

# In Search of the Band Ship Saw, Or the Tilting Bandsaw

by Dana Martin Batory

**J**ust what is a band ship saw or angling bandsaw? Quite simply, the mechanisms supporting the wheels, blade, and guides tilt while the table remains level.

With the common bandsaw, when it's required to cut at an angle, the table carrying the wood is canted. This isn't an obstacle with ordinary lumber, but there is considerable difficulty keeping heavy timbers in position while fed through the saw.

The "ship" designation comes from the fact the angling bandsaw was primarily developed for building wooden ships whose thousands of massive timbers and heavy planking required intricate bevels, tapers, and curves, often occurring all at once. To make these compound cuts, most of the saws could even be tilted while the cutting was in progress.

Dave Schnell, owner of Dave's Boat Works, Boulder Junction, Wisconsin, kindly explained it to me in layman's terms. "[The ability to cant the saw] is a big help in shaping sawn frames for large wooden boats

where the inside angle of the frame changes from the keel up to the sheer plank of the hull. This is also used in making transoms, knees, and the bow stem."

There were two types of ship saws—the single direction, which tilted forty-five degrees left, and the double-bevel, which tilted forty-five degrees right or left. The single direction saws were usually lighter and smaller—36 to 40 inches, while the double saws were often 48 inches, massively built, with a frame that rode in a large cast iron C-shaped arm with dovetailed ways to stabilize the frame.

The earliest example of a tilting bandsaw is that built by First & Pryibil Co. (later P. Pryibil Co.), New York City, and described in the 11 March 1871, *Scientific American* (Figure 1).

Those who inspected the wood-working machinery exhibit at the last Fair of the American Institute will at once recognize in our engraving the representation of a substantial and elegant band-saw machine exhibited by First & Pryibil, of 452, 454, and 456 Tenth avenue, New York.

The machine attracted much attention, not only on account of its strength and compactness, but from the fact that it can be made to saw bevels while the table is kept level, the adjustment being made to the desired angle without even stopping the saw.<sup>1</sup>

The upper wheel slid laterally on an arched bar supporting its bearing. The table also worked on a slide, connected by a lever with the upper sideways slide, and moved in synch with the wheel. The upper unit pivoted on a steel pin joining the column and blade supporting arm. A handwheel and screw angled the saw. The saw was also equipped with a mechanism for tightening and tracking the blade. An adjustable square steel bar held the upper blade support and guide while an auxiliary blade support on the left swung with the saw. Weighing about sixteen hundred pounds, the 38-inch cast iron bandsaw could handle material 13 inches thick at ninety degrees.

In circa 1880, Polyblank & Co., Newton Abbott and Dartmouth, England, also offered a tilting bandsaw (Figure 2). There is no indication the English saw in-

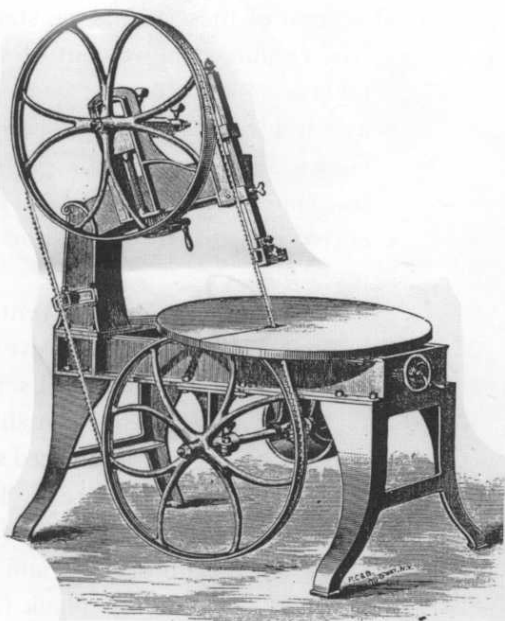


Figure 1. First & Pryibil Co.'s circa 1871 angling bandsaw with moving bed. The earliest known tilting bandsaw.

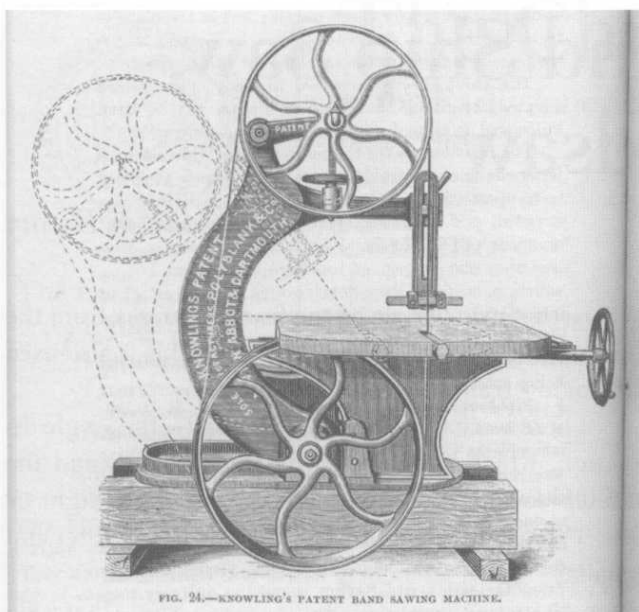


Figure 2. Polyblank & Co.'s circa 1880 angling bandsaw with moving bed.

fluenced American designs, but it is worth mentioning. M. Powis Bale described it in his classic *Wood-working Machinery, Its Rise, Progress And Construction 1800-1880*:

Our illustration represents a machine embodying several improvements which have recently been patented by Mr. Knowling, of Newton Abbott, Devonshire.

The chief points claimed as novel are:—In so constructing the machine that when the saw is canted for cutting at an angle, the table of the machine shall travel in a horizontal plane; undue strain

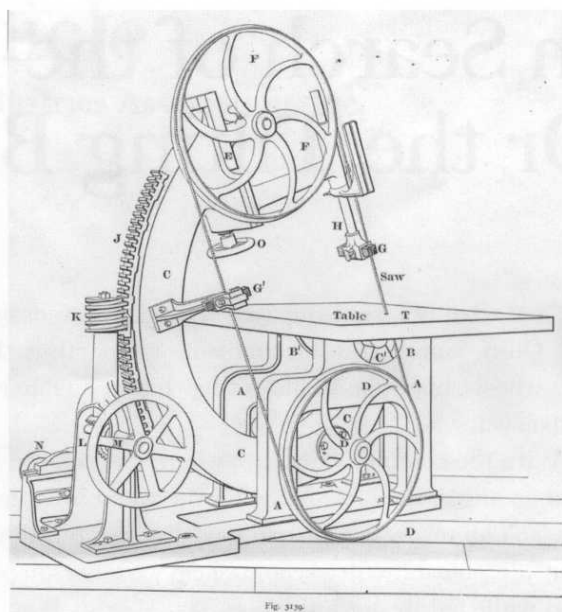


Figure 3. Another English ship saw design, Samuel Worssam & Co., London, circa 1892.

on the saw is thus avoided, and the table carrying the wood is kept at a dead level. The main frame of this machine is fitted at its base with trunnions, which work in a foundation plate. A screw is so arranged underneath the table, that, by means of the hand wheel the frame of the machine is canted, and the table moved at the same time. Another improvement consists in adjusting the tension of the saw by means of a pivoted arm or bracket, carrying the upper saw-wheel, which is acted on by a screw bedded on a spring support placed on a fixed rest.<sup>2</sup>

While Bale recognized that other patents separately covered several of these points, he stated that "the combined movement of saw and table is novel, and must be mentioned as a decided advance in this class of machines, and should be found of service to cabinetmakers, chairmakers, and others requiring to cut bevelled work."<sup>3</sup> (Figure 3)

However, American inventor John L. Knowlton patented a massive wooden and cast iron circular bevel scroll saw on 7 April 1868; intended for shipbuilders, it seems to have influenced ship saw design even more (Figure 4). The four h.p., 12-inch saw had a sweep of 270 degrees out of 360 degrees and did the work of forty men. A plank fifty feet long and eight inches thick could be sawn on both edges in less than five minutes!

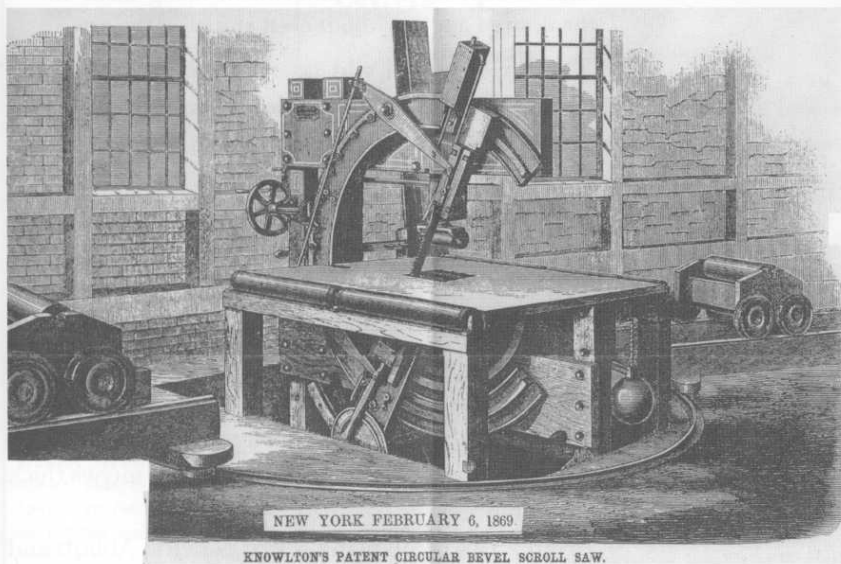


Figure 4. Knowlton's Patent Circular Bevel Scroll Saw, circa 1869. Compare design to Fay & Co.'s No. 8 Band Saw.

J. A. Fay & Egan Co., Cincinnati, Ohio, described their new 48-inch, No. 8 Band Saw in Catalogue Series L, circa 1900 (Figure 5). (It was their first combined catalog.) The machine carries the J. A. Fay & Co. nameplate. Fay & Egan were consolidated in 1893, though operated as separate entities until about 1900. It isn't known whether this arrangement encompassed separate patent applications as well. Probably not. It is very likely the saw dates to at least 1893. As the catalog described it:

This cut illustrates an extremely heavy band saw made on an entirely new principle, operated by

power, and designed especially for sawing different angles on ship timbers. Heretofore work of this kind was done on a machine fitted with a tilting table, the heavy timbers being moved and held in position as well as this circumstance would permit, or a machine with only the top wheel to angle or fall away from a straight line, in which case it carried the saw blade with it, and made it equally as difficult to operate or cut to line. This new machine is made with both wheels to move on a radius, *the center of which is the point at which the saw passes the top of table.*<sup>+</sup>

The massive, hollow core, cast iron column was planed perfectly true with sufficient floor space to in-

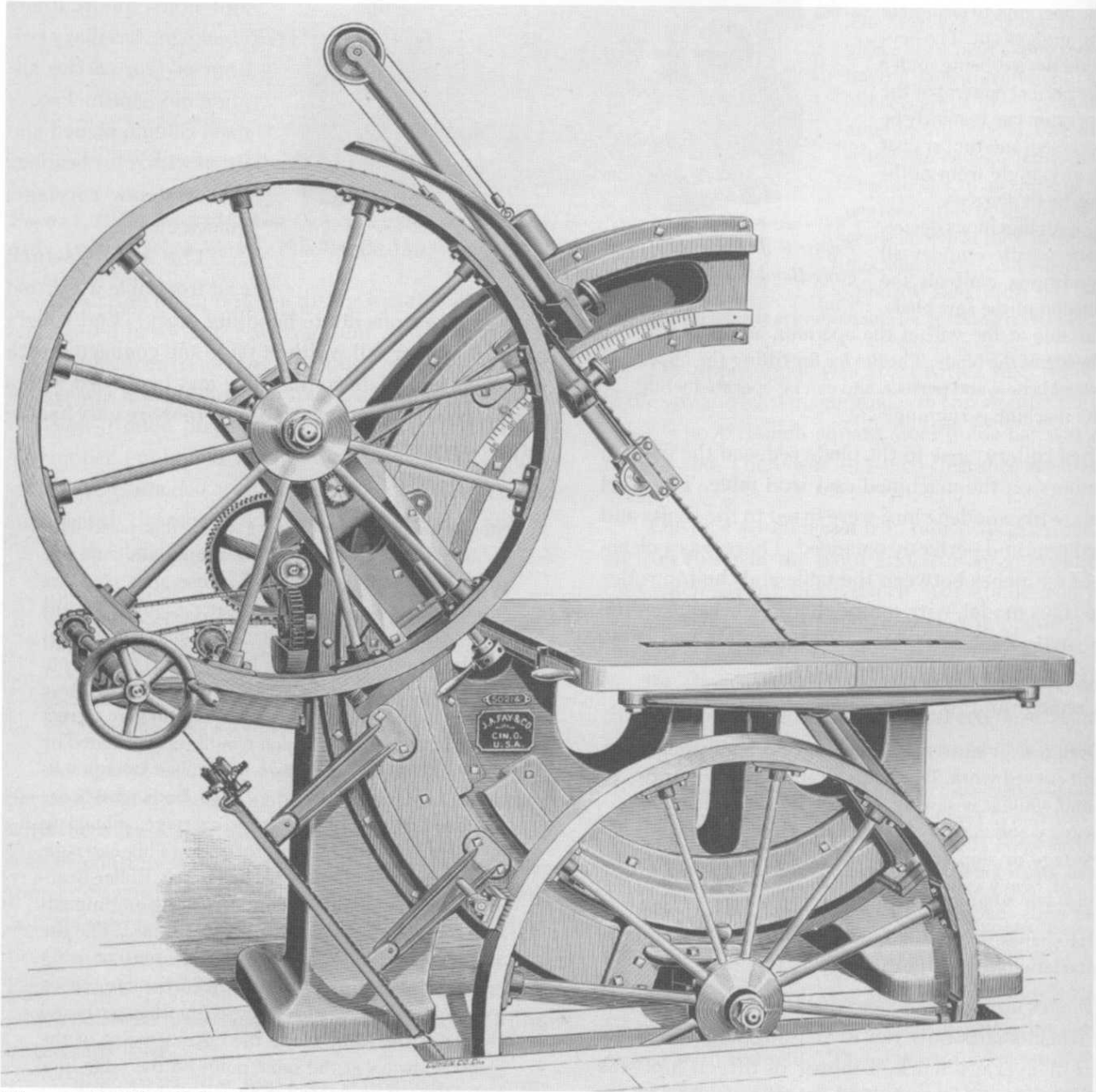


Figure 5. J. A. Fay & Co.'s c. 1893 New 48-Inch No. 8 Band Saw. J. A. Fay & Egan Catalogue Series L, c. 1900.



sure steady running with the blade at any angle.

As the catalog explained:

The radial slide, with bearings of ample length attached, works in planed ways; the mandrels of steel, of large diameter, run in self-oiling boxes, and the whole is made to bevel by power as well as by hand, and has an index plate within sight of the operator, to designate the angle of cut. The bevelling device, being under the perfect control of the operator, can instantly be reversed, and timbers cut at any angle from nothing to 45 degrees.

An ingenious device, very sensitive under all conditions, controls the tension of the saw blade, variable at the will of the operator, and prolongs the life of the blade. The device for tilting the upper wheel is new and perfect, and can be operated while the machine is running.<sup>5</sup>

Bed rollers close to the blade reduced the friction of timbers on the machined cast iron table. The steel wheels, with wooden rims, were fitted to the shafts and turned true and perfectly balanced. There was a clearance of 24 inches between the table and the top roller guide. This model, with minor changes, became, in the early 1920s, the No. 311 Angling Band Ship Saw (Figure 6).

Catalog no. 120, 1926-7 described it as:

Designed for extra heavy band sawing, both straight and curved work. Blade can be angled by power or hand while it is sawing, making it very valuable in heavy wooden ship construction. Used to great advantage in ship construction work, railway wood shops, heavy vehicle and implement factories, lumber mills that get out large timbers sawed to special shapes, etc. Will saw to any angle in a full quarter circle (right or left).<sup>6</sup>

Blades up to 3 1/2 inches wide could be carried and both wheel shafts now ran in self-aligning ball bearings. For average work, a motor of fifteen h.p. was recommended, for continuous heavy work and for

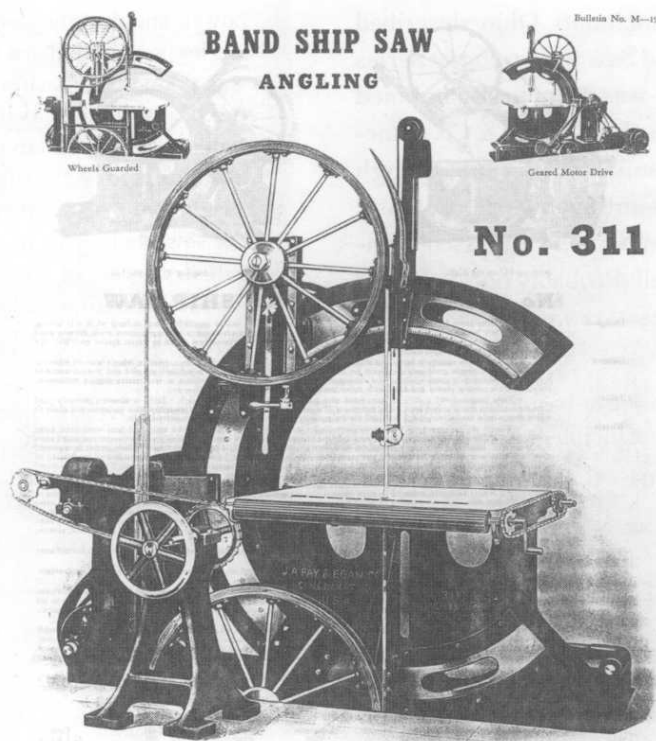


Figure 6. J. A. Fay & Egan Co.'s circa 1920s No. 311 48-inch Angling Band Ship Saw. Feb. 1944 Bulletin.

fast cutting a twenty or twenty-five h.p. motor.

Catalog 140, 1946, described the No. 311 at its peak. Weighing in at seventy-eight hundred pounds, the "column gives ample capacity for all ship sawing, at the same time being short coupled and without excessive curve and overhang to cause vibration and consequent blade breakage. Auxiliary column at rear carries angling mechanism. Face of main column planed and fitted with roller bearings to carry saw carriage, guides, etc."<sup>7</sup>

The 48 x 48-inch cast iron table was fitted with rollers to facilitate handling stock. "End rollers are 4" diameter full width of table and connected with sprockets and chain so that they may be turned with a crank provided for the purpose, to more readily handle large heavy timbers."<sup>8</sup>

The wheels were:

Steel-spoked with solid bent wood rims, faced with rubber. These solid rims have been found superior to iron or laminated rims, because ship saws are usually operated close to salt water. Laminated rims under these conditions open up, while iron rims, it will be found, have to have leather faces riveted on, this in spite of claims to the contrary, and these leather facings soon stretch, loosen and give a great deal of trouble, all of which trouble is eliminated by the solid bent wood rims with rubber facings vulcanized on, as used on the "311." Both wheels are mounted on a heavy circular carriage, gibbed to main frame, with take-up for wear. This carriage, travels on frictionless, self-lubricating, Roller Bearings, mounted in main column, making angling adjustment, quick, easy and extremely close. The use of roller bearings eliminates the necessity of using heavy, slow acting, cumbersome and dangerous counterweights. As wheels move simultaneously and always in the same plane the cutting point of the blade is always at the same point on the table line, regardless of angle. Index shows exact angle.<sup>9</sup>

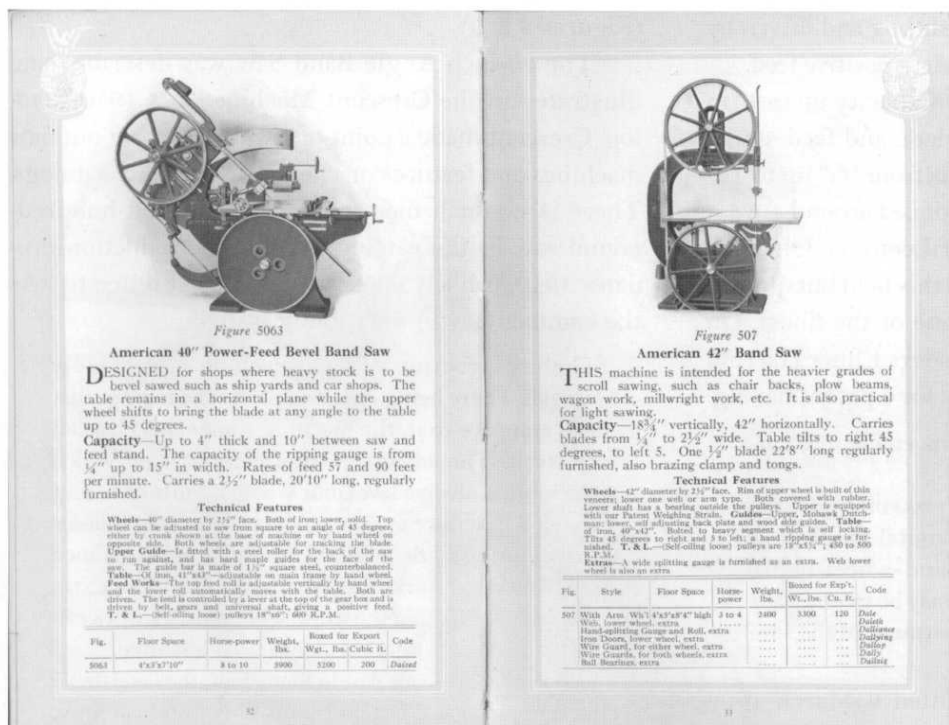


Figure 7. Williamsport Machine Co.'s circa 1897, 40-inch Bevel Band Saw (now with power-feed). American Wood Working Machine Co. 1921 catalog.

On driven machines, the tilting was through a one h.p. geared head motor with a limit switch stop provided at each extreme angle. A push button magnetic starter was also provided for forward, reverse, and stop.

Non-friction blade roller guides were furnished. The upper guide was mounted on a square steel post with a self-controlled counterweight. Set vertically, there was 24-inch clearance, 16 inches at the extreme angle.

As the catalog described it:

Power angling device is controlled by means of handle at operator's position and is provided with a device whereon the stops can be set automatically to stop the angling movement at any point. Hand wheel also located at operator's position, to concentrate control, provides means for giving a very close setting.<sup>10</sup>

An option was heavy wire mesh guards for the upper and lower wheels, which angled simultaneously with the wheels. Like almost all ship saws, the no. 311 was discontinued in the early 1950s for lack of customers. Several made by the now extinct company are still going strong. The Mystic Seaport Museum, Mystic, Connecticut, recently used its restored 1929 Fay & Egan No. 311 to build a replica of the slave ship *Amistad*, which had been made famous in Steven Spielberg's film of the same title.

Williamsport Machine Co., Williamsport, Penn-

sylvania, became part of the American Wood Working Machine Co. conglomerate in 1897, so its twenty-nine-hundred pound, 40-inch Bevel Band Saw dates to at least then.

"This machine," said a 1905 AWWM catalog, "is intended for all classes of band sawing where heavy stock is to be sawed beveling, and is adapted to ship and boat building, car shops, etc.:

The Main Frame is cast in one piece, very heavy and rigid, having cored sections. The Wheels are of iron, 40" in diameter, 2 1/2" face. The top wheel can be adjusted to saw from square to an angle of 45 degrees, either by means of the crank shown at the base of the machine or by hand wheel on opposite side. Both top and bottom wheels are adjustable for tracking on wheels.<sup>11</sup>

The upper guide was fitted with a steel roller back of the saw and hard maple guides to run against the saw's sides. The 1 1/2-inch square steel guide bar was counterbalanced. There was a 17-inch clearance at ninety degrees.

The 52 x 48-inch cast iron table was provided with an iron roller at the front and rear for relieving friction when sawing heavy stock. Adjustable iron plates were fitted into the table to close the opening when the saw was adjusted.

By 1909, AWWM Co. had introduced the similar thirty-nine-hundred-pound Power-Feed Bevel Band Saw with a smaller 41 x 43-inch cast iron table (Figure 7):

This machine is designed for all classes of band sawing where heavy stock is to be bevel sawed and is adapted to ship yards, car shops, etc. A large saving of stock is accomplished for preparing cants used in the manufacture of columns, piping or any other class of work that requires building up, as there is practically no waste whatever, merely the saw kerf.<sup>12</sup>

The top feed roll was adjustable for any thickness up to 4 inches and the lower feed roll automatically moved with the table. There were two rates of feed—57 and 90 f.p.m. (feet per minute). The feed was controlled

by a hand lever at the top of the gear box and driven by belt, gears and universal shaft, giving a positive feed.

The catalog noted that it had "Capacity up to 4" in thickness and 10" between saw blade and feed stand. The capacity of the ripping gauge is from 1/4" up to 15" in width."<sup>13</sup> Both saws were discontinued around 1923.

The Crescent Machine Co. of Leetonia, Ohio, established 1898, was a latecomer to this field but quickly earned a reputation for making one of the finest. On 25 September 1905, company founders Elmer Harrold and Clinton G. Wilderson, applied for a patent having:

... invented a new and useful Improvement in Band-Saw Machines.

Our invention relates to that class of band-saws in which the table remains horizontal in all positions of the saw, the upper band-wheel being mounted on a curved arm, which may be swung back to effect the desired angular adjustment of the saw.

Patent No. 814,652 was granted 6 March 1906

(Figures 8 & 9).

The 36-inch Angle Band Saw was described and illustrated in the Crescent Machine Co.'s 1910 Catalog. Crescent made a point of always pointing out new machines and features on the title page of its catalogs. There is no such mention of the eighteen-hundred-pound saw in the catalog indicating production pre-dates 1910; it likely dates to late 1906 (Figure 10). As the commentary in the catalog stated:

The construction of this machine is decidedly unique. There being nothing else in the market that will compare to it, the machine stands in a class all by itself. The advantage of a band-saw on which the table is always level, but which admits of tilting the saw, is at once apparent, since it is so much easier to handle the work on a level table than on an inclined one. On large work it means the saving of an extra man helping to hold the work; while smaller work can be turned out more accurately and in less time.

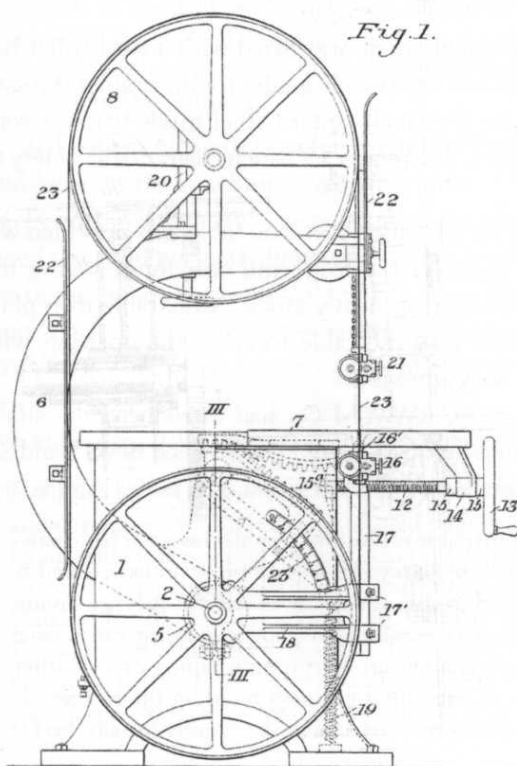
In the Crescent Angle Band-Saw, the level-table feature is worked out on thoroughly practical lines,

No. 814,652.

PATENTED MAR. 6, 1906.

E. HARROLD & C. G. WILDERSON.  
BAND SAW MACHINE.  
APPLICATION FILED SEPT. 25, 1905.

3 SHEETS-SHEET 1.



WITNESSES

R. H. Baldwin  
Warren W. Swartz

INVENTORS

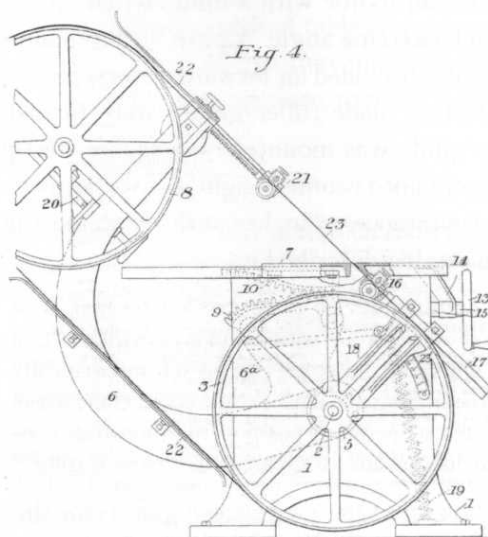
Elmer Harrold  
Clinton G. Wilderson  
by Robert H. Brown  
their attorney

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3 SHEETS-SHEET 2



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Figures 8 & 9. Two views of patent no. 814,652, granted 6 March 1906 to Elmer Harrold and Clinton G. Wilderson for their angling bandsaw.

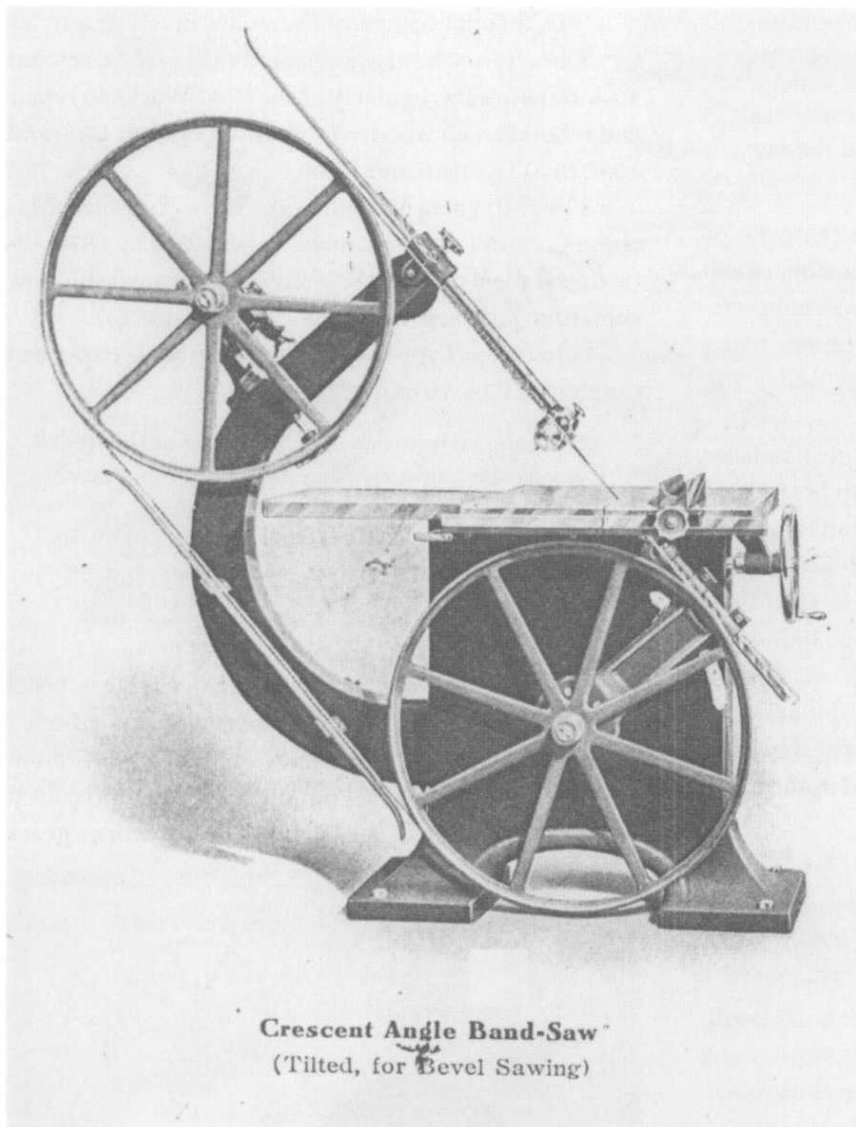


Figure 10. Crescent Machine Co.'s c. 1906 36-inch Angle Band Saw With Moving Bed. 1910 Catalog.

and the machine is so perfected that it is not only more convenient for bevel sawing than the ordinary type of machine, but there is not a single objectionable feature in the machine for common, plain, square sawing. The angle may be gradually changed while saw is in the cut, making it a valuable machine for boat-work. It is also very well adapted for pattern shop use—in fact, any place where bevel-work is being done.<sup>14</sup>

All the parts worked automatically—no adjustments were necessary after changing the angle. The entire operation was accomplished by turning a handwheel until the pointer indicated the desired angle on the graduated scale on the pedestal. The handwheel turned easily since the weight of the machine's upper part was counterbalanced. Nor was the location of the

drive-pulley changed, and the machine could be belted up as easily as an ordinary bandsaw.

Perhaps not knowing of Prybil's earlier bandsaw, Crescent touted the saw's most prominent feature, deservedly so, since apparently it was the only modern ship saw with it.

The table is carried back on its pedestal in harmonic motion with the saw, so the saw keeps its proper position in the table slot. Both the lower and upper guides keep in exact alignment with the saw, and the lower guide keeps a proper distance from the under side of the table. The tension of the saw does not change when angle of saw is changed. There are no complicated devices to get out of order, and it is owing to its simplicity that we are enabled to sell the machine at a moderate price.<sup>15</sup>

A rack on the underside of the 23 x 34-inch cast iron table engaged a gear fastened to the arm, so the table was carried back horizontally on the pedestal in a uniform motion with the saw, keeping the saw in its proper position in the table slot, and keeping the table always in the same relation to the saw. The catalog pointed out that:

The arm is hinged to the pedestal in a very rigid manner by means of a heavy trunnion passing through them, concentric with lower shaft, making the machine just as rigid when tilted as when standing erect, and just as rigid and durable as an ordinary band-saw. The bearings for lower shaft consist of solid bushings fastened into trunnion, and are provided with oil-chamber and capillary felt, making them practically self-oiling and dust-proof. The upper bearing is made with revolving shaft running in adjustable bearings, same as our regular band-saws. This is much better than the loose-pulley style used on most makes of band-saws. The table slides on the planed ways of the pedestal, and is provided with a steel gib for taking up possible wear. The saw will tilt back to an angle of 45 degrees, a stop being provided at that point. Also the saw may be



tilted forward to 4 degrees beyond the perpendicular. A stop is also provided on the perpendicular point so this point may be easily reached without referring to the graduated scale. But this stop can be instantly swung out of place, allowing the saw to pass on an out-tilt angle as mentioned.<sup>16</sup>

The machine had all the standard features of Crescent's regular band-saws—spring-tension, counterbalanced guide-bar, hollow core, cast iron frame, universal adjustments to upper wheel, etc. The saw had a clearance of 18 inches at ninety degrees under the guide.

In 1918, Crescent added a 40-inch-angle bandsaw, weighing some twenty-four hundred pounds and furnished with a pair of rollers at the front and rear ends of the table for moving heavy lumber, with a clearance of 20 inches under the guide (Figures 11 & 12).

A 3 July 1930 Price List set the 36-inch belt drive at 550 dollars (about 4,000 in today's dollars), and the 40-inch belt drive at 790 dollars (6,000 dollars). By 1931 both saws had completely enclosed wheel guards and ball bearings. They were discontinued in the early 1940s.

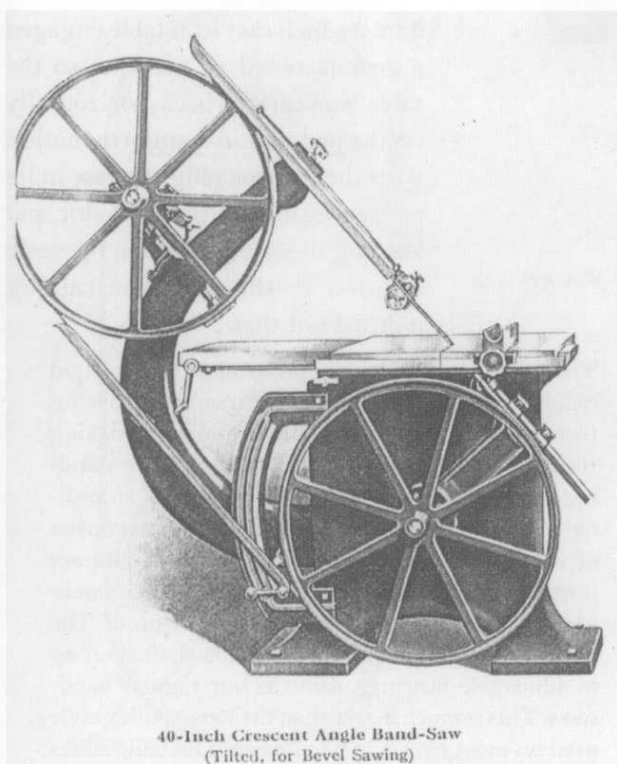


Figure 11 (above). Crescent Machine Co.'s new 1918, 40-inch Angle Bandsaw with Moving Bed, from the 1918 catalog.

Figure 12 (right). Crescent Machine Co.'s 1918, 40-inch Angle Bandsaw with Moving Bed as shown in the 1921 catalog.

The defunct company's saws are much sought after. Schnell uses a museum-quality restored Crescent 40-inch ship saw regularly at the Boat Works to repair and rebuild small wooden craft built between 1900 and 1950 in Wisconsin and Michigan.

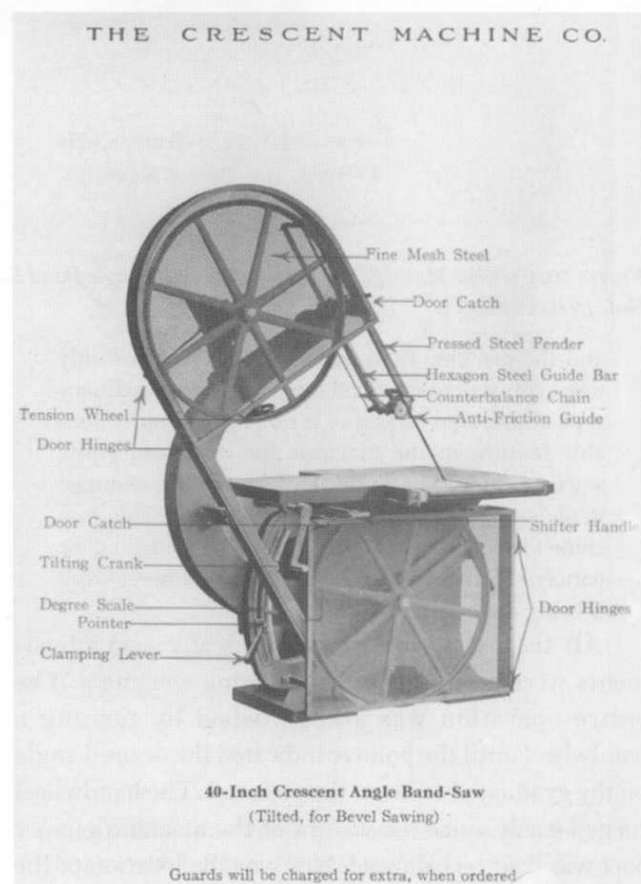
The P. B. Yates Machine Co. (Yates-American Machine Co.), Beloit, Wisconsin, established in 1876, introduced their monster 8,755 pound, 48-inch ship saw sometime between 1908 and 1917 (Figure 13).

"The Yates Type V-40 Tilting Ship Saw," explained Catalog No. 14, circa 1917,

was designed primarily for the cutting of ship timbers on the angle, but may be used for any scroll work.

It will tilt 45 degrees each way past plumb. Its strong circular frame is cast in one piece, and supports the moving parts. It is well ribbed and very rigid."<sup>17</sup>

The tilting mechanism consisted of a large bevel gear segment bolted to the cross-head and positioned within the frame of the machine. This segment ran in mesh with a 8-inch bevel pinion. This pinion received its power through a set of extra heavy worm gears





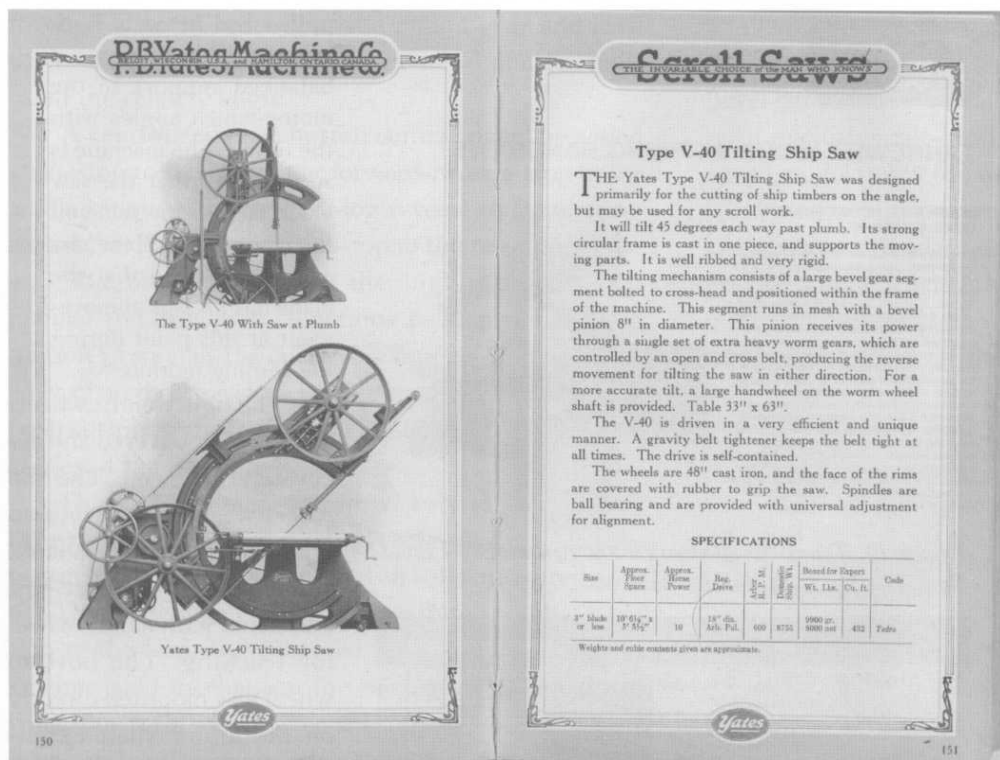


Figure 13. P. B. Yates Machine Co.'s circa 1917, 48-inch Type V-40 Tilting Ship Saw. Catalog No. 14 c. 1917.



Figure 14. Yates-American Machine Co.'s c. 1930 40-inch Power Or Hand-Feed Bevel Band Saw. First Edition General Catalog c. 1932.

controlled by an open and cross belt, producing the reverse movement for tilting the saw in either direction. For a more accurate tilt, a large handwheel on the worm wheel shaft was provided.

The cast iron table measured 33 x 63 inches. The rims of the cast iron wheels were covered with rubber to grip the saw. The ball bearing spindles were provided with universal adjustment for alignment. Ten h.p. was recommended.

The V-40 was later discontinued and replaced with the smaller and much lighter 40-inch Power or Hand-Feed

Bevel Band Saw, a reintroduction of American Wood Working Machine Co.'s mode. (Figure 14).

"(The Yates-American 40-inch Power or Hand Feed Bevel Band Saw," stated the First Edition General Catalog c. 1932, "is designed for all classes of band sawing where heavy stock is to be bevel sawed. It is adapted to ship yards and car shops."<sup>18</sup>

The top wheel was spoked, the bottom wheel solid, both of cast iron and rubber coated. The top wheel adjusted on a segment to saw from 90 degree to 15 degree right, 45 degree left. Adjustments were made by a crank with worm and worm wheel at the front, with a hand wheel at the rear for micro-adjustment. The wheel shafts were heavy and ran in long babbitted bearings. The lower shaft was provided with an outside or third bearing. An index was provided for adjusting the strain for different size saws.

The power feed model had a cast iron 41 x 43-inch table, the hand feed machine 54 x 48. Adjustable iron plates were fitted on the table to close the opening when adjusted for bevel sawing. The power feed machine adjusted by a hand wheel at the right of the operator. Iron bed rollers were supplied on the hand feed machine.

The adjustable top feed roll would handle stock up to 4 inches thick. The lower feed roll automatically



through a worm reduction, and pinion gear and rack drive, to the tilting frame. A scale and pointer indicated the relative angle.

A centralized push button control panel provided start-stop to the saw blade; forward-reverse-stop to the angling motion; jog forward-jog reverse to the angling motion; and forward-reverse-stop to the table feed rolls.

"The built in brake on the angling motor," explained the brochure, "functions to stop the angling motion as soon as the current is shut off, and provides an easy method for close setting to angles by using the push button controls. Limit switches guard the extreme angles of the machine."<sup>21</sup>

The cast iron table measured 44 x 41 inches, with idler rollers provided both front and rear; the table supporting the optional power driven rolls measured 45 x 67. The large diameter rolls were fluted to give traction to the feed, and provided with a quick acting-lever operated mechanism for raising or lowering the rolls. The rolls were driven through machine cut spur gears and worm drive, with a one h.p. motor for the Varispeed drive. The reversing feature permitted returning the piece for another cut.

"Angles right or left to 45 degrees," concluded the brochure, "built in brake on both wheels, finger tip variable angling control, jogging push buttons for setting angle of cut, overall height including bottom of pit 136", clearance saw to frame vertical 29", at 45 degrees 29", clearance under guide when vertical 24", at 45 degrees 16", weight with plain table 7000 lb."<sup>22</sup>

Tannewitz's successor, Ramco of Jenison, Michigan, still makes the saw to order. In 1998 two were sold to a Middle Eastern navy to build mine sweepers at a cost of 150 thousand dollars each. The saw was popular. The Essex Shipbuilding Museum, Essex, Massachusetts, operates a vintage L. Power & Co. No. B-11, and another was in longtime use at the Philadelphia Navy Yard, closed just recently.

Other companies that offered ship saws were London, Berry & Orton Co. (The Atlantic Works) of Philadelphia, which built a 36-inch model from circa 1890 to the late 1920s, and Turner, which offered a 48-inch model. Detailed information on Power; London, Berry & Orton; and Turner remains elusive.

A good design is hard to keep down. An interesting footnote is the fact that from 1993 through 1998 Sears offered a two-speed Craftsman 12-inch bevel cut bandsaw (Figure 16). Featuring a cast aluminum frame and 27 x 33-inch table atop a rigid steel stand, the

\$349.99 bandsaw would cut material up to 6 inches thick and 12 inches wide at 1,500 or 3,000 f.p.m.. "Make bevel cuts from 0° to 45° while workpiece remains flat with exclusive tilt-head," states a catalog. A single-speed model (\$279.99) was available in 1993 and 1994.

Vintage ship saws are still actively sought after since no inexpensive modern ones are being built. Woodworkers have not only found them invaluable for shipbuilding, but have discovered they are ideally suited for building timber-framed houses and even re-sawing lumber.

## Notes

1. *Scientific American* (11 March 1871).
2. M. Powis Bale, *Woodworking Machinery, Its Rise, Progress And Construction 1800-1880*.
3. Ibid.
4. J. A. Fay & Egan Co., *Catalogue Series L*, (Cincinnati, Ohio: circa 1900).
5. Ibid.
6. J. A. Fay & Egan Co., *Catalog No. 120* (Cincinnati, Ohio: 1926-1927).
7. J. A. Fay & Egan Co., *Catalog No. 140* (Cincinnati, Ohio: 1946).
8. Ibid.
9. Ibid.
10. Ibid.
11. *American Wood Working Machine Co. Catalog* (Williamsport, Pennsylvania: 1905).
12. *American Wood Working Machine Co. Catalog* (Williamsport, Pennsylvania: 1909).
13. Ibid.
14. *Crescent Machine Co. Catalog* (Leetonia, Ohio: 1910).
15. Ibid.
16. Ibid.
17. *P. B. Yates Machine Co. (Yates-American Machine Co.) Catalog No. 14*, (Beloit, Wisconsin: circa 1917).
18. *Yates-American First Edition General Catalog* (Beloit, Wisconsin: circa 1932).
19. Tannewitz Brochure (Grand Rapids, Michigan: circa 1962).
20. Ibid.
21. Ibid.
22. Ibid.

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*Dana Batory is a geologist-turned-cabinetmaker who operates a small, one-man shop in Crestline, Ohio. He is also author of the book Vintage Woodworking Machinery—An Illustrated Guide To Four Manufacturers (Mendham, N.J.: Astragal Press <astragalpress@aatglobal.net>, 1997), which also provides information on buying and restoring machinery. The author also has autographed copies available for \$30. (402 E. Bucyrus St., Crestline, OH 44827). A second volume will appear in 2003 devoted to Crescent, Whitney, Parks, and Boice-Crane.*