Orientations

Chinese Furniture 1984-2003

Detail of *huanghuali* canopy bed with railings, p. 103

The Artistry of Chinese Furniture Joinery: A Manifold Expression

Curtis Evarts

The appreciation of Chinese furniture cannot be complete without an understanding of the internal dynamics on which its beautiful forms are based. An ingenious system of joinery, developed over many centuries, is central to the spirit of classical Chinese furniture, and it should be valued by the connoisseur as highly as a piece's elegant shape.

The first studies of joinery were made in the 1930s when Yang Yao (1902-78), a draftsman by profession, was employed by Gustav Ecke (1896-1971) to produce technical drawings of the structure and construction of Chinese furniture for Ecke's *Chinese Domestic Furniture*. Between 1934 and 1943, under Ecke's supervision, twenty-one of the 122 pieces of furniture eventually catalogued were supplemented with plans, and front- and side-view drawings. These included detailed sections and notes to illustrate the construction of various types of furniture. Thirty-four traditional woodworking joints were also illustrated. The drawings were beautifully executed on drafting sheets sent to Beijing from Europe. These 90 by 120 centimetre sheets of linen cloth had a wax coating that made them transparent, allowing the final drawings to be traced from drafts (only two of these drawings survived the Cultural Revolution [1966-78], during which time the wax was melted from the linen and the material used for some other purpose). When the book was finally published in 1944, they illustrated with clarity and precision the logic and genius of Chinese furniture construction.

Wang Shixiang first became interested in classical Chinese furniture in 1949, after visiting the United States to see museum collections, several of which had acquired examples from Westerners who had lived in China during the 1930s and 40s. After the Cultural Revolution, he was allowed to travel throughout China to research Chinese furniture. The 359 examples illustrated in his *Connoisseurship of Chinese Furniture* (1990) were a small sampling of what he had seen. With the assistance of master craftsmen in Beijing, he disassembled several hundred pieces to examine the joinery. Complex joints were sometimes reproduced in softwood or even cut from turnips, and then converted into perspective drawings by Wang's wife, Yuan Quanyou. The carpenters were constantly surprised that even after many decades of working with furniture, they were still finding joints they had never seen before.

As the study and examination of Chinese furniture intensifies, new joints continue to be discovered. As Wang Shixiang has said, basic joinery follows simple, clear concepts of form and function, but in responding to a commission, a master craftsman had to consider the overall design and available materials and then adapt his basic techniques accordingly. A story found in chapter nineteen of the *Zhuangzi* illustrates this deep-rooted aesthetic relationship between the Chinese artisan and the object.

> Master Qing cut wood to make a bell frame, which when completed, greatly startled observers, who thought that the piece must have been the work of spirits. The Duke of Lu, on seeing it asked, 'What technical skill did you use to make it?' The carpenter answered, 'I am just a workman with no technical skill to speak of. However, I have one thing to say. When I was about to make the frame, I did not dare to waste my *qi*. I fasted to calm my heart. For the first three days of fasting, I never let the thought of happy occasions, rewards, rank or emolument enter my mind. During five days of fasting, I never thought of criticism, either condemnation or approval or whether my work was well or poorly executed. In seven days of fasting, I quietly became unaware of my four limbs and my body. During that period neither the public nor the court were in my thoughts. My attention was so completely concentrated on my work that nothing outside disturbed me. Then I went into the woods looking for material which would fit my scheme naturally. When I saw the form of the bell frame in the wood, I proceeded to make the frame. Otherwise, I would have stayed my hand. My aim was to blend nature with nature. This may be the reason why people thought the frame was the work of a divine spirit.
> (After Shih, p. xxiii)

That makers of Chinese furniture also laboured to calm their minds in the search for ways to blend natural principles with natural materials can be perceived in some of the masterpieces that have survived. A quiet intensity is expressed, not only in the beautiful forms but also in the manifold varieties of joinery lying beneath their surfaces. In Chinese furniture, endurance was achieved through continued innovation in joinery techniques, which increased stability and functionality. The following group of recently discovered and relatively sophisticated joins offer further insight into the joiner's art.

A pair of *huanghuali* yokeback armchairs in the Dr and Mrs Marvin Gordon Collection in San Francisco, California (see 'Outstanding Pieces in Private Room; Chinese Classical Furniture in New American Collections' in this volume, p. 173, fig. 15) are interesting examples of their type, with original hard-seat contruction and plain horse-belly aprons set between legs of square section. The aprons below the seat frames of chairs generally serve both a structural and decorative function. Their joints strengthen the frame and they provide visual interest by creating various ornamental openings. Most three-piece aprons utilize a half-lap mitre or a mitred tongue-and-groove to join their horizontal and vertical elements. However, these joints provide little strength in an independent frame and their reinforcement as a solidifying inner framework is rather minimal. In this pair of chairs the front posts are set back, and the overall structure is not as strong as that of chairs whose front legs penetrate the seat frame to become the armposts. It is probably for this reason that the maker chose to join the apron members using a half-lap mitre joint with a dovetail housing (Fig. 1). Like the joints often used on a corner-leg table joint, this example rigidly connects the three-piece framework, supplementing the overall solidity of the chair.

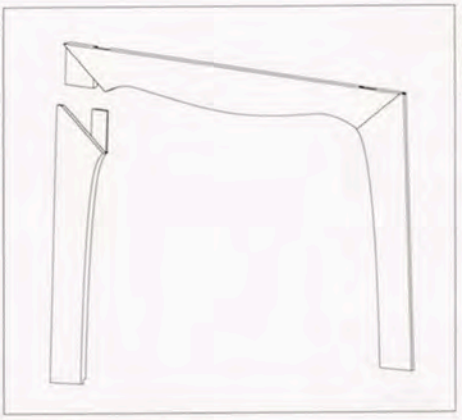
A similar joint can occasionally be found on the bridle joints of recessed-leg tables (Fig. 2). The apron is rarely cut from one

piece of wood, as a large amount of timber is required to give the proper length to the spandrel head. Typically, the spandrel head is built up with an additional piece butted or half-lap mitred to the apron (Fig. 2a). There are, however, interesting variations of the half-lap mitre and dovetail key joint in both two-piece and one-piece spandrel heads. Figure 3 illustrates a joint from a wide, recessed-leg painting table in the Museum of Classical Chinese Furniture in Renaissance, California. Two spandrel heads are joined to the apron with a dovetail tenon to give rigid support to the leg. When the apron is well fitted to the spandrel heads, the entire unit is stronger than an apron cut from one piece of wood, since any advantage of the latter is minimized by the weak cross grain over the spandrel head, the point at which strength is most needed. In a restoration workshop in Hong Kong, another bridle joint was recently discovered with a hidden dovetail key, which locks a full spandrel head to the apron with a half-lap joint to provide a secure flange (Fig. 4). There is a shallow groove in the back of the spandrel head into which the leg can slide. When the double-lock tenons at the top of the leg are finally fitted into their reciprocal mortises in the top frame, the leg is securely keyed into a stable flange. From a structural point of view, the single-piece spandrel head is preferable because of its simplicity. When materials were in short supply, however, two-piece spandrels joined with a dovetail key proved to be an innovative solution.

A large, square, well-proportioned, *huanghuali* table in the collection of the Museum of Classical Chinese Furniture reflects the architectural style after which recessed-leg furniture was modelled. Its aprons (Fig. 5) also incorporate the half-lap mitre and dovetail joint. It is interesting to note, however, that adjacent to this sophisticated joinery are humpback stretchers attached to the aprons with their original nails (Fig. 5a). Although it is often said that Chinese furniture makers used neither nails nor glue, original nails have often been found pinning humpback stretchers to the underside of aprons and, as will be illustrated later, thickened lacquer was occasionally used as an adhesive.

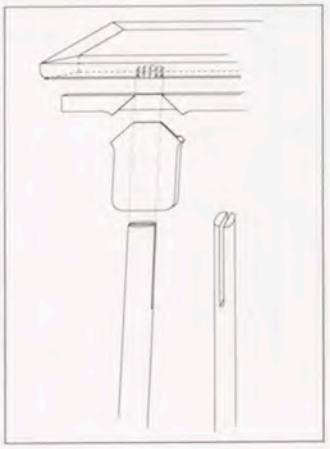
On recessed-leg tables, the end aprons are frequently lost as a result of an uncharacteristically weak Chinese joinery design. Perhaps carpenters viewed this part more as a decorative element than as something that required an integrated design, not anticipating that the tables might often be lifted or pulled from this point. The delicate zigzag joint (Fig. 6) that was often used provided little resistance to gravity or heavy handling, with a rather weak endgrain tooth locking the joint. Also found are splined mitres and mitred end-pieces pinned to the end frame member with wooden pins and sometimes even nails. Much less frequently seen is the more sensible mitred joint with concealed dovetails (Fig. 7), the interlocking surfaces of which were designed to withstand both natural and applied forces. Its presence is undoubtedly the signature of a quality workshop reflecting the high standards of its master.

The development of the corner-leg joint with a locking dovetail key allowed intermediate and floor stretchers to be successfully abandoned on corner-leg tables. A circular incense stand with three legs has an even more sophisticated variation of this joinery (Fig 8). Here the craftsman was no longer working with familiar right angles, but with the more complex realm of circular and curvilinear geometry, which required mastery in calculation and three-dimensional visualization. Although the joint remains functionally the same as the corner-leg joint, the use of thick aprons meant that double dovetail

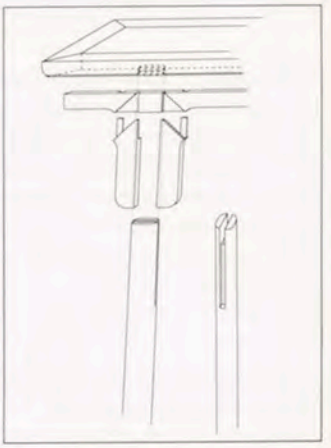


(Fig. 1) Drawing of a chair apron with half-lap mitre and dovetail joint

(Fig. 2) Detail of a typical bridle joint with a one-piece spandrel head from a recessed-leg painting table
Late 16th/early 17th century
Huanghuali
Table: height 81.6 cm, length 228.3 cm, depth 60.9 cm
Museum of Classical Chinese Furniture, Renaissance, California, MCCF 16.01

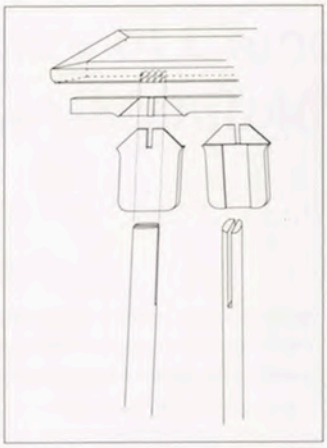


(Fig. 2a) An exploded view of the bridle joint in Figure 2



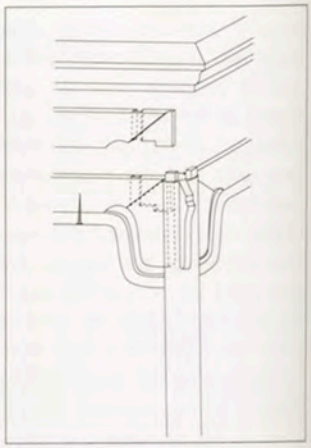
(Fig. 3) Drawing of two spandrels joined to an apron with dovetail keys

(Fig. 4) Drawing of a one-piece spandrel head joined with a dovetail key

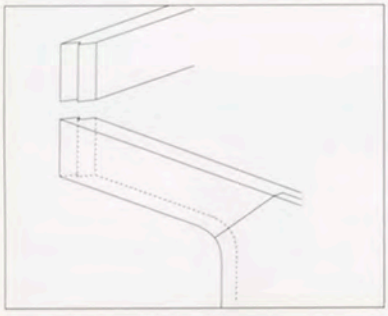


(Fig. 5) Detail of a square table with corner spandrels
Late 16th/early 17th century
Huanghuali
Height 88 cm, width 105.5 cm, depth 105.5 cm
Museum of Classical Chinese Furniture, Renaissance, California, MCCF 19.01

(Fig. 5a) Drawing of the apron and humpback stretcher construction of the table in Figure 5



(Fig. 6) Drawing of a typical zigzag joint found on the end aprons of recessed-leg tables



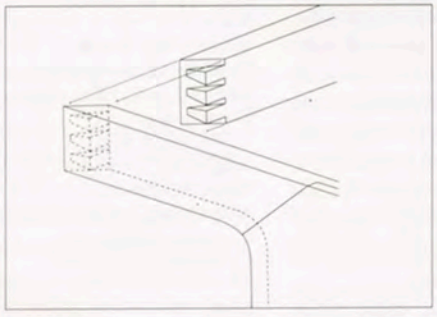
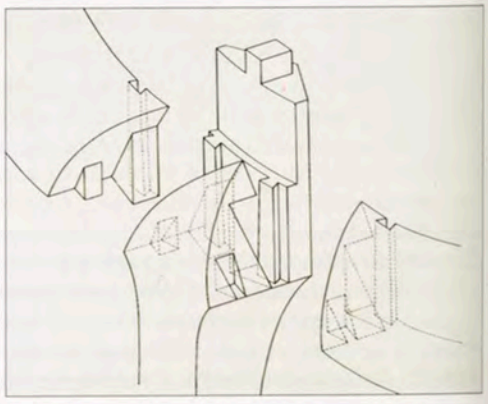
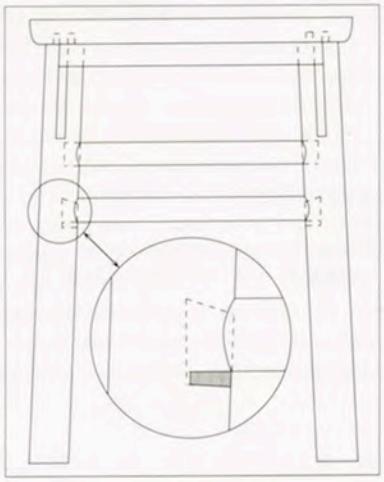


Fig. 7) Drawing of a mitred apron with a concealed dovetail joint



(Fig. 8) Drawing of the apron-to-leg joint of a *huanghuali* three-legged incense stand

(Fig. 9) End view of a recessed-leg painting table
Late 16th/early 17th century
Huanghuali
Height 81.6 cm, length 228.3 cm, depth 60.9 cm
Museum of Classical Chinese Furniture, Renaissance, California, MCCF 16.04

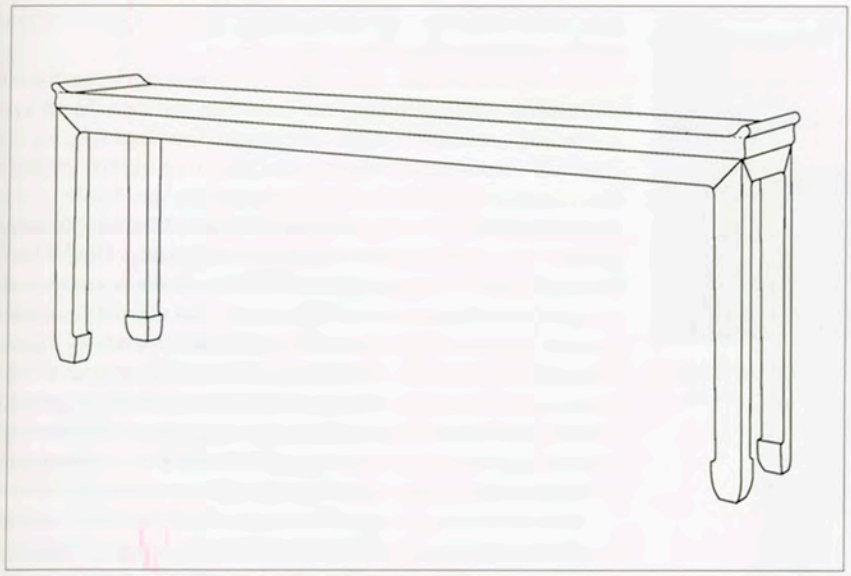


(Fig. 9a) Drawing of a hooked tenon and plug joint on the table in Figure 9

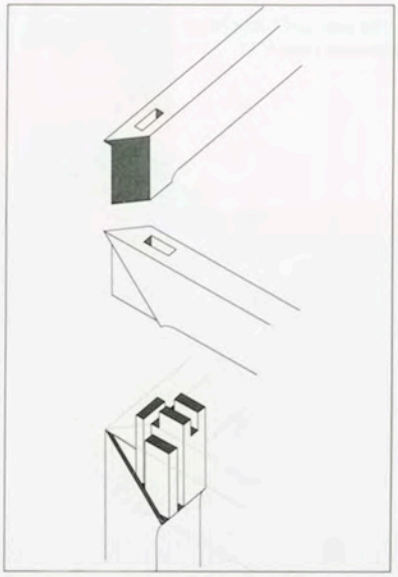
tenons could be used to firmly attach the aprons to the legs with a structural soundness that enabled the whole piece to be sculpted and finished in the round.

One reason for the aesthetic appeal of Ming furniture is its intelligent design based on 'common sense'. The application of this humble principle is often neglected or distorted by rigid thinking or by a slavish regard for fashion. The hook-and-plug tenon joint, an example of simple intelligence, is illustrated by both Yang Yao (Ecke, p. 154) and Wang Shixiang (Wang, vol. 1, p. 124) together with 'giant's arm braces' (*bawangcheng*). On larger recessed-leg tables (Figs 9 and 9a), the lower of the double stretchers is also occasionally fitted with a hook tenon. When driven into place with a wedge-shaped plug, this holds the legs together securely without the necessity of wedging the less attractive exposed tenon. The end of the slightly wedge-shaped plug, visible under the lower stretcher, is sometimes mistaken for an alteration to the mortise or a carpenter's error. When the double tenons at the top of the leg are securely fitted into the frame, the entire leg-frame structure is locked together. A pair of *huanghuali* southern official's armchairs recently offered by Barling's of London, also featured hook-and-plug tenons used to secure the stretchers below the seat frames.

An unusual corner-leg table with everted flanges and without leg stretchers or reinforcements was recently examined by this author. It was fashioned with particularly thick members to support its solid top (Fig. 10a). The construction of the corner-leg joint is unique, utilizing stout tenons cut from the



(Fig. 10a) Drawing of a corner-leg table with everted flanges



(Fig. 10b) Drawing of the corner-leg joint of the table in Figure 10a

(Fig. 11) Corner-leg side table with everted flanges
Late 16th/early 17th century
Huanghuali
Height 87 cm, length 184.5 cm, depth 41.5 cm
Museum of Classical Chinese Furniture, Renaissance, California, MCCF 18.08

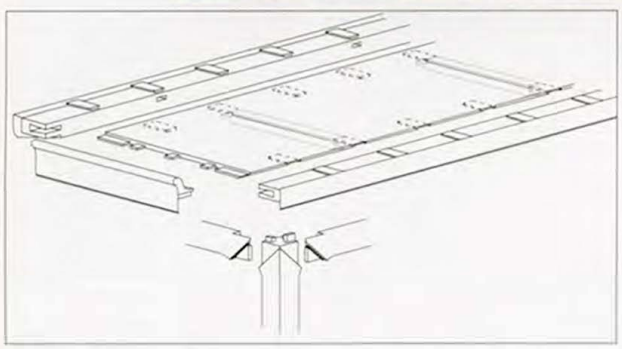
thick legs (Fig. 10b). The strength of this joint is greater than that of the more typical corner-leg joint where the tenon is generally cut from the apron rather than the leg. A vertical tenon can penetrate the entire width of the apron without resulting in a visual distraction, and its greater length improves resistance to lateral and shear forces.

Another variation of this form (Fig. 11) is much more elegant in its proportions. Although it also appears to have a solid *huanghuali* plank top, the underside reveals a common panel and frame construction with supporting transverse braces. Disassembling the table revealed some of the most ingenious joinery ever seen. The top was first separated from the base by knocking it off the double-lock tenons protruding from the top of each leg. An unusual double-lock tenon arrangement was discovered, with one of the tenons cut in an L shape and stepped. The table top's end frame member with an everted flange was removed by knocking it straight off the end. This revealed three long, narrow tenons on the short side of the panel as they slid out from deep mortises in the flange. When this member was fully removed, an unusual blind dovetail tenon was exposed that interlocked with a reciprocal mortise in the tenon of the frame on the long side of the table top (Fig. 11a). When all are in place, the flange and the frame members sandwich the panel and are pinned and locked together with the protruding double-lock tenons on the legs. With the everted flange/end frame member removed, a cross section shows the

(Fig. 11a) Detail of frame joint of the table in Figure 11

(Fig. 11b) Detail of across section of the table in Figure 11

(Fig. 11c) Detail showing traces of lacquer on the table in Figure 11



(Fig. 11d) An exploded view of the top of the table in Figure 11

panel mitred along its long edge and inset in a wide rebate cut into the frame (Fig. 11b).

The panel appears to be held in place by the conventional three transverse braces. As the long frame members were separated from the panel, however, dovetail mortises cut into the underside became visible, spaced every twenty three centimetres along its edge. Their counterpart wedge-shaped dovetail tenons were carved from material left in the wide rebated areas of the long frame member. A close examination of the dovetail tenons revealed that they had been precisely cut and yet remained completely undamaged. Since it was apparent that the table top had never been disassembled, it is interesting that traces of a thin, reddish-coloured lacquer, used for supplementary adhesion, were found inside this series of joints and along the long mitred edge (Fig. 11c).

To reassemble the table (Fig. 11d), the long frame members were slid back into the dovetail mortises cut into the underside of the half-inch thick panel. Because of the close spacing of the dovetail mortise and tenon joints, the long mitred joint at the point where the edge of the panel meets the frame could be locked tightly to prevent warping. Even after almost four hundred years, this panel remains completely flat. The end frame/everted flange members were then simultaneously slipped into the tenons of the panel and the large, complex tenons extending from each long frame member. This is a remarkable example of design and execution and when the table is fully assembled, not a hint of its internal complexity is visible. Even the series of dovetail wedges seems to have been intentionally cut back a quarter of an inch from the inside edge of the frame to leave no trace when fully assembled.

Below the top, an extra thick apron half-lap mitres and joins securely with a long, thick tenon to the leg. A small additional tongue extending from the apron's mitred edge fits a corresponding groove in the mitred shoulder of the leg, keying these lapped surfaces together. The lightweight top was then set on this sturdy lower frame, fitting tightly into the protruding tenons. The placement and unusual configuration of these tenons were conceived to increase resistance to lateral loading as well as to lock and pin the complex frame and panel members of the top tightly together.

The common denominator in all of these examples is the extra attention given to the conceptualization of their various functions. Those who ask whether it was practical to put so much effort into design should turn to a passage from the *Zhangwu zhi* (*Treatise on Superfluous Things*) by Wen Zhenheng (1585-1645) reflecting upon the attitudes of a bygone time. 'In making utensils the men of old valued utility without sparing expense; thus, their manufactures were extremely well prepared, unlike the slap-dash attitude of men of later times...they delighted in refined elegance and did not vainly add inscriptions and value only signatures' (Clunas, p. 79). The inscriptions and signatures of a master craftsman are the pieces themselves, and today their remaining works still quietly radiate a calm perfection.

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Photographs by James Kline, Figures 2, 5, 9 and 11; drawings and photographs by Curtis Evarts, Figures 1, 2b, 3, 4, 5b, 6, 7, 9a, 10 and 11a, b, c and d; drawing by Emily Gordon, Figure 8.

Suggested further reading

Sandra Lok Fu Chin, *Classical Chinese Wood Furniture*, San Francisco Craft & Folk Art Museum, San Francisco, 1992.

Craig Clunas, *Superfluous Things: Material Culture and Social Status in Early Modern China*, University of Illinois Press, Urbana and Chicago, 1991.

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