

## Automata Toy



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Create a charming hand-operated mechanical toy.

The fun is automatic!

Few things are as exciting as a shiny new toy. Before the invention of microchips and electric motors, children's toys were powered by cranks, gears, cams, and followers. These mechanical toys, or automata, continue to elate and fascinate creators and operators of all ages.

An automaton is a relatively simple self-operating machine or control mechanism designed to follow a sequence of operations, resulting in predetermined movements. All automata have a mechanism that drives the movement and showcase parts that move. Showcase pieces can move up and down, appear and disappear, move apart from each other, or spin in a circle. In complex automaton, all these pieces can work together to create an elaborate animated scene.

Automata can be quite complicated, rivaling the mechanical inner workings of a clock. They can also be quite simple.

A simple automaton can be made with just a few supplies and a lot of imagination. All that is needed are a few clothespins, paper clips, copper wire for the mechanism, and paper or airdry clay for the moving showcase piece. Clothespins provide an excellent base, as they can be stacked together, and the center of the spring is perfect for holding an axle or crank in place while still allowing it to rotate. The crank is made from an opened paper clip, formed to have a small divot at one end. When a wire is attached to the apex of the divot, it will move up and down when the crank shaft is turned. This up-and-down motion can be combined with two stationary points on either side, creating a perfect base for a winged animal that appears to fly when the crank shaft is turned.

The instructions below will show you how to build a base for a flying creature, but you can use your imagination to build any animal or object you want! When creating a design, start with the showcase object and desired motion, then design a base that can support such a movement. Additional materials such as mini clothespins, wooden craft sticks, and chipboard may be needed for these more complex designs. Whatever you design, be sure to look for solutions whenever you get stuck, refine the design, and enjoy the process!

**Note: Instructions and materials are based upon a class size of 24 students. Adjust as needed.**



### Materials (required)

[Creativity Street Large Wooden Spring Clothespins](#), Pkg of 50, Natural, (62144-1338): need 3 clothespins per student

[Blick Copper Wire](#), 24-gauge, 100 ft, (33415-1024); share one roll across class

[Officemate Paper Clips](#), #3, 200 count, (57354-1001); share one package across class

[Mini Long-Nose Pliers](#), 5", (33083-1010); share one between two students

[Aleene's Quick Dry Tacky Glue](#), 4 oz, (23884-1104); share one bottle between four students

### Suggested materials for decoration:

[Crayola Model Magic](#), Assorted colors, and sizes (33214-)

[American Crafts Washi Tape](#), Assorted designs, Pkg of 8, 6 yds, (54110-)

[Awagami Creative Washi Paper Pack](#), 1 lb, (11325-1001)

[Black Ink Mulberry Paper Scrap Pack](#), (12465-3590)

[Blick Matte Acrylic Paints](#), Assorted colors, (00727-)

### Optional Materials

[Creativity Street Craft Sticks](#), Bag of 150, (60401-1500)

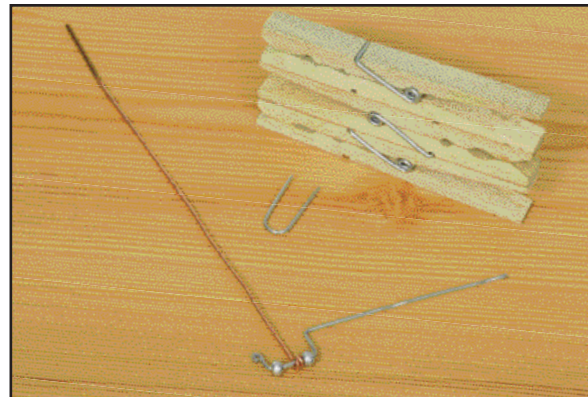
[Creativity Street Jumbo Craft Sticks](#), Bag of 100, Natural, (60406-1350)

### Ready to order materials?

Go to [www.DickBlick.com/lesson-plans/automata-toy/](http://www.DickBlick.com/lesson-plans/automata-toy/)  
to access a product bundle for your convenience.

## Process

1. Glue three clothespins together, stacked with the pinchers of the middle clothespin facing in the opposite direction of the top and bottom clothespin. This will be the base of the automata toy.
2. Create the main turning rod, or axle, of the machine. Open a paper clip, straightening the wire until the last bend.
3. Bend the open end of the wire at a 90-degree angle. Keep the wire in a parallel line and bend again, at a 90-degree angle approximately 1/2" away from the first bend. Then bend the end of the wire up and over, creating a squared "U" bend.
4. Slide two beads to the center of the "U" bend.
5. Thread the unbent end of the wire through the center of the middle clothespin's spring.
6. Bend the end of the wire or glue a bead to the end of the wire to keep the wire axle from sliding out.
7. Use mini long-nose pliers to attach a 5" long piece of wire to the "U" bend in the axle, between the two beads. Wind the wire twice around the paperclip tightly, but not so tight that it cannot move. This piece of wire will move up and down when the axle is turned.
8. Pull the axle back so that the "U" bend is nearly touching the paperclip.
9. Cut a paperclip so that it is approximately 3/4" of an inch long keeping the curved end of the paperclip intact.
10. Use the cut paperclip to cage the copper wire, keeping it upright and centered. Tape the cut paperclip piece to the top surface of the clothespin. Test the mechanism by turning the axel handle.
11. Create the main showcase piece using paper or a lightweight airdry clay, such as model magic. For this mechanical design, the showcase piece should reflect a flying animal, such as a bird, butterfly, or mythical dragon.
12. Attach the main part of the animal's body to the top of the copper wire. If using a paper showcase, bend the top of the wire at a 90-degree angle, perpendicular to the base. Use washi tape to secure the bent end of the wire to the showcase. If using airdry clay, insert the end of the copper wire at the base of the piece while the clay is still wet.
13. To create the wing stabilizers, you will need two 5" pieces of copper wire.
14. Bend both wires at a 90-degree angle one inch in from the end creating an "L" shape.
15. Use washi tape to secure the wires to the top of the clothespin base, on either side of the center wire, with the open side of the "L" facing outwards and away from the center of the piece. The exact placement of these wires will depend on the design of the showcase piece.
16. Make a bend going in the same direction of the wings, at the top of the two wires about an inch down from the top.
17. Attach the two wires to their respective wings.



**Step 1:** Create a base out of clothespins and use a paper clip to make the main turning rod of the machine.



**Step 2:** Create the main showcase piece—a flying creature—using paper or a lightweight airdry clay.



**Step 3:** Attach the creature and add wing stabilizers, taping one end to the base and the other to the wings.

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### Process (cont.)

18. Test the crank shaft and motion of the creature. Some adjustments may be needed. If the showcase piece is having trouble moving, the wires may need to be trimmed. A good rule of thumb is that the wing pieces should be about half an inch shorter than the main center piece. Refine the piece and trim where needed. Washi tape can be used to extend the wires to the wings and add flexibility, if needed. Bends in the wire can be sharpened with pliers.
19. After the mechanics of the piece have been refined, visual details and embellishments can be added, such as covering the base clothespins with paper, washi tape, or a box created from heavy cardstock.

### National Core Arts Standards - Visual Arts

#### Creating

**Anchor Standard 1:** Generate and conceptualize artistic ideas and work.

**Anchor Standard 3:** Refine and complete artistic work.

#### Presenting

**Anchor Standard 5:** Develop and refine artistic techniques and work for presentation.

#### Connecting

**Anchor Standard 10:** Synthesize and relate knowledge and personal experience to make art.

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