

Model 3

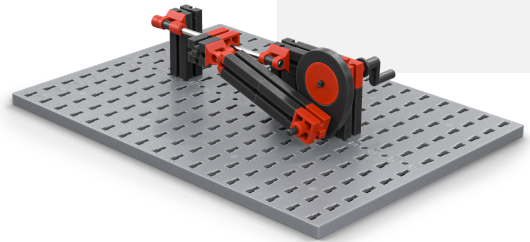
Crank-push scissors

Drives usually generate a rotary motion. However, a reciprocating motion is often required for the output. This can be achieved with crank swings, a scissor lift, and push cranks. Push cranks play a central role in combustion engines as "crankshafts": they convert the thrust motion of the piston rod into a rotary motion of the output shaft.

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DESIGN TASK

The gear shown in Fig. 1 is a "crank swing": it converts a circular motion (that of the eccentric disc) into a swinging motion: the axle at the upper end of the movably mounted base block moves along a circular arc. A typical application for a crank swing is a simple windshield wiper.

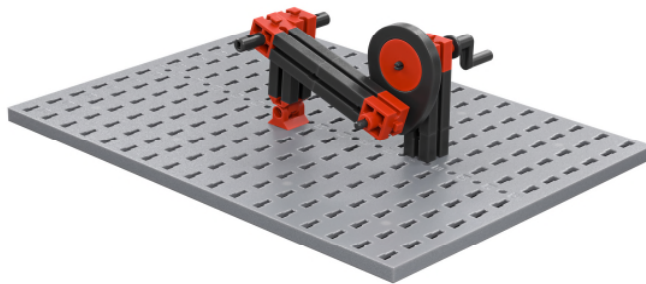


Fig. 1: Crank swing arm

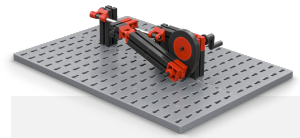
Extend the crank-swing mechanism to create a windshield wiper with two separate wiper blades. (You can simulate the wiper blades by attaching static struts to the base module at the sides using an S-bolt.)

EXPERIMENTAL TASK

1. A mechanism very similar to the crank swing is the "push crank" shown in Fig. 2
. Unlike the crank swing, the circular motion of the eccentric disc is converted into a thrust motion rather than a swing motion: the guide provided by the metal axle ensures that component 15 with a bore moves back and forth in a straight line.

In addition to the aforementioned function as a crankshaft in vehicle drive, there are other useful applications – e.g., as a "feed gear."

Extend the push crank to create such a feed gear, that evenly pushes a sheet of paper forward by a fixed distance on the base plate. Demonstrate how it works.
how it works.



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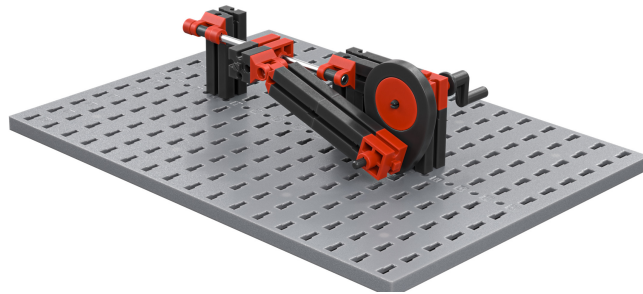
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Fig. 2: Thrust crank

2. Fig. 3 shows a scissor jack that is lifted using a worm gear
. The gear is self-locking, i.e., the jack remains stable in the position set with the worm gear.

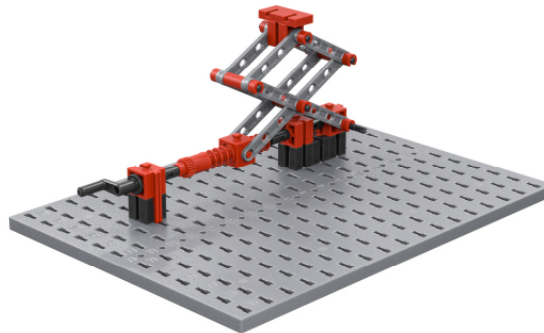
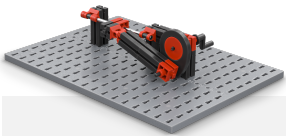


Fig. 3: Jack with scissor lift and worm gear



3. Build the car jack according to Figure 3. You will notice that the car jack lifts surprisingly high. Think about how the lift could be increased further. Name several possibilities and compare them.



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Additional task

Build the scissor lift shown in Fig. 4 with a motor and test the model.

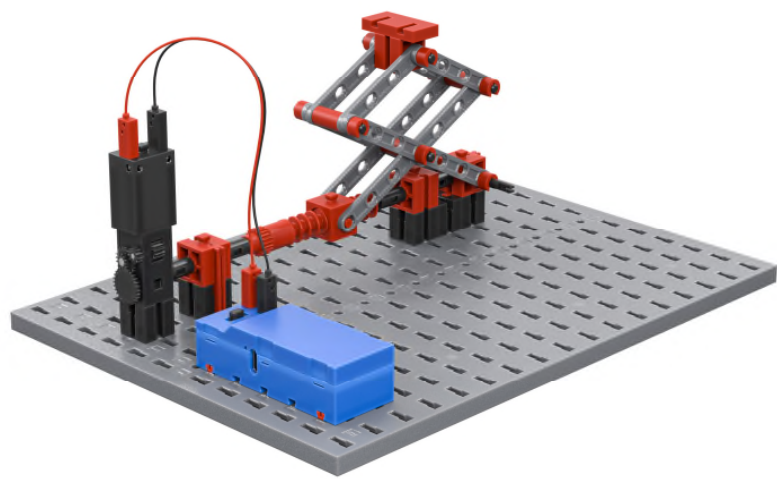


Fig. 4: Scissor lift with motor

