 2 cubits and 2 palms (120cm exact) wide, fell down to seal the entrance of the King's Chamber.

More about the granite partition: standing in the vestibule, looking at the top block, there is, in central position, a small semicircular bump with the round side up ($r = 1p = 7.5\text{cm}$), protruding almost 3cm (1 digit and a half) toward the observer (photo **D04**). Since this protuberance has been achieved by removing a thickness of more than 2.5cm of granite, from the whole surface of the two blocks, for sure it should have had an important purpose.

This operation of "removal" was made *a posteriori*, with the blocks already inserted in their guides since, just inside the guides, the block original thickness is visible (figs. **D03** and photo **D41**).

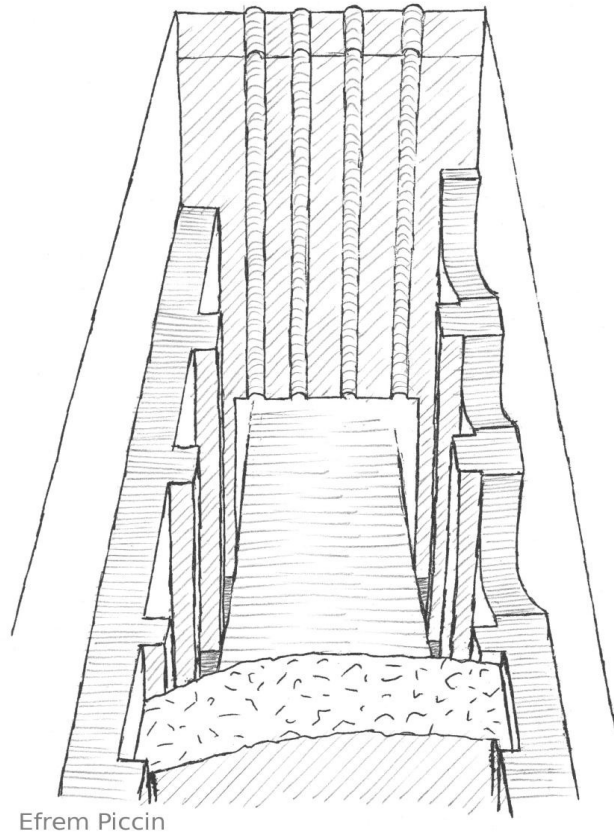


Figure 10: The Antechamber of the Portcullis, View from Above

This working system was a normal practice at the time. It was the only way to protect the finishing surfaces from any danger due to the hauling.

Still standing in the vestibule, looking upwards, it is possible to notice that the upper edge of the divider top block is lower than the two side walls and has a very rough surface, as if it came directly from the quarry without any finishing. Frankly it seems a little strange, being part of the initial project.

Also, on the portcullis side, there are details intriguing the brain: looking north, we can see in the divider stones, two tiny holes (diameter = 2cm, about 1 digit), vertically aligned and centrally located. One is just above the stone parting and the other about 1p (7.5cm) below (photo **D05**).

The most interesting part, looking deceptively innocent, is the large vertical granite block, south side of the Antechamber (photo **D06**), at the end of a short corridor (255cm = 4c + 6p) above the passage to the King's Chamber.

I have to say I did not give it, at first, the importance that Hemiunu gave 4500 years ago.

This granite block has four large, equidistant vertical grooves, semicircular shape, carved in with a diameter of about 1p (7.5cm). It is a monolith and that should have been suspicious, since all the room walls are formed by granite blocks on three levels, sealed with mortar: nothing huge as a monolith.

Moreover, it ends 4p (30cm) short of the ceiling, which consists of three transversal granite slabs (still picture **D06**), the gap being filled by a slice of limestone—perfectly matched, including the grooves (covering part of the east corner as well).

This insignificant slice of limestone should have made me think but, at the beginning, I assumed it was a slight carelessness from Hemunu.

I would kick myself for being so blind.

Only later did I realize the importance of this monolith. This is the most important block inside the Great Pyramid. It is the key to everything and Hemunu took all the measures to protect it, so that nothing could damage it even minimally.

Perhaps you do not believe me, but I have good reasons to think so and I will share them with you.

Now the official explanation: the four grooves were intended to allow four ropes sliding inside, embracing the granite portcullis from below and keeping it lifted up in their homes, waiting for the moment to be lowered.

I found a good animation on the Internet describing the lowering of the three portcullises by passing the ropes through the four top holes and sliding on three round logs, like pulleys, housed in the side saddles (fig. **D07**).

I confess that this hypothesis seems very plausible in the animation, but it is all wrong from my point of view (?...!).

If the purpose of the big monolith was simply to allow the ropes to pass, why to use so big stone with all the difficulties involved. Much simpler to use stacked blocks like the rest of the room.

And why such long grooves running up and down the whole wall until to the corridor below.

Peeking for a moment in the adjoining King's Chamber, looking at the lintel above the entrance, certainly the large size of this block, compared to the size of the others in the room, will amaze us.

This is also a granite monolith, 236cm (4.5c) in height, 134cm (2c + 4p) in depth, and 311cm visible width plus another possible 208cm embedded in the east wall (if this stone is placed symmetrically on the passage), having a plausible total width of almost 10c (5.25m.)

That means we have to deal with an estimated weight of: $1.34 \times 2.36 \times 5.25 \times 2.7 = 44.8T$!

The presence here of such a behemoth is not surprising. If it is true that Hemiunu visited the pyramids built by his father, he undoubtedly recalled that in the Red Pyramid the (limestone?) block above the room entrance yielded dangerously under pressure (photo **D08**). So he chose the appropriate measures.

We were not talking about this block, but rather of another fully adjacent to it, having the same height, presumably the same width and, because L shaped, it enters in the east wall for 35cm, so its original size was even bigger than that one of the King's Chamber.

I think this monolith was installed originally without any groove and having a depth just 35cm more, as suggested at the east side.

Somewhere in the pages coming up far ahead, I explain the method to drill so hard rocks using the tools of that era.

It is a kind of drill press, so I think that the four grooves have been obtained by operating on site, initially practicing four vertical holes when it still lacked the ceiling of the room, followed by the laborious task of removing 35cm. granite excess for seeking the current plan and then proceeding to the realization of the four grooves chisel (from the photos in my possession, it seems that only the upper part of the grooves is "shapely").

Just to allow the passage of four ropes?

Some might say that such a monolith can, in tandem with its mate, bring stability to a point that has been shown to be critical.

Never!

The "slice of limestone" in this respect is revealing.

Carefully studying the King's Chamber and "Zed" above it, I realized the extraordinary technical knowledge that Hemiunu must have had.

If we consider a modern earthquake-resistant construction, we find the secret is not so much in stiffening of the structure as in the "flexible joints" working as shock absorbers for the dissipation of energy in transit.

Today, we use modern resources. Hemiunu had only granite and limestone.

By building the Zed, he has created a sturdy granite box able to withstand, with a thousand stratagems, the enormous weight of the pyramid. But he has also used the limestone as a powerful shock absorber.

Granite is hard but brittle. Brought to the collapse conditions, it will fracture along the veins. The limestone instead crumbles slowly allowing small progressive adjustments.

This is precisely the secret of Zed (explanation follows later) and makes us understand that the small slice of limestone above the monolith block is there to protect it, ready to sacrifice itself if necessary.

All this, in my opinion, has been designed to protect the four grooves below.

The monolith does not participate in weight bearing. Indeed, it is well protected by the adjacent twin block and by the small limestone cushion above: the goal is clearly to save it howsoever. I cannot believe this is just for four ropes!

Nowadays this block has undergone restoration work since its lower horizontal edge was missing a large portion in the center, apparently removed by violators (photo **D09**). The ablation is very deep and goes for a long stretch southward affecting the ceiling of the passage leading to the King's Chamber (?...!).

The concrete restoration correctly follows the contours of the four grooves and also simulates the color of granite (photo **D10**).

Unfortunately this is not the only restoration carried out inside the Great Pyramid.

Since the eighty's there have been numerous interventions, some of which are, in my opinion, absolutely reckless because they concealed precious details which may help in understanding the events that occurred at the time of closing.

For example, in the Grand Gallery there is no way to know if other niches were found empty and if so, what they were. Even in the Descending Corridor a recent repair work has sealed joints that were rather essential for me (?...!).

Luckily, first Agnese and later Saraò unearthed some dated photos on the Internet. With a lot of good luck, I was able to find in them some of the missing clues (insufficient but important) in support of my thesis.

In the Antechamber of the Portcullis even now there are little details supporting my hypothesis, included in the following description.

Reading over what I have written, I realize that my work tends to take on the connotations of a thriller, but on the whole, I do not mind. This was how I lived through the period of my research—without being assured of the grand finale.

For you it's different, because I guarantee you a stunning conclusion, I hope shared, certainly unexpected, which may be partly corroborated by objective evidence obtained with a modest non-invasive intervention.

Too bad that as in all the thrillers you will have to wait until the end!

Let us now return to the Antechamber of the Portcullis: considering the short length of the small vestibule (55cm), by subtracting the thickness of the indentation (2.5cm), we have 52.5cm, exactly 1 cubit. This cannot be coincidental.

In this place it was essential to have a net space of 1c. Why?

If we wanted to rise on the portcullises, the space above the granite partition seems to be designed exactly for this purpose. So I called it "crawl space" since the beginning. Assuming this was its purpose, why climb over the portcullises? And why the bump in the vestibule has been obtained by removing more than 2.5cm thickness from the two granite blocks, since the original thickness was planned as "normalized", equal to 5 palms exactly (37.5cm)?

It would have been easier to remove 2.5cm thickness from the limestone north wall.

Of course it could be done, but the limestone indentation would not have been suitable for the planned goal.

At this time, many readers will hate me, but it is necessary to ask the right questions in order to appreciate the solutions.

Meanwhile, let us take up the matter of the movie describing the closing of the pyramid.

I've said the animation is very believable; so much so that I understand it is the official version, or at least the most reliable one, today.

The portcullises of the movie are of a modest height ($112\text{cm} = 2c + 1p$) since they had to be parked, at first, between the ceiling of the passage below and the lower edge of the semicircular saddles, housing the rotating logs (I want to remember that, at the time, the wheel was unknown and the modern pulley too). That height, I highlighted a few pages ago describing this place, is equal to the core measures: $2c + 6p$ (151cm).

If the portcullises had really had this height, they could, once lowered, block the passage below and rise 40cm over the bottom edge of the block with the grooves (photo **D11** and **D12**).

The size is very credible since it is also compatible with the type of damage (described above) of the monolith block.

Apparently the Pyramid violators climbed over the crawl space, understood the deception, and (bypassing the first two) demolished the top edge of the third portcullis with their chisels opening a passage over the corridor edge.

The facts seem to fit perfectly with this reconstruction, but I think they are not very plausible.

I will illustrate my argument.

First, the opening above makes the first two portcullises unnecessary. Even if stones and mortar filled it, it doesn't make sense: too easy to remove this frame rather than the granite.

Second, such a closure, with so modest portcullises and the by-pass above, is a very poor device and I'm awfully sensitive to the intelligence of Hemiunu. In my eyes he was a genius, at least as formidable as Leonardo was in his day, and I refuse to believe that he would design such a nonsensical scheme.

Let me add here (I'm in the revision process, in 2007, two years after the first draft) that in the double slope Pyramid Nefermaat, his father, used the first granite sliding closure and, because a genius, he had eclipsed since the beginning the imitators who succeeded him.

This gate (along with its left open twin) solves the two fundamental problems of the gravitational sliding stone gates.

This type of gate cannot be lowered down by gravity only: granite, although hard, is brittle and falling freely from a height of over one meter would probably be fatal. Secondly, a hypothetical violator, when confronted with an obstacle of this kind, would have no difficulty to insert wedges under the granite to lift it. In all the next pyramids, this has always been the adopted technique, from Khafre to Menkaure.

The two closing gates designed by Nefermaat provide instead the measure of his genius. Rather than falling vertically, they slide diagonally in their homes, descending with a modest speed and preventing any lifting with wedges, effectively blocking the passage, unless you know the deception and the exact direction of the descent into place. So much so that only one, in the Pyramid of the double slope, has been violated and only using bat and chisel... the only possible way (photo **D13**).

Impossible that Hemiunu ignored this technique adopted by his father and incredibly had used a so naive solution.

Third point: the portcullises have a weight of 1700kg approximately, not too much. Why don't try lifting them by wedges and ropes, taking advantage of the four holes at the top of every block and the allowable space above, rather than breaking them?

Fourth point: after entering, it would be useless to break the other two as seems to have been done. Why so hard work having already the path free?

Lastly: in the movie the three granite doors were kept lifted by ropes properly blocked using the semicircular bulge on the other side of the double-stacked partition.

Imagine these blocks lifted in position and perhaps waiting for years, just suspended by ropes—well, it is not credible at all. But the solution of this problem is obvious: standing on the portcullises side and looking down, we may see, on both sides of the passage floor, three pairs of prismatic pits, about ten centimeters (1p?) deep, between the vertical granite guides (photo **D14**).

It is from the bottom of these pits, a few pages ago, I began to measure the height of the room.

These pits are usually not mentioned, so much so that I have learned of their presence only in recent times —and with a sense of despair because I could not explain their presence.

As it turned out I was wrong; now their functioning is obvious to me and I hope it will be to you too.

Instead of being suspended by ropes, it is much more plausible the three portcullises were simply supported on three pairs of long and narrow blocks standing in these side pits.

In this way, the gates have been positioned at the height of the passage ceiling and the six supporting blocks would have been filled the guide cavities (photo sequence **D15...D18**).

It seems too obvious a solution and I am surprised not to have found it described anywhere, but maybe it is.

However, it is hardly credible that the closure device should be entrusted to so modest portcullises, even due to the crawlspace above the first two.

I previously divided the Antechamber height into three parts: $2c + 2p$, $2c + 6p$ and $2c + 2p$.

The sum of central height and the lower height is equal to the one of the central height and the top one: $4c + 8p$ or, since $1c = 7p$, $5c + 1p$.

Now try to imagine how the whole perspective changes if the height of the three portcullises is exactly $5c$ (photo sequence **D19... D28**)!

This is the portcullis right size, consistent with the room measures and their purpose!

Having a 5 cubits height, when they are lifted up, only 1p of free space will be available between the room ceiling and their top (photo **D23** and **D24**).

Once lowered however, they will be exactly flush with the east wall, as well as at the level of the lower part of the semicircular saddles on the west side (photo **D27** and **D28**).

I believe this is the correct alignment.

Once such three portcullises were lowered, it would no longer be possible to bypass the first two. Even climbing over them, there is too little working space to break a section of granite nearly a meter and a half long (equal to the sum of the three horizontal thicknesses), nor can they be lifted by ropes or wedges: too close to the ceiling (excluding the weight of 3tons). Better instead to attack them frontally as it was logical to do.

I am absolutely convinced this was the scheduled way to block the passage. Also the height of 5c. was, I think, intentional and consistent.

I also figured out a way they could be lowered gradually, avoiding to damage them.

Let's imagine lowering the southernmost of the three, the one blocking the access to the King's Chamber.

We start by placing under it, fairly in central position, a set of wooden (or limestone) blocks. Atop this we will insert a copper wedge, having a kind of "lug" bent upwards at the end. By forcing this into the joint with a club, the portcullis will be raised a few millimeters, enough to free the two stone side supports (they also may be broken and removed in pieces).

Then, on the left side but still in a central position, a second set of wooden (or limestone) blocks with a similar copper wedge is placed, just few millimeters short of the bottom of the portcullis.

Working with the bat and a crowbar, stuck between the block and the "lug", the copper wedge from the right side is slipped off and the gate goes down a little, until it rests on the left wedge.

By reducing the height of wood (or limestone) support on the right side, we will reposition the copper wedge, obviously now a bit lower compared than the left blocks and so on.

I thought this method to lift up heavy stones, but it works also for lowering.

This description solves some issues of the portcullises or at least, their actual measurements, but more complications arise.

It is clear that such a locking system has no need of a vestibule or a crawlspace above: the whole device can work even without the small pre-entrance and its

upper passage. Moreover with the shutters in the standby position, it is impossible to do anything from the top: no free space enough.

This means that whatever was the purpose of the small vestibule, it could only be used when the portcullises down.

And what about the three saddles? And the two little holes? And the two small notches, laterally carved in the megalith block with the grooves, visible in the photo **D29**?

Here then that the idea evolves by itself: the crawlspace will be used only after the portcullises have been lowered, so that, in due course, someone will climb over them—to do what?

I consider appropriate, at this point, to summarize some essential issues no longer in doubt.

The granite portcullises measurements are: height 5c, 1c thickness and width equal to $2c + 2p$ (120cm).

These are credible dimensions of the device and, most important, the room measurements are consistent with them.

In the wooden model I built, the functioning of this part is even obvious, including the six temporary supports inserted vertically into the pits.

I may seem stubborn here, but frankly the facts are indubitable.

Based on this, I will be forced to discard as false everything not compatible with it: first the three turning logs in the saddles (very questionable, due to the wheel was unknown).

Second, the damage at the bottom edge of the monolithic block has a different explanation (later on).

Third, the impractical hypothesis about the four grooves and the four top holes to use for the portcullises lowering by ropes.

I forgot: fragments of the portcullises have been found scattered everywhere inside the pyramid. Even today, lying down next to the legitimate entrance, there is a portion of granite having the same thickness and the drilled holes (photo **D30**).

Doing the math with the dimensions adopted, each portcullis will weigh about 3000kg!

One man cannot lift a load greater than 30kg, especially for long time.

Imagining to lift one of these blocks by ropes, it is evident we need at least 100 men. And where will they fit?

Someone may argue it is not the only case of heavy load inexplicable transporting by means of the era. However, for the monolith transportation I have optimal

solutions (See Chapter: Block transportation) and I would like also to do a practical demonstration. But the weight of this block simply cannot be raised, given the small space around it. It would also be foolish to do so, since the same result can be obtained with much less effort.

Imagine then that the pyramid is erected to the level of the Antechamber ceiling. The first portcullis lies by the cavity, perpendicularly to it, in a vertical position on its 120cm long side.

The block shall be prepared on the east side of the pit, as on the west sides are already in place the blocks of the north ventilation duct, coming up from the King's Chamber.

Now imagine the whole Antechamber has been filled by sand right to the brim: just installing the ropes through the four holes at the top of the portcullis and pulling from the other side of the pit until it stands onto the sand (fig. **D31**).

Still using the ropes it is held in position and guided into place by slowly removing the sand below, funneling it into the Grand Gallery or the King's Chamber (still open at the top): same way for the next two portcullises.

I do believe this is a fact: it is impossible to lift a weight of 3tons having a free space of 120cm by 50cm only.

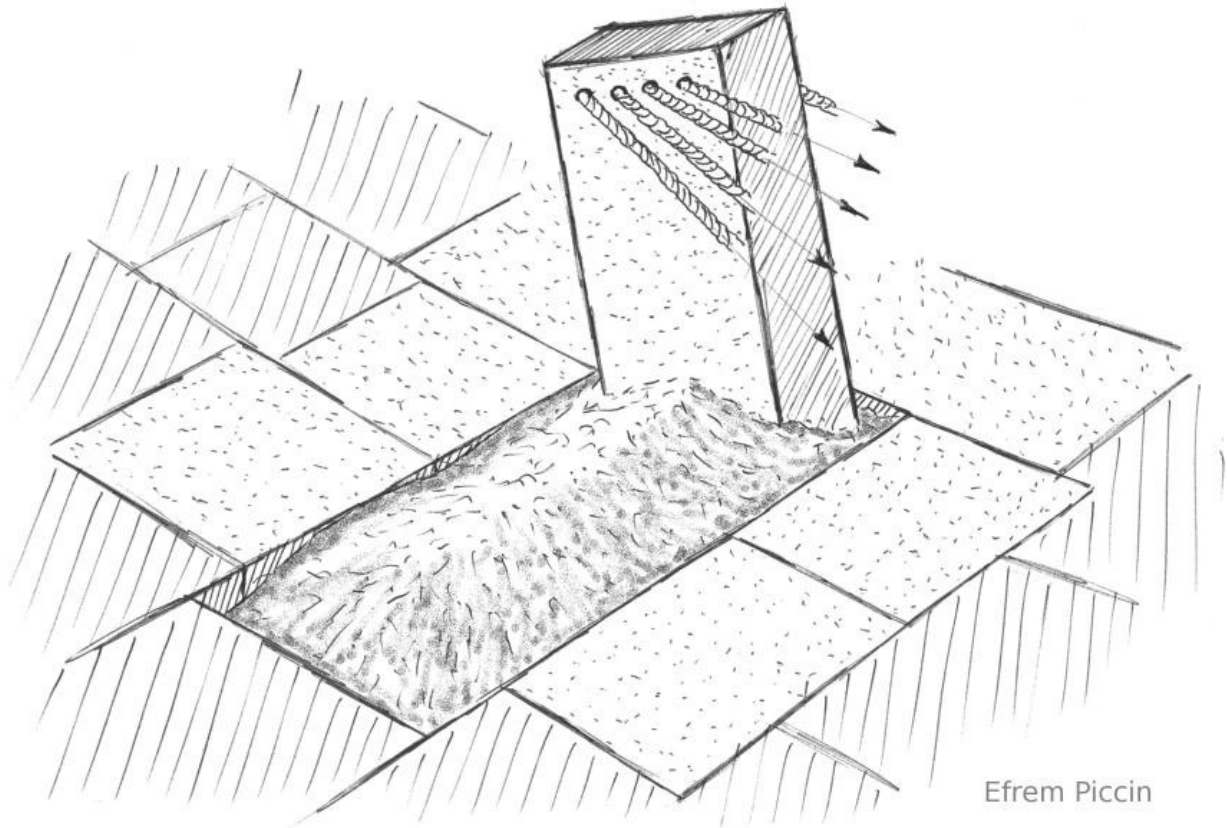


Figure 11: Installation of the Portcullises

Certainly many people have much to say about this method, but it is intelligent and works, the lifting way simply is not applicable.

So the portcullises were steered in place by ropes running through the four top holes and others passed from below, suitable for moving in case they got stuck while being lowered (it happened at least once considering the six parallel vertical scratches on the east side, at half height of the second guide (photo **D32** and **D33**).

It was not an easy job to glue all the elements together in a plausible solution.

Let us not forget, however, at last that when the three portcullises are in the standby position, the crawl space above is not available.

I believe this also is an indisputable matter.

Another small objection: if the housing of rotating logs was the saddles purpose, why are they only on one side? Why not on the east wall as well?

Finally, even the purpose of the two sidewalls is incomprehensible, since creating additional space at the top which is unusable when the portcullises in the standby position.

It means it may have a purpose only when the portcullises are down.

Criticism exhausted, I will try to give my explanation. It will be good to arm yourself with patience since the description will not be easy, but I hope to be able to attach photos or at least the drawings. From the technical point of view everything works fine.

First and foremost, I reconstructed the top of the granite divider in its original shape, since I don't think it was so compromised originally (photo **D34**): the upper edge squared and at the same level of the groove containing the granite divider in the west wall.

Of course, in this way the east sidewall remains shorter, compared to the west wall and the partition, but I have imagined filling this empty space with a suitable stone block sealed by mortar.

This stone should be 3p (22.5cm) wide, 3p high and 1c + 5p (90cm) long (photo **D35**).

I built a small wooden block, in scale to the measurements of this block. But once installed in my model, I realized that it did not fill the whole area: a portion of the east wall was still uncovered and that disturbed me from the aesthetical point of view.

Only later when, in my model, I started to move the other blocks in position, I did realize how this lack was important.

Without this deficiency the other blocks (?...!), that passed through here (of course in my hypothesis), would never have been able to make the necessary rotations (photo **D53**).

Looking closely at my photos, I found a significant white imprint, square in shape and certainly of mortar, located exactly where this stone would have touched the north wall (photo **D38**).

The imprint in the photo is taller than necessary, but all in all, that's how it should be so, since the granite stone below, also touching the north wall, has been damaged. A tiny fragment of granite is still bonded to the limestone wall; perhaps it is the lower edge of the inserted block (photo sequence **D36... D43**).

Having the three great portcullises lowered as described above, for reasons we shall see later, it is necessary to place above them three additional granite blocks, having "standardized" measurements consistent with the rest of the room.

Keep in mind that the step on the east wall, the upper edge of the portcullis and the low point of the three saddles are all on the same plane. So three blocks with

identical measurements of 3c x 1c x 3p may be installed above but, of course, shaped at one end to fit into the saddles.

The thickness of 3p was carefully chosen by observing the diameter of the surviving semicircular saddle is 6p (45cm), consequently its radius...

The semicircular part of the blocks shall have a 4p (30cm) length (photo **D44**).

By the way, the saddles have been constructed to fit the blocks, not vice versa.

Now I will explain how these three new blocks, in order to be raised on top of the portcullises, must perform a complex rotation requiring their rounding at one end. As a result of this, the resting points must be semicircular, so as said, the saddles are shaped to accommodate the round end of the three blocks.

Now let's try to understand why these blocks should have a semicircular end. The weight is at least 600Kg and must be handled in a confined space where, physically, no more than four men, two above the portcullises and two below, can take place.

The block may be lifted up just in two ways, one of which, however, too dangerous.

Let us examine this case first: the stone has a rectangular shape and comes inside the corridor lying on its long side.

To rise, first it has to be lifted, the short side leaning against the divider.

The vestibule size allows it, but the block must then be pushed up by force of the arms (just 4 men?) to the upper edge of the divider to finally rest on top of it and furthermore without any stop and with the serious risk to slide uncontrolled sideways.

I would say that this way is frankly impossible.

The second option is amazing. Too bad you cannot see all the working sequence in my model! But who knows, maybe with a publisher being willing...

The block comes still stretched out on the long side with the round profile underside but upstream. Once inside the vestibule, the block will be lifted with the round side up and resting on the granite divider, then tilted to the left and slightly rotated on itself, the round part leaning at the corner between the east wall and the south side of the divider.

It is necessary to proceed in this way since the width of the vestibule does not allow the block to rotate by simply standing it up (available space is 55cm, while the section diagonal of the block is 57cm).

There are no serious difficulties to do that: just using levers and intelligence, without having to lift it (photo **D45** and **D46**). While rotating it, it is possible to realize why the length of the round part must be four palms at least (30cm).

If not, the two square edges would not allow the free rotation and the bottom one would be stuck against the divider.

In this way, however, it rotates freely just below the divider. We can really understand how long this has been studied by observing the movement. Looking that in the model the result is truly remarkable (photo **D47** and **D48**).

The block rotation stops when its round part rests against the east wall while the bottom edge, onto the floor, moves westward. Then it will be easy to straighten the block so that it leans against the west wall, ready for lifting (photo **D49** and **D50**).

I want to say that, pushing it up in this way, the space is enough and primarily it cannot slide because trapped at the wall corner.

For the lifting just one man is enough, using the method of the two wedges described above (remember there is a modest side gap of about 2.5cm). Perhaps someone, from above the divider, may give a hand pushing the block to the west wall by using a lever against the opposite wall.

In this way it can go up to the ceiling. At this point it will be necessary to coordinate the task, which could be very risky. Someone on top of the divider has to push the block towards west, while someone else from the bottom pulls it eastward to the passage center.

If everything is done correctly, the stone will slide down but instead of falling, would rest on the granite bump, remaining locked in this position, allowing a precious and safe working break.

Here the true purpose of the bump and the reason why it must be granite and not limestone (photo **D51**).

This protrusion certainly worked many times, and from both sides, due to the two series of dents visible on the granite divider just above it.

Falling down, the stone edges must have stuck firmly above the bulge, marking the granite in a symmetrical manner. Even if someone has repaired the imperfection by cement, the patch has a characteristic shape of eight-lying horizontally (like the mathematical symbol for infinity). The shape and position of the scratches are consistent with my theory (photo **D52**).

Working from below, inserting slant posts and straightening them with hammer blows, the block is raised again, keeping it diagonally till the upper edge will be on

the top of the west wall, sliding the block over the lip which was marked and rounded by this operation.

Continue to push the block up from below; when the top edge reaches the west side ceiling, it begins to rotate, rising its bottom part pressed against the east wall. Inevitably, it will end up sliding to rest over the two lateral edges of the vestibule (photo **D53**).

This sliding against the east wall left an evident scrape in the limestone wall, but it is possible to see the abrasion continuing on the granite too (photo **F33**).

At this point, pushing from below by posts, the block will be flipped upside-down (the round part below), being so arranged above the divider and finally pushed forward to fall into the first semicircular saddle (photo sequence **D53...D58**).

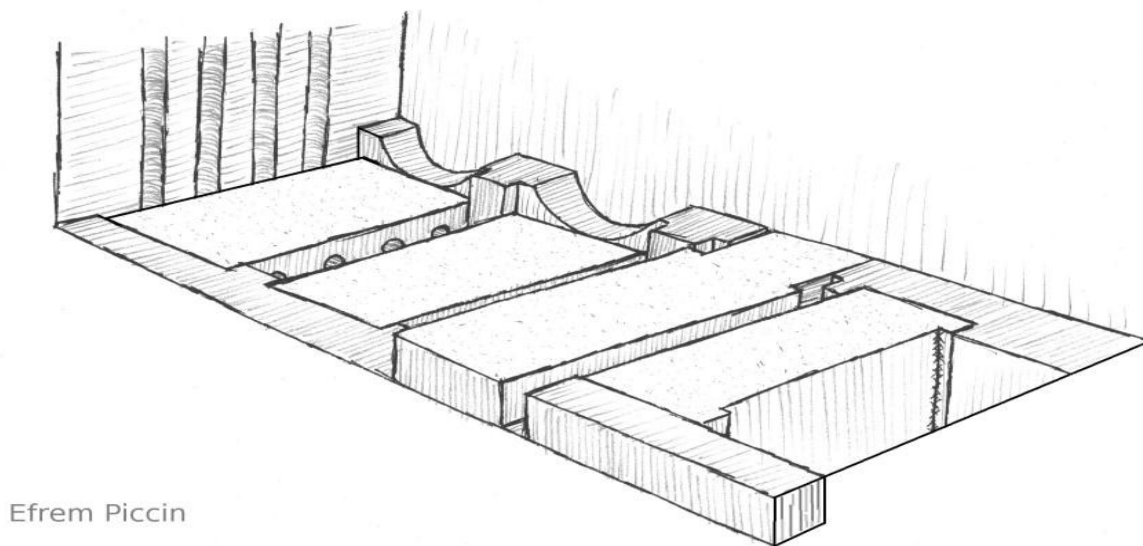


Figure 12: Laying the blocks with the round head

I realize that this is a complicated explanation, but I assure you that it works amazingly well. I came up with the idea first, and only after I built the model, I realized that everything worked exactly as I expected. You cannot imagine the thrill it was for me.

As the book progresses, though publishing is not on the horizon so, perhaps in the future I will attach a whole series of model photos and, if I can send someone to Cairo, also photos of various details I told you, still present in the Antechamber of the Portcullises.

Checking the whole sequence of movements in my model, I find it extremely convincing and of course everything had been planned at the design stage.

I am sure that somewhere Hemiunu had built a model of the Antechamber of the Portcullises in 1:1 scale to check the device working properly, as he did for the intersection between the two lower passages, carved into the rock, right at the north-eastern edge of the pyramid.

That is the perfect replica of the bottleneck for the wedged granite block. This excavation is called "trial passages" and it will be described ahead.

Maybe you are convinced regarding this procedure, but a question arises: why bring these three granite blocks over the portcullises?

It is implausible as additional weight just to deter violators of raising the portcullises: too much effort for so modest a purpose.

Yet the three blocks were placed exactly in the position that I told you. There are other telling details: on the north side of the granite divider, laterally with respect to the button, there are vertical scratches, even slightly angled, made by the stones that rose from here. Just look carefully and think.

There's more: I have pictures showing the upper part of the east wall, at the south corner. Well, in all the photos, exactly at this point, the megalith with the grooves shows a square mark of mortar, three palm high, exactly the same size of a block just described (photo sequence **D58...D61**).

Perhaps it may not be enough yet, but I have other arrows in my bow. I have an explanation for the two small holes, the small notches, and more mortar imprints... Wait and see.