

A Random History of Mining

(And thus the industrial revolution)



Matthew Dockrey

A Day That Will Live In Infamy, 2009

The Neolithic

Flint,
Obsidian,
Chert,
some others.

Why these?



Conchoidal Fractures

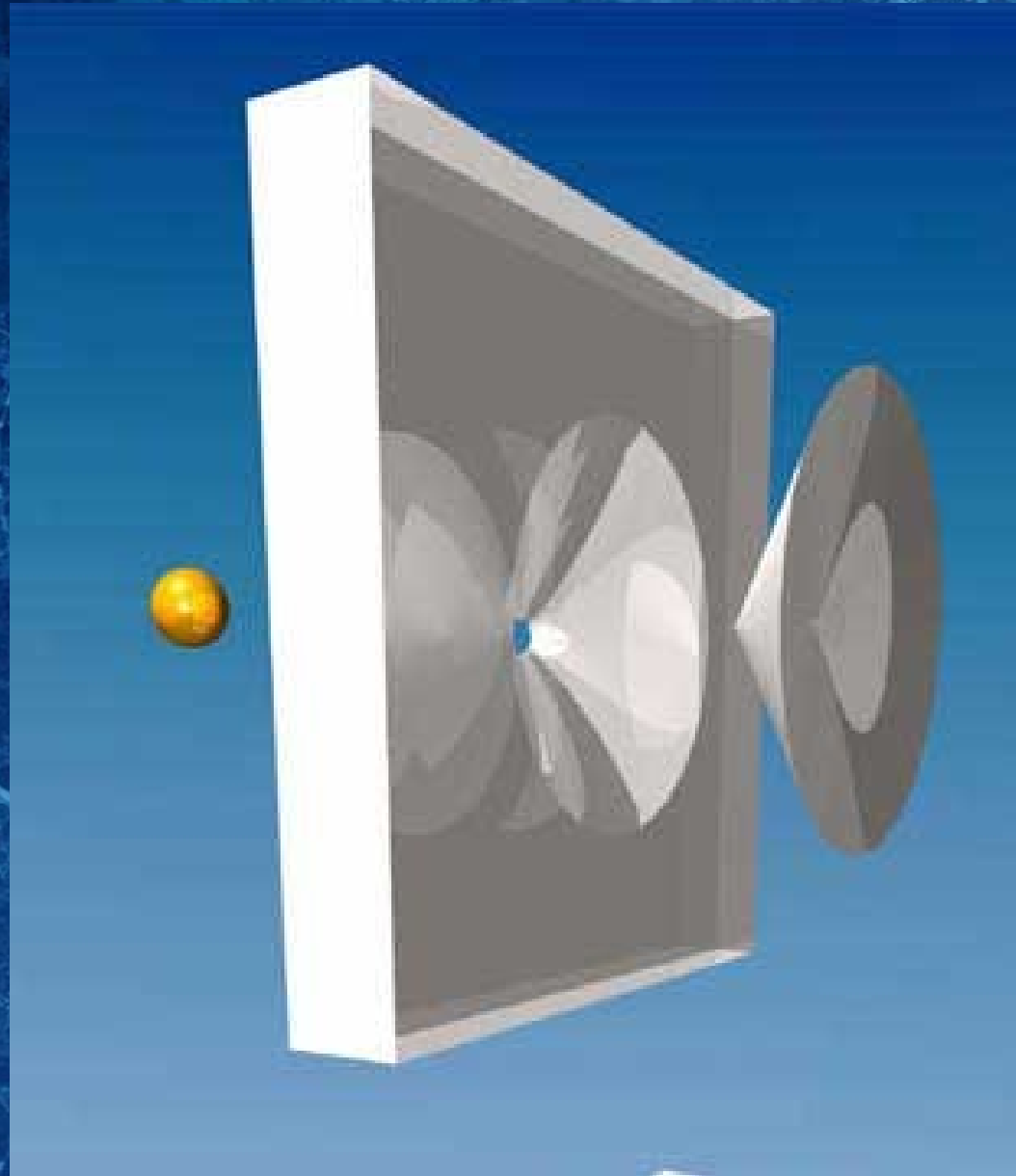


Image courtesy of sterlingsculptures.com

Conchoidal Fractures II

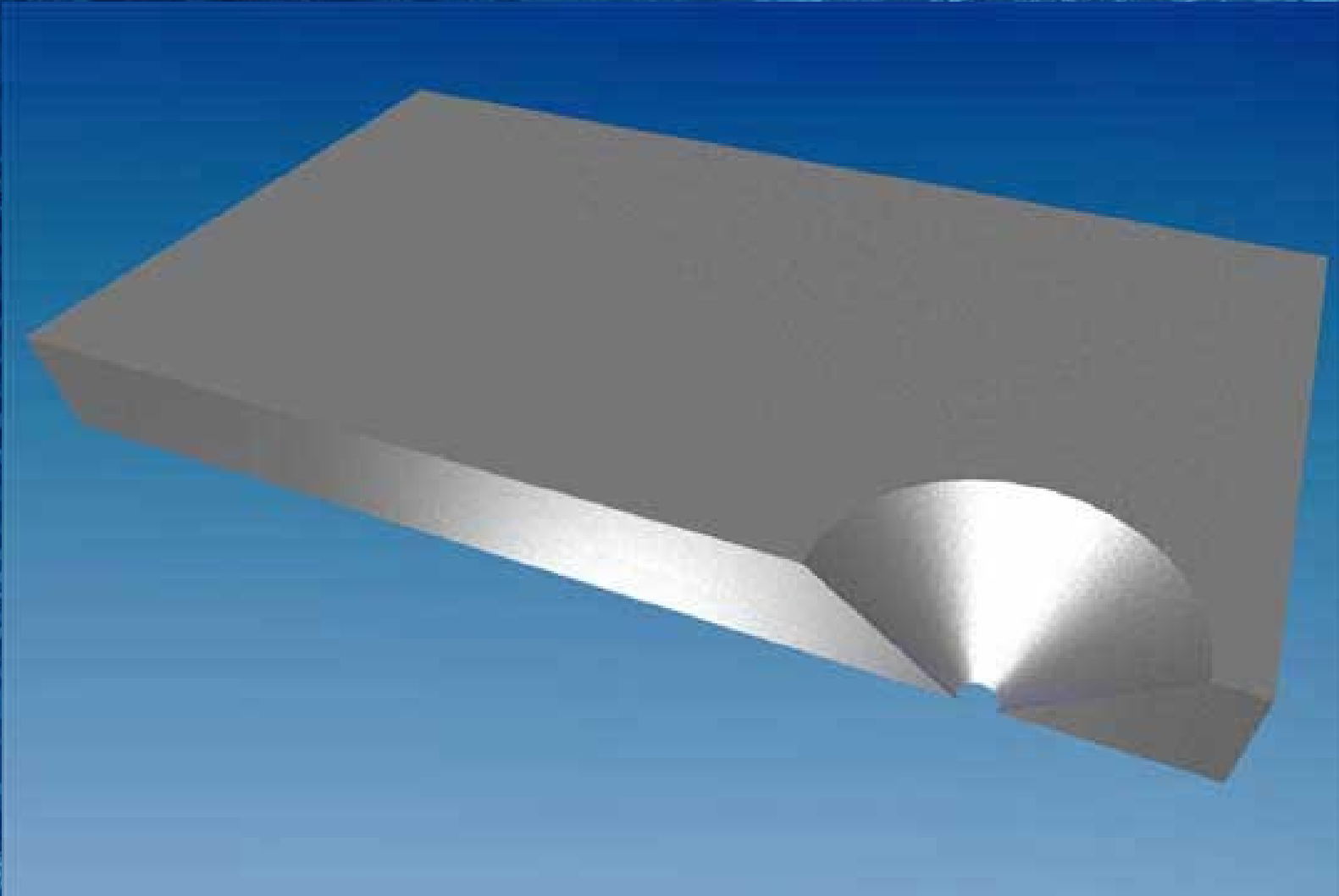


Image courtesy of sterlingsculptures.com

Conchoidal Fractures III

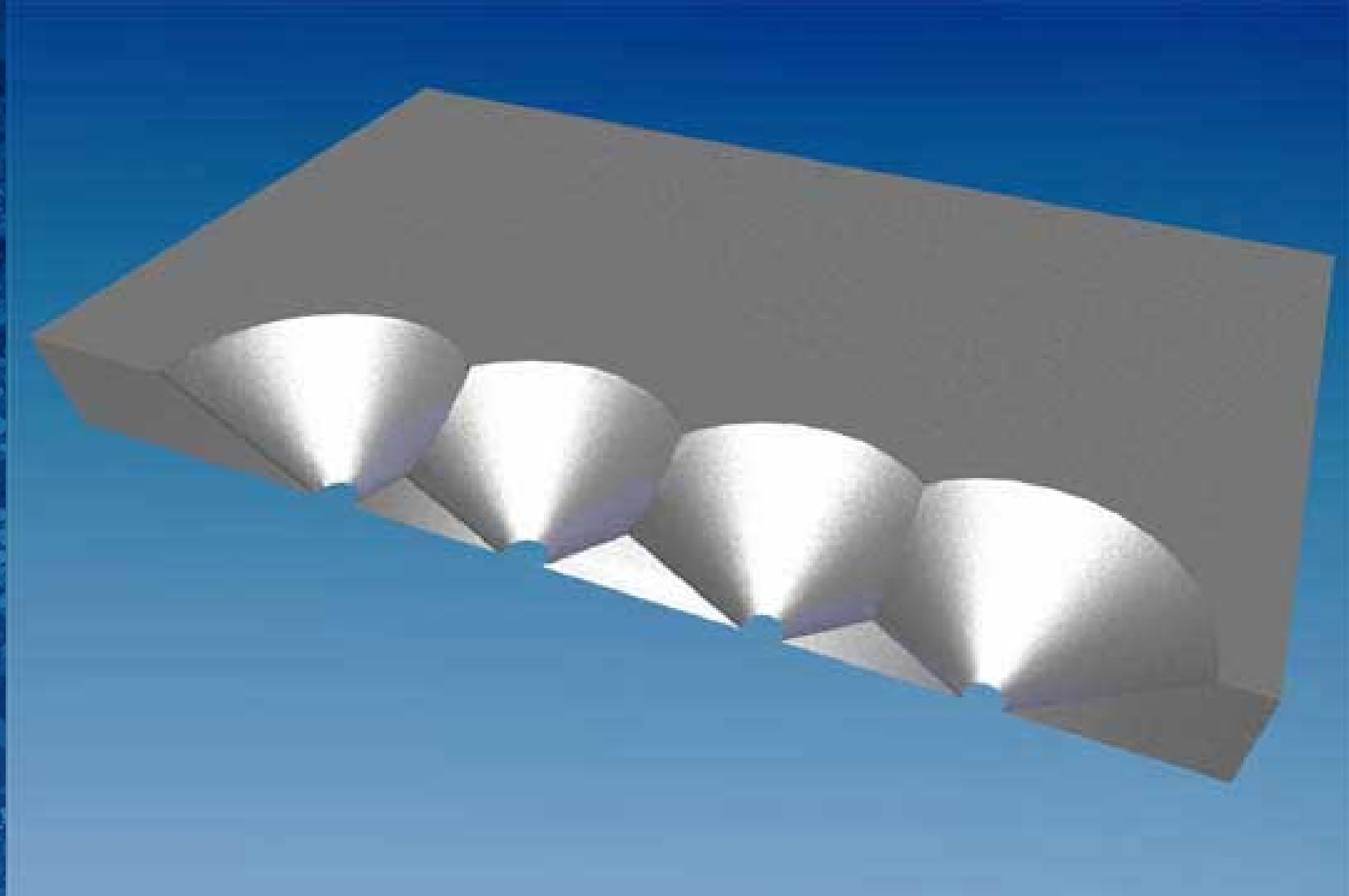


Image courtesy of sterlingsculptures.com

Flintknapping



Image from texasbeyondhistory.net

Grime Graves



Image discourtesy of English Heritage

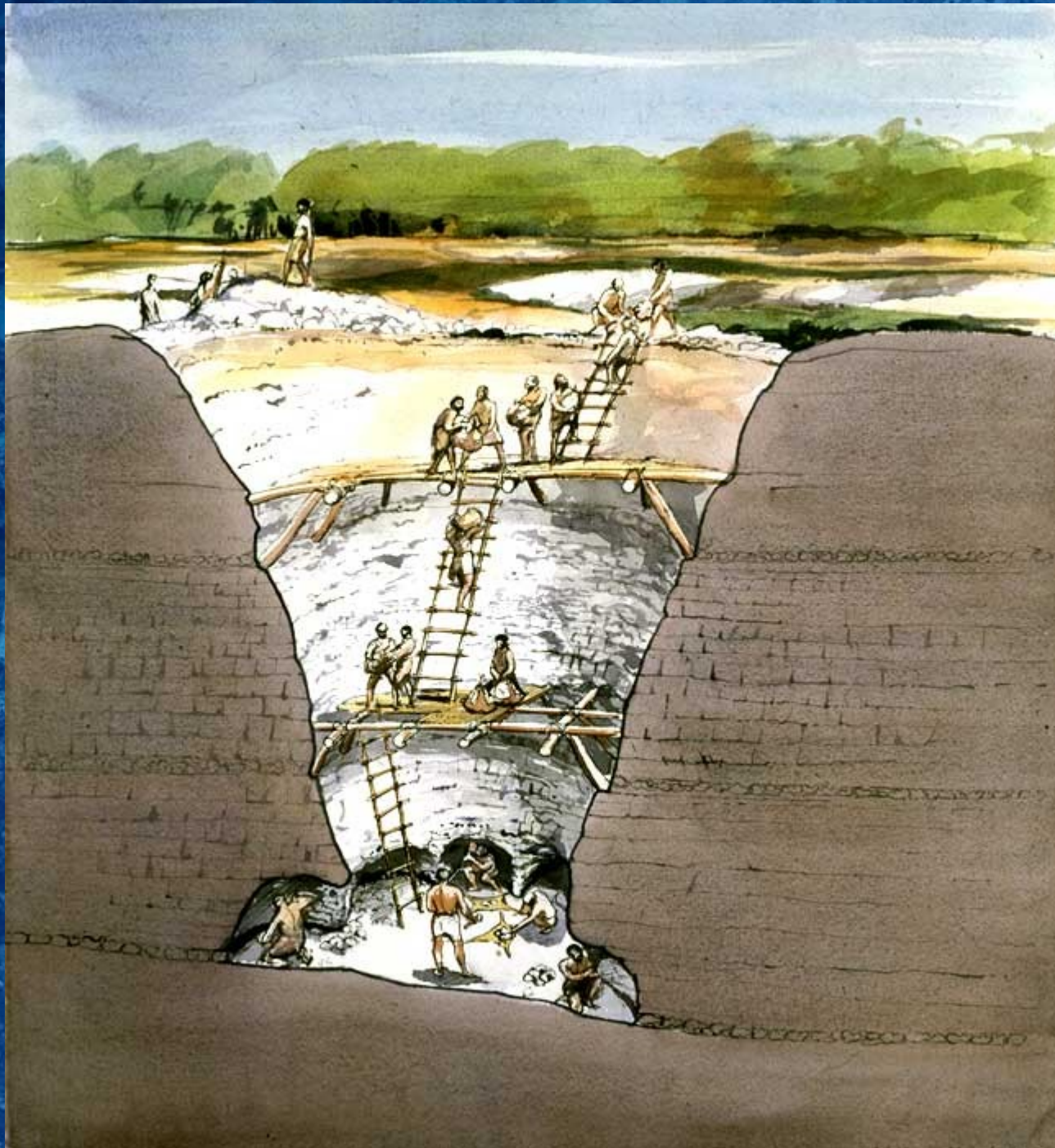


Image dis courtesy of English Heritage

Holy hell, can you freaking
imagine?

Remember, *neolithic*. No metals!

Antler tines and leather bags. That's it!

Soil and soft rock only, obviously.

Trade networks spanned thousands of
miles.

SRS BSNS



The great void

The next couple thousand years, kind of mysterious

Not much left, and there wasn't much written about it

Until...

De Re Metallica

Premier manual of mining and metallurgy
for hundreds of years (1556)

Georg Bauer => Georgius Agricola

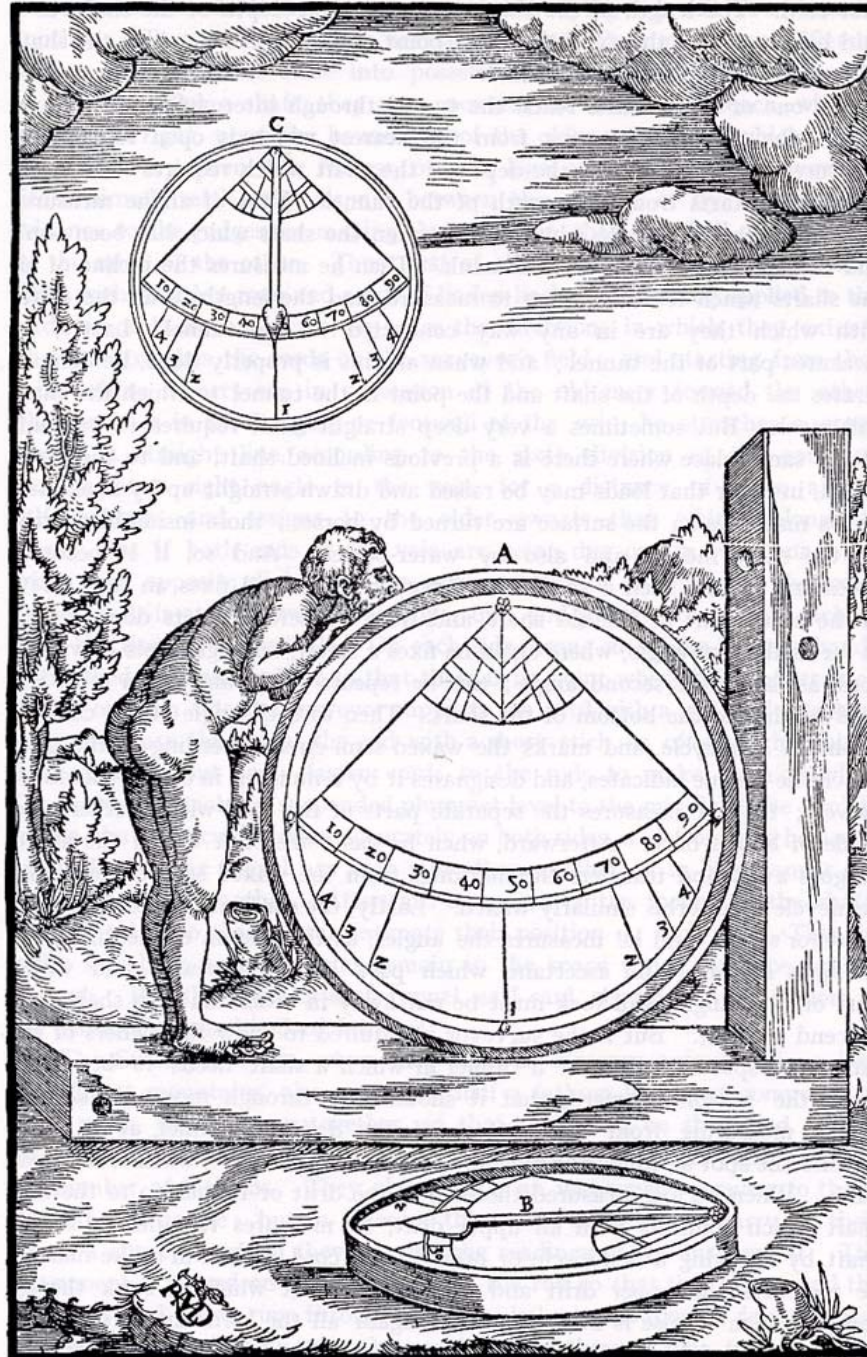
Joachimsthal and Chemnitz

(Joachimsthal => Thaler)

First English translation in 1912 by Herbert
and Lou Henry Hoover

Oddly superstitious

such an angle as represents the slope of the mountain, so that its lower end may reach the end of the straight cord; then he stretches a third cord



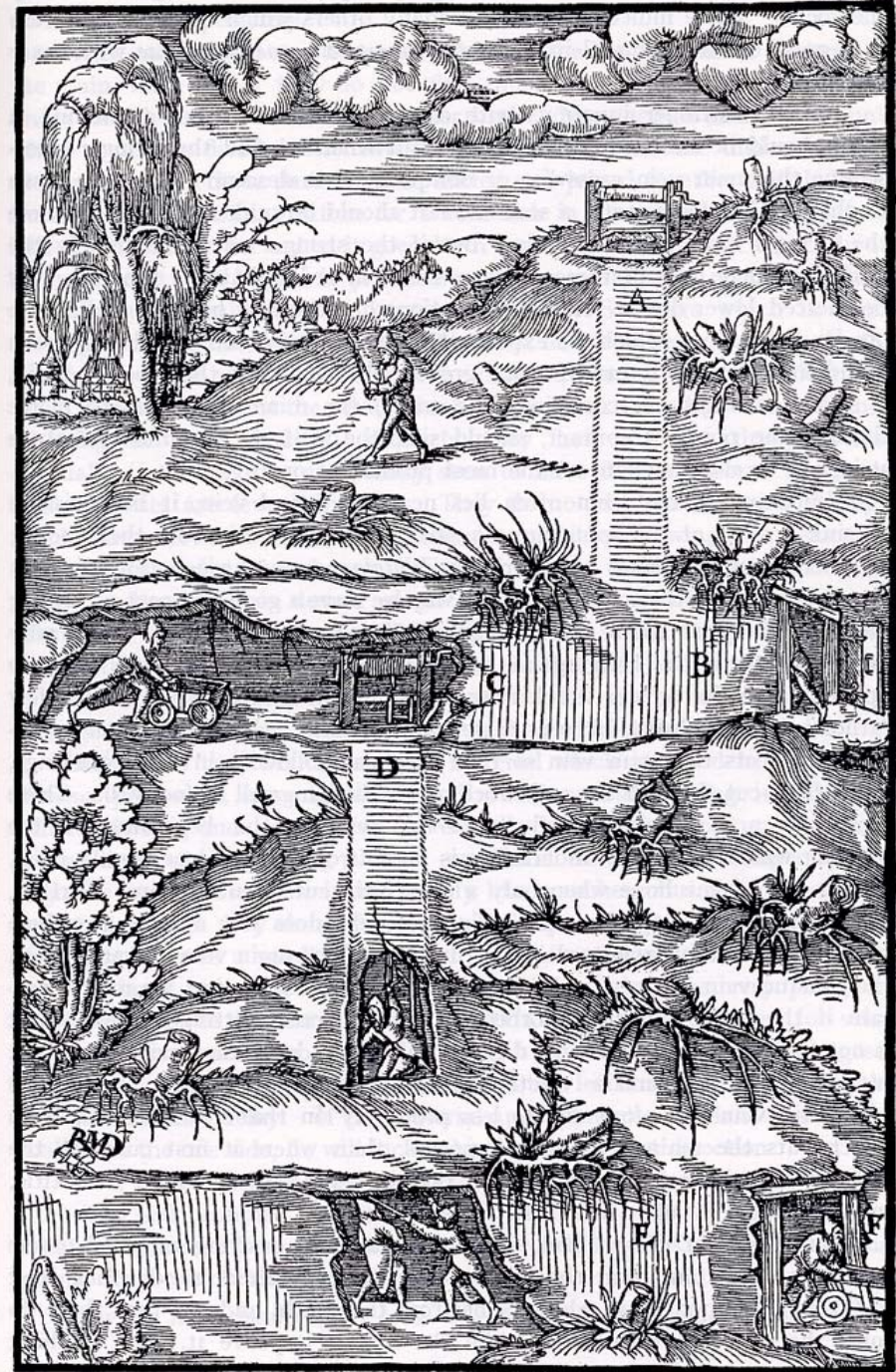
A—STANDING PLUMMET LEVEL. B—TONGUE. C—LEVEL AND TONGUE.

divide it obliquely; however, my discourse is now concerned mainly with *vena profunda*, but most of all with the metallic material which it contains.

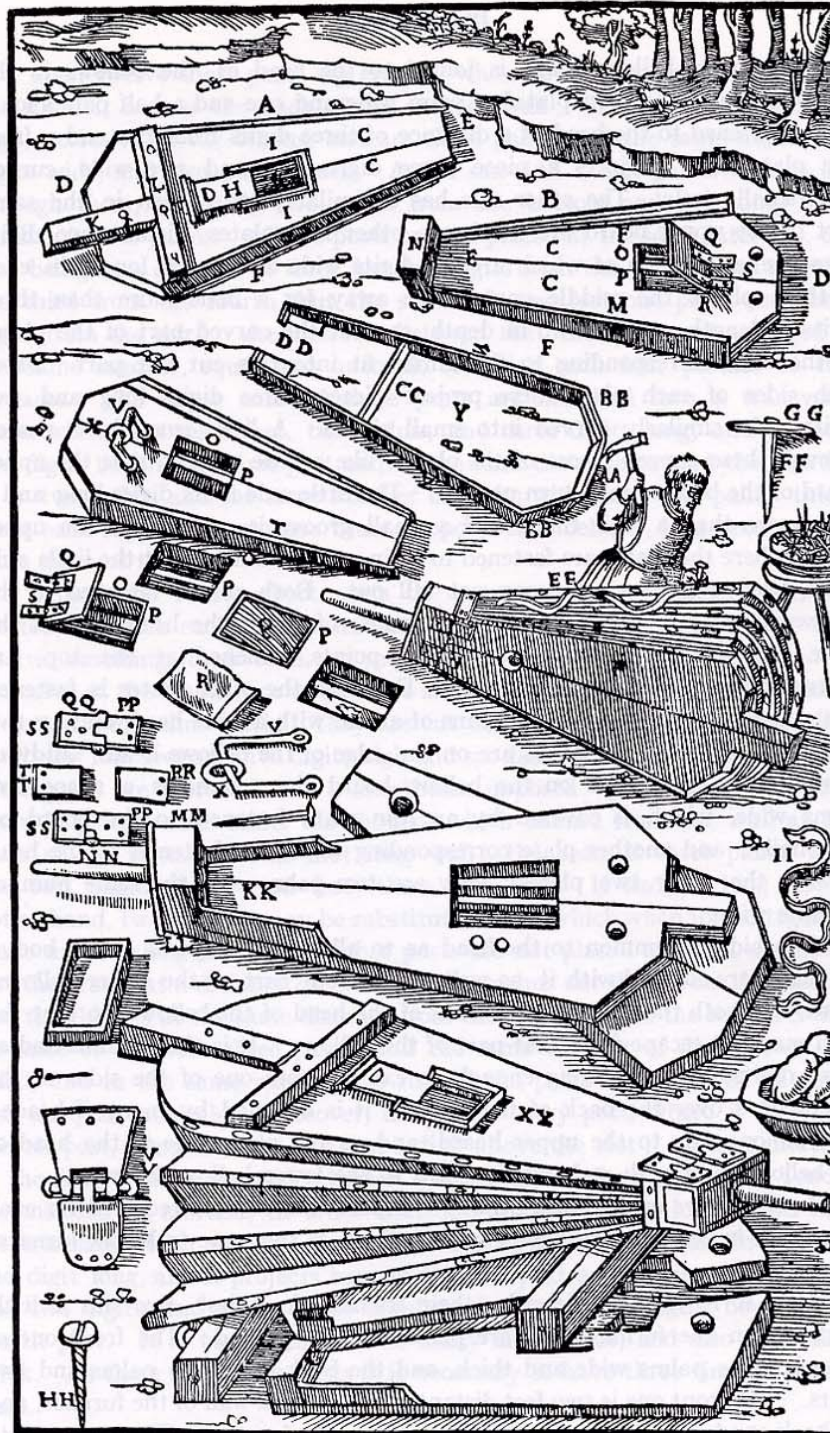


THREE VERTICAL SHAFTS, OF WHICH THE FIRST, A, DOES NOT REACH THE TUNNEL; THE SECOND, B, REACHES THE TUNNEL; TO THE THIRD, C, THE TUNNEL HAS NOT YET BEEN DRIVEN. D—TUNNEL.

ground. This kind of an opening, however, differs from a tunnel in that it is dark throughout its length, whereas a tunnel has a mouth open to daylight.



A—SHAFT. B, C—DRIFT. D—ANOTHER SHAFT. E—TUNNEL. F—MOUTH OF TUNNEL.



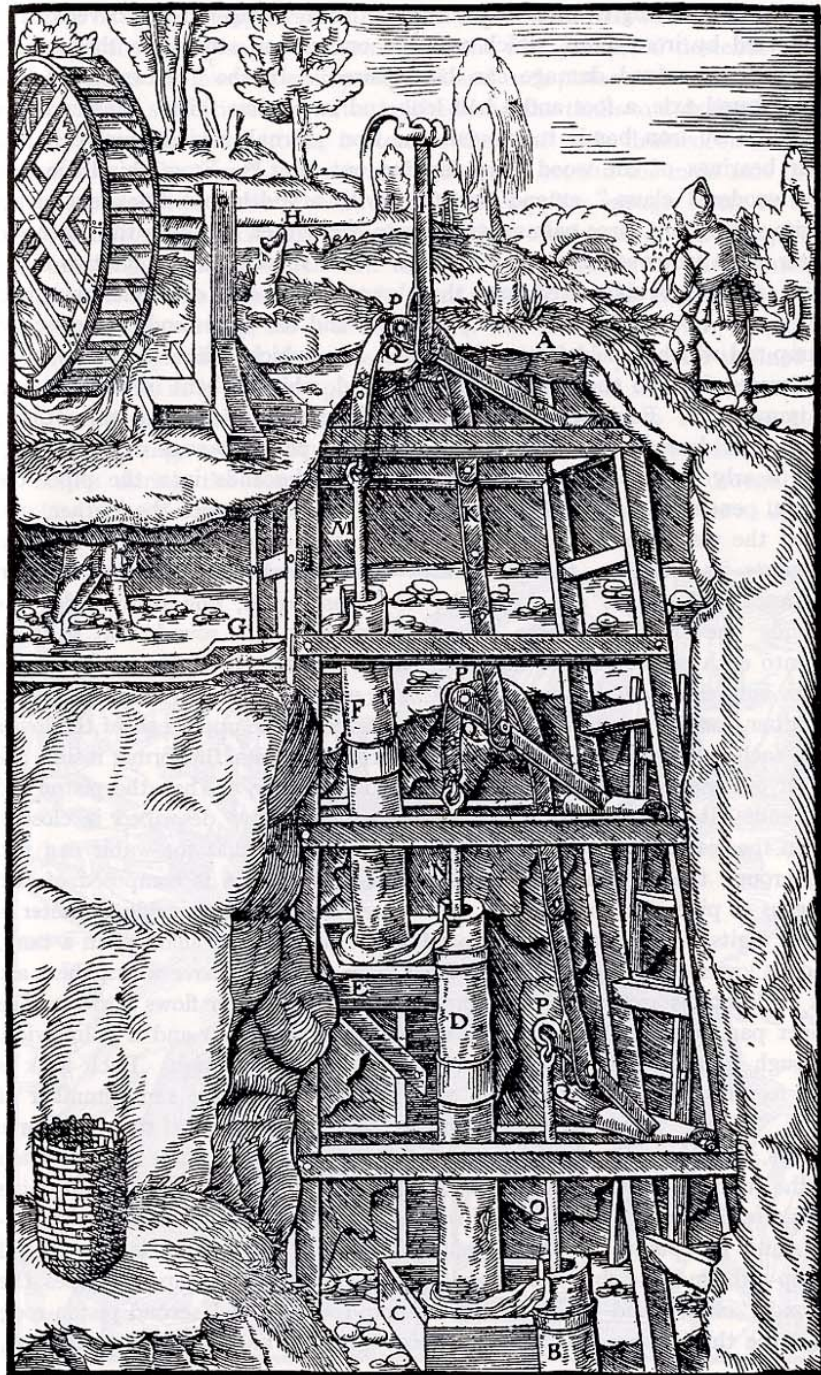
A—UPPER BELLOWS-BOARD. B—LOWER BELLOWS-BOARD. C—THE TWO PIECES OF WOOD OF WHICH EACH CONSISTS. D—POSTERIOR ARCHED PART OF EACH. E—TAPERED FRONT PART OF EACH. F—PIECES OF LINDEN WOOD. G—APERTURE IN THE UPPER BOARD. H—LID. I—LITTLE MOULDINGS OF WOOD. K—HANDLE. L—CLEAT ON THE OUTSIDE. THE CLEAT INSIDE I AM NOT ABLE TO DEPICT. M—INTERIOR OF THE LOWER BELLOWS-

Water, water everywhere...

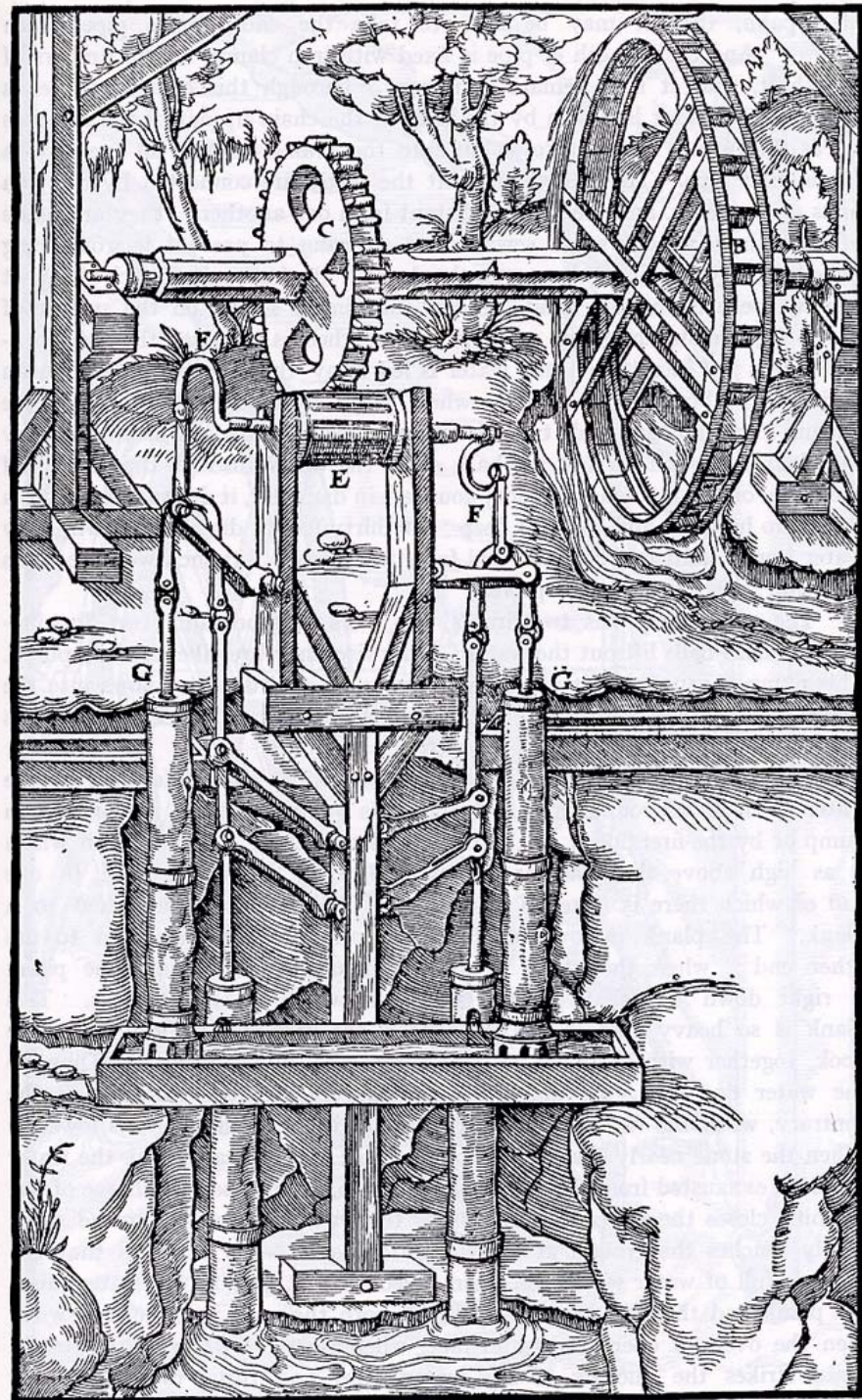
If you dig deep enough, most holes will eventually fill with water.

Can drain (with an adit) or pump.

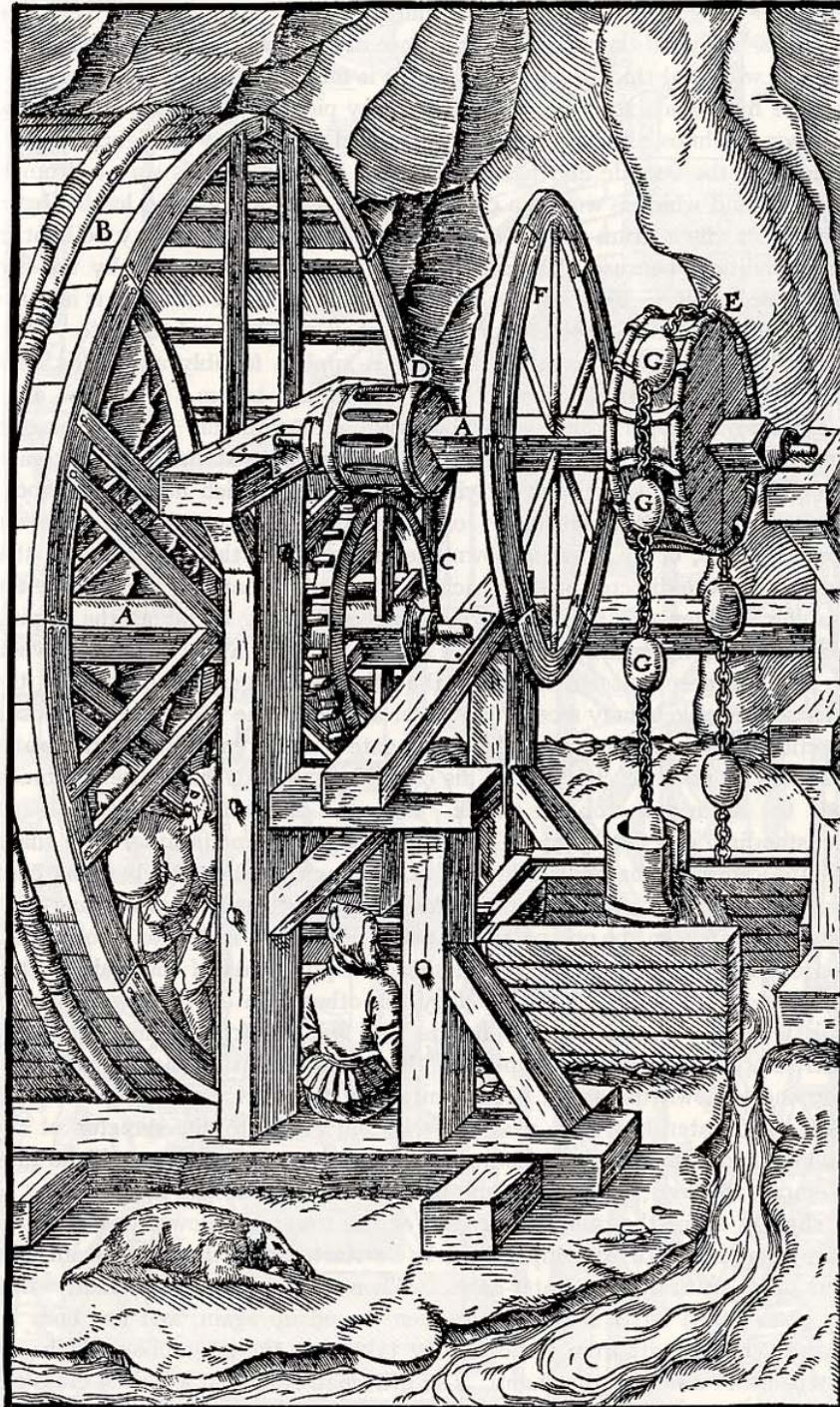
Both work better in mountains...



A—SHAFT. B—BOTTOM PUMP. C—FIRST TANK. D—SECOND PUMP. E—SECOND TANK. F—THIRD PUMP. G—TROUGH. H—THE IRON SET IN THE AXLE. I—FIRST PUMP ROD. K—SECOND PUMP ROD. L—THIRD PUMP ROD. M—FIRST PISTON ROD. N—SECOND PISTON ROD. O—THIRD PISTON ROD. P—LITTLE AXLES. Q—“CLAWS.”



A—UPPER AXLE. B—WHEEL WHOSE BUCKETS THE FORCE OF THE STREAM STRIKES. C—TOOTHED DRUM. D—SECOND AXLE. E—DRUM COMPOSED OF RUNDLES. F—CURVED ROUND IRONS. G—ROWS OF PUMPS.



A—AXLES. B—WHEEL WHICH IS TURNED BY TREADING. C—TOOTHED WHEEL.
 D—DRUM MADE OF RUNDLES. E—DRUM TO WHICH ARE FIXED IRON CLAMPS.
 F—SECOND WHEEL. G—BALLS.

Water wheels? Eh.

Another source of power was needed

People had been speculating about (and sometimes even building) steam engines since the aeolipile in ~250BC

But only as a toy or curiosity, never trying to solve a real problem

Until...

Thomas Savery



Thomas Savery.

"A new invention for raising of water and occasioning motion to all sorts of mill work by the impellent force of fire, which will be of great use and advantage for draying mines, serving townes with water, and for the working of all sorts of mills where they have not the benefitt of water nor constant windes." Patent (without description!) 1698

The Miner's Friend; or, An Engine to Raise Water by Fire (1702)

First to use the term "horsepower"

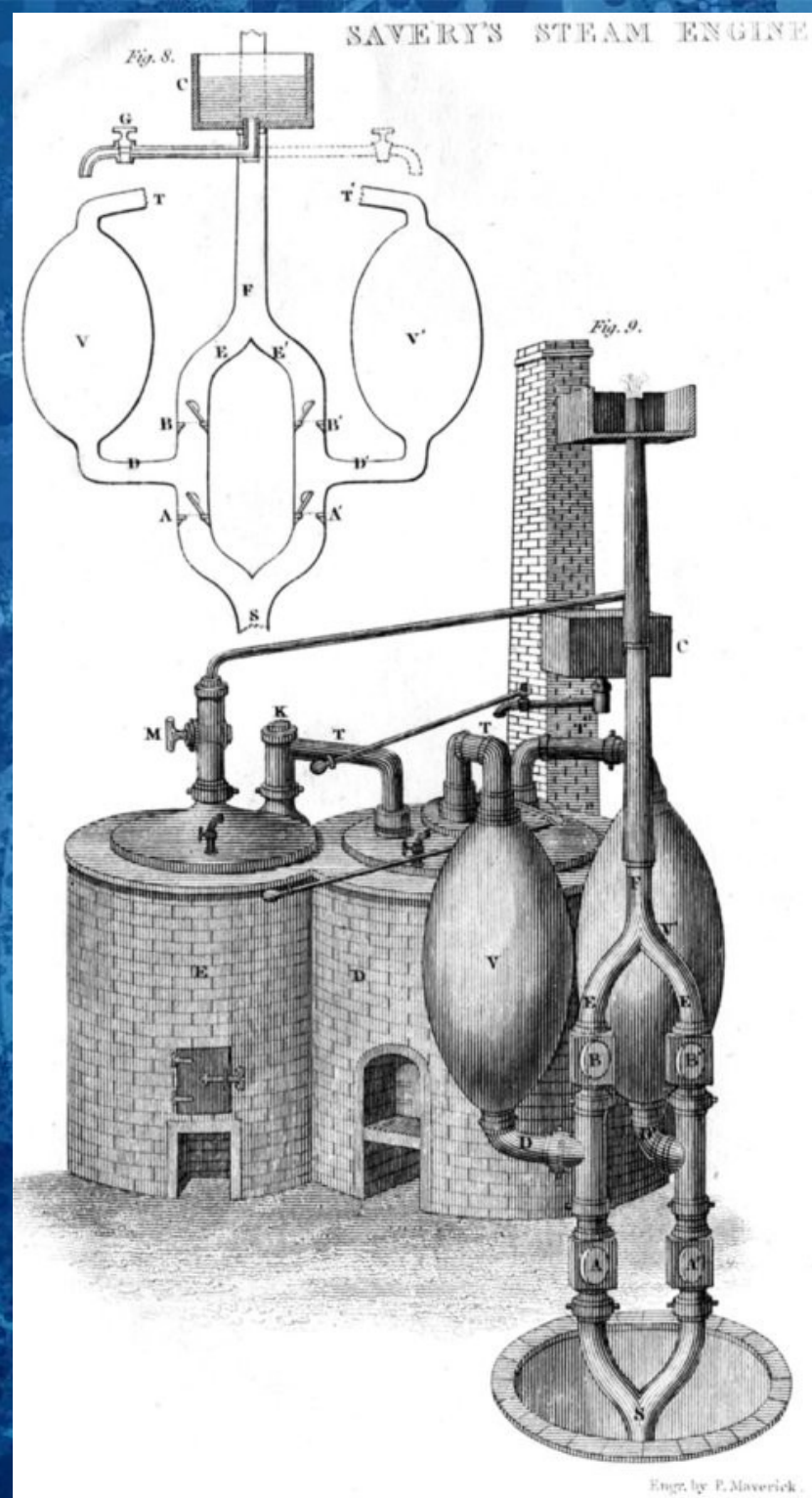
Slow, inefficient

Could only lift about 40 feet

Only ever really used in gardens

Tended to explode

But it (kind of) worked!



Thomas Newcomen

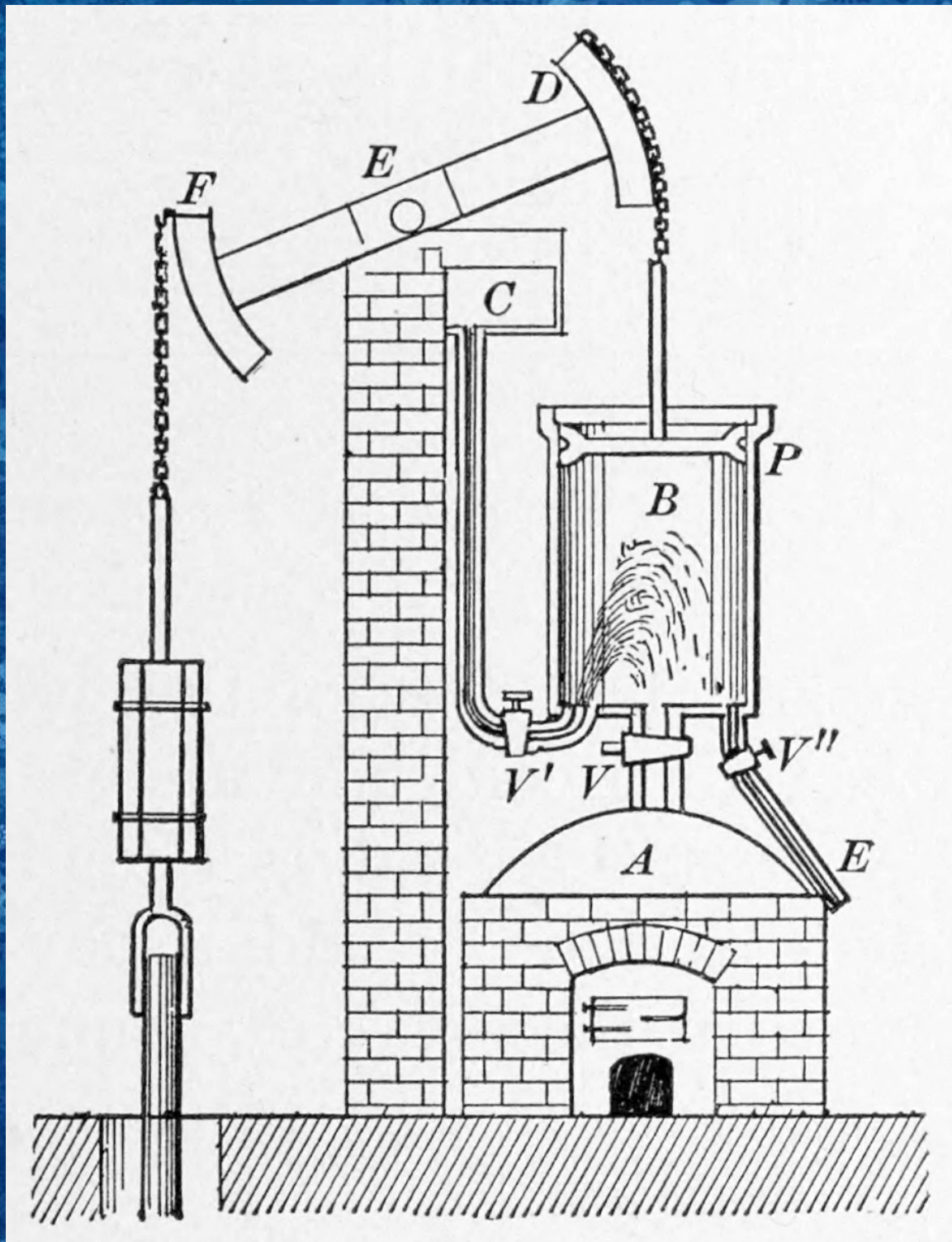
Ironmonger, preacher

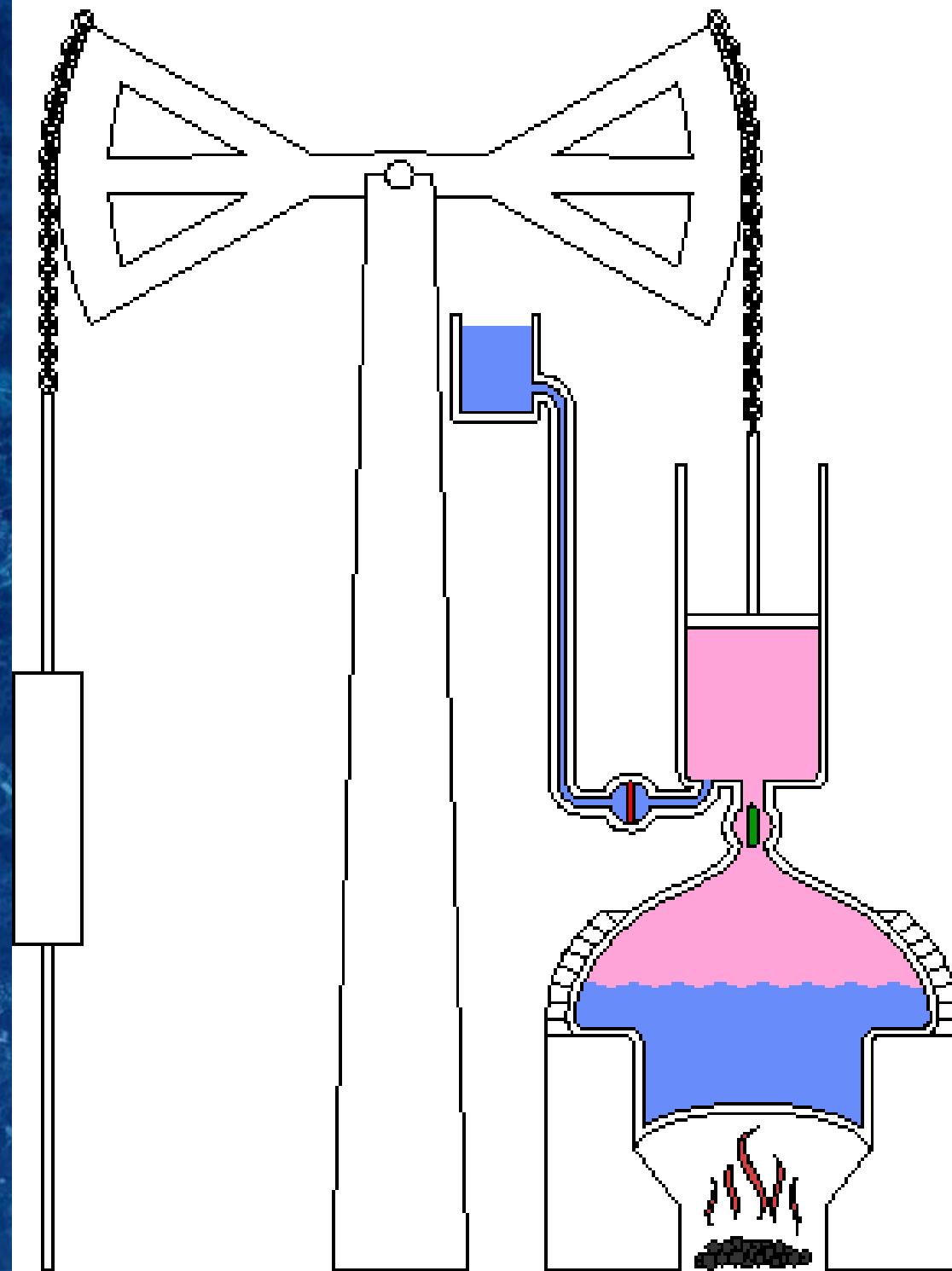
Not fancy enough of a guy for us to have a picture or know much about him, sadly

Practical, good at tinkering

Utterly screwed by intellectual property laws AND Royal Society snobbery

The Newcomen Atmospheric Engine (1712)





The background is a deep blue color with a complex, abstract pattern. It features numerous overlapping circles of various sizes and colors, ranging from dark blue to light cyan. Some circles are solid, while others are outlined or filled with a fine, dotted texture. The overall effect is a dense, layered composition that suggests a network or a complex system.

Video: Industrial Revelations, Episode 1

Problems

Still not very efficient

Horrible boiler design

Hot-cold-hot-cold cylinder

Lack of precision
machining was limiting



James Watt

Added condenser, other refinements: 1765

Note: 50 years after Newcomen!

Better cylinder design possible due to improvements in machining

Another intellectual property bastard

Held back high pressure steam as long as possible

Not really deserving of an SI unit, if you ask me

So...

Can now drain deep mines

Can also hoist ore and spoil as well as
water

But what about people?

The Man Engine

Already have pump rods going up and down, so why not ride them?

Started early, 17th century?

Continued into the early 20th century

Levant disaster, 1919, 31 people killed

Animation:

<http://www.tinmining.co.uk/private.htm>

Video:

<http://www.prosieben.de/wissen/multimedia/videos/videoplayer/58030/>

In Conclusion

It is hard to separate the development of mining technology from technology in general

We've done some pretty crazy stuff to get at minerals, even before the monster devices of the last 100 years

Miners like beer, right?

Let's go honor their lifestyle.

The End!



This image from Astronomy Picture of the Day,
many others from Wikipedia, duh.