Detecting Horizontal Comb Perforations on an Isolated Stamp

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A few years ago I wanted to better understand how one might determine if an isolated stamp had a normal or a horizontal comb perforation. I first turned to Jan Karásek's 1980 pamphlet on early Czechoslovak stamp perforations, his *Zoubkování čs. poštovních známek (1918-1939)*. He did not describe how one might examine such perforations but instead made reference to an article published ten years earlier in the *Merkur* by František Šrámek that did explain the process.

I found the article (*Merkur*, November 1970, no 11 (21), Special Study II, pages 161-176), read it, and discovered Mr Šrámek's technique depended upon minuscule differences in the distance between perforation holes that could only be measured in fractions of a millimetre using very precise optical equipment (not to mention some sophisticated mathematics). I felt that there was a hint in his system that implied a simpler technique could be found but was unable to articulate just what that technique would look like. So I went on searching the literature.

In a recent *Filatelie* (3/2020, pp. 2-7, Josef Chudoba did a nice job explaining how to recognize different sorts of perforations but he did not present an updated version of Mr Šrámek's technique. I continued my search and found a mere two issues later – in *Filatelie* 5/2020, p. 5 – an article by Radomil Květon that elegantly answered the problem with a technique available to almost everyone. Before describing Mr Květon's methods I would like to introduce a few facts about perforations in general – and a bit about comb perforations – that will help in your understanding how and why his solution works.

Back in the 1920s perforation machines in Czechoslovakia were hand operated devices (Fig. 1). Workers loaded sheets of stamps into a machine fitted with a bar decked out with pins. The operator would align the bar to upper edge of the top row of stamps, then press a mechanism that would cause the machine to strike, that is, to lower the bar and penetrate the paper with its pins, thus producing the perforation holes so familiar to us. The operator would then move the bar to the next row of stamps and repeat the process until the entire sheet had been perforated.

Line Perforations

For line perforations, where the pins on the bar were arranged in a straight line (Fig. 2), the operator typically started perforating a sheet by punching a line of horizontal holes above the top of the first row of stamps. This process would be repeated for each row of stamps (ten strikes), then a final row of holes punched below the bottom of the last row of stamps (eleven strikes in all). The operator then rotated the half-perforated sheet 90°and performed a similar operation on the sides of the stamps. It took a total of twenty-two strikes to completely perforate a sheet.

A sheet of line perforated stamps displays two characteristics (Fig. 3). First, the perforation holes extend to the edges of the sheet in both the horizontal and vertical directions. Second, where the horizontal and vertical lines of holes meet, they are almost always misaligned.

Comb Perforations

For comb perforations the pins on the bar were arranged as an upside-down U (Fig. 4). For normal comb perforations, with the first strike of the bar the machine would perforate the top and both sides of the top row of stamps. As with line perforations, this process was repeated for each row of stamps (ten strikes). The operator then moved the bar to perforate the bottom of the last row of stamps for a total of eleven strikes in all. Compared to line perforating, comb perforations cut the workload in half.

Normal comb perforations also display two characteristics (Fig. 5). First, the perforations only extend downward under the last row, with a decorative extra hole at both ends of each horizontal row. Second, the horizontal and vertical rows appear to meet perfectly. This is actually an illusion as can be seen in Figure 6 where a slight extra space above the top of the stamp is visible. What is perceived as an intersection is really the upper corners of the inverted-U array of pins.

Note that the bottom of the upper stamp and the top of the lower stamp in Figures 5 and 6 share the same set of perforation holes. This fact makes clear that for normal comb perforations the top and bottom of any particular stamp have been perforated by precisely the same set of pins. It is upon this fact that Mr Květon founded his technique.

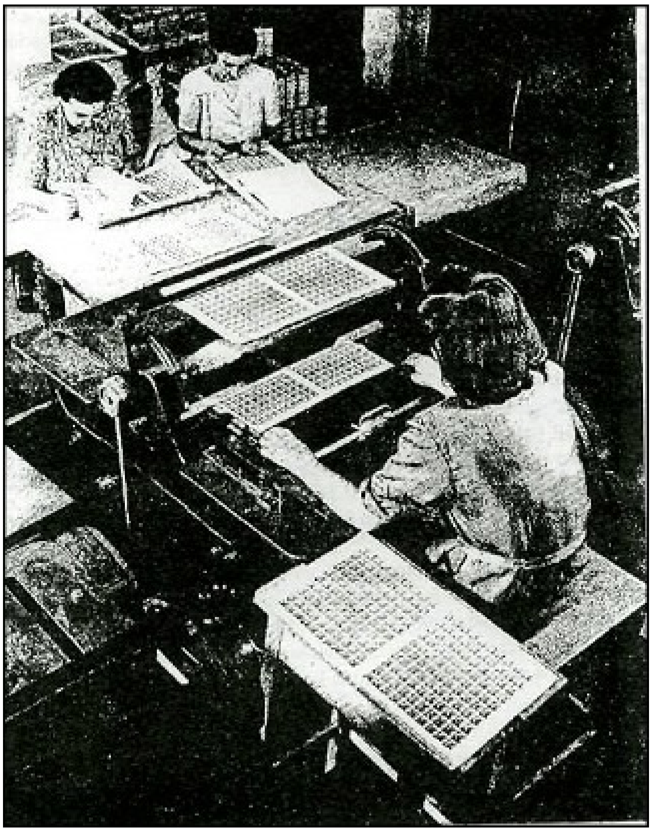

Fig. 1.
Worker at a hand-operated perforator.
Source: CPSGB POD No. 146.

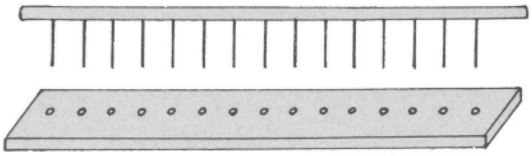

Fig. 2. Line perforator bar and pins.
From: *Zoubkování čs. poštovních známek*

Fig. 3.
Line perforations extend to the edge of the sheet in both the horizontal and vertical directions. Note the misaligned interception of the vertical and horizontal lines of holes.

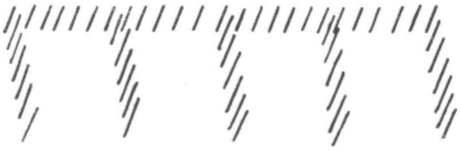

Fig. 4.
Schematic arrangement of comb perforation pins.
From: *Zoubkování čs. poštovních známek*

Fig 5.
Normal comb perforations extend downward. Note the apparent perfect interception of vertical and horizontal holes.

Fig. 6.
The illusion of a perfect intersection exposed. The small space above the intersection reveals that the lines of holes never really meet; the intersection is actually the top corner of the array of pins.

Czechoslovak philatelists in the 1920s proved that the pins in a perforation bar were like fingerprints: each pin was skewed just a tiny bit, no pin was mounted at a perfect right angle to the bar. Thus, the holes they punched in the paper matched their misalignment. While no two sets of pins were exactly alike, holes punched by the same set of pins always matched.

Consider: if normal comb perforation is the case, then the perforation holes on the top and bottom of the stamp must match. In addition, since the sides of any one stamp were perforated by different sets of pins, their holes should not match. These facts were what Mr Šrámek used in 1970 for his very complex method; Mr Květon did the same. We might ask what did Mr Květon have in 2020 that Mr Šrámek did not have in 1970? A computer! More specifically, Mr Květon had on his computer a graphic editor (such as Adobe Photoshop or the many others on the market; I use Serif's PhotoPlus).

Mr Květon's Technique

Mr Květon used his graphic editor to move the top row of perforations next to the bottom row. This involved first cutting a slice from the top of the stamp's image with his graphic editor and adding it as a layer. He then did the same to the stamp's sides. If this is beyond your abilities, ask a child or grandchild to show you how to use a graphical editor – it's well worth the effort.

Let us use this technique to first prove a stamp is a normal comb perforation. According to the above explanation, for that to happen the stamp's top and bottom perforation holes must match, but it's two sides (the vertical perforations) must not.

Before you begin remember to first straighten the image aligned on a set of perforation tops. You may select either the horizontal or vertical perforations as they were applied by the same strike and are automatically aligned with one another. First, prove the top and bottom perforations match (Fig. 7), then show that the sides do not match (Fig. 8).

Fig. 7 a.
Crop an image of the top of the stamp. Make sure the upper edge of the crop is aligned with the top of the perforation's teeth. Save the cropped image.

Fig. 7 b.
Paste the image of the top perforations to the original image as a new layer at the bottom of the stamp.

Fig. 7 c.
Carefully align the teeth on the new layer to the teeth at the bottom of the stamp. Note the match.

Fig. 8.
Repeat the same steps by matching the left side to the right. Look for differences. These are obvious above and below the arrow.

Some holes are misaligned, some develop oval shapes from misalignment. The stamp is normal comb perforated.

Horizontal Comb Perforations

By now many readers may be wondering why knowing whether a stamp has normal or horizontal comb perforations is important. One word: scarcity. The Czech Graphics Union in 1921 only used horizontal comb perforations in a very limited manner. Stamps so perforated may command as much as 300% the price of normally perforated stamps.

For normal comb perforations the sheet was placed in the machine vertically (Fig. 5) and the pins were arranged such that there were fewer pins at the top and more on its sides (Fig. 4). The machine for horizontal comb perforations was set up just the opposite: the sheet was placed in the machine on its side (Fig. 9) and the pins were arranged such that the top had more pins than its sides (Fig. 10). In either instance, the bar was moved from the far side of the machine toward the operator (Fig. 1) .

Thus, instead of extending below the last row of stamps, for horizontal perforations the holes extended toward the pane's left or right. The decorative hole at the end of the horizontal row shown in Figure 5 would appear at the top and bottom of the vertical rows on panes horizontally perforated.

Fig. 9.
For horizontal comb perforations, the holes extend into the right or left margins, but not both. The stamps were mounted horizontally.

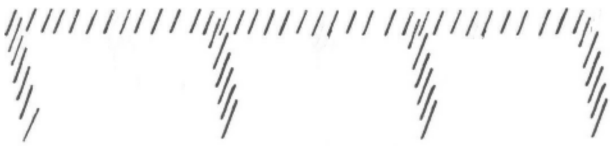

Fig. 10.
For horizontal perforations there were more pins at the top than on the sides.

To identify a horizontal comb perforation on a single stamp requires obtaining the opposite results of those found examining normal comb perforations: the top and bottom must not match, while the two sides must match each other (Fig. 11).

Fig. 11.
Proof that the stamp has horizontal comb perforations.
The top and bottom holes, because they were made by different sets of pins, are misaligned. The left and right sides, because their holes were made by the same set of pins, match.

Recall what was said earlier about line perforated stamps. The top and bottom of the stamp were perforated by the same set of pins; the same is true of the two sides. Thus, for line perforated stamps we would expect the top and bottom to match and for the left and right sides to match. While there is no reason to perform such a test, it is put here for completeness (fig. 12).

Fig. 12.
This stamp from the failed booklet issue was line perforated. As we expected, the top matches the bottom and the left side matches the right side.

However, because line perforating required moving the pane of stamps when the perforating bar was shifted from horizontal to vertical (or vice versa), extreme care must be taken to be sure before making the cuts that the perforation holes are parallel. This may mean straightening the top, making the cut, then straightening the side before making the second cut. In this instance, you will likely want to match the top and bottom before going on to the sides.