

I. Dynasty 293

Chapter 293: The Birth of Tungsten

Inside the machinery department, Song Changping sat with his artillery production team.

After reorganizing the teams, Song Changping had kept only his original artillery crew.

Standing before the blackboard, Xiao Ming began sketching the structure of the flintlock musket.

Both matchlocks and flintlocks were smoothbore firearms—the only difference was how the gunpowder was ignited.

Matchlocks were simple, operating similarly to cannons. Once you had a barrel, it wasn't difficult for Song Changping and the others to replicate the design.

But for Xiao Ming, producing matchlocks was pointless. In the field, matchlocks were unreliable against cavalry. With a firing rate of two shots every three minutes, just like the “three-barreled bird guns” of the late Ming, soldiers would barely fire twice before being forced into melee. Worse, if the match cord went out, a matchlock was no better than a stick.

Flintlocks, however, avoided the problem of extinguished matches. They were far more stable. That's why flintlocks quickly replaced matchlocks historically.

“Overall, the external structure of a flintlock mechanism includes the hammer, main spring, frizzen spring, and pan,” Xiao Ming explained.

“The hammer holds the flint. The main spring powers the hammer. The frizzen spring supports the steel frizzen that the flint strikes. The pan holds a small amount of priming powder.”

“Internally, you have the trigger, sear, tumbler, bridle, and sear spring. The trigger activates the mechanism. The tumbler controls the main spring’s energy. The sear locks and releases the tumbler. The bridle fixes the parts in place, and the sear spring keeps the sear pressed into position.”

“Basically, when you pull the trigger, the sear releases the tumbler, allowing the hammer to strike the frizzen and produce sparks, igniting the powder.”

Pointing at the detailed diagram, Xiao Ming explained the structure piece by piece. Song Changping and the craftsmen listened intently, memorizing everything.

They also carefully noted the dimensions of each component on the blackboard.

From Song Changping’s perspective, forging the tiny parts—hammer, springs, tumbler, and trigger—would be troublesome.

After explaining the full structure, Xiao Ming said, “Now, raise the problems you foresee.”

“Your Highness, it’s still the issue of the springs,” Song Changping said immediately. “How do we make steel flexible enough?”

Without springs, building a flintlock was impossible.

Xiao Ming smiled. “Before, it wasn’t possible. Now, it is.”

“Oh? Why’s that?” Song Changping asked.

“Do you know why I insisted on finding tungsten before moving forward with musket production?” Xiao Ming asked.

The craftsmen shook their heads.

Xiao Ming explained, “The gun barrel was just one problem. You could forge barrels by hand—but that would only allow you to make matchlocks, not flintlocks. Springs require spring steel, and spring steel requires elements like carbon and manganese. Without manganese, you can’t make reliable springs. So even if we had barrels, producing flintlocks would have been impossible.”

He paused, then said, “Now you understand why I obsessed over finding tungsten. It’s not just for making cutting tools. It’s also because black tungsten ore comes with manganese.”

Song Changping nodded slowly. As craftsmen, they knew that rolled iron could make barrels. But handmade barrels would vary in quality and consume enormous amounts of labor.

After covering the musket design, Xiao Ming assigned tasks to Song Changping’s team.

Now that they had lathes and precision measurements, it was time for assembly-line production. Standardized parts made by different craftsmen would be assembled later, dramatically improving production speed.

If Xiao Ming stuck to traditional methods, he could never compete with the Western powers—or even Japan. His territory only had 600,000 households, and most of his labor came from a limited number of slaves.

Without mechanization, it would be impossible to compete.

“I’ll take charge of producing the spring steel,” Song Changping volunteered.

Xiao Ming looked at him approvingly. “Good. Let’s find Zhang Liu.”

Later, with Zhang Liu

Each member of the flintlock project was assigned to their part. Xiao Ming and Song Changping found Zhang Liu.

By now, molds for the boring machine, milling machine, and drill press cutting tools had been completed—only the extraction of tungsten remained.

“Prepare charcoal. Mix the tungsten powder with charcoal and smelt it at iron-melting temperatures,” Xiao Ming instructed Zhang Liu in the courtyard.

Following orders, Zhang Liu and his craftsmen immediately got to work. They had been eagerly waiting for this moment.

Given current technology, Xiao Ming could only use carbon reduction to extract tungsten.

Historically, in 1783, Spaniard de Elhuyar discovered black tungsten ore and used carbon reduction to obtain tungsten powder for the first time, naming the element.

Thus, Xiao Ming’s method was feasible. Though the purity wouldn’t be very high, it would be more than sufficient for their needs.

In fact, it might allow Qingzhou’s lathe industry to rival—or even surpass—the West for a time.

They mixed the tungsten powder with charcoal and poured the mixture into a blast furnace preheated by the heat storage chamber. Then they waited.

An hour later, once the furnace cooled, Zhang Liu extracted the material from the outlet.

Amid the black powder, some silver-white granules appeared.

Though there weren't many, it confirmed that carbon reduction had successfully extracted tungsten.

"Your Highness, are these silver granules tungsten?" Zhang Liu asked excitedly. He had never seen anything like them before.

Xiao Ming nodded, eyes gleaming with joy. This was another technological breakthrough for Qingzhou.

"Yes. This is tungsten. Now we can produce tungsten steel."

The craftsmen's faces lit up with bright smiles. Zhang Liu immediately ordered, "Quick, bring a sieve. Extract the tungsten particles! And prepare more charcoal—we'll refine even more tungsten!"