

The TOOLSHED



NUMBER 203

MARCH 2021

✻ ✻ ✻ A Journal of Tool Collecting published by CRAFTS of New Jersey ✻ ✻ ✻

Modifications to Metallic Planes to Reduce Friction

By Bob Garay

The use of hand planes go back to Roman times, their design was basically a wood or metal body that securely holds a cutter that slightly extends from a cut-out on the planes bottom. Roger K. Smith in his book P-TAMPIA has photos of unearthed Roman planes with iron bodies or bottoms. Metallic planes were used in Europe during the 14th-16th centuries. Yet for the most part planes in America developed as



Above - The G.P. Davidson 1902 patent plane with bone inserts on the bottom. Patent #696,414 April 1, 1902. Photo courtesy of the D'Elia Antique Tool Museum.

wood bodies up until the early 19th century. Craftsman enjoyed the smooth workings of wood on wood with limited friction while using them. Yet in an effort to improve the workings and manufacture of hand planes, makers looked again at iron bodies to hold the cutter. Often the heavy iron bodies met with caution from woodworkers, as they found the heavier iron bodies with an iron sole produced more friction when using. Not a huge problem for the hobbyist, but the early woodworker who used a plane 12 hours a day this difference was a big deal. Thus manufacturers experimented with ways to reduce the friction these metallic planes produced. This was an exciting time of experimentation, especially for current day plane collectors. Collectors often hunt for

these rare planes with modifications to the planes bottoms, in an effort to reduce the friction so they were closer to the smoothness of wood bottom planes.

When I started woodworking as a youngster I used my Dads planes or the planes in the school shop. These were usually Stanley planes and I cannot remember ever using one that was corrugated. It was while I was in the Navy

working in the Patternmakers wood shop that I first used one with a corrugated sole. I thought this was great – and when using it I felt like it did indeed work smoothly with less friction. Of course nowadays I look back and think it was all my imagination with the uniqueness of it all skewing my judgement. As now after thirty years as a shop teacher I have done plenty of planing with both smooth bottoms and corrugated bottoms and I don't really feel any difference. During more recent times as a tool collector, I came to realize Stanley was not the first to implement corrugations to reduce friction. I also found that some creative makers experimented with some wild designs to make the metallic plane more comparable with the smoothness of the wooden plane.

(Continued on pg. 3)

March Issue Contents

Modifications to Plane Bottoms - Bob Garay1, 3-6

Designs for metallic plane bottoms to reduce friction

E. G. Storke – Patent: 96,052, Oct. 19, 1869. Method of Preventing the Adhesion to the Wood of the Faces of Metallic Planes Auburn, NY, (Elliot Storke founded the **Metallic Plane Company** in 1867) A metallic plane having the sole grooved in lines parallel to the sides. Storke says this is to decrease the points of contact between the plane and work piece and **to form free air-channels** so that **no vacuum** can be formed. The overall intention is to **reduce friction**. Although these channels are commonly known today as corrugations, Storke only refers to them as fluting, grooving, or channeling. Excerpt: *“Those flutes, grooves, or channel, may be more or less in number, and cut to a greater or less depth, provided the object be thereby attained of relieving all extra and unnecessary friction.”*

And it goes on to say -

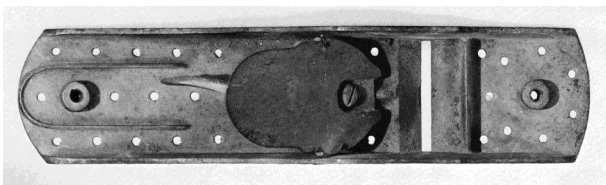
“The practical effect of this has been to prevent in large degree the introduction of general use of metallic planes. The object of my invention is twofold, namely to remove about one-half of the surface of the face of the plane, so that there shall be



Above & right - Metallic Plane Co jointer plane with corrugated bottom.

fewer points of contact, and to form free air channel, so that no vacuums can be formed, or any trouble arise from atmospheric pressure, however perfect the plane or true the surface on which it is moved.”

Orril R. Chaplin - Patent: 126,519. May 7, 1872, Improvement in Carpenters’ Planes. The patent says *“My invention relates to the means to **reduce the adhesion** of the plane-stock to the material being dressed; and it consists in perforating the face of the plane-stock with a series of holes thereby reducing the area of the stock exposed to atmospheric pressure.”* A later Chaplin’s Plane Advertisement in 1887 says, *“the corrugations afford air spaces, and reduce friction to the minimum.”*



Chaplin Patent model Smooth Plane, Bed & saddle only. Holes through sole for less friction are part of the patent. PTAMPPIA PG.156



Above & right - Chaplin Patent planes made by Tower & Lyon with bottom corrugations.

Zoar plane - This is a “second category” of Knowles - type plane discussed by Roger Smith in PTAMPPIA Vol-



Above - Zoar fore plane -No known patent. Origin - Zoar, Ohio. Heavy cast iron plane with corrugations on the bottom. Photo courtesy of the D’Elia Antique Tool Museum.

ume 2 Figure 4, p.10. The Zoar planes were most likely cast at one of the foundries in Zoar, Ohio. Zoar is located in the eastern side of the Tuscarawas River, settled in 1817 by a group of German Pietists who produced agricultural and industrial goods.

Louis C. Rodier – Patent: 212,986, Mar. 4, 1879, Laflin Manufacturing Co. – Westfield, MA. Improvement in Bench-Planes, Westfield, MA. Patent description describes benefits of the wavy corrugations. *“It will be seen that I cast sinuous grooves in the face of stock. A running longitudinally thereon. The general objective of such or straight grooves—viz., **to prevent adhesion** of the plane to a very smooth surface—is well*



Above - Rodier plane with wavy corrugations on bottom.

Continued on page 4.



Above - **Hazard Knowles**, Colchester, Connecticut. Patent and date unknown. Knowles type jointer 27" long with Herring-bone pattern corrugated bottom. Photo courtesy of the D'Elia Antique Tool Museum.

understood, and to accomplish that objective straight grooves are sufficient; but in using a plane so made it is found that in planing sharp corner of a board the corner will often drop into a groove and thus become scraped or injured; but if the face be corrugated with sinuous grooves as shown, this inconvenience is entirely obviated."



Above & right - **Siegley** No. 4-1/2 smoother plane with corrugated bottom.

Jacob Siegley – Patent: 510,096, Dec. 05, 1893, Wilkes-Barre, PA, *"The underside of the main part of the bottom "a" and the underside of the throat piece "b" are provided with longitude corrugations "f" by which the friction of the bottom of the plane with the surface to be planed is considerably reduced and an easier working than with the solid smooth bottom produced."*

In a Siegley Advertisement in 1901 it was written, *"The bottom of the plane being corrugated therefore will*



Above - **Holly** smooth plane with dimpled conical-shaped corrugations.

greatly reduce the friction common to all solid iron planes."

Birdsill Holly – Patent: 9,094, July 6, 1852, Silsby, Race & Holly, Seneca Falls, N.Y. "Although not part of this patent specifications, all Holly's planes of this "new style" have either parallel fluted corrugations or a series of conical-shaped corrugations that appear to have been made with the tip of a large drill bit."



Above - **Morris** jointer plane with diamond shaped intersecting ribs on the bottom to reduce friction.

Ellis H. Morris – Patent: 109,037, Nov. 8, 1870. Manufactured by the Sandusky Tool Co. 1870-1875. "The invention consists in casting the body of the plane with a series of intersecting ribs, covering the entire face... In the drawing represents a thin iron plate, cast with narrow projecting and intersecting ridges on its lower face." I am well aware that cast-iron planes have been made with longitudinal grooves planed in their faces, and therefore disclaim the invention of such. What I claim as my invention, and desire to secure by Letters Patent, is - The intersecting ridges on the face of a metallic plane.



Above - **Steers** smoothing plane with dovetailed rosewood strips to reduce friction.

William Steers – Patent: 284,919, Sep. 11, 1883. Brattleboro Tool Co. Plane Sole with Rosewood Inlay dovetailed. – "The metallic face-plate having longitudinal ribs and transverse ribs forming the throat of the plane, combined with wooden strips, inserted between the ribs, as set forth."

The Steer's patent had recessed grooves machined into the sole of the plane to accommodate rosewood strips into the dovetailed joint. The natural oil of the rosewood, together with its lesser surface tension, probably accomplished the intended function, but it is hard to believe that a feature that would have consumed so much time in the manufacturing and assembly process would have been of sufficient perceived merit to justify the additional expense by the woodworkers of the day. Whatever its economic success, the Steer's patent is an extremely well made and interesting antique hand tool. This plane has the beauty of a rosewood bottom and is about as close to a wood bottom on a metallic plane one can get.



Above - Jack plane & Smoothing plane made by the **Boston Metallic Plane Co.** with open slots in the base to reduce weight and friction.

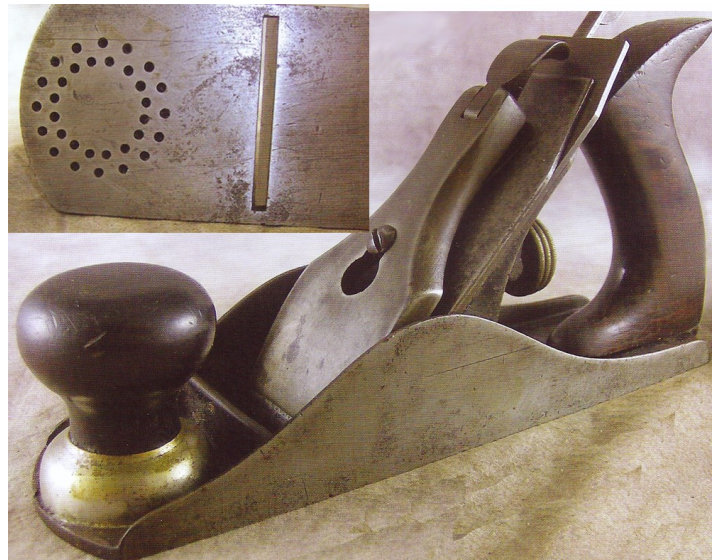


Above & right - Bailey Tool Co. block plane with their name cast into the sole as corrugations.

Bailey Tool Company – Block plane - Woonsocket, RI. In the 1870s Seldon Bailey was involved in the manufacture of wringing washing machines. In 1872, he formed the Bailey Tool Company to make planes using a patent by Joseph Bailey who was Superintendent of the Bailey Wringing Machine Company, and assigned his patent for an eccentric rod to clamp the cutting iron to Seldon Bailey, who was President of the company. One of the early planes this company produced is the graphic block plane with the corrugated bottom forming the company name. Seldon Bailey, who was president of the Bailey Tool Company but not a relation of Leonard Bailey, realized that his company was in financial difficulties and asked Leonard Bailey for help. Leonard Bailey suggested that the Bailey Tool Company improve their marketing by having “Bailey Tool Company” cast into the sole of some of their block planes. Leonard Bailey had left the Stanley Company after a patent dispute and was making his own planes in a shared space of the Bailey Tool Company Factory.

Cyrus H. Hardy - Boston metallic Plane Co. Patent No. 131,544, September 24, 1872. Patent calls for the provisions for “openings or slots” that reduced the weight of the plane. This company was in business for only a short time 1872-1874. The removal of metal on the bottom would indeed decrease the weight of the plane and therefore reduce friction.

Oliver Longval - Patent #471,391, March 22, 1892, Millbury, Massachusetts. Oiling device modification made on a Stanley No. 4 smooth plane. Patent applied for. “O. LONGVAL” stamped on the top of the knob. In his patent description he states - *“the plane when thus oiled running smooth and easy upon the most objectionable surfaces.”*



Above - Oliver Longval - Oiling device modification made on a Stanley No. 4 smooth plane. Photo courtesy of the D’Elia Antique Tool Museum.

Continued on Page 6



Above - Weyland Self Oiling Plane. 1904 patent. Photo courtesy of the D'Elia Antique Tool Museum.

Joseph Weyland Patent 770,881, September 27, 1904. Los Angeles, California. Self oiling plane modification. Fill the hole in the top of the knob and dispensing hole drilled into the sole. Oiler modification here is shown on a Stanley No. 4-1/2 plane.

William Foster - Savage Mfg. Co. Patent 3,355, November 24, 1845. William Foster patent of a Knowles type cast iron jointer plane 21" long. As stated in his patent - *"The material which is inserted in the recess occasions the plane to run light and easy, thus rendering it the most efficient plane stock made for durability, economy and convenience. The material which is inserted in the recess (CZ) occasions the plane to run light and easy, thus rendering it the inmost efficient plane stock made for durability, economy and convenience."*

The cap is stamped Phoenix Works. The word "SAVAGE" is cast into the top heel of the plane. The Savage Mfg. Co. of Savage, MD 1840-1850 . There is an opening behind the cutter for soap stone as shown in the patent to reduce friction.



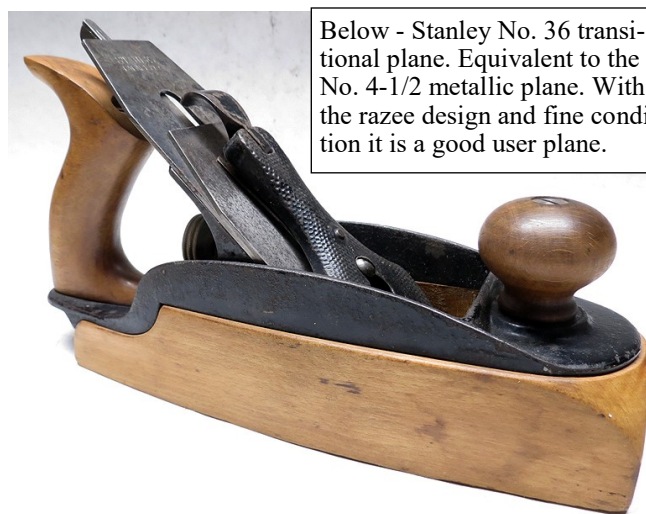
Above - Foster jointer plane with cut-out opening behind cutter for soap stone insert. Photo courtesy of the D'Elia Antique Tool Museum.

Conclusion

During the 100 years of these plane modifications it makes one wonder, did any of this actually work to reduce the friction of the metallic plane enough to notice or to matter. As many of these modifications did not

sell well and are rare today, I would think not. Or maybe it was the extra work and expense that did not justify the limited results. Of all these modifications the simple corrugations did catch on and had success with buyers. Also the Steers patent plane has enough samples still around to consider it a success, and also what a beautiful plane.

But to me, the modification that seems to be the one that really won early woodworkers over is a plane that today is pooh-poohed by many woodworkers and collectors. The wood bottom transitional plane. The wood bottom matched with a cast iron top frame included all the adjustment features of the Bailey - Stanley metallic planes and the smooth frictionless action of the older wood planes. Of course like the wood planes the bottoms did get worn and eventually the mouths did open up, but a transitional plane in good condition is a pleasure to use.



Below - Stanley No. 36 transitional plane. Equivalent to the No. 4-1/2 metallic plane. With the razee design and fine condition it is a good user plane.

Thus what can be done to the metallic plane to reduce the friction inherent in the metal to wood contact. The one thing that can't be patented seems to work the best. Clean the bottom of the plane with a light sanding and coat it with paste wax. This totally changes the action of the planes performance. Woodworkers are amazed with the superb smoothness this paste wax application achieves in reducing the friction of their planing action. Yet I do enjoy all of these creative modifications to the metallic planes.

Many thanks to Andy D'Elia for his contribution of many of the planes and information included here. The D'Elia Antique Tool Museum in Scotland, CT is filled with his collection of patented and rare planes. See his website for more information here - D'Elia Antique Tool Museum.

Thanks to Don Wilwol for his article, *Why Were Planes Corrugated*, it got me thinking about this topic and he kindly contributed some of his research here. Much more information on antique tools can be seen at his website - www.timetestedtools.net