**Dragon Warriors supplement**

**The Sapper**

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*You have been warned.*

For some unknown reason this page has been intentionally left blank.

That was until I typed these entries.

Man has always strived to control his environment, to level mountains, contain and divert rivers, shelter himself from the elements and overcome obstacles. His mastery of his environment is attributed to his intelligence, his willingness to alter his environment, construction of tools and using available tools to shape materials. In warfare the sapper has contributed immensely to ultimate victory and unlike all other professions his skill is not in his skill with the sword nor his knowledge of the arcane arts but the ways of altering his environment. With his coordination, unskilled workers can quickly work together to assemble barriers, bridge rivers, construct traps, conceal and reinforce structures as well as build advanced sanitation measures to act as a barrier against disease, vermin and troublesome adventurers who don’t mind crawling through where I flush my refuse.

The profession is a challenging one since the advantage of the sapper is that given enough time he can breach walls, cross rivers, construct and operate siege weapons. In most underworlds the Sapper would be best for building defensive locations, breaching doors and walls and would be a master of enclosed environments where movement is restricted and offering opportunities to conceal traps and other structures. The only problem is if the party have to move quickly, in such cases these professions may be able to make minor changes to their environment, spotting structural weaknesses and exploiting opportunities to change the world around them.

Updates

171020 – Good article I found on Dragon Magazine 152 on Mining – see references

170312 – Starting equipment

160830 – some entries in italics on possible scenarios with Benton, a sapper party leader who demonstrates leadership, initiative and a myriad ways of solving the many issues that they face, and the consequences arising from their actions.

160324 – cover art

160321 – Conversion of word file versions and attempt to add examples, **intend** to include trap stealth rules, percentage success rate, (hidden percentage success), environmental factors anticipation factor, percentage catastrophic failure probability

150204 - Minor adjustments and change of terms

130301 - Increasing size of descriptions, more wiki links, addition of Ulixes entries

121206 - Yes we know, such a profession is overpowered. Since the days of using tools and creating fire humanity has been mastering his environment. Over many Millenia he has evolved and advanced to building roads, aqueducts, sanitation, transport and all. With such ingenuity there are very few obstacles that he cannot overcome.

120531 - Looking at the very limited Terrain rules, the Sapper profession must be expanded once siege rules are created and adopted. Something along the lines of ship points for walls would be nice.

**To do list**

Construction base success

Construction optimal (refinement of constructs, reduce material use, increase durability, duration and environmental resistance)

Hurried construction (improvisation with available materials, temporary solutions, )

Additional features (wheels, floatation, fire proofing, concealment)

Structure reliability

Structure decay / weathering / entropy gravity meteorological oxidizing, age,

**Stat requirements** - Intelligence 9+. The player must be super intelligent to make use of his environment (\*). Many of their skills will require GM judgement as to whether it is feasible and so it helps if the GM has an intelligence of 9+. Knowledge of geology, masonry, chemistry, physics, mechanical engineering, pyrotechnics and pretty much any other science will be of immense help to GMs and players who are smart arsed and think they can play this profession with 13th century limitations

(\*Truth is, the author believes that no intelligence stat or other prerequisite such as literacy is needed as long as intelligence is more than 0 the player can certainly push sand around. Bearing in mind that even a young child might manage a sick deformed sand castle, this profession is open to anybody)

Initial Stats

ATTACK 12

4th, 7th, 10th

DEFENCE 6

4th, 7th, 10th

EVASION 3

4th, 7th, 10th

MAGICAL DEFENCE 3

every rank

STEALTH 13

PERCEPTION 5

Health points d6 + 6

3rd, 5th, 7th, 9th

Literacy (\*), basic knowledge of geology, meteorology, physics, engineering, masonry, metallurgy, chemistry and other skills as listed below

**Starting equipment:**

Shovel (d3,3) and one of Pick (d8,3) or hammer (d6,4) or Axe (d8,6), Hardened leather armour, dagger, flint/tinder, lantern, rope, 4d6 florins

**Rules of Adventuring - supplemental**

Basic rules of stealth – if a viewer is not actively searching then there is no test for concealment. Only when a player actively searches should he make a roll.

**Passive perception roll**

Despite the above rule, players may notice something is wrong. They can’t exactly place their finger on it but they may spot strange circumstances such as the overgrowth of vegetation in darkened areas or concentrations of decayed leaf gathering at certain spots, or unexplained accumulation of earth that doesn’t resemble any weathering phenomenon that they are familiar with.

GM’s should make rolls on behalf of players, especially if they are not actively suspecting any concealed traps or doorways. If successful, players can be informed that something is odd about a certain structure, not exactly what but that something stands out like a pointy structure or a natural vegetation based lengths of connecting material.

Penalty should be at -10 STEALTH to take into account that the player is not paying attention and doesn’t have a clue. Also factor in any other factors such as distractions, blindness and any ambient noise, rough weather, poor visibility and charging ogres.

**Fire (New rules)**

One reason why man has mastered his environment and making him unique over animals is that he can control fire. As a general rule when a player takes a certain level of damage he can expect to be burning and to take damage every round until he suffocates the flames.

A knight taking a hit from a DRAGONBREATH spell is generally not flammable and takes d6+6 – AF for damage.

However for a man in flammable silks who gets hit by DRAGONBREATH can expect to take additional damage until he can put the fire out.

This depends on the **intensity** of the flames (damage per round) and also the **amount of fuel** (number of rounds). The ease by which he can **beat out** (extinguish) the flames depends on how flammable he is.

Proposed rules of adventuring:

(This damage can be calculated by d6 damage – AF next round. Player can minimize this by either by running or moving into a pool of water by the next round or beating out the flames. This is accomplished by a d6 roll and subtracting that from the damage and assumes that the player is able to do so and is not restrained or unable to roll on the ground.

If the same individual is covered in fuel he can expect the same d6+6-AF + a figure of 1-6 depending on what he is covered in (1) dried dung to (6) highly pyrophoric materials such as refined volatile petroleum products.

Revise)

https://en.wikipedia.org/wiki/Pyrophoricity

**Sapper skills**

All sappers can speculate on structures they want to build, movement of earth, vegetation, concealing structures, raising earth mounds, digging ditches. Bearing in mind that they are probably residing in the 21st century, their knowledge of things to come may exceed any medieval contemporary despite the lack of survival skills for a medieval age. I assume that without the detailed background in technical education their amateurish attemps will be laughable, but it does not help if the GM is a hikikomori cretin with bookworm tendencies.

The scale and speed at which this happens varies with the materials, the tools, the amount of labour, weather and other factors all determined by the Games master. This role leaves a lot to GM judgement and imagination as it could involve blocking a door by hammering in a wedge up to construction of fortresses. Naturally, an inexperienced 1st rank sapper will make numerous mistakes and the outcome could be quite comical whereas master sappers will probably create perfect structures with numerous failsafe components.

**Dig pit/trench/elevate dirt**

Any adventurer can dig a hole. Numerous uses whether that is to create cover by excavating dirt or raising dirt to form barriers. Note that there may be unintended consequences such as weakening structures, hitting the water table or bedrock and other factors.

**Conceal/Camouflage structure**

Any adventurer can conceal a ditch, doorway, structure using available materials. Outcome determined by skill level, time involved and availability of suitable materials. Base STEALTH is intelligence. Sappers add rank to concealment (Intelligence + Rank). Only check when players actively search.

**Build road**

Creating a convenient stretch of ground that is suitably hard enough or properly drained in order to optimize travel for pedestrians or for wheeled vehicles. The time depends on the desired effect whether that is smooth solid surfaces for comfortable wheeled transport or drainage in a wet environment.

**Sapper skills**

**Rank 1**

**Dig ditch**

Sapper can dig a ditch better than any other profession. This includes understanding the nature of the earth, its moisture content and ability to retain its shape, its composition of clay, sand, whether it can be stacked conveniently, use of water streams to dispose of excess materials, the methods and effect of drainage on its mass and other means of manipulating its composition.

Useful for obscuring line of sight as well as minimizing the effects of other missiles and concealing positions. The resulting earth can be piled and rammed to produce walls and obstacles. Interesting effects can be made as materials can be used to damn steams and larger bodies of moving water. Depending on the level of the water table this allows adventurers access to water sources and can create natural moats to slow things down. Until more advanced terrain rules are implemented the GM must make their own judgement on the effectiveness of any task.

*Example, Benton the sapper is anticipating an attack by orcs at night time. Since the adventurers have wounded who cannot travel and have nothing better to do Benton instructs his party to assist him. They conceal their wounded in vegetation whilst Benton makes preparations.*

*By digging a channel from a nearby stream they waterlog a large area of woodland thus slowing down the orcs. In the darkness they are unable to approach stealthily due to splashing and their movement gives away their position. When the orcs approach his party are able to pick them off with missiles and engage the few agile orcs who can traverse the marshes quicker. Demoralized after the loss of their leader the remaining orcs run off into the night…*

**Raise wall/reinforce**

Using locally available materials, the Sapper can construct a wall to hinder movement. Time varies from walls constructed of earth, rock, wood, barrels, dead bodies and all. Generally the main value is the obstruction of people, line of sight, missiles and offers some protection against radiation and other emissions. Height depends on time invested, plasticity of the materials, whether they can be assembled properly (rocks, earth, bales of hay)

*Knowing that they are being followed by Elves whom they angered after killing a Unicorn during their hunting (It didn’t help that Benton created a spiked pit that was lethal to anything bear sized or bigger) Benton and party find a cave. Benton manages to quickly seal off the entrance from their pursuers forcing any attacker to wander in one at a time.*

*But then the bear awoke from its slumber and was agitated by the presence of the sapper and party…*

**Hydraulics**

Knowledge of water, the likelihood of reaching the water table, the means to divert water by creation of channels using available materials as well as its effects on structures in reducing or improving on material cohesion. Any farmer can do it, but a Sapper can do it well. Still takes hours or even years depending on the scale of the work. Structures may not be reliable and there is always a potential chance that the structure will disintegrate during construction or sometime after construction. This is related to the dig ditch skill as often the main raw material will be earth. Variations in clay content, sand and other composition will contribute.

The sapper will have a greater grasp of sanitation, water contamination and measures to reduce the spread of mosquitoes, parasites and others. This skill also allows players to build very nice toilets and even a form of flush system and odour reduction. The highest skilled sappers may find themselves building waterworks for a Kings palace

*Having reached an isolated, deserted farmhouse Benton and party decide to rest. An orc scout hiding in the well was killed and the party barbarian thought it was fun to throw him back in. With their water source polluted Benton orders the barbarian to get to work, selecting a new location to dig the well, less accessible and yet near the water table allowing the task to be completed within a day.*

**Rank 2**

**Chemistry I - Incendiaries**

Use of oil based incendiaries, smoke signalling, flash bombs/pellets. Includes refinement of flammables, their control and ignition methods.

Such devices are often designed to be easily deployed but remember the possibility of accidents during manufacture and storage. In order to make successful judgements the GM is expected to have a familiarity with the design of such devices himself and basic medieval or even 21st century knowledge of incendiary devices. Bearing in mind that most 21st century individuals probably have greater knowledge than middle age sages, it is expected that this should not be a problem.

Note that advanced explosives including methods that generate shockwaves are not covered by this.

*Benton and party have been lost for days. After travelling the wilderness for a few days they spot in the distance mounted scouts. Being kilometres away they cannot reach them in time but by quickly creating a smoke signal using a flask of lantern oil and orc body fat he is able to create a visible column of black smoke that can be seen from a distance.*

*Unfortunately they were also spotted by some orc scouts. Attending to the flames Benton was not quite prepared for an attack. However armed with a bottle of strong spirits that they were celebrating with he inserts a rag, lights it and hurls it at the orcs causing one to catch fire and runs away.*

*SPEED 10, DRAGONBREATH d6+6-armour.*

**Tunnelling I**

Base knowledge of materials, hardness of tools, breaking up soil and dislodging rocks by mechancal means. Insufficient for tunneling through rock. Sapper is able to employ means to hold up tunnels and support tunnels and channels. Basic knowledge of ventilation methods, air movements and air density. Geology and Mining.

*Having trapped themselves in a cave with a hungry bear the party now find themselves trapped and gradually suffocating. Benton notes the size and age of roots protruding through the cave wall. Selecting a spot the party get to work tunneling an exit. They manage to break through the earth and ensuring that they do not die from suffocation. Benton then works on securing an exit suitable for the party to escape through.*

**Snares, basic gravity and fulcrum devices**

Basic trapper skills, falling devices, swinging devices, building fun parks for children, adding wheels to everything, can use rolling boulders and improved accuracy using gravitational based traps. Either the outcome of falling victims or the outcome of having solid objects connect with the victims by gravitational acceleration. Simple mechanical devices and reducing ineffiency, sound pollution, minimizing squeaks or spark generation

*Those orcs are back and in pursuit. Benton notes that the trail they will have to take snakes around a cliff. Benton arranges a sophisticated trap involving weakening the path structure and a falling boulder. When night falls, they await the orcs who pursue them.*

*At night the party of 12 orcs are observed taking the pathway. Benton levers a boulder at them. With a SPEED of 10 the Orcs are easily able to evade it. But when the boulder hits the path, it brings down that section and 8 of them fall into the nearby river.*

**Rank 3**

**Fire proofing**

Basic knowledge of melting, boiling and ignition points. Knowledge of materials and oxidation potential, knowledge of oxygen starvation methods, non-combustion fuel depletion methods, basic coating techniques, water retention salting for animal skins, use of tars and high ignition point coating materials, conduction of materials and convection heat transfer methods for accelerated dispersal of heat

*The orcs are attacking. Having found shelter in an abandoned building Benton anticipated the possibility that the orcs might use fire to smoke them out. However he anticipated this and coated some key wooden parts with wet clay that was readily available from the nearby streams. Foiling the orcs the only alternative for them was a full frontal assault through the barred doorway with a crawl space that was carefully trapped…*

**Advanced structural camouflage/concealment**

Using readily available raw materials to disguise and break the outline of large structures, setting ambushes or concealing massive moats, traps, spiked edges, ropes and mechanical components from detailed search and inspection, folding of structures, elastic structural reformation, wind and water impact resistance, optical illusions and means to distract and draw viewers attention using bright markers, use of colouring and smells to distract viewers. (Baiting), throwing shiny objects to suggest precious valuables, or precious valuables, or stupid treasure maps with ‘x’ on them. To make liquid appear solid and liquid stilling methods.

*After disturbing an Ogre the party are on the run again. They reach a broken bridge and cross it using a felled tree. Rather than dispose of the log, they lay it out and Benton arranges some rocks around it but creates weakness should anything exceeding 200lbs apply its weight on it. The Ogre follows that night and hurriedly steps on the trapped bridgework…*

**Structure reinforcement**

Assessing structural strengths and emergency damage control methods, physical support for doors, placement of nails as well as longer term concrete reinforcement, addition of wooden props to doors and other structures, sealing ship hull breaches, restricting leaks with available materials, manufacture and use of glue,

*The party are on the run… again. In the city of Ongus their Assassin failed to pick a Thulander Barbarian’s money pouch. A whole mob of drunk Thulanders pursue them through the streets. They managed to run into a home and lock the door but they can hear the crowds shouting and preparing to break down the door. Benton takes a dagger and sword from the Assassin and uses it to jam the door shut by wedging it and using the sword to bar the door. This gives them more time as the barbarians make multiple attempts to force the door using their heads.*

**Rank 4**

**Chemistry II - Explosives manufacturing & operation, lime & other chemical agents**

Advanced chemistry, manufacture, purification and concentration of acids, alkalis, flammables, glue and advanced concrete mixing. Supplements other skills creating powerful mixtures, more flammable materials, concentration of ammonia and development of gunpowder, grenades, fire spears, basic mines,

**Advanced Traps & Mechanical device operation/disarming**

Automated crossbows, tripwire, switch activated devices, automation, springs and tension device employment, long term persistence of such devices, long term potential energy storage, gravity devices,

**Lock Picking & trap disarming**

As the assassin skill but superior in every way. Able to assess extent of traps, to disable key components and render it useless, finding ways to access protected trap components or to divert kinetic energies, remove incendiary fuel sources, removal of detonators,

**Rank 5**

**Demolitions**

Buildings & structure destruction, directional control of leveled structures, (9/11 (x) thermite) , analysis of potential energy and critical weakness points, angle of impact and working against the grain, structural flaws, fracture detection and utilization

**Bridging**

Specialty using available raw materials, iliterate, nonskilled labour to create access. Lower percentage of failure during construction or after completion, taking on excess loads and surviving

**Masonry I**

Building simple buildings with low z axis, increases stability during and after construction, creation of directional support, arches, horizontal or vertical support structures, spreading potential energies

**Rank 6**

**Chemistry III - Advanced metallurgy/material science I**

Development of hardened materials for structures, siege engines, magnesium flash powder, advanced inorganic chemistry, quicklime, caustic soda purification, ammonia concentration, simple synthesis of ammonium nitrate and other high energy substances for detonation, mercury salt and other types of detonators. strong acid combinations, fast acting corrosives, aerosol blinding agents

**Macro materials, liquid/gas displacement methods**

Development of basic mechanical devices for moving earth/cutting trees, mass movement of the environment, shifting water, archimedes screw plus, aqueducts, gas diversion/ventilation methods, iron smithing techniques, high temperature steel manufacture and manipulation methods, basic carbon steel manufacture, Selentium central heating systems, mine ventilation

**Aquatic/flotation/atmospheric devices I**

Creation of flotation devices for individuals / small cartwheel size item transportation, heavy material hulls, buoyancy, knowledge of water/air pressure, basic aerodynamics, kite construction, balloon construction, withstanding pressures at all altitudes and depths

**Rank 7**

**Advanced damage control**

Quick yet effective repairs of structures using available materials. Results vary. Knowledge of material strengths, microfractures, thermo/cryo destruction methods, oxidation states, basic electrolysis and salt weakening of steel/iron structures

**Basic submersible technologies**

Water sealing techniques, sub marine construction, advanced water pressure resistance and reinforcement methods

**Wind/water power driven structure construction (Automation)**

Mechanical automation, labour saving devices, diversion of energies to mechanical devices, human powered cycle construction, cranks, water clocks, windmills, watermills,

**Rank 8**

**Chemistry IV/Gun powder techniques**

Variable basic uses, short ranged projectiles, signalling bombs, shaped explosives, flint ignition devices, refinement and detonation of fertilizers, alcohol distillation and purification, salt oxidation/reduction materials, chlorine purification & storage,

**Advanced mirror/crystal state construction/refinement**

Chrome and other reflective materials refinement, other reflective surface techniques, light focusing methods, advanced optics, glass manufacture & crystal synthesis/purification methods, telescopic devices,

**Advanced construction (Siege weapons)**

Ballista, Catapult, Ram, Trebuchet, fireships, mobililty, weight capacity, longer distance projectiles, stability & reliability, combined functions,

**Rank 9**

**Miniaturization**

Hand held flame throwers, smaller traps, concentration of chemicals and active components

**Chemistry V - Gaseous poisons, aerosol corrosives**

large area of effect, blinds, irritates, incapacitates, suffocates, degrades materials, manufacture, concentration, storage & deployment of ammonia and other volatile substances

**automation & mechanical devices**

advanced mechanization, mass production methods, improving mobility of devices or structures, rotational/moving components, transmission of kinetic energy and control interfaces, efficient rock tunneling methods

**Rank 10**

**Mass manufacturing/construction coordination**

human resources - coordination of unskilled, iliterate, non-sapper workers, accomplishing simple processes and individual stages of manufacturing, maximize output and work safety, pyramids, ziggaruts, best path geological analysis for walls,

**Advanced mechanics/ siege weapon construction/aerodynamics**

semi-automated devices, improved mobility and minimizing human input, adding wheels, basic flight methods (Icarus), hand gliding, parachutes, water displacement/mobility

**Semi-automated transports, efficiency multiplier**

human labour reduction on a large scale, simple convection / energy conversion methods, simple combustion/steam engine methods, Emphidian computers for calculating movement of astronomical bodies,

**Rank 11**

**Advanced Miniaturization**, improved energy conversion/transmission

All of the above but with greater efficiencies

**Energy conversion**

Channelling electricity, kinetic to electrical power

manipulation of electricity, conversion from kinetic to electrical to light, sound and thermal energy

**Rank 12**

Automata construction

Complex artificial intelligence

Automated coffee machines

Voice command

Light sensors/triggers

Full electromagnetic spectrum sensors (Panoptical vision)

Online references

Dragon Magazine 152 on Mining

Profession

<http://en.wikipedia.org/wiki/Sapper>

<http://en.wikipedia.org/wiki/Pioneer_(military)>

<http://en.wikipedia.org/wiki/Combat_engineer>

<http://en.wikipedia.org/wiki/Assault_pioneer>

Incendiary devices

<http://en.wikipedia.org/wiki/Early_thermal_weapons>

<http://en.wikipedia.org/wiki/Incendiaries>

<https://en.wikipedia.org/wiki/Greek_fire>

<https://en.wikipedia.org/wiki/Incendiary_device>

General terms

<https://en.wikipedia.org/wiki/Siege_warfare>

<https://en.wikipedia.org/wiki/Investment_(military)>

<https://en.wikipedia.org/wiki/Military_engineering>

<http://global.britannica.com/technology/military-engineering>

<https://en.wikipedia.org/wiki/Adhesive>

Barrier construction

<http://en.wikipedia.org/wiki/Wall>

<https://en.wikipedia.org/wiki/Palisade>

<https://en.wikipedia.org/wiki/Earthworks_(engineering)>

Hydraulics

<https://en.wikipedia.org/wiki/Hydraulic_engineering>

<http://en.wikipedia.org/wiki/Aqueduct_(bridge)>

<http://en.wikipedia.org/wiki/Navigable_aqueduct>

<http://en.wikipedia.org/wiki/Aqueduct_(water_supply)>

<https://en.wikipedia.org/wiki/Moat>

<https://en.wikipedia.org/wiki/Motte-and-bailey>

Automatons

<http://en.wikipedia.org/wiki/Military_robot>

<https://en.wikipedia.org/wiki/Robotics>

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Significance** | **Robot Name** | **Inventor** |
|  | 7000 BC | In Mohanjo-daro, the Dravidian civilization was using bow drills for dentistry. The recent unearthing of the fossil also opens up questions why early Tamils (Thamizh People) needed dentistry. The answer could be the starch, from the cooked ground flour-based food they were consuming. | Dentist bow driller | Early Tamils |
|  | Third century B.C. and earlier | One of the earliest descriptions of automata appears in the [*Lie Zi*](https://en.wikipedia.org/wiki/Lie_Zi) text, on a much earlier encounter between [King Mu of Zhou](https://en.wikipedia.org/wiki/King_Mu_of_Zhou) (1023–957 BC) and a mechanical engineer known as Yan Shi, an 'artificer'. The latter allegedly presented the king with a life-size, human-shaped figure of his mechanical handiwork.[[8]](https://en.wikipedia.org/wiki/Robotics#cite_note-needham_volume_2_53-8) |  | Yan Shi (Chinese: 偃师) |
|  | First century A.D. and earlier | Descriptions of more than 100 machines and automata, including a fire engine, a wind organ, a coin-operated machine, and a steam-powered engine, in *Pneumatica* and *Automata* by [Heron of Alexandria](https://en.wikipedia.org/wiki/Hero_of_Alexandria) |  | [Ctesibius](https://en.wikipedia.org/wiki/Ctesibius), [Philo of Byzantium](https://en.wikipedia.org/wiki/Philo_of_Byzantium), Heron of Alexandria, and others |
|  | c. 420 B.C.E | A wooden, steam propelled bird, which was able to fly |  |  |

**Emphidians**

<http://en.wikipedia.org/wiki/Odysseus>

Trojan Horse

<http://en.wikipedia.org/wiki/Trojan_horse>

failed siege weapon, doubled as a mobile prison

<http://en.wikipedia.org/wiki/Archimedes>

Death rays, Naval claw device

<http://en.wikipedia.org/wiki/Claw_of_Archimedes>

The Claw (Greek: Ἁρπάγη, harpágē, "snatcher") of Archimedes (also known as the "iron hand") was an ancient weapon devised by Archimedes to defend the seaward portion of Syracuse's city wall against amphibious assault. Although its exact nature is unclear, the accounts of ancient historians seem to describe it as a sort of crane equipped with a grappling hook that was able to lift attacking ships partly out of the water, then either cause the ship to capsize or suddenly drop it.

These machines featured prominently during the Second Punic War in 214 BC, when the Roman Republic attacked Syracuse with a fleet of 60 Quinqueremes under Marcus Claudius Marcellus. When the Roman fleet approached the city walls under cover of darkness, the machines were deployed, sinking many ships and throwing the attack into confusion. Historians such as Livy attributed heavy Roman losses to these machines, together with catapults also devised by Archimedes.

The plausibility of this invention was tested in 1999 in the BBC series Secrets of the Ancients and again in early 2005 in the Discovery Channel series Superweapons of the Ancient World. The producers of Superweapons brought together a group of engineers tasked with conceiving and implementing a design that was realistic, given what we know about Archimedes. Within seven days they were able to test their creation, and they did succeed in tipping over a model of a Roman ship so that it would sink. While this does not prove the existence of the Claw, it suggests that it would have been possible.

<https://en.wikipedia.org/wiki/Icarus>

Flying vehicles

<https://en.wikipedia.org/wiki/Heracles>

<https://en.wikipedia.org/wiki/Augeas>

## Fifth Labour of Heracles[[edit](https://en.wikipedia.org/w/index.php?title=Augeas&action=edit&section=1)]

[](https://en.wikipedia.org/wiki/File:Mosaico_Trabajos_H%C3%A9rcules_(M.A.N._Madrid)_05.jpg)

[Heracles](https://en.wikipedia.org/wiki/Heracles) rerouting the rivers [Alpheus](https://en.wikipedia.org/wiki/Alfeios_River) and [Peneus](https://en.wikipedia.org/wiki/Pineios_River_(Peloponnese)), to clean out the Augean stables. Roman mosaic, 3rd century AD.

The fifth [Labour of Heracles](https://en.wikipedia.org/wiki/Labours_of_Hercules) ([Hercules](https://en.wikipedia.org/wiki/Hercules) in [Latin](https://en.wikipedia.org/wiki/Latin)) was to clean the Augean ([/ɔːˈdʒiːən/](https://en.wikipedia.org/wiki/Help:IPA_for_English)) stables. [Eurystheus](https://en.wikipedia.org/wiki/Eurystheus) intended this assignment both as humiliating (rather than impressive, like the previous labours) and as impossible, since the livestock were divinely healthy ([immortal](https://en.wikipedia.org/wiki/Immortality)) and therefore produced an enormous quantity of [dung](https://en.wikipedia.org/wiki/Cow_dung) (ἡ ὄνθος). These stables had not been cleaned in over 30 years, and 3,000 cattle lived there. However, Heracles succeeded by rerouting the rivers [Alpheus](https://en.wikipedia.org/wiki/Alfeios_River) and [Peneus](https://en.wikipedia.org/wiki/Pineios_River_(Peloponnese)) to wash out the filth.

**Selentium**

<https://en.wikipedia.org/wiki/Roman_military_engineering>

The military engineering of [Ancient Rome](https://en.wikipedia.org/wiki/Ancient_Rome)'s armed forces were of a scale and frequency far beyond that of any of its contemporaries'. Indeed, military engineering was in many ways institutionally endemic in Roman military culture, as demonstrated by the fact that each [Roman legionary](https://en.wikipedia.org/wiki/Roman_legionary) had as part of his equipment a shovel, alongside his [*gladius*](https://en.wikipedia.org/wiki/Gladius) (sword) and [*pila*](https://en.wikipedia.org/wiki/Pilum) (spears).

<https://en.wikipedia.org/wiki/Roman_engineering>

<https://en.wikipedia.org/wiki/Roman_siege_engines>

<http://www.ancient.eu/Roman_Siege_Warfare/>

<https://en.wikipedia.org/wiki/Immunes>

[Engineers](https://en.wikipedia.org/wiki/Engineer), artillerymen, [musicians](https://en.wikipedia.org/wiki/Musician), drill and weapons instructors, [military police](https://en.wikipedia.org/wiki/Military_police), [carpenters](https://en.wikipedia.org/wiki/Carpenter), [hunters](https://en.wikipedia.org/wiki/Hunter) and medical staff were among the multiple specialized jobs immunes provided for the [Roman army](https://en.wikipedia.org/wiki/Roman_army). Immunes also received better pay than the regular troops.[[4]](https://en.wikipedia.org/wiki/Immunes#cite_note-4)

<http://en.wikipedia.org/wiki/Roman_aqueduct>

<https://en.wikipedia.org/wiki/Frontinus>

Sextus Julius Frontinus (c. 40 – 103 AD) was one of the most distinguished Roman senators of the late 1st century AD. He is best known to the post-Classical world as an author of technical treatises, especially De aquaeductu, dealing with the aqueducts of Rome.

<https://en.wikipedia.org/wiki/Tacitus>

<https://en.wikipedia.org/wiki/Vitruvius>

<https://en.wikipedia.org/wiki/Masada>

<https://en.wikipedia.org/wiki/Siege_of_Masada>

In 72, the Roman governor of Iudaea, Lucius Flavius Silva, led Roman legion X Fretensis, a number of auxiliary units and Jewish prisoners of war, totaling some 15,000 men and women (of whom an estimated 8,000 to 9,000 were fighting men[14]) to lay siege to the 960 people in Masada. The Roman legion surrounded Masada and built a circumvallation wall, before commencing construction of a siege ramp against the western face of the plateau, moving thousands of tons of stones and beaten earth to do so. Josephus does not record any attempts by the Sicarii to counterattack the besiegers during this process, a significant difference from his accounts of other sieges of the revolt.

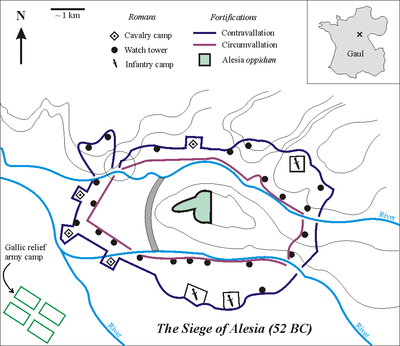
The ramp was completed in the spring of 73, after probably two to three months of siege. A giant siege tower with a battering ram was constructed and moved laboriously up the completed ramp, while the Romans assaulted the wall, discharging "a volley of blazing torches against ... a wall of timber",[3] allowing the Romans to finally breach the wall of the fortress on April 16, 73 CE.[15][16][17] When the Romans entered the fortress, however, they found it to be "a citadel of death."[3] The Jewish rebels had set all the buildings but the food storerooms ablaze and had committed mass suicide, declaring "a glorious death ... preferable to a life of infamy."[15]

Julius Caesar

<https://en.wikipedia.org/wiki/Battle_of_Alesia>

SAPPERS WINNING AGAINST OVERWHELMING ODDS AND AGAINST TWO SUPERVICIOUS ANGRY BLOODRAGING CHAUBRETIAN SAVAGE ARMIES!!!!

It was the last major engagement between [Gauls](https://en.wikipedia.org/wiki/Gauls" \o "Gauls) and Romans, and is considered one of Caesar's greatest military achievements and a classic example of [siege warfare](https://en.wikipedia.org/wiki/Siege_warfare) and [investment](https://en.wikipedia.org/wiki/Investment_(military)). The battle of Alesia marked the end of Gallic independence in France and Belgium.



CUSTOMS AND TRADITIONS

OF THE

CANADIAN MILITARY ENGINEERS

2003-06-30 11. Roman Engineers. In the Roman army, every soldier was an engineer and was expected to wield a

spade as often as a sword. The Roman legion practised its engineering skills at each night’s stop when on the

move. Unless at permanent camp, it would always construct a temporary one. The six thousand legionaries

would construct a square earthen rampart, a ditch around the circumference and a palisade of stakes on top.

This process of ‘castramentation’ took only three to four hours. The Romans raised their military-engineering

operations to a highly scientific level and Roman army engineers, operating much as do the engineers of

modern armies, marched with the advance guard. They were equipped for surveying and mapping, selecting

and building camps, and building the roads over which the main body of troops followed. The engineers also

secured water supplies and erected camp fortifications.

<https://en.wikipedia.org/wiki/Roman_military_engineering>

<https://en.wikipedia.org/wiki/Roman_siege_engines>

<http://jaysromanhistory.com/romeweb/engineer/art1.htm>

<http://www.roman-empire.net/children/builders.html>

<http://www.romeartlover.it/Costroma.html>

<http://en.wikipedia.org/wiki/Da_vinci>

Tanks flying devices

<https://en.wikipedia.org/wiki/Lennart_Torstensson>

**Khitans**

<http://en.wikipedia.org/wiki/Zhuge_Liang>

Zhuge Liang was believed to be the inventor of mantou, the landmine and a mysterious but efficient automatic transportation device (initially used for grain) referred to as the "wooden ox and flowing horse" (木牛流馬), which is sometimes identified with the wheelbarrow.

Although he is often credited with the invention of the repeating crossbow that is named after him and called "Zhuge Crossbow", this type of semi-automatic crossbow is an improved version of a model that first appeared during the Warring States Period (though there is debate whether the original Warring States Period bow was semi-automatic, or rather shot multiple bolts at once). Nevertheless, Zhuge Liang's version could shoot farther and faster.

Zhuge Liang is also credited with constructing the Stone Sentinel Maze, an array of stone piles that is said to produce supernatural phenomenon, located near Baidicheng.[24]

An early type of hot air balloon used for military signalling, known as the Kongming lantern, is also named after him.[25] It was said to be invented by Zhuge Liang when he was trapped by Sima Yi in Pingyang. Friendly forces nearby saw the message on the lantern paper covering and came to Zhuge Liang's aid. Another belief is that the lantern resembled Zhuge Liang's headdress, so it was named after him.

<https://en.wikipedia.org/wiki/Stone_Sentinel_Maze>

The Stone Sentinel Maze was mentioned in Chapter 84 of the historical novel [*Romance of the Three Kingdoms*](https://en.wikipedia.org/wiki/Romance_of_the_Three_Kingdoms) by [Luo Guanzhong](https://en.wikipedia.org/wiki/Luo_Guanzhong).

[Liu Bei](https://en.wikipedia.org/wiki/Liu_Bei) was defeated by [Lu Xun](https://en.wikipedia.org/wiki/Lu_Xun_(Three_Kingdoms)) at the [Battle of Xiaoting](https://en.wikipedia.org/wiki/Battle_of_Xiaoting) and he fled towards [Baidicheng](https://en.wikipedia.org/wiki/Baidicheng) with Lu Xun hot on pursuit. When Lu Xun arrived at Yufu Shore by the [Yangtze River](https://en.wikipedia.org/wiki/Yangtze_River) near Baidicheng, he felt a strong enemy presence and cautioned his troops of a possible ambush. He sent men to scout ahead, who reported that the area was deserted except for some scattered piles of rocks. Bewildered, Lu Xun asked a local, who told him that [*qi*](https://en.wikipedia.org/wiki/Qi) started emerging from the area after Zhuge Liang arranged the rocks there when he first entered Sichuan.

Lu Xun personally inspected the area and believed that the "maze" was only a petty display of deception, so he led a few men inside. Just as he was about to leave, a strong gust of wind blew. Dust storms overshadowed the sky and the rocks seemed like swords, mountainous piles of dirt emerged while the river waves sounded like an attacking army. Lu Xun exclaimed, "I have fallen into Zhuge Liang's trap!", and attempted to escape from the maze but to no avail.

<http://en.wikipedia.org/wiki/Jiao_Yu>

<http://en.wikipedia.org/wiki/Sunshu_Ao>

<https://en.wikipedia.org/wiki/Ximen_Bao>

<https://en.wikipedia.org/wiki/Du_Shi>

<https://en.wikipedia.org/wiki/Li_Bing_(administrator)>

Li Bing (Chinese: 李冰; pinyin: Lǐ Bīng; c. 3rd century BC) was a Chinese administrator and engineer of the Warring States period. He served the state of Qin as an administrator and has become renowned for his association with the Dujiangyan Irrigation System, the construction of which he is traditionally said to have instigated and overseen. Because of the importance of this 2000-year-old irrigation system to the development of Sichuan and the Yangtze River region, Li Bing became a great Chinese cultural icon, hailed as a great civil administrator and water conservation expert. In Chinese mythology, he is known as the vanquisher of the River God and is compared to the Great Yu.[citation needed] Dujiangyan is still in use today and is listed as a UNESCO World Heritage Site.

<https://en.wikipedia.org/wiki/Zhengguo_Canal>

But Han heard that Qin was fond of embarking on enterprises, so with the intention of causing its energies to be dissipated and in order to prevent it from making an attack to the east, it accordingly dispatched a water engineer named Zheng Guo to give controversial advice to Qin by making it excavate a canal from the Jing River west of Mount Zhong as far as Hukou, from where it was to go east along the Northern Mountains and flow into the Luo. It would be more than 300 li long, and the intention would be to use it to irrigate the fields. When it was half completed the true purpose was realized, and Qin intended to kill Zheng Guo, but Zheng Guo said: ‘At first I was acting in order to cause dissension, but when the canal is completed it will surely be a benefit to Qin.’ Qin thought this was true, so in the end had the progress on the canal continued. When the canal did make further progress, it was used to cause the stagnant waters to flow, and irrigate the salty land over an area of more than 40,000 qing, so that the harvest totalled one zhong per mou. Thereupon the area within the passes was turned into fertile but uncultivated land, and there were no calamitous years, and thus Qin became rich and strong, and in the end unified the feudal states. Because of this it was called the Zheng Guo Canal.

<https://en.wikipedia.org/wiki/Mozi>

Mozi was a carpenter and was extremely skilled in creating devices, designing everything from mechanical birds to wheeled, mobile "cloud ladders" used to besiege city walls (see Lu Ban). Though he did not hold a high official position, Mozi was sought out by various rulers as an expert on fortification. He was schooled in Confucianism in his early years, but he viewed Confucianism as being too fatalistic and emphasizing too much on elaborate celebrations and funerals which he felt were detrimental to the livelihood and productivity of common people. He managed to attract a large following during his lifetime which rivaled that of Confucius. His followers—mostly technicians and craftspeople—were organized in a disciplined order that studied both Mozi's philosophical and technical writings.

<https://en.wikipedia.org/wiki/Lu_Ban>

Lu Ban (simplified Chinese: 鲁班; traditional Chinese: 魯班; pinyin: Lǔ Bān; Wade–Giles: Lu Pan) (507–440 BC) was an ancient Chinese carpenter, engineer, and inventor. He was a contemporary of Mozi, and is the patron saint of Chinese builders and contractors. Lu Ban was born in the State of Lu[1] to a renowned family during the chaos of the Spring and Autumn Period civil wars. His original name was Gongshu Yizhi (Chinese: 公輸依智). He was also referred to as Gongshu Ban (公輸班), Kungshu Pen (公輸般) and Kungshu Pun (公輸盘), but was most commonly known as Lu Ban.

According to tradition, he was responsible for several inventions, as described in Chapters 49 and 50 of Mozi:

Cloud ladder—a mobile, counterweighted siege ladder.[2]

Grappling hooks and ram—implements for naval warfare.[3]

Wooden bird—a non-powered, flying, wooden bird which could stay in the air for three days. It has been suggested to be a prototype of a kite.[4]

Other inventions were also attributed to him, such as a lifting implement to assist with burial,[5] a wooden horse carriage and coachman,[6] and other woodworking mentioned in various texts, which thereafter led Lu Ban to be acknowledged as a master craftsman:

The Book of Lineages (世本), written circa the 3rd century BC.

The Tales of the Marvellous (述异记), by Ren Fang, written circa the 5th century AD.

The Records of Origin on Things and Affairs (事物纪原), by Gao Cheng, written circa the 11th century.

The Origin on Things (物原), by Luo Qi, written circa the 15th century.

The Treatise of Lu Ban (鲁班经), attributed to Lu Ban, written in the 13th, 14th, or 15th century.

<http://en.wikipedia.org/wiki/Mongol_Empire>

With experienced Chinese engineers and bombardier corps who were experts in building trebuchets, Xuanfeng catapults and other machines, the Mongols could lay siege to fortified positions, sometimes building machinery on the spot using available local resources