

# **Technical Description of a Hole Puncher**

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## **Definition**

A hole puncher is a mechanical device used to create circular holes in sheets of paper, allowing them to be put into binders, folders, and other filing systems. It functions as a simple yet effective mechanism to support document organization. A hole puncher converts applied mechanical force into precise cutting action. Though commonly found in office settings, variants of this device are used in industrial, commercial, and even artisanal applications, from ticket punching to crafting.

Hole punchers are essential for maintaining neat and professional document arrangements. Depending on the model and design, they can punch one or multiple holes, following standardized layouts such as ISO 838 or the US 3 hole system. The effectiveness and safety of a hole puncher depend heavily on its accurate design, proper maintenance, and user awareness of its components and functionality.

## **Overview**

The Swingline 74015 3-Hole Punch, a typical office model, is composed of a steel base and punch heads with a plastic handle cover. This model can punch up to 20 sheets of paper at once using the US-standard 3-hole layout. Measuring approximately 11" x 2.8" x 2.4" and weighing around 1.5 lbs, its design supports document organization with efficiency and ease of use. The puncher's effectiveness and safety depend on proper maintenance and user awareness of its components.

The Swingline 74015 has a compact rectangular form with rounded edges. Its solid metal construction and plastic covered handle provide durability and comfort. The base includes rubberized grips to prevent slipping.

The device has three aligned punch heads mounted beneath the handle, along with a built-in paper guide for alignment. A tray underneath collects the paper circles, or chads. The base includes printed measurement markings and adjustable guides for paper placement. A locking mechanism keeps the handle in a closed position for storage.

## **Components**

### **Handle**

The handle functions as the lever arm made of either molded plastic or coated metal, it is typically mounted on a hinge or pivot joint. Applying downward pressure on the handle generates a mechanical advantage, allowing the user to exert less force while driving the punch heads downward.

### **Punch Head**

The punch head is a small metal cylinder that cuts through the paper. It lines up with holes in the die below. Punch heads are sharp and sometimes hollow so they can push the chads into the tray easily.

### **Die Plate**

The die plate is a metal platform with holes under the punch heads held by the die holder. Dies

must match the diameter and shape of the punch heads to make clean holes. The distance between the die and punch head must be minimal to ensure a clean cut.

### **Stripper Plate**

The stripper plate is placed between the punch plates and die plate. After punching, the stripper plate pulls the material off the punches as they retract upward. It prevents the sheet from sticking to the punches and maintains the cycle's smoothness.

### **Base Plate and Paper Guides**

The base plate is the lower component that supports both the die and the paper guides. Paper guides are typically plastic or metal arms designed to keep the sheets aligned correctly. The paper guides help keep your paper in the right place so the holes are spaced correctly. Under the die, there's usually a tray to collect the chads.

### **Adjustable Features**

The Swingline 74015 includes adjustable paper guides and punch head locks. The heads are fixed in position, but users can slide the paper guide laterally to align holes with various paper sizes. Depth markers ensure correct hole placement relative to the paper edge.

## **Explanation of Operation**

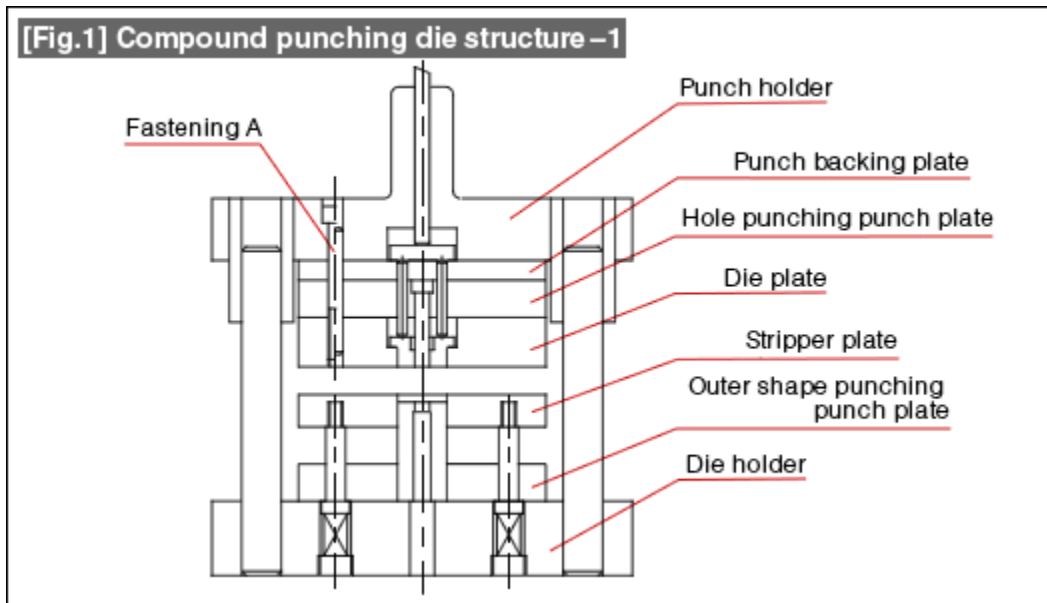
The way a hole puncher works is based on a lever system. When the user presses the handle downward, mechanical energy is transmitted through a pivot to the punch heads. The force is concentrated and directed downward, pushing the cylindrical punch heads through the paper and into the die holes below.

As the punch head contacts the paper, the punch head's sharpened edge slices through the paper, and the resulting chads are pushed through the die openings into the chad tray. This process ensures proper holes are made in the paper without causing any other tears or distortions to the paper itself. The action is quick and efficient, typically requiring only a single motion to complete.

In multi hole models, this mechanism is repeated simultaneously across multiple punch heads, ensuring all holes are made in a single stroke. The mechanical advantage gained from the lever arm reduces the force needed, allowing even thick stacks of paper to be punched cleanly.

Industrial punchers may use motors or hydraulic pressure for greater power and precision.

Visuals



The basic structure of a compound punching die (MISUMI. (2013, April 26).)

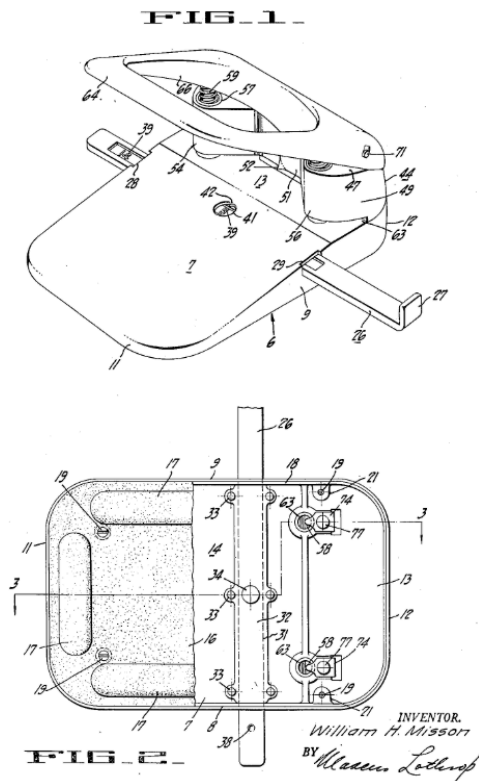
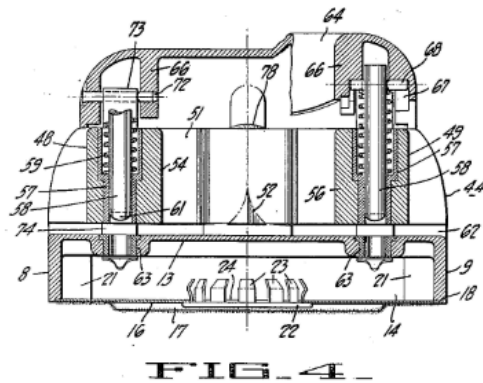
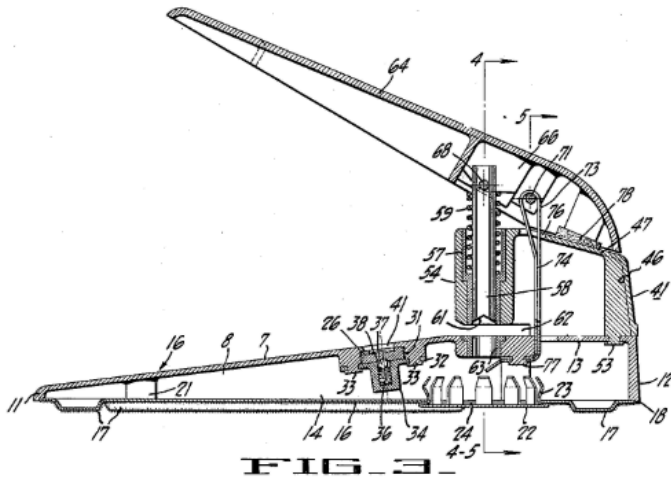


Figure 1: Isometric view of the paper punch. (Misson, W. H. (1952))

Figure 2: Bottom view with part of the cover removed to show inside (Misson, W. H. (1952))



INVENTOR.  
 William H. Misson  
 BY *Maxim Lotterop*

Figure 3: Cross-section view showing internal parts (Misson, W. H. (1952))

Figure 4: Cross-section view shown from a different plane (Misson, W. H. (1952))

## Conclusion

Although it may appear to be a simple office tool, the Swingline 74015 is a carefully engineered mechanical device that demonstrates the effective use of simple machines. It transforms a basic lever mechanism into a practical solution for organizing and managing paper documents. Each component, from the handle to the punch head and die, works in harmony to perform a task that is both common and essential in professional, academic, and personal settings.

Since its invention in the late 19th century, the hole puncher has been continuing to improve. Modern versions offer improved comfort through ergonomic design, increased safety features, and greater functionality, such as adjustable punch heads, and Chad collection trays. These improvements reflect the broader evolution of mechanical tools, where efficiency and safety are prioritized without sacrificing performance. An equipment designed so carefully as this would be reality it's only around \$15-20, a price point affordable for the great majority of people.

Even in today's digital world, the hole puncher remains relevant. Despite the shift toward electronic documentation, paper continues to have a role to play. As long as physical documents are needed, tools like the hole puncher will continue to serve an important purpose.

Ultimately, the hole puncher is more than just a desktop accessory, it's a device that shows how a simple mechanical principle can be applied in a meaningful way to solve everyday problems. Its continued usage in offices, classrooms, and homes serves as a reminder that even the most ordinary tools can have a lasting impact when designed with purpose.

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