



Mini D-Ring Binder Mechanism Organizer Concept

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Summary

Proof of concept for an authentic FDM-printed bi-stable binder spring mechanism. (Not a standard binder size)

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I'm hoping this is a first ; the first FDM 3D-printed binder mechanism? Not really meant for actual use; it just needs to be the first 😊. Although not 100% 3D-printed, the spring, bistable mechanism, and rings are, so I'm still counting it!

Been playing around with bistable C-shaped leaf springs (see [Glasses Case](#) and [Tackle Box](#)), and a binder spring is pretty much the same thing, except the C-spring is extruded to be really long and has holes that allow rings fastened inside to pass through. It's a very non-standard ring profile (so screws can fasten), so I modified tackle box trays from the [Tackle Book](#) as pages for an example of interesting "stationery" - along with modifying the case for the binder covers.

Demo and assembly at <https://youtu.be/1c2v9sq0Abk>

<https://www.youtube.com/watch?v=1c2v9sq0Abk>

Caveats

This is a **proof-of-concept** project. It has several issues that prevent it from being practical:

- Not as strong as a traditional steel spring
- Rings are too flexible
- Plastic fatigue
- Non-circular ring profile and teeth shape can snag pages being moved across.
- etc.

Tools and Extra Hardware

- Snips and Pliers
- Plastic-compatible threadlocker
 - Optional
 - DO NOT USE NORMAL LOCTITE; make sure it's plastic-compatible (I just used Elmer's Glue).
- Countersunk M3x8 Screws
 - x6
- M3 Nuts
 - x6
- Countersunk M3x20 Screws
 - x6
- M3 Nylon Locknuts
 - x2
 - Can be replaced with normal M3 nuts and threadlocker if desired.
- Screwdriver for screws

Printing

All parts should already be oriented correctly, with the correct side lying on the bed. The spring should be PETG, but it probably doesn't hurt to make the entire mechanism out of PETG.

- Spring.stl
 - x1
 - PETG
 - Needs overhang supports for ring holes. I would also recommend tree supports on the left and right sides for the bottom 1/2 of the height for shoring.
 - Recommend printing with a brim.

- At least 2 perimeter layers.
- HingePlate.stl
 - x2
- Ring_A.stl
 - x3
- Ring_B.stl
 - x3
- Cover_Top.stl
 - x1
 - Supports needed below hinge pins.
- Cover_Bottom.stl
 - x1
 - Supports needed below hinge pins.
- Cover_Back.stl
 - x1

And page contents

This D-Ring binder isn't shaped like a normal one. A normal D-Ring binder is considerably taller than the expected paper stack it can support (at least without curling the pages), so the rings don't collide with the cover when it's empty. I didn't want that extra wasted space, so it's more compact, but that also means it only works well when it's filled with just enough so that both the top and bottom covers are parallel.

- Page_Med.stl
 - x3
- Tacklebook_Long_Lid.stl
 - x30 (3 per page)

Assembly

Prep

1. Remove any supports and clean off parts. For the Spring, some parts are thin, so take care not to break them. However, if those thin parts break, the part is still usable. It's recommended to completely cut the tree supports carefully into pieces with snips before removing them.

Binder Mechanism

1. Take the 2 HingePlates and mesh them together.
2. Slide the meshed HingePlates into the Spring. The HingePlates have seats carved out for where the rings will fit; make sure that faces upwards (towards the holes in the Spring).
 1. The plates should be in the open position, where the V of the plates bends upwards in the same direction as the curve of the

spring. If they aren't, firmly push the middle of the plates in to latch them open.

3. Seat a ring of both type A and B into the middle HingePlates.
4. Put M3x8 screws through the rings to fasten them to the HingePlates. Thread from the top (the modeled-in countersink is on the rings).
5. Put (non-locking) nuts on the bottom sides of the screws. Use (plastic-compatible) threadlocker if preferred.
 1. Use pliers and screwdrivers to make sure the nut is on tight.
 2. While this is just a proof of concept and not recommended, if you intend to use this for anything, make sure everything is fastened tightly and consider some threadlocker. Over time, the nuts will loosen from the impact of the binder opening and closing, and the only way to get access to re-tighten them is to unscrew the spring from the cover.
6. Repeat with the other rings. Use the same ring type for each HingePlate (so one will have only type A fastened, and the other only type B).

Cover

You may need to use moderate force to bend the pins into the hinge bores. But do not over-bend the parts to the point where they whiten (plastic crazing) and/or permanently deform. When attaching the cover parts, the inside of the cover has the hex pattern; assemble them so all the hex-pattern sides face the same way when lying open and flat.

1. Attach the Cover_Top to the Cover_Back.
2. Attach the Cover_Bottom to the Cover_Back.

Full Binder Assembly

1. Insert both M3-20 screws from the back of the Cover_Back through to the inside.
2. Place the binder ring mechanism onto those screws on the side.
3. Lightly place the M3 locknuts on the screws; thread them just enough to stay on the screw.
4. You'll notice the binder mechanism has a bit of play if you lightly wiggle it. Tighten the locknut just enough to remove that play. Do not overtighten.

At this point, the binder is finished. Open and close the rings by pulling them apart and pushing them together. If possible, manipulate multiple rings at a time to reduce the stress on any one ring.

Pages

1. See page assembly instructions from [Tackle Book](#).

2. Bend the hole-punch area at the ends of the thinner flexure part to form a Z shape that goes upwards.
3. Print and assemble 3 pages.
4. Place in binder.

Labels

Also included a labels SVG. Nothing fancy, just rectangle dimensions to match the debossed guides on the covers. Some content falls outside the document's page boundary; you'll need to open it in an SVG editor to get to it.

Model files



spring.stl



hingeplate.stl



ring_a.stl



ring_b.stl



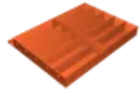
cover_top.stl



cover_bottom.stl



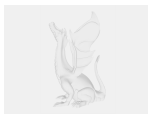
cover_back.stl



page_med.stl

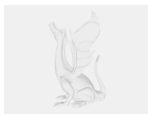


tacklebook_long_lid.stl



bindersys_15.blend

Other files



labelssvg.zip

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