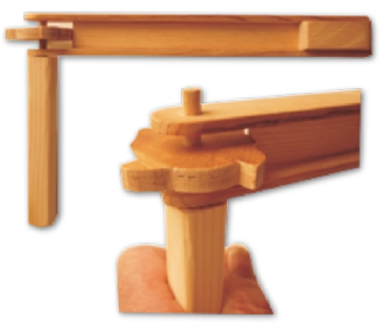
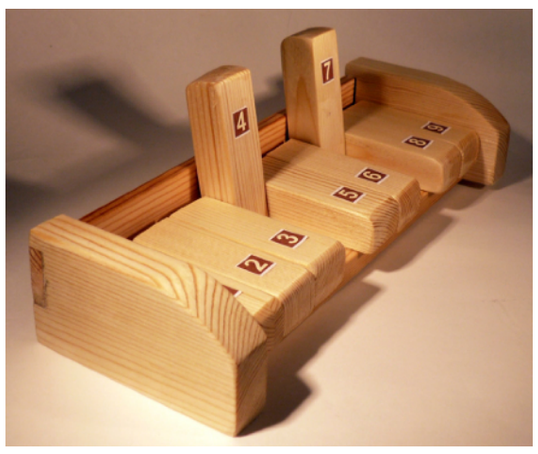
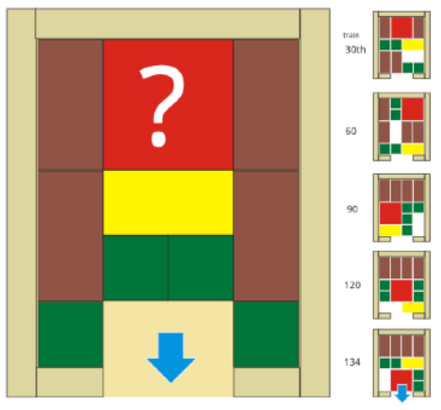
werken-technik.de

Woodwork building instructions

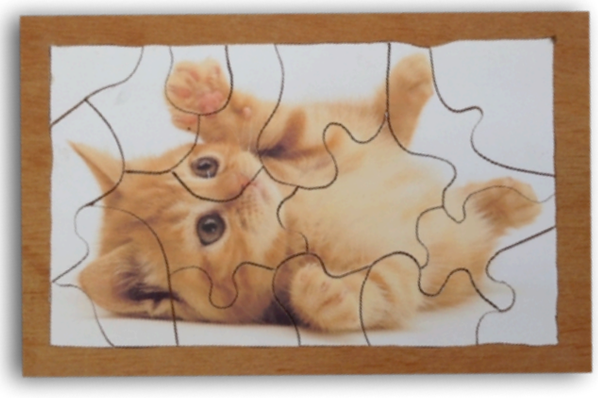
click on the icon!

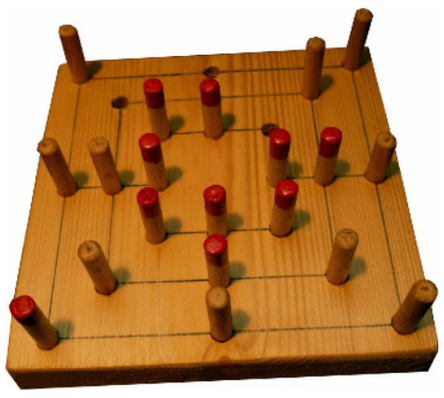


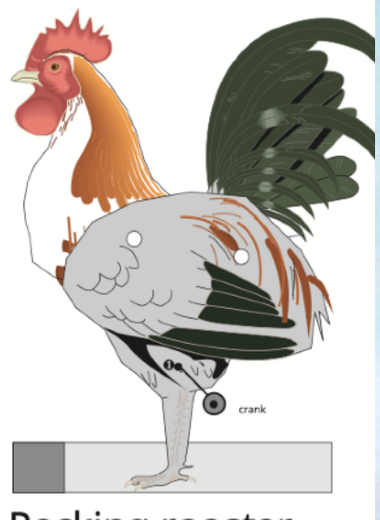




How are you getting out of here?







Pecking rooster

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Heiner Prüser

Oldtimer made of wood

This task leaves a lot of space for free design ideas. The planning should start with a small draft sketch on a 1: 1 scale.
First of all, the wheel size has to be determined and in the scale 1: 1 in the Draw in side view.

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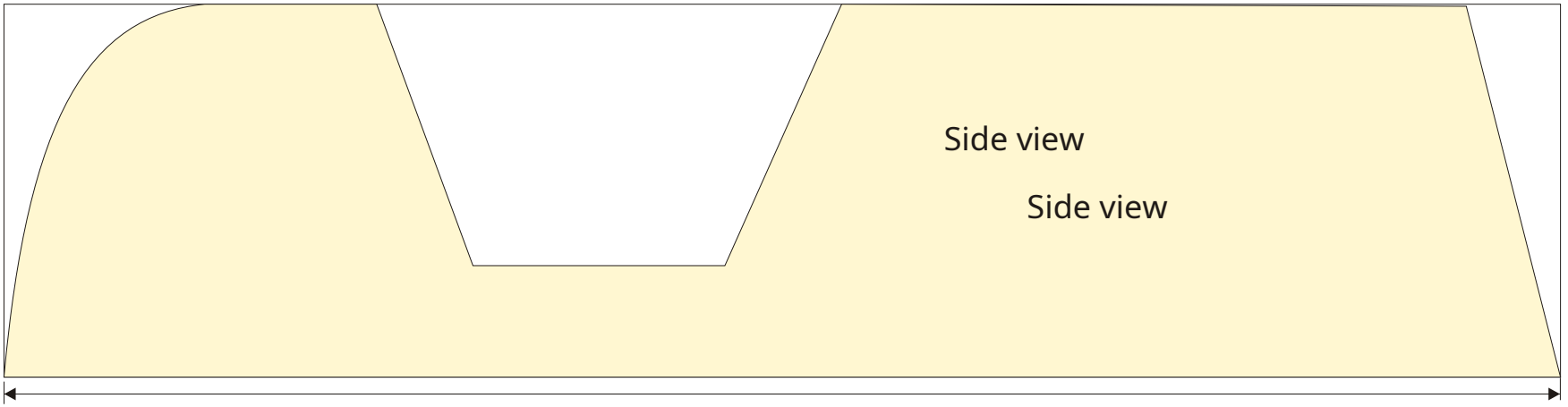
All parts are sawn out of strips / boards made of spruce or pine and then further processed.
The hubcaps are made from 10 mm round wood, which is clamped into the column drill; the rounding is created with a file and sandpaper on the rotating log.
Then you saw off the rounded cap with the precision saw.
All parts are glued together and then rubbed in with cellulose matting.

The lamps made of 20 mm spruce rods have 4 mm rods in the fenders and lamps pinned. The same procedure was followed for all wheels, the steering wheel and the spare wheel.

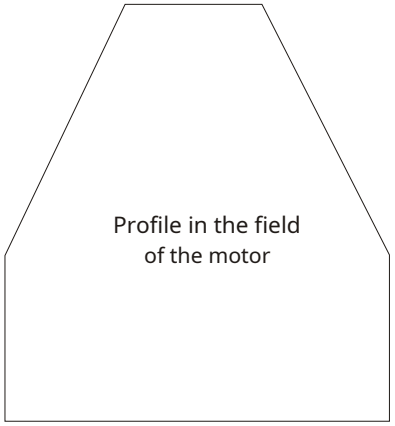
Oldtimer made of wood

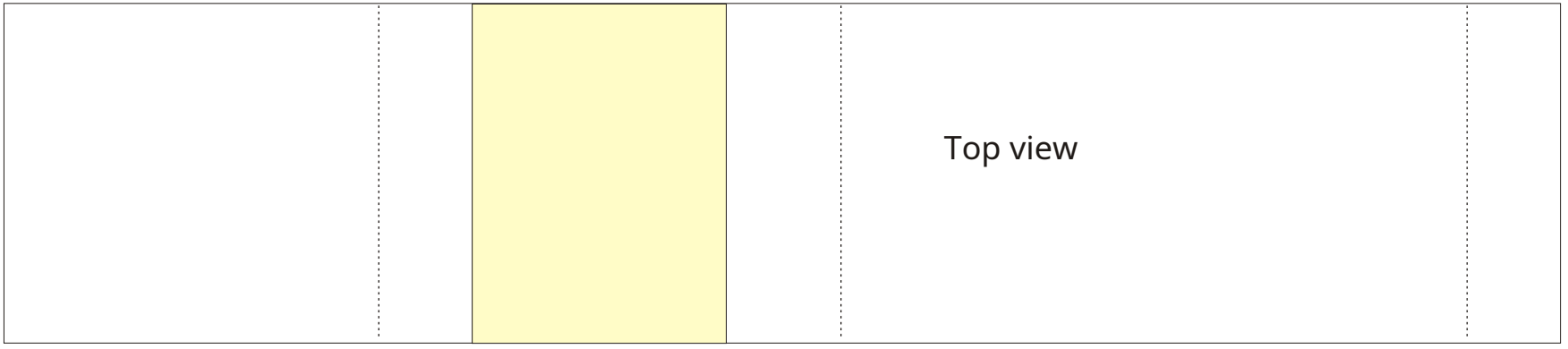
Scale 1: 1

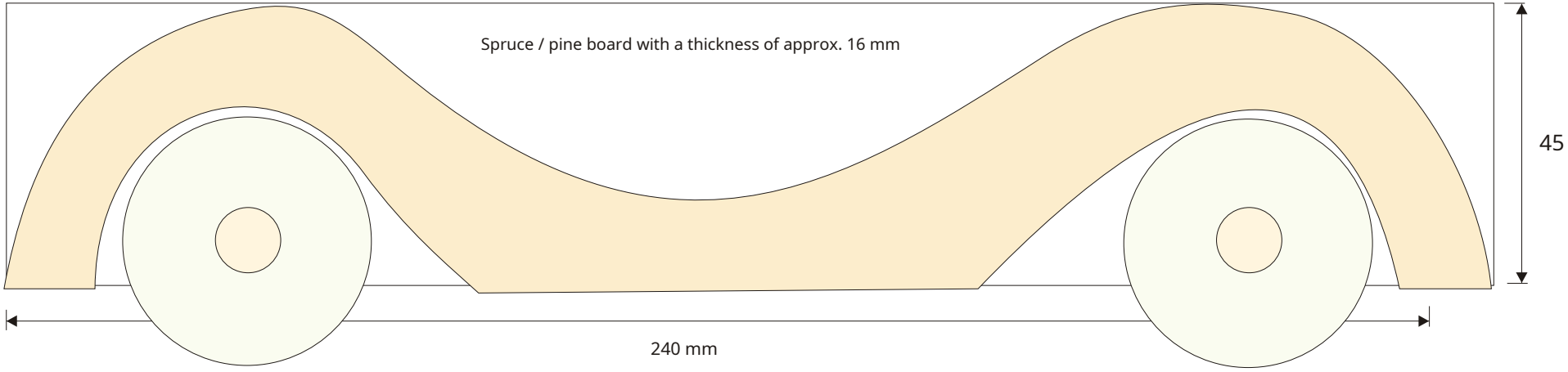


Middle part of the classic car made from a solid wood strip 230 x 55 x 50 mm

The cheapest material is spruce / pine (the cheapest roof batten 40 x 60 mm)

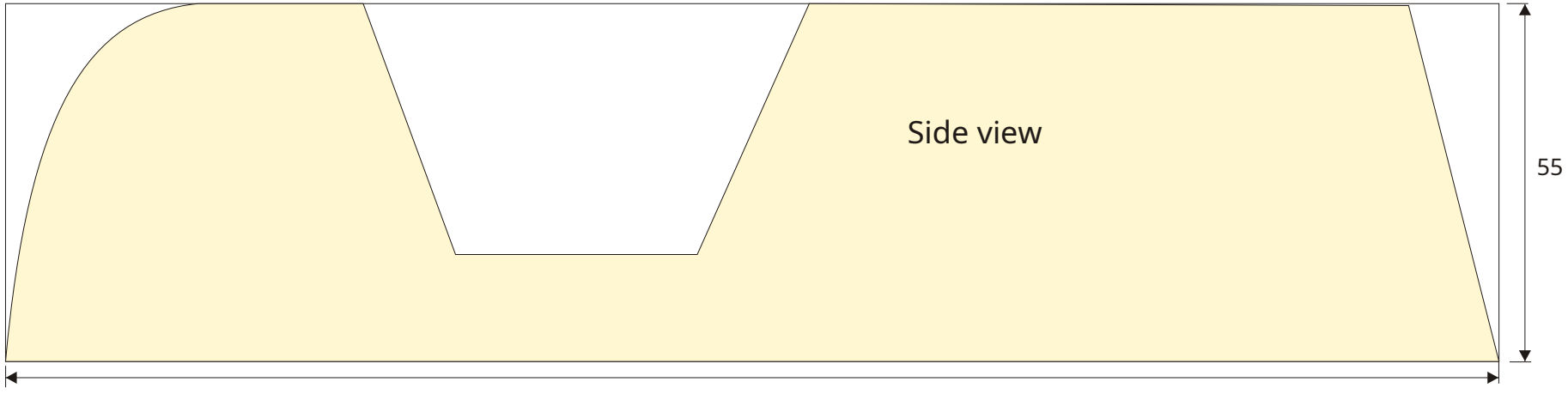


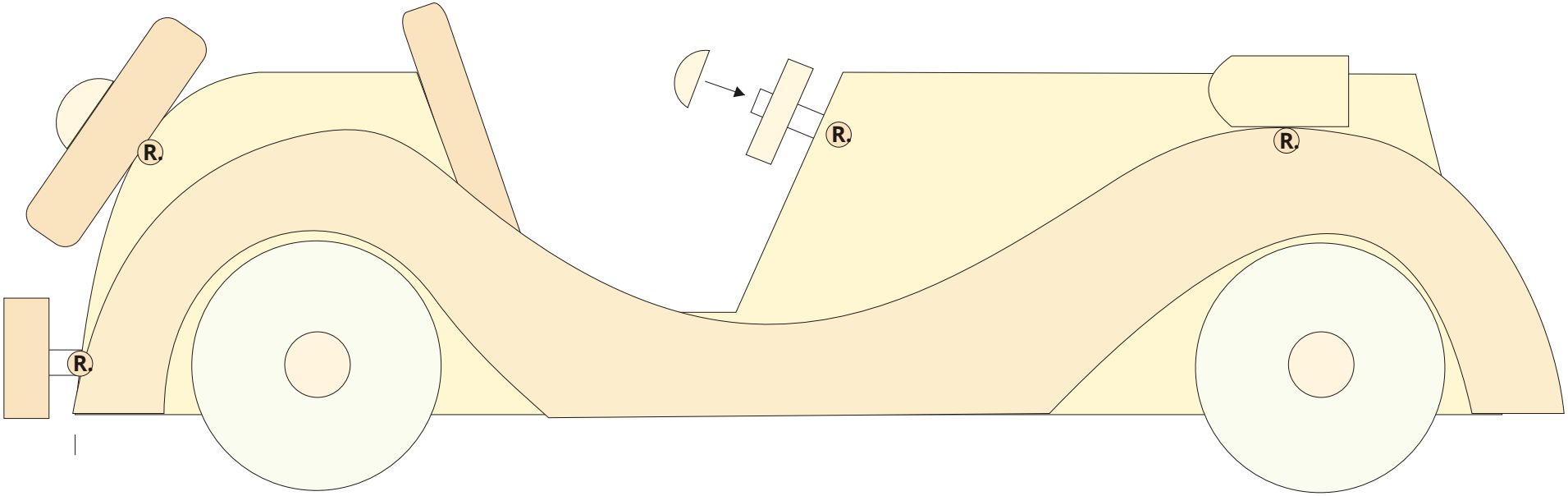




The side parts for the fenders are sawn out of the board. (Fretsaw or scroll saw)

The easiest way to make the wheels is from 40 mm round discs. (Mark in the middle, drill 4.5 mm through.) The wheels are placed on 4 mm round rods that are drilled into the vehicle body with 4 mm.
A 10 mm round rod is attached to the round rod axis as a hub cap (drill inside with 4 mm) and previously clamped to the drill and "turned" round with a file and sandpaper.

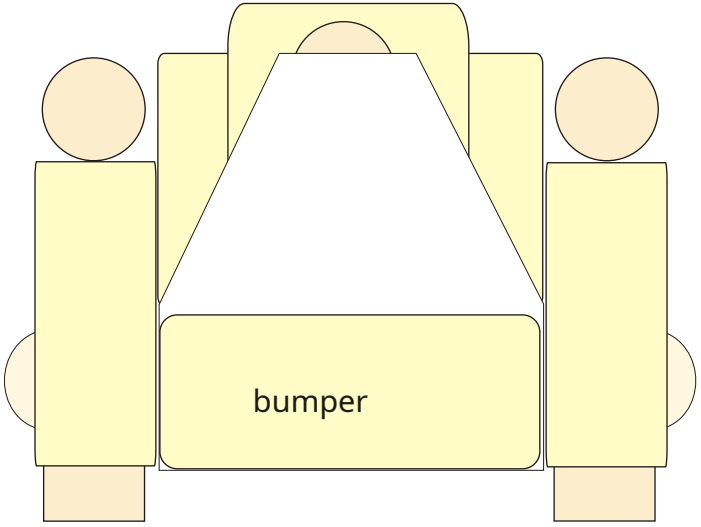


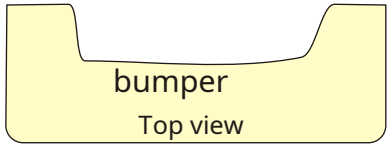


Spruce / pine board with a thickness of approx. 16 mm

R. = Round rod 4 mm

Front view





Top view

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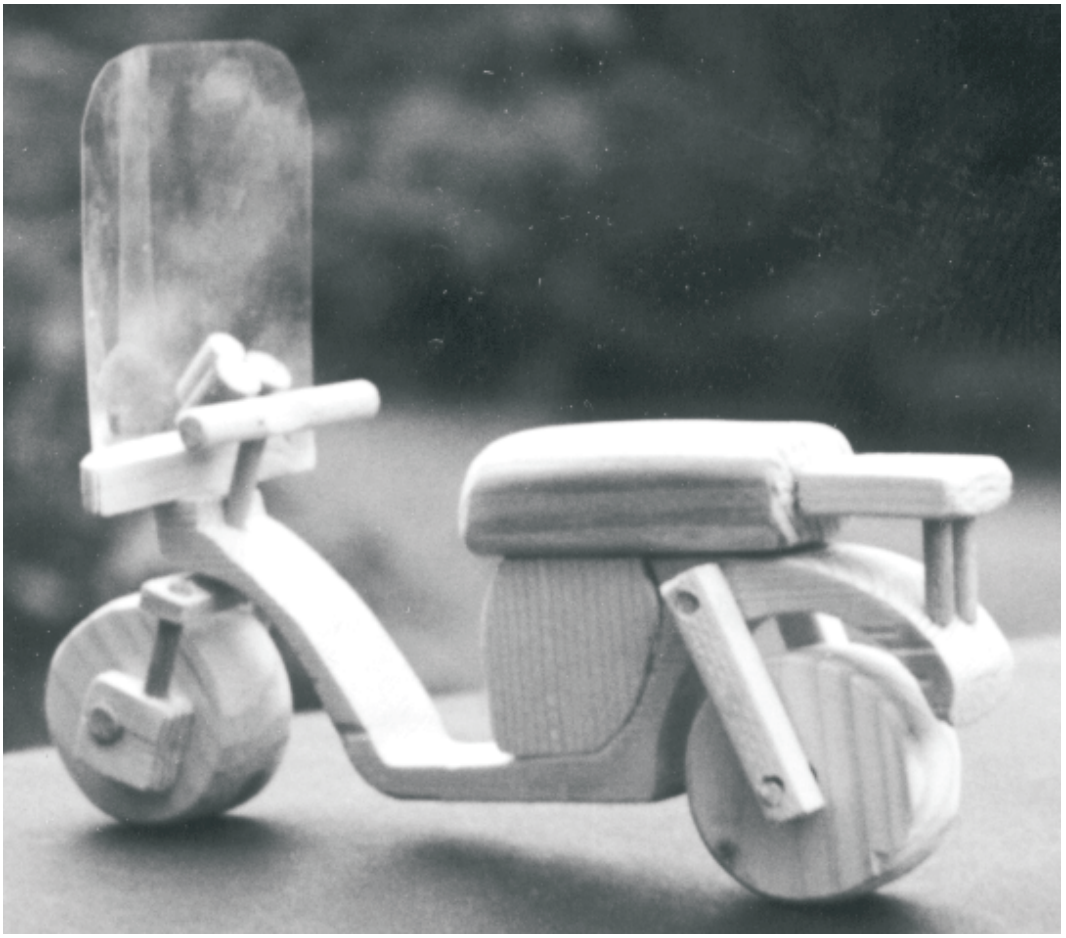
Heiner Prüser



Motorcycles made of wood

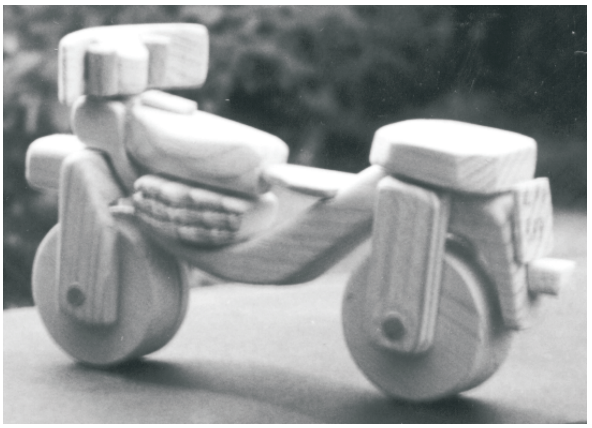
from class 9 | Time: approx. 10 hours | Order no. 905

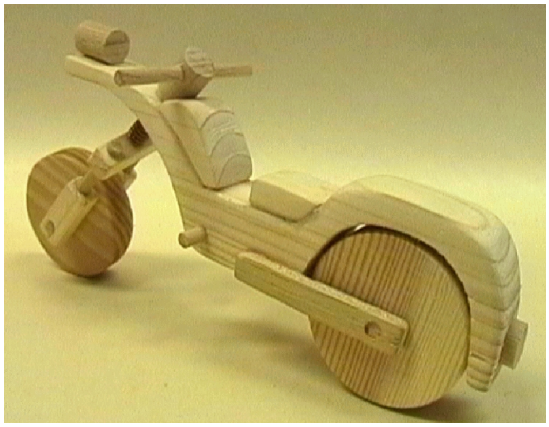
Work aids for successful handicraft lessons

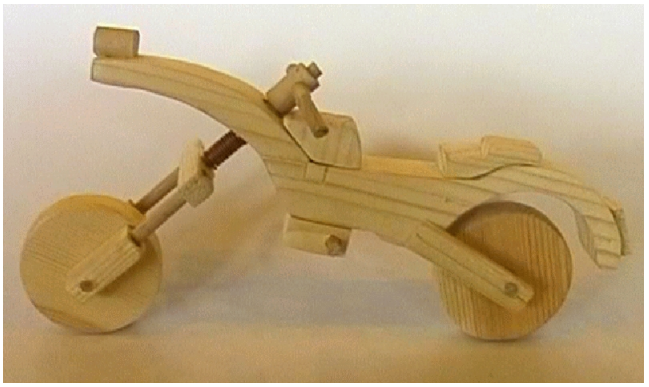
GPV_905

www.werken-technik.de

Notes on lesson planning







When planning, start with the size and shape of the wheels available! This is followed by the shape of the chassis, which is sawn out of solid wood (e.g. spruce) with the fretsaw.

Recommended for class	Time requirement	material costs	Level of difficulty
Class 9/10	approx. 10 hours	about 1 euro	★ ★ ★ ★ ☆

Material:

Solid wood strips; Round rod 4mm / 6mm / 10 mm,
round disks 30 mm / 40 mm
Welding wire, possibly sheet metal and other small parts

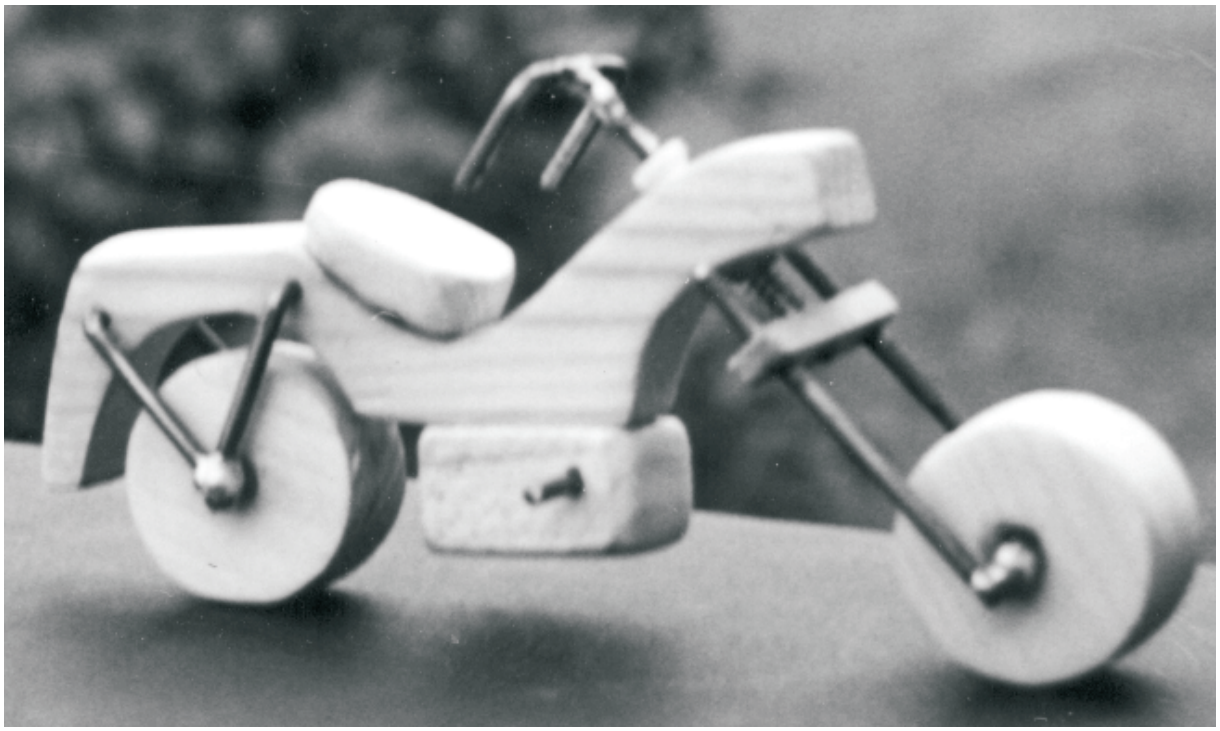
Problems in construction:

Sawing the solid wood strips for the chassis

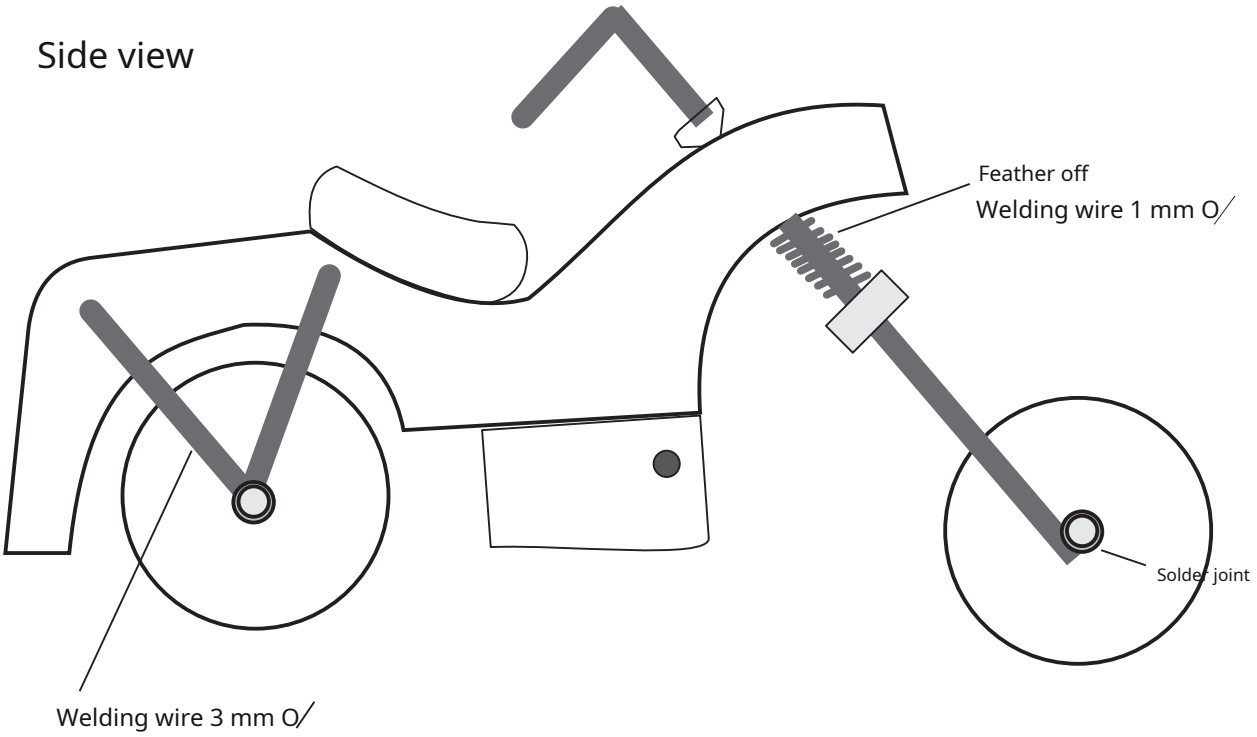
Realization of the front suspension and steering

Construction drawing scale 1: 1

Type a



Side view



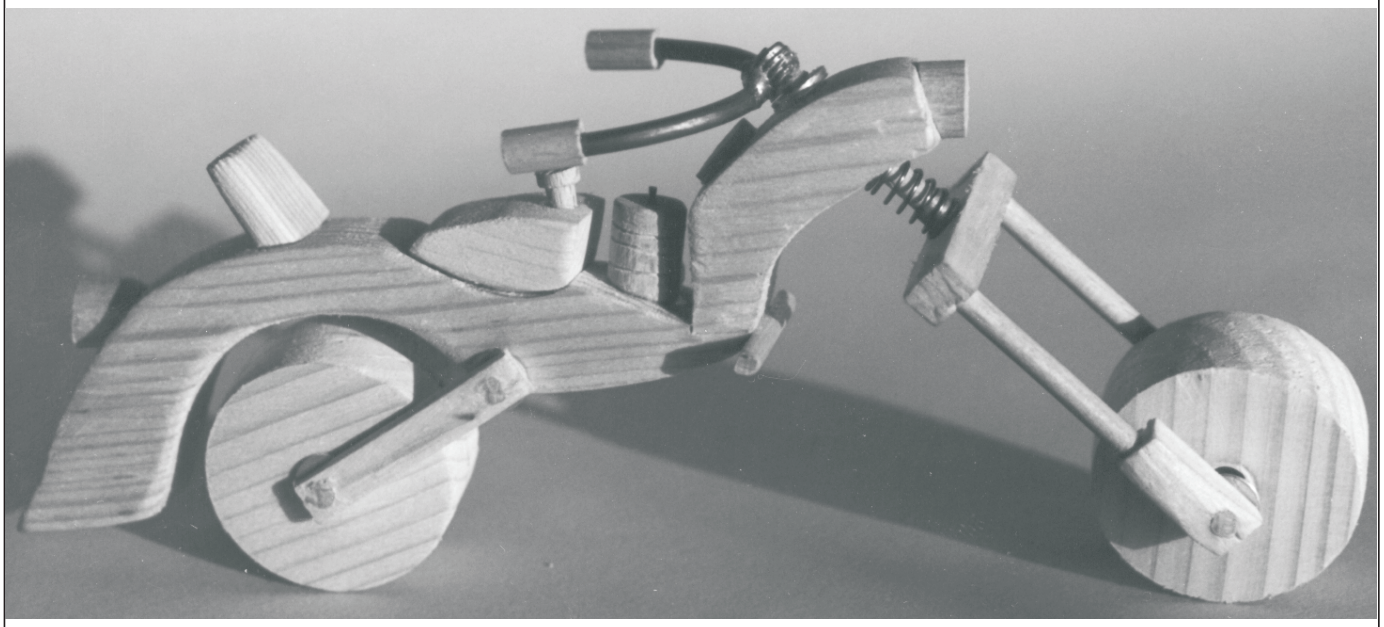
When planning, start with the size of the wheels used!
The wheels of the prototype were sawn out of solid wood with a hole saw.

Transfer the outline of the chassis onto a solid wood strip. Saw out the outlines with the fretsaw. (Guide the saw blade vertically!) Then drill the holes and smooth the wood surface.

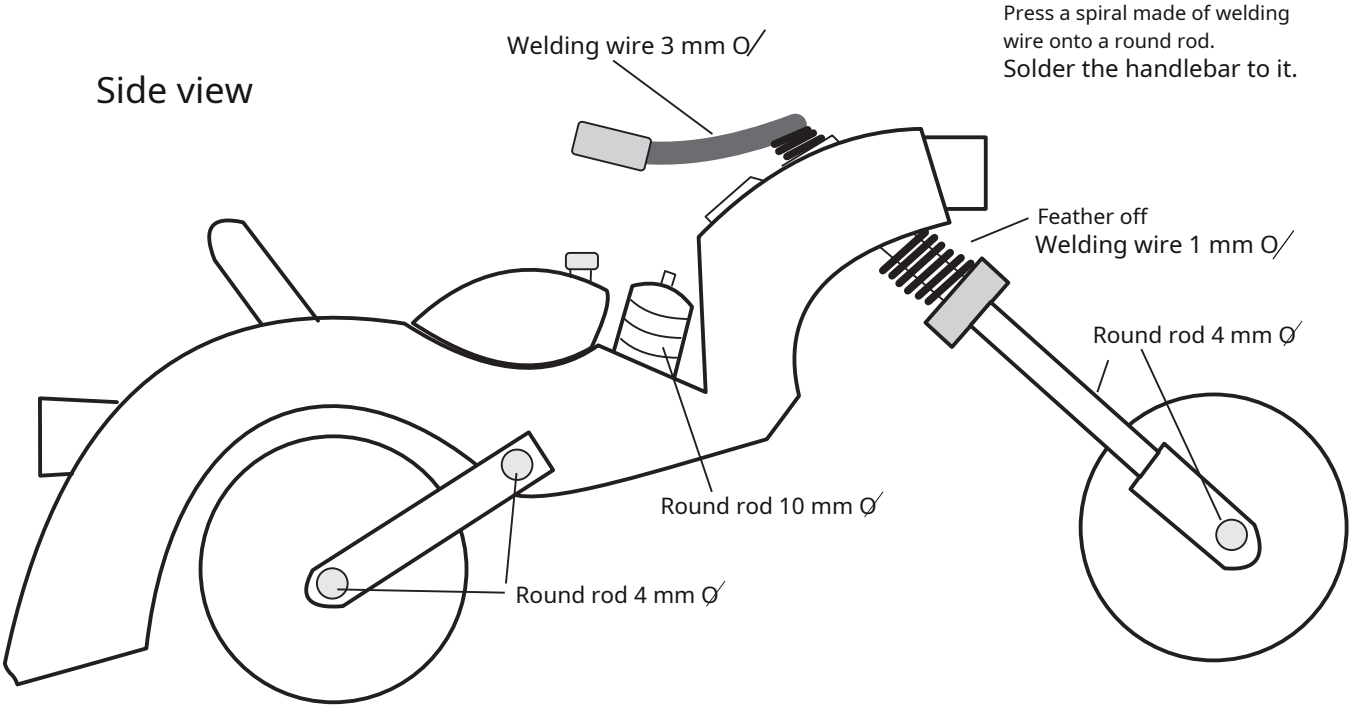
GPV_905

Construction drawing scale 1: 1

Type B



Side view



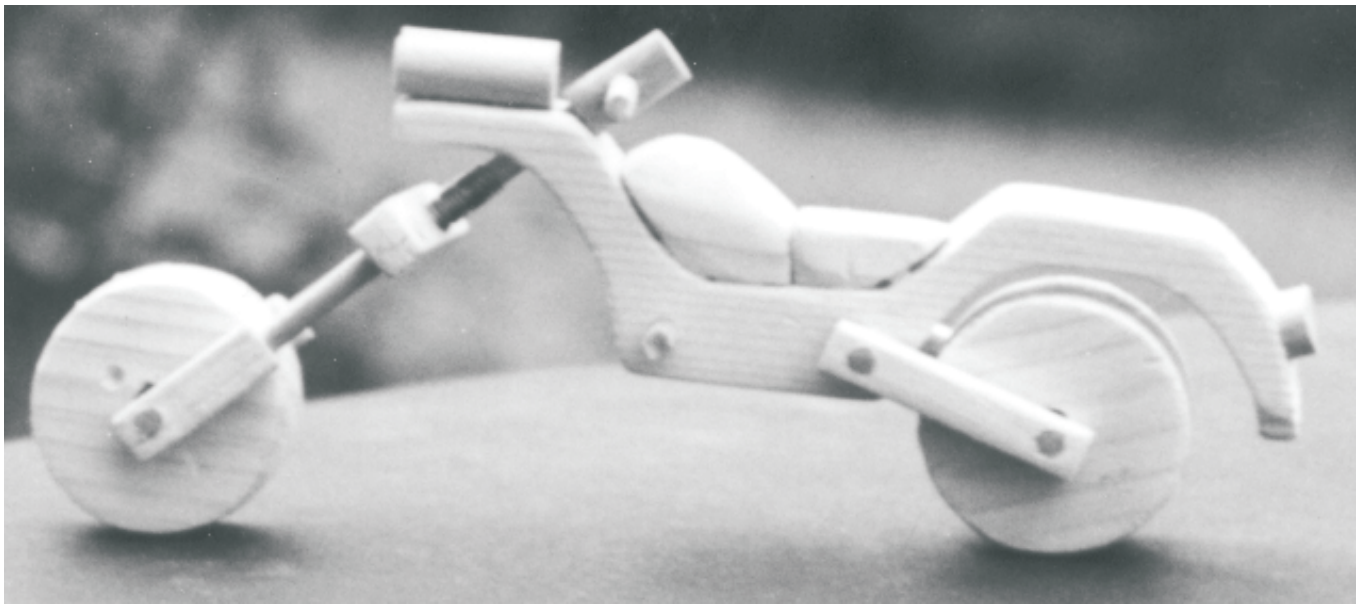
When planning, start with the size of the wheels used!
The wheels of the prototype were sawn out of solid wood with a hole saw.

Transfer the outline of the chassis onto a solid wood strip. Saw out the outlines with the fretsaw. (Guide the saw blade vertically!) Then drill the holes and smooth the wood surface.

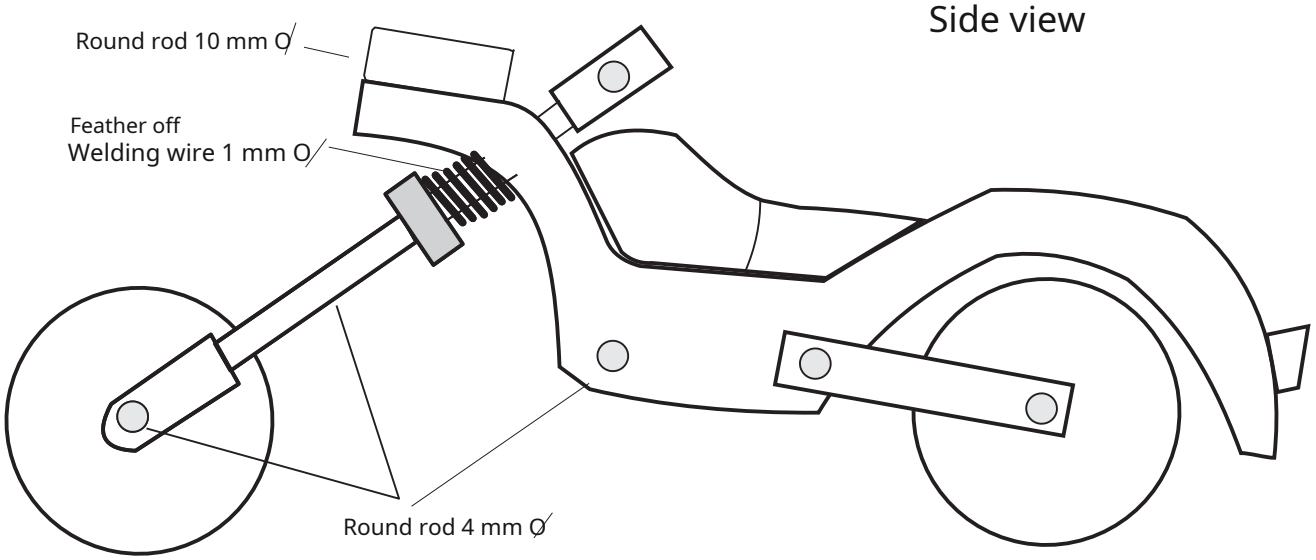
GPV_905

Construction drawing scale 1: 1

Type c



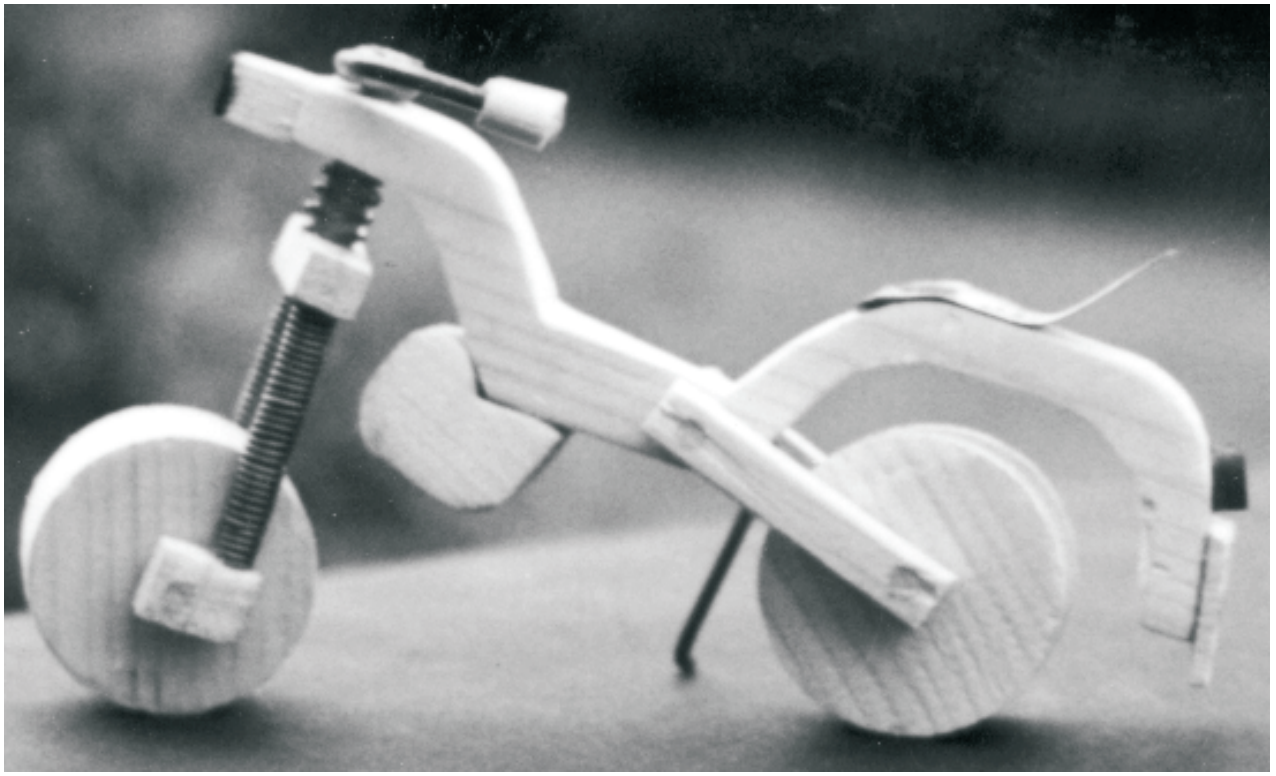
Side view

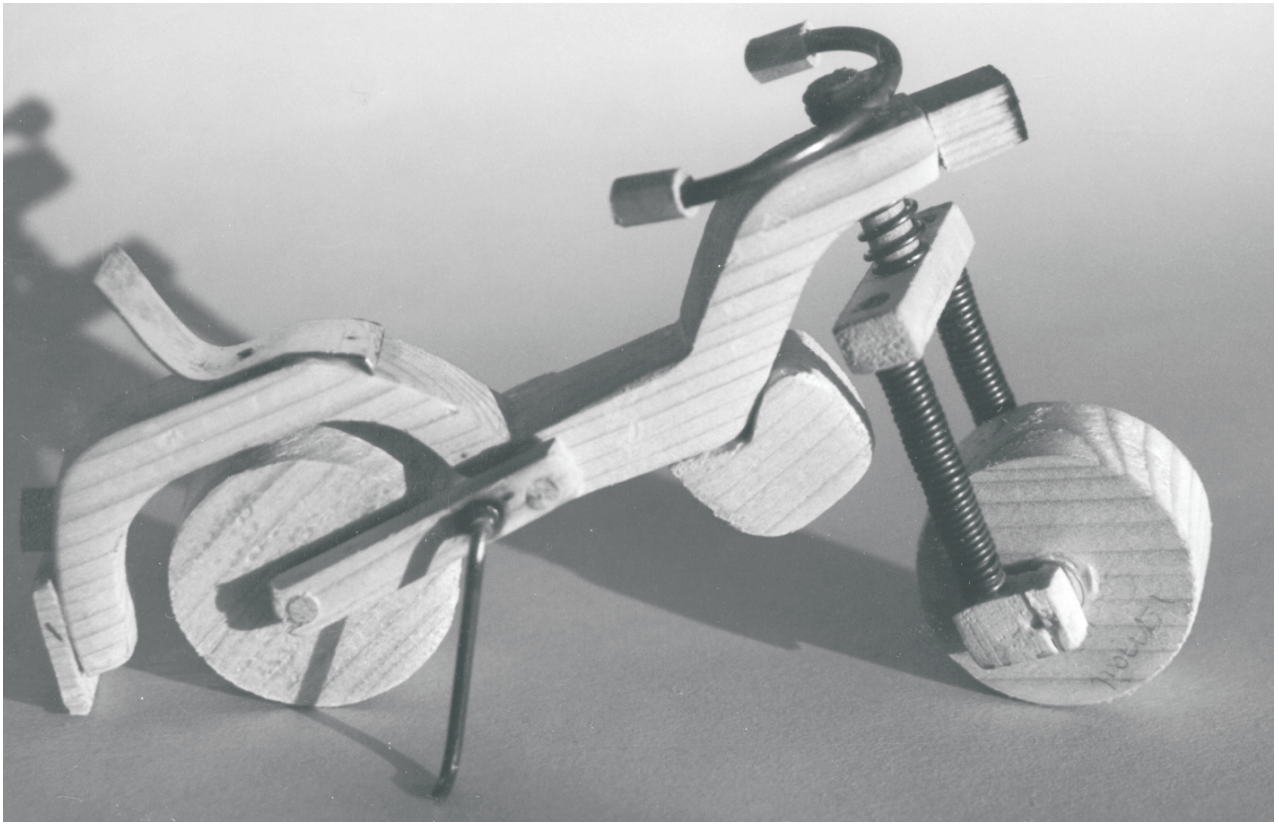


G

Construction drawing scale 1: 1

Type D





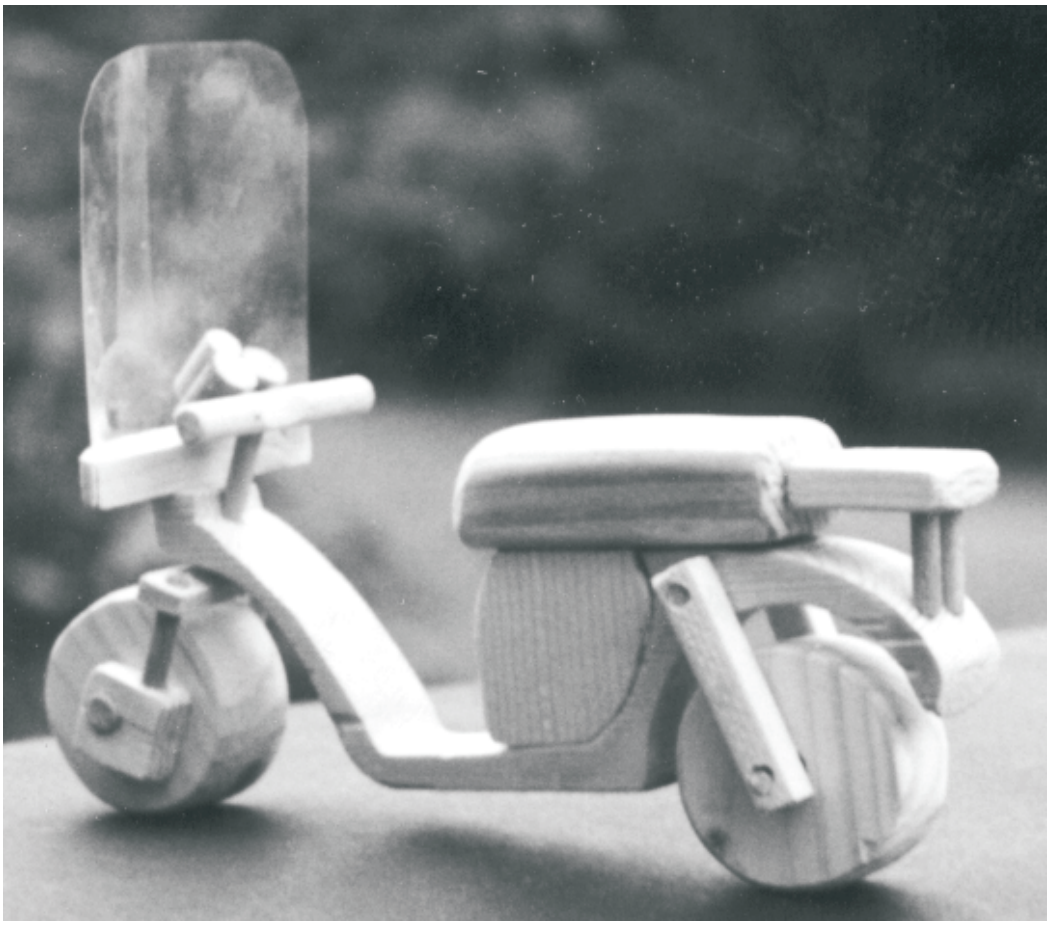
GPV_9

Photo in original size

Type E

Scooter

Windbreak
disk out
Plastic wrap



GP

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Heiner Prüser

Mini racing car

This task leaves a lot of space for free design ideas. The planning should start with a small draft sketch on a 1: 1 scale.
First of all, the wheel size has to be determined and in the scale 1: 1 in the Draw in side view.
As can be seen in the photo, depending on the age and ability of the student simple or more complicated workpieces are created. What these two models have in common is the construction of the axle bearings, who is responsible for ensuring that the vehicles roll well.

Work aids for successful handicraft lessons

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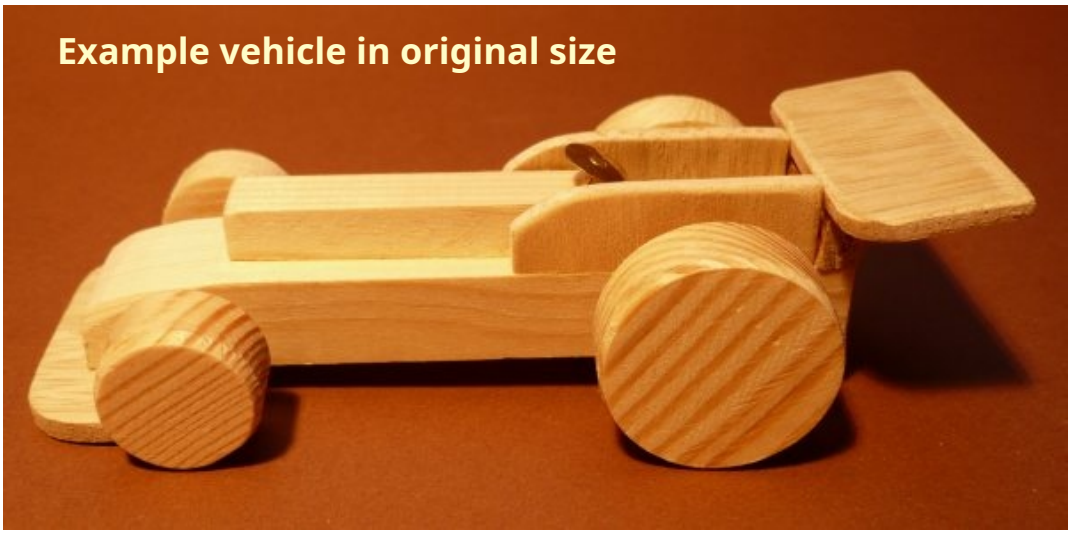
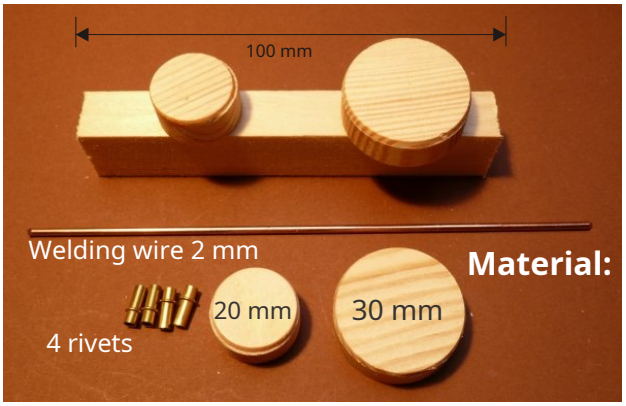
Teacher information

Exercise class 5/6

This work assignment can be offered in different degrees of difficulty in the most diverse class levels, both in a very free form and with certain specifications regarding material and size that must be observed by the students. Here is an example for Class 5/6:





Material specifications:

1 bar 100x12x20 mm

Welding wire 2 mm

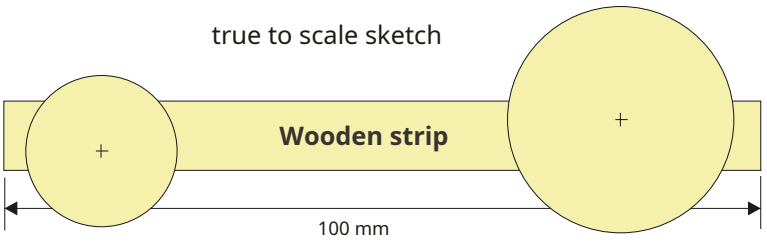
4 rivets for the axle mounting

4 round disks with a diameter of 20 or 30 mm

alternatively, “wheel disks” can be sawn off from the round bars provided.

Task:

First, make a true-to-scale sketch with the selected wheel sizes on the student worksheet (see right).
Then the drill holes are marked and pre-punched. (Is the chassis horizontal?) Only after the teacher has given the OK, drilling is allowed.

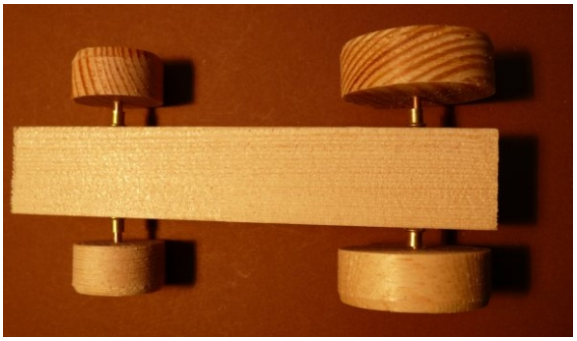


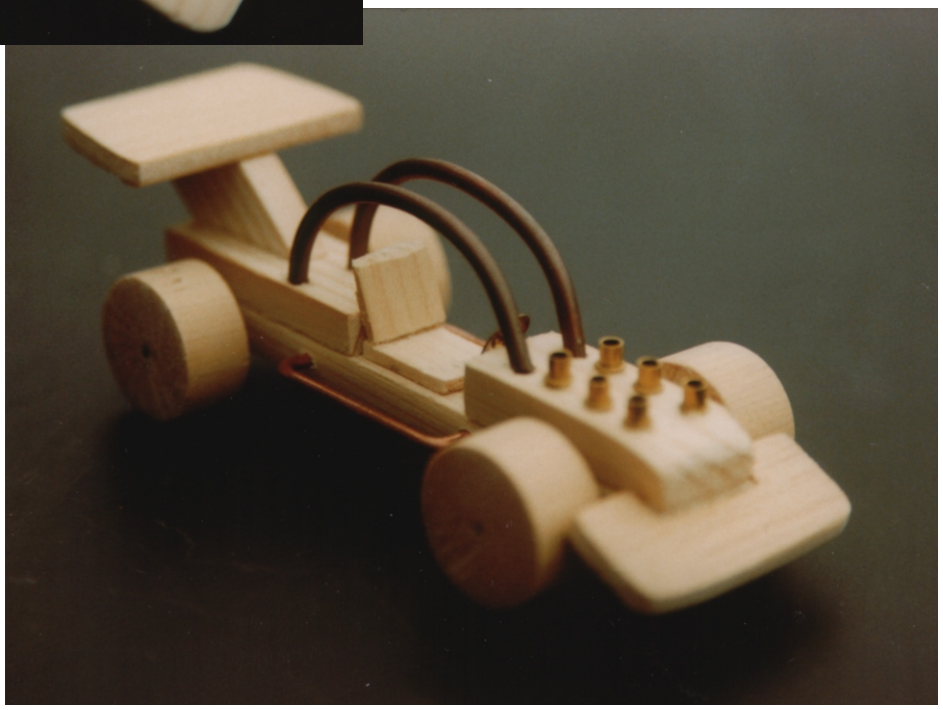
Determination of the center of the circle with a centering angle

In the case of very small wheels, it is best to determine the center by eye.

Photo hold

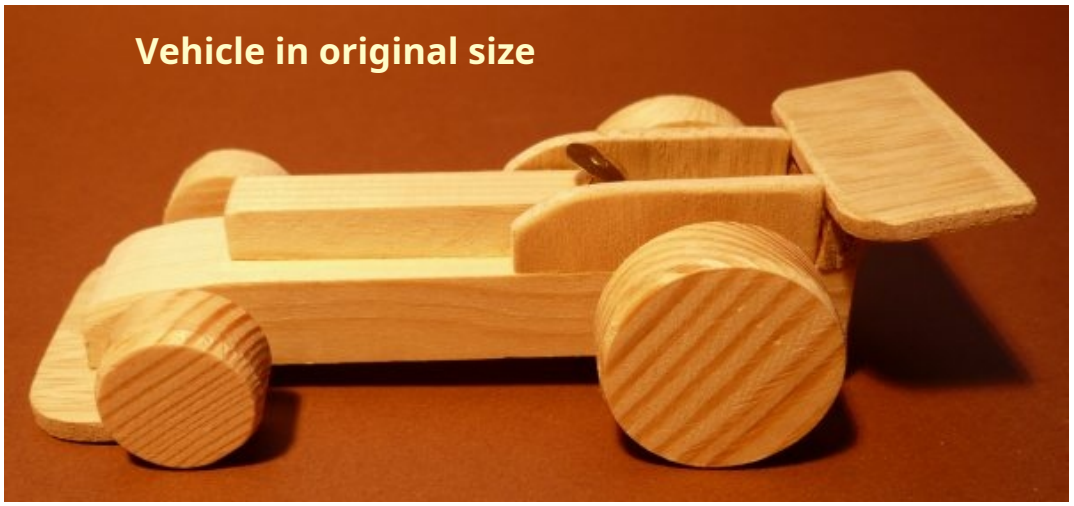
It all starts with the chassis

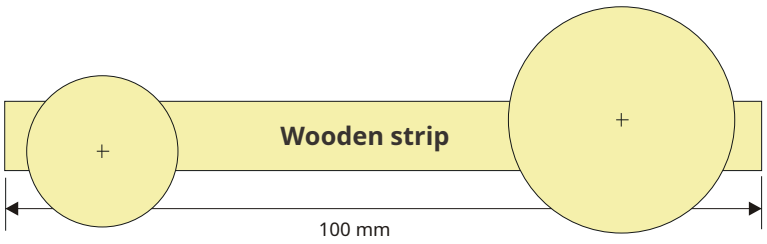




Building instructions mini racing car

Surname:





Draw a true-to-scale sketch (side view as above) with the wheel sizes you have selected!

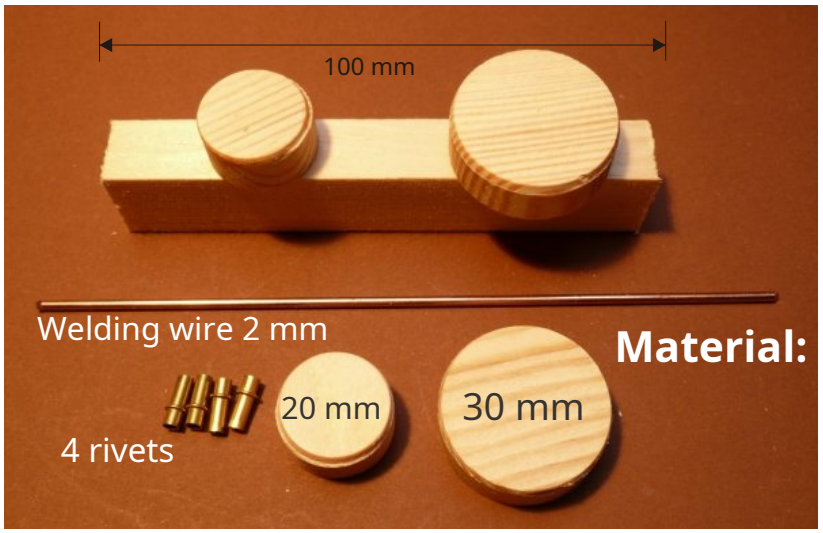
Drawing 1

Draw the center of the wheels and mark the intended drill holes!

Drawing 2

Surname:

Building instructions mini racing car



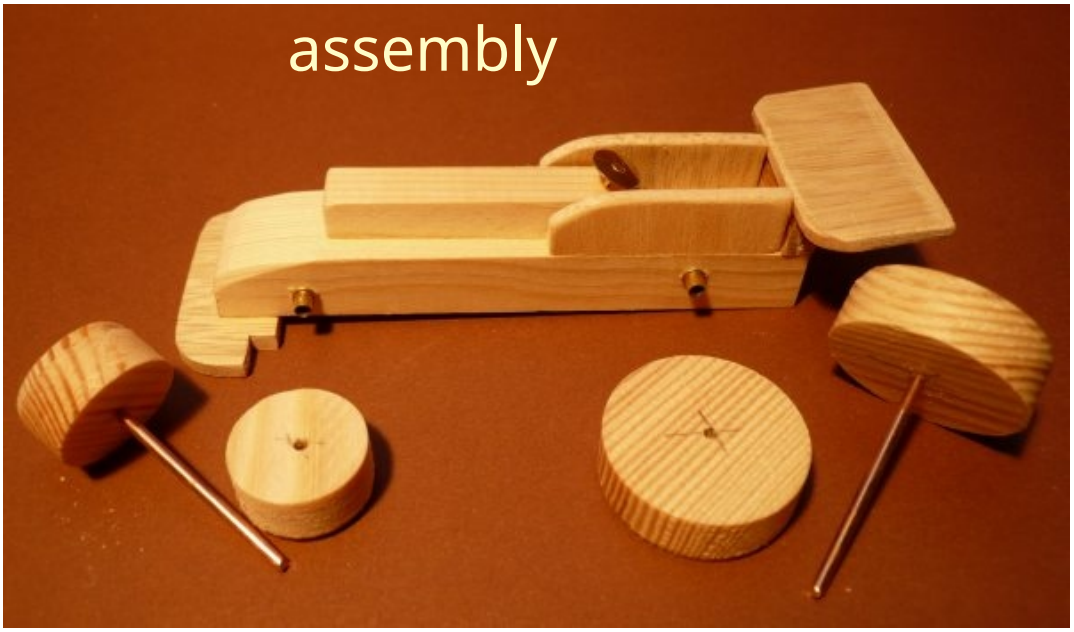
The chassis strip is drilled through with 3 mm.
The collar rivets are pressed into the hole with round nose pliers.

The wheels are drilled with 2 mm.

Jig saw with a suitable strip as a drilling underlay!

Determination of the center of the circle with a centering angle

In the case of very small wheels, it is best to determine the center by eye.



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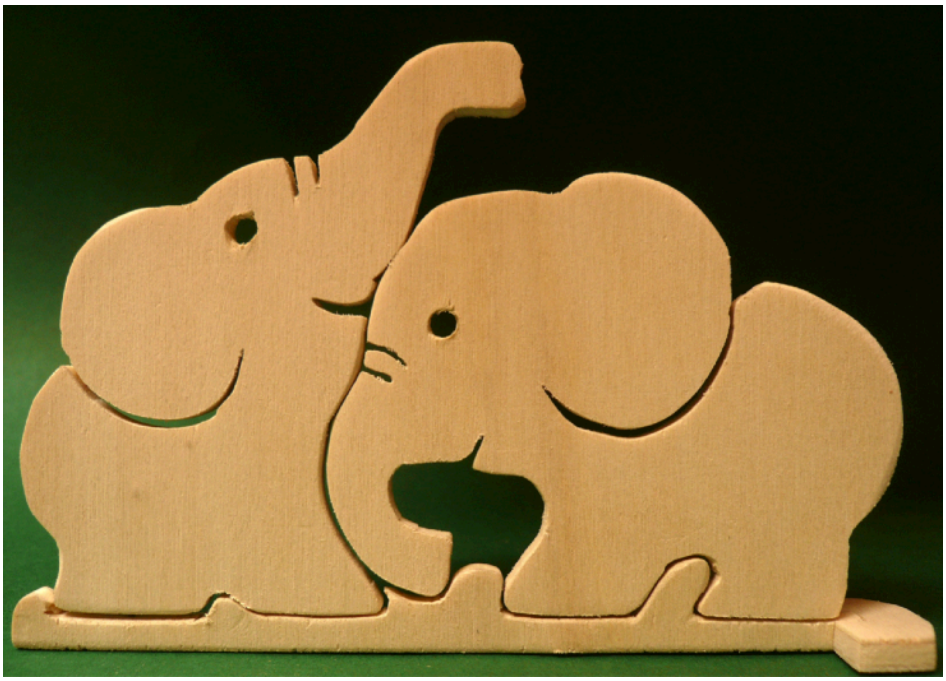
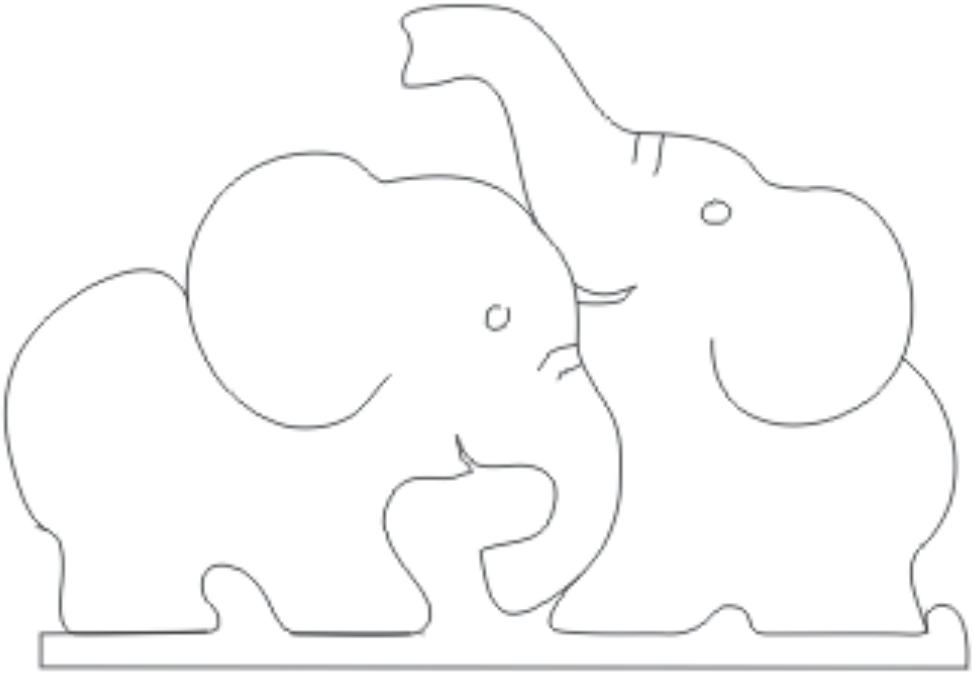
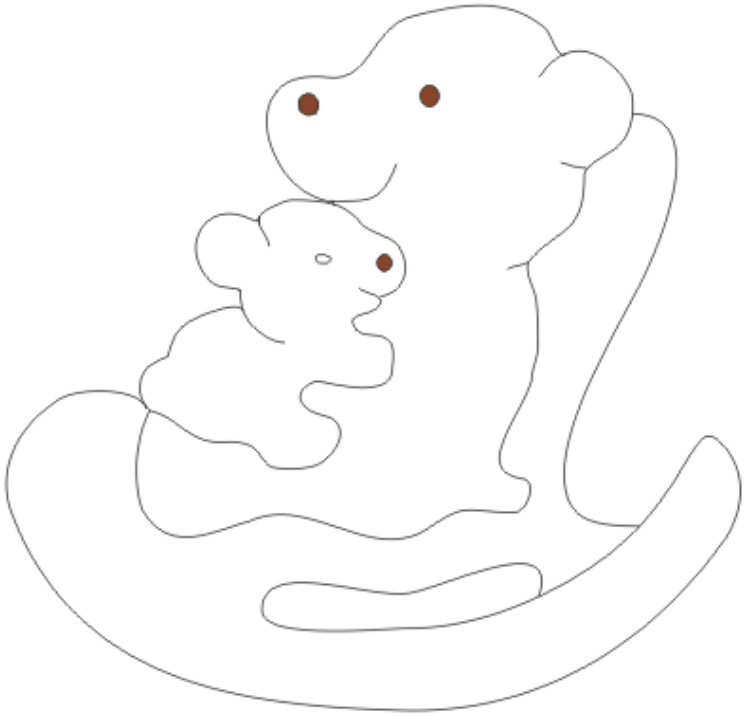




Glue the template onto the plywood with glue stick

Saw out the figures, remove the template paper, sand the edges of the parts and - if desired, color them with stain.



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Saw out the figures, remove the template paper, sand the edges of the parts and - if desired, color them with stain.

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Heiner Prüser

Animals off the board

Work aids for successful handicraft lessons

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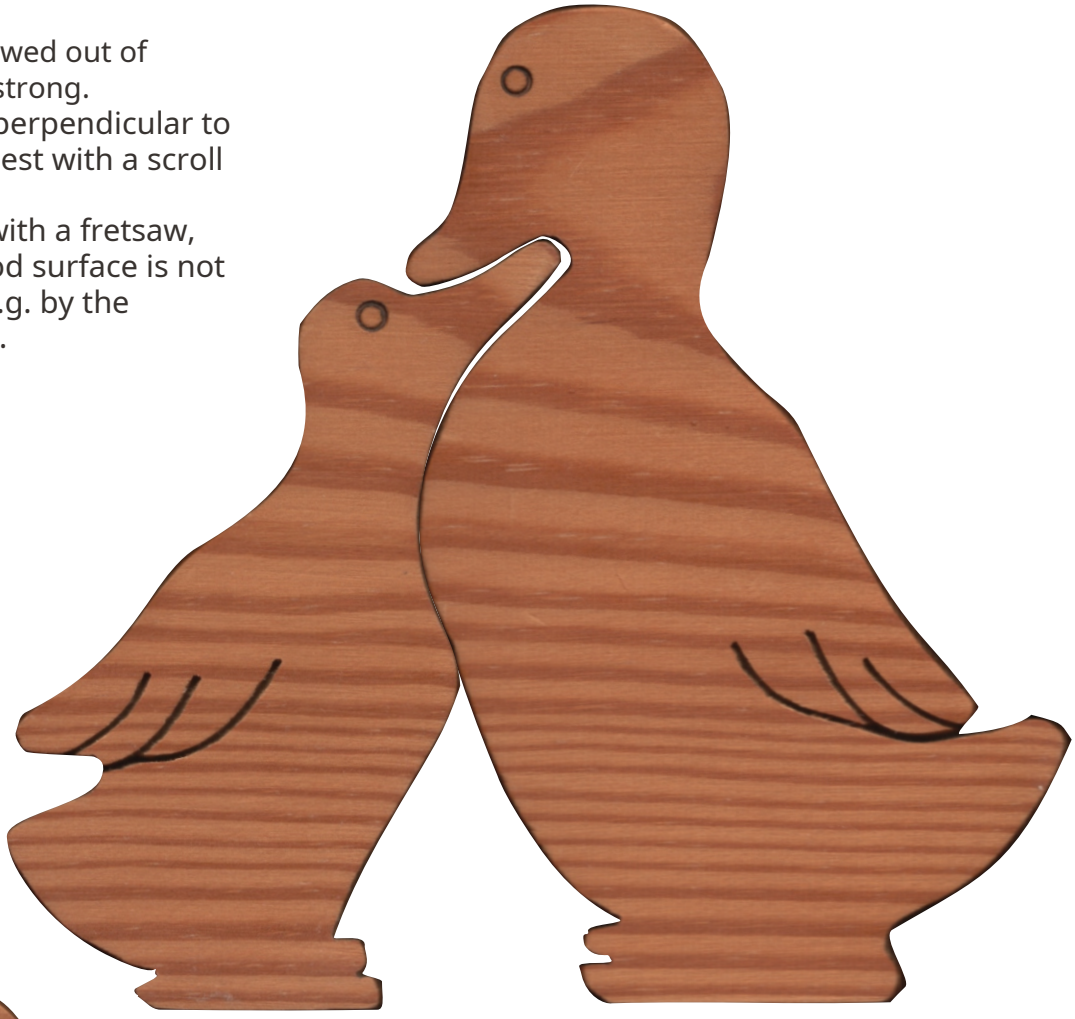
Surname:

Animals off the board

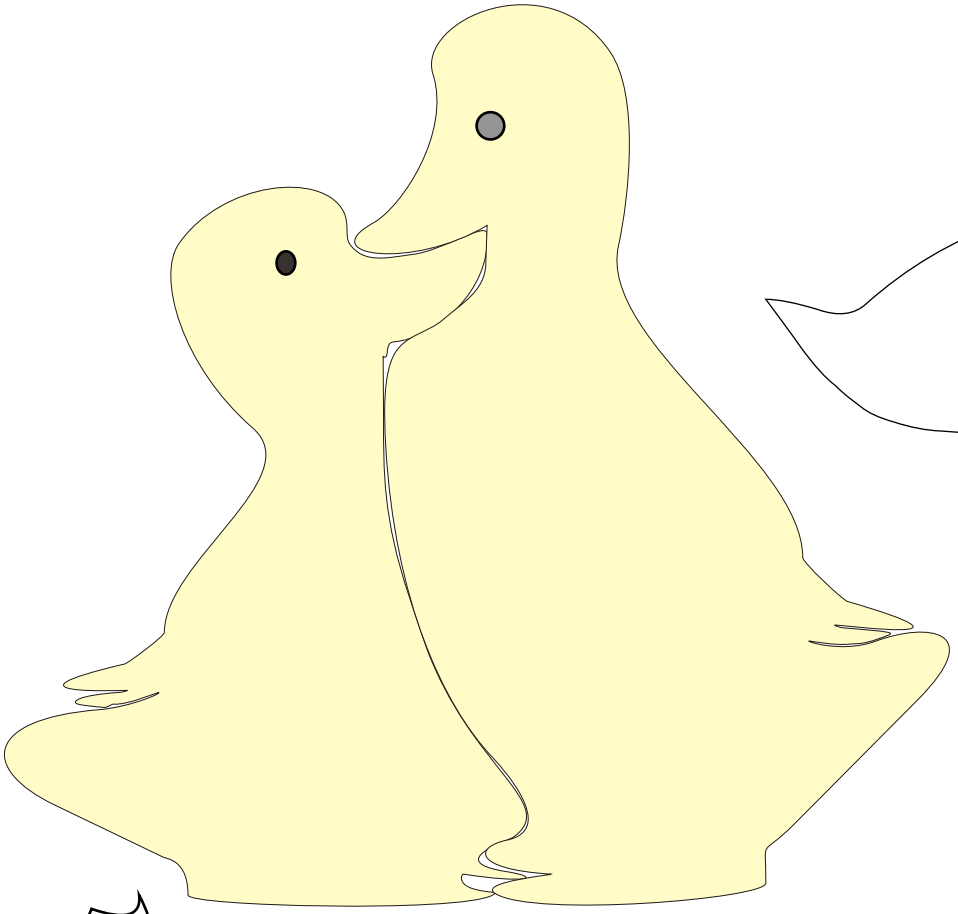
Animal figures can be sawed out of boards that are not too strong.
The saw cut should be perpendicular to the board. This works best with a scroll saw.
If the saw cut is made with a fretsaw, make sure that the wood surface is not damaged by the saw (e.g. by the protruding wing screw).

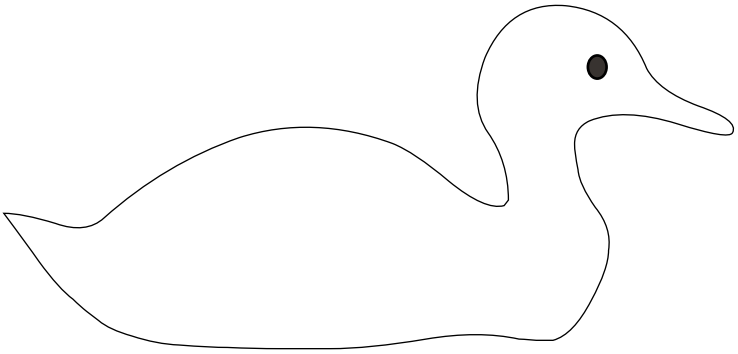


Surname:

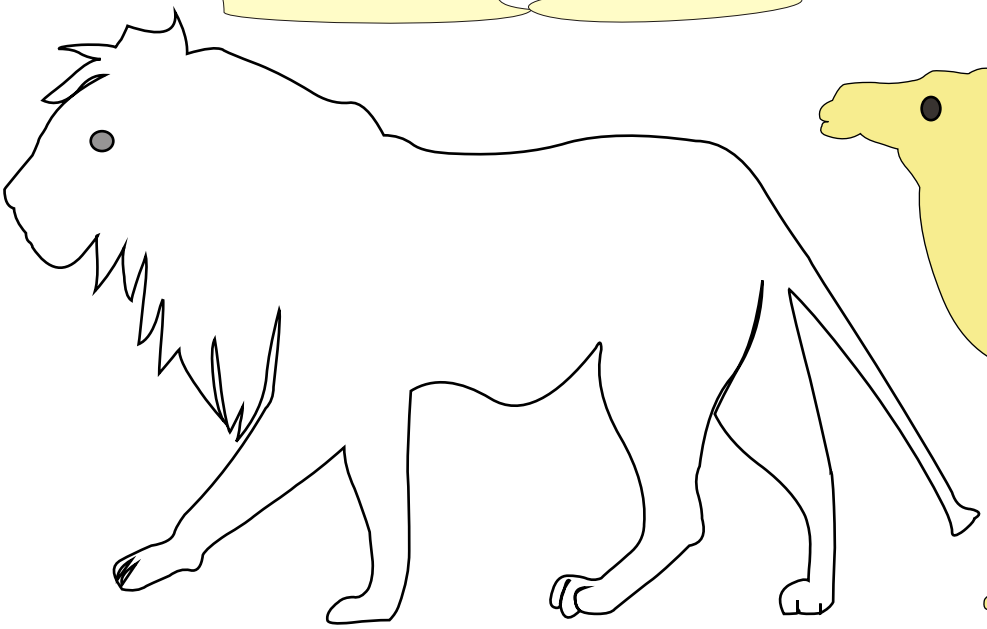
Animals off the board

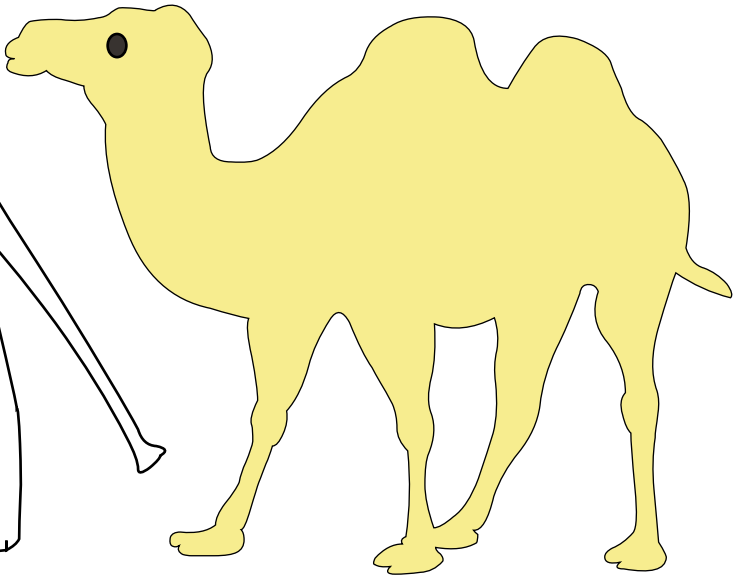
2 animals sawn from a board.

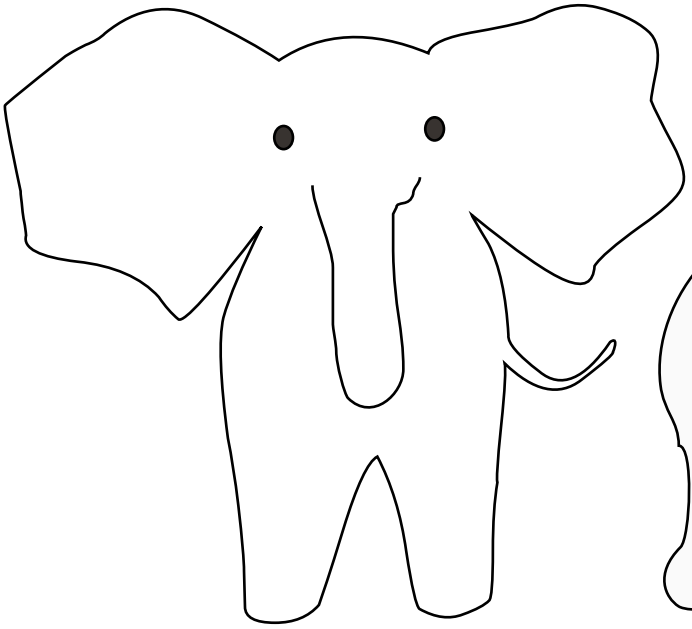


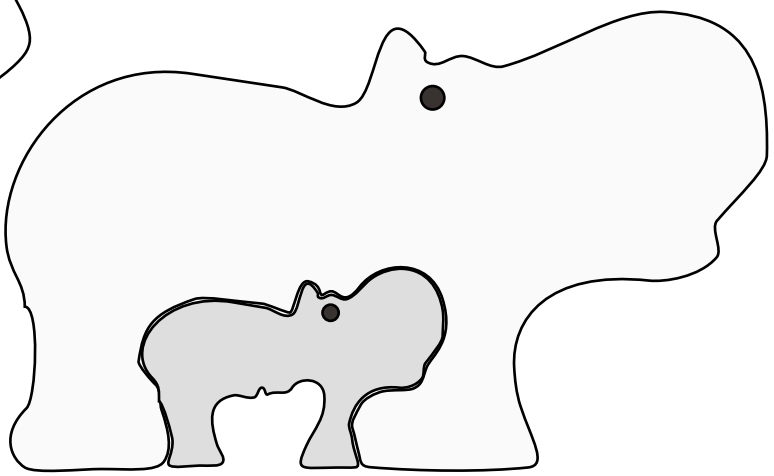


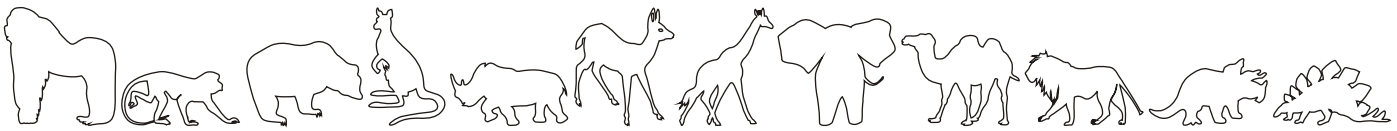
further motifs

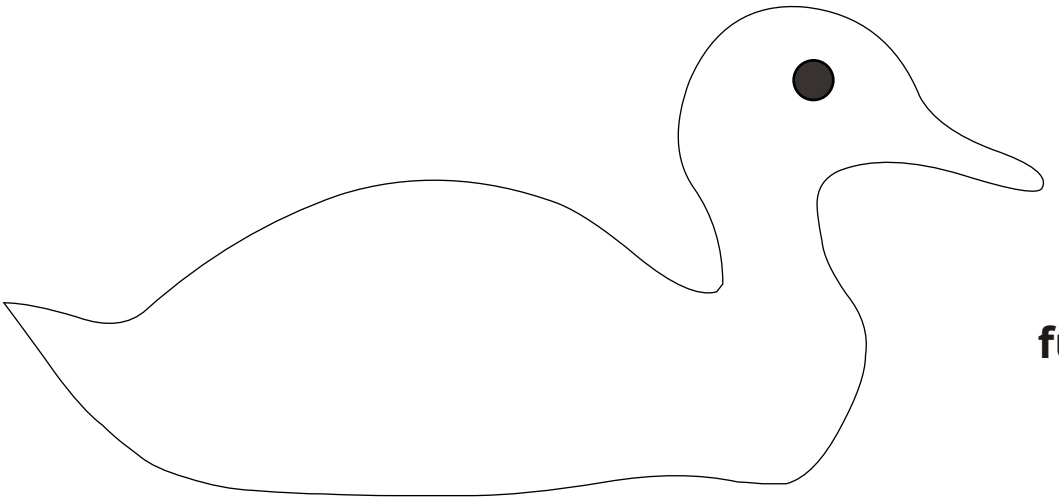




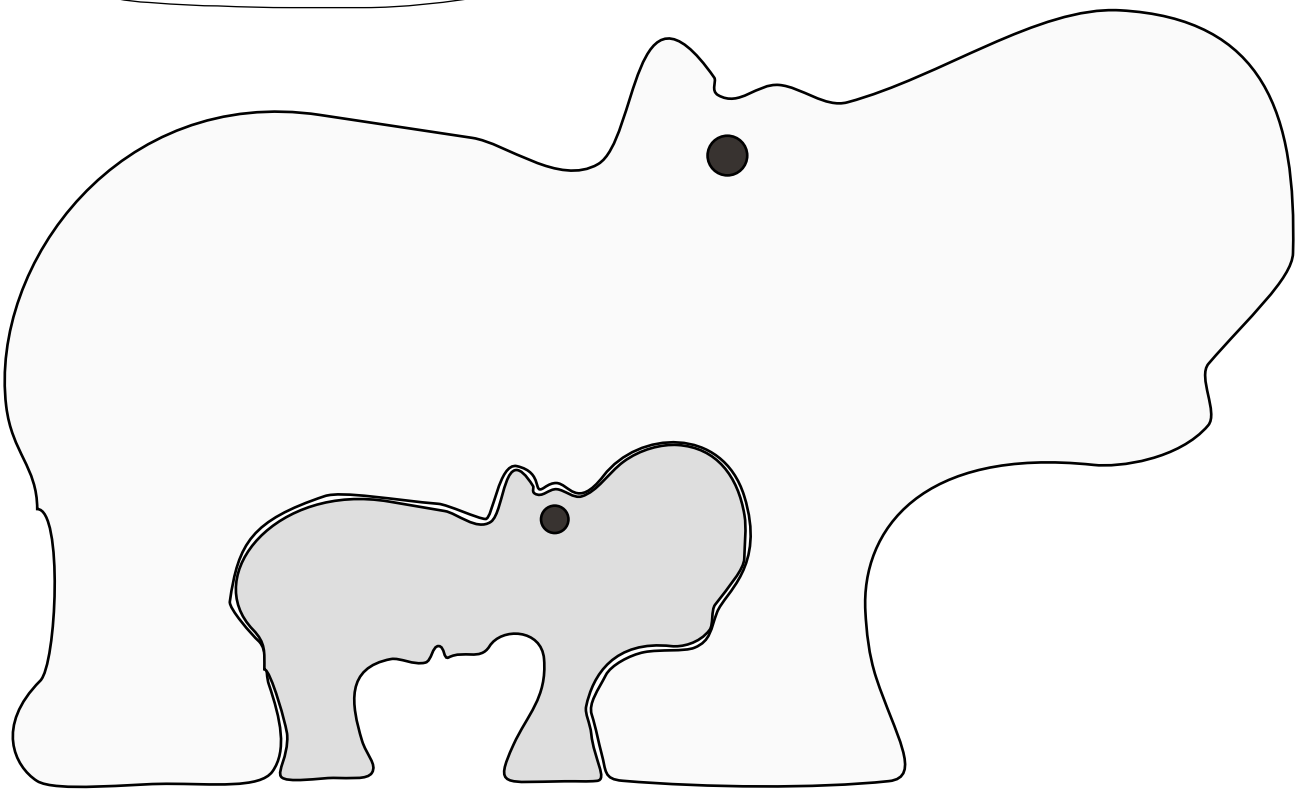








further motifs



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Heiner Prüser

camel

A simple piece of work to get to know the properties of soft coniferous wood.
Pupils practice sawing with a fretsaw, drilling and coping saw
Surface treatment with files, grinding and matting.

Work aids for successful handicraft lessons

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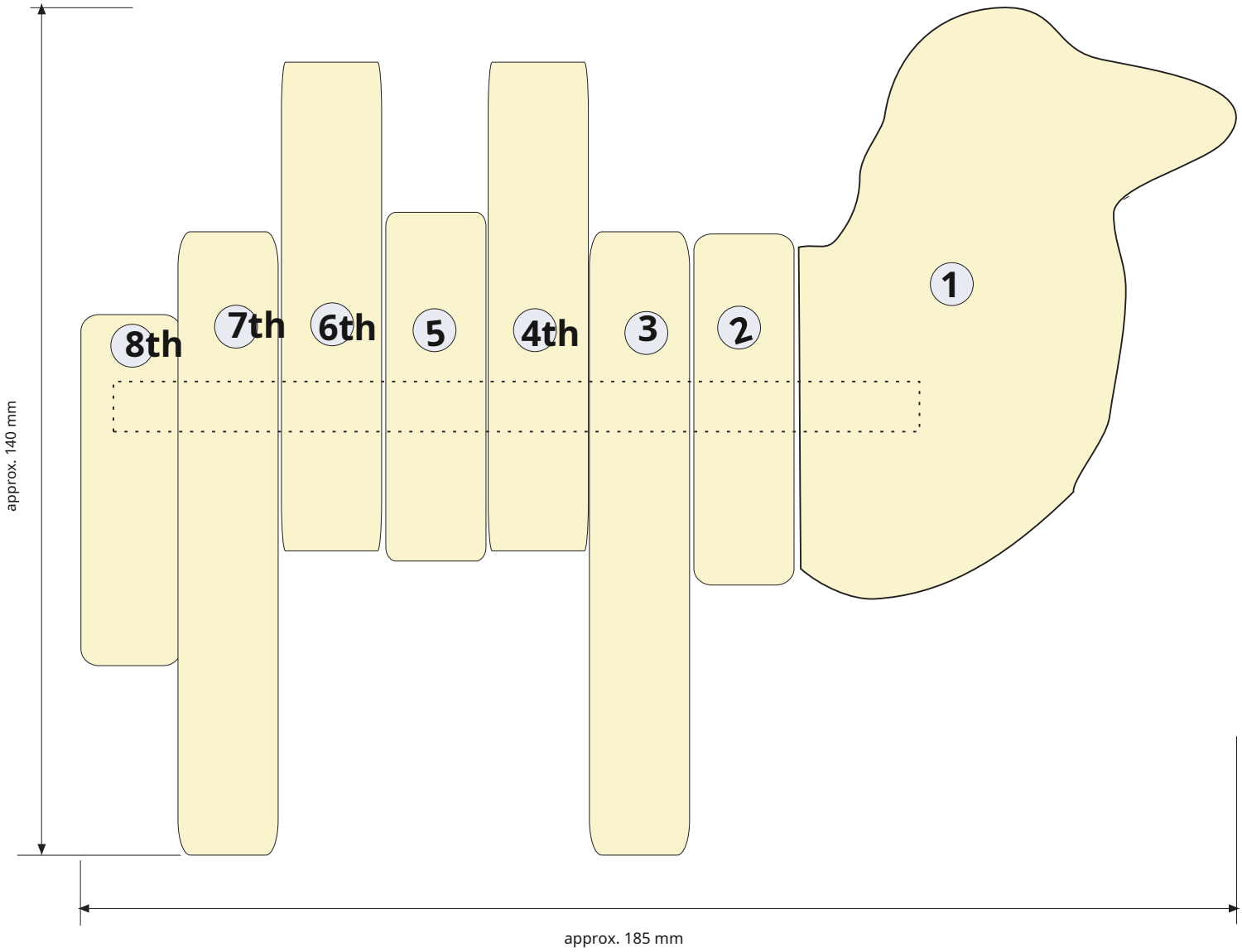
Building instruction 1

Original size drawing

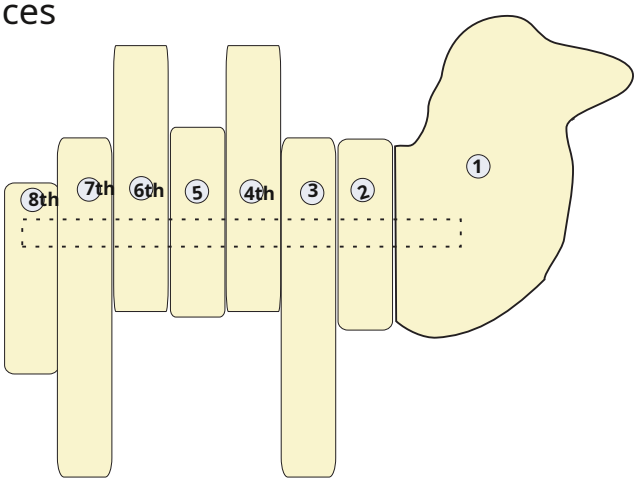
Material: spruce / pine board of 16 mm thickness, round rod 8 mm,



1) Saw the parts of the camel with the precision saw. The head is sawed out with the fretsaw.
2) Drill with 8 mm.
3) Smooth the surfaces
4) Matt the wood

Building instruction 2

1) Saw the parts of the camel.
2) Drill with 8 mm.
3) Smooth the surfaces
4) Matt the wood



tail **8th**

56 x 14 mm

throat

2

56 x 32 mm

Humps

56 x 78 mm

4th

leg

45 x 100 mm

3

Saw the head
with the fretsaw!

head

1

drilling 8 mm

5

belly

56 x 68 mm

Humps

56 x 78 mm

6th

leg

45 x 100 mm

7th

Round rod 8 mm

Translated from German to English - www.onlinedoctranslator.com

Heiner Prüser

Tiger duck

A very simple work task to start off with, rather popular with girls.

The planning should start with a small draft sketch on a 1: 1 scale. The first step is to determine the wheel size and draw it in the side view on a 1: 1 scale.

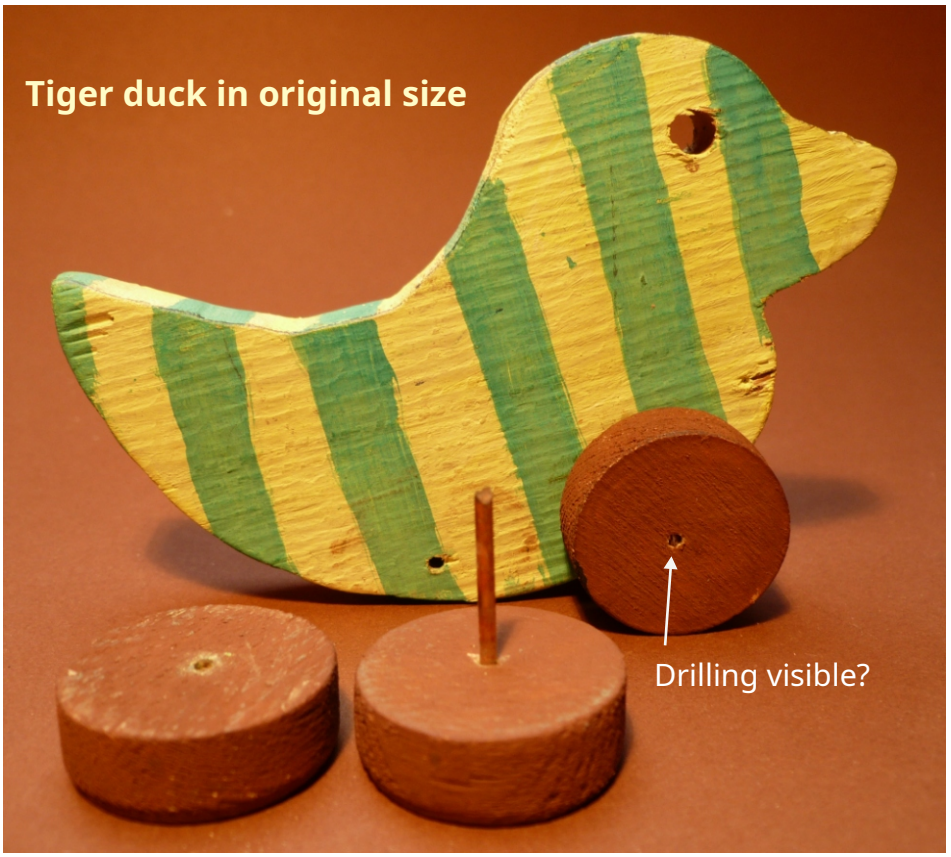
If the wheels are not drilled in the middle, the duck will be pulled
a waddling motion.

Work aids for successful handicraft lessons

www.werken-technik.de

Surname:

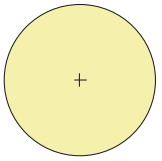
Instructions for tiger duck



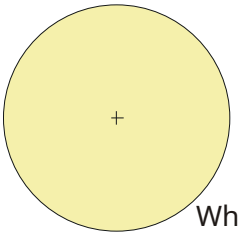
Material:

1 softwood board
4 round discs

Axis off
- Round rod 4 or 6 mm
- or from welding wire 2 mm



Wheel size 20 mm



Wheel size 30 mm

drawing

Draw the tiger duck in original size with the wheels as a side view!

Note: Material for the axle / hole in the center of the wheel or eccentric? / Hole visible or invisible from the outside? /

Tiger duck

If the wheels are not drilled in the middle,
arises when pulling the duck
a waddling motion.

Translated from German to English - www.onlinedoctranslator.com

Heiner Prüser

Spinning top

Overcoming the laws of physics is still an exciting and fun undertaking. We fondly remember playing with the top from childhood. These little colorful wooden toys seem to defy gravity and somehow have a life of their own. With a sufficiently high rotation speed, they stand proudly upright - seemingly motionless - or sway majestically to and fro.
This "inexplicable" circulation of the tops is always fascinating.

Factual information (from Wikipedia)

A top is originally a children's toy that balances on a point after being rotated around an axis. In physics, a top is a (rigid) body that rotates around an axis, otherwise can move freely or is more or less held at one end of the axis or both. In physics, gyroscopes do not necessarily have to be rotationally symmetrical.

The spinning top is one of the oldest toys that can be found at archaeological sites. In addition to the use of toys, spinning tops have historically been used for games of chance and fortune-telling. In technology, gyroscopes are used, for example, for stabilization and navigation, since the direction of the axis of rotation remains the same when no force is acting on it. The reason for this is the conservation of angular momentum.

In the physical sense, a rotating rigid body is a top. From a mathematical point of view, tops are solid rotating bodies.
The behavior of the toy top is based on the gyroscopic effect. Usually the top wobbles first until the interaction of the top and bottom forces the top into an upright position. After a longer period of upright rotation, the angular momentum and thus the gyroscopic effect gradually decrease. This leads to an increasing precession, which ultimately ends up dragging in a strong tendency to tip.

The toy is available in numerous designs and variants:
Humming top / whip top / Nimmgib /
Standing top (revolving top), it turns upside down when turning.

Whip top from Wikipedia, the free encyclopedia

A whip top is a children's toy. A top, usually with a cross-section in the shape between U and V and equipped with horizontal tires, is turned upright on the pointed side. This can be done between the palms of the hands, with a stick protruding upwards and two fingers, or in the classic way with a whip wound around the top. If it turns once, with a little skill it can be kept in constant rotation by repeatedly lashing it with the whip.

Whoever manages this the longest wins.

Take

Take it made of brass

The Nimmgib (also Nimm-Gib-Kreisel, English Put and Take) is a spinning top game of dice with which children were playing for countable things, such as marbles or sweets, as early as the early 1920s.
The top consists of a tip, a knurled handle and a hexagonal prism, the sides of which are marked with the following various inscriptions:

GIVE TWO - TAKE ONE - GIVE ALL - TAKE TWO - GIVE ONE - TAKE ALL

The Nimmgib is thrown between thumb and forefinger
The rules of the game are very simple: At the beginning everyone supplies a certain amount of input material. It is determined who rolls or spins first. The top is started and the instructions of the prism surface are followed, which points upwards after the Nimmgib has come to rest. Then it is the turn of the next player in a clockwise direction. Anyone who is no longer in use is eliminated.

Notes on lesson planning

the Notes on lesson planningare taken from the following link on the Swiss central education server:

http://www.zebis.ch/inhalte/unterricht/technisches_gestalten/stati /ideen/56_kreisel.php

Task
Make multiple tops out of corrugated cardboard, plywood, or solid wood. Compare them and then make a top that rotates as long as possible. Add a puller to it.

Started
Various objects (stone, roll of tape, pencil, ball of wool, button, washer ...) are ready. Each child selects an object and tries to make it circle. Guess: which object rotates the longest? Why?

criteria
Get to know the basics of a well rotating top through technical experiments: rod thickness, rod length, plate size, weight and tip
Try out, change, optimize your own gyroscope

Possible approach
Playing with different, already existing tops;
develop and manufacture your own gyroscopes, compare solutions (running times, smoothness);
Hold gyroscopic competitions,
Color mixes with interchangeable discs ...

material
Round rods, gray and corrugated cardboard, plywood, solid wood, thick paper, cord, upholstery nails, paints

procedure
cut, saw, drill, glue, paint ...

variants
Spinning top, jumping top, whip top, magic top> WW 2: p. 149; Develop and manufacture game boards for spinning tops

Surname:

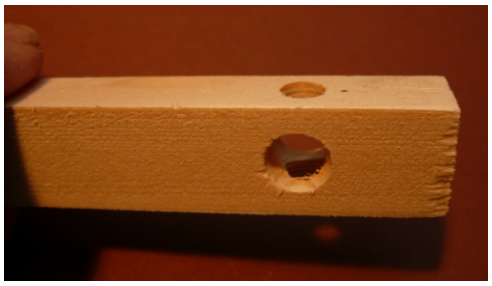
building instructions

Task

Make multiple tops out of plywood or solid wood.
Compare them and then make a top that rotates as long as possible.

Add a puller to it.

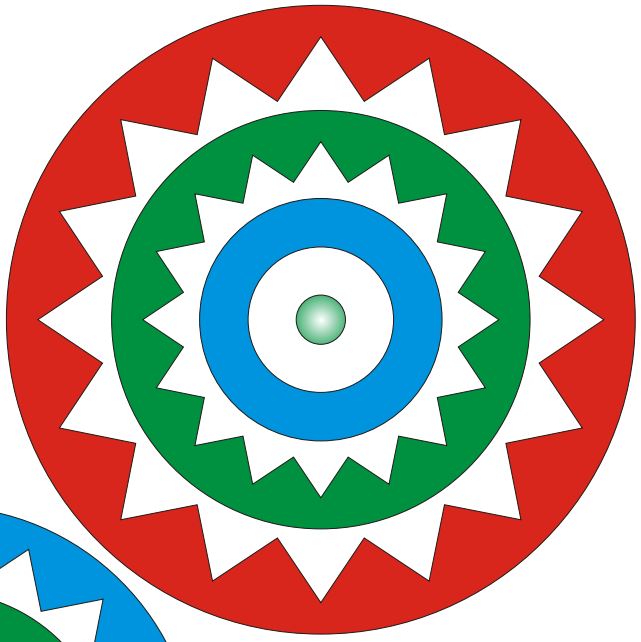
Puller for gyroscopes

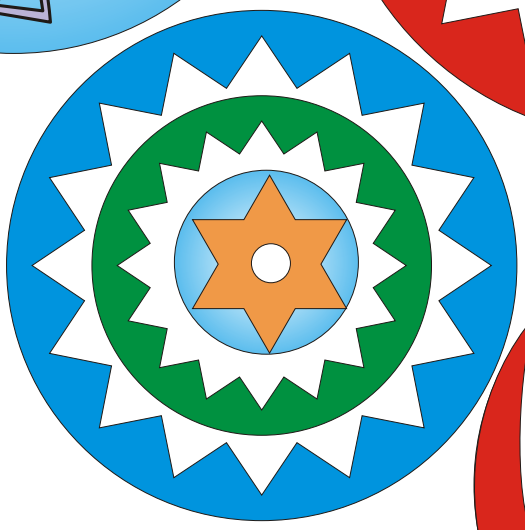


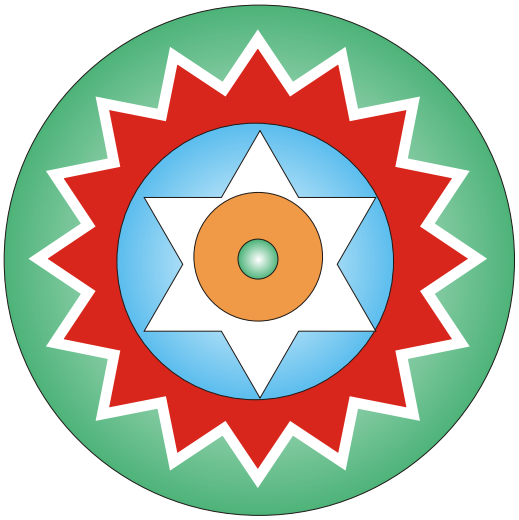
Drill first, then saw!

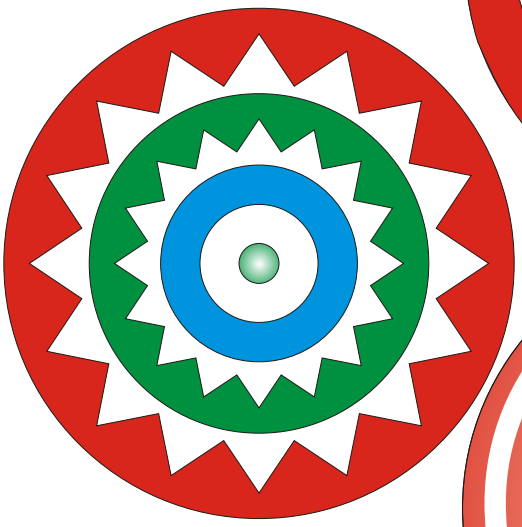
Tip: round off the gyro axis

Stickers for spinning tops









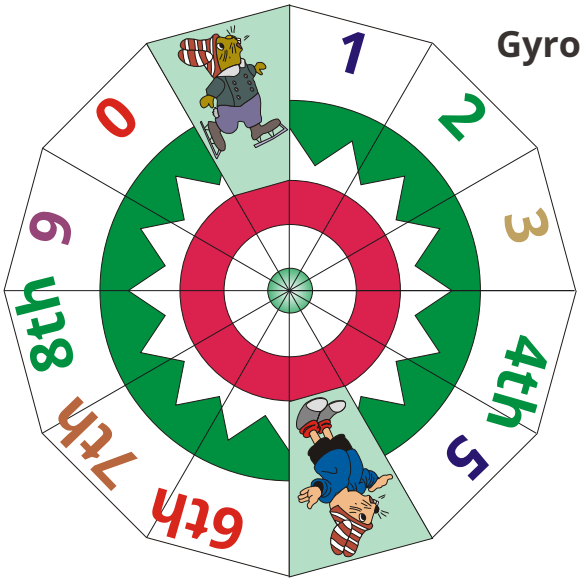
Kreisel

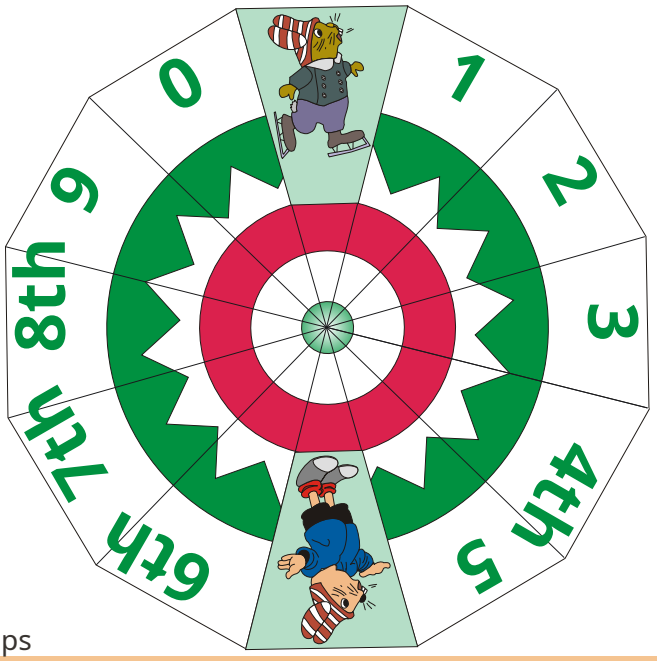
Develop and manufacture game boards for spinning tops

Pictures and text from: www.murmelwelt.de/kreisel1.html

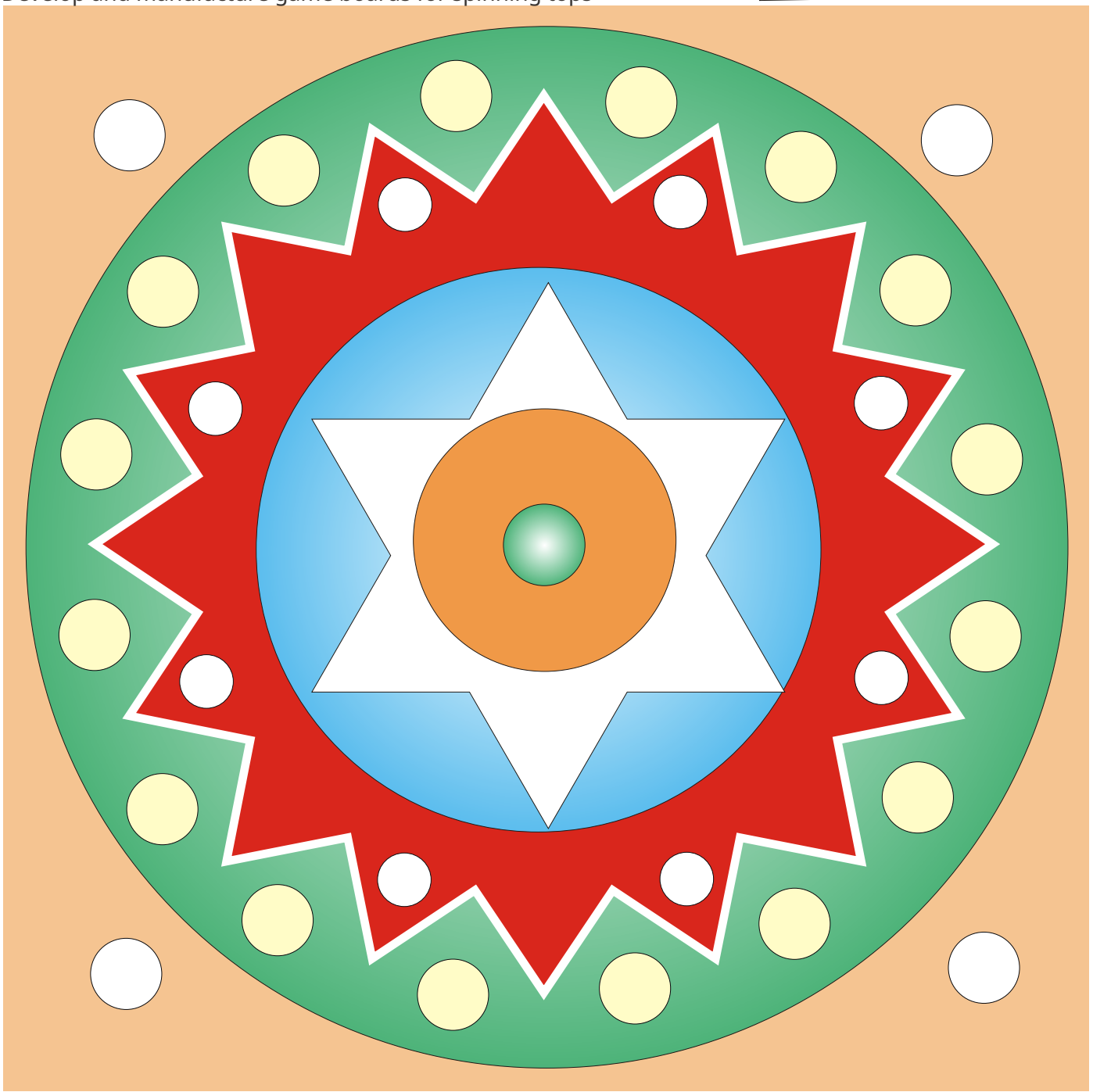
This top game made of sheet metal (diameter of 24 cm, height 6 cm) can be played on from both sides. The balls are made of wood.

Gyro "cube"





Develop and manufacture game boards for spinning tops



Translated from German to English - www.onlinedoctranslator.com

Heiner Prüser

Wand propeller

This workpiece is very suitable for entry into woodworking and is already very successful in the lowest grades:
An ancient, simple wooden toy is a stick with a propeller and notches. If you rub the notches with a stick, the propeller turns. There is a little trick involved and the ignorant usually do not get the propeller going at all.

The direction of rotation depends on the point at which a finger (thumb or forefinger) is in contact with the notch wood when rubbing. The thumb or forefinger must slide sideways at an angle from above or sideways at an angle from below under a certain pressure with the friction pin along the notch wood.

Surname:

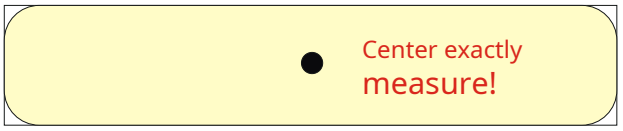
building instructions

Wooden strip

200 mm

Experts rub the notched bar with the round rod, and that's itthe propeller turns.

Saw off a wooden strip approx. 80 mm long, mark in the middle and drill a bit larger than the diameter of the selected nail.



Round off the ends and check again and again that there is no imbalance. (If one side of the propeller keeps moving down, that side is too heavy!)

Evenly spaced notches with

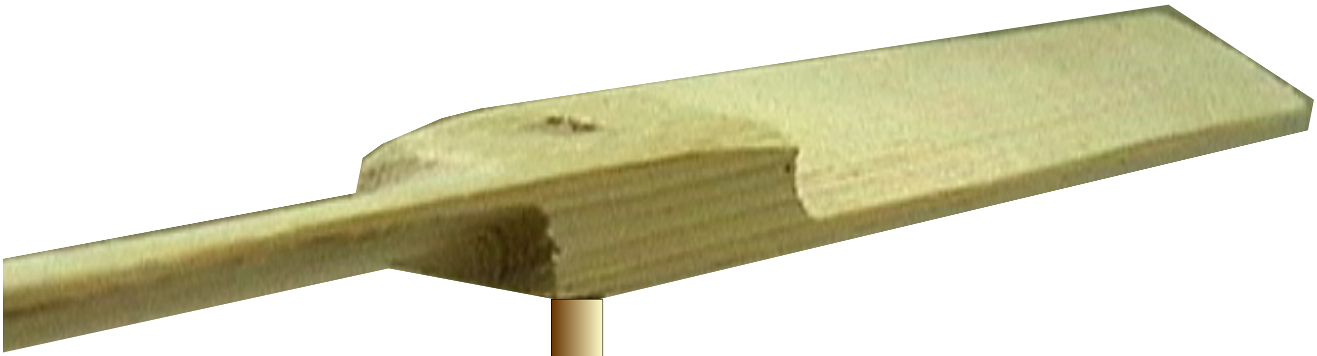
- triangular file,
- round file

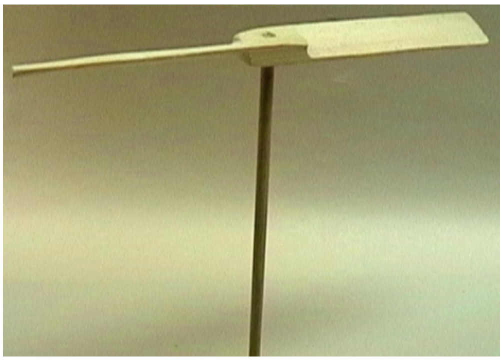
Find out which round rod thickness fits which notches.

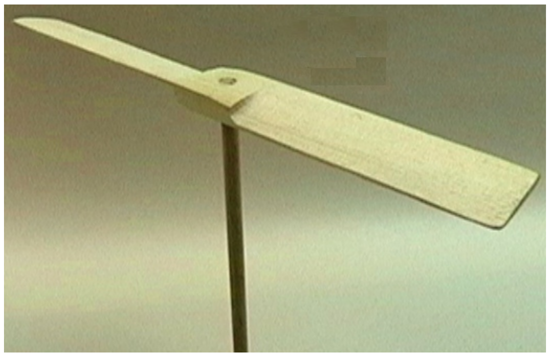
Translated from German to English - www.onlinedoctranslator.com

Heiner Prüser

Work aids for successful technology lessons







UE 7 Flight propeller

Class 7/8 4 h

12 / 2006

www.werken-technik.de

Lesson — Flight propeller

Work assignment: Manufacture of an airworthy play device from a coniferous wood strip

Material: Wooden strip (spruce / pine) approx. 5 x 24 mm, cross-section of round beech rod 4 mm (or 5/6 mm)

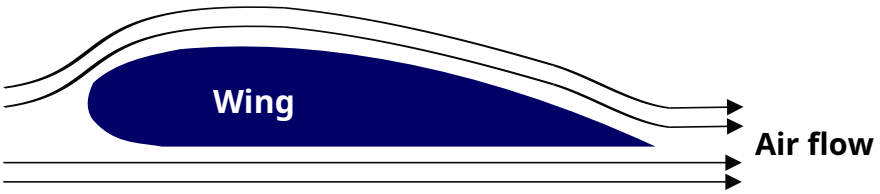
Work techniques: Measure, drill, file, sand

Learning goals: The students should

Factual information **Flight propeller**

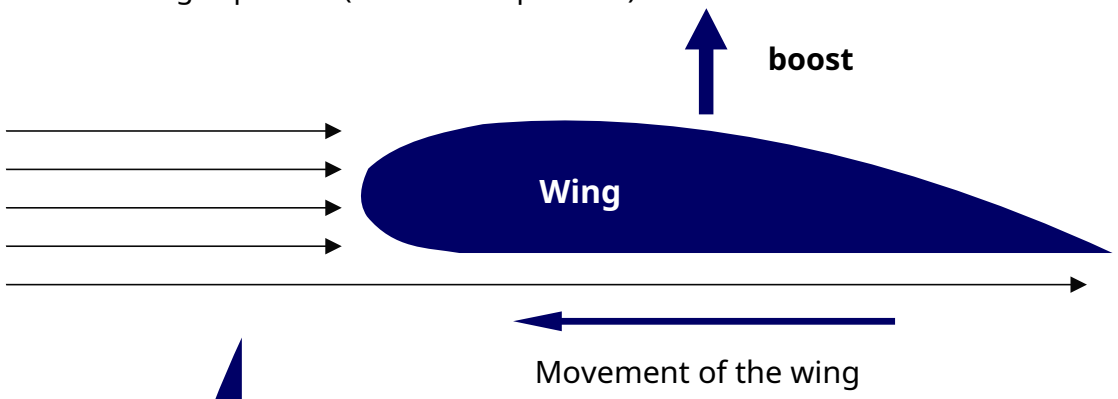
Aircraft propellers (propellers) generally provide propulsion for powered airplanes or powered aircraft models. Plastic propellers have largely replaced wooden propellers because they are lighter and more durable. In addition, they are now increasingly used for energy conversion as wind turbines or wind power plants.

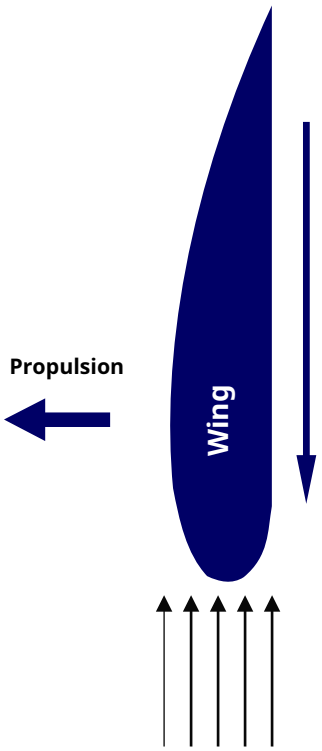
If one examines the operating principle of an aircraft propeller, one finds that the propeller blade has the same profile as an aircraft wing:



The air on the more curved side of the wing has a longer way to travel than on the underside. This increases the flow velocity here.

Where the air flows faster, the air pressure is lower. This creates a pressure gradient that pushes the wings upwards (in a normal position).





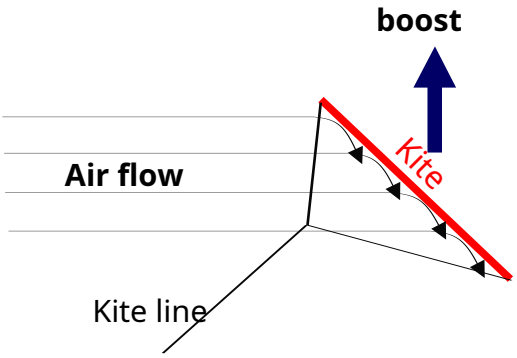
In the case of the propeller, the more pronounced curvature points to the front. By rotating the surface, the profile moves through the air.

This creates a suction on the front surface, pressure on the rear side.
If the propeller turns faster, the propulsion increases.

Factual information — Flight propeller

With the “flight propeller” to be built here, however, it is not necessary to achieve the shape of the lift profile.
The propulsion of the flight propeller results solely from the inclined position of the surface, which creates lift similar to that of a kite.

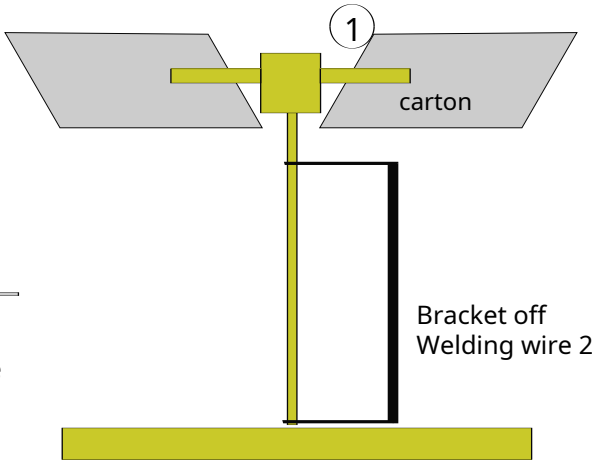
desired profile of the flight propeller



The windmills and wind turbines used to function in a similar way, and they also only had sloping surfaces.
It is important that the students understand that both propeller halves are inclined in opposite directions.

This insight is conveyed by a series of experiments with a self-made demonstration model, in which the wing inclination can be changed as desired:

By blowing on it
(or using a hair dryer) the relationships between wing inclination can be seen here and direction of rotation.



The tilt of the sash can be adjusted with the movable rod.

The above interdependencies are used in fluid flow machines:

	air	water
by ... driven	Windmill Steam turbine	water wheel Water turbine
puts ... moving	Hair dryer, fan vacuum cleaner	Agitator Centrifugal pump
is used for Locomotion	propeller Rotor (helicopter)	Propeller

Planned course of the lesson

24 hours

Semicircle seat

Entry / motivation

5 ' Flight test with a finished flight propeller
(alternatively: turbine wheel (furnace play) turns over candle flame)

15 ' Problem definition / development

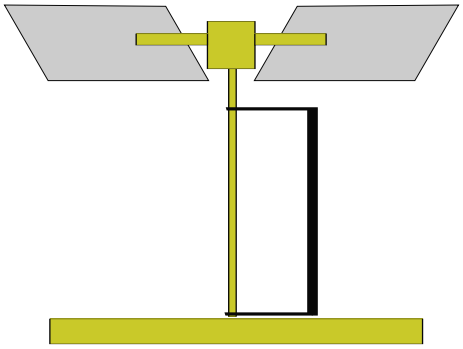
Teacher: What causes the lift when the propeller is turned? (Another food for thought: turn the flight propeller the wrong way round so that he crashes.)

Students make assumptions about buoyancy, direction of rotation.

Experiment: (with a self-made demonstration model)

- Dependency of wind direction - surface inclination - direction of movement

- Inclination of the two propeller surfaces to one another



Securing results:

Teacher changes the surface inclination on the demonstration model and changes the direction of rotation

5 ' ***Task*** → see student worksheet 1

55 ' ***Craft work*** *Expected problems:*

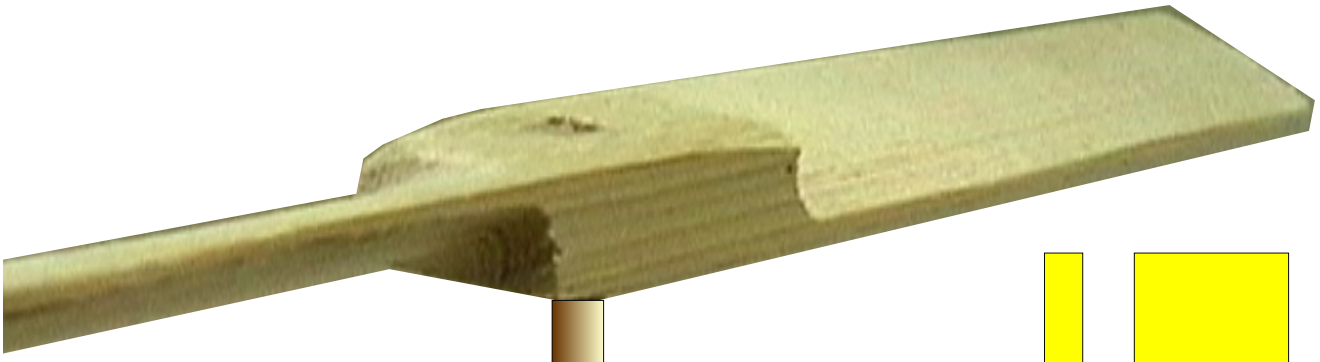
- Students get the middle wrong

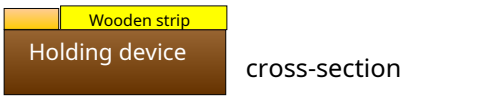
- Problems with clamping the thin wooden strip
(Tip: place on a wooden base; build a holding device from a bar with a stop that is clamped in a vice)
- Incorrect rasping (caution!) And filing destroy the bar (never *away from the wood* rasps and files!)

- Eliminate unbalance!

- Test flights not in the workshop (hallway, school yard!)

Student Worksheet 1 — **Flight propeller**

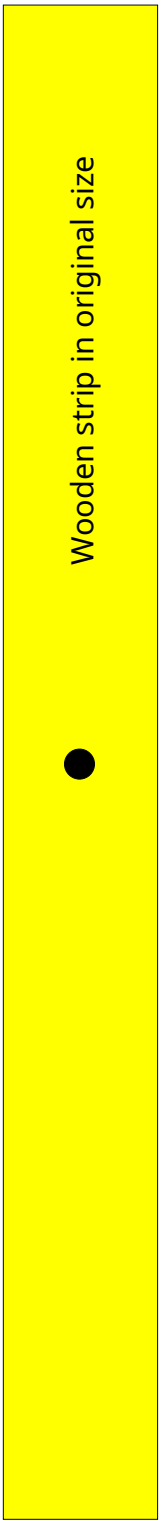




cross-section

Holding device for filing

Top view



1) Saw off the bar in a cutting box.

2) Find the center, mark the center of the hole and prick it; drill with a 4 mm twist drill ((on a wooden base).

3) Shape the propeller with a rasp (be careful!) And a file. Attention: risk of breakage! Therefore apply when filing (see above).

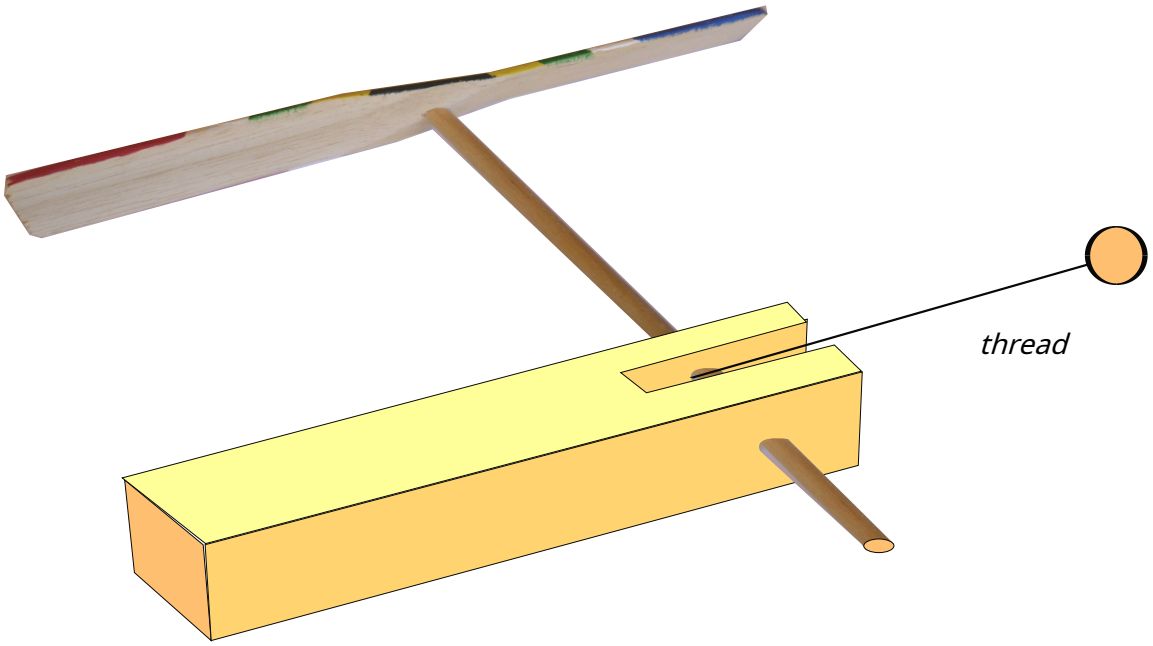
4) Insert the round rod (approx. 20 mm long) into the hole. Check the balance of both propeller halves. If there is an imbalance, try to correct it.

Cross section through the propeller bar

Illustration enlarged

Student Worksheet 2

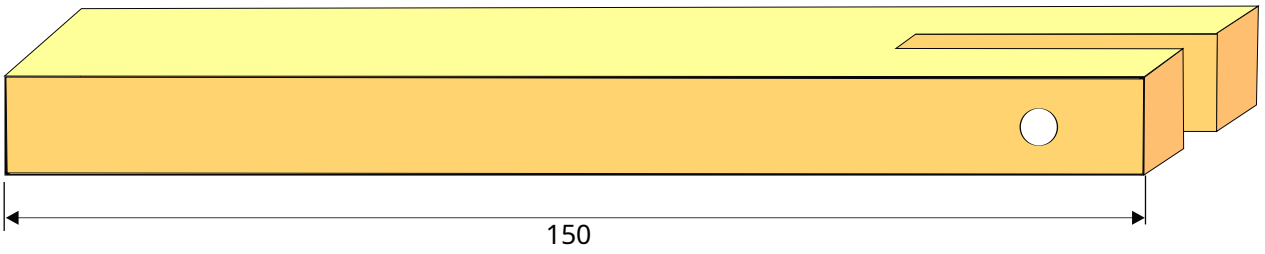
Flight propeller: starter device



When the flight propeller is finished, you can build a starting device:

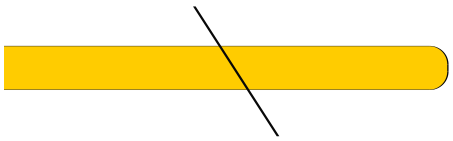
Material: - 1 wooden strip (e.g. 150 mm long; 20 x 20 mm cross-section)

- approx. 40 cm tear-resistant, not too thick thread (e.g. cobbler thread)



1) Drill a hole to hold the round rod (0.5 mm larger than the round rod)

2) Saw with the precision saw approx. 40 mm deep; With the fretsaw you can saw across and the middle piece of wood will fall out.
Now file the inner sawn surfaces completely smooth so that the thread does not get stuck!



Saw a narrow notch 4 mm from the bottom *aslant* in the round bar.

Start: Push the round rod into the starting device so that the sawed slot lies in the groove. Make a knot in the thread and press this end of the thread firmly into the slot on the rod. Now turn the round rod and half wind the thread. Now pull hard!

Translated from German to English - www.onlinedoctranslator.com

Heiner Prüser

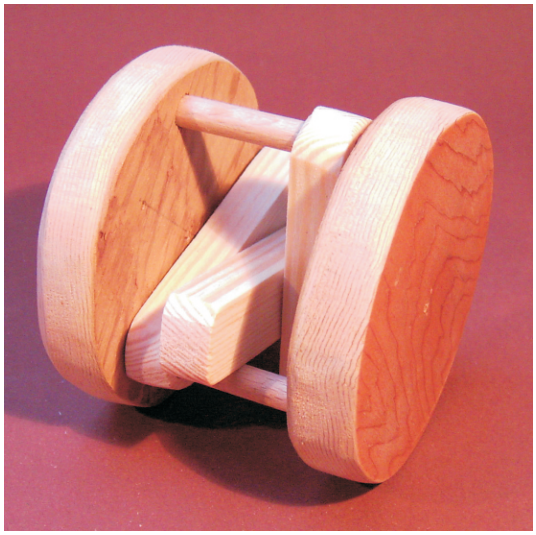
This work task is well suited to apply the theoretical knowledge from the interactive drill driver's license course in practice.

Since only 9 holes have to be drilled by each student, an available column drilling machine is sufficient for a group of works if necessary. For reasons of practice, each student should clamp and unclamp all drills himself.

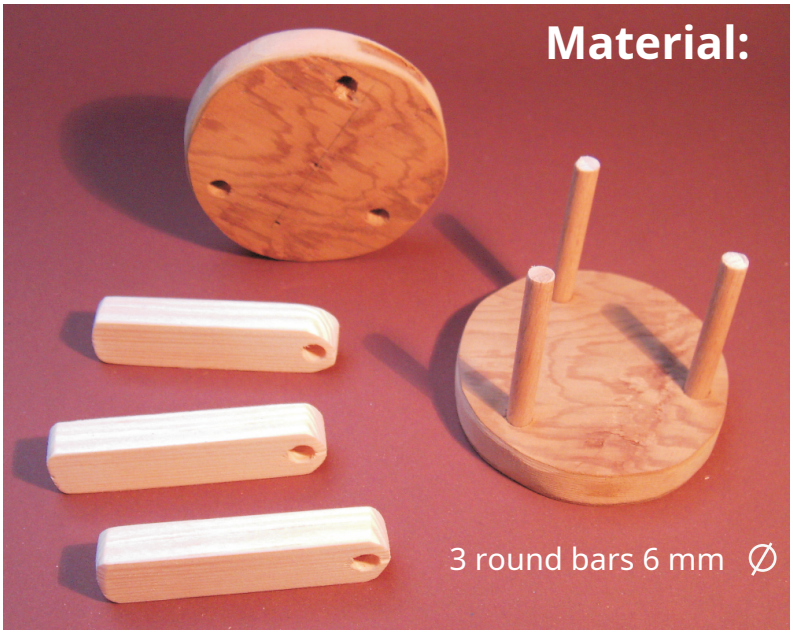
After successfully completing the task, the pupil can enter a **Drilling machine license** to be issued.

Building instruction rattle reel

www.werken-technik.de

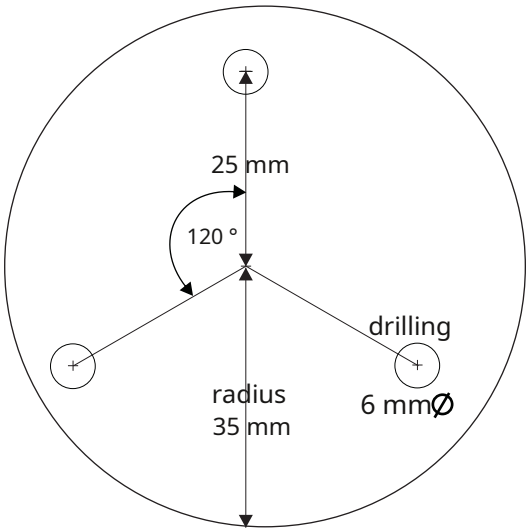


When rolling, the bar sections rotate due to gravity on the round bars and generate a rattling noise when they hit the opposite round bar.

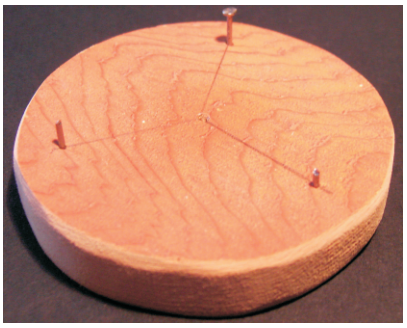


3 strips 60x15x10 mm 2 round discs 70 mm ∅

Example: round disc with a diameter of 70 mm



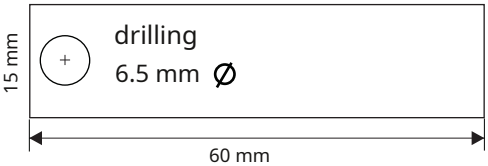
For the 2 round disks, use soft wood that is not too thick and can be sawed well with a fretsaw (or scroll saw). Prick the center point with a drawing compass, mark the arc with a 35 mm radius and saw out.



As indicated on the left, transfer the measurements to the first round disc and drive in 3 small nails in the center of the drill hole for the round rods.
Pinch off the nail heads and press both discs together. Mark both discs on the side; so that you can put them back together in this position later.

Pull out the nails and drill 6 mm at the marked points. (Set the drilling depth stop so that the hole does not go through on the other side. For this reason, do not use a drill with a center point.)

3 strips 60x15x10 mm



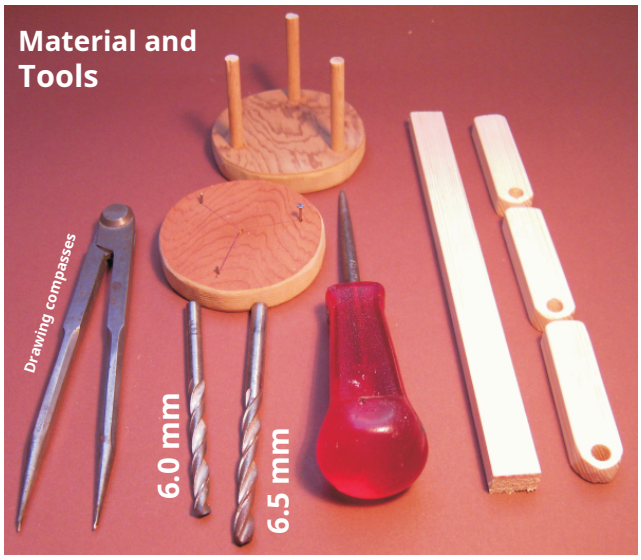
First drill the bar, then saw off. (The hole is very close to the edge and therefore breaks out easily.)

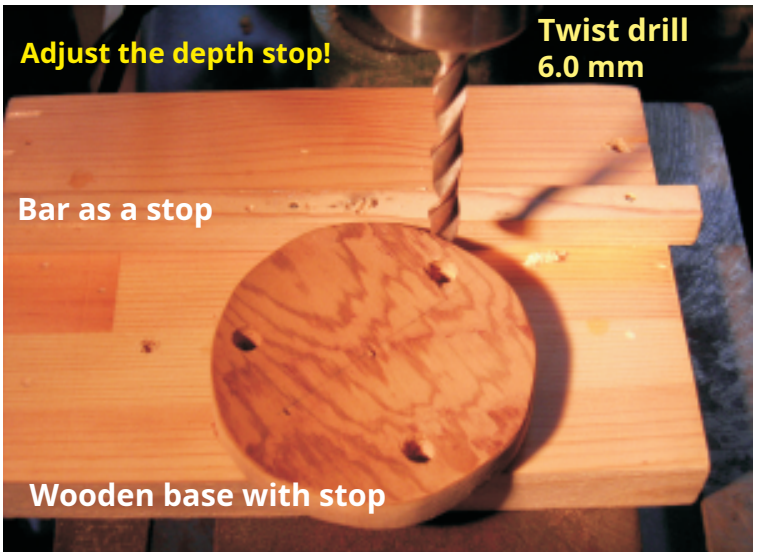
Round off and grind the lasts after sawing.

Then slide the strips onto the round bars as shown in the photo on the left and press both round disks together at the marking line.

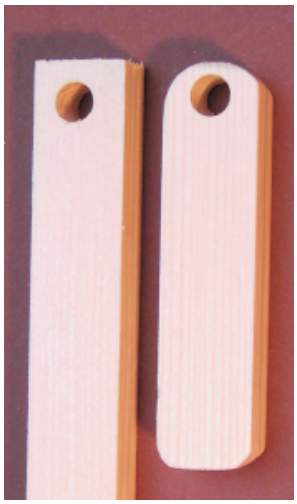
First of all, there should be no glue at all, in order to still be able to make changes to the rattle roller.

Of course, the rattle reel can also be built with any other dimensions.





If you're drilling small pieces of wood, it's better to use one **Wooden base with stop**. In this way the wood lies firmly on a base and the hole cannot "break out" downwards. Place the wooden parts by hand on the wooden base



Working steps when drilling in wood

fat all work steps that must be carried out by each student in the class appear.

> Mark the hole
> Prick the center of the hole
> Determine the drilling diameter
> Determine the drilling depth
> Select drill
> Clamp the drill
> Set the drilling table
> Adjust the depth stop if necessary
> Workpiece clamp / **hold tight**
> Switch on the machine
> Slowly lower the feed lever
> Drill slowly with even pressure
> Raise the feed lever while holding the workpiece down!
> Switch off the machine
> Let the engine run down
> Unclamp the workpiece
> Unclamp the drill
> Sweep away chips
> Tidy up the workplace

Translated from German to English - www.onlinedoctranslator.com

Heiner Prüser

Noise instrument ratchet

The ratchet is set in motion by lively turning a narrow wooden frame with a wooden spring blade around a hand-held shaft to which a gear is attached. The spring leaf rattles around the stationary gear and generates depending on the speed of rotation, a loud, crackling noise. The term ratchet or ratchet (from "ratteln", related to English "rattle"), also Schnarre or Schnurre, Räppel, Rappel or Knarre, denotes a wooden noise and effect instrument. see http://de.wikipedia.org/wiki/Ratsche)

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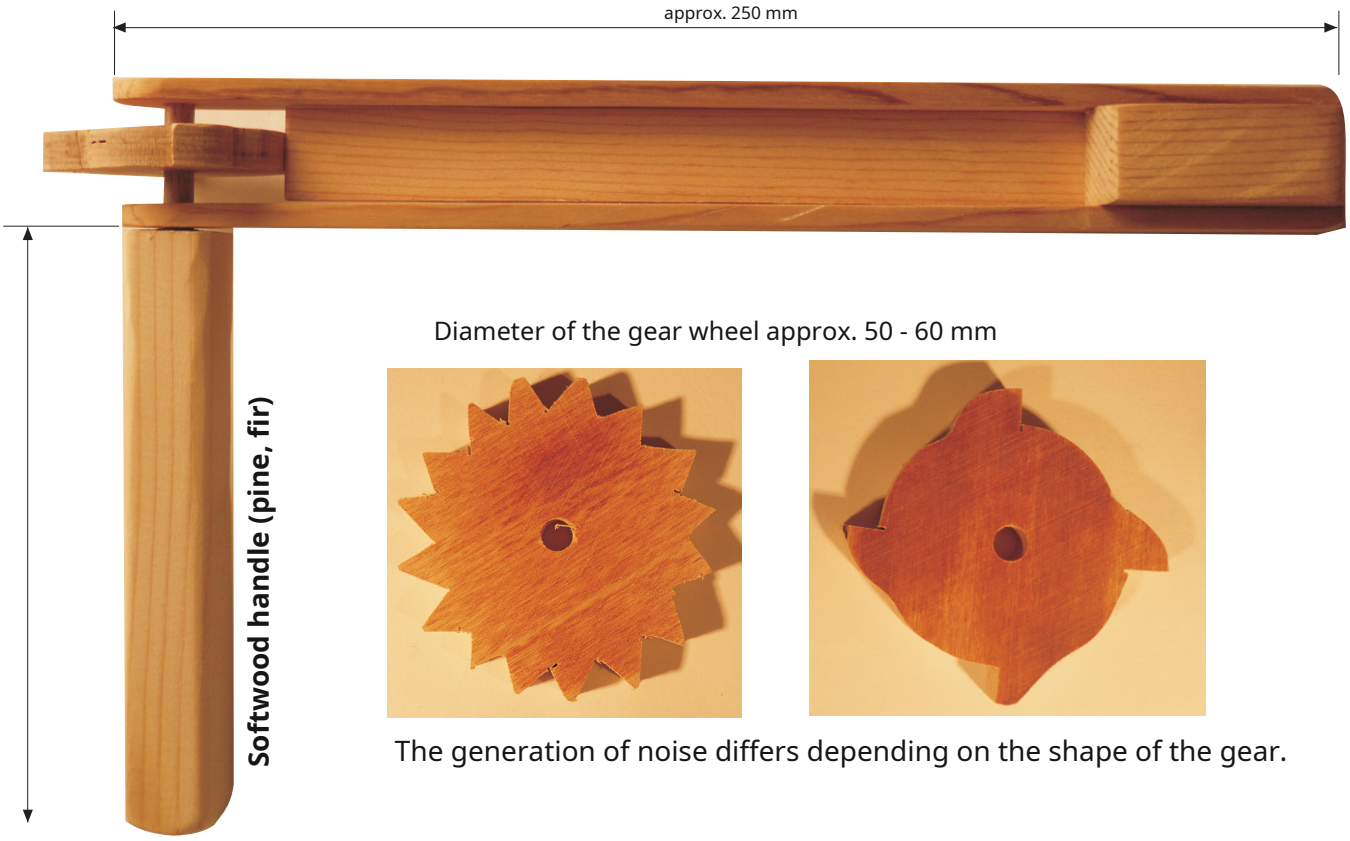
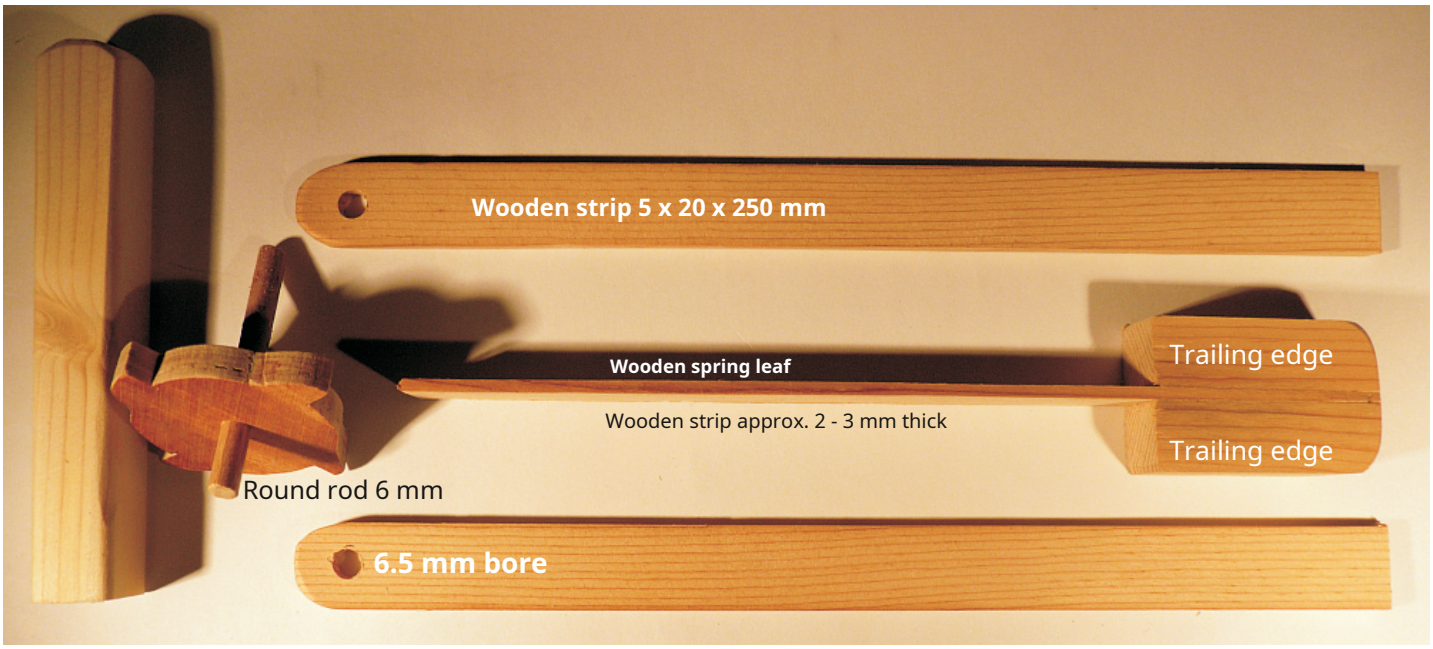
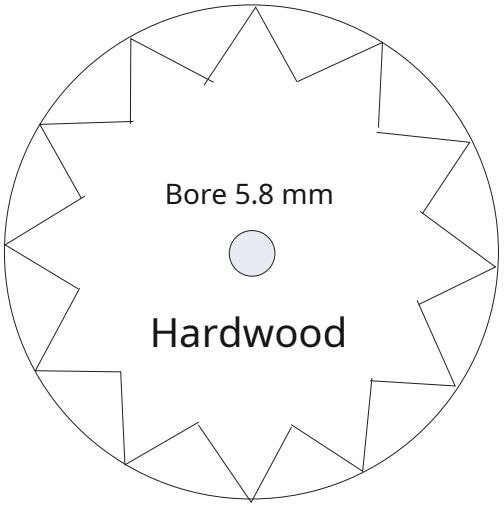
building instructions



Diameter of the gear wheel approx. 50 - 60 mm

The generation of noise differs depending on the shape of the gear.





All dimensions do not have to be strictly adhered to. The wooden spring leaf is glued firmly between the two end strips. If it is very thin, there will be little noise. If the wooden feather blade is too thick or too short, it is not flexible enough.

Important:
The gearwheel must be sawn out of hardwood (e.g. beech, beech plywood). Borehole 5.8 mm so that the gear wheel sits firmly on the round rod.

The distance from the wooden spring leaf to the gear wheel is decisive for the strength of the noise.

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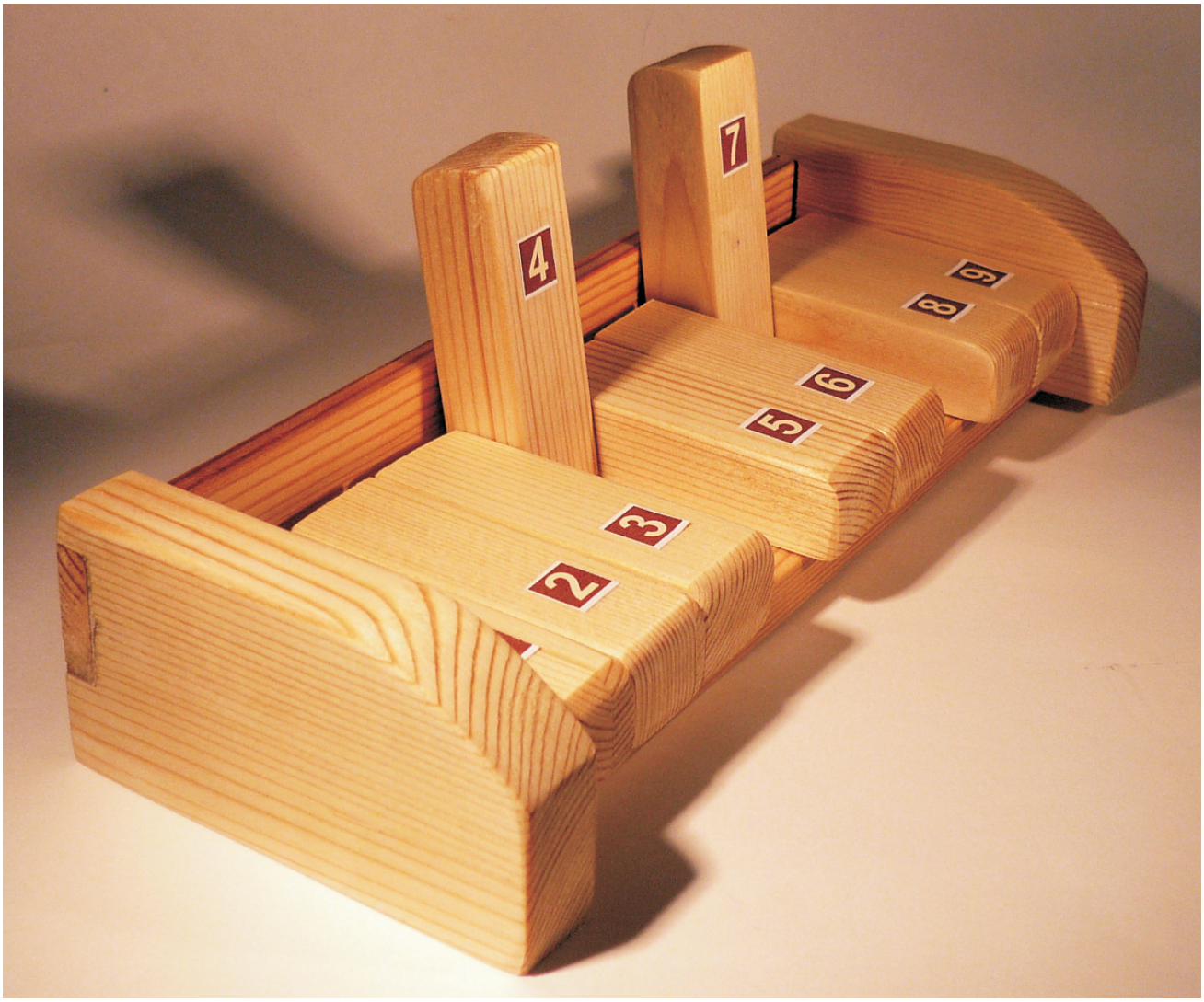

Flap play

A popular dice game from the Alpine countries is the flap game. It takes care of Entertainment at the family table and on all sorts of occasions.
Depending on the version, the game is suitable for introducing basic techniques of the Woodworking with a focus on drilling in wood.
The rules of the game are very simple: You roll 2 dice. The number that you just rolled is always turned over. Whoever can no longer roll the dice has lost.

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Shut the box, clapboard, folding board or folding box

is a dice game that is preferably played in a group of two to four people. The origin of the flap game is not known, but there are references from the 19th century in Normandy, where the game was particularly widespread among seafarers (cf. David Parlett: The Oxford History of Board Games);
it lives on as popular entertainment in the pubs.

Usually a box with nine numbered flaps is used, but there are also boxes with ten or twelve flaps; Instead of using a folding box, you can just as easily write the numbers 1 - 9 on a piece of paper and cross them off.

The basic rules

A game consists of several rounds. Each player row. If it is a player's turn, all Kla are first rolled with two dice and the corresponding flaps are closed.
When closing the flaps, the rule applies that every decomposition of the sum of the eyes may be used. I. E. if the two dice show a 6 and a 3, for example, he can split the sum of 9 in any way he wants, i.e. 9, 1 + 8, 2 + 7, 3 + 6, 4 + 5, 1 + 2 + 6, 1 + 3 + Select 5, ... and close the flaps with the corresponding numbers.
As soon as the sum of the still open flaps equals six or less, the player continues his turn with only one instead of two dice. The train ends as soon as no more flaps can be closed.

Now his (minus) number of points, his penalty score, is determined, to this the numbers of the not closed flaps are added, i.e. if the flaps with the numbers 1, 5 and 9 remain open, this counts as 1 + 5 + 9 = 15 Points. Then the next player is to throw.
The goal of every player is to close all the hatches (shut the box) and not to write minus points.
Rounds are played until all players except one have achieved a penalty score of 45 or more points (45 is the sum of all keys, because 1 + 2 + ... + 9 = 45).
The minus points are continuously added so that the individual players are eliminated one after the other and the last survivor wins.

variants
Sometimes the game is played in such a way that a player who manages to close all the hatches is immediately declared the winner of the game.

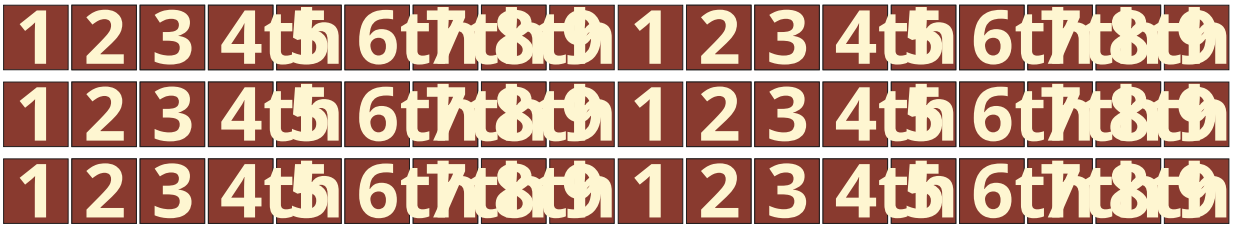
Penalty score: The numbers of the flaps that are not closed are read as a number from left to right, ie if the flaps with the numbers 1, 5 and 9 remain open, this is worth 159 points.

Rules for closing the flaps
Only those flaps may be closed that correspond either to the sum or to the individual values on the two dice; ie if a player throws a 6 and a 3, he can either close the hatch with the number 9 or the hatches with the numbers 3 and 6.

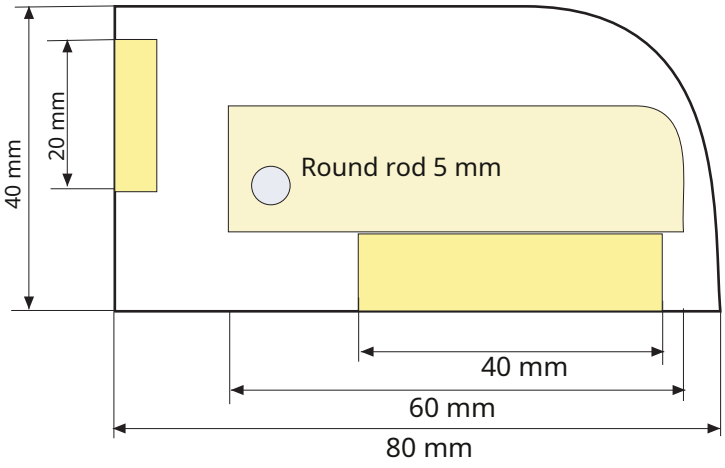
Use in class
This game is also very well suited as an educational game for mathematics lessons for breaking down numbers in elementary school. It was presented with instructions on how to build it yourself in the educational journal TU: Zeitschrift für Technik im Studium, (1993) 68, pp. 34-36 by Thomas Aberle as a flap board.
From "http://de.wikipedia.org/wiki/Shut_the_Box"

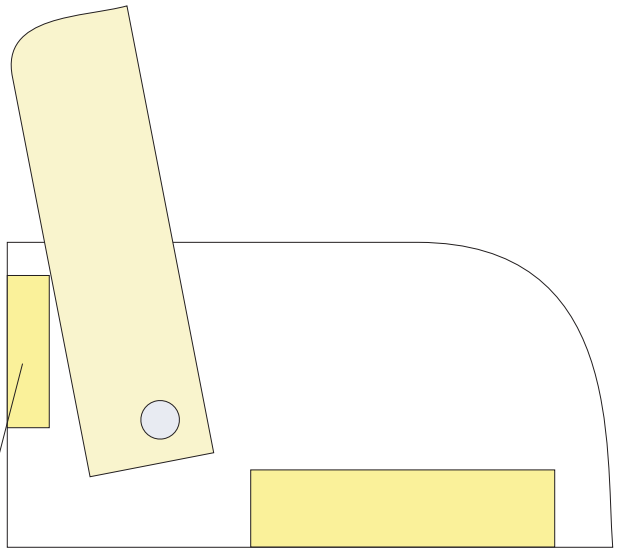
Single version made of 16 mm spruce / pine wood

All parts before assembly



Side view scale 1: 1





Board is butt glued

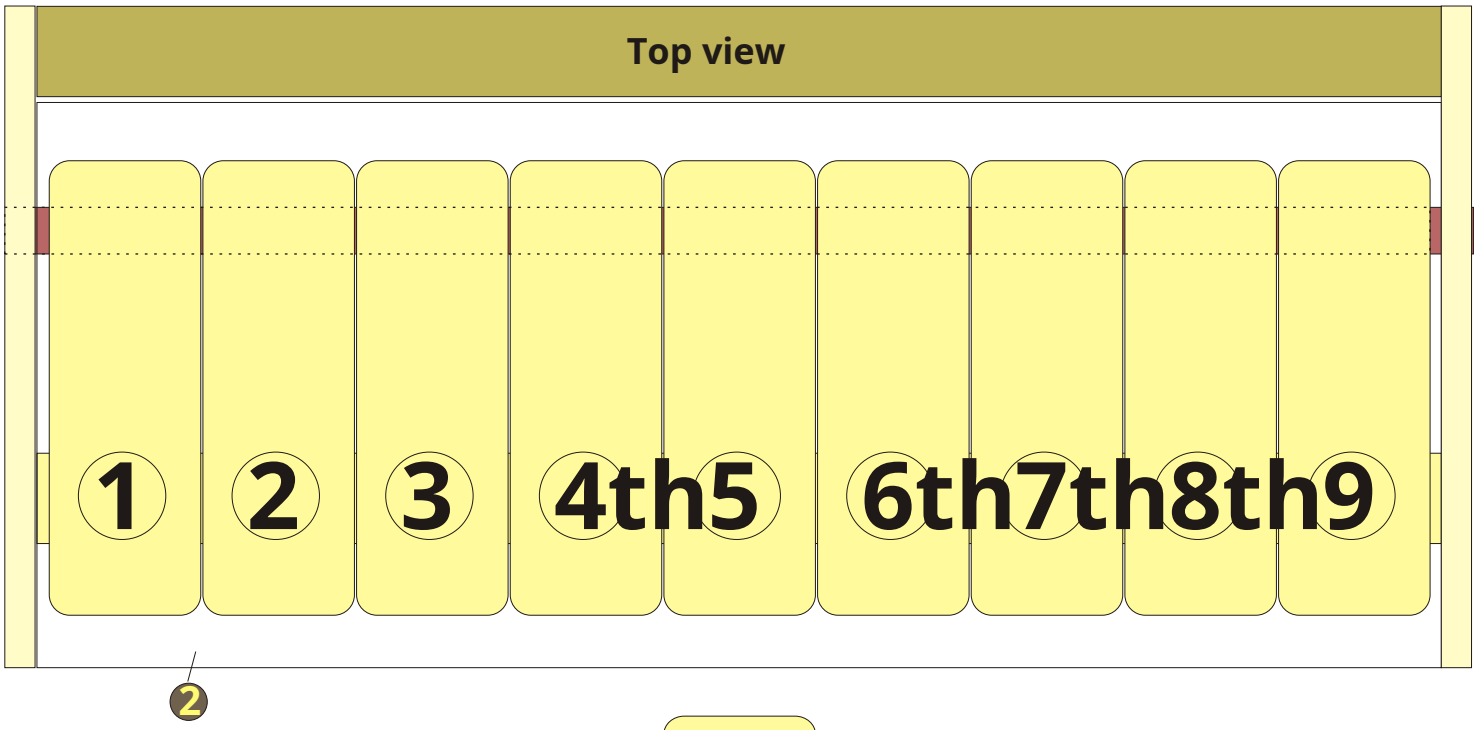
Bar will
mortised and glued

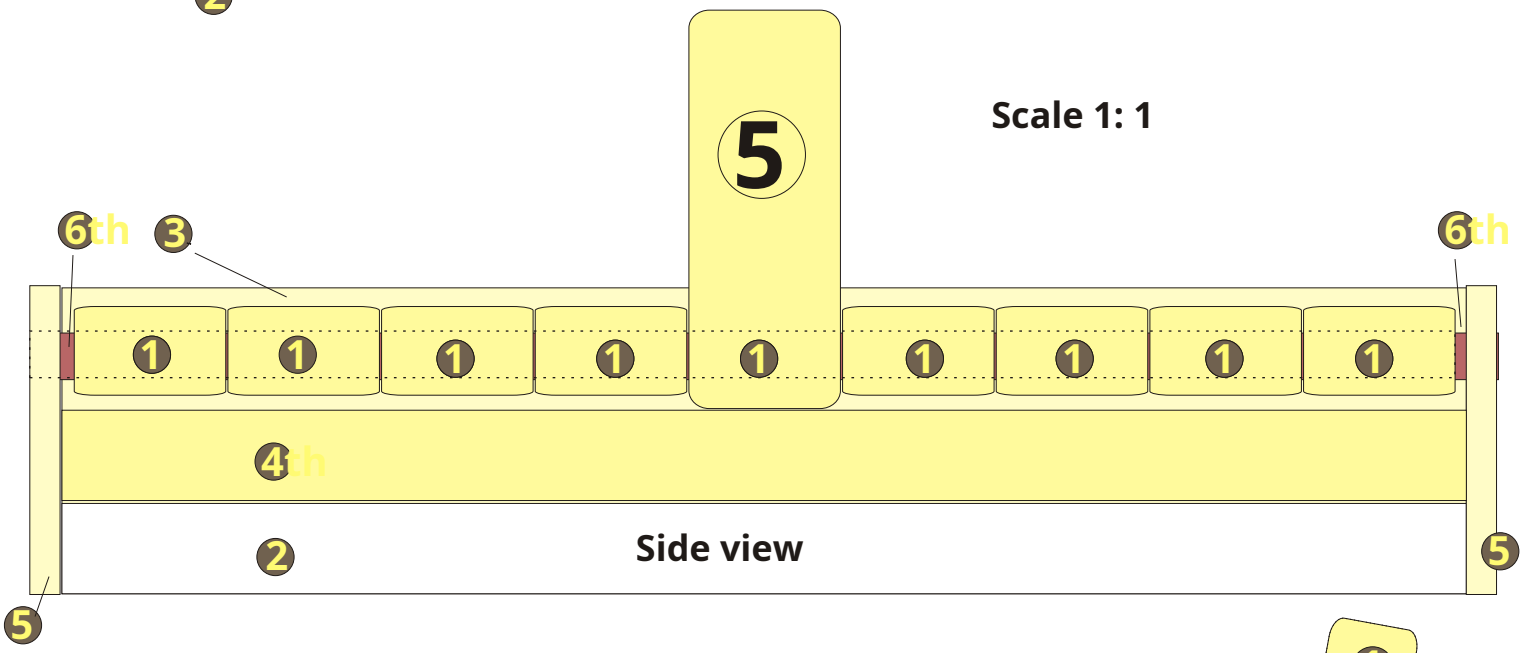
Flap play in different designs

Photos: www.eu-holzspielzeug.at

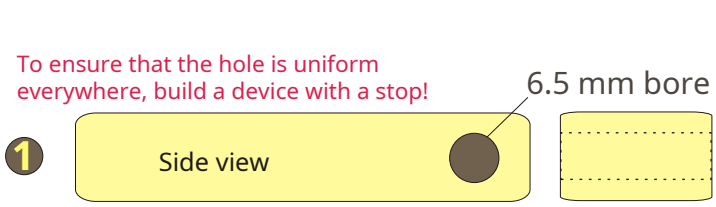
Surname:

building instructions





To ensure that the hole is uniform everywhere, build a device with a stop!



9 flaps 20 x 60 x 12 mm

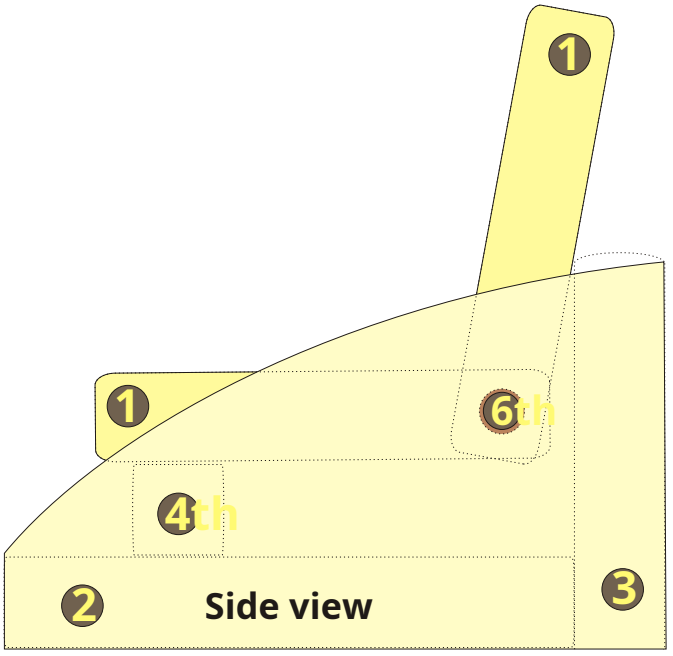
2 Base plate 190 x 75 x 12 mm

3 Back 190 x 60 x 12 mm

4th Bar 190 x 12 x 12 mm

5 2 side panels made of 4 mm plywood

6th Round rod 6 mm



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Heiner Prüser

3 ball game clown

A simple puzzle / balancing game:

3 balls (or beads made of wood / plastic) should be balanced in the 3 recesses.

The simple task allows many variations with different levels of difficulty:

- Construction according to your own design or according to given instructions
- Play open or closed / frame with miter cut or butt joint

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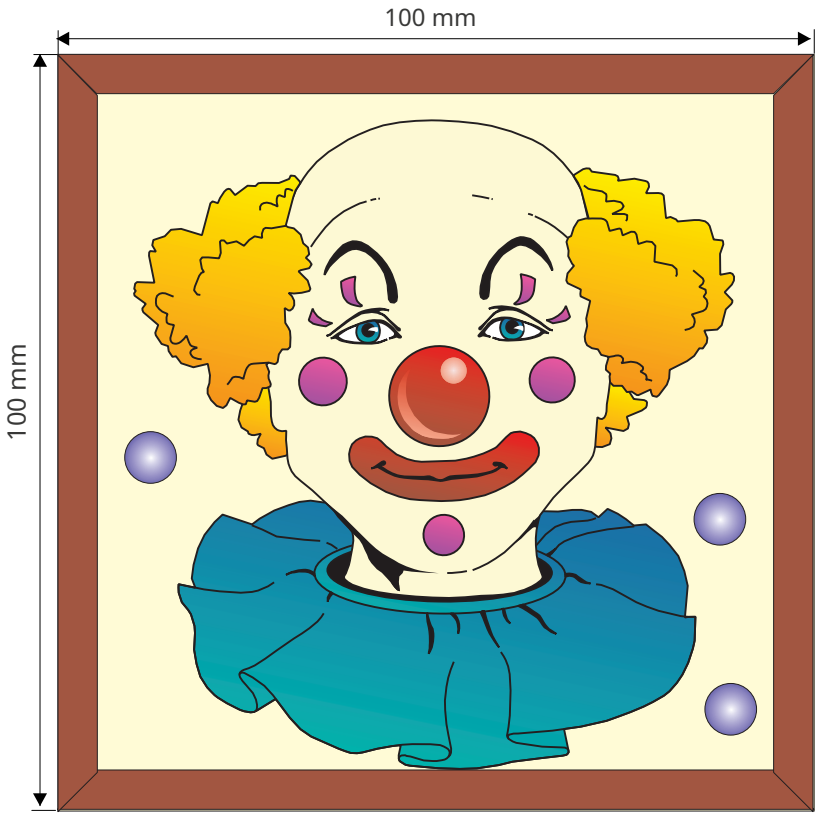
building instructions



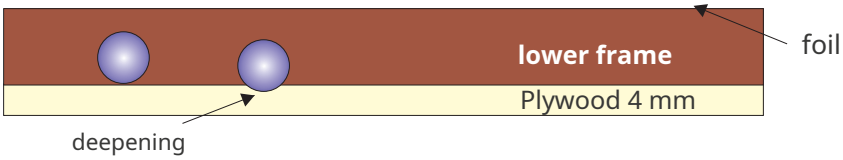
material

1 strip 5 x 50 mm (or other format)

playing area 100 x 100 mm
made of plywood 4 mm

3 balls or pearls

1 Glue the color print onto the plywood surface and drill the 3 recesses after it has dried. (Test the drilling depth stop beforehand!)



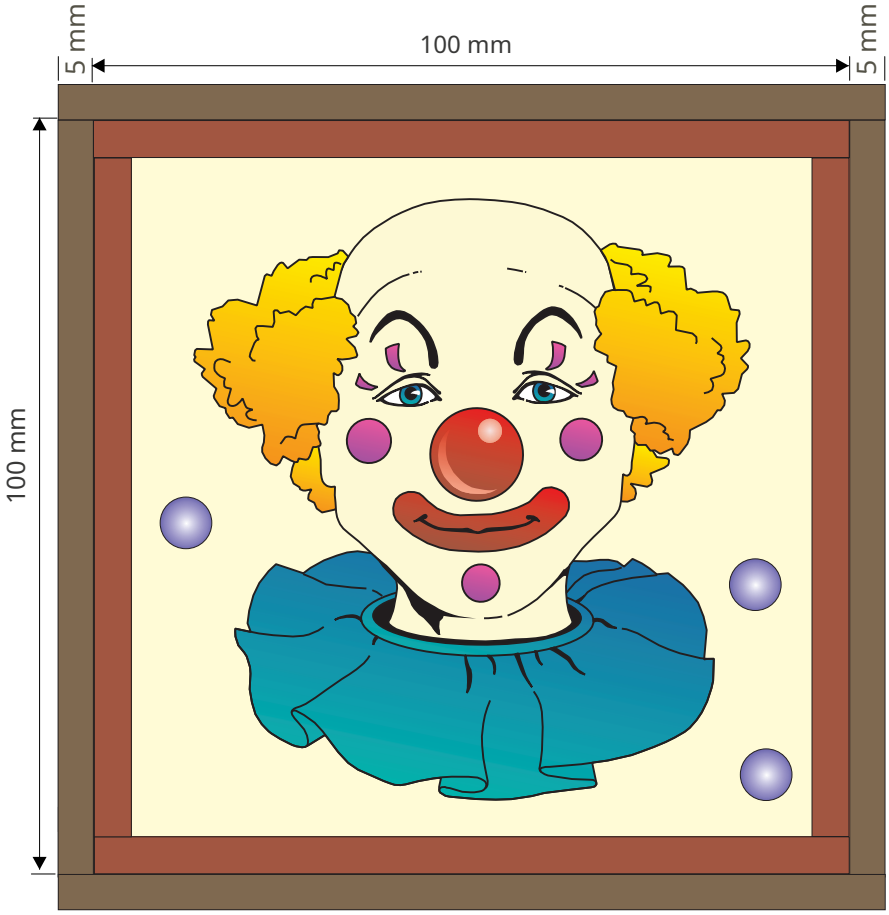
2 Glue the strips to the plywood

Variation:
The 3 holes were drilled all the way through and strong paper glued under the plywood.
The strips were not mitered.

Here the transparent foil was attached with self-adhesive copper foil. (Copper foil around the wooden edge press on the side)

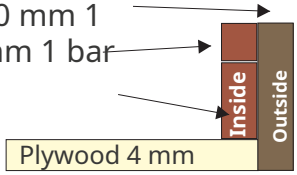
Surname:

building instructions



Material:

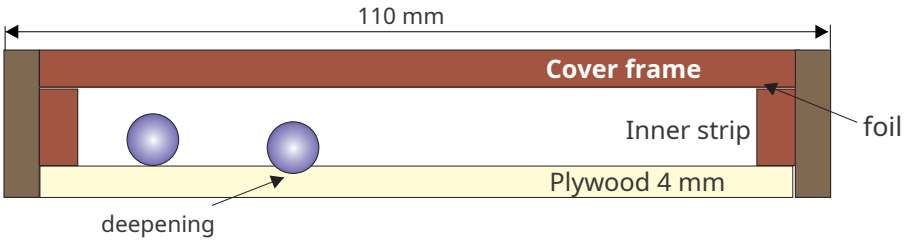
1 bar 5 x 20 x 50 mm 1 bar 5 x 5 x 50 mm 1 bar 5 x 10 x 50 mm



plywood 100 x 100 mm

3 balls or pearls

1. The color print on the plywood Glue the surface and, after drying, drill the 3 indentations. (Test the drilling depth stop beforehand!)
2. If desired, it will be on the frame a transparent film is placed, which is then attached with a cover frame.



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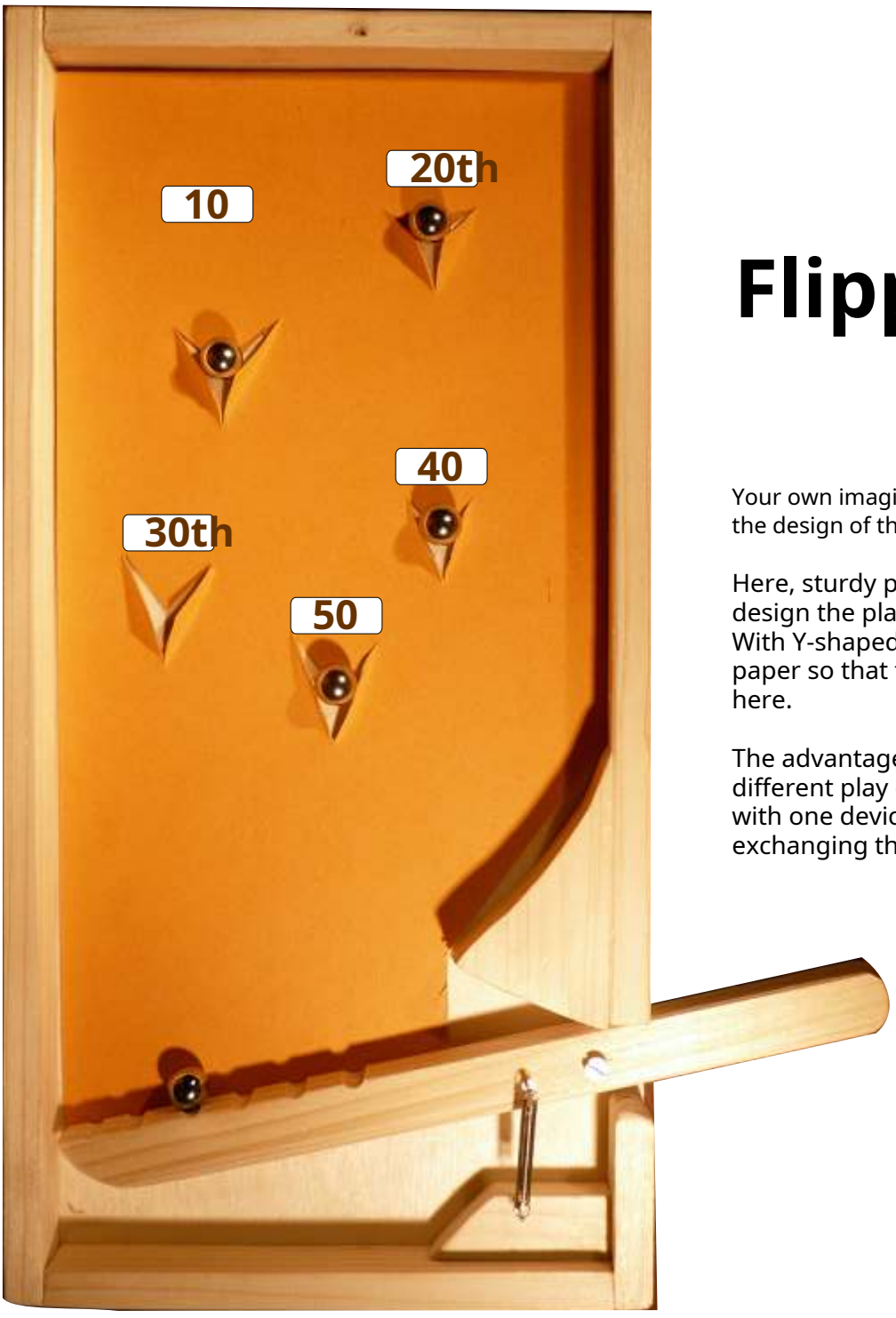

Flipper 7 - 4

Your own imagination is required for the design of the pinball play area.

Here, sturdy paper was used to design the playing area.
With Y-shaped cuts you can unfold the paper so that the balls can find a hold here.

The advantage of paper is that different play options are possible with one device by simply exchanging the playing surface.

Work aids for successful handicraft lessons

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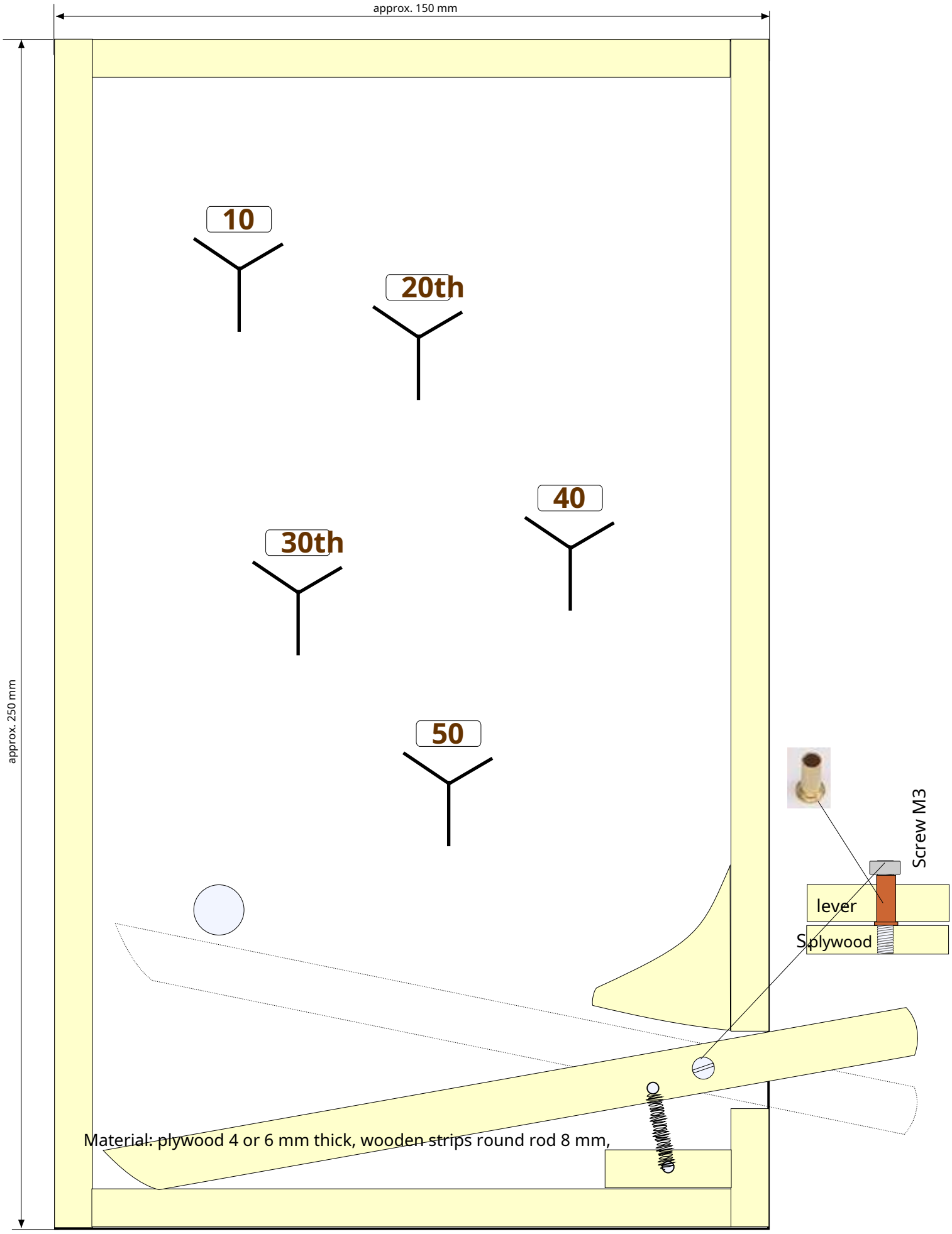
building instructions

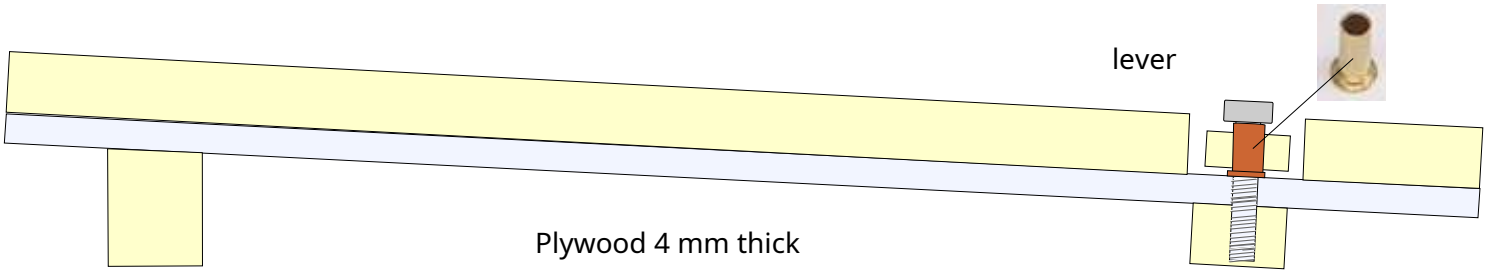


Building instruction 2

Material:

Wooden strips, screw M3 12 or 16 mm long, 1 brass bearing bush 1 tension spring, soldering pins, steel balls 10 mm

Side view



The pinball machine stands on 2 wooden strips of different heights, so that the playing surface has a certain incline.

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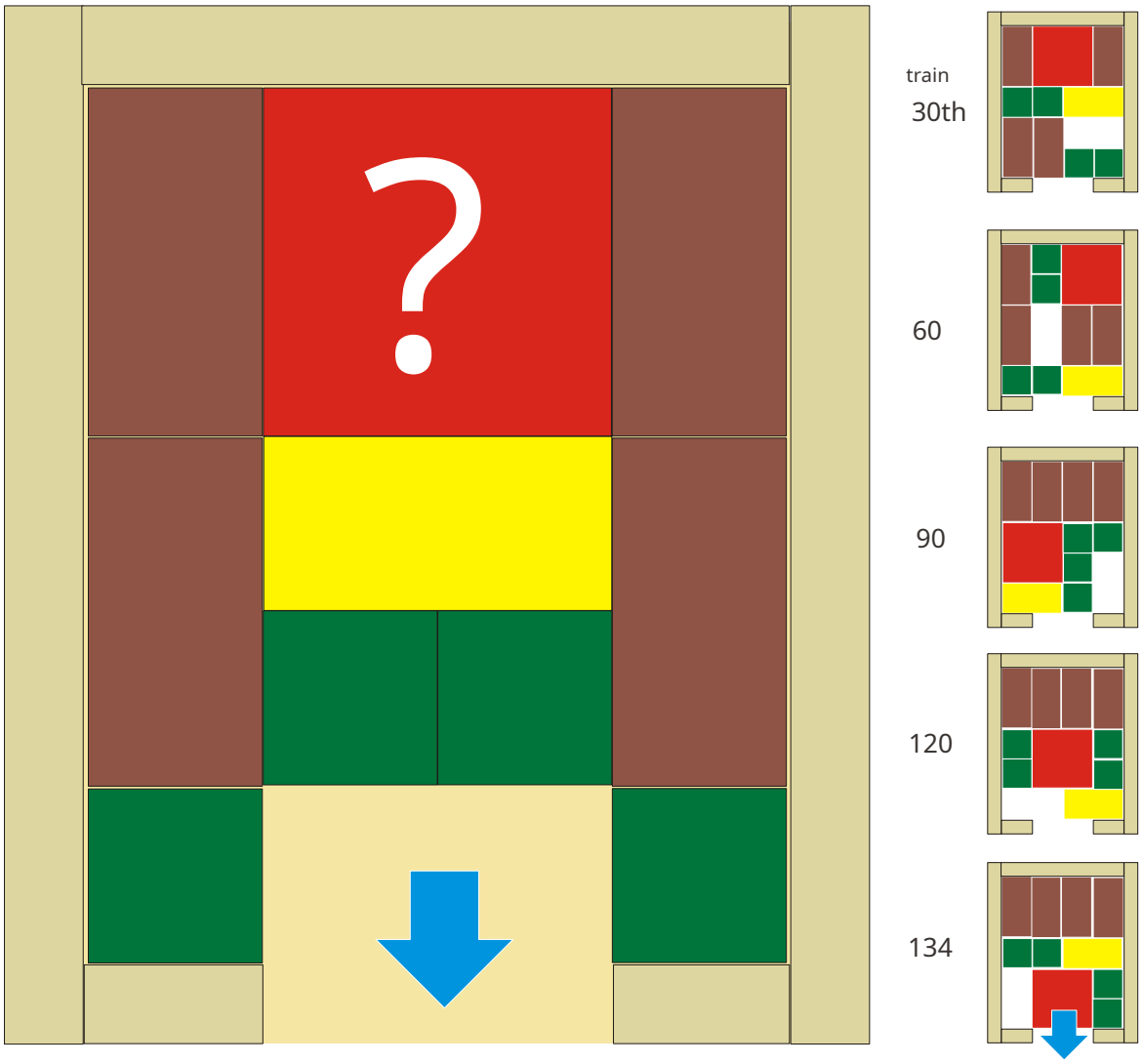


How are you getting out of here?

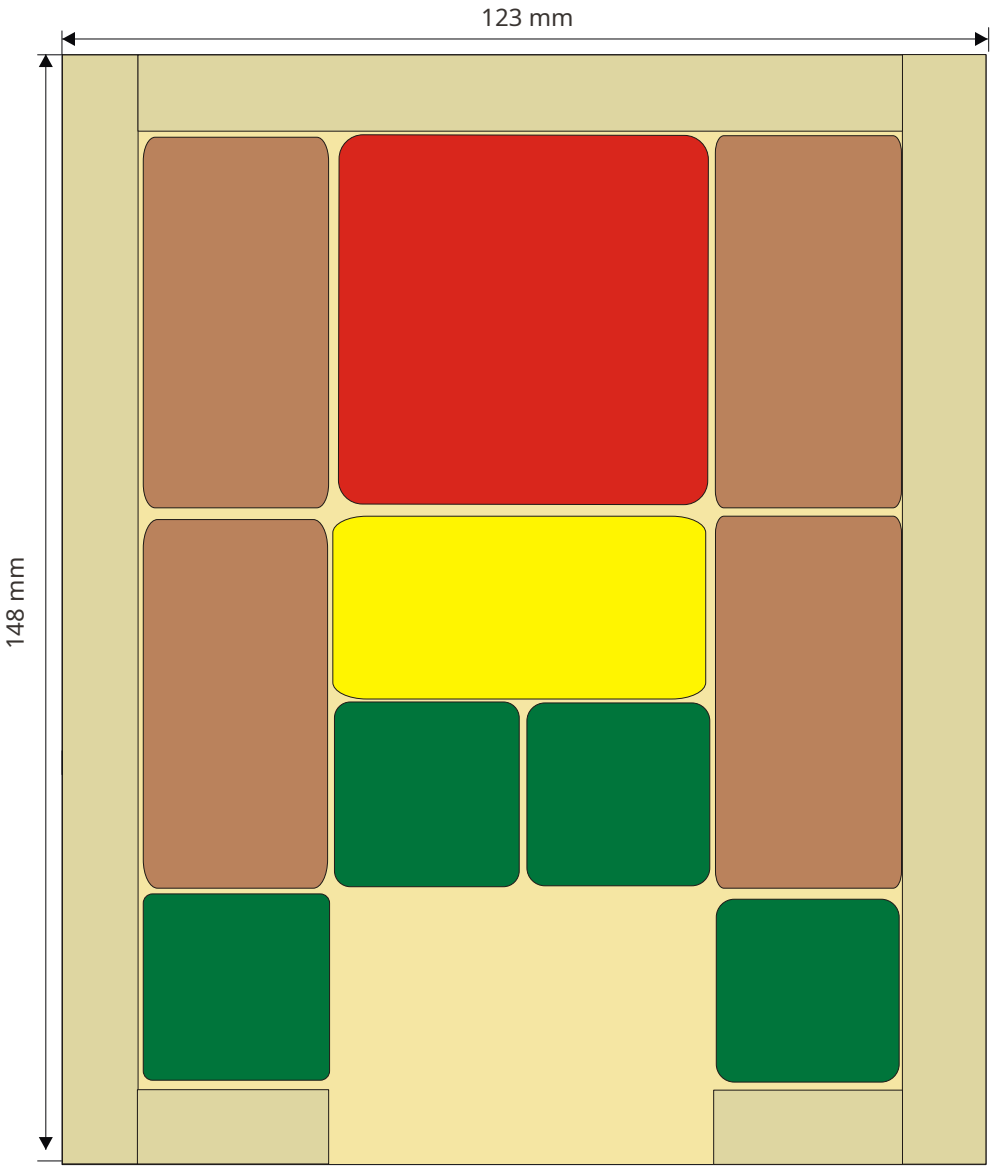
Aim of the game: The big red square should be pushed through the opening below.

Unfortunately the other stones are blocking the way.

An interesting task that requires a lot of patience to solve!The starting position is given in the picture. Only pushing the wooden tiles into the free spaces is allowed; they must not be lifted or twisted.

Surname:

building instructions



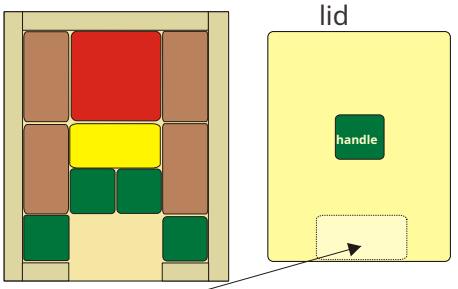
material

2 strips 10 x 145 mm 1
strips 10 x 120 mm 2
strips 10 x 145 mm

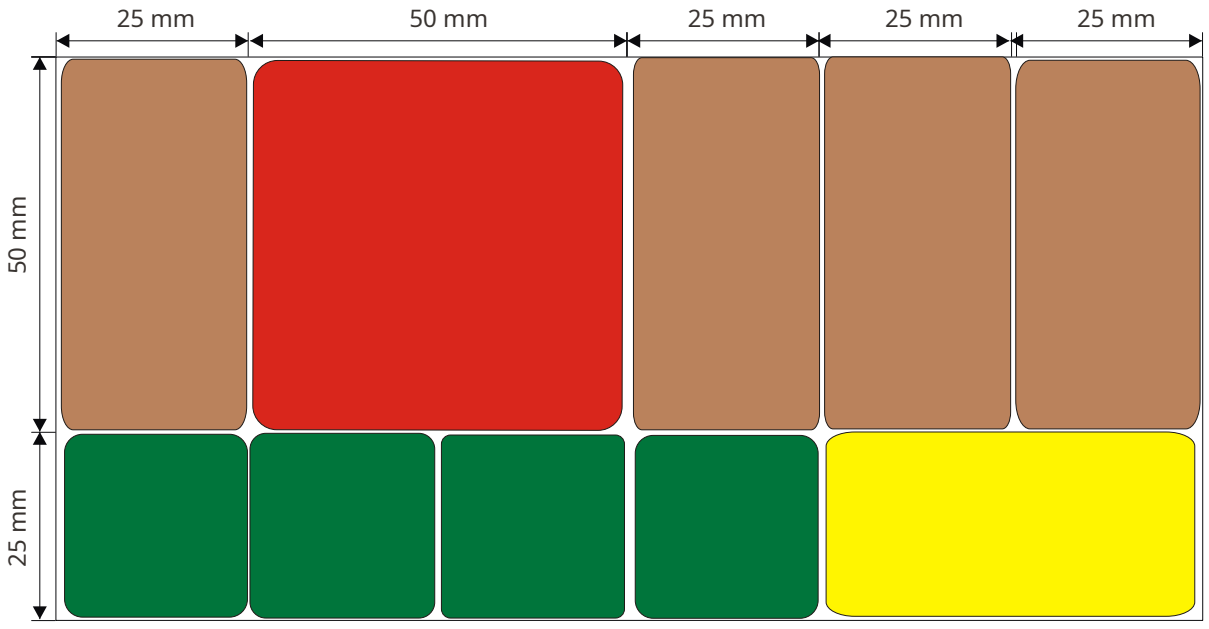
Plywood 4 mm

Playing surface 120 x 145 mm
Playing tiles 150 x 75 mm

1. First the tiles with the
   Saw out the fretsaw.
   Then smooth with sandpaper and round off the edges.
2. Arrange the playing tiles in the starting position and try out whether they fit on the intended playing area with the edge strips.
3. Saw out the playing area with the edge strips; Glue on the edge strips.
4. If desired, a plywood lid can be used to ensure that no parts are lost.



The rectangle on the underside prevents tiles from falling out.



Tokens

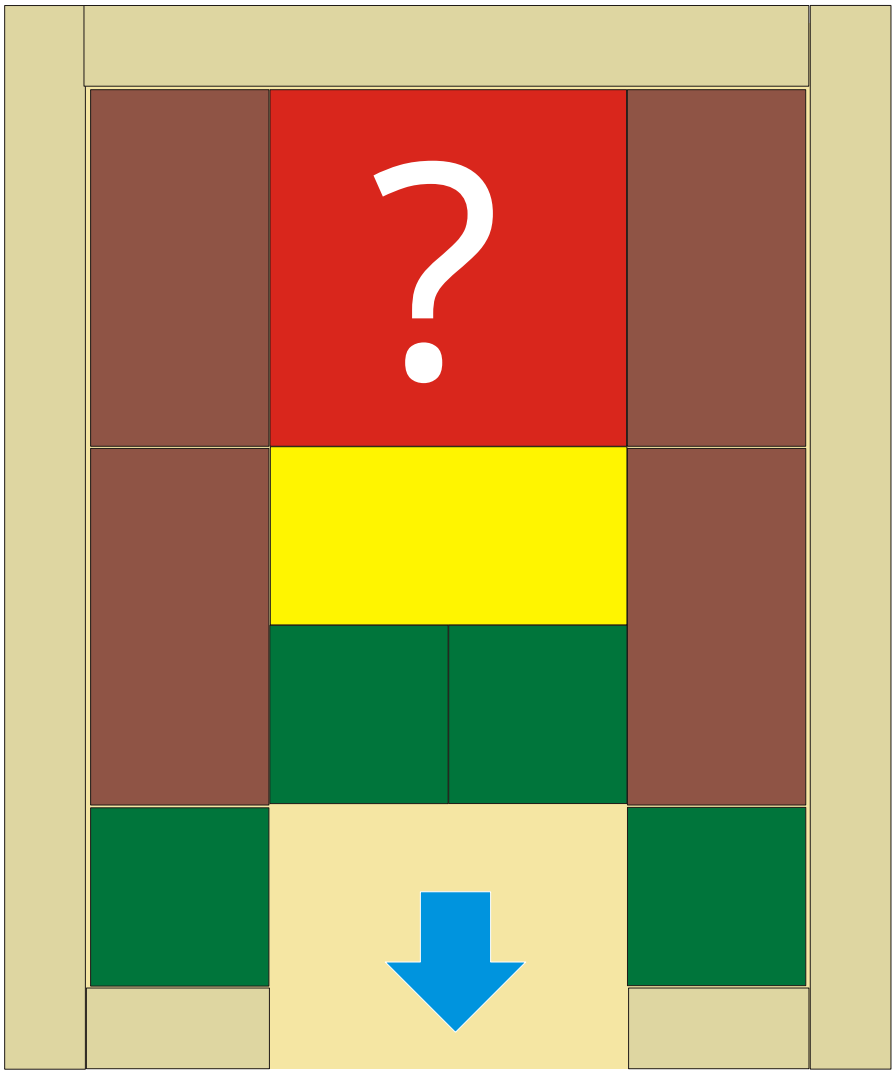
150 x 75 mm

saw out and with
Smooth the sandpaper
and round off

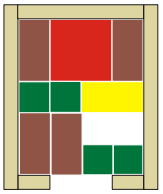
How are you getting out of here?

Rules of the game

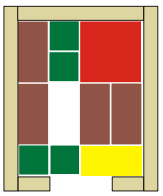
Rules of the game: The big red square should be pushed through the opening below. Unfortunately, the others blockWooden plate the way.
An interesting task that requires a lot of patience to solve!The starting position is given in the large picture. Only pushing the wooden tiles into the free spaces is allowed; they must not be lifted or twisted.



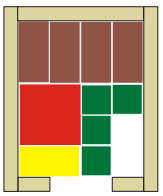
train
30th



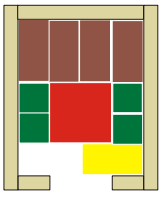
60



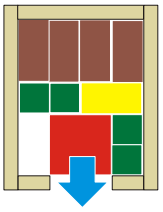
90



120



134



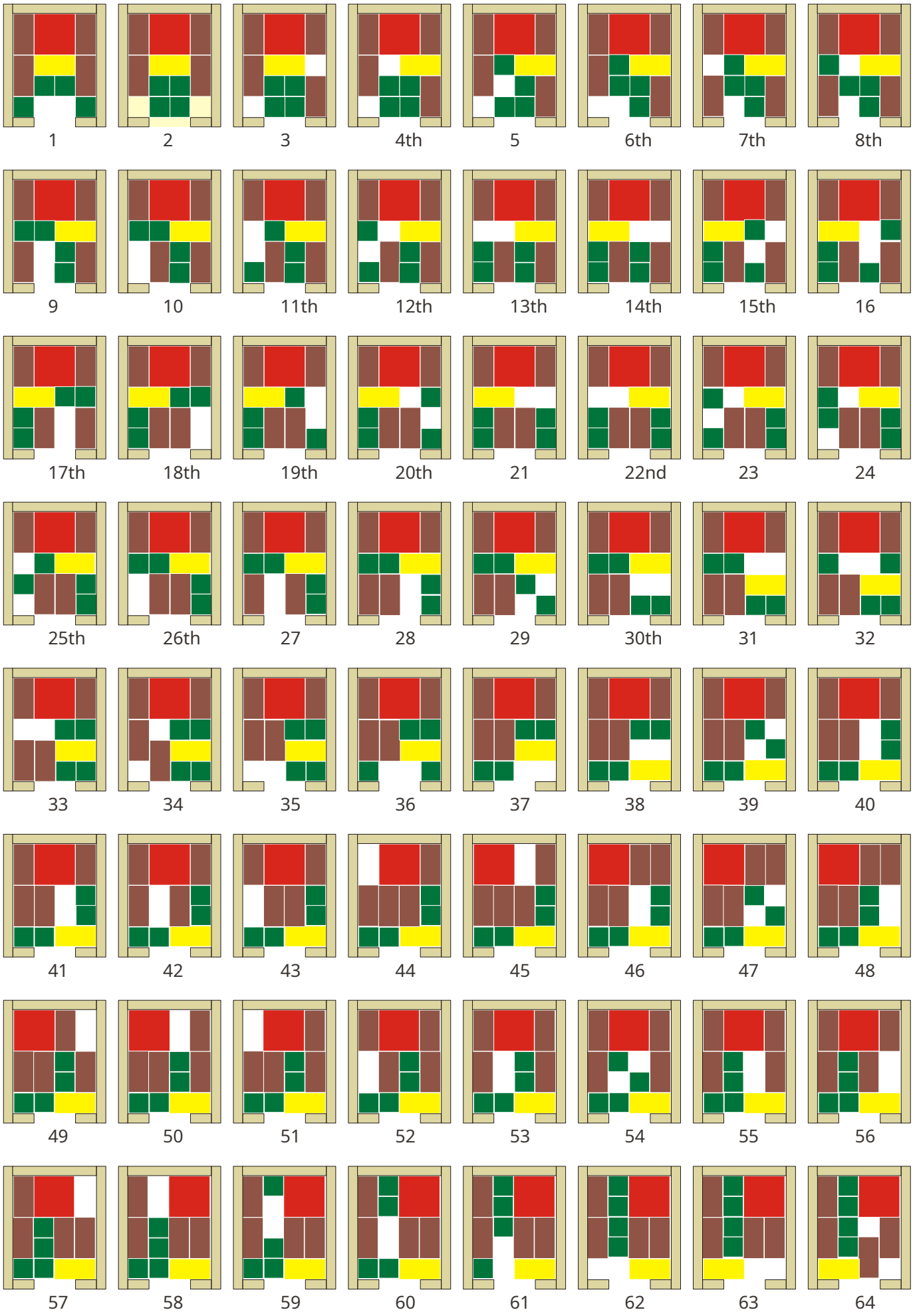
Solutions:

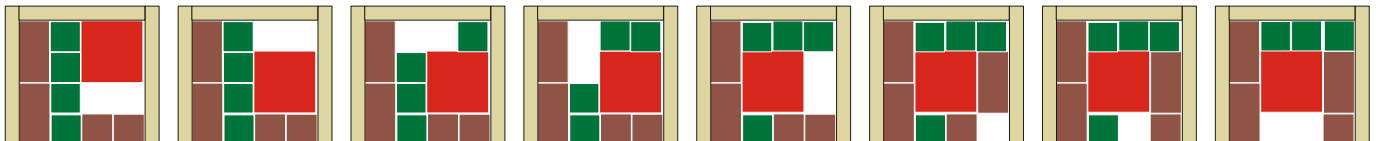
The yellow rectangle is causing the biggest problems and often has to be moved so that the red square can get down.
With the green squares you clear the way. In doing so, they often have to be moved together.

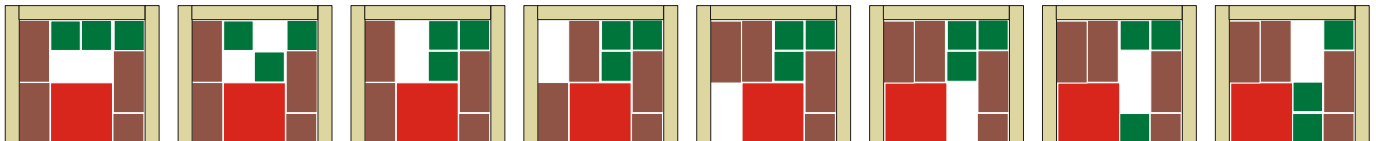
Rules of the game: The big red square should be pushed through the opening below.

Solving the task in 134 moves requires a lot of patience. The starting position is given in Figure 1. Only pushing the wooden tiles into the free spaces is allowed; they must not be lifted or twisted.

Solution




65 66 67 68 69 70 71 72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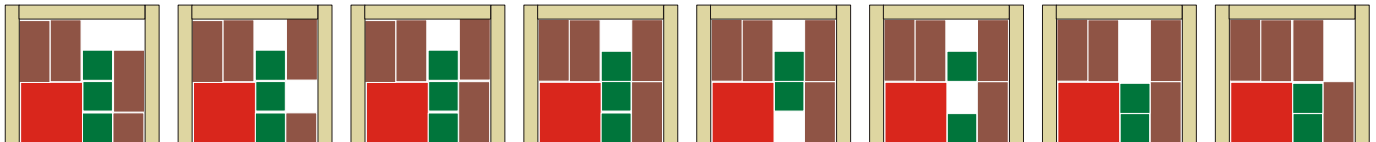
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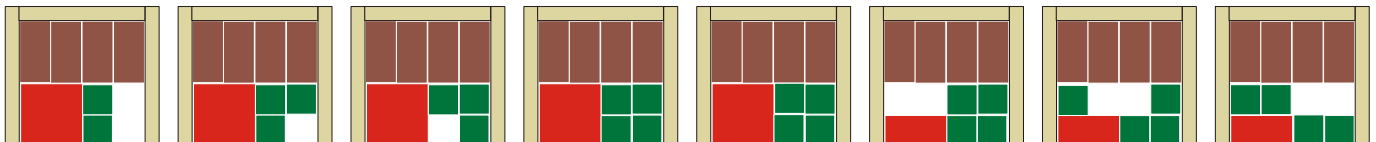
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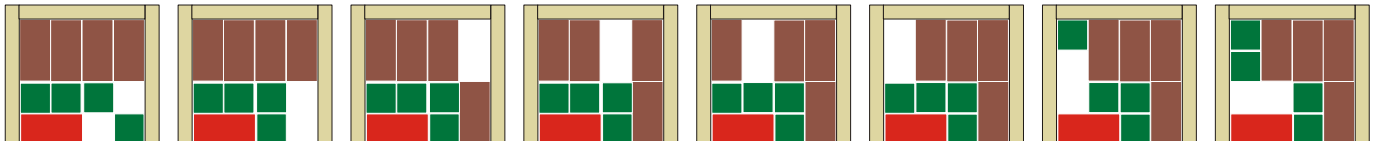
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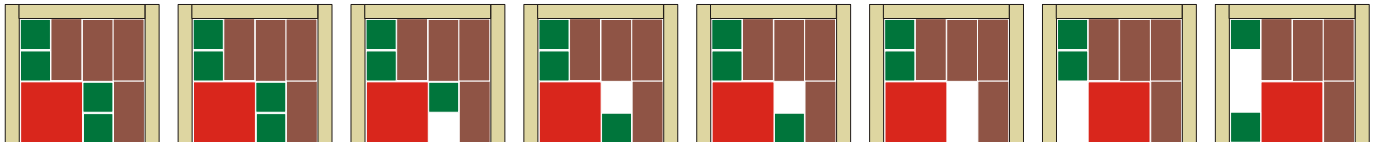
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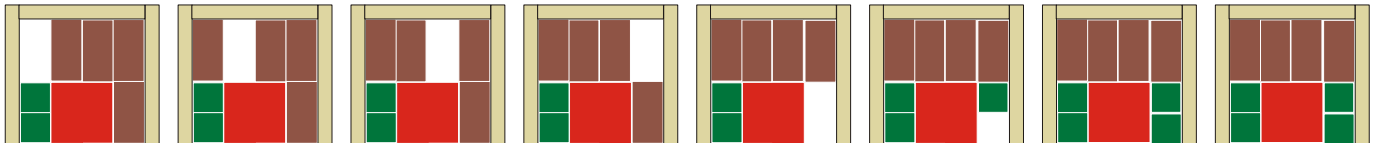
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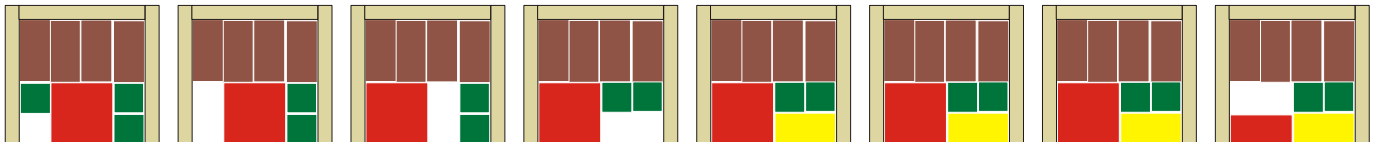
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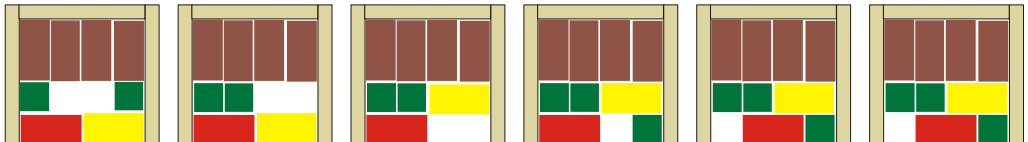
129 130 131 132 133 134

solution

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Heiner Prüser

Secret safe

from class 7 | Time: approx. 5 hours | Order no. 703

Work aids for successful handicraft lessons

GPV_703

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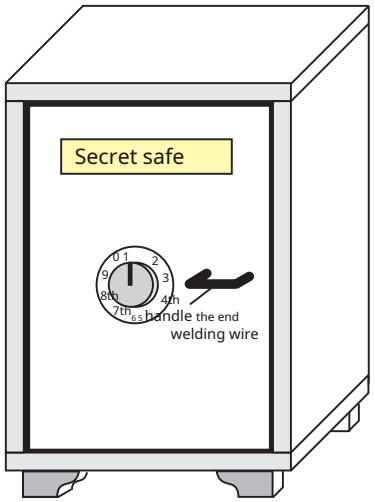
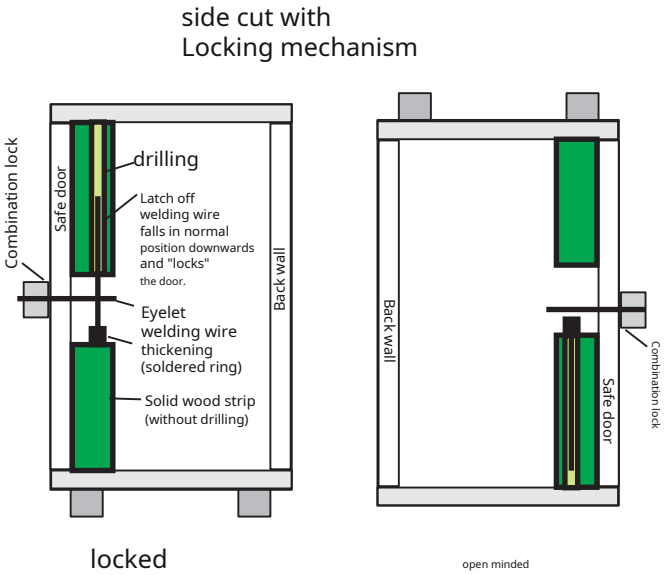
Notes on lesson planning





If you are building a "box" for the first time, you will find that there are a few problems to be solved:
When planning, you have to consider the material thickness of the walls and at the beginning think about which walls to go after **go through outside** and what walls are **between others** are located.

The locking mechanism, on the other hand, is quite simple: A 2 mm welding wire moves loosely in a hole. If the "safe" is normal, it locks the door. (The bolt made of welding wire prevents you from opening the door with the door handle.) If you turn the safe upside down, the welding wire falls down and the door can be opened.
The combination lock has no function, it is only used to mislead when trying to open it.

In addition, opening the safe can be made more difficult by a thickening at the end of the locking bolt: The door can only be opened when the door handle is pushed into the door a little.

Recommended for class	Time requirement	material costs	Level of difficulty
Class 7/8/9	about 6 hours	about 1 euro	★ ★ ★ ★ ☆

Material: Limba plywood 4 mm thick, round rod 10 mm, welding wire 2 mm, small solid wood strips, nails, glue

Differentiation: The amount of work and the degree of difficulty depend on the form in which the plywood boards are prefabricated and whether the "box" is planned by oneself or whether the work is carried out according to a given plan.

★ ★ - Plywood parts are sawn to size

★ ★ ★ - Plywood parts are sawn into strips of the required width

★ ★ ★ ★ - Safe is planned and sawed out independently with all dimensions

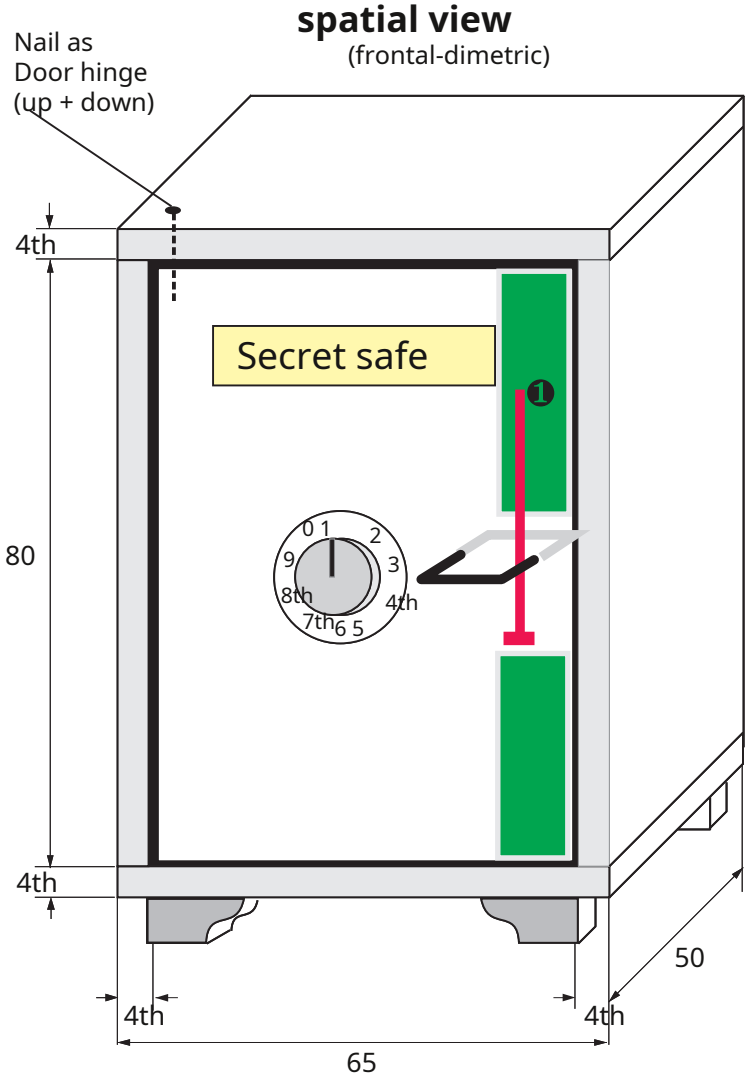
★ ★ ★ ★ ★ - "Inventing" a further guard locking

Problems in construction: Planning the "box", straight, right-angled saw cuts, accuracy of fit, joining the walls (nailing + gluing the first "box" walls)

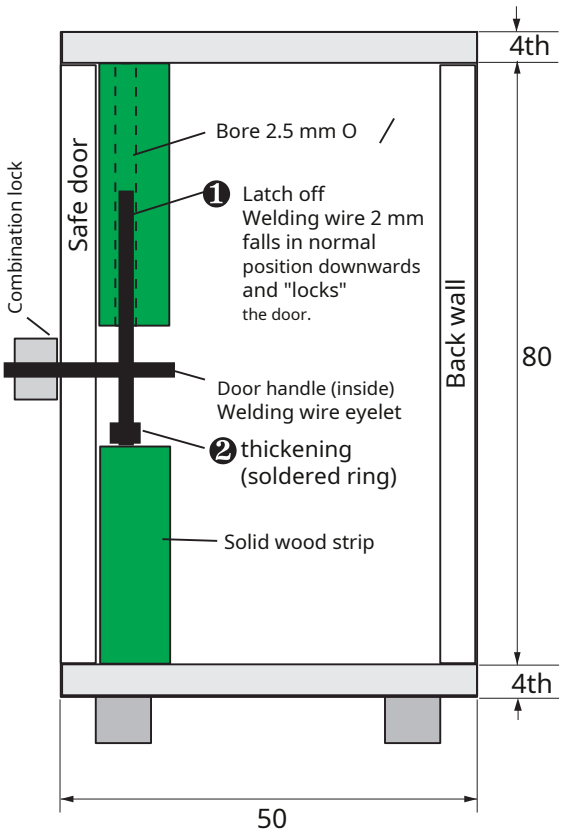
Bending of the door handle from welding wire, precisely fitting hole in the door, bend on the inside; Insertion of the door, nail as "door hinge"

How the lock works

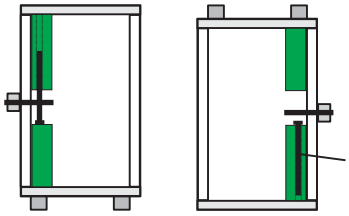
spatial view
(frontal-dimetric)



side cut
with locking mechanism

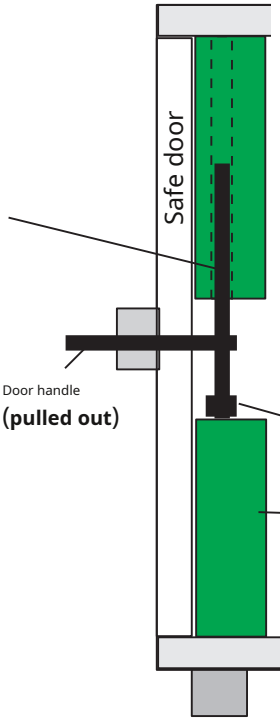


This is how the lock of the secret safe works:



❶ A welding wire 2 mm (the locking "bolt") moves loosely in a hole. If the "safe" is normal (drawing on the left), it locks the door because it falls through the extension of the door handle on the inside of the door.
If you turn the safe upside down (drawing on the right), the locking bolt falls into the hole. Now the door can be opened.

The combination lock has no function, it is only used to embellish and mislead
Attempted opening.



Because of the thickening ❷ below
Opening the safe can be made even more difficult at the locking bar:
If you pull the door handle out of the door as far as possible, the thickening on the bolt blocks the door, even if you turn the safe upside down.

The door can only be opened when you slide the door handle into the door.

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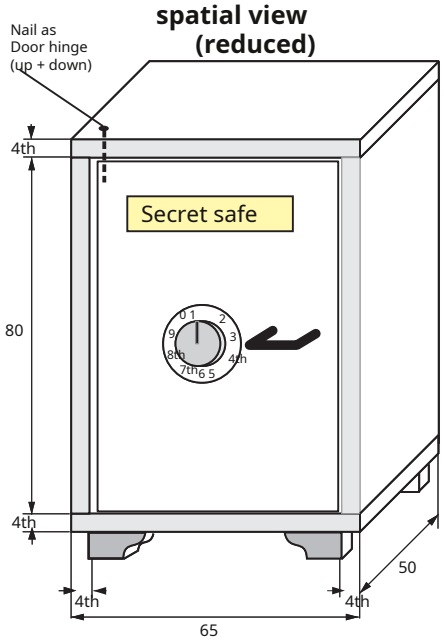
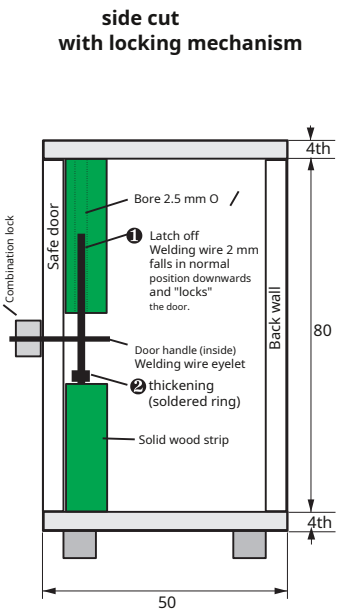
Building instruction 1





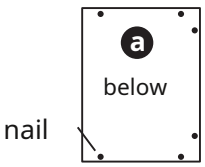
If you are building a "box" for the first time, you will find that there are a few problems to be solved:
When planning, you have to take the material thickness into account and at the beginning think about which walls to go after **go through outside** and what walls are **between others** are located.

In the present planning, the material used was Limba plywood with a thickness of 4 mm;
The back wall sits between the side walls; the door is 2 mm narrower than the rear wall because on
Door hinge a small gap must remain free.

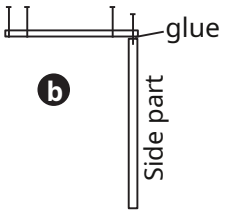
It is best to build the safe in the following order:

❶ Plywood panels **accurate to the millimeter** mark, saw out, lightly sand the edges

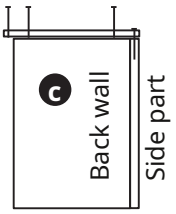
❷ Nail and glue the underside with the side parts and rear wall: To do this, first knock the small nails approx. 2 mm from the edge into the underside so that they protrude straight out of the top (drawing).



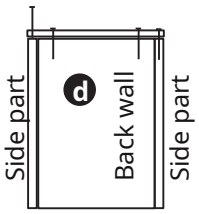
Do not hammer in the nails too close to the edges!
Make sure that the nails are vertical!



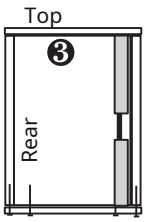
Put glue on the edge of the side part, put on the underside and drive in the 2 nails. Should a nail go wrong, pull it out again!



Apply glue to the top and side edges of the
Give back wall and drive in the 2 nails.



Put glue on the top and side edges of the second side wall and drive in the 2 nails.



❸ The 3 sides glued together are now turned over, the upper edges are coated with glue and the top is pressed firmly on. Now the glue spots can solidify in a few minutes.

❹ In the meantime, saw the 2 strip sections for the safe lock and drill through one strip with 2.5 mm. You pinch the welding wire (2 mm thick) to the correct length and insert it into the bar with a hole.
Then you glue the strips on the inside with 4 mm (door thickness) distance to the front edge.

❺ Door handle made of welding wire (see construction manual 2)
Combination lock (see construction manual 2)
Feet (see construction manual 2)

❻ The door is rotatably fastened with 2 nails:

Nail approx. 4 mm from the door edge

knock in the door away!

Pre-drill with 1 mm Ø beforehand, also with it the nail perpendicular is hit!

❼ Glue the feet of the safe (see construction manual 2)

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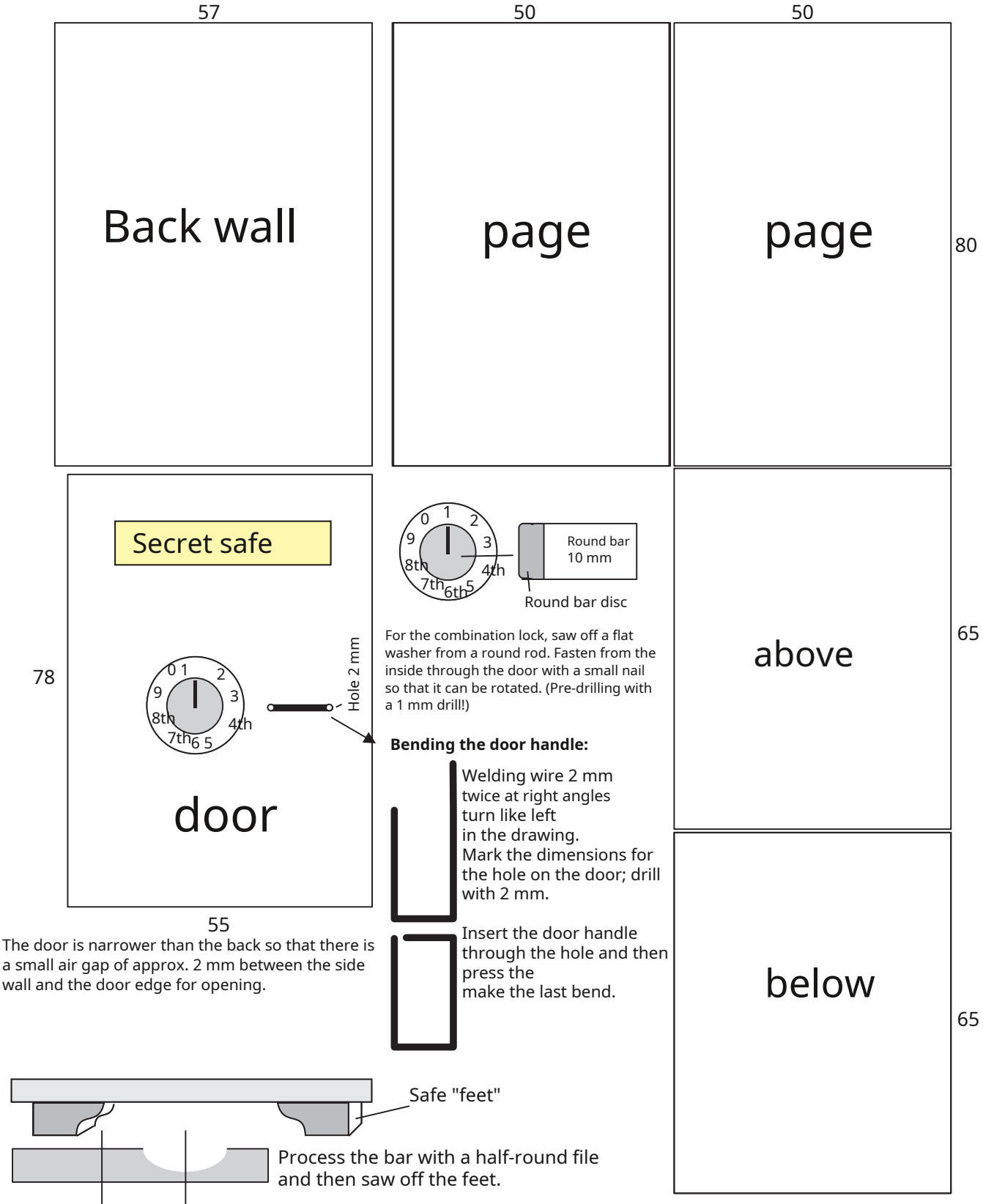
Building instruction 2

Construction drawing scale 1: 1



For the combination lock, saw off a flat washer from a round rod. Fasten from the inside through the door with a small nail so that it can be rotated. (Pre-drilling with a 1 mm drill!)

Bending the door handle:

Welding wire 2 mm
twice at right angles
turn like left
in the drawing.
Mark the dimensions for
the hole on the door; drill
with 2 mm.

Insert the door handle
through the hole and then
press the
make the last bend.

The door is narrower than the back so that there is a small air gap of approx. 2 mm between the side wall and the door edge for opening.

Process the bar with a half-round file and then saw off the feet.

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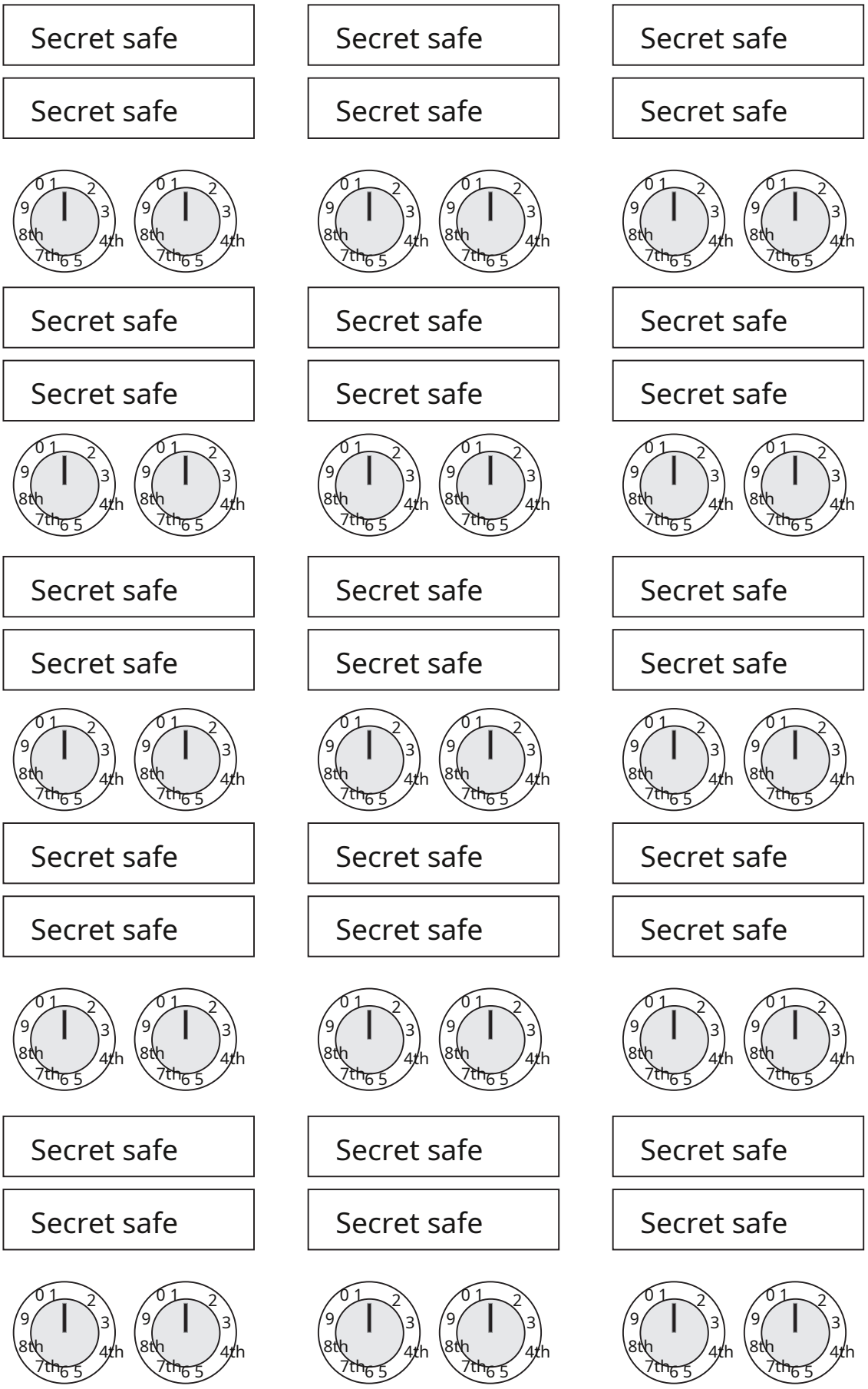
Master copy for the stickers



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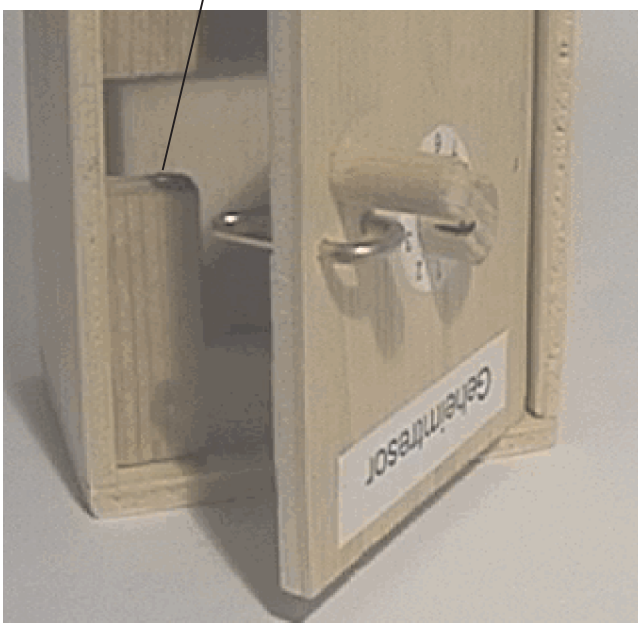
Company photos



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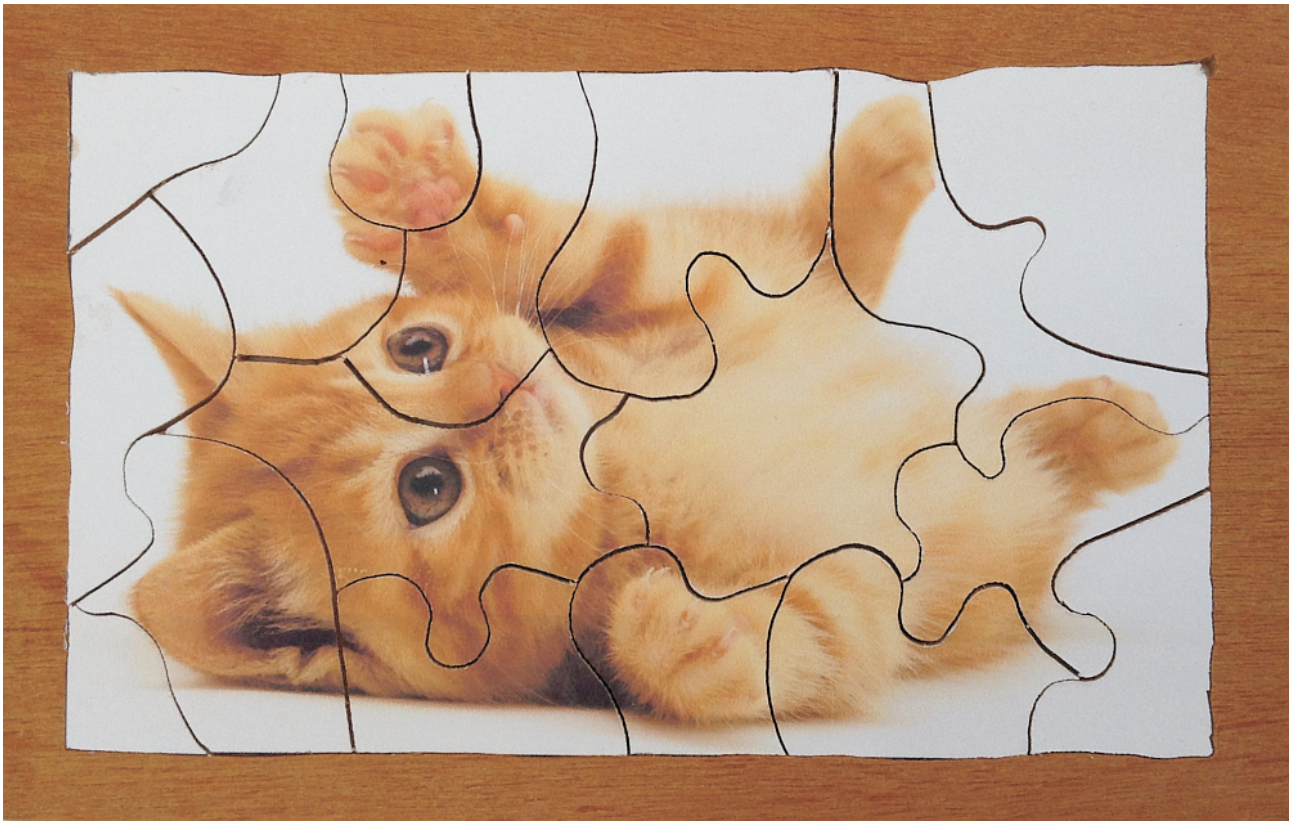

Plywood puzzle

Class 5/6/7

Time: 4 hours

Work aids for successful handicraft lessons

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Plywood puzzle

Motif kitten / car Benz

building instructions

Search for motif, cut out (magazine, calendar, ...)

1 Print out the motif, cut out and glue it onto a sheet of plywood over the entire surface.
Glue and harden for at least an hour.

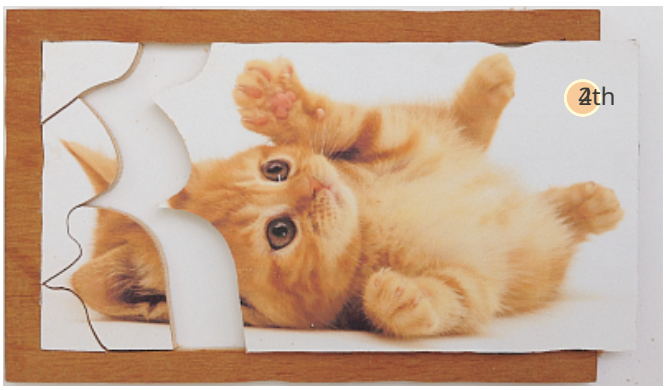
2 Small hole in one corner so that the fretsaw blade can be passed through there.

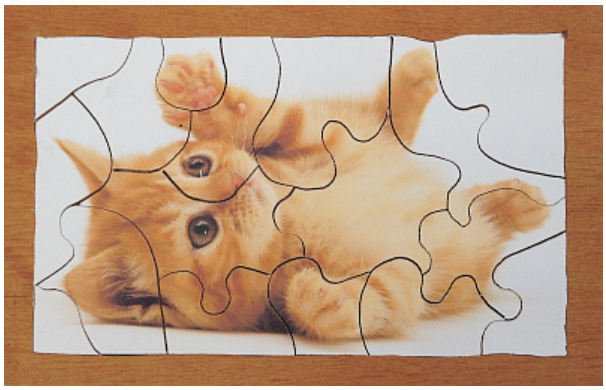
2 Small hole in one corner so that the fretsaw blade can be passed through there.

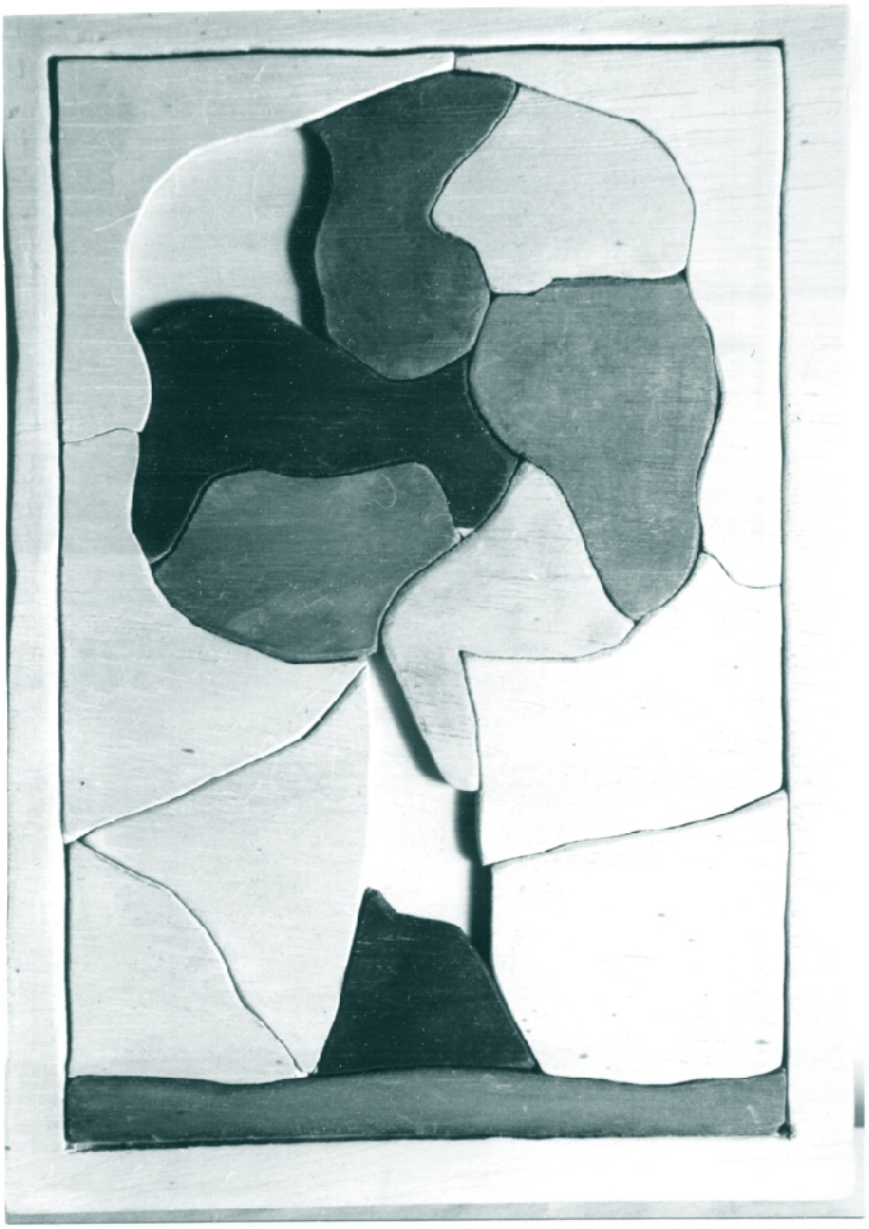
3 Saw out the motif inside

4th Saw the motif into small pieces

5 Glue the frame onto sturdy cardboard or gray cardboard.







Motif tree

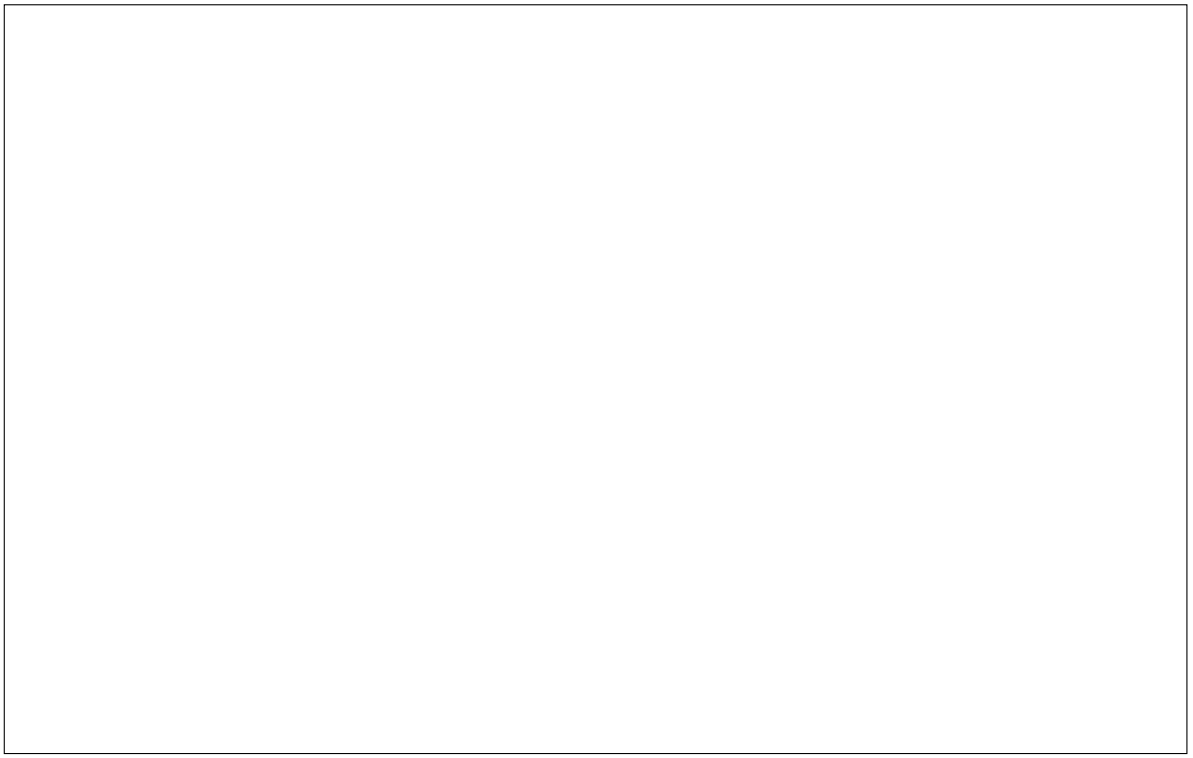
The tree parts are stained in different
Colored wood colors.

Construction drawing scale 1: 1

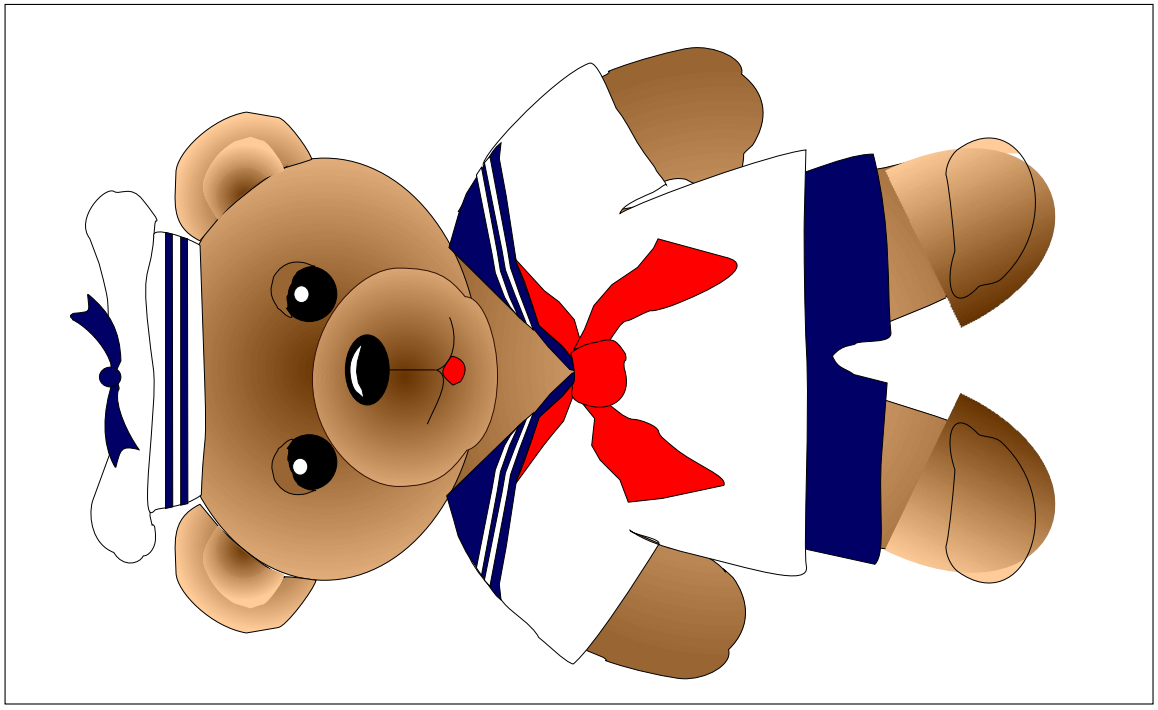
frame

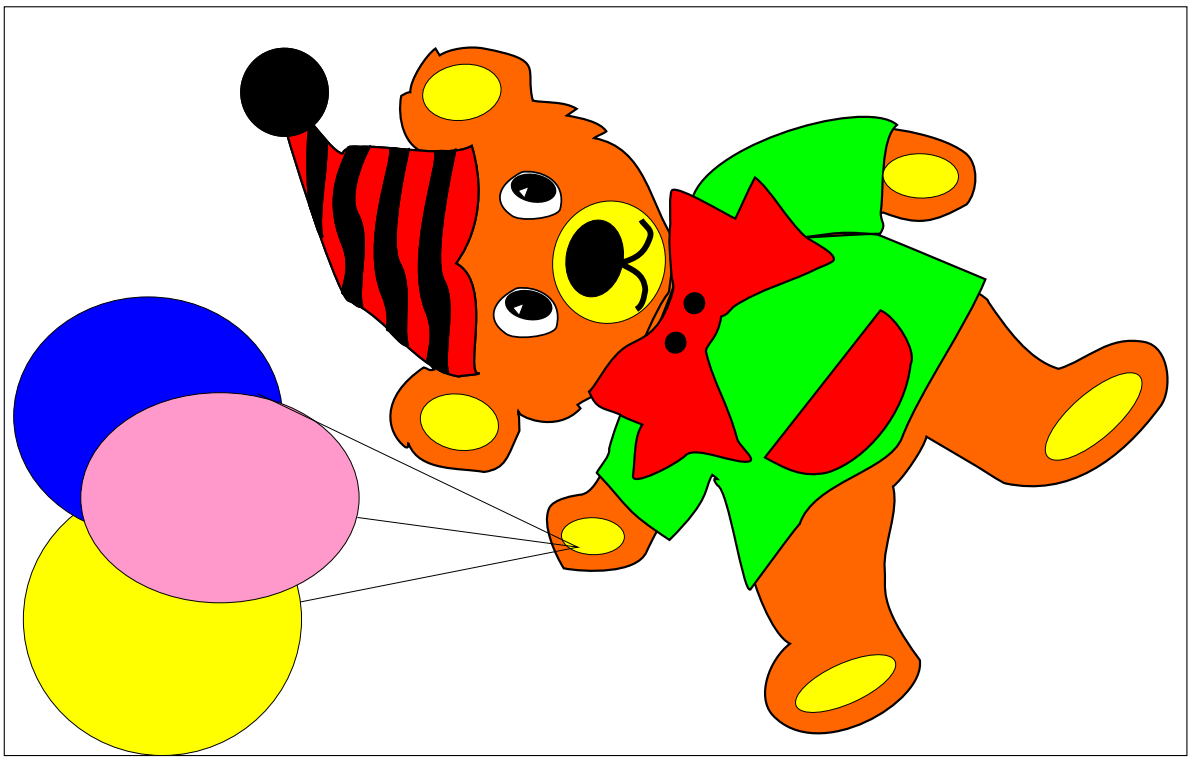
Draw your design for the puzzle here!

frame



Construction drawing scale 1: 1





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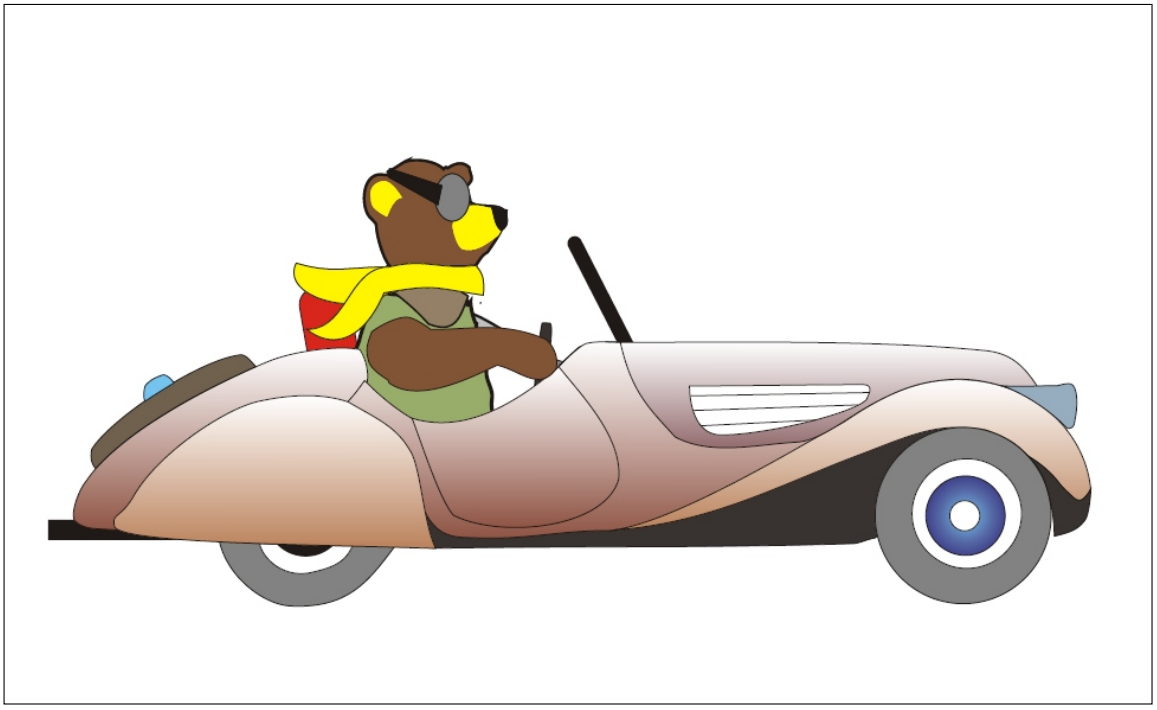
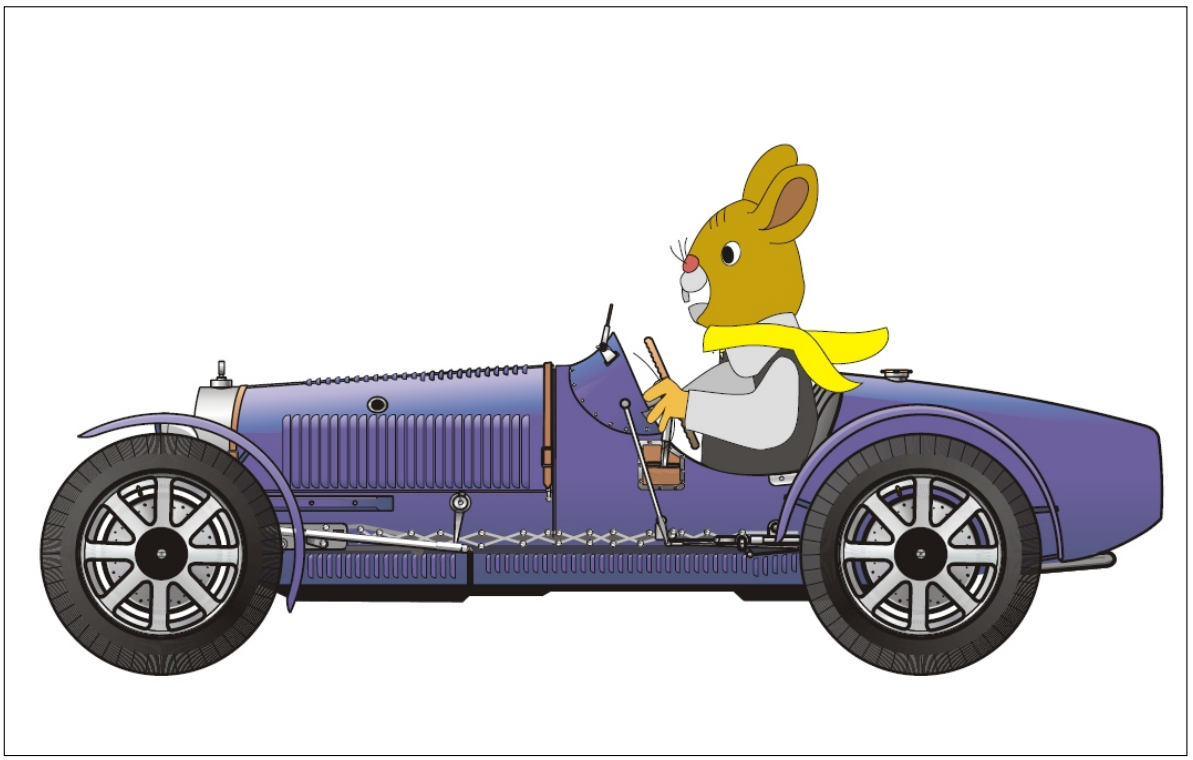
Construction drawing scale 1: 1





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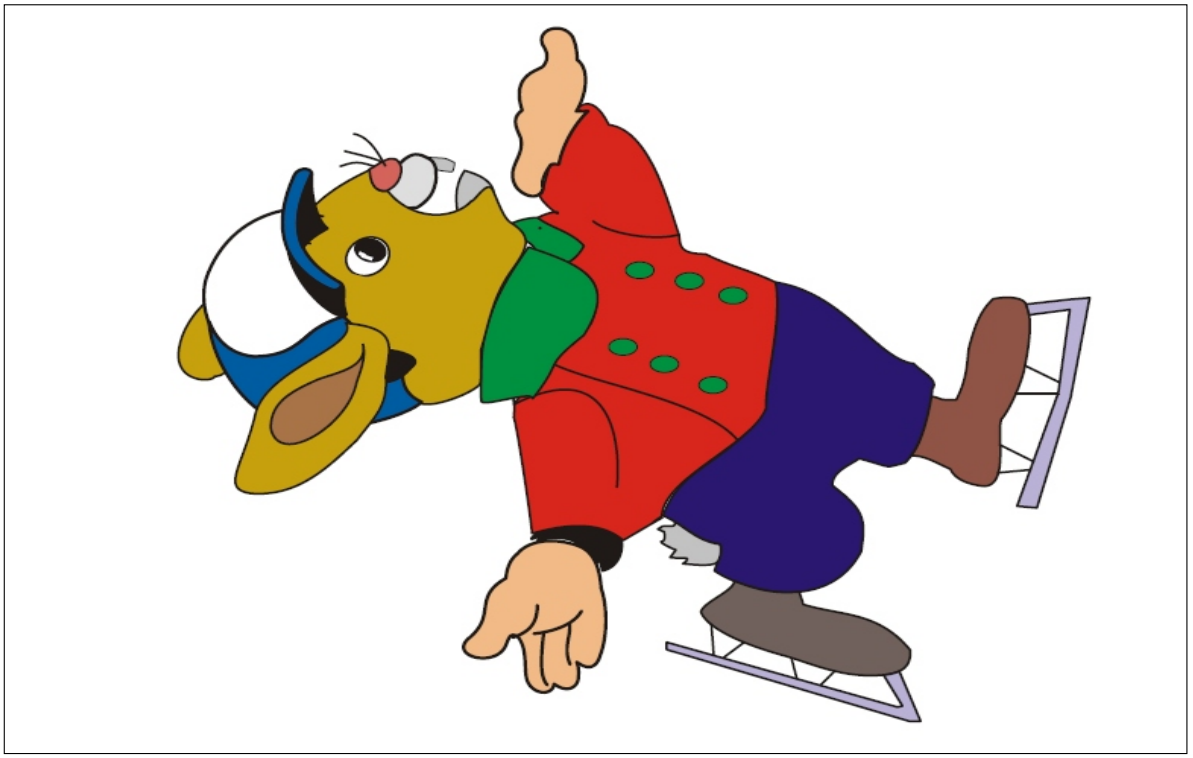
Construction drawing scale 1: 1



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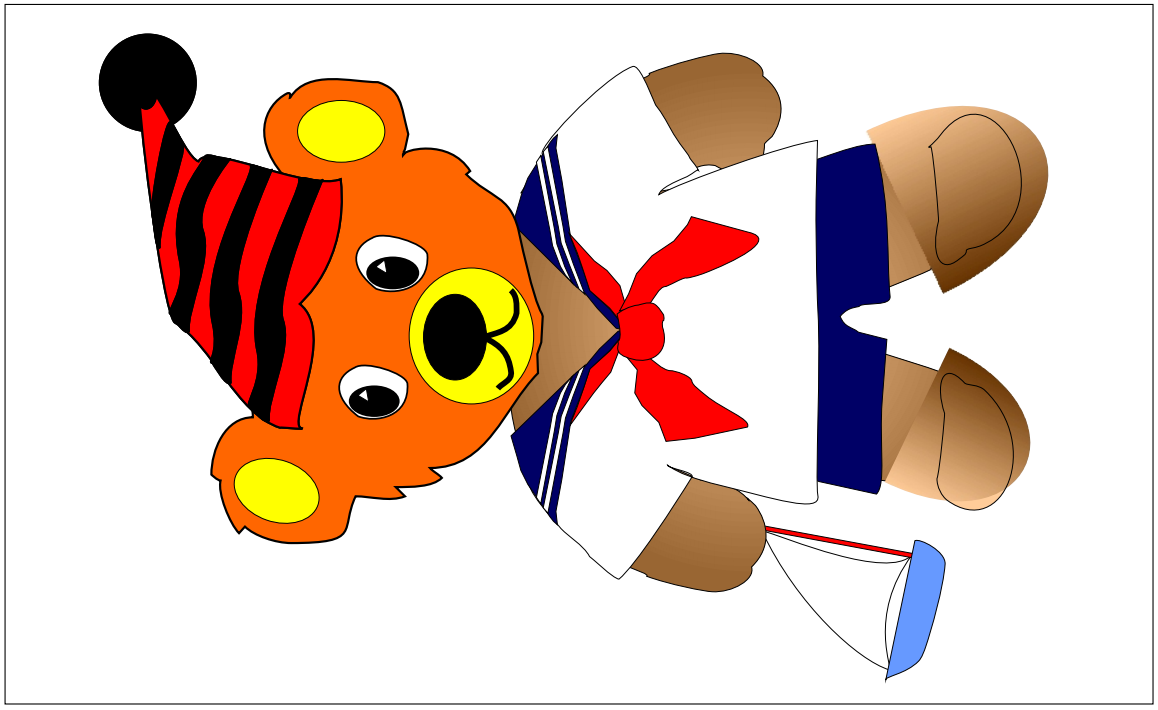
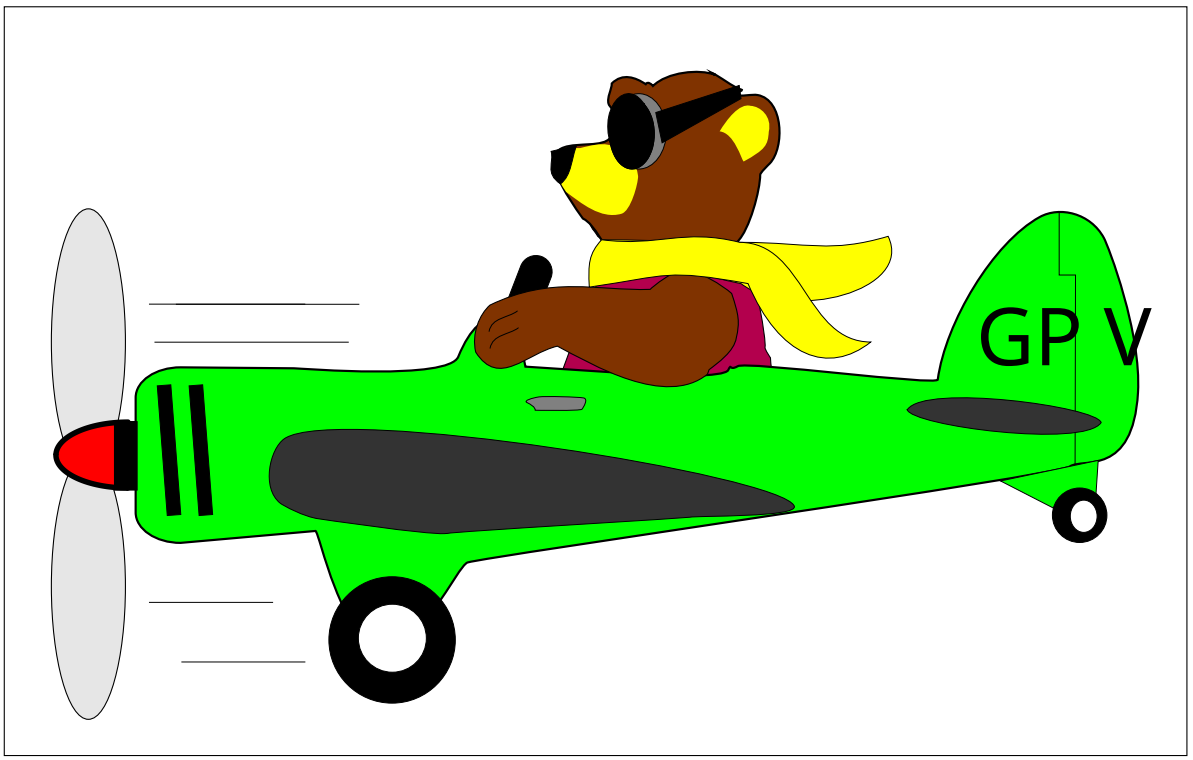
Construction drawing scale 1: 1





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Finally build something that you can use or give away. And then learn something and have fun building!

Important prerequisite for success in building: (cut before class!)
- 4 mm plywood in strips of 60 and 52 mm for the sides of the cube-shaped container
- Solid wood approx. 10 mm thick in strips approx. 70 mm wide
- sensible procedure when gluing together:
  (right-angled “room corner”) or
  Cuboid block of wood with the internal dimensions of the box

from grade 6 2/2014

Work aids for successful handicraft lessons

www.werken-technik.de

Teacher information for lesson preparation (in key words)

Material: 4 mm plywood in strips 60 mm wide and 52 mm wide (sides of the box)

Solid wood approx. 10 mm thick in strips approx. 70 mm wide (Lid)

Round wood (e.g.

250 skewers of bamboo, diameter approx. 3 mm, approx. 5 euros

http://de.opitec.com/opitec-web/articleNumber/605934

One-off production

Learning objective: Gathering knowledge when building boxes

- Preparation of a building sketch with dimensions, construction drawing
- Working techniques and tools for precise sawing
- Planning the work process
- Individual work / partner work?
- Construction of auxiliary devices (cutting box, corner of the room)

Series production

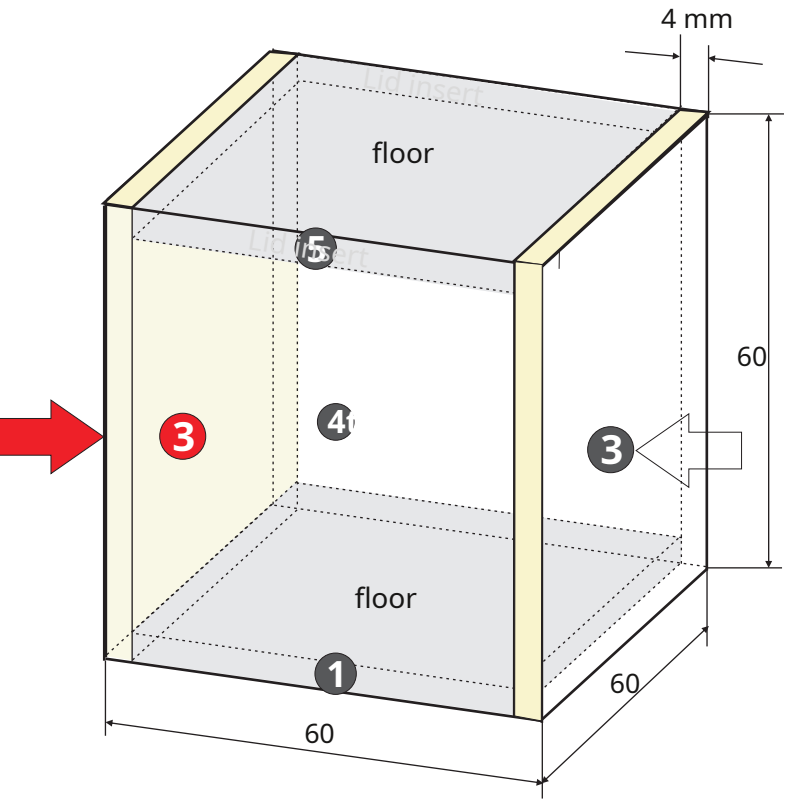
Learning objective: - Planning and organization of a meaningful workflow

- Fixture construction to achieve consistent quality
- Establishment of workplaces, workflow

Organization of lessons in the study group:

- Table group organizes small series production
- Divide the entire learning group into 2 independently acting competing production companies
- Cost-benefit calculation, organize sales (bazaar, school festival, etc.)

Comparison of single-order production / series production



Construction drawing for plywood 4 mm

3

big page
Left

60 x 60 mm

3

big page

to the right

Components for the box

Scale 1: 1

Solid wood lid (10-12 mm thick)

4

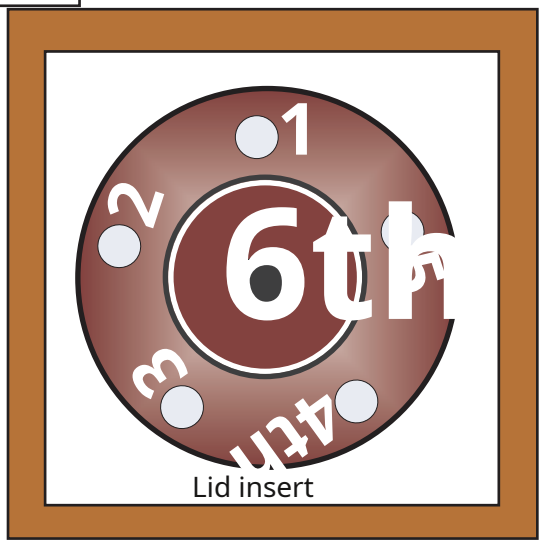
small page
front

52 x 60 mm

2

small page
rear

52 x 60 mm



Lid insert

1

Base plate

52 x 52 mm

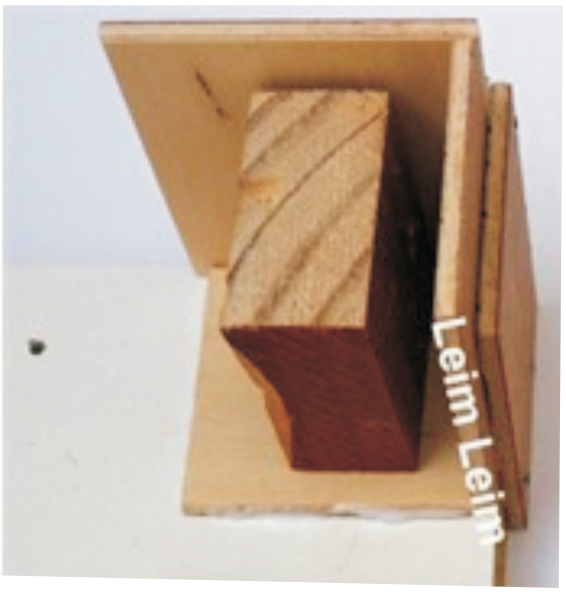
5

Lid insert

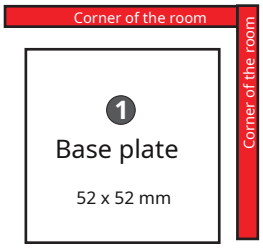
The 4 mm diameter hole for 1 to 5 is drilled with a depth stop so that it does not go right through.

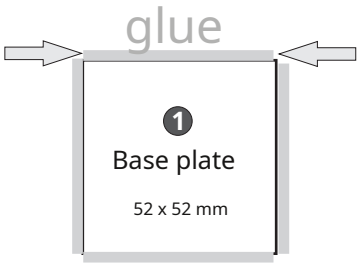
The hole at 6 with a 6 mm diameter is continuous.

Assembly instructions (assembling the box)

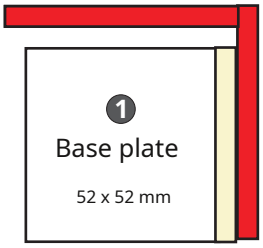


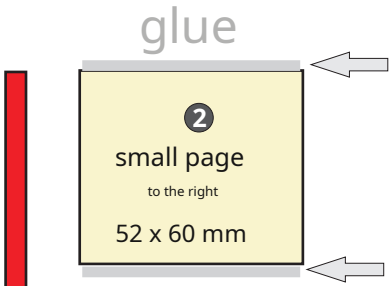
Top view



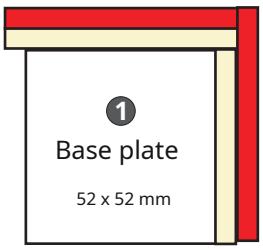


1 Spread glue on the edges of the base plate and place it in the corner of the room (4mm distance)

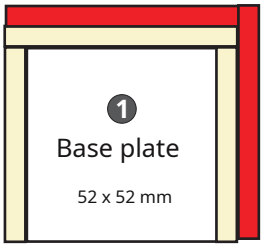


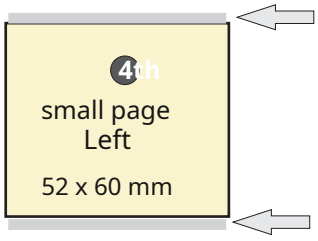


2 Spread glue on two edges on the right side and place in the corner of the room

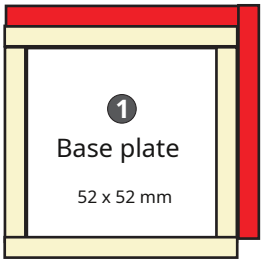


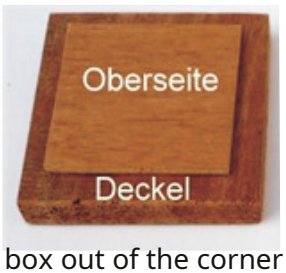
3 Place the side in the corner of the room





4 Spread glue on two edges on the right side and place in the corner of the room





Now fit the cover on top and press the last missing side onto the base plate and the sides from the front.

Carefully lift the finished box out of the corner of the room, slip on the rubber ring. After 5 minutes, check the correct fit of the pages again, remove the cover, adjust the pages a little if necessary and then let the glue set.

Form for the stickers

The fertige game

Form for the rules of the game

Fold the form twice so that it fits in the box

Rules of the game

www.werken-technik.de

Each of the 2 to 6 players receives the same number of wooden sticks (5 sticks are a good number, for example) .
Now the dice are rolled one after the other and the sticks are inserted into the hole corresponding to the number of dice. If the hole is already occupied, the stick must be picked up and the next player throws the dice. If you roll a six, the stick can disappear into the hole in the middle of the lid.

Whoever runs out of chopsticks first is the winner.

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www.werken-technik.de

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Now the dice are rolled one after the other and the sticks are inserted into the hole corresponding to the number of dice. If the hole is already occupied, the stick must be picked up and the next player throws the dice. If you roll a six, the stick can disappear into the hole in the middle of the lid.

Whoever runs out of chopsticks first is the winner.

Rules of the game

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Chopstick game

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Chopstick game

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Chopstick game

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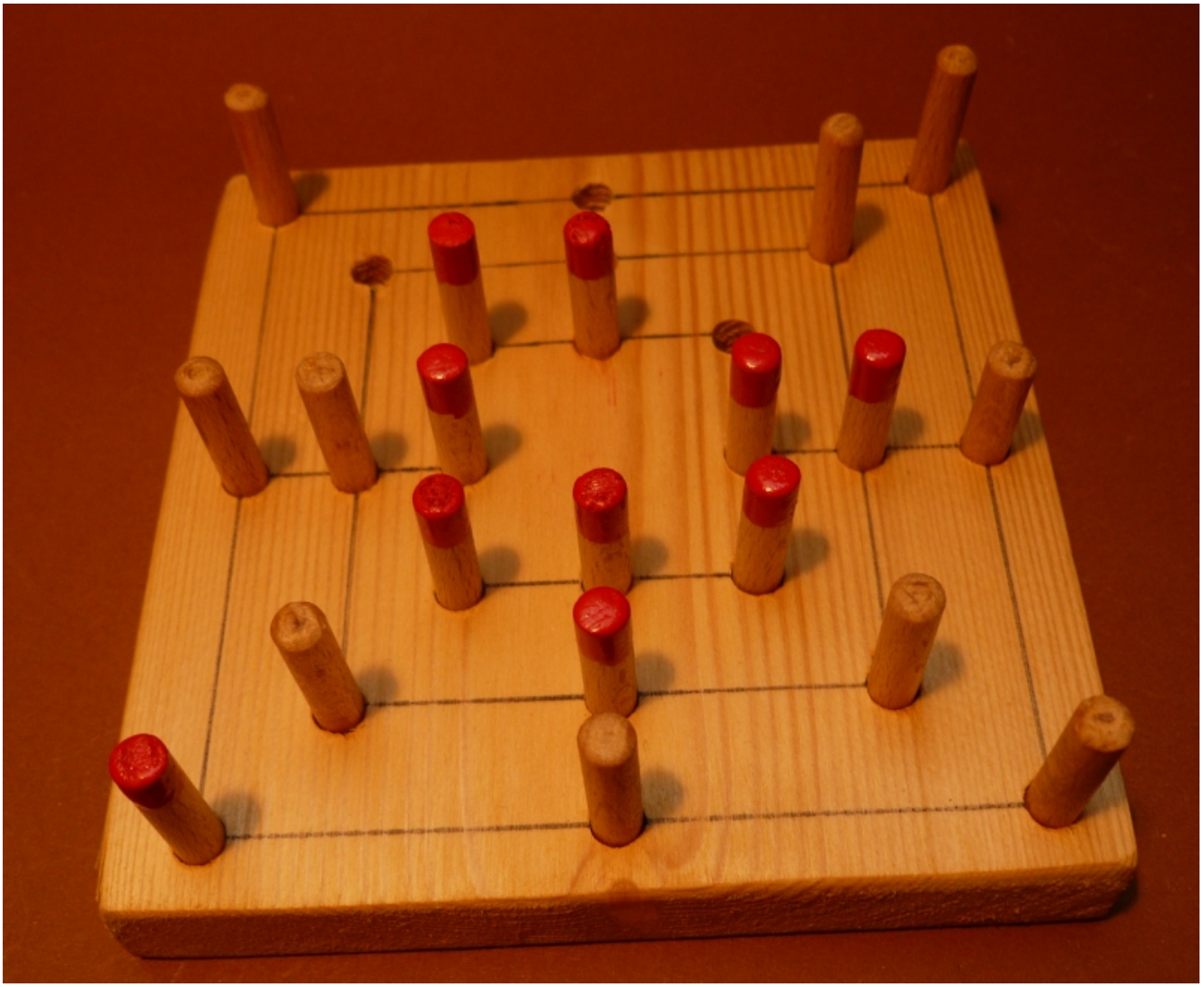
Heiner Prüser



mill

Mill is a simple board game for two players in which chance does not play a role. The basic principle is to get three pieces in a row. Mill is played on a game board with three squares one inside the other with connecting lines in the middle of the sides.
The game pieces are usually nine black and nine white round, flat game pieces, which are usually made of wood or plastic. Other colors are also possible.
Here in the photo round bars with a diameter of 6 mm are used as game pieces.

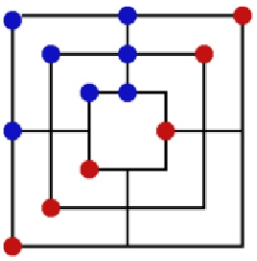
Factual information the end **http://de.wikipedia.org/wiki/Mühlespiel**

General

Mill is a Game with complete information. In addition, it is a fair game: it has been shown that neither the newcomer nor the newcomer can necessarily win. In the case of equally strong experienced opponents, the game often ends in a draw, whereby the following player has an advantage in contrast to chess because he is allowed to put the last piece on the board. When the last stone is placed, the player who is moving can make a possiblezugzwang to calculate. ETH Zurich provided evidence that the game always ends in a draw if neither player makes a mistake.

As early as 1993, the game was played by *Ralph Gasser* at the ETH Zurich completely solved for the first time.

Compared to Chess game Mühle has significantly fewer variants. While in chess the number of theoretically possible positions is 2.28 * 10_{46} is estimated, there are only round at Mühle 1.8 * 10_{10} different positions (which cannot be converted into one another through rotations and reflections).
Mill is not a trivial game:
The position opposite corresponds to the position with the longest winning distance. Red on the move wins in 165 executions with a perfect play of both colors.



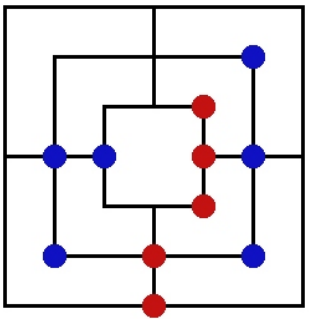
Red train.
Win in 165 moves

Gameplay

The game runs in three phases:
Setting phase - The players take turns placing one stone each, a total of nine each, on intersections or corners of the board
Pull phase - The pieces are drawn: in each round, each player may move one piece to an adjacent, free node.
Final phase - As soon as a player only has three stones left, he can jump with his stones: The player can now jump with one stone to any free node on the board per round. As soon as another stone is taken from him, he has lost the game.
As soon as a player can no longer make a valid move, he has also lost. Three stones of one color lying next to each other in a straight line on squares are called a "mill". When a player closes a mill, he may remove any of his opponent's stones from play, provided that this stone is not also part of a mill. The official tournament rules do not allow stones to be knocked out of a closed mill even in the final phase. However, this rule differs from region to region and is sometimes handled differently in commercially marketed products.

strategy

Especially during the initial phase of the game, it is less important to set up mills early on than to ensure that your stones can move freely. The four crossing points of the mill board are to be occupied preferentially, while the corner points are to be avoided. In addition, when hitting a stone, it is usually better to open an additional mill of your own than to prevent an opponent's mill.
The following situations are particularly desirable:
The red stones form a so-called "dilemma", this means that the red player can close a mill with each round.
This allows him to quickly decimate the opponent's stones without the latter being able to take effective countermeasures.



http://www.haraldhamster.de/muehleregeln.html

matchfield

The playing field consists of three squares drawn one inside the other. In the middle, all three squares are connected by a straight line.

Game pieces

Both players receive 9 pieces each: one player 9 white pieces, the other 9 black pieces. (or as in the self-made game 9 natural-colored or 9 colored round rod ends).

Goal of the game

To make a mill you have to put 3 stones on a line. The aim of the game is to take so many stones away from your opponent that he can no longer make a mill.

Start of the game

A draw will be made to determine which player starts. The winner of the lottery places his or her stone on a corner of a square or an intersection of the center lines. Then the second player also places a stone. If a player can place three stones on a line, he may take any stone away from the opponent.

After setting

When all 18 stones have been placed, the players take turns moving one stone to an adjacent free space. A player who can no longer make a valid move has lost.

Leap

If a player only has three stones left, he can jump into any free space.

end

The game is over when a player only has two stones left.

Mill game online:

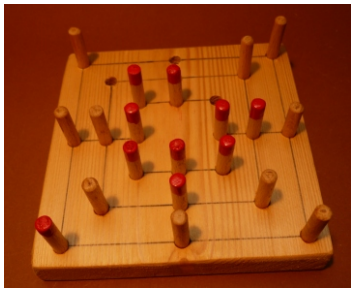
http://www.theoinf.tu-ilmenau.de/~nuetzel/mindstorms/muehle2003/anleitung.html

Information about the mill game: http://www.mathematische-basteleien.de/muehle.htm

What is the mill game?
Game play and rules
initial phase
Middle phase
End phase Two special cases The
game of the mill is solved

Surname:

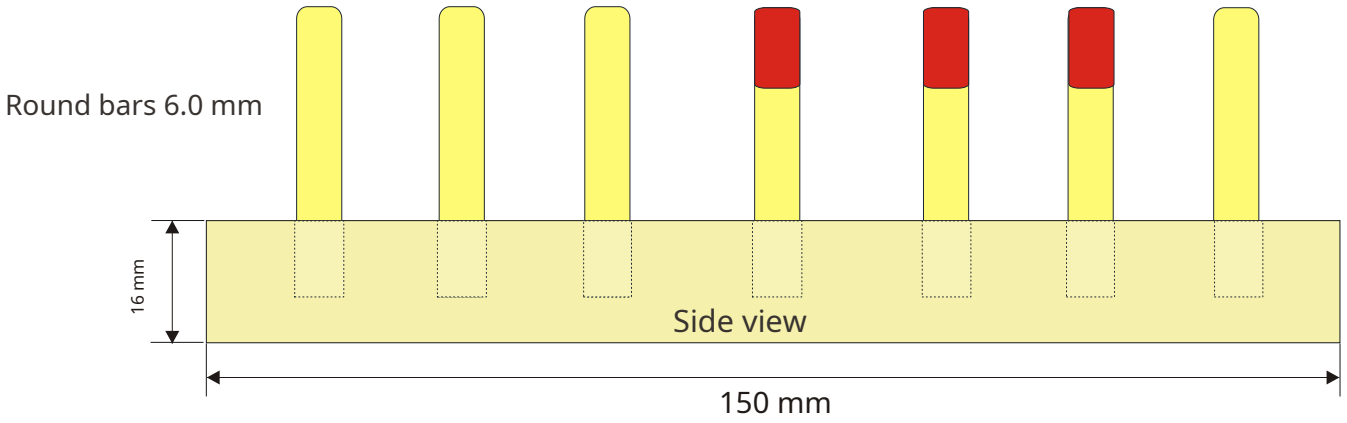
Building instructions on a scale of 1: 100

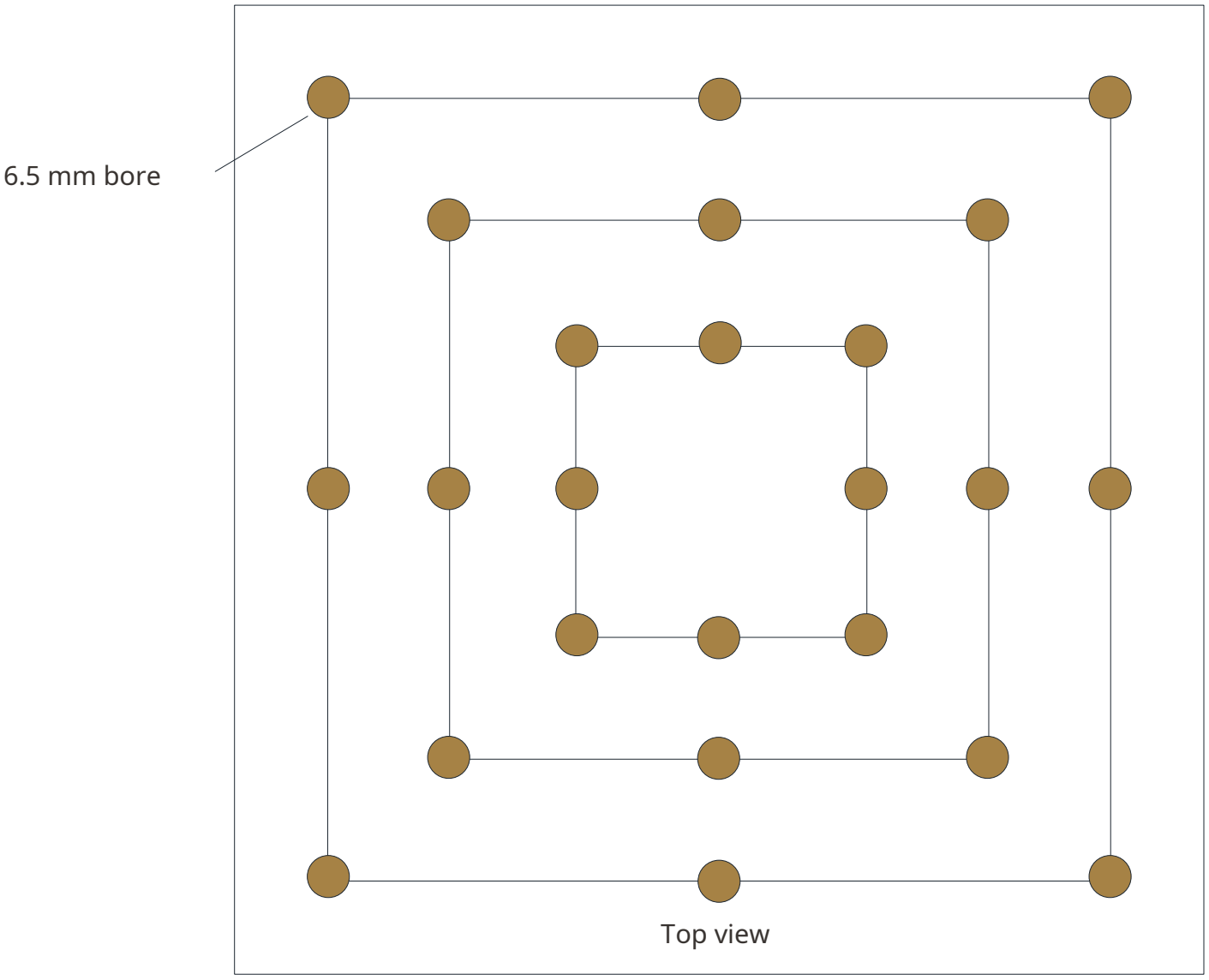


For the game of the mill, two times 9 pieces are required.

In the photo, round bars 6 mm have been sawn off to the same length (cutting box) and 9 of them have been dipped in color at one end.

Tip: Pre-pierce the drill holes carefully and carefully with little pressure and Drill the depth stop. (Avoid breaking out the drill holes!)





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Heiner Prüser

Sphere - maze

A simple puzzle / balancing game:

The task allows many variations with different levels of difficulty:

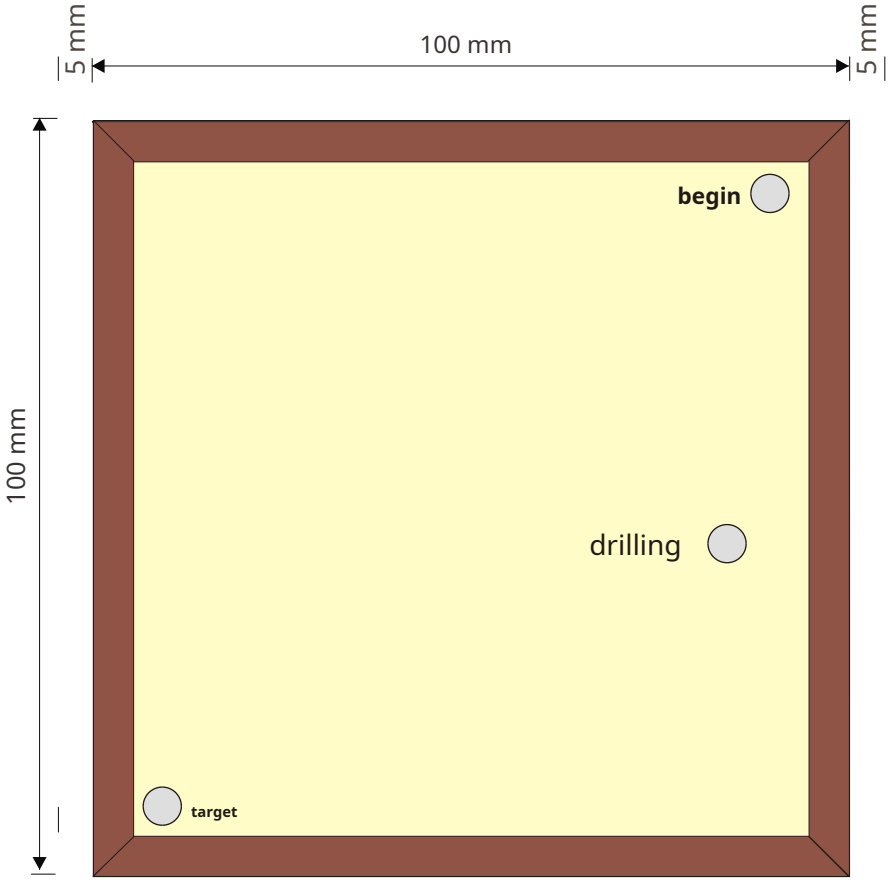
- Construction according to your own design or according to given instructions
- Play open or closed / frame with miter cut or butt joint

Work aids for successful handicraft lessons

www.werken-technik.de

Surname:

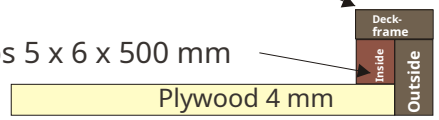
building instructions



Material:

2 strips 5 x 10 x 500 mm

2 strips 5 x 6 x 500 mm



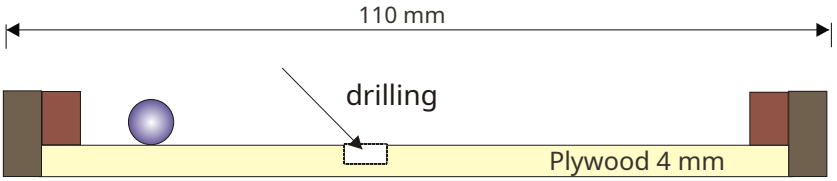
1x plywood 100 x 100 mm

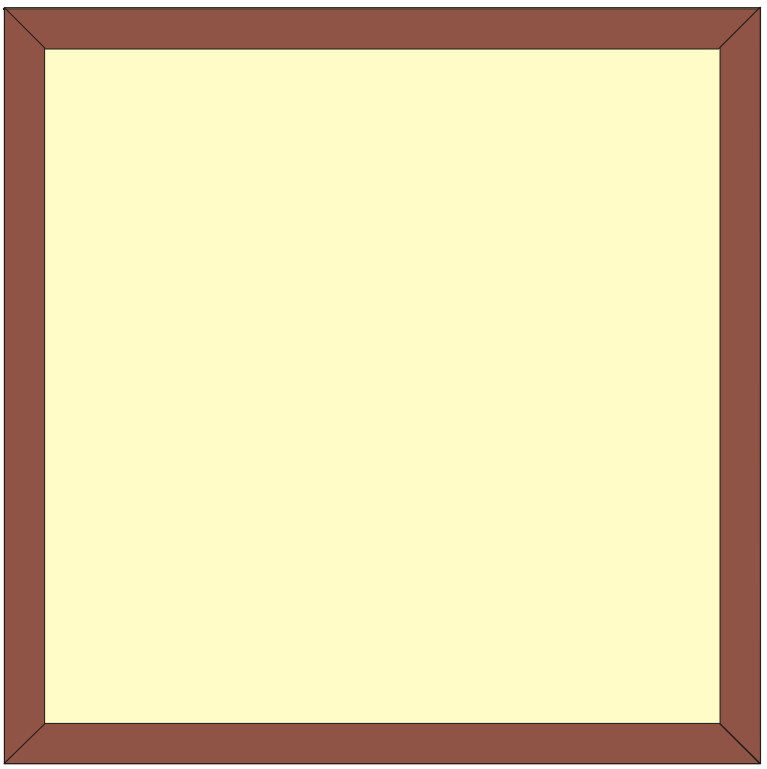
1 steel ball 6 mm

Strip and round bar sections for the design of the labyrinth

The plywood board is designed with holes 5 mm in diameter and obstacles of your choice so that a play maze is created.

The player has to balance the ball from start to finish as quickly as possible.





1. **Design the play area** so that the most interesting labyrinth possible for a balancing game is created.

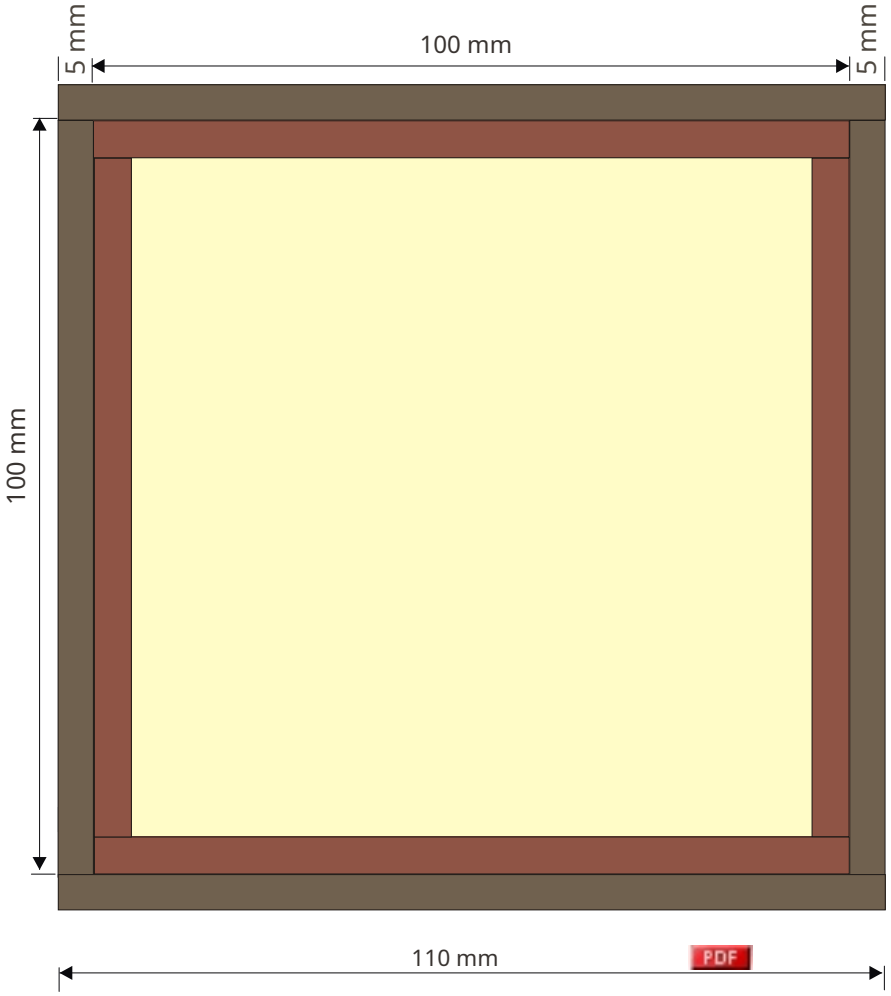
   You can use a wide variety of materials for this.

   Make two different plan sketches beforehand.

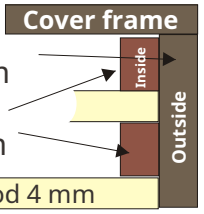
2. Build the housing in a neatly crafted manner with a mitred frame.

Surname:

building instructions



Material: foil



1 strip 5 x 25 x 500 mm

2 strips 5 x 7 x 500 mm

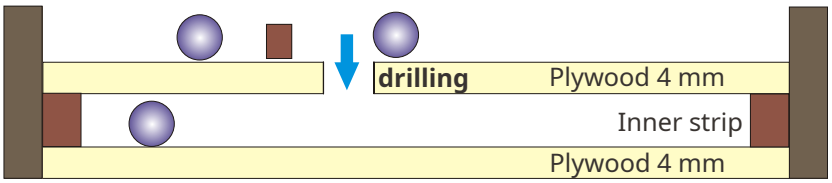
2x plywood 100 x 100 mm

1 steel ball 6 mm

1 **Design the play area**, so that the most interesting possible labyrinth for a balancing game is created.

2 Build the housing neatly by hand with a frame in miter or overlay.

3 If desired, a transparent film is placed on the frame, which is then attached with a cover frame.



open maze game with 2 floors

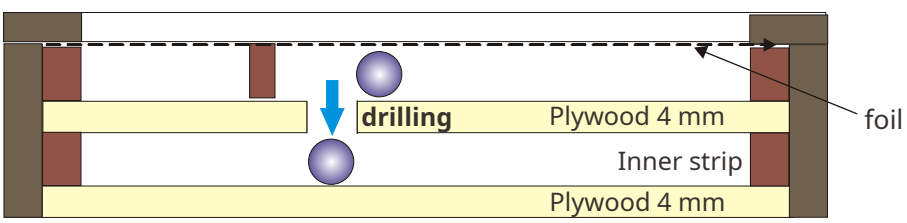
The holes can be made with different diameters:

<6 mm: The ball is only stopped.

> 6 mm: The ball falls from the upper level to the lower level.

Closed labyrinth game with 2 levels and cling film

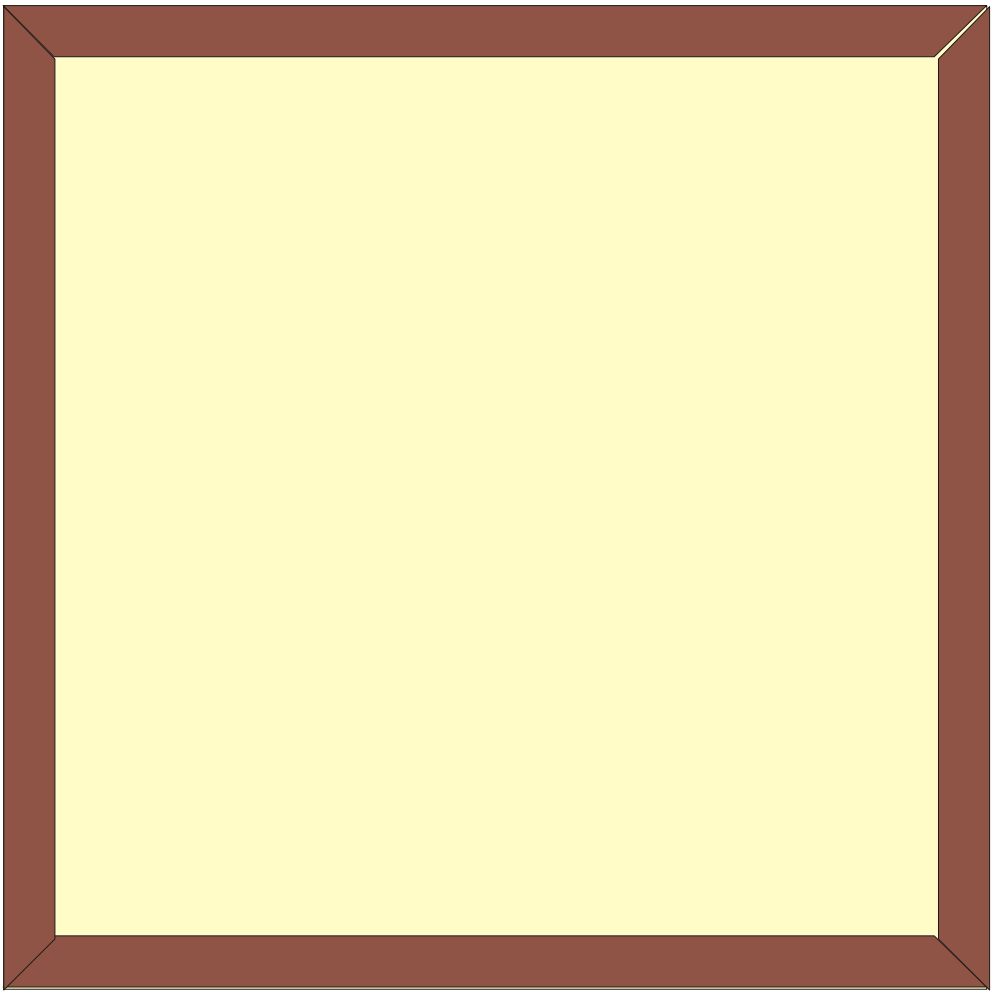
A cling film completes the game: so the ball can no longer be lost.



other designs

LABYRINTH, extra large Real wood game of skill, 325 x 305 x 85 mm Item no. 322048

Partner skill game maze



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Heiner Prüser

Flying Horse

As can be seen above, the horse is moved by a crank made of 2 mm welding wire. The crank is stored in 2.5 mm holes in the side walls made of 4 mm plywood.

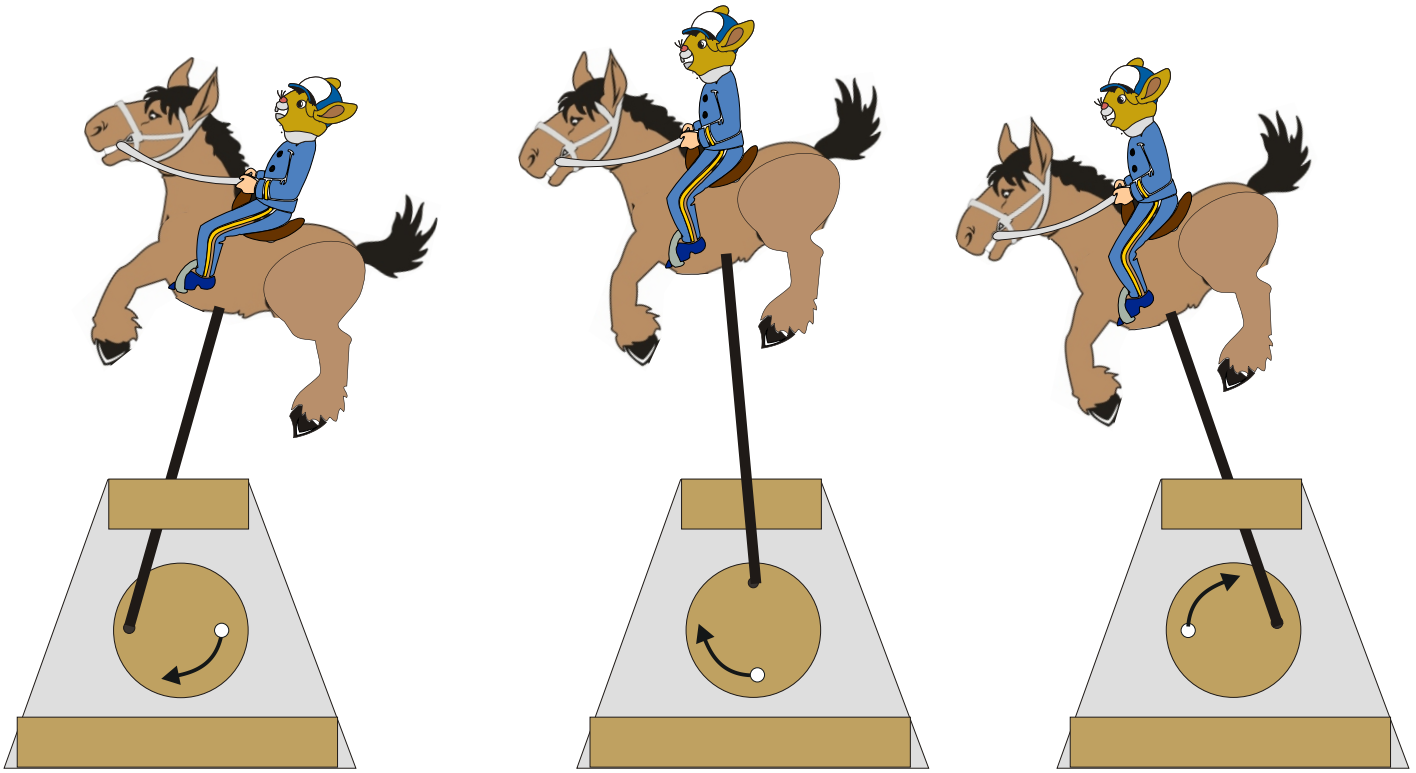
The rear legs are flexibly glued to 4 mm round wood. The horse's body made of plywood is simply attached to the connecting rod made of 1mm welding wire.

The form of movement depends on 2 factors:

- crank stroke
- Distance of the guide hole for the connecting rod from the crank

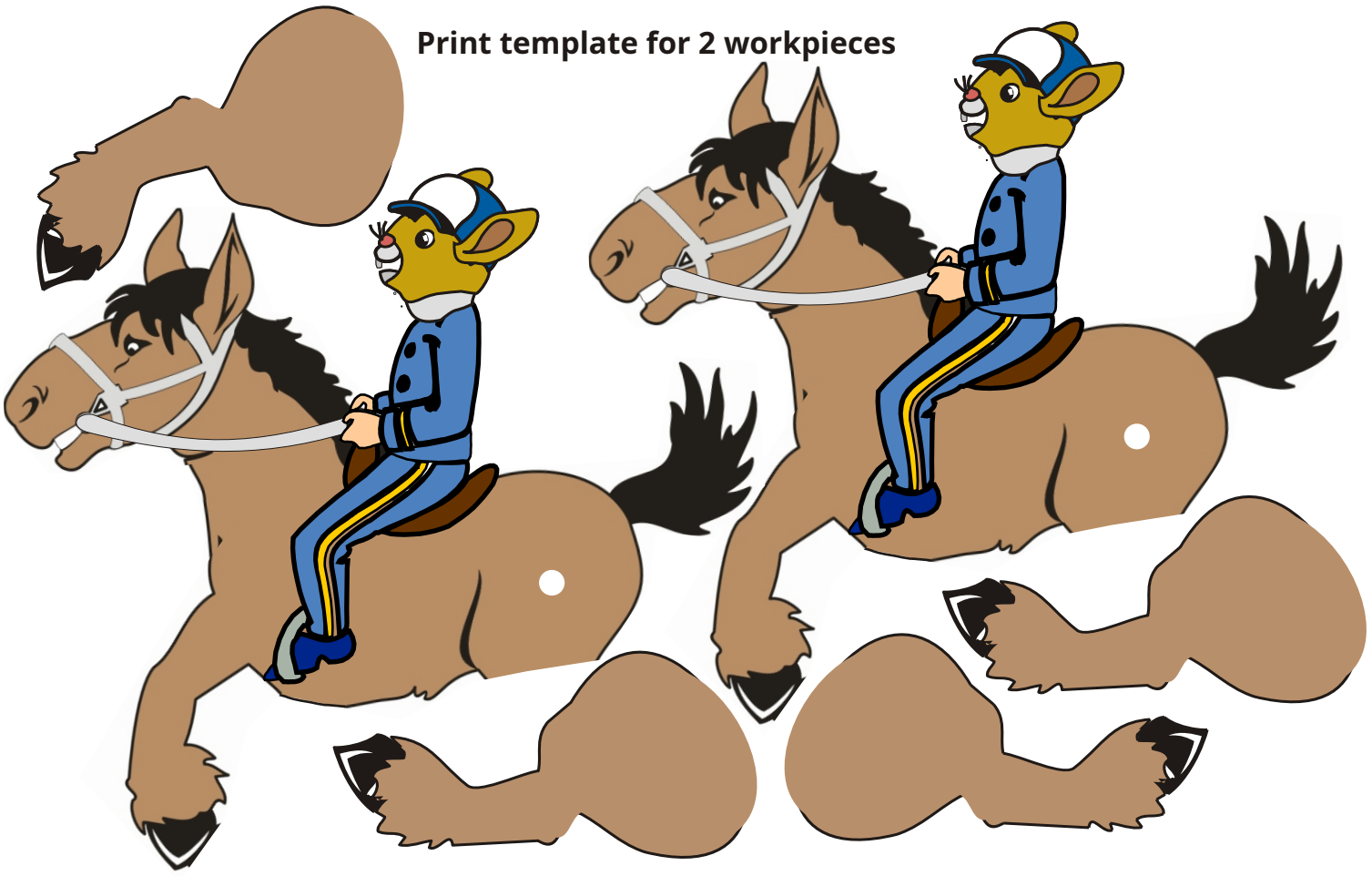
Origin of movement

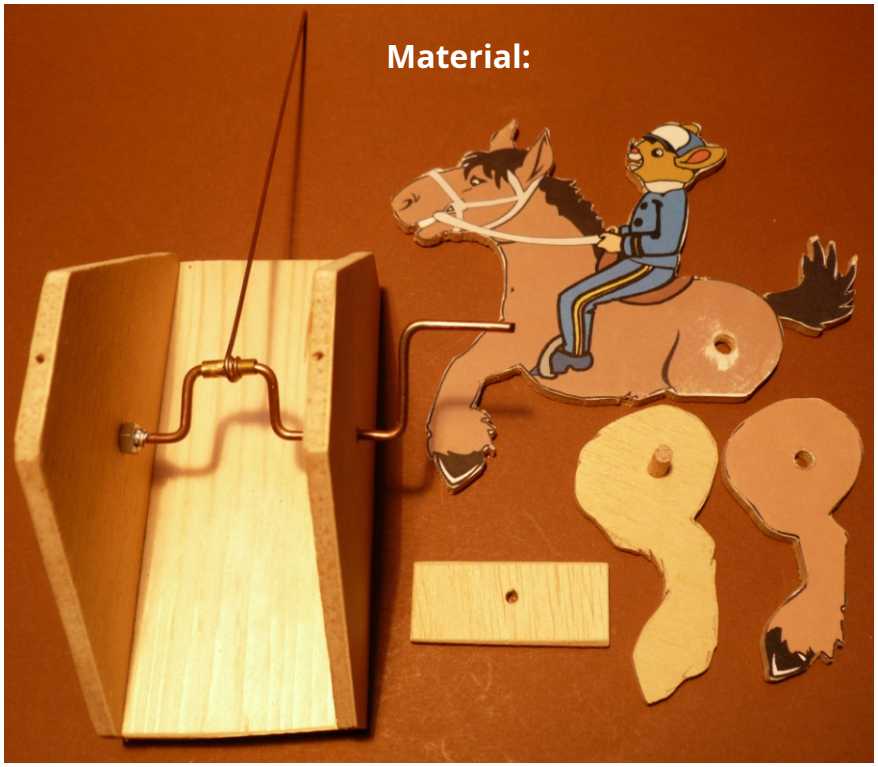
Artwork



hes for that
s horse

Print template for 2 workpieces





Material:

1 wooden strip
Plywood 4 mm

Welding wire 2 mm
Welding wire 1 mm

1 rivet for the connecting rod bearing

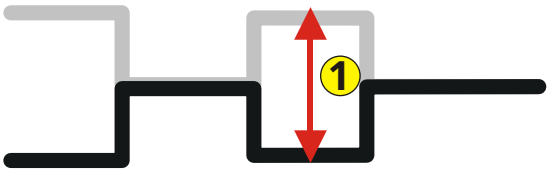
Task: Use the crankshaft to create the most interesting possible movement of the Horse.

Glue color prints onto plywood and saw them out

Bend the connecting rod to form an eyelet and solder it in place

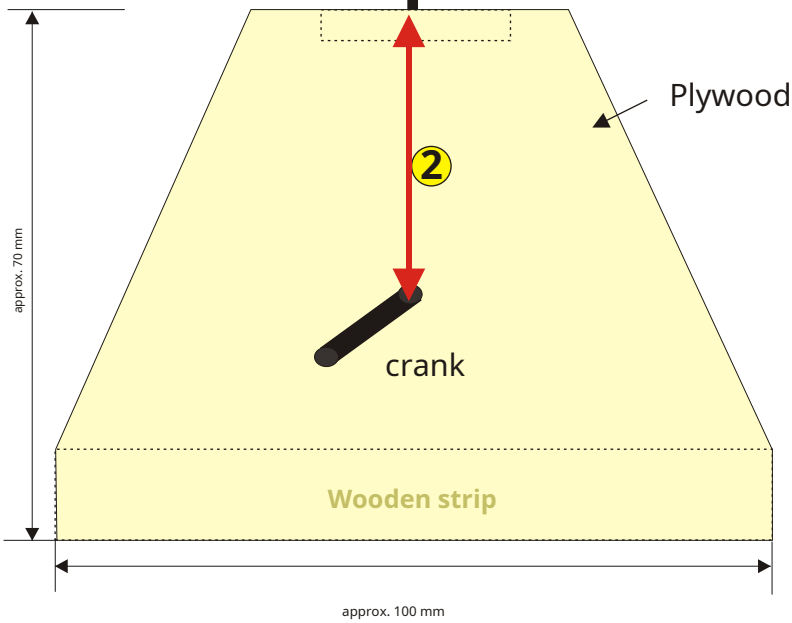
The form of movement depends on:

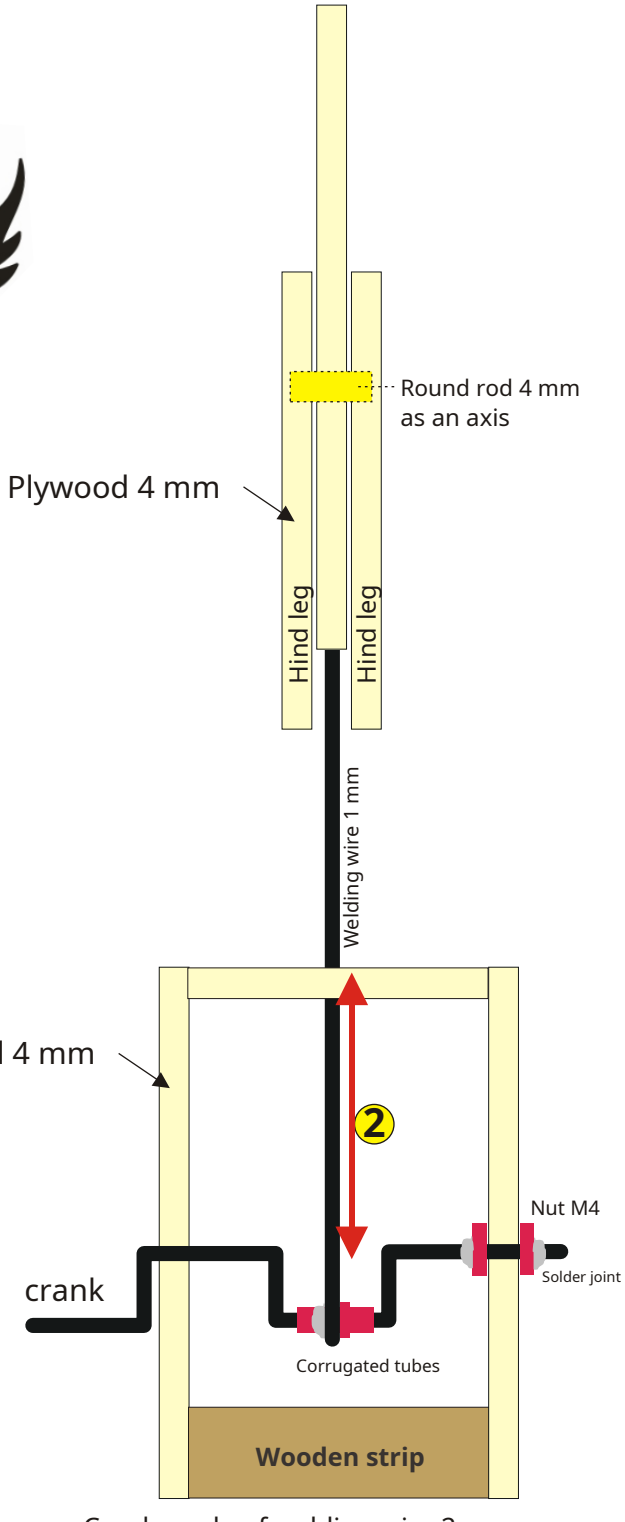
1. **Crank stroke**
2. **Distance of the guide hole**
   for the connecting rod from the crank



Side view

Scale 1: 1





Crank made of welding wire 2 mm

Photo examples

The horse's body made of plywood is simply plugged onto the connecting rod made of 1mm welding wire.

Here the connecting rod is a little longer than in the photos on the previous page.

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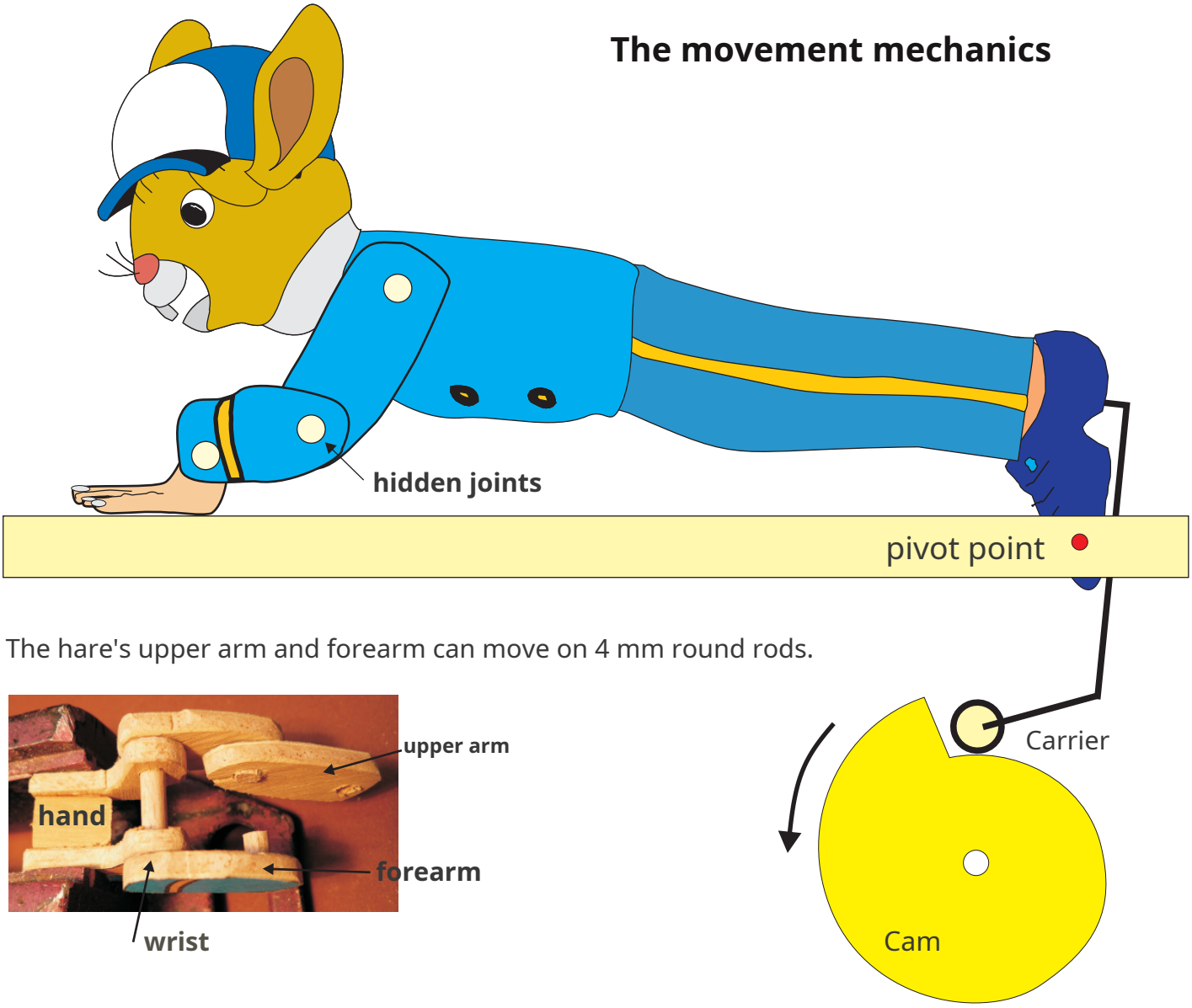
Heiner Prüser

pushups

This task leaves a lot of space for free design ideas. The photo shows a version with reduction gear 1: 8 on the the push-up rabbit is detachably attached with 2 welding wires 2 mm. See also the task "abdominal muscle trainer", which is a bit easier to build.

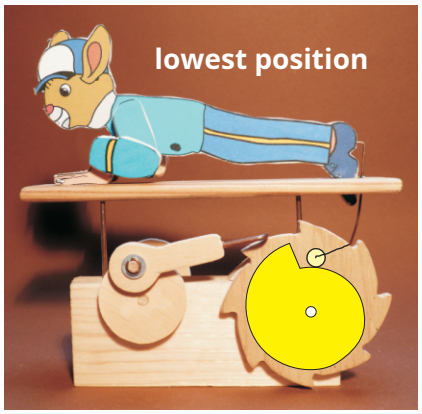
The movement mechanics

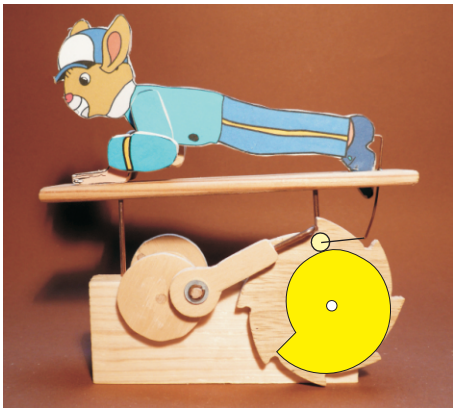


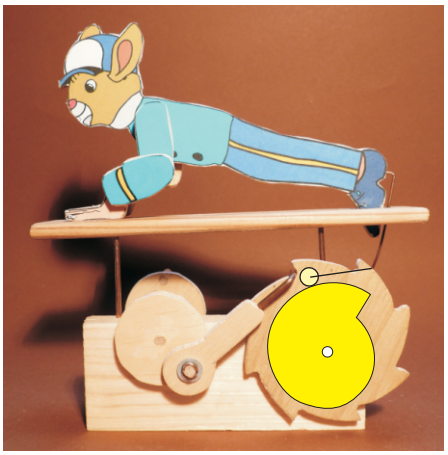
The hare's upper arm and forearm can move on 4 mm round rods.

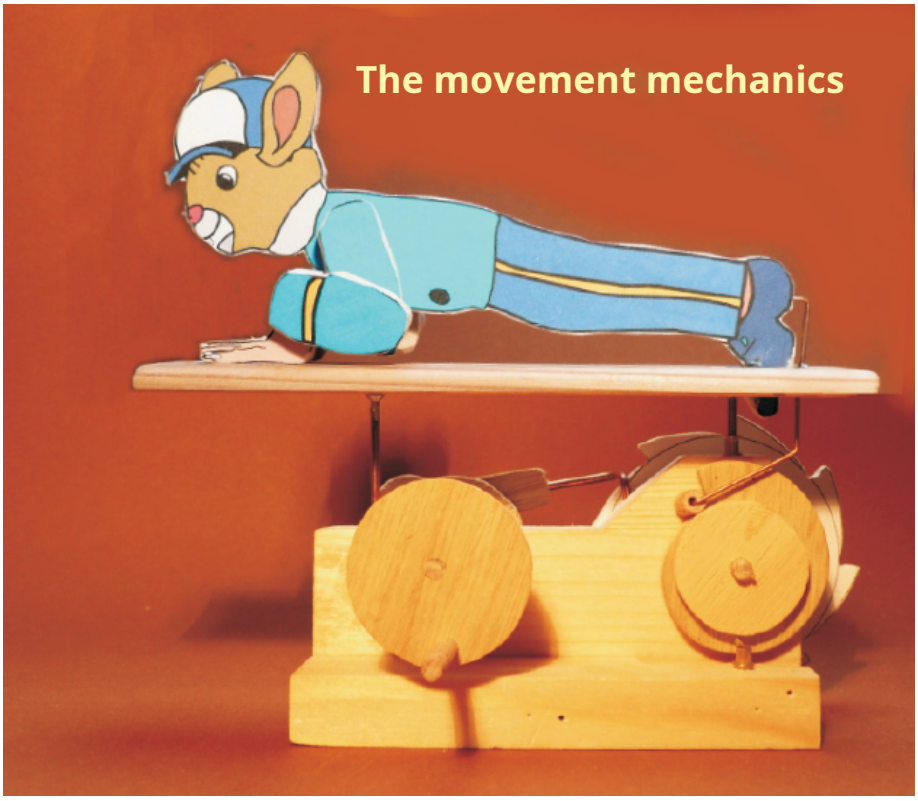
The entire body rotates around the pivot point in the shoe.

The driver with the roller is through the cam lifted and thereby turns the body into a steeper position. This will stretch your arms because your hands are glued to the mat.

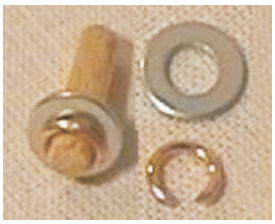








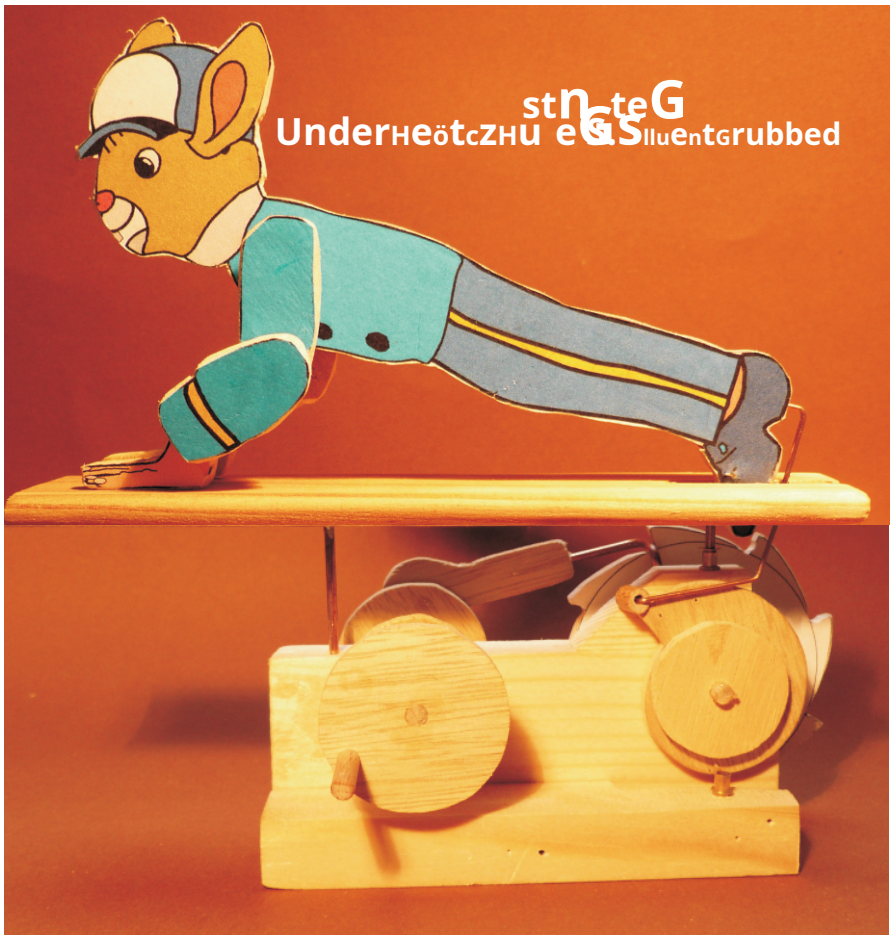
This task leaves a lot of space for free design ideas.
The photo shows a version with reduction gear 1: 8, on which the push-up training rabbit with 2 welding wires 2 mm is detachably attached.



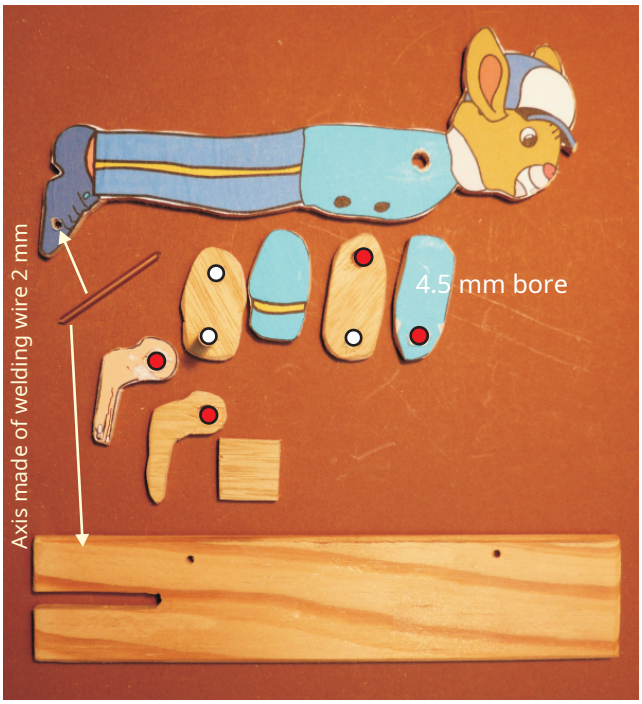
As axes to serve Round bars with 4 mm Diameter. Clamping rings made of welding wire with a washer in front of them secure moving parts on the rods from slipping. The clamping rings are wound as a spiral on a 4mm rod, which is clamped in a vice.

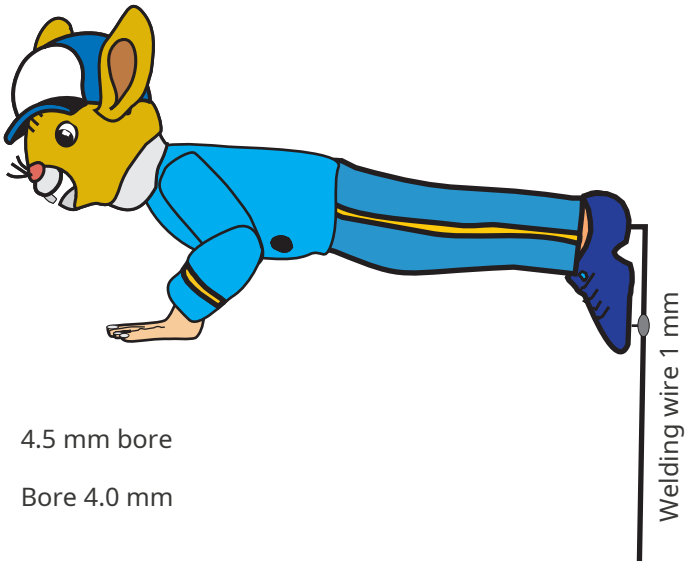
The gearing in this photo reduces the movement so that the cam disc makes one revolution when the drive crank is turned eight times.

Of course, that is much easier **Direct drive** via a crank disc.



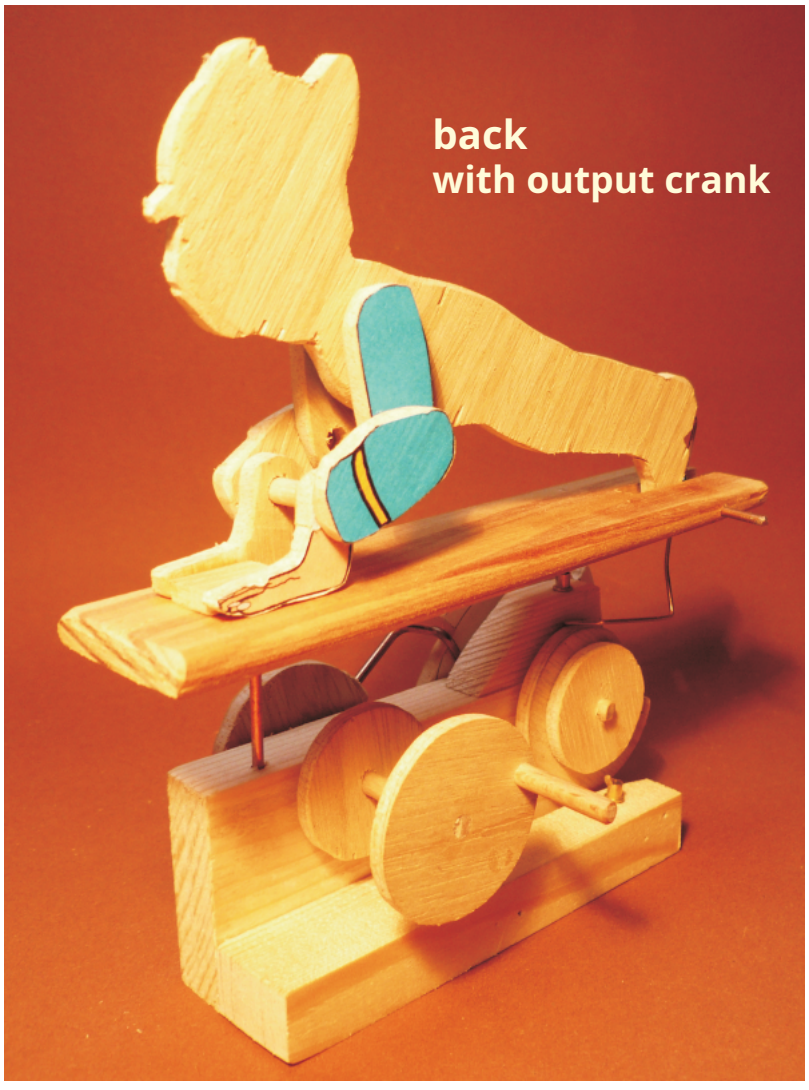
Building instructions for the figure





- 4.5 mm bore
- Bore 4.0 mm

For the 4.0 mm hole, set the drilling depth stop so that the hole remains invisible from the outside, as shown in the picture.
Then saw off 4 mm round rods and put the figure together on a trial basis and test the flexibility!

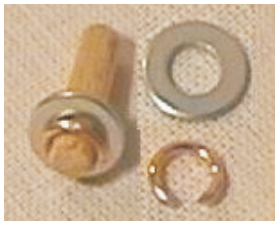


When the figure does the movement
as required
carries out the
Carrier lever on
foot
attach:

Use the pliers to push the end of the wire into the plywood
push in.

A little nail
push in and the
Driving wire
solder on.

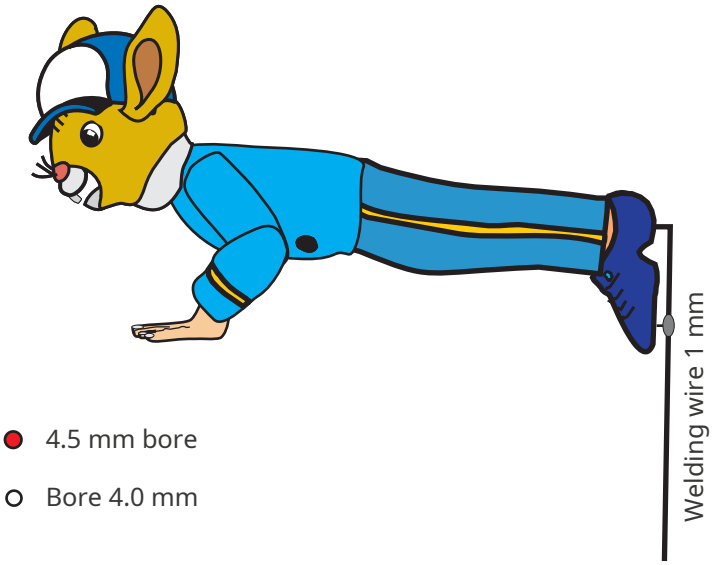
Round rods with a diameter of 4 mm serve as axes.



Clamping rings off
Welding wire with a
Washer in front of it
secure moving parts on
the rods from slipping

building instructions

Model arch

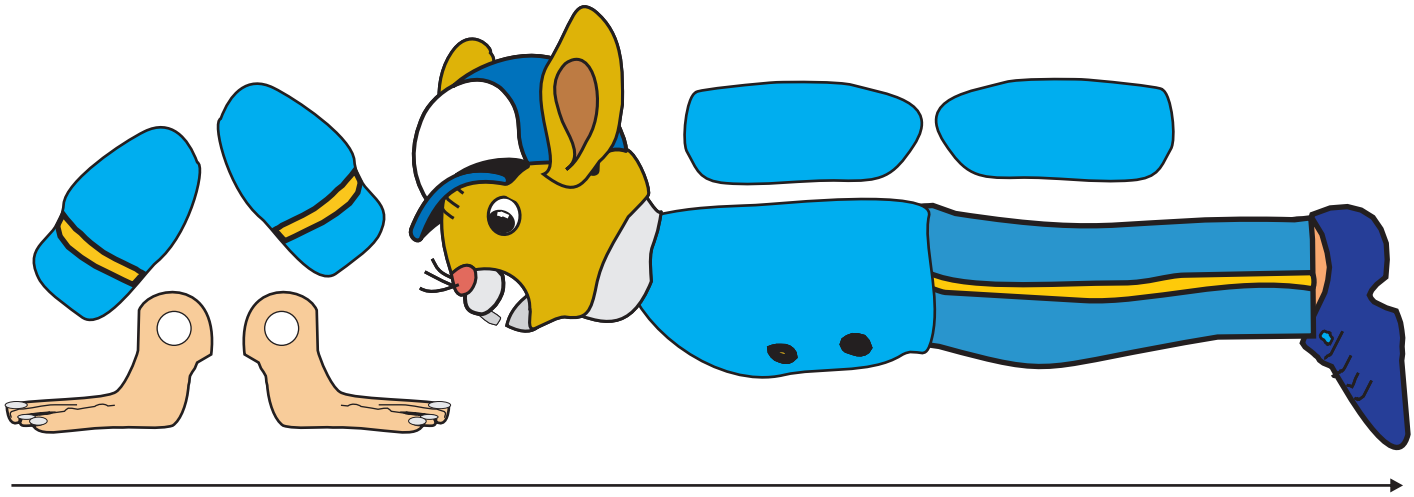


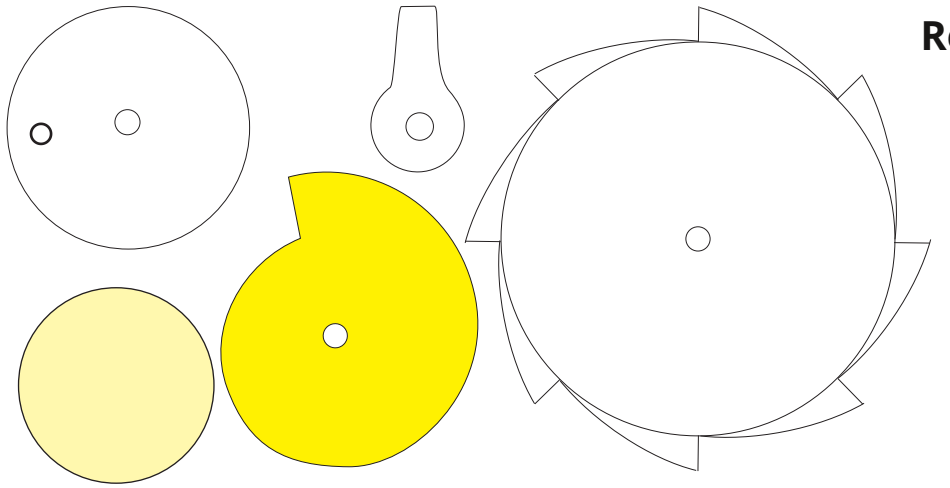
- 4.5 mm bore
- Bore 4.0 mm

For the 4.0 mm hole, set the drilling depth stop so that the hole remains invisible from the outside, as shown in the picture.
Then saw off 4 mm round rods and put the figure together on a trial basis and test the flexibility!

The easiest way is this:

Print out this page in the color printer, glue the parts onto plywood and then saw them out.



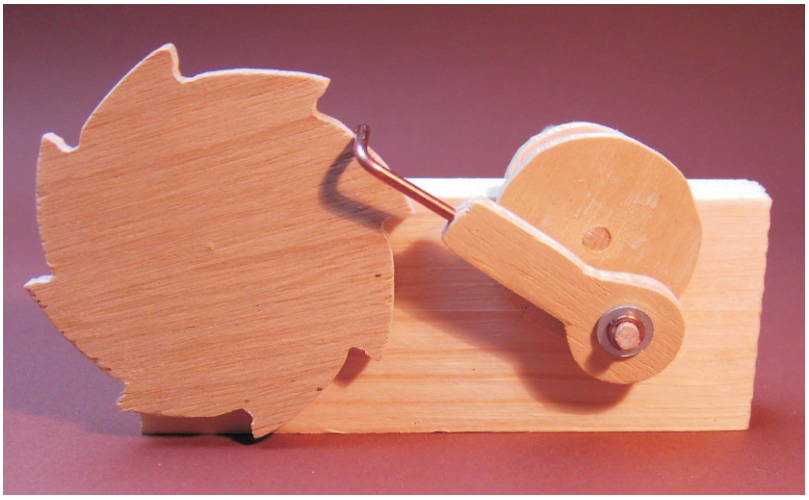


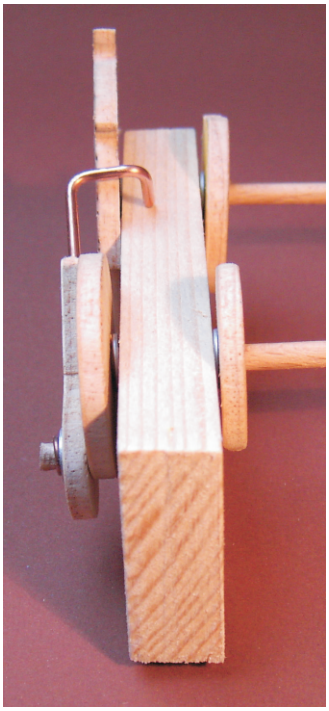
Reduction gear

All 4 mm holes for 4 mm round rods

building instructions

Reduction gear

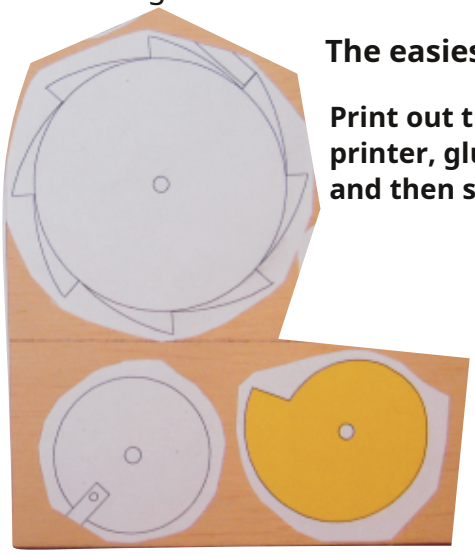




Clamping rings off
Welding wire with
a sub
washer in front of it
secure movable
Share on the
Round bars in front
slipping.

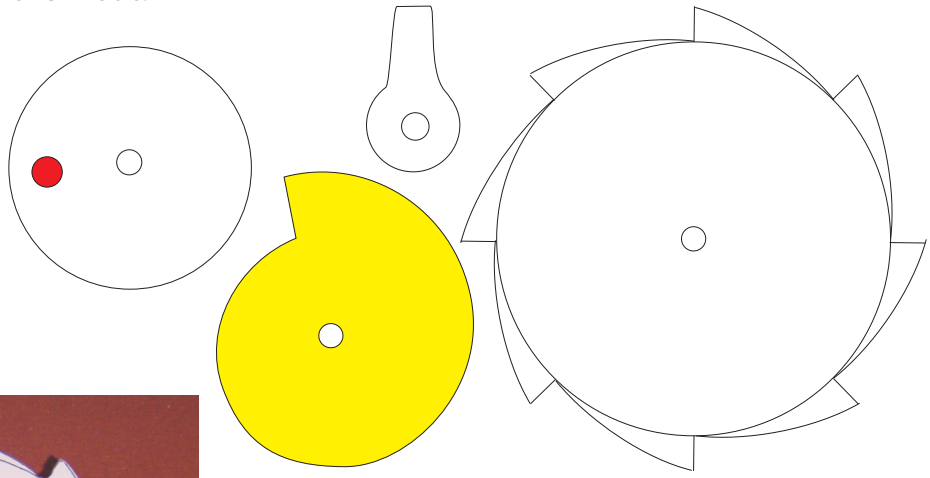
The clamping rings
one wraps as
Spiral on one
4mm welding wire
(or twist drill),
that one in
vice
clamped.

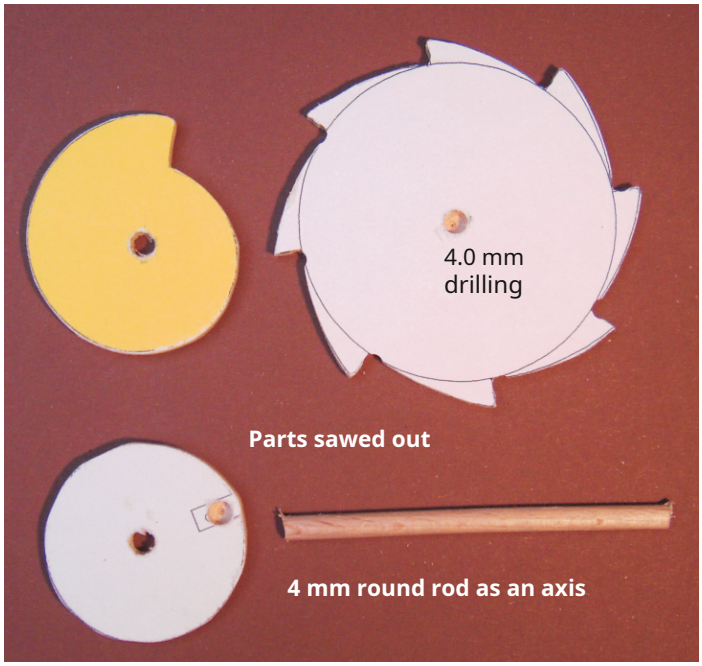
The movement is reduced by the gear so that the cam disc makes one revolution when the drive crank is turned eight times.

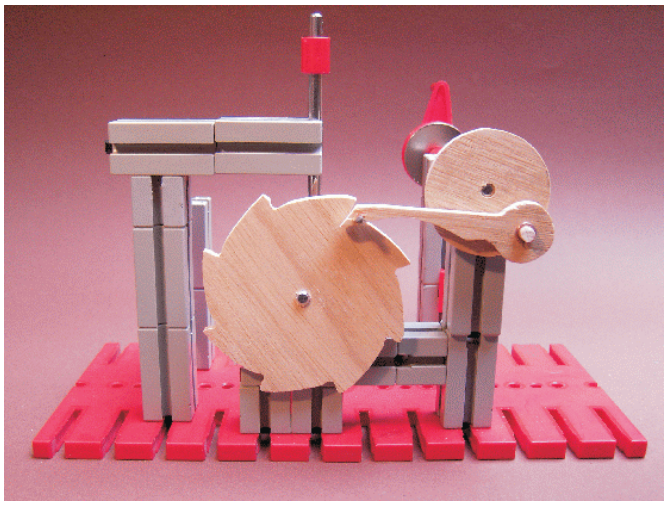


The easiest way is this:

Print out the model sheet in the color printer, glue the parts onto plywood and then saw them out.







Rehearsal of the mechanics with Fischertechnik

When the parts have been sawn out and drilled, they can be assembled on a trial basis using Fischer technology to ensure that they function properly to test and to plan how and at what intervals the axles will be stored.

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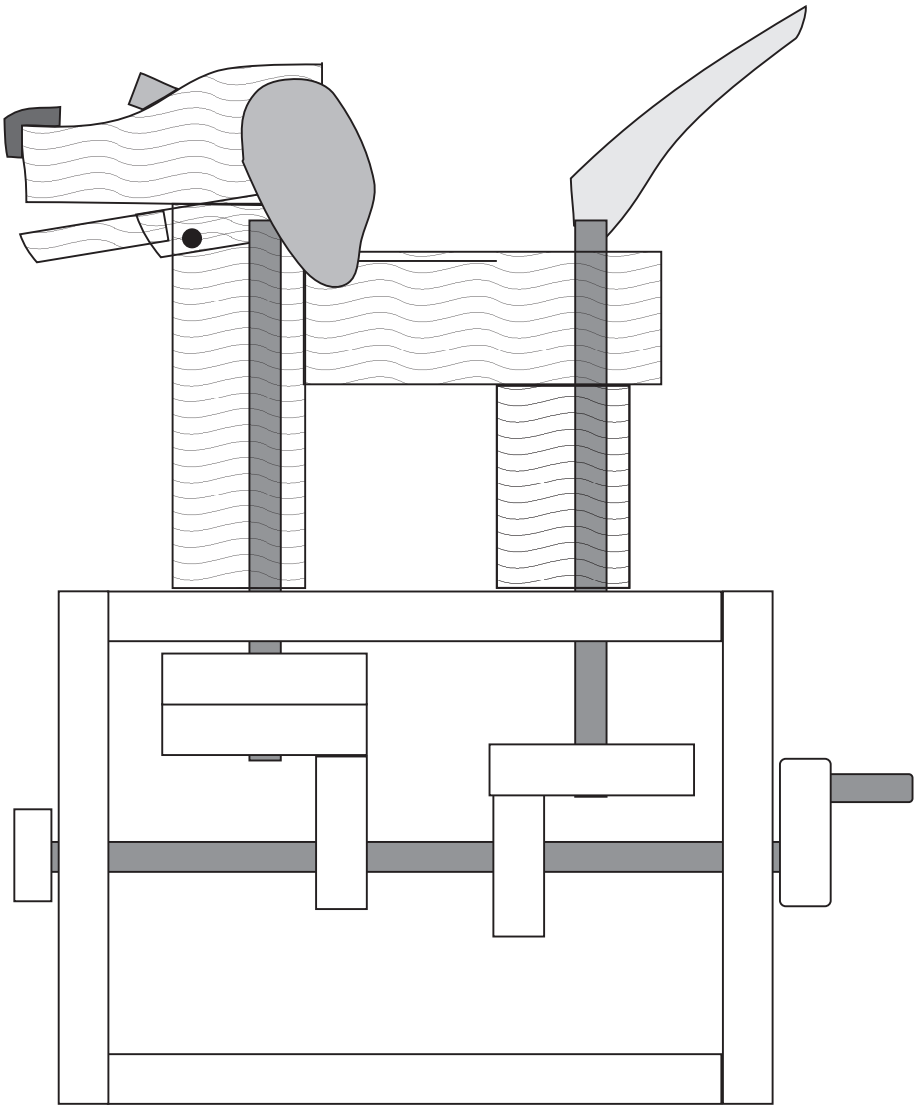
Heiner Prüser



Barking dog

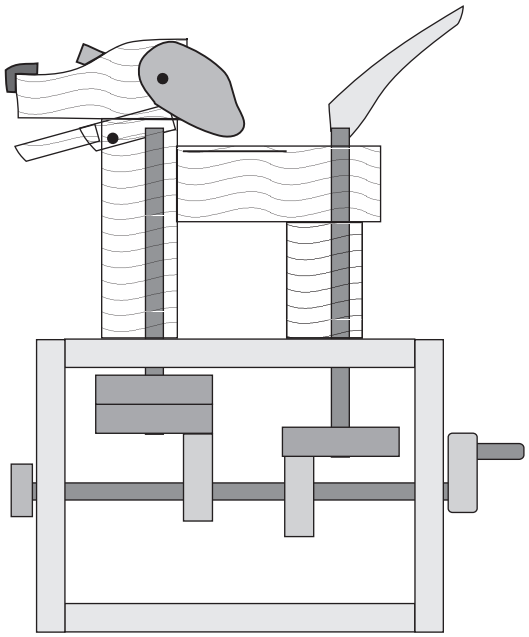
from class 8 | Time: approx. 10 hours | Order no. 901

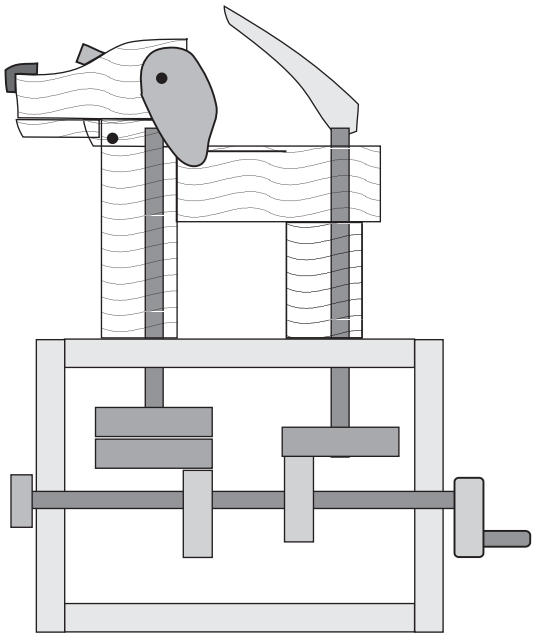
Work aids for successful handicraft lessons

GPV_901

www.werken-technik.de

Notes on lesson planning





The tail is rotated by the drive shaft (friction wheel drive). The speed of rotation can be changed by moving the friction wheel sideways. The lower jaw closes due to the weight of the two wooden wheels. The wooden wheel on the axle is drilled eccentrically, lifts the two wooden wheels. This causes the lower jaw to fall down.

If the tail is only to turn temporarily, the right drive wheel is also pierced eccentrically. In addition, the ears can also be moved. (However, this requires a great deal of precision and patience when building!). The function of the friction wheels can be improved with a bicycle tube rubber.

Recommended for class	Time requirement	material costs	Level of difficulty
Class 8/9	approx. 10 hours	approx. 2.50 euros	★★★★☆

Material:

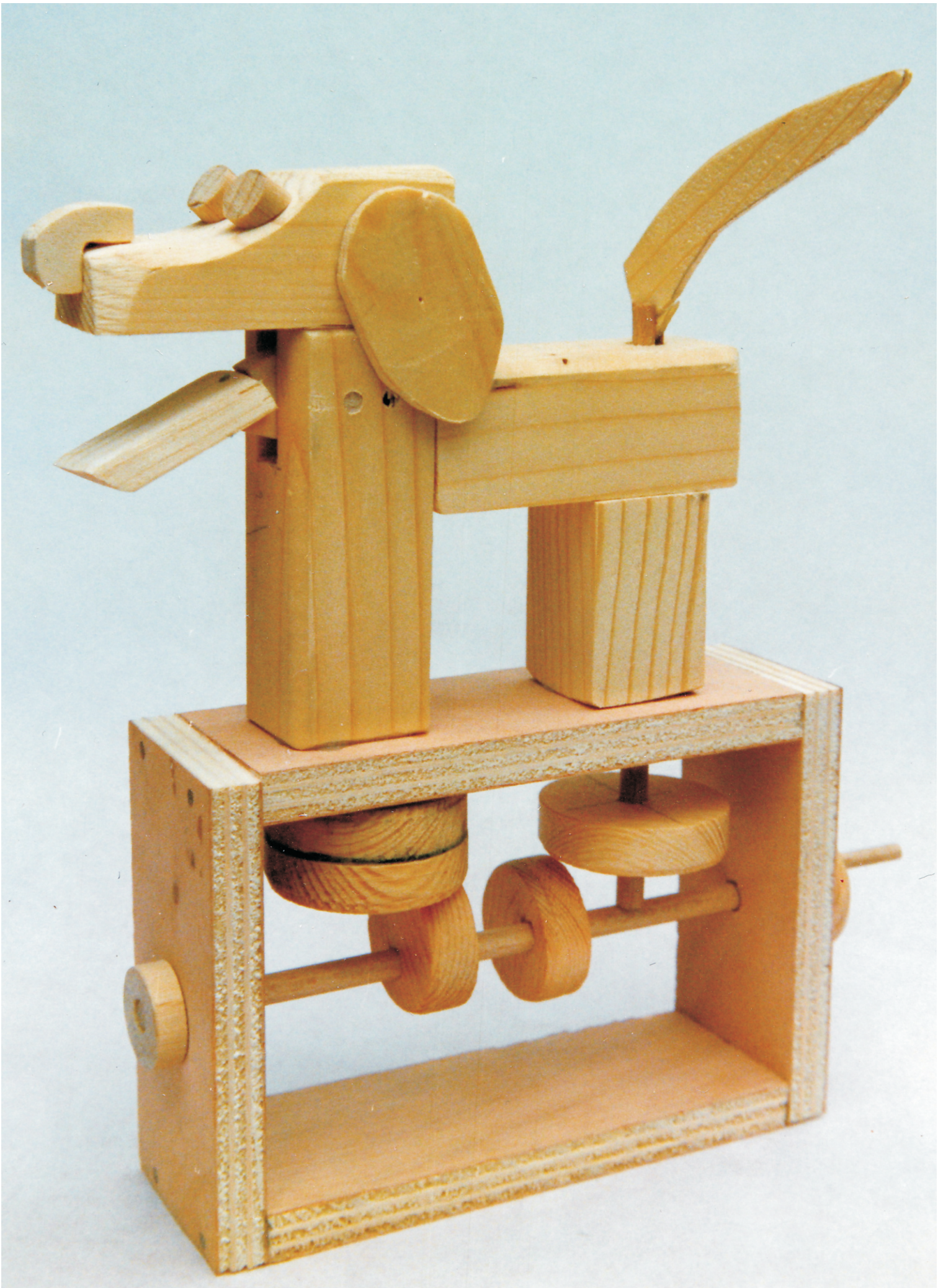
Wooden strip 10 x 45 x 450 mm; Round rod 4mm / 6mm / 10 mm, round disks 30 mm / 40 mm
Solid wood strips with a cross section of 25 x 25 mm

Differentiation:

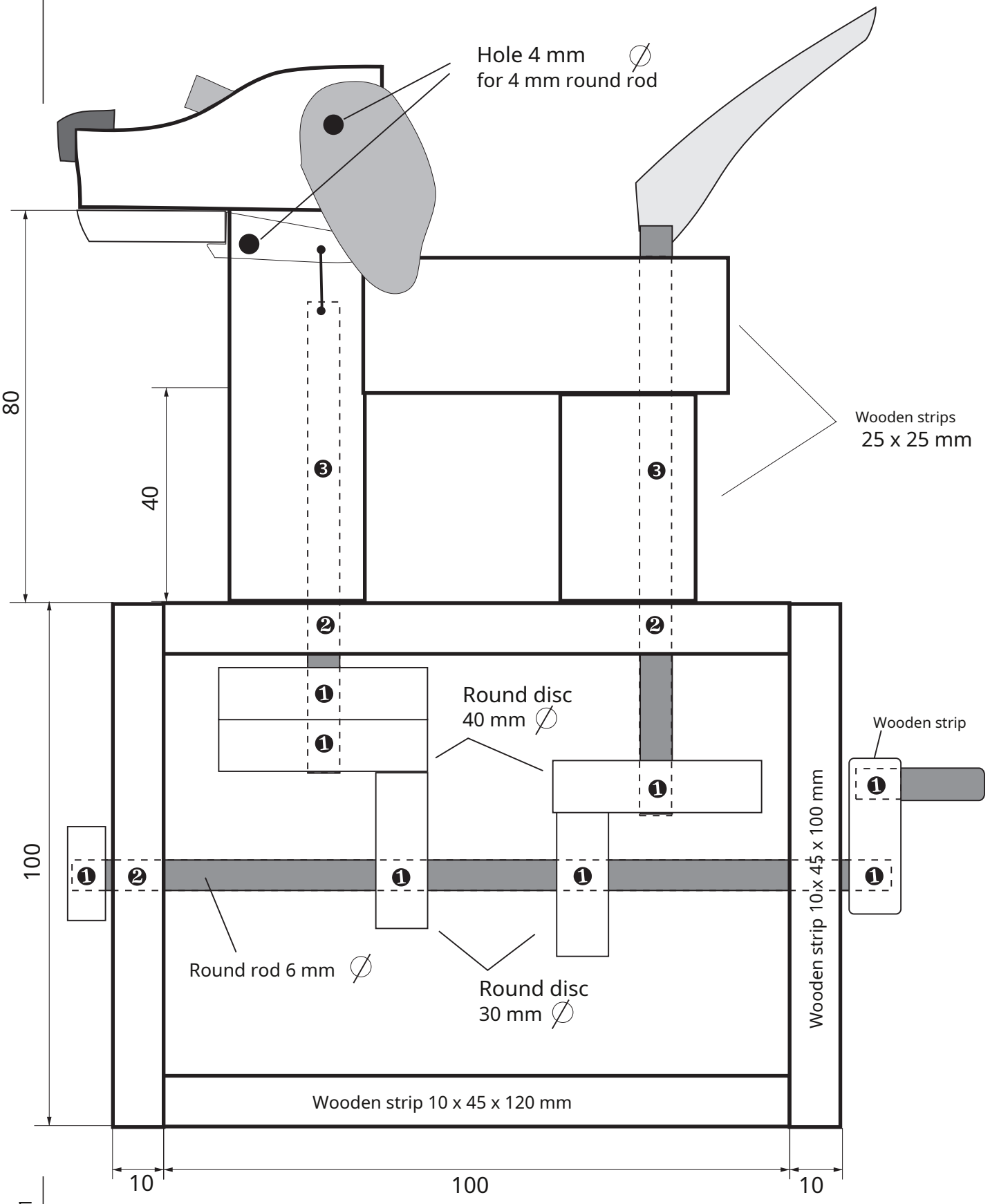
Mechanics without movable ears	★★☆☆☆
Mechanics with movable ears	★★★★☆
Provide construction plan / without ears do not	★★☆☆☆
specify construction plan / without ears do not	★★★☆☆
specify construction plan / with ears	★★★★☆
Inventing a mechanical animal	★★★★★

Problems in construction:

Right-angled sawing of the strips for dog bodies
Installation of the lower jaw (smooth)
reliable connection of the lower jaw with the pull rod
correct order of assembly

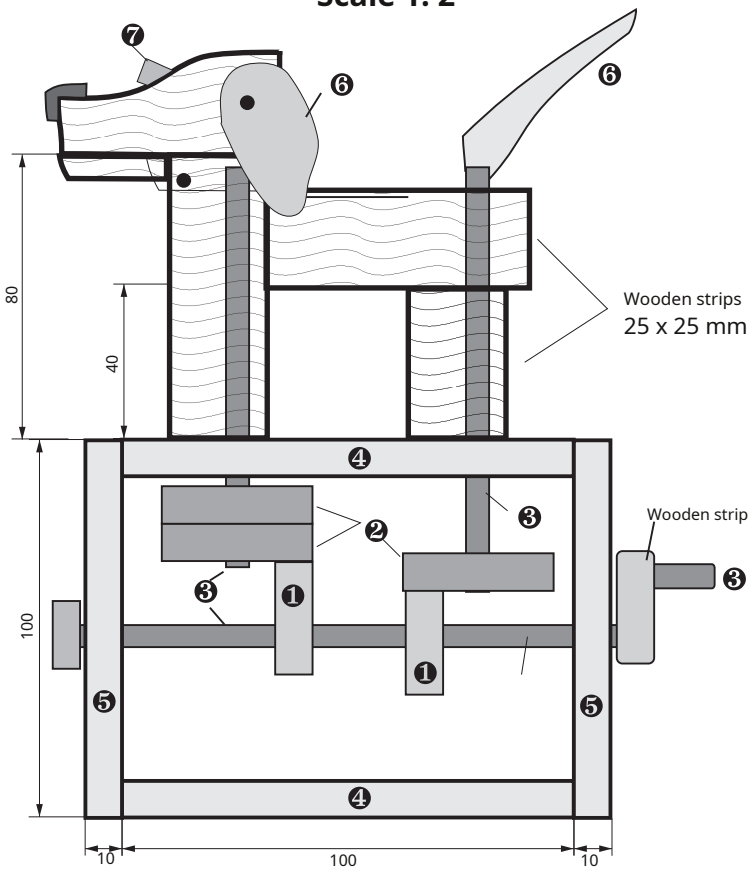


Construction drawing scale 1: 1



GPV_901

Scale 1: 2



Parts list

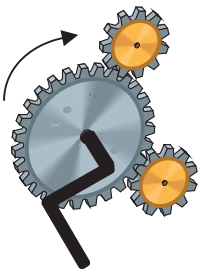
- ❶ Round disc 30 mm ∅
- ❷ Round disc 40 mm ∅
- ❸ Round rod 6 mm ∅
- ❹ Wooden strip 10 x 45 x 120 mm
- ❺ Wooden strip 10 x 45 x 100 mm
- ❻ thin wooden strip
- ❼ Round bar 10 mm ∅
- • Hole 4 mm ∅ for round rod 4 mm

The dog's body is made from a solid wood strip with a 25 x 25 mm cross-section.

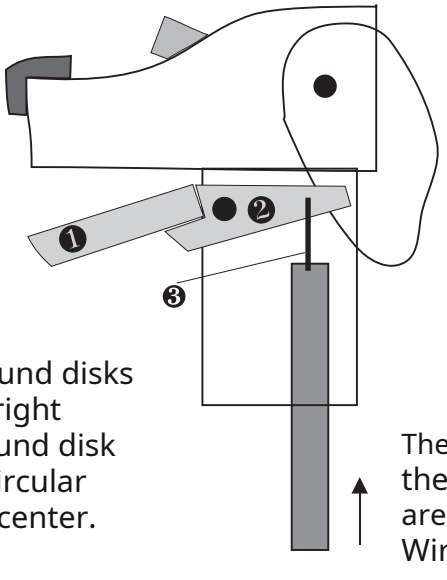
Round beech rods with a diameter of 6 mm are used as axes.

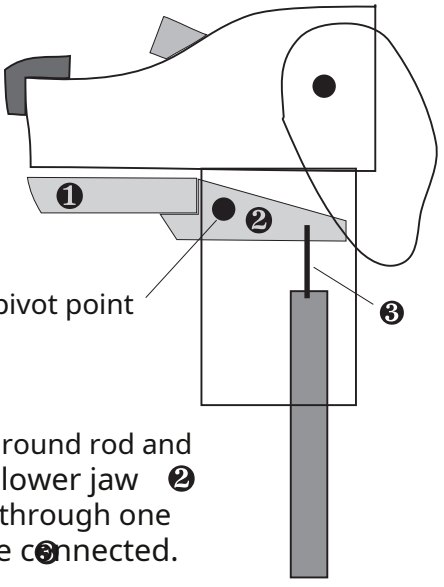
When the drive wheels spin, you pull a rubber (cut from the bicycle tube) onto the round washers.

Thats how it works:



If you turn the crank, both round disks rotate on the drive axle. The right round disk turns the large round disk around with its tail. The left circular disk is positioned slightly off-center.

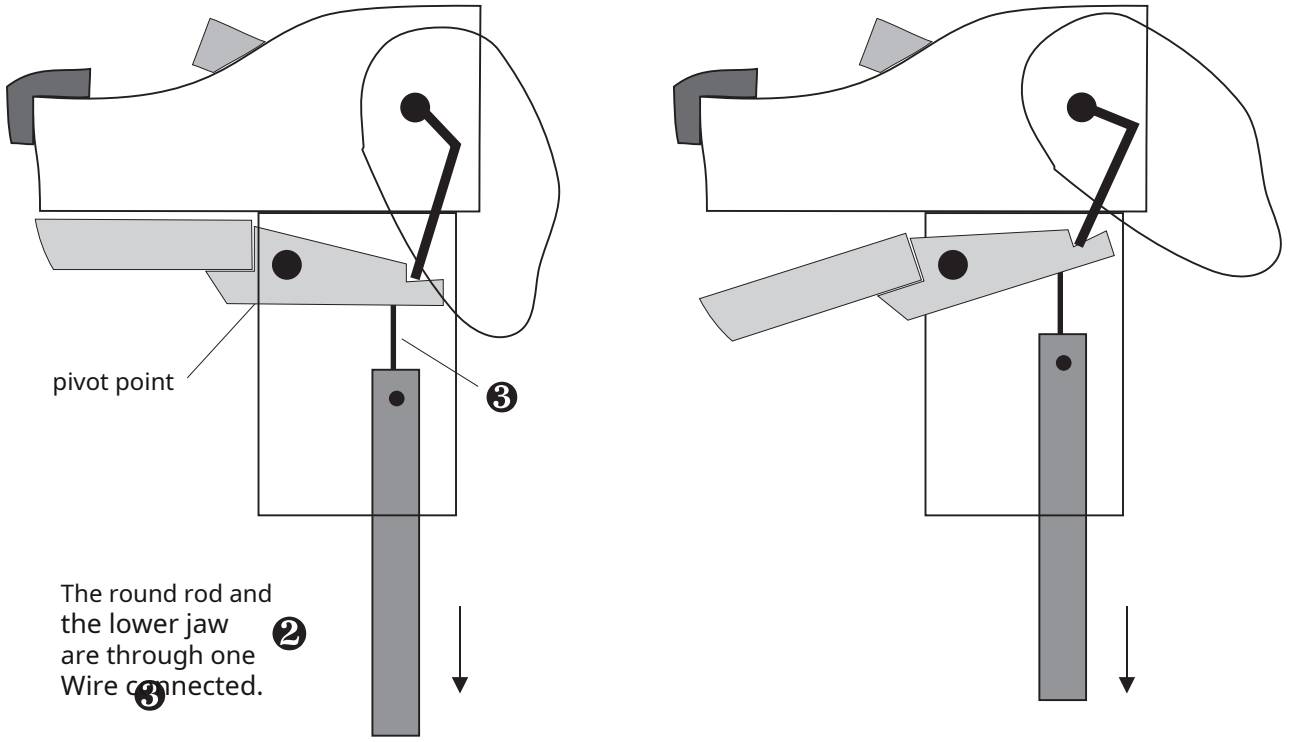




The round rod and the lower jaw ❷ are through one Wire connected.

As a result, she lifts the round rod like a cam disc, which leads up to the dog's head. The dog's lower jaw (1) falls down. The round rod is connected to a rotatably mounted piece of wood (2) by a thin copper wire. If the round rod sinks again due to the weight of the round disks attached to it, the dog closes its mouth.

Building instructions ear mechanics



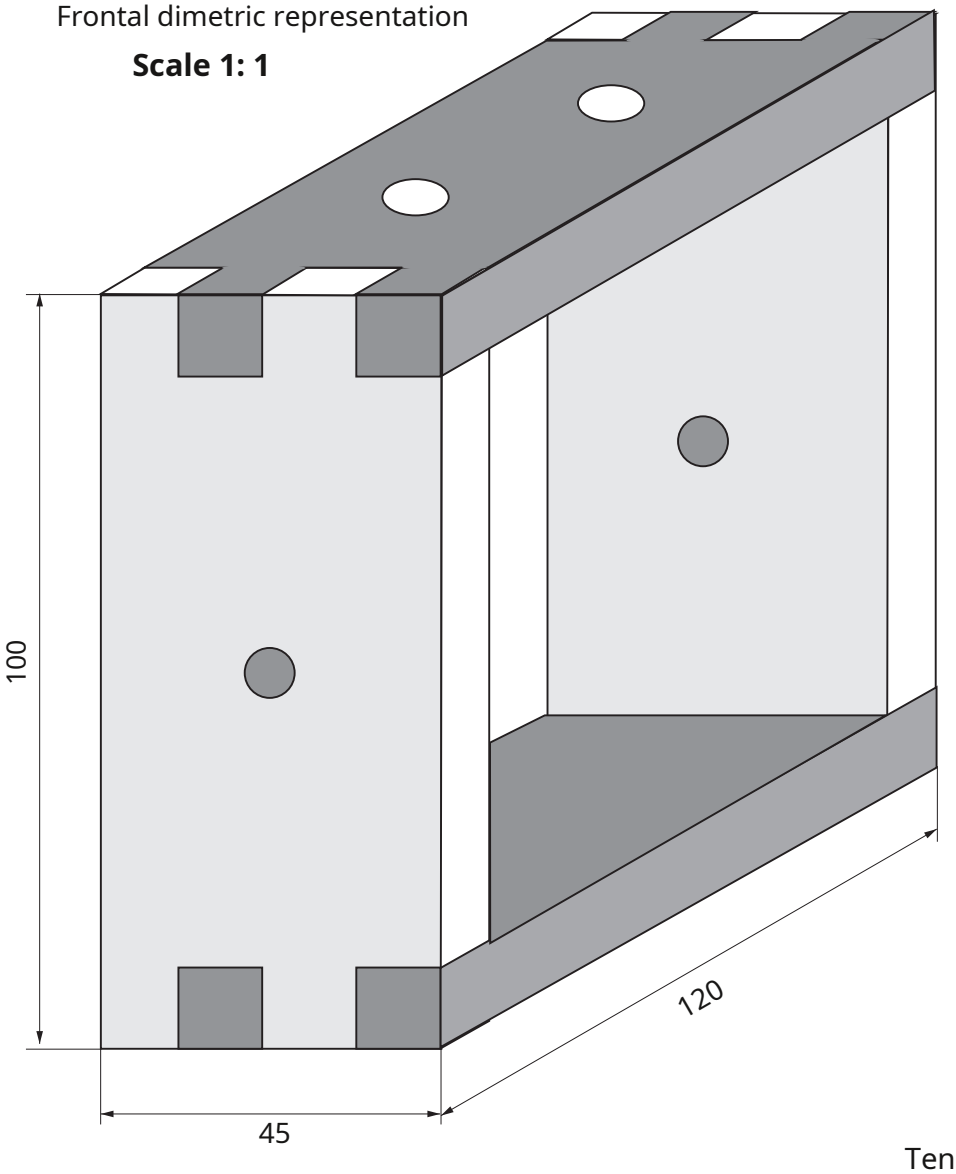
The ears are glued onto a round rod 4 mm with a little distance to the head so that they can move easily together with the round rod. (Head hole for receiving the round rod with 4.5 mm!). A hole 1 mm in diameter is drilled in the round rod. A welding wire with a diameter of 1 mm is attached here. This welding wire rests on the lower jaw (see drawing!).
When the dog's mouth opens, the ears are pushed back.

Tip: Just put the dog's head and body together (dowel connection), so in case of problems the repair of the mechanics remains easier!

Construction manual for the bogie

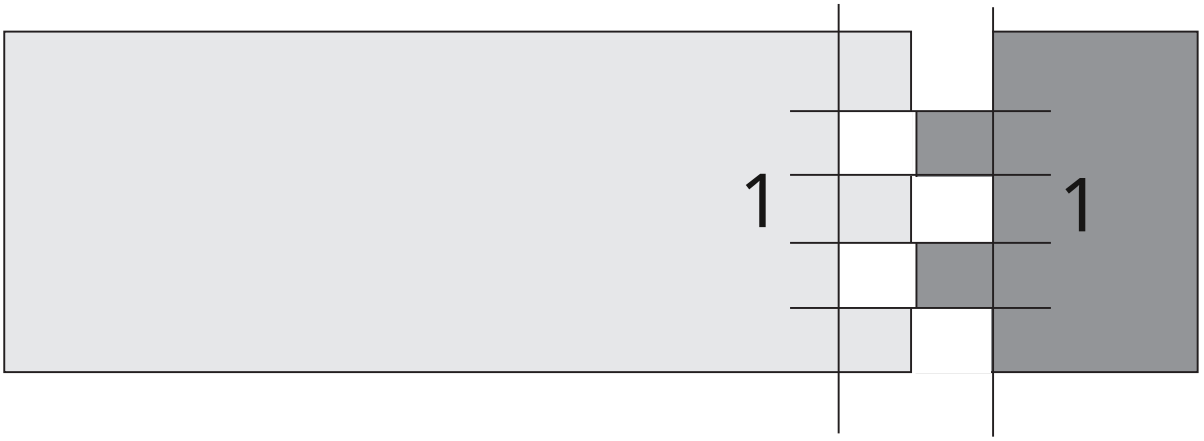
Frontal dimetric representation

Scale 1: 1



By mortising
get that
Bogie a
stable connection.

Tenon connection



Where the wooden panels are to be mortised together, they are placed next to one another.

- Then draw the exact width of the plate.
- The tenon width is drawn in on both panels at the same time with 4 pencil lines across both ends of the panel.
- Then saw along these lines; Saw out the mortises crossways with the fretsaw.

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Heiner Prüser

Pecking rooster

Class 7/8 Time: 4-6 hours Order no. 804

Work aids for successful handicraft lessons

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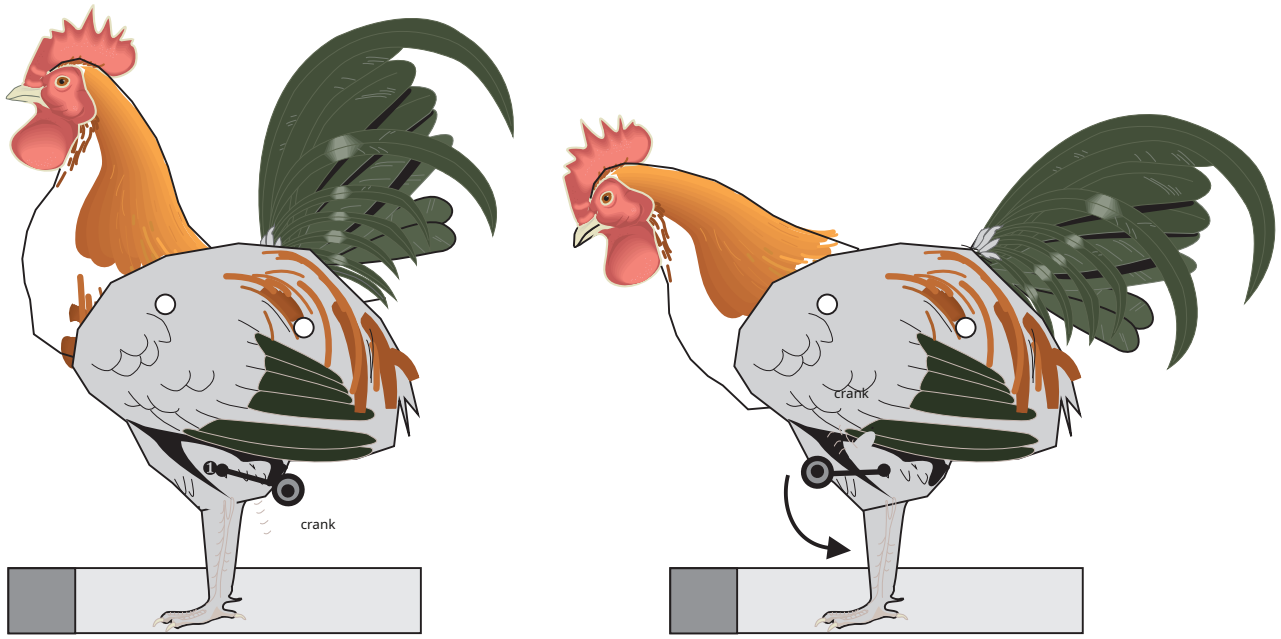
GPV_804

Notes on lesson planning



The tail and head are easily movable on a round rod between the two halves of the body and tied to the eccentric of the crankshaft with a thread. As the crankshaft rotates, the head and tail are moved up and down.

Recommended for class	Time requirement	material costs	Level of difficulty
class 8	4 - 6 hours	1 €	★ ★ ★ ☆ ☆

Material:

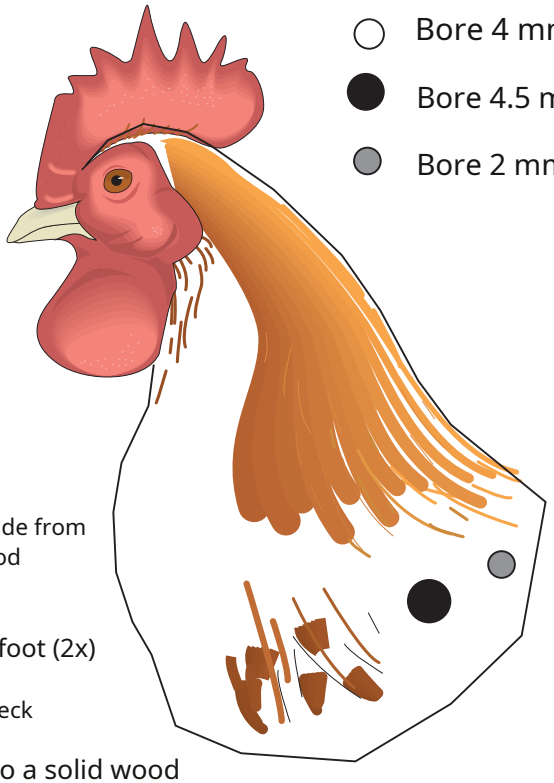
Limba plywood 4 mm thick, round rod 4 mm, welding wire 1 mm, thread, brass tube

Problems in construction:

Sawing the body parts out of plywood

Bending and installing the crankshaft
Tight knots of the head and tail
Correctly coordinate the movement of the head and tail. Correct assembly order

Construction drawing scale 1: 1



Bore 4 mm O /

Bore 4.5 mm O /

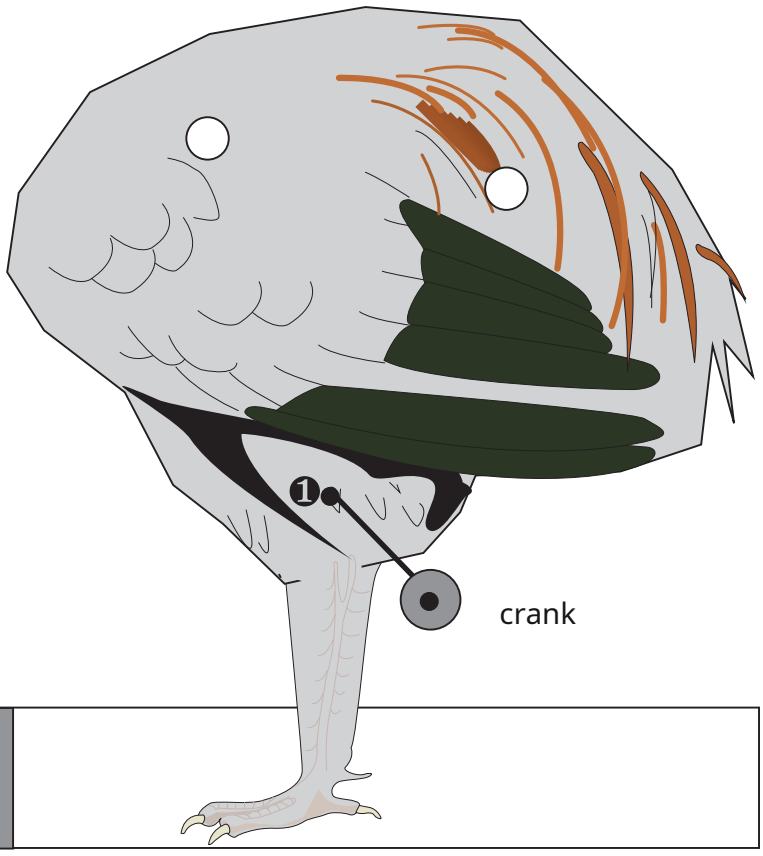
Bore 2 mm O /

The tap is made from Limba plywood
sawn out:

- body with foot (2x)
- tail
- head with neck

There is also a solid wood
- vertical ledge (t-shaped)

It is driven by a hand crank via a crankshaft with an eccentric between the body halves.



Vertical ledge

The body is sawn out twice and receives 2 holes with a diameter of 4 mm.
The head and tail are drilled at 4.5 mm so that they can be easily attached to a round rod with a 4 mm diameter between the two halves of the body. A thread is attached to the head and

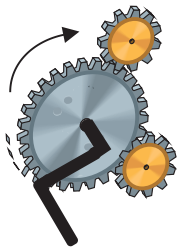
Tail attached so that both move around the pivot point when pulled.

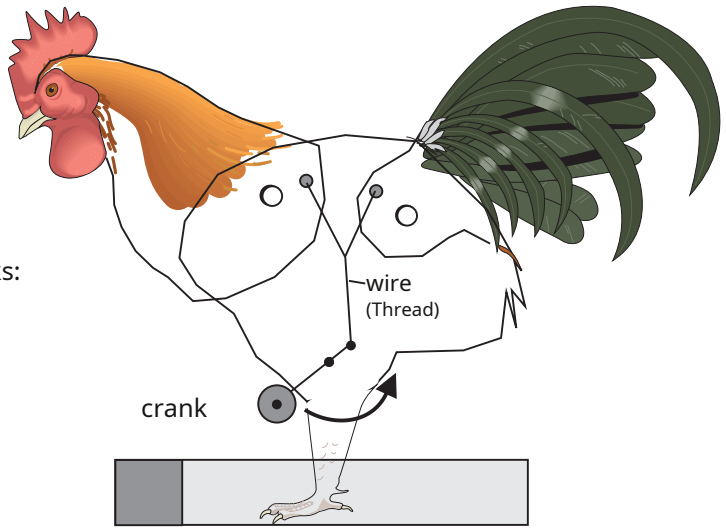
at ❶ the body becomes 2mm Pierced diameter. This hole is intended for a crank made of welding wire 1 mm thick. A round rod can be drilled through and attached as a crank handle.

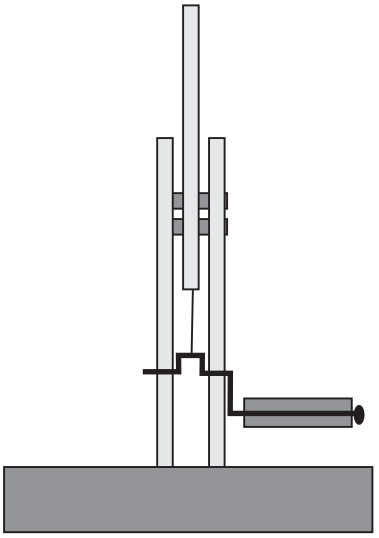
When the crank is inserted between the legs, the threads to the head and tail are attached to the eccentric of the crank so that the head and tail move correctly. Finally, the legs are nailed to the vertical ledge so that they can be pulled off again in an emergency.

GPV_804

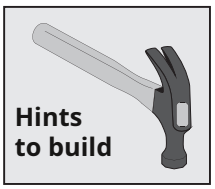
Thats how it works:



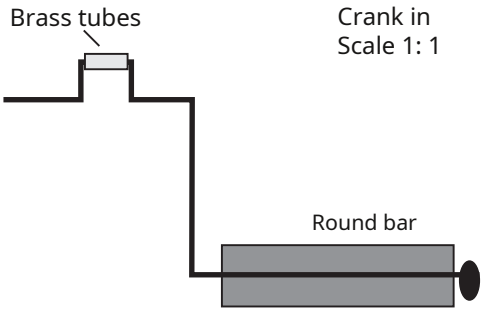




When you turn the crank, the head and tail move up and down.



Component:	Material:	Notes on construction
body	plywood Limba 4mm	
crank	welding wire 1 mm ∅ Round bar Brass tubes	



First bend the eccentric, attach the tube before making the second kink!
Then put the crank through the hole in the back of the body. Thin wire on
Solder the brass tube in place.
On this wire the threads (or wires) for the head and tail to be attached. If the sequence of movements is correct, attach the front body to the bar!

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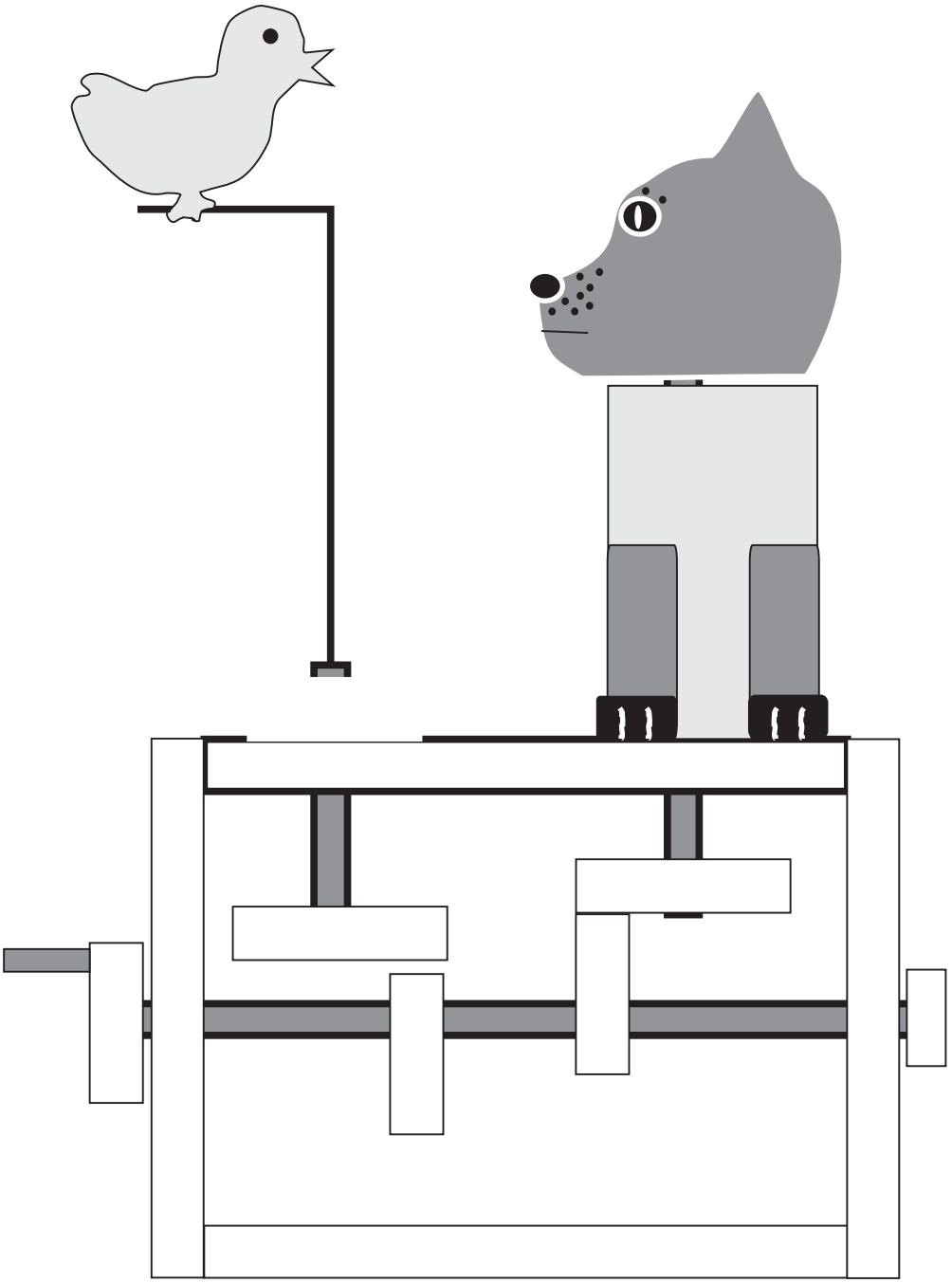

Cat and bird

from class 8 | Time: approx. 10 hours | Order no. 805

Work aids for successful handicraft lessons

GPV_805

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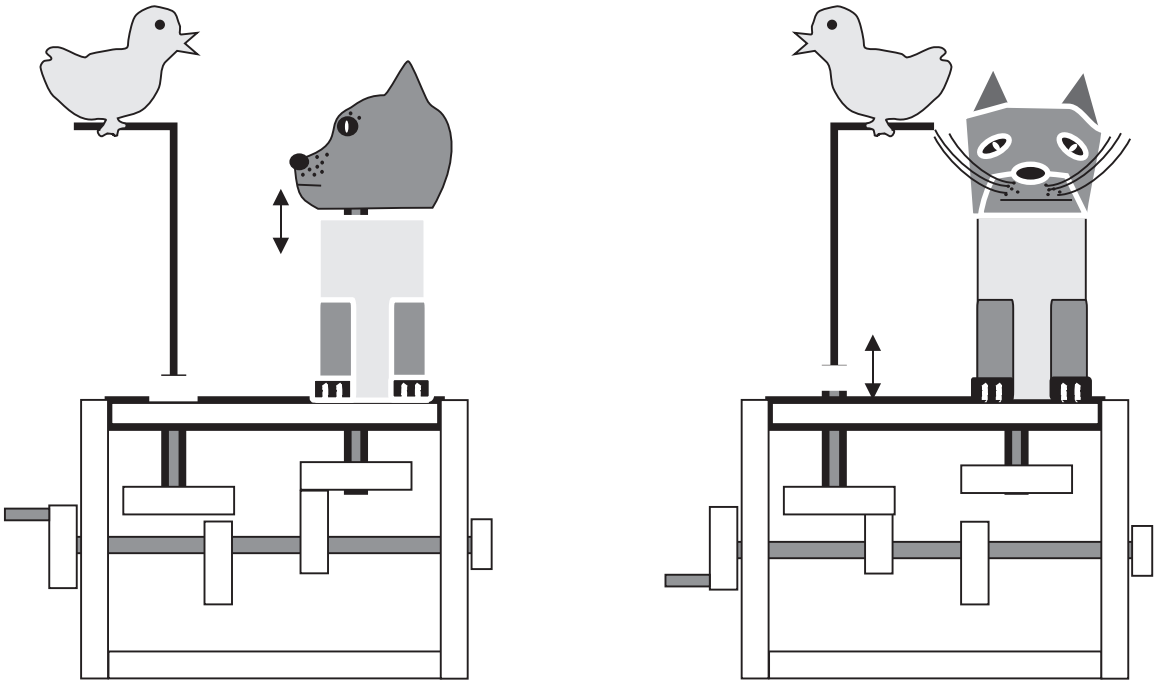
Notes on lesson planning



The drive shaft rotates the bird on the pole and the cat's head (friction wheel drive). The speed of rotation can be changed by moving the friction wheel sideways.
If you drill through the circular disks of the drive axle eccentrically, you can also ensure that both driven parts only rotate temporarily. So the sequence of movements can be designed very differently. In the picture above left the cat's head is currently moving; at the top right you can see that only the bird can turn at the moment.
If the drive wheels spin, the friction can be increased with a rubber (cut the ring from the bicycle tube) on the drive wheels.

Recommended for class	Time requirement	material costs	Level of difficulty
class 8	about 8 hours	about 2 euros	★ ★ ☆ ☆ ☆

Material:

Wooden strip 10 x 45 x mm (length approx. 450 mm) beech rod 6 mm (length approx. 350 mm)
3 round disks 30 mm / 2 round disks 40 mm solid wood strips with a cross-section of approx. 25 x 40 mm plywood
Limba 4 mm; Welding wire 1 mm for the bird

Differentiation:

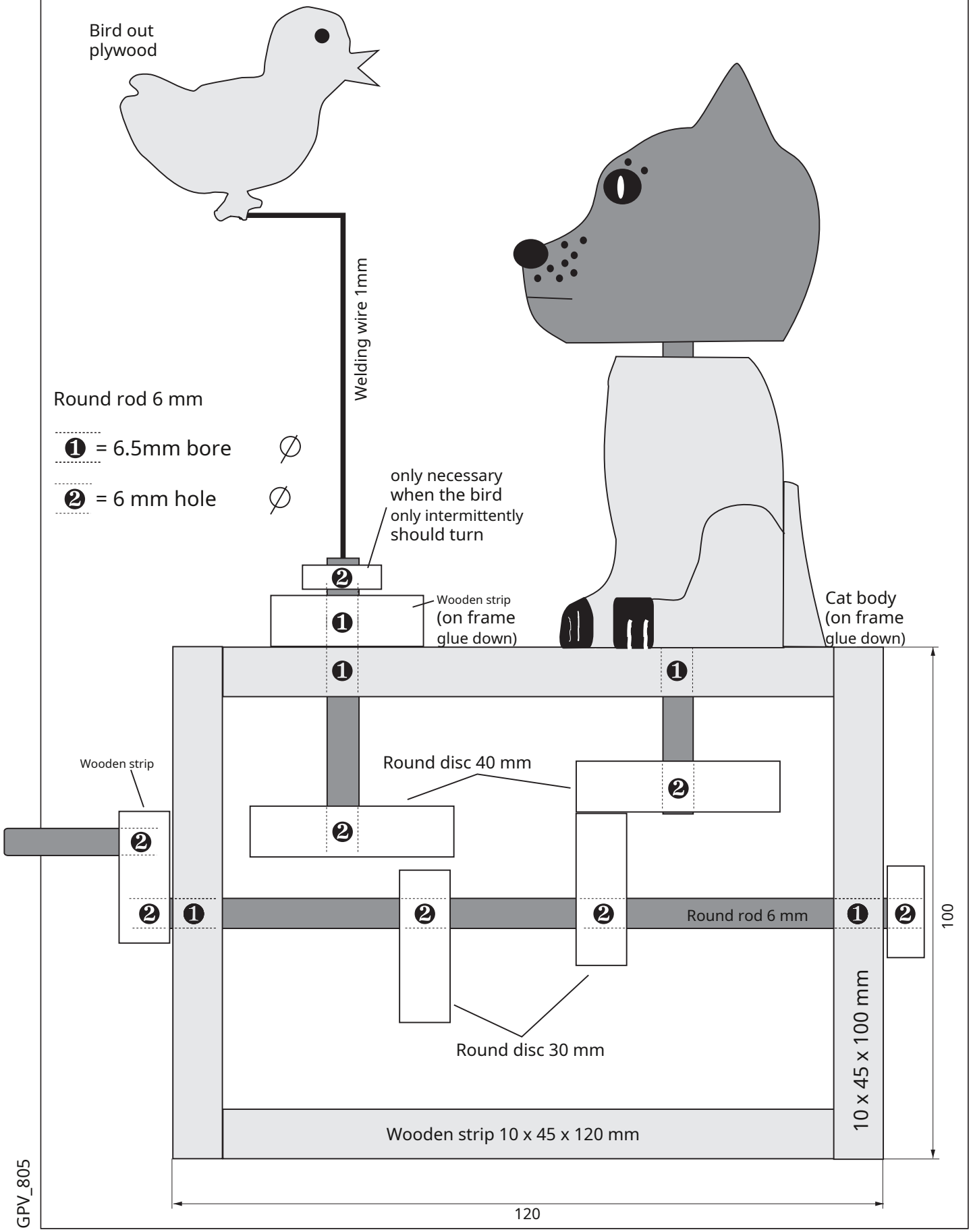
The construction drawing serves as a stimulus for your own ideas; Creativity is particularly important when it comes to designing animal shapes.
Specify construction plan / do not specify construction plan Bogie
with tenon connection / without tenon connection

Problems in construction:

Sawing the solid wood strips for the cat's body (fretsaw!)
Design of the cat's body and head
Coordinating the movements

Friction wheel drive spins
(Remedy: pull the rubber ring from the bicycle tube onto the drive wheel)

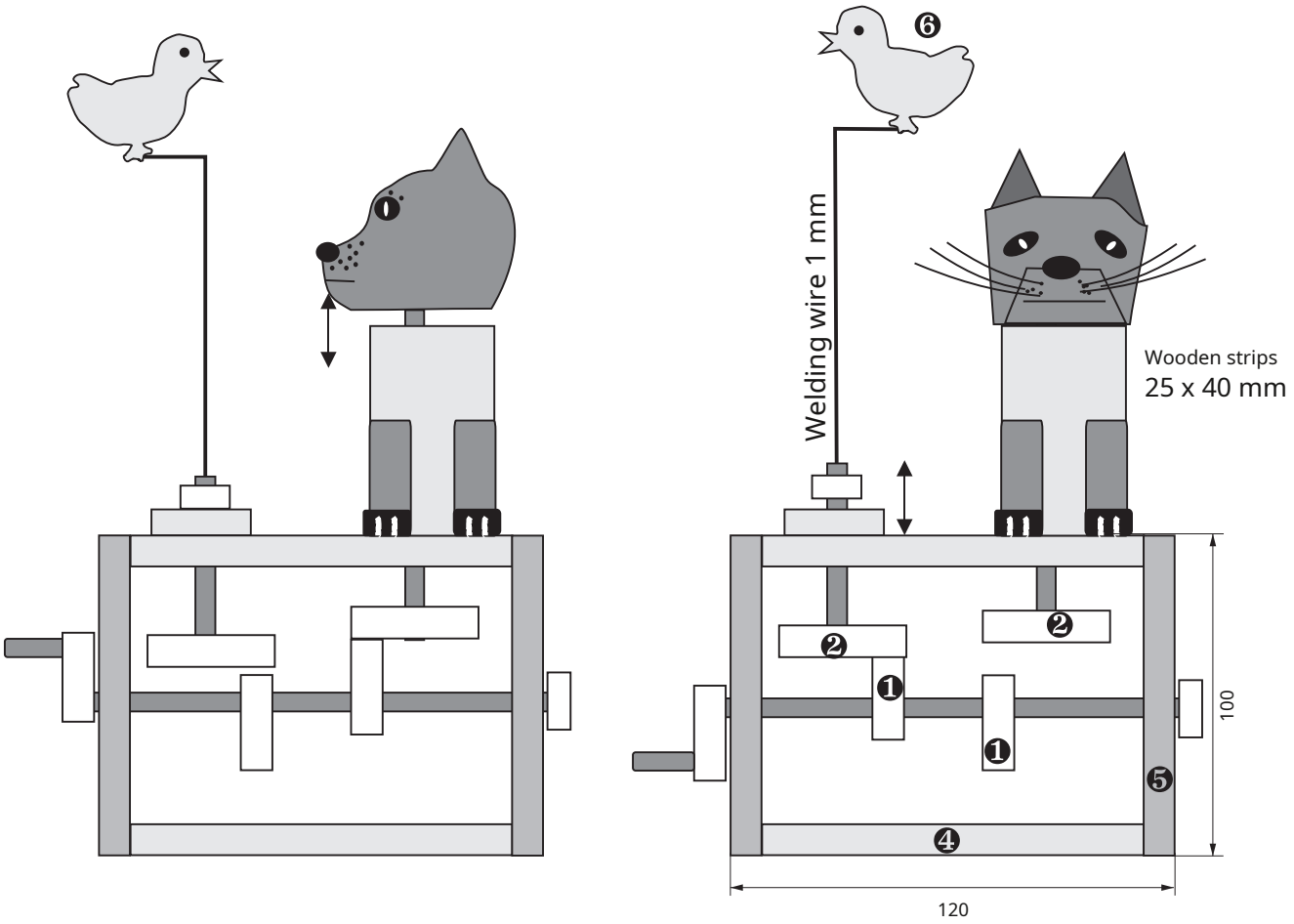
Construction drawing scale 1: 1



GPV_805

building instructions

Scale 1: 2



Parts list

❶ Round disc 30 mm ∅

❷ Round disc 40 mm ∅

❸ Round rod 6 mm ∅

❹ Wooden strip 10 x 45 x 120 mm

❺ Wooden strip 10 x 45 x 100 mm

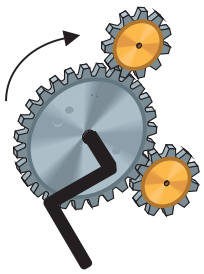
❻ plywood / thin wooden strip

Round beech rods with a diameter of 6 mm are used as axes.
The round disks are drilled with 6 mm.

The cat's body is made from a solid wood strip with a cross-section of approx. 25 x 40 mm.

If the friction wheel drive spins, you pull a rubber (cut from the bicycle tube) onto the drive wheel.

Thats how it works:



The drive shaft rotates the bird on the pole and the cat's head (friction wheel drive). The speed of rotation can be changed by moving the friction wheel sideways.
If the wooden round disks of the friction wheel drive spin, they can be made more "grippy" with a rubber cover. (Bicycle tube) If you drill through the circular disks of the drive axle eccentrically, you can also ensure that both driven parts only turn temporarily. The sequence of movements can thus be designed in very different ways.

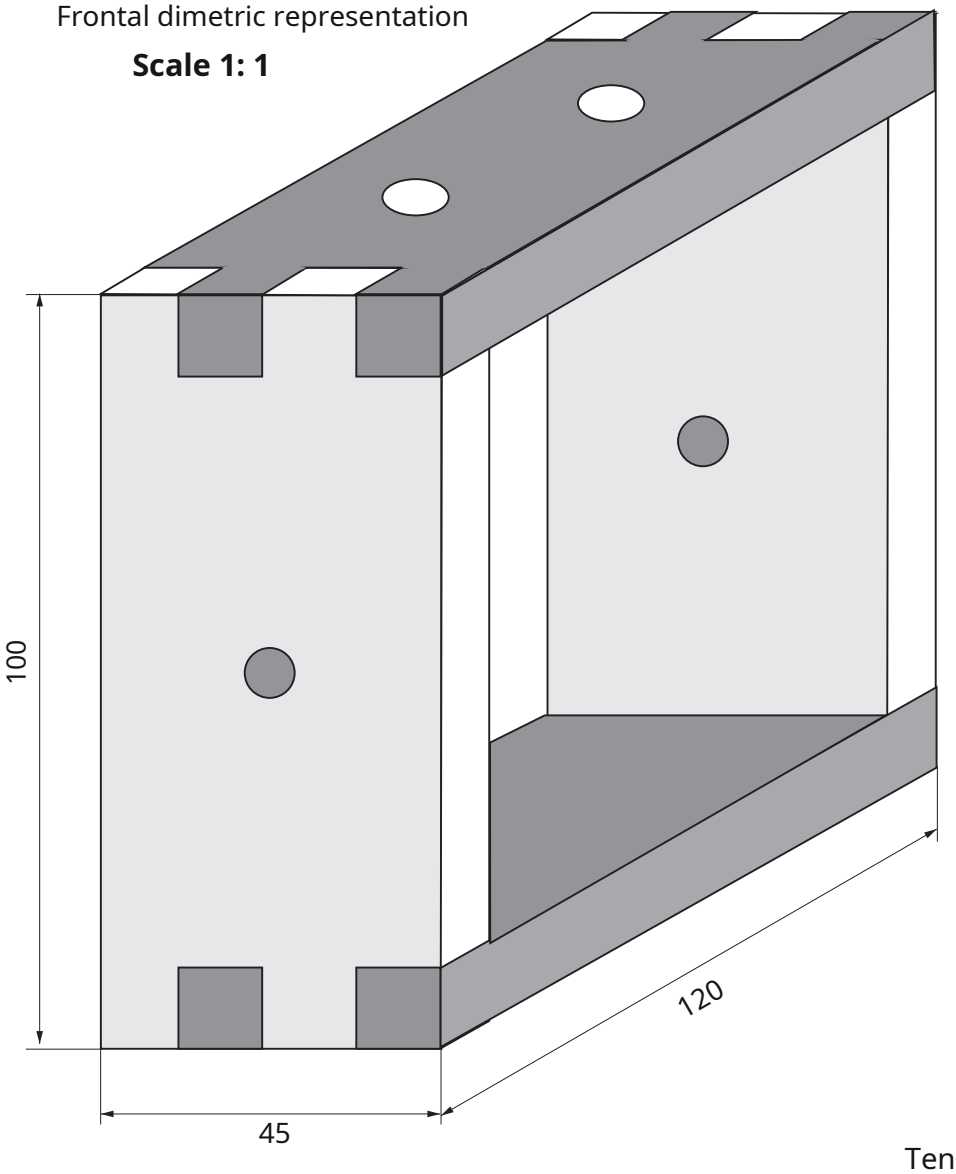
In the picture above left the cat's head is currently moving; at the top right you can see that only the bird can turn at the moment.

GPV_805

Construction manual for the bogie

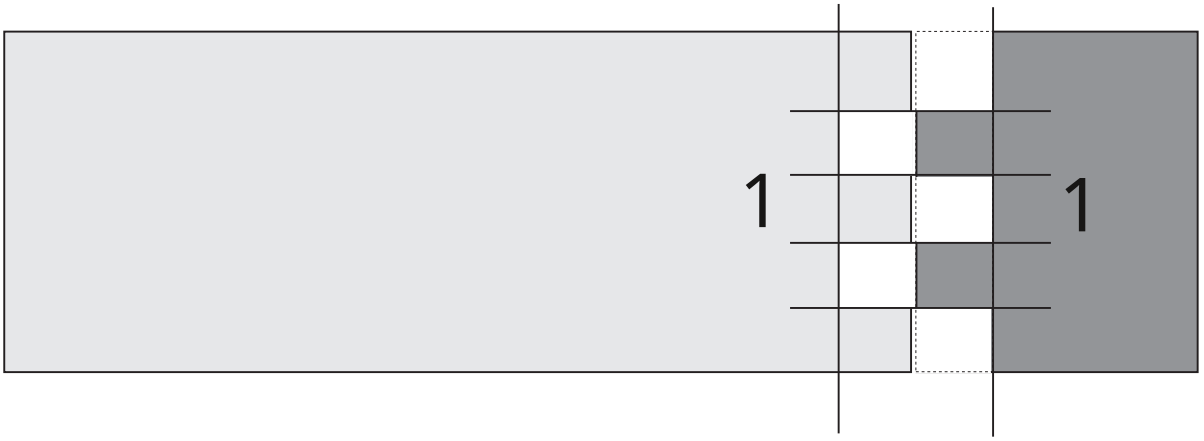
Frontal dimetric representation

Scale 1: 1



By mortising
get that
Bogie a
stable connection.

Tenon connection



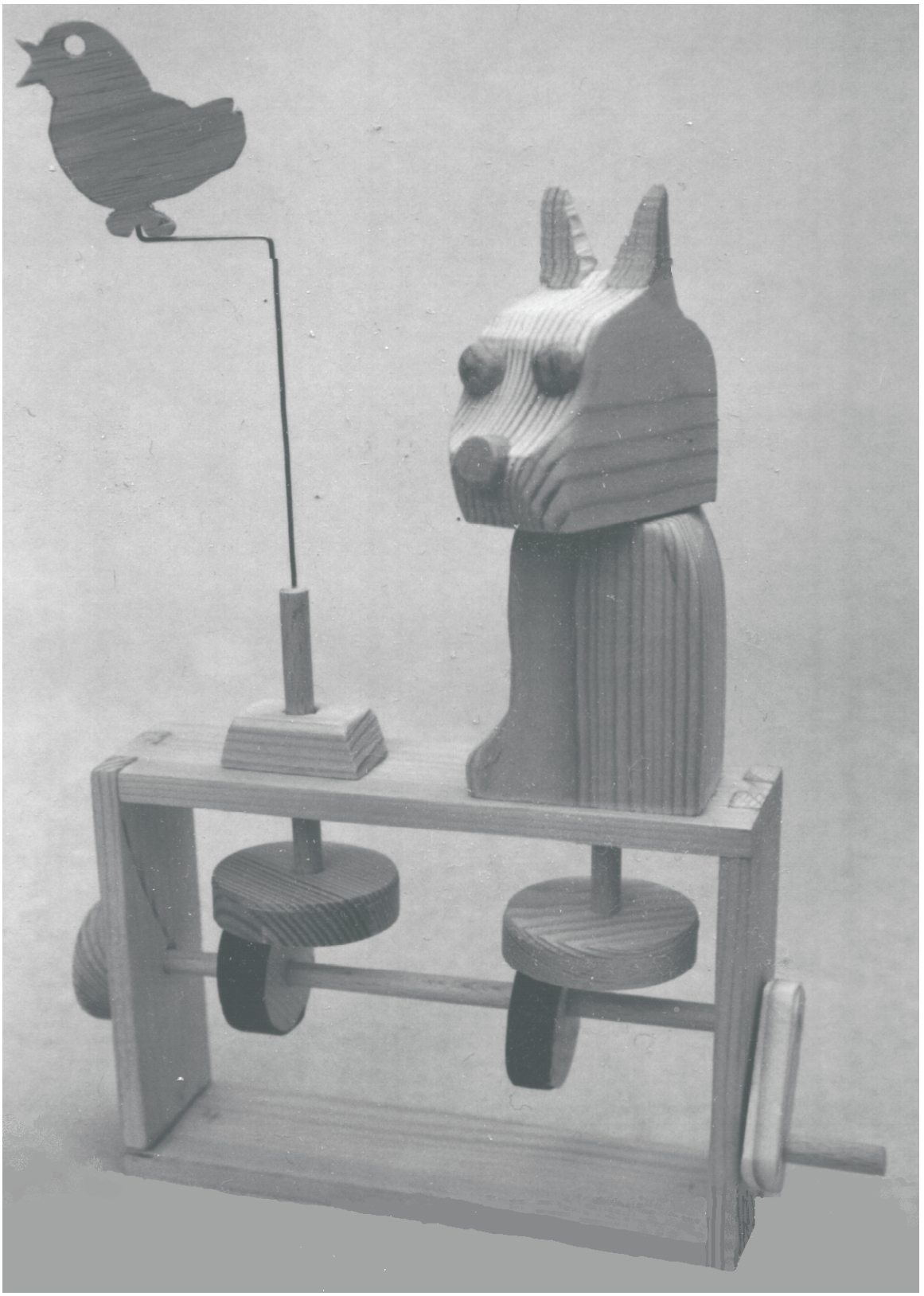
Where the wooden panels are to be mortised together, they are placed next to one another.

- Then draw the exact width of the plate.
- The tenon width is drawn in on both panels at the same time with 4 pencil lines across both ends of the panel.
- Then saw along these lines; Saw out the mortises crossways with the fretsaw.

GPV_805

Cat and bird

The figure is approximately natural size



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