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# MASTER WEAVER

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## SHUTTLES AND SHUTTLE-RACES

The shuttle is probably the part of weaving equipment which is the least understood by both the weaver and the manufacturer. There are very few satisfactory shuttles on the market, and most of the less satisfactory ones can discourage a beginner for ever.

A shuttle does not need to be very elaborate or precisely made. Its lines are of little importance as long as they fulfill a few simple requirements. They can be made from other materials than the classical boxwood. But they must have certain properties, and certain factors cannot be disregarded.

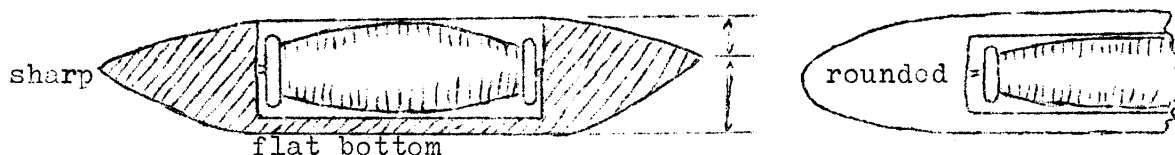
In the very principle of the hand shuttle there are already contradictions. For instance: each weaver works best with one particular kind of shuttle. But he should have at least two types: one for narrow, and one for wide warps. The first should be lighter (but not smaller), the other - heavier. Both should have exactly the same shape, and size. This is because the action of throwing and catching the shuttle must be completely automatic, so that the hand unconsciously assumes a certain position, regardless of the shuttle used. If there is a necessity of adjusting this position to the different shuttles, the weaving suffers at least in speed if not in quality.

Thus we have the first important condition: all shuttles used by the same weaver should have the same shape. This does not apply of course to special shuttles used in rug weaving etc.

But what shape? The bottom must be flat and straight, so that there is no tendency to roll or dip when going over comparatively soft shed. Whether there are ribs or holes in the bottom, does not make any difference except for the price. The varnish will stay longer on a solid flat bottom, than on a ribbed one. The curve from the bottom to the tip should be rather a short one. The tips should be raised higher than the center of the shuttle. They must be sharp in the vertical cross-section, but well rounded in the horizontal one. Too pointed tips are hard on fingers - dull ones break the warp ends if they strike any. Metal tips are all right if they are not too sharp, i.e. they should have the same shape as the wooden ones.

The shuttle should be deep enough, so that the bobbin or quill when filled with weft can be completely hidden. Otherwise the weft on the bobbin rubs on the upper part of the shed. Many shuttles are too low from this point of view.

The weight is very important. It should be sufficient to carry the shuttle through the shed and overcome not only the friction between the shuttle and the warp, but the friction of the unwinding weft as well. The weight must be distributed so that the shuttle is light in the center and heavy on both ends. This prevents it from swinging to the sides. The ends should be of solid wood or even weighted with metal.



All the above remarks apply to hand-shuttles only. Flying shuttles are constructed much more scientifically for the simple reason that the machinery cannot correct their trajectory, and the hand can.

Another important factor which decides upon the quality of a shuttle is the way the weft is unwound from a bobbin or quill. The most common arrangement is to have the bobbin which rotates on a spindle. It is simple and efficient but not very precise mechanism. The tension of the weft depends on too many factors and cannot be controlled satisfactorily. Even very well wound bobbin unwinds unevenly towards the end. On one hand it weights less then than when it is full, on the other - the smaller diameter when the bobbin is nearly empty makes it more difficult to start. These two factors do not eliminate each other and the movement of the weft is not even. If braking devices are used either on the bobbin or on the weft itself. they only partly correct this irregularity, and nearly always produce too much tension.

From this point of view a perfect arrangement is the one used in flying shuttles. Here the bobbin does not rotate. The weft comes from one end of a "plug" with hardly any resistance. The tension required for good weaving can be regulated and is independent from other factors, such as the amount of weft on the plug.

Consequently the best shuttle is one built as a hand-shuttle but with the releasing mechanism of a flying shuttle.

The shuttle-races (or race-boards, race-blocks etc) are great help if they are properly built, and they have no disadvantages. If they increase the weight of the batten, it is all for the best in most cases. However, they should be wide enough, and mounted at such an angle to the batten, that the fully opened shed just touches the board on its entire width. If the shed is too high, the race is useless, if it is too low, the race will rub against the warp and may damage it.

In connection with shuttle races special shuttles with rollers in the bottom can be used. Otherwise these shuttles are not to be recommended.

The shuttle races are particularly helpful in cases when the lower part of the shed is very soft, or when it has comparatively few ends, as in swivel weaves woven right side up.