The Making of a Chinese Bronze Mirror, Part 2

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In the study collection of Chinese art in the Royal Ontario Museum, Toronto, there is a remarkable specimen of Chinese cast bronze work which concerns us here (Fig. 1). It is part of a bell, of the Warring States period (480-221 B.C.), and of the Shou-chou type, (Cat. No. 954.5.9A). The extraordinary fineness of the linear relief patterns which decorate the bell at once drew my attention to them. At first sight they appeared to have been reproduced from short lengths of braid or ribbon, often worked with a little spiral knot at the end.

After studying the work for some time I felt that work of this fineness would be impossible to model by hand, in clay or wax. I looked closely and noticed that the sides of each line of the pattern were not smooth, like those of a ruled line, nor as one might have expected them to be if modelled by hand. For, at minute but regular intervals, they bulged out on both sides simultaneously, and vertically also, as if formed by stitches — worked in the manner of "couching".

Such an observation needed confirmation. A lens was called upon and it confirmed my observations. I then consulted Dr. H. Burnham, Conservator of Textiles in the Museum, and he, after studying the work minutely, decided that the original pattern from which the mould for the bronze casting had been made was not of braid or ribbon, but that it could have been produced by embroidery. This decision provided solutions for a number of difficulties that had occurred to me. (1) How was the overcrowding of the very fine ridges which formed the pattern, avoided as they turned a corner? For if the fabric had been a braid I should have expected it to crumple up irregularly there. But the little parallel lines got round the bends without losing step or buckling at all. (2) How were the raised edges to the ribbon-like patterns formed? Were they made by separate stitches, or from a thick thread, fastened down along the edges of the ribbon or braid? (3) How were the coiled up, high relief forms at the extremities of the "boomerang" and other shapes formed? That they were all worked in embroidery provided answers to these questions.

Probably the most interesting feature of the design is that provided by what may be called "the triangular-spiral pattern". This, worked in minute stitches, decorates much of the ribbon-like ornament. The stitches look miraculously small, yet they show clear evidence of being hand-worked embroidery. We can follow the course of each thread, or rather bundle of fibres, noting the little bulge where it, escaping from the grip of the "couching stitch", which, at regular intervals, held it down, expands a little, and is thus free to absorb a larger quantity of the lacquer or wax with which it was subsequently treated. The minute variations in the width and height of relief in the threads which form the patterns on the bell are thus accounted for.

More than 2000 years ago the question as to what kind of needle could be employed for such fine work as that for the bell might have set the

Fig. 1. Fragment of a bronze bell (detail,) shown with scale for measurement. Warring States Period.
Total fragment is 6⅛ inches by 2¾ inches, or 15.6 cm. by 7 cm.
Royal Ontario Museum, Toronto. Catalog No. 954.5.9A.

Chinese craftsman, or woman, a difficult problem. But that he, or she, found a satisfactory solution to it is clear, as the work on the bell fragment proves. A recent enquiry addressed to Mr. S. J. Mander, Clerk to the Cordwainer's Company in London, elicited the information that a boot-maker hand-stitching a boot, employs a spear-pointed awl, which divides the fibres of the leather, making an oval-sectioned slit through which he pushes, from either side, one end of the thread, in order to produce a lock-stitch. And that a pig's bristle is employed as a needle. No eye is required here. For, after "stranding out" the fibres at each end of the thread, a bristle is inserted at each extremity among the frayed out fibres. These are now pressed neatly and firmly round the bristle, and the wax with which it has been treated holds the bristle clearly in position.

But what thread could have been employed to produce the exceedingly fine embroidered lines on the ribbon-like forms on the bell? I consulted Mrs. Hamilton-King, Principal of the Royal School of Needlework, South Kensington, London, who very kindly produced some fine Chinese silk thread, now no longer procurable, which measured about 0.1 mm. in diameter, its single fibres being about 0.01 mm. in thickness. Mrs. Hamilton-King also referred me to the work of Loelia, Duchess of Westminster, who has done some very fine embroidered work in human hairs, and very kindly brought to the School, a landscape worked by herself, in which the clouds were worked in human hair. Now the thickness of a human hair varies from person to person, but an average thickness might be reckoned at two thousandths of an inch (0.002 inch). So "a hairsbreadth" may be taken to mean one five hundredth of an inch. Now, a thread very much coarser than this was employed for the embroidery reproduced on the bell. But in any case there should not have been any difficulty in procuring a supply of human hair in China.

My next problem was, "Could a pattern as delicate as that on the bell, be moulded in unglazed porcelain-like plastic material?" It would be similar perhaps to that employed by English master-potter, Josiah Wedgwood (1730-1795), which, after firing, but unglazed, could have been used as a mould for impressions in wax, like the ornament on the bell. I consulted Mr. R. J. Charleston, of the Department of Glass in the Victoria and Albert Museum, South Kensington, London, who kindly showed me pieces of unglazed Wedgwood "Basalt" and "Jasper" wares which, after having been fired, retained delicately modelled work as fine as that on the bell. From these, squeezes in wax could have been taken and employed in a similar manner to those used by the Chinese craftsman to decorate the bell-model.

But would not the task of embroidering the whole pattern for the bell take an unreasonable amount of time, unreasonable even in China? A consideration of the work reveals a number of joins and the repetition of parts of the pattern, turned different ways. What then was the shape and size of the original embroidered pattern? There is a very obvious junction of four similar parts of the pattern near the centre of the photograph, and the boomerang-shaped device appears four times. If a single pattern could be repeated four times it would considerably reduce

the amount of embroidery to be done. It is probable that the original piece of embroidery was no larger than a rectangle measuring 40 by 30 mm., for from four wax impressions of that size one could build up all those parts of the work that are shown in the illustration. The extreme fineness of texture in the casting is proof enough that by the Warring States period, the Chinese had developed a ceramic material as fine in texture as Wedgwood's "Basalt" and "Jasper" wares, and that they employed it to make moulds from which they could produce wax "squeezes" for the decoration of their models for bronze castings of high quality.

There are at Toronto, besides the bell fragment discussed above, a pair of bronze vases, perhaps 15 inches high, (Cat. N.B. 2682 & 2683), whose decorative patterns were derived from an embroidered original, very like that on the bell. I think that there can be little doubt that a search among the fine bronze castings of the "Warring States" and later periods would reveal other examples of such work, and among them some mirrors.

The "dragon" mirror (Fig. 2) at the Royal Ontario Museum, Toronto (Cat. No. 933.12.18), has a decorative pattern constructed in two layers. The first is a diaper or all-over design, of concentric circles and spirals, changing occasionally into triangular spirals, or parallel strokes. Its relief nowhere rises above, or sinks below, one general level. The pattern was made from irregularly spun threads, probably of wool, slightly stiffened by being dipped into a solution of gum, and then being hung up to dry. The effect of even a small amount of stiffening is that when the thread is being arranged in its place on the model by the tweezers, either a gentle curve or a sharp angle can be produced at will, and its shape will remain unchanged permanently. For example, when forming the claws of an animal or when making a triangular-spiral pattern or other particular shapes, two pairs of tweezers might be used; one in either hand. The thread might have been dipped into molten wax, or be given a few touches of wax or lacquer to fasten it in position. This wax or lacquer work is not so neat as the embroidered work on the bell. The illustration shows many little angles in the curves, and the irregularity in the "inclined-radial" circle reveals poorly-spun material, insufficiently gummed.

Fig. 2. Detail of a bronze mirror, Shou-chou type. Warring States Period. Dia. 5¼ inches or 13.3 cm. The photograph is an enlargement, 4:1.

The upper layer of decoration is formed by a number of dragons and other curiously shaped beasts, engaged in a general battle. There is great variety both in the structure of the different creatures, and in the height of relief employed for them. There are heavy plaited and coiled members, beaded and scroll work and bundles of fibres wound about with threads which cut deep grooves in them. And two circles of stiff coiled strip, perhaps originally of vellum coiled over a string, form boundaries to the main field.