



Technical analysis and diagramming exercises



1st year of the second cycle



Name: **Corrected version**
June 2010

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in collaboration with the

Centre de développement pédagogique

Rules of diagramming

Complete the sentences using the words below:

proportion - elements - colour - links - view - simple lines - parts - symbols - forces - movement

- 1- Choosing the best view to represent the object.
- 2- Represent the object by simple lines.
- 3- Name the various parts of the object.
- 4- Use symbols to represent the operating principles.
- 5- Represent the forces using arrows.
- 6- Represent the links and the guidance.
- 7- Use colour to represent the various parts of the object.
- 8- Represent the movement of the parts using appropriate symbols.
- 9- Indicate the critical elements.
- 10- Retain a certain proportion between the various parts.

Technological analysis of the staple remover

Global function of the object:

Allows staples to be removed from paper with simple pressure from the fingers.



Analysis of the object

Observe the object and answer the following questions:

1- What type of lever is used in this object?

Class 3 lever

2- How is the pivot built? Give the characteristics of the link.

Using a rivet.

Indirect link, rigid, fixed and partial.

3- Why are the levers so short? (Distance between the pivot and the points).

Since a lever is used to reduce the necessary force to execute the task, then this task requires little force. It also allows easier access to the staples.

4- What materials make up this object? What is the advantage of each of them in the use of the object?

Mainly metal, which gives the object the necessary rigidity and resistance to remove the staple without the object becoming worn.

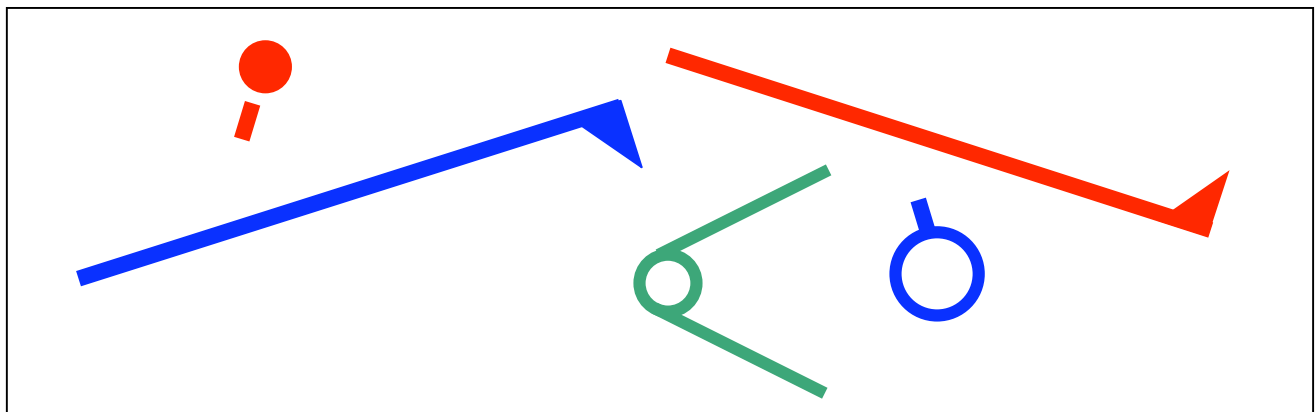
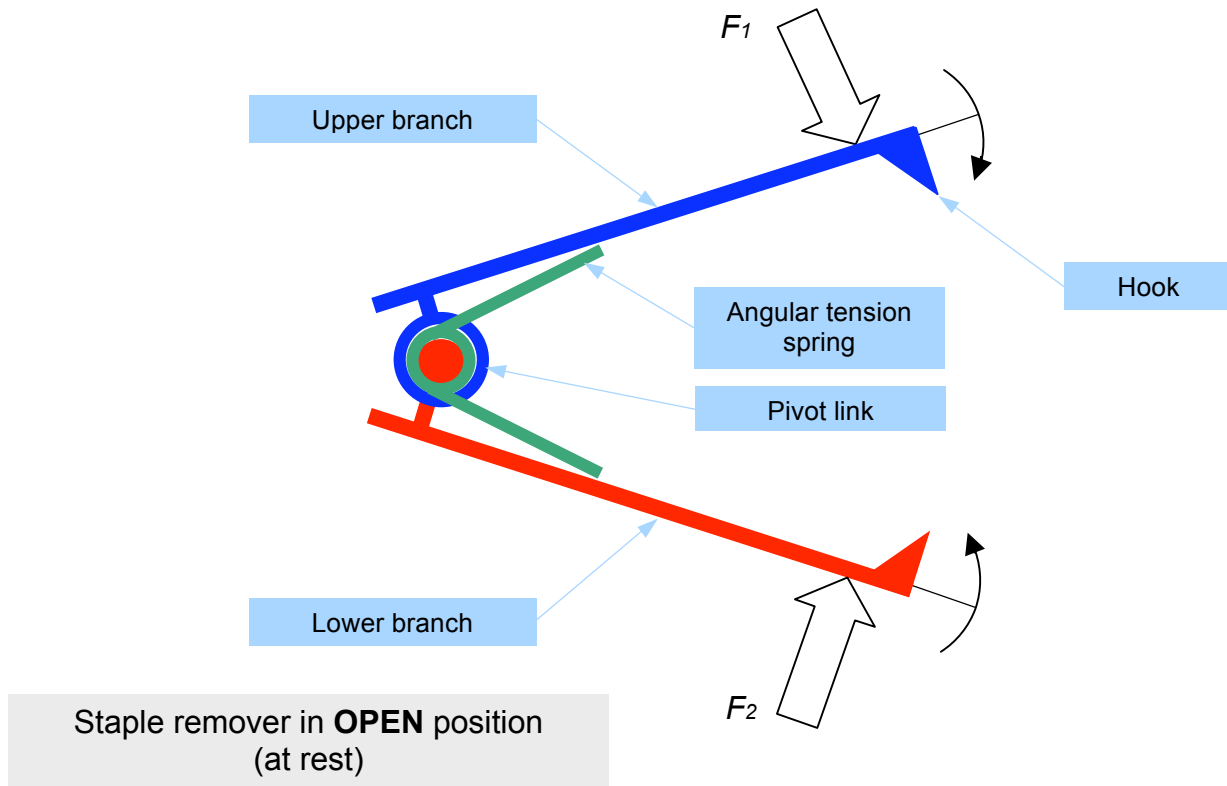
Plastic is cheaper than metal and gives a surface on which to apply pressure and to hold the object.

5- Is there another simple machine besides the lever in the object?

Yes, the inclined plane in the hooks.

Complete the principles diagram of the staple remover

- 1- Carry out the principles diagram of the staple remover using the elements in the inset.
- 2- Connect the parts of the object to the elements on the diagram.



PRINCIPLES DIAGRAM

Technological analysis of the hand beater

Global function of the object:

Beats foods using hand power.



Observe the object and answer the following questions:

1- Which is the drive gear in this object?

The drive gear is the 64 tooth gear.

2- Which are the driven gears in this object?

Two 12 tooth pinions.

3- Which of these gears turns more quickly?

The two 12 tooth pinions.

4- Does this transmission of movement mechanism allow for the increase or decrease in the rotation speed?

It increases the speed of rotation of the beaters compared to the rotation of the crank.

5- What is the rotation ratio of the hand in relation to the beaters?

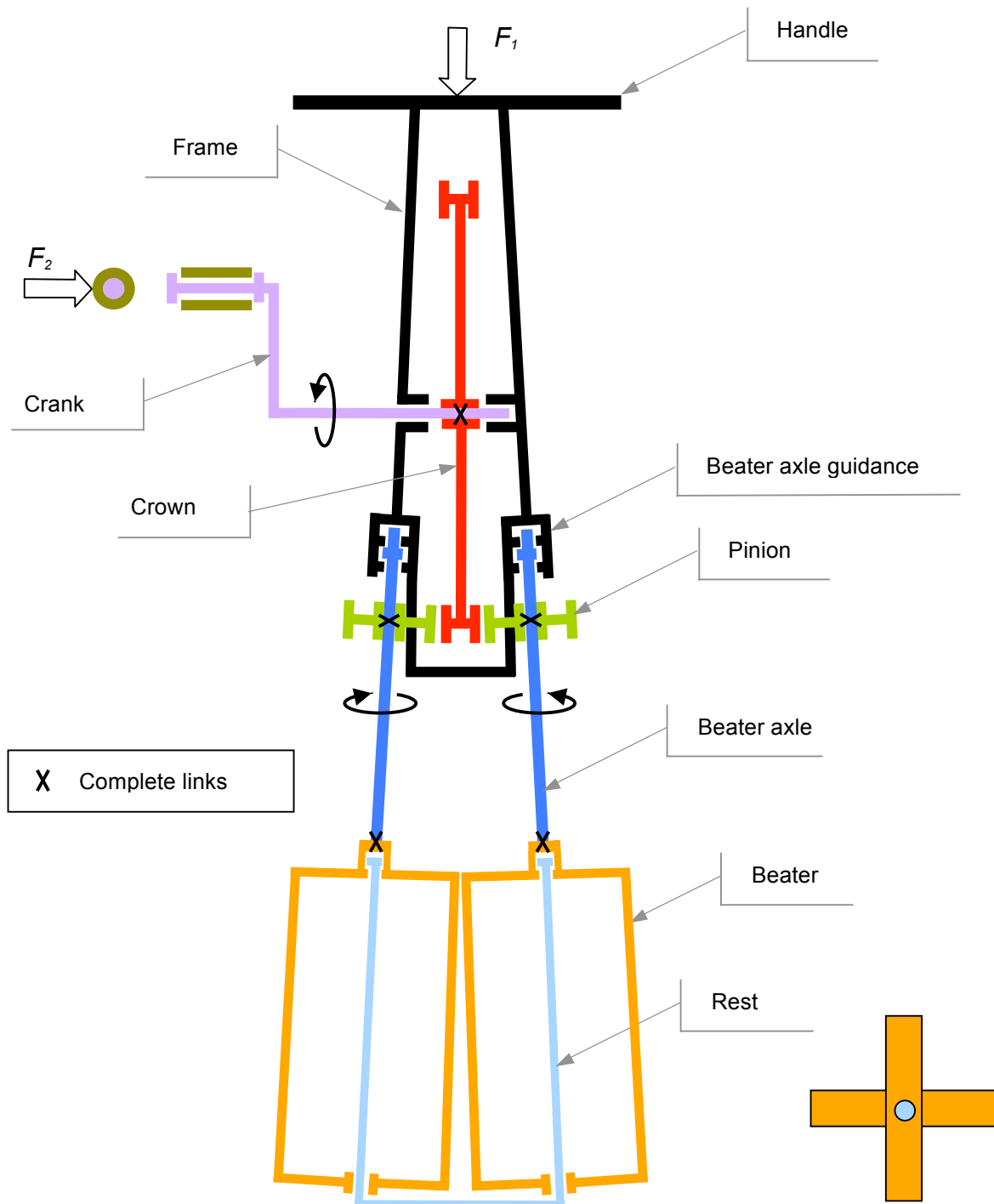
The speed of the beaters is increased by 5.3 in relation to the speed of rotation of the crank.

6 - In which direction do the beaters turn?

One beater turns clockwise, the other, counterclockwise.

Complete the principles diagram of the hand beater

- 1- Complete the principles diagram by drawing the gears.
- 2- Connect the parts of the object to the elements in the diagram.



Technological analysis of the dynamometer

Global function of the object: To measure a force (N) or weight (g).

Analysis of the object

Observe the object and answer the following questions:

1- What is the purpose of the upper ring?

To restrain or to pull the dynamometer while it is being used.

2- What is the purpose of the hook at the bottom?

To hook or attach the dynamometer to an object whose weight or force we are seeking to measure.

3- Why is there a spring in this object? What is its purpose?

The traction spring offers resistance to measure the force of traction of the object which is suspended on its hook or ring.

4- What is the use of the gradation shown on the cylinder?

This is used to evaluate the force or the weight.

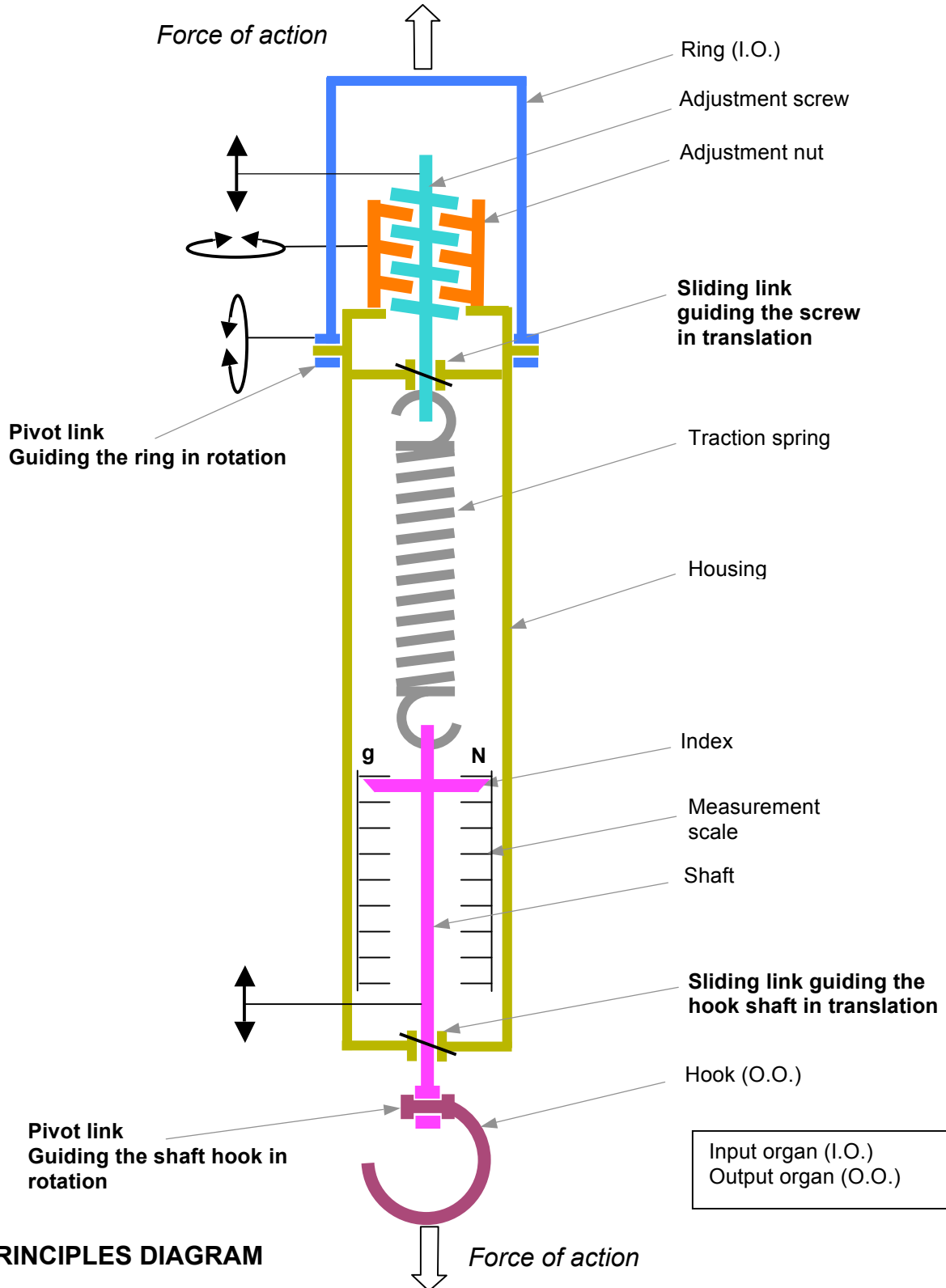
5- How does the adjustment system of the dynamometer work?

The adjustment system consists of an adjustment screw and bolt which, using the rotation of the screw, allows the adjustment of the height of the spring and the shaft/index attached to it.



Complete the principles diagram of the dynamometer

- 1- Draw the missing elements on the principles diagram.
- 2- Connect the parts of the object to the elements in the diagram.

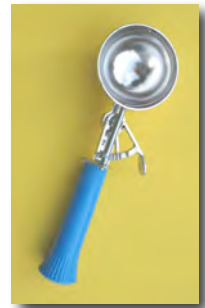


PRINCIPLES DIAGRAM

Technological analysis of the ice cream scoop

Global function of the object:

Form ice cream into a ball and easily remove it from the scoop.



Analysis of the object

Observe the object and answer the following questions:

1- Describe how this object functions.

By pressing the finger rest, located at the end of the rack, the rack rotates, which in turn rotates a pinion mounted on the axle, attached to the knife. The knife then removes the ice cream stuck on the scoop. A torsion recall spring brings the rack back to its initial position.

2- What is the purpose of the knife?

Removes the ball of ice cream from the scoop.

3- What role does the recall spring play?

Allows the rack to return to its initial position.

4- How many teeth are on the rack? On the pinion?

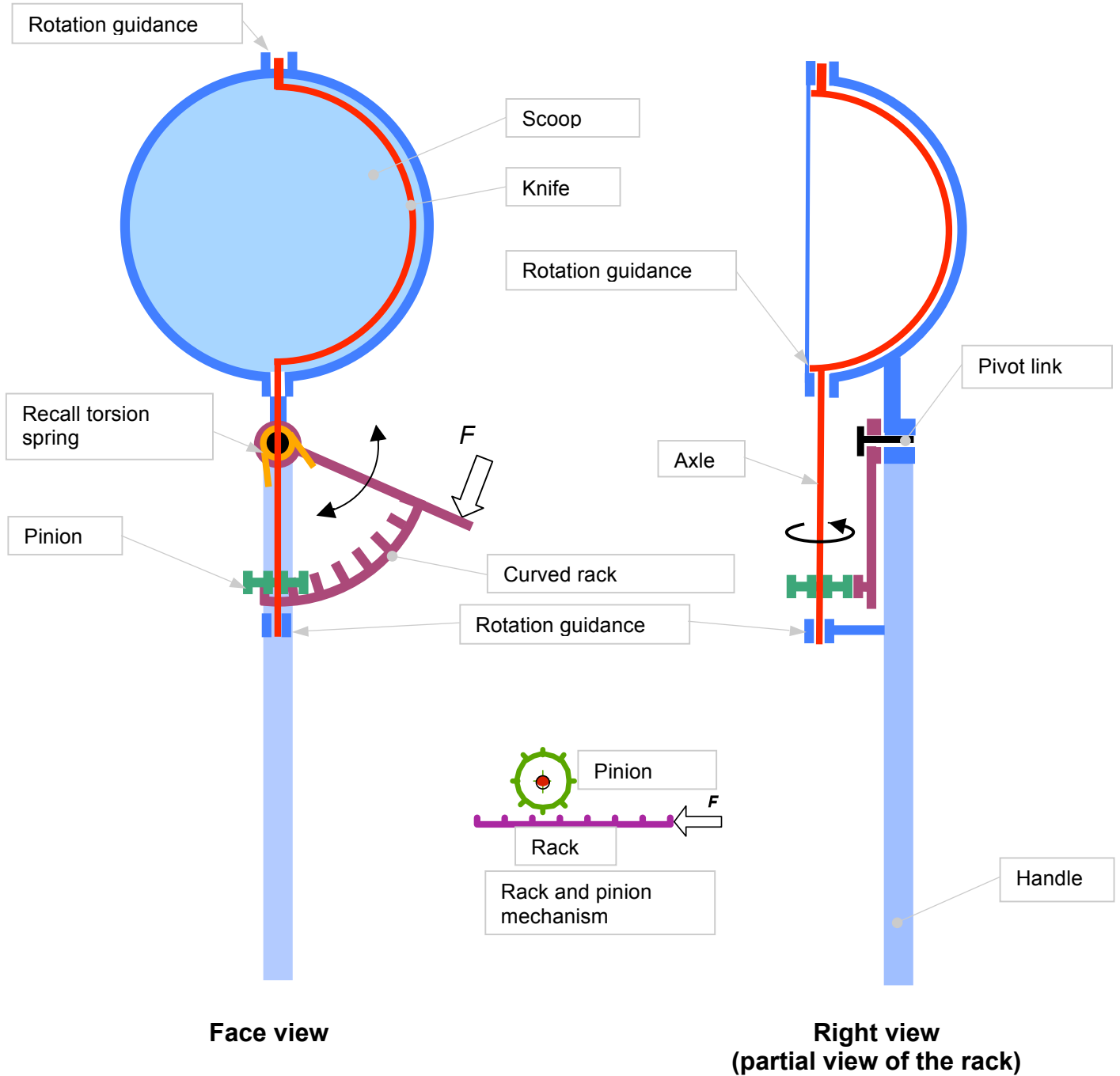
The rack has 6 teeth and the pinion, 5 teeth.

5- What is the amplitude of movement (in degrees) of the knife?

180° of rotation.

Complete the principles diagram of the ice cream scoop

1- Complete the principles diagram in face view.
 2- Connect the parts of the object to the elements in the diagram.



PRINCIPLES DIAGRAM

Technological analysis of the cutter compass

Global function of the object: Cut circles in paper or in other thin materials.



Analysis of the object

Observe the object and answer the following questions:

1- What is the movement that allows the knife to move on the slider?

Translation movement.

2- How are the drypoint and the knife affixed to the object?

They are affixed using a bolt that tightens and a guidance device.

3- What is the purpose of the drypoint?

Maintains the cutter compass in place.

4- Where is the force of action applied to operate this object?

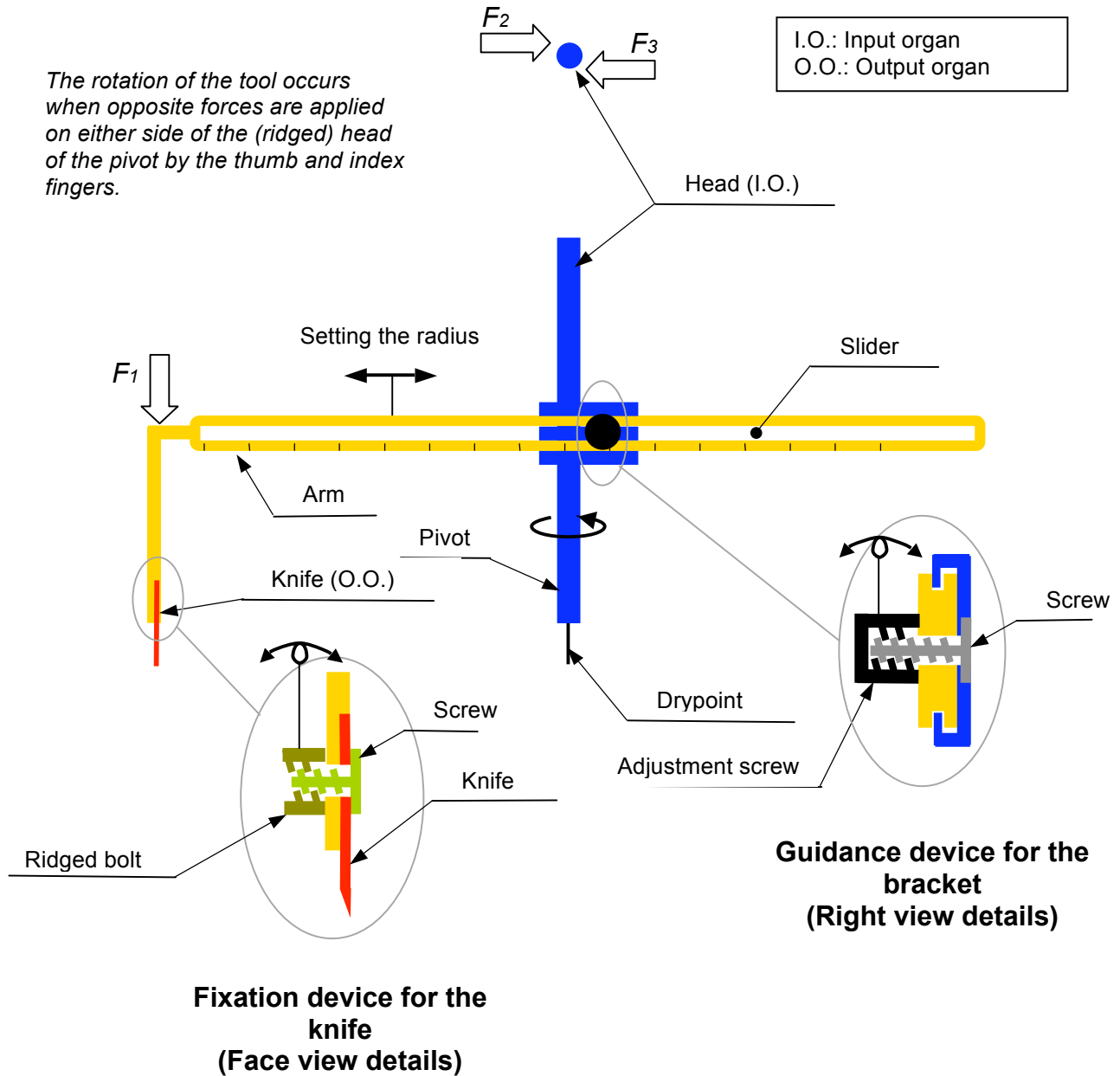
On the head of the compass (input organ).

5- What type of movement is carried out by the screw when it is inserted into the nut?

Helical movement.

Complete the principles diagram of the cutter compass

- 1- Represent the movements associated to the parts.
- 2- Draw the screw-nut systems of the drypoint and of the knife.
- 3- Connect the parts of the object to the elements in the diagram.



PRINCIPLES DIAGRAM

Technological analysis of the tripod

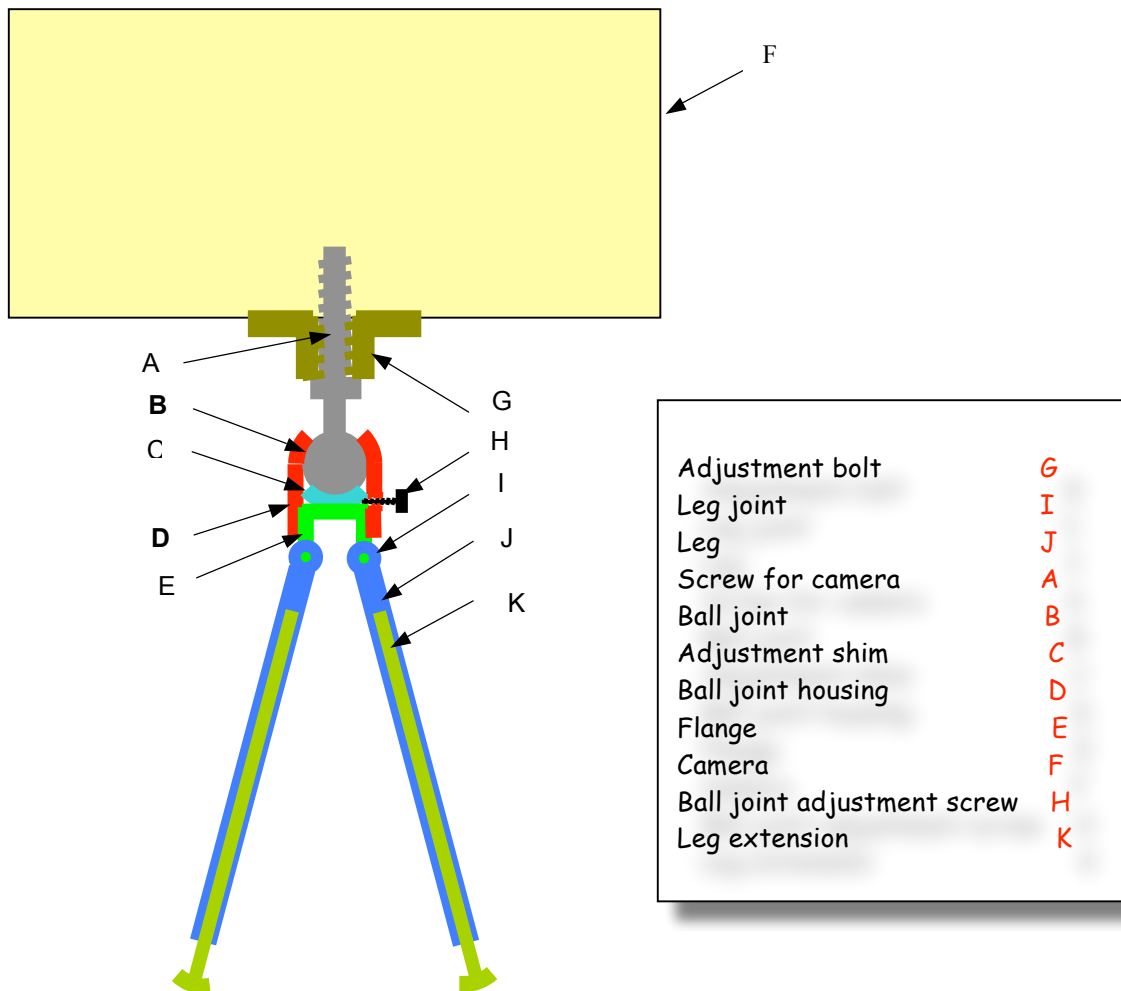
Global function of the object:

Allows a camera to be held in a stable position and to maintain it at the desired position either vertically, horizontally or at an angle.



Analysis of the object

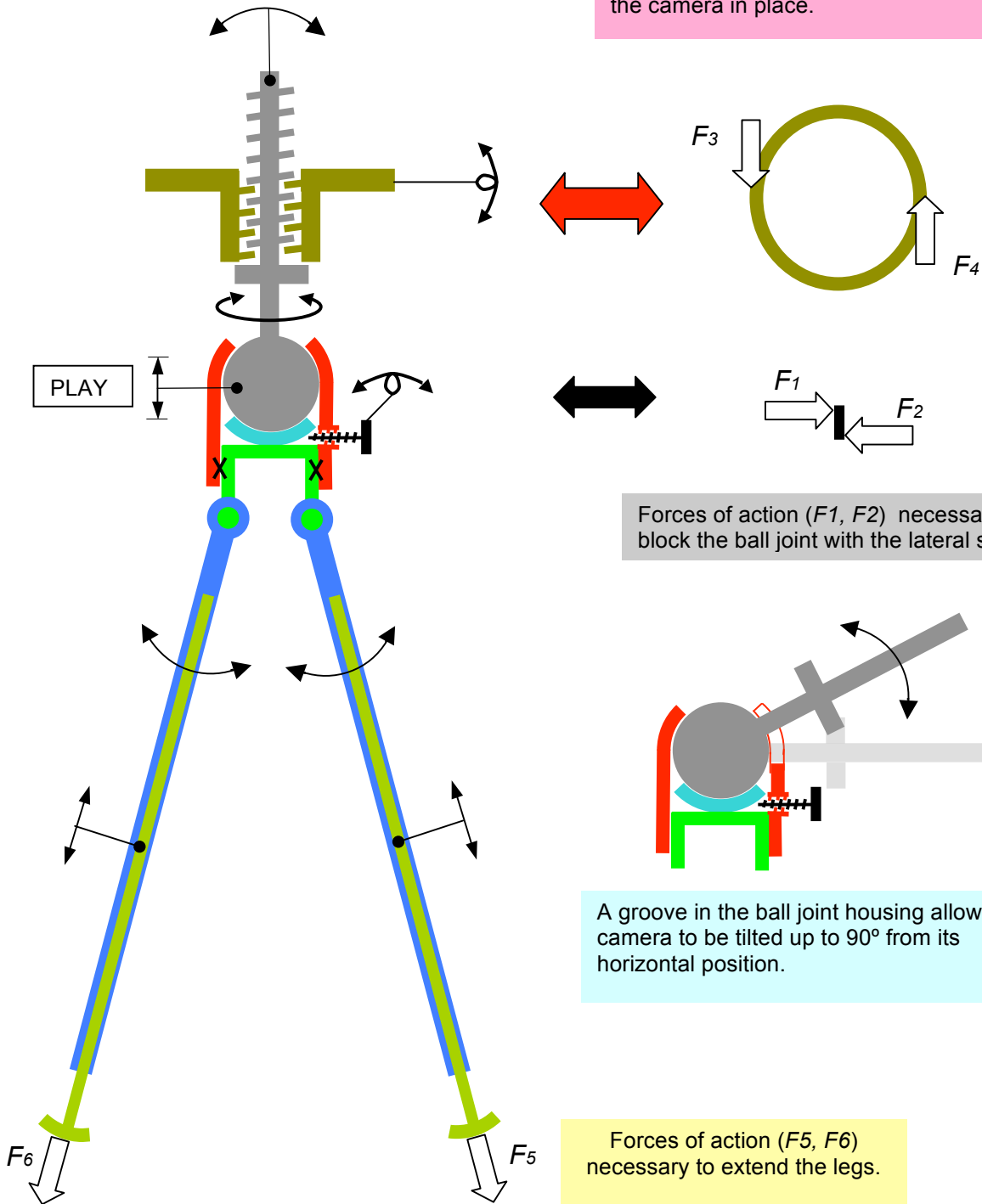
Associate the letter to the correct part.



Complete the principles diagram of the tripod

- 1- Place the movement symbols on the diagram.
- 2- Draw the missing screw-nut system.

Forces of action (F_3, F_4) necessary to affix the camera in place.



Forces of action (F_1, F_2) necessary to block the ball joint with the lateral screw.

A groove in the ball joint housing allows the camera to be tilted up to 90° from its horizontal position.

Forces of action (F_5, F_6) necessary to extend the legs.

**PRINCIPLES DIAGRAM
(forces and movements)**

Technological analysis of the articulated toy

Global function of the object:

Fun toy allowing one part (the jaw of the dinosaur) to be moved from a distance.



Analysis of the object

Observe the object and answer the following questions:

1- Which element in the object allows the dinosaur head to lift when the trigger is released?

The torsion spring.

2- What type of movement is associated to the string when we pull the trigger?

A translation movement.

3- Where is the torsion spring affixed?

The spring is fixed to the dinosaur's skull and to the tube.

4- Which part of the dinosaur head is mobile? Which is fixed?

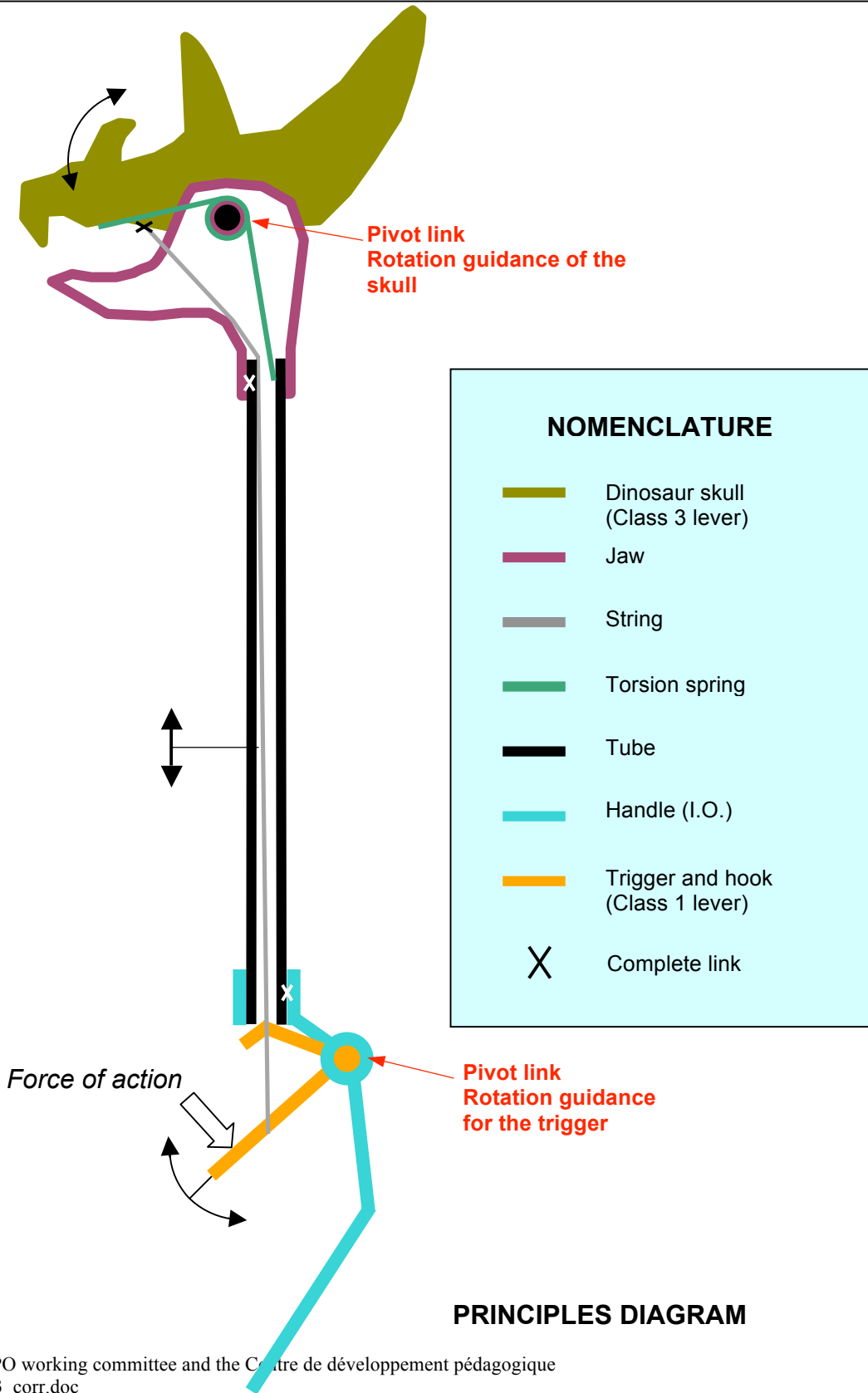
The head of the dinosaur is mobile and the jaw is fixed to the tube.

5- Explain the operating principle of the object.

The toy is made up of a tube which includes a handle and a trigger on its lower part and a dinosaur head at the top. The head is in two parts: The lower part, the jaw, is fixed and linked to the tube, while the upper part, the skull, is free in rotation and linked to the jaw with a pivot link. The skull at the level of the palate is linked to the trigger by a string that goes through the tube. A recall torsion spring mounted on the head joint allows the skull to lift when the trigger is released.

The operation consists of making the skull move around its joint by pulling the trigger located at the end of the tube.

Complete the principles diagram of the articulated toy
 1- Complete the principles diagram.



Technological analysis of the meat grinder

Global function of the object:

Grind pieces of meat and other foods of a similar nature beginning with pieces of about 30 mm in diameter.



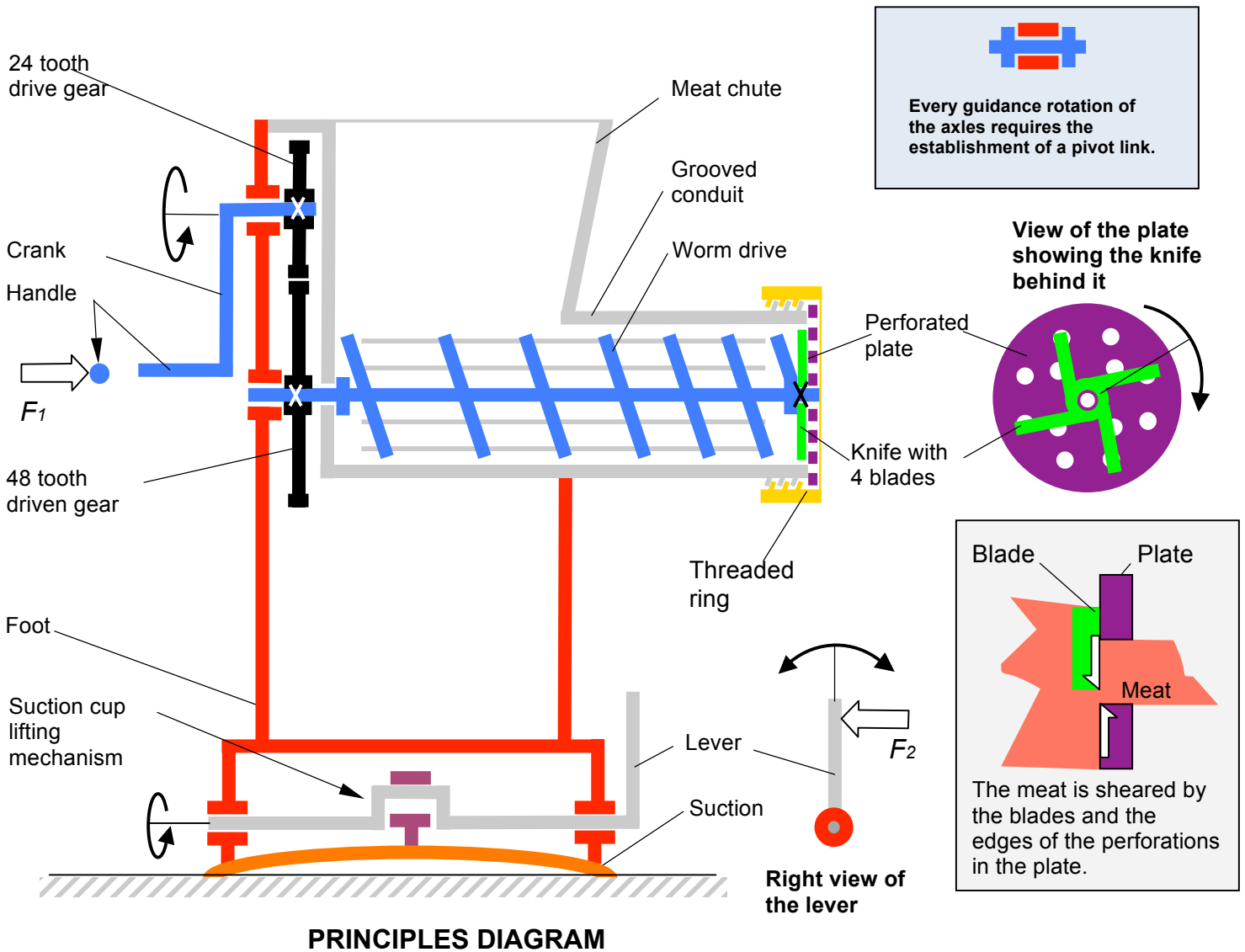
Analysis of the object

Observe the object and answer the following questions:

- 1- How many teeth are in the drive gear contained in this object? 24 teeth.
- 2- How many teeth are in the driven gear contained in this object? 48 teeth.
- 3- What is the purpose of this gear? De-multiplication of the speed and increase in the force transmitted.
- 4- While observing the worm drive in the grinder, you will notice that it contains a "decreasing step". Explain what a "decreasing step" is and emit an hypothesis as to its purpose in the meat grinder. The grooves in the worm drive are closer together at the right side of the screw, which is called a decreasing step. Thanks to the decreasing step, the food is pushed towards the blades of the grinder.
- 5- What is the purpose of the grooves in the conduit? To create friction between the conduit and the food, to prevent the food from turning with the screw.
- 6- How is the grinder affixed to the work surface? By a suction cup.

Complete the principles diagram of the meat grinder

- 1- Represent the gears.
- 2- Represent the worm drive.
- 3- Connect the parts of the object to the elements in the diagram.



Technological analysis of the salad spinner

Global function of the object:

Spin the washed, wet lettuce while gathering the water extracted from it.



Analysis of the object

Observe the object and answer the following questions:

1- Describe the operation of the transmission of movement mechanism in this object.

The device is made up of a container equipped with a central pivot on which a basket with slits turns. The basket is driven by a gear system made up of a 52 tooth crown (the drive gear) activated by a crank. It transmits its rotation movement to a 13 tooth pinion (the driven gear), giving a gearing ratio of 4. The pinion is attached to a driving disk placed above the basket, and turns it thanks by contact ensured by jamming.

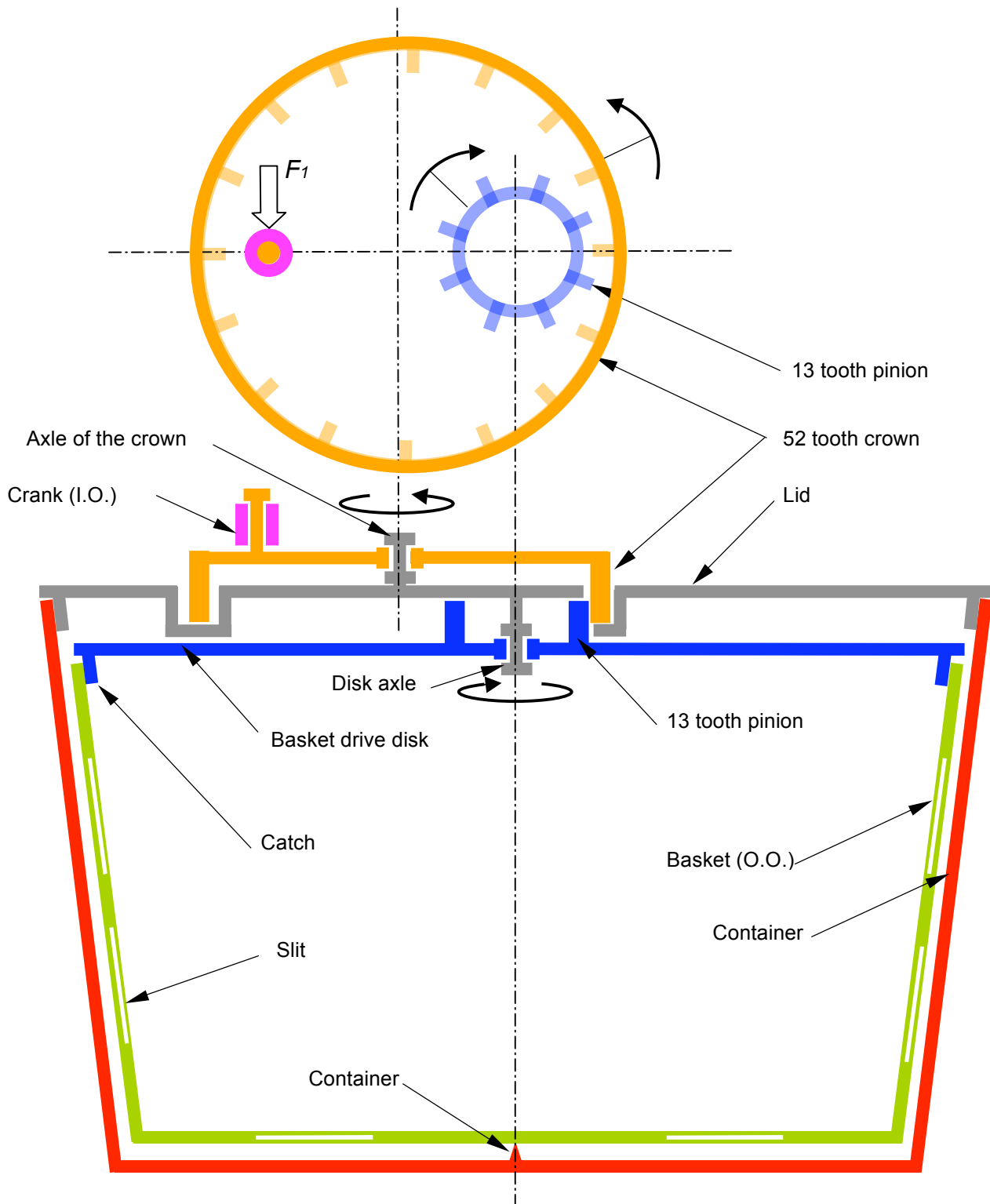
2- How is the water extracted from the lettuce leaves?

By turning, the spinner creates simulated gravity, like a centrifuge. This gravity acts on the lettuce and the water droplets.

The water droplets slide on the lettuce, escaping and accumulating on the sides of the container, exactly as if the water had been at the bottom of the container.

Complete the principles diagram of the salad spinner

1- Connect the parts of the object to the elements in the diagram.



Technological analysis of the glue stick

Global function of the object:

Allow glue in solid form to be applied to a surface without soiling your hands while keeping the glue from drying out.



Analysis of the object:

Observe and disassemble the glue stick

1- Specify where and how the seal on the glue stick is ensured.

The cap for the top end of the stick and the bulges at the base.

2- Describe the mechanism that allows the basket to lift in the tube.

When the wheel is turned, a push screw moves in rectilinear translation towards the top, bringing with it the basket and the glue.

3- What is the shape of the glue reservoir?

A cylinder.

4- What element of the reservoir guides the glue when it is pushed upwards?

The grooves inside the reservoir.

Complete the principles diagram of the glue stick

1- Complete the principles diagram.

Closed (glue inside)

Open (glue out)

