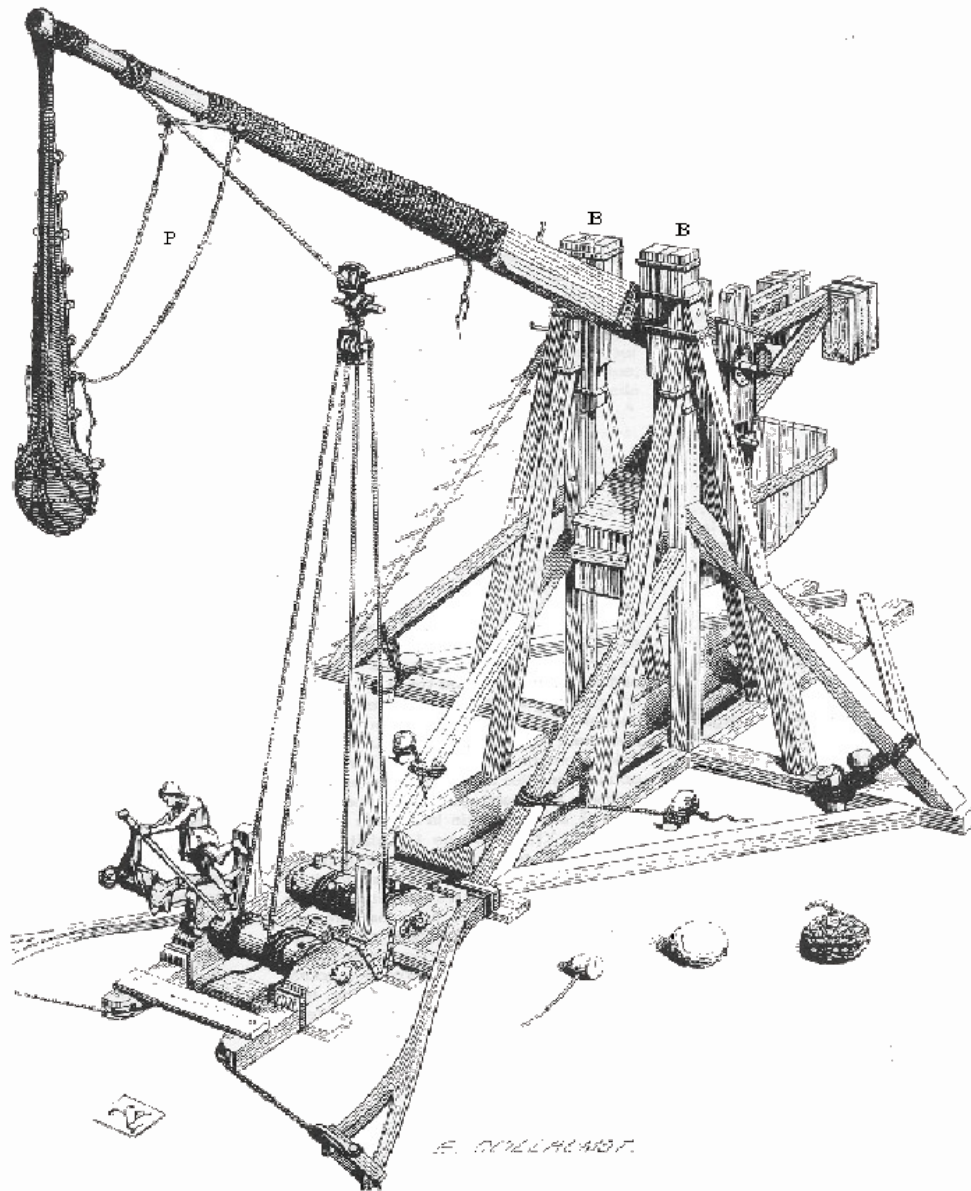


Ballistik einer Mittelalterlichen Kriegsmaschine



*Simulation eines
Trebuchet
mit
openSUSE Linux,
Python, Box2D*

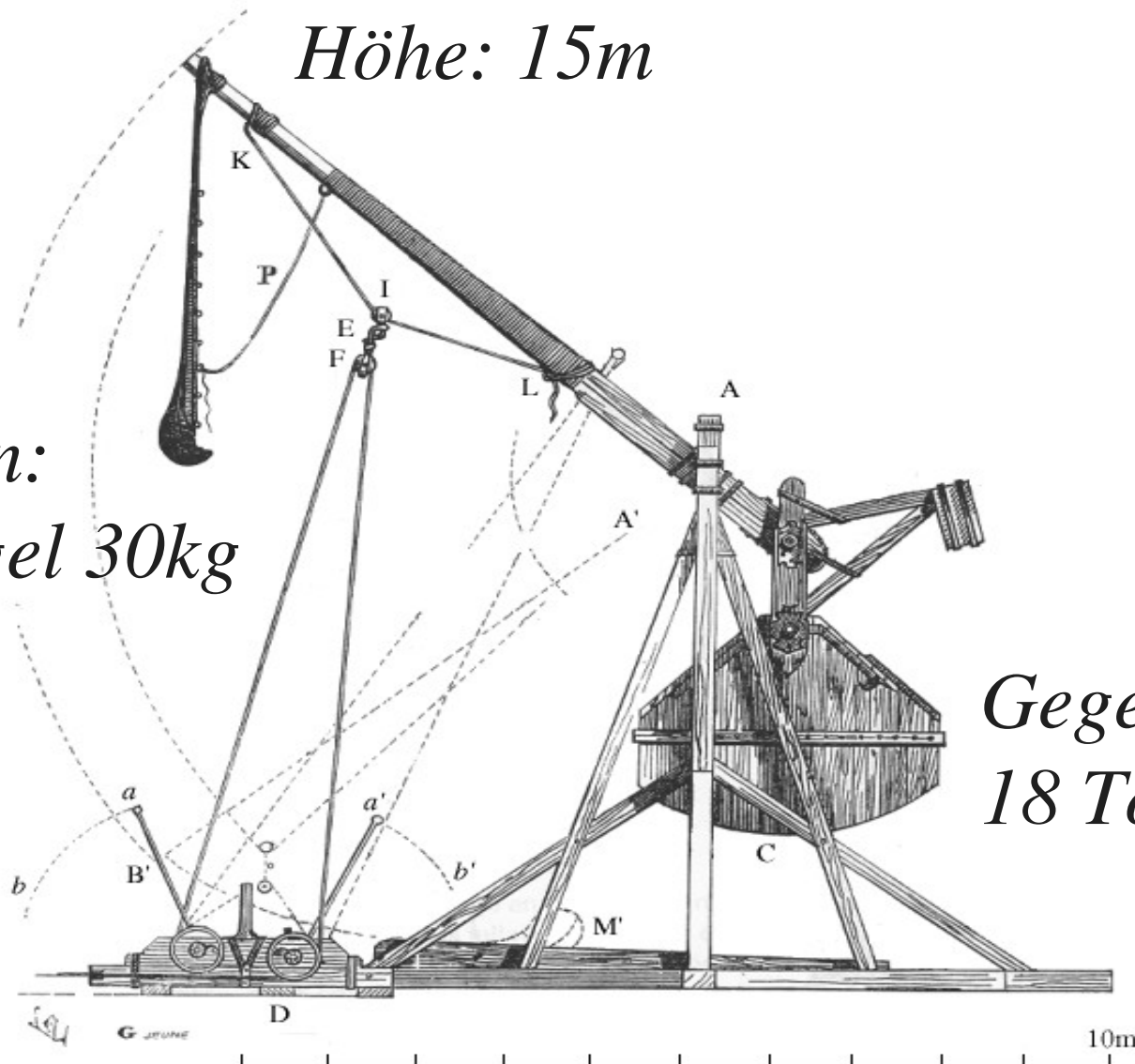
© Jürgen Weigert, 2011

Trebuchet, Baujahr ca.1350

Höhe: 15m

Munition:
Steinkugel 30kg

Gegengewicht:
18 Tonnen



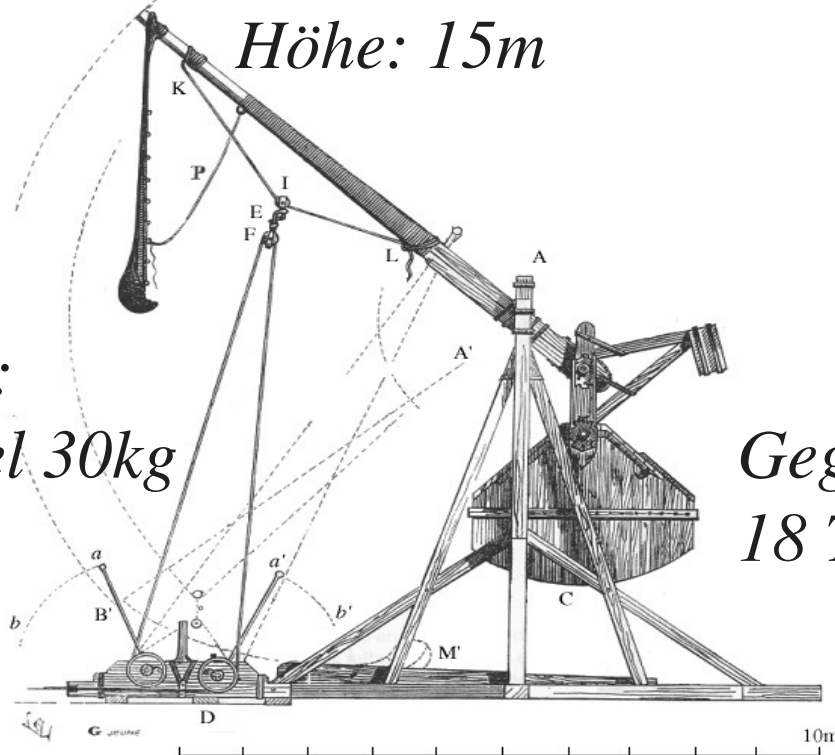
Schußweite: angeblich 450m ... aber wie?

Trebuchet, Baujahr ca.1350

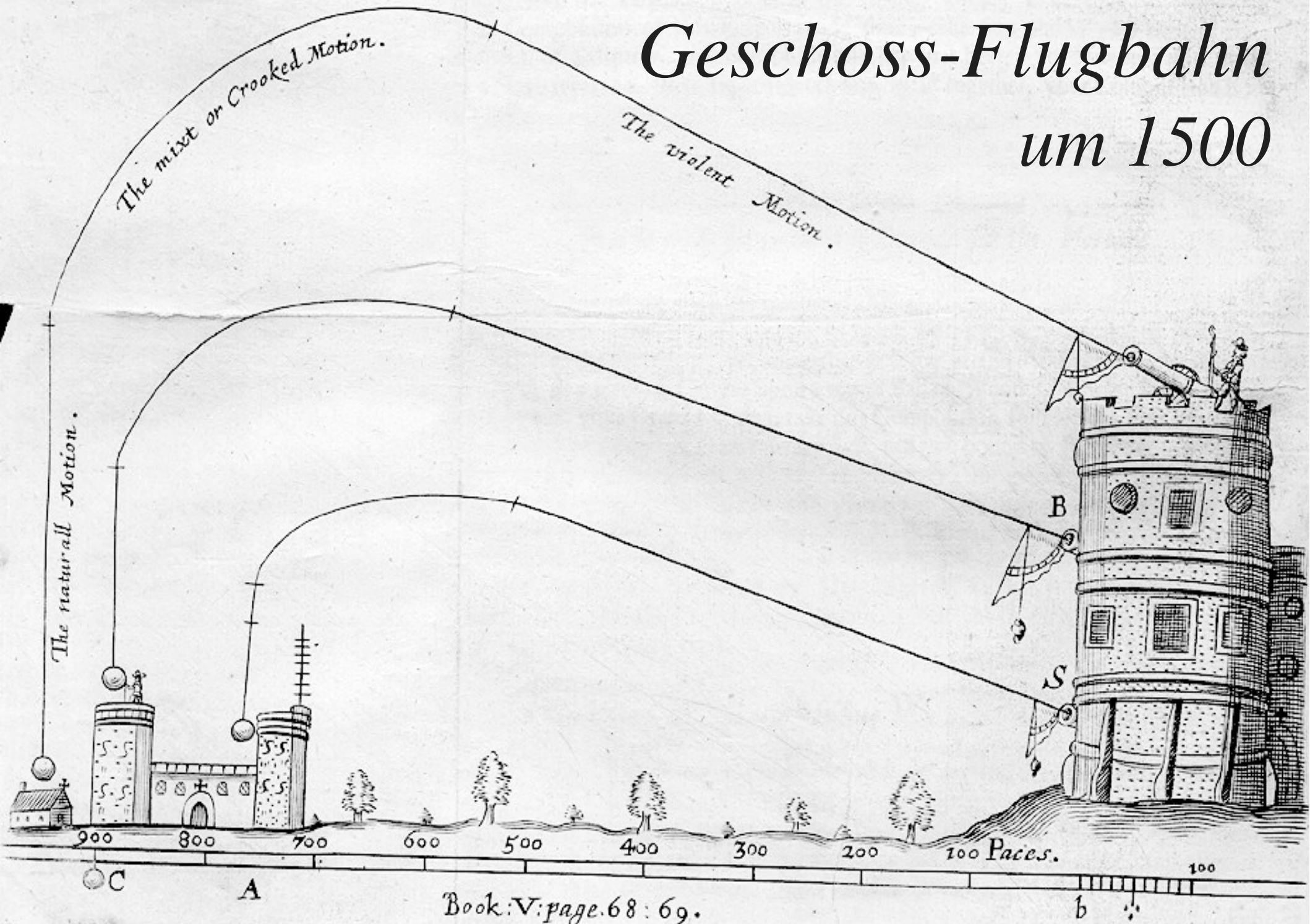
Höhe: 15m

*Munition:
Steinkugel 30kg*

*Gegengewicht:
18 Tonnen*



Geschoss-Flugbahn um 1500

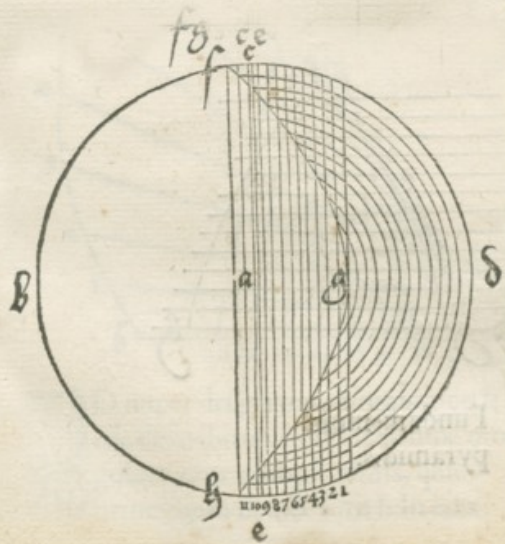


ALBERTI DVRERI

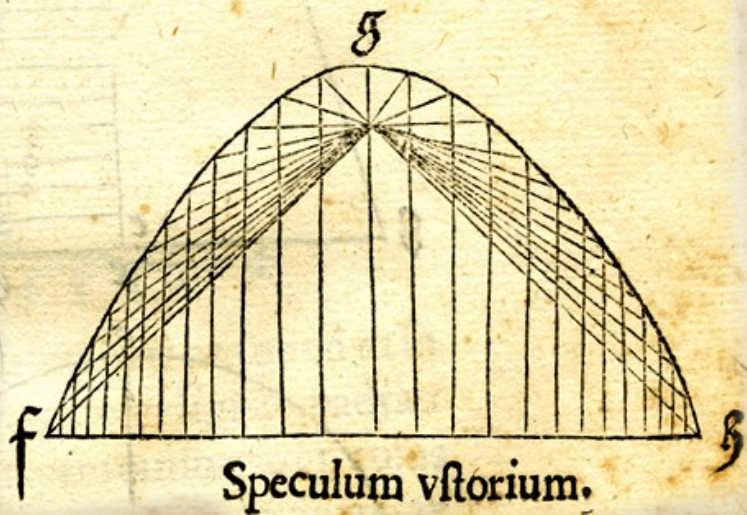
GEOMETRIAE LIB. I.

33

ęuales, qđ sic p̄cipit, Quū ex p̄cto e. in quo reflexio fit, lineā pp̄diculārē sursum ducis, et posito circini pede in signo e. & altero semicirculū p̄trahis à linea a b. sursum, donec iterū eā attingis, ac metiēdo inuenis, quòd radius luminis c e. & linea visualis d e. ęqualiter distāt à linea perp̄diculari, tunc linea d e. p̄tracta ostendet tibi locū in quo lumen ab oculo recte videri potest. Quare cū linea tua visualis per speculum siue aquam penetrarit et alia à lumine c. cadit perp̄diculariter, interfecabūt se duę illę lineę in loco vbi lumē apparet sitq; ille f. Cōsimiliter repercutiūtur radii solares in speculo, quod ex parabolę linea factū est: excidunt enim omnes, ad vnūq; punctū cōueniūt, vbi fortiter viūt. Huius rei rationē monstrarūt mathematici, qui volet, apud eos legat. Quę sup̄rà dixi p̄sens figura ostēdit.



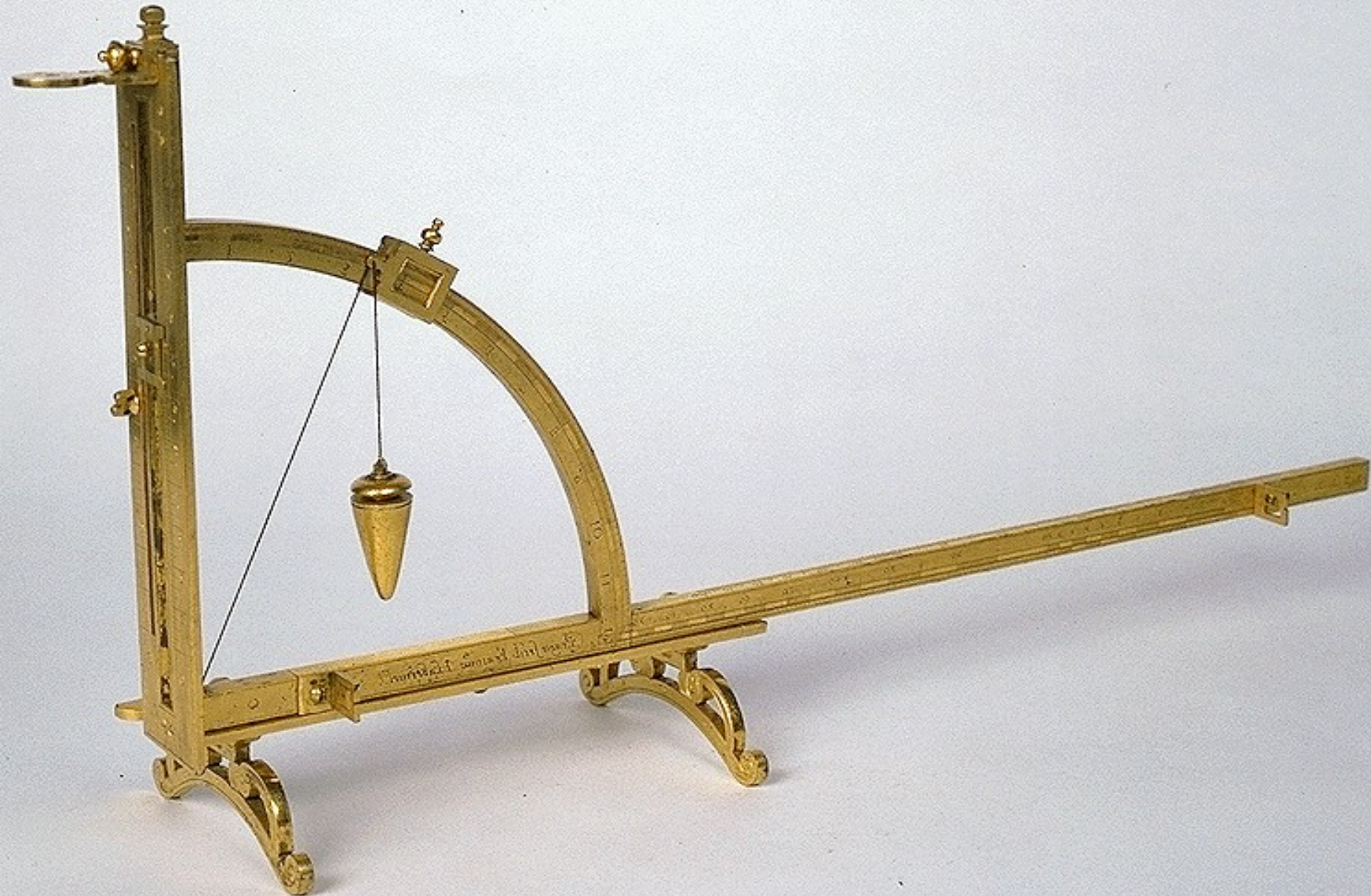
Parabola.



NOVA SCIENTIA INVENTA DA NICOLO TARTALEA.B.



Flugbahn-Berechnung

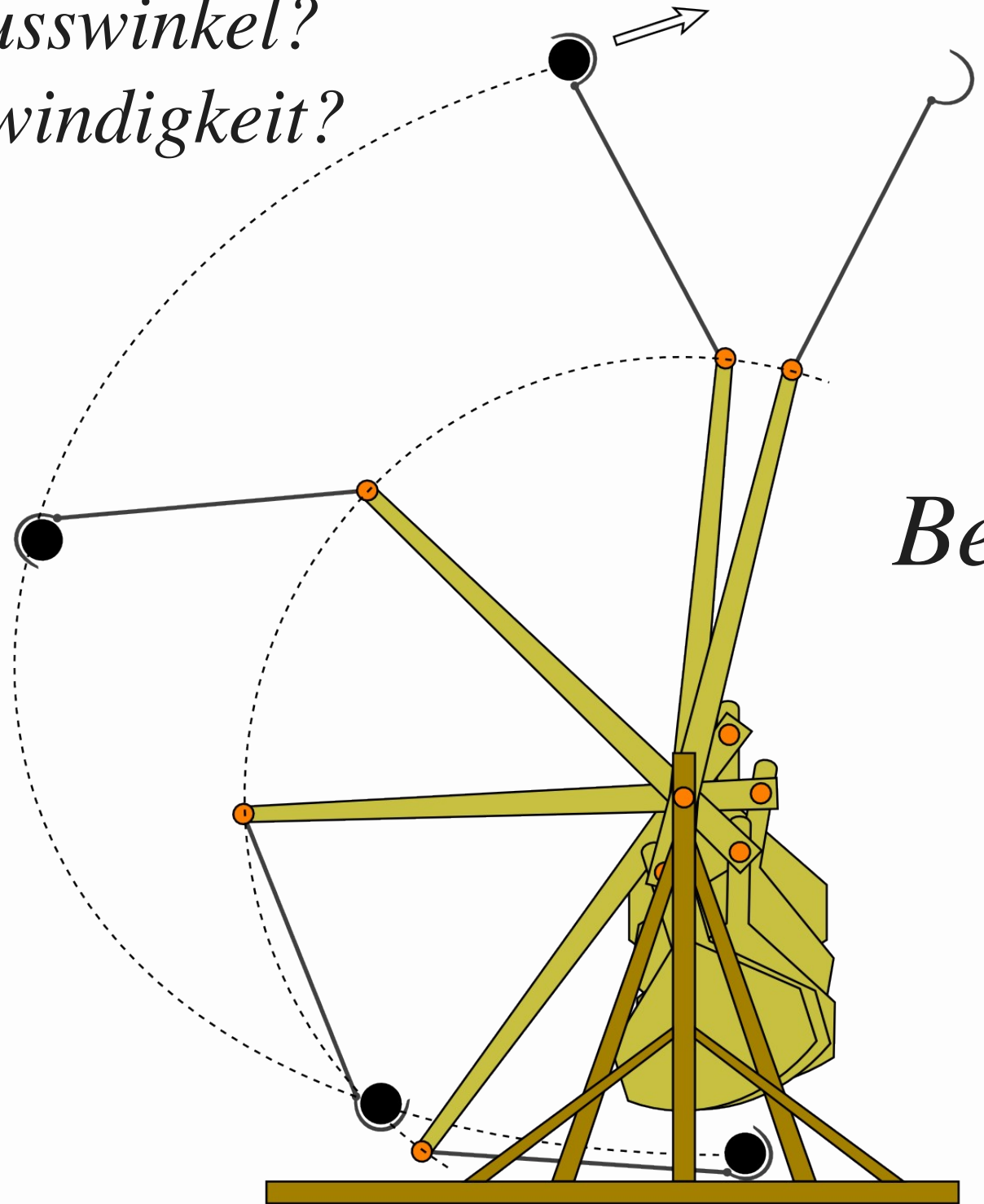


Flugbahn-Berechnung

- *Abschusswinkel*
- *Geschwindigkeit*



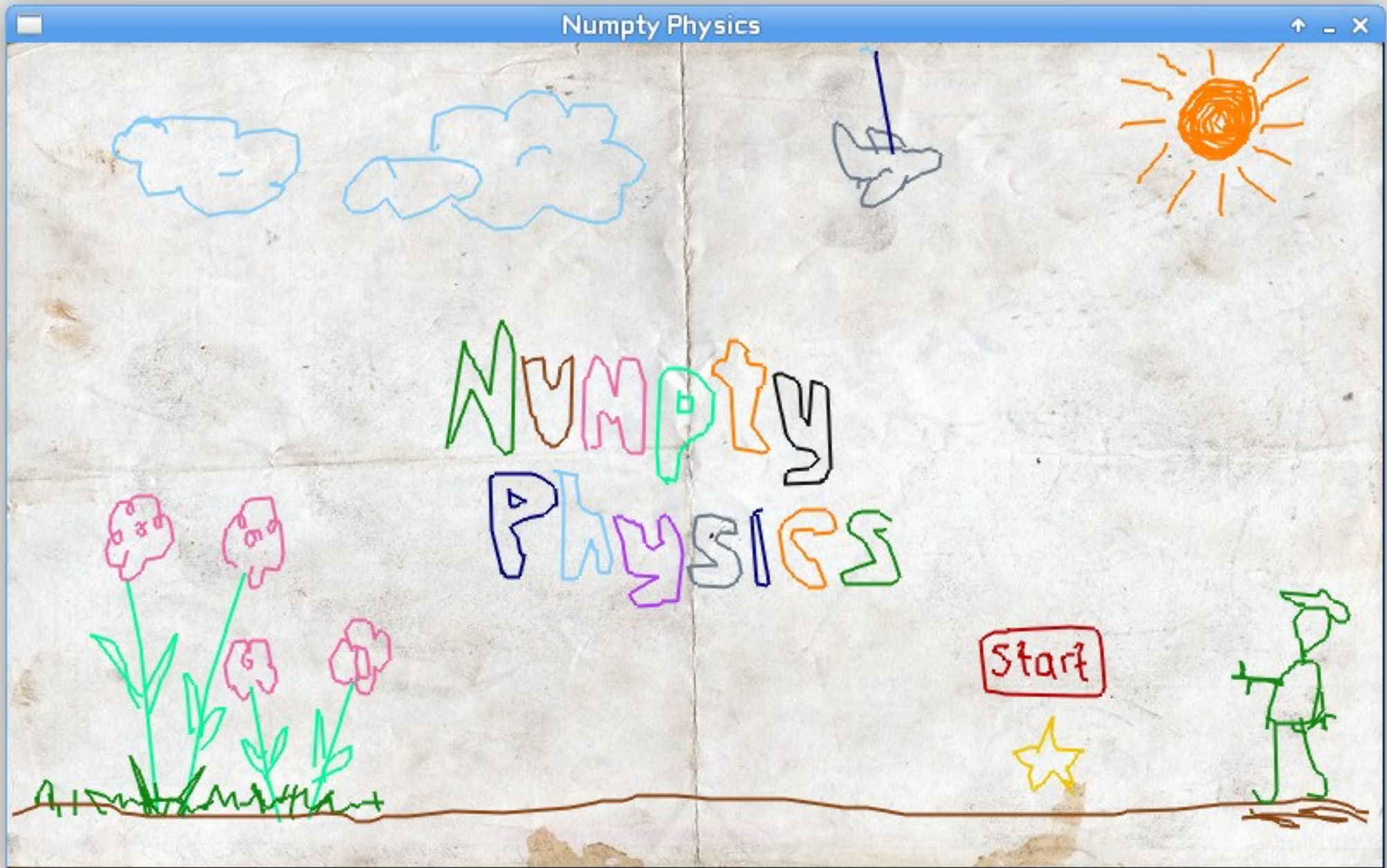
*Abschusswinkel?
Geschwindigkeit?*



*Flugbahn-
Berechnung?*

Nein!

Flugbahn-Simulation!!



```
emac
File Edit Options Buffers Tools Python He
# From: X11: Sugar devel: languages: pyth
# Requires: python-box2d python-pygame
from pygame_framework import *
import math

VERSION = 0.4

## definitions of the trebuchet:
l1 = 0.4 # 0.4 [m], le
l2 = 1.6 # 1.6 [m], le
l3 = 1.5 # 1.5 [m], le
l4 = 0.5 # 0.5 [m], di
l5 = 1.2 # 1.2 [m], he
l6 = 0.5 # 0.5 [m], size of cw box
m1 = 5.0 # 30 [kg], mass of counterweight
m2 = 0.085 # 0.08 [kg], mass of projectile
mb = 1.5 # 1.5 [kg], mass of arm
# rotational inertia of the counterweight box [kg*m^2] ???

## we construct the arm in the 'loaded' position.
## the tip of l2 points low, and
## the sling (l3) starts exactly horizontal, to eventually drop onto the slide
h1 = 0.2 # construction height of the sling

## cosanhyp
phi = math.acos((l5-h1)/l2)
a2 = -l2*math.sin(phi) # x-offset of the tip from the main axle
a1 = l1*math.sin(phi*1.0) # x-offset of the cw hinge from the main axle
b1 = l1*math.cos(phi*1.0) # y-offset of the cw hinge from the main axle
# positive y-axis points upwards.

--(DOS)--- Trebuchet.py 13% (41, 0) (Python)
```

- *Physik-Simulations-Engine*
“Box2D” aus dem Spiel NumptyPhysics
- *als OpenSource Bibliothek frei verfügbar*
(<http://build.opensuse.org/search>)
- *und Python (C, Java, Perl) Bindings*
vorhanden

Download

Trebuchet Simulator:

obs://build.opensuse.org/home:jnweiger:python/*/trebuchet-simulator

http://software.opensuse.org/search?q=trebuchet-simulator&include_home=true

Box2D:

<http://code.google.com/p/pybox2d/>

obs://build.opensuse.org/X11:Sugar/*/python-box2d

Numpty Physics:

<http://numptyphysics.garage.maemo.org/>

obs://build.opensuse.org/games/*/numptyphysics

http://www.youtube.com/watch?v=MHek-5BepOQ

Video footage and images:

http://www.youtube.com/watch?v=L1EAA7pkEJ4

http://mathdl.maa.org/mathDL/46/?pa=content&sa=viewDocument&nodeId=2591&bodyId=3060