Introducing Mechanical Puzzles: Part 2

by Jerry Slocum © 2001

The introductory article in this series appeared in the last issue of GPCQ, Vol.2, No.1, p.12, Spring 2001. This article describes Put Together and Take Apart puzzles.

Put Together Puzzles

The oldest and largest class of mechanical puzzles consists of those puzzles that are solved by assembly or by fitting the pieces together. The most popular member of this class is the jigsaw puzzle. Dissected puzzles of a completely different type were popular much earlier in Greece, and they appeared in the mid-eighteenth century in Japan, and at the turn of the nineteenth century in China. The object of this type of puzzle is to put together a given set of geometric pieces to form a specified outline or figure. The earliest known example is the Loculus of Archimedes, or the Stomachion (the problem that drives one mad!). This puzzle, a fourteen-piece dissection of a square, appeared in the third century B.C. and was reportedly played with and possibly invented by Archimedes.

In the fourth century Magnus Ausonius wrote a poem about the Stomachion and in it he mentions that 1000 kinds of things can be represented with the 14 pieces, including a wild elephant. (Figure 12 - Stomachion Elephant) a flying duck and a barking dog.

One of the most ingenious and imaginative dissection puzzles is the Tangram, formed by dissecting a square into seven pieces. (Figure 13 - The Tangram) The Tangram is singular in its ability to transform simple, geometric pieces into elegant, sophisticated, and sometimes paradoxical figures. The Tangram became popular in China about 1800, and by 1818 it was the first puzzle craze in Europe and America. It remains popular to this day and it is widely regarded as the most elegant and beautiful of the dissection puzzles. (Figure 14 - Mcloughlin Brothers Tangram Set)

Checkerboard puzzles involve restoring a dissected standard checkerboard that has been cut into about a dozen pieces. (Figure 15 - Checkerboard Puzzle) Two of the most famous puzzle designers, American Sam Loyd and Englishman Henry Ernest Dudeny, are responsible for the creation of difficult checkerboard puzzles. Professor Hoffmann, in his classic book, Puzzles Old and New, (1893) warned about solving a seemingly easy checkerboard puzzle: "At first sight, the task would seem to be one of the easiest possible, but any such idea very soon vanishes when the matter is put to the test of experiment."

Toward the end of the last century, the German firm Richter began producing dissection puzzles using small manufactured bricks. (Figure 16 - Anchor Cross Puzzle) These were known as Anchor Stone Puzzles and were very popular during World War I, when they were used by soldiers on both sides to while away the long boring hours in the trenches.

Other interesting dissection puzzles are obtained by cutting up crosses or letters. The most elegant is the "T" puzzle, which is dissected into only four pieces. (Figure 17 - "T" Puzzle) We all know that a "T" is formed by a horizontal and a vertical line, however the key piece must be placed on a diagonal, making it very difficult to solve.

Another class of puzzles in this section are Magic figures, such as the Magic Square. (Figure 18 - Magic Square Puzzle) Numbered blocks or marbles must be placed in an array so that the sum of numbers in each row, column and diagonal is the same.

Other types of put-together puzzles include three dimensional assembly puzzles such as the Soma Cube (Figure 19 - Soma Cube) and Puzzle Rings. (Figure 20 - Puzzle Rings)

David Klainer of Lincoln, Nebraska, spent the better part of six years trying to assemble twenty-five N-pentacube pieces into a cube, or prove it impossible. He almost fainted with shock when he finally solved it. Later computer analysis uncovered only four solutions. This is the magnetic appeal of the put-together puzzle. It can seize your interest and not let go until a solution is found.

Take Apart Puzzles

Take-apart puzzles represent a broad range of objects and clever applications of principles of physics to prevent you from opening them and finding their secret compartments. Some have been deliberately designed as puzzles and others have incidentally become puzzling to open, close, or use, due to functional or safety improvements.

As early as the seventeenth century many trick locks were designed to improve the security of standard locks by making them more difficult to open. (Figure 21 - Puzzle Lock) Some high-security padlocks, with dual shackles, had two hidden keyholes, and required two quite different keys. The keys were given to two trusted employees and were the predecessor (Continued on page 11)

Figures for this article are in the separate insert to allow printing in color.

Jerry Slocum at Convention.
(Continued from page 10) to dual-key safe-deposit boxes. In the first half of the nineteenth century, high-security trick locks and a steel bar were added to safes to prevent thieves from using dynamite in the keyholes and blowing them open. These locks represented the highest level of the lock makers design and craftsmanship skills, and one of the most important uses of puzzles in the nineteenth century.

Trick matchboxes served two useful purposes: to prevent accidental fires in one’s pocket caused by early unstable and unsafe matches and as entertainment to fool friends. (Figure 22 - Black Cat Matchsafe) The tricks employed did not always endear an owner to his or her friends. A popular trick was to provide a knob that appeared to open the matchbox, but only pricked the finger of the unfortunate victim. (Figure 23 - “Touch-me-not” Matchsafe) Other trick matchboxes, however, were very good puzzles. One that offered a free Johnnie Walker whiskey to any solver, necessitated spinning the matchbox to open it.

The first puzzle knives appeared in the sixteenth century. The purpose of the puzzle feature was to prevent an individual’s knife from being used against him. One of the tricks used on these early puzzle knives was to provide a secret latch that, when released, allowed the two sides of the handle to be counter-rotated, thereby revealing the blade and locking it open. (Figure 24 - Fish Puzzle Knife)

In the seventeenth and eighteenth centuries, before the widespread availability of secure safes, secret drawers and compartments were built into boxes, containers, and furniture to hide valuables. Portable desks, called writing slopes, with numerous secret compartments, were used by the pursers of eighteenth century sailing ships for safekeeping the crew’s payroll.

The Golden Age of secret opening puzzles was the period from 1870 to 1900. Famous stores such as Marshall Field in Chicago, Peck and Snyder of New York and Hamleys of London sold a variety of very clever secret opening puzzles. These were beautifully made of polished boxwood, ebony, brass or nickel plated steel. Professor Hoffman’s book, Puzzles Old and New, describes more than fifty secret opening puzzles and there were probably at least twice as many available at that time. (Figure 25 - “Hoffmann” Trick Opening Puzzles) Some of these puzzles were used to carry matches, rings and snuff but the object of most was to amuse and puzzle. Often the puzzle was to remove an object such as a marble or ring from a barrel, a tower or a cannon.

The American Indian Puzzle Purse, (Figure 26 - American Indian Puzzle Purse) is from the Potawatomi tribe. The puzzle is to open it. It was used by the Squaw to hold and carry “dice” and money. She carried it by threading her belt through the strips of deerskin. Squaws would gamble with the dice while the Braves danced. The puzzle purse kept the winnings and losing secret from their husbands. How do you open it? If we open the flaps, both sides are sewed shut. The purse is opened by pulling the deerskin strips through the stitches, which are sewn between the strips. An identical purse is described in the book, “Recreations Mathematiques et Physiques”, written by Jacques Ozanam and published in 1735. Apparently the Indians learned the idea from the French.

Japanese puzzle boxes, which have been exported to the west since the last half of the nineteenth century, were generally more complex. (Figure 27 - Japanese Trick Box) Some require several sliding panels to be moved in a specific order before the “trick box” can be opened. During the last decade Japan has again become known for the originality and quality of its puzzle secret opening puzzles.

Dozens of extremely clever and beautiful secret opening puzzles have been designed and made by Akio Kamei. (Figure 28 - Kamei’s Secret Opening Puzzles) Produced from the finest and rarest woods, the exquisite craftsmanship of these secret puzzle is matched only by the ingenuity of their design. Many use new principles of operation that offer stimulating take-apart challenges. Akio Kamei, from Hakone Japan, currently designs and makes some of the best secret opening puzzles ever made. Two lumps of “sugar” must be put in the “Sweet Cup of Coffee” and stirred to release the locking pins and allow the secret compartment to be opened. (Figure 29 - Kamei’s Coffee Cup Puzzle) The shape of the “Egg” is the clue to finding it’s secret compartment. (Figure 30 - Kamei’s Egg Puzzle) It is opened just like an egg.

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Figures for this article are in the separate insert to allow printing in color.
Figure 21 Puzzle Lock with a hidden keyhole, 17th century.

Figure 22 Black Cat Matchsafe, 1912.

Figure 23 “Touch-me-not” pin prick Matchsafe, circa 1880.

Figure 24 Russian Fish Puzzle Knife, 1992.

Figure 25 “Hoffmann” Trick Opening Puzzles, circa 1890.

Figure 26 Potawatomi Indian Puzzle Purse and “dice”, circa 1880.

Figure 27 Japanese Trick Box, circa 1980.

Figure 28 A few of Kamei’s Secret Opening Puzzles, 1985 - 2000.

Figure 29 Kamei’s Sweet Cup of Coffee Puzzle, 1985.

Figure 30 Kamei’s Egg Puzzle, 1984.
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Figure 12 Solution to Archimedes Stomachion Elephant Puzzle.

Figure 13 Ivory Tangram and Tunbridge Ware Box, circa 1850.

Figure 14 McLoughlin Brothers Chinese Puzzle (Tangram) Set, circa 1875.

Figure 15 Luers First Checkerboard Puzzle, 1880.

Figure 16 Richter’s Anchor Cross Puzzle, 1892.

Figure 17 “T” Puzzle, 1903.

Figure 18 Jacques Magic Square Puzzle, circa 1850.

Figure 19 Piet Hein’s Soma Cube Puzzle, 1960.

Figure 20 Puzzle Rings, 20th century.