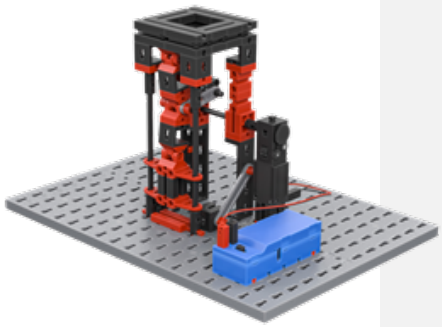
Model 18
Toggle press

The students receive the construction instructions for building the toggle lever press.



Date

Name

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THEMATIC TASK

1. The three components are:
   a) The gear reduction gearbox,
   b) the eccentric mechanism, and
   c) the toggle lever mechanism.
2.

Similarities:

- Both mechanisms use levers to convert rotary motion into linear motion.
- In both cases, force amplification occurs, so that a small input force can generate a larger output force.
- The force amplification increases the closer the lever comes to a straight position.

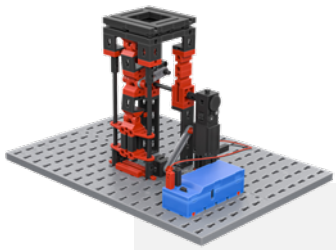
Differences:

1. Eccentric crank with I-strut 30:

- The eccentric crank ensures continuous, rotating motion.
- The force is transmitted via a rotating movement, which is converted into a linear movement of the press head.
- The maximum pressing force occurs when the eccentric is at its lower dead center position.

2. Knee lever mechanism

- Here, two articulated levers work together to enable particularly strong power transmission.
- The force is transmitted by compressing the knee joint, which causes a non-linear amplification.
- The greatest force is generated when the mechanism is almost fully extended, as only a small movement is then required to apply a large force.



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EXPERIMENTAL TASK

From the considerations of the thematic task, it follows that the toggle lever press can build up considerably greater forces than the simple eccentric press.

The toggle lever press involves a "series connection" ("cascading") of two knee joints. This amplifies the effects of the individual mechanisms.

While the eccentric crank provides a uniform rotary motion and operates continuously, the toggle lever mechanism amplifies the force particularly strongly when it is almost fully extended. Toggle lever mechanisms are therefore ideal for presses or clamping devices that require a very high end force.

APPENDICES

Building instructions and templates for the models:
Model 18: Construction manual for toggle lever press.

Further information

[1] Wikipedia: Toggle lever.

[2] Wikipedia: Toggle lever press.