Magic Mirror 1008686

Instruction sheet

01/13 ALF

1. Description

Originating from the Chinese Han dynasty (206 BC - 24 AD), the magic mirror combines optical and mechanical principles with highly advanced metallurgy. Knowledge of how it was made was lost during the Song dynasty (960 – 1127) and remained a mystery until 1975. It is only then that Chinese craftsmen and scientists were able to rediscover the secret behind this mirror.

If sunlight or a nearly parallel light beam impinges on this mirror and the light is reflected on to a white surface, decorative patterns on the rear of the mirror become visible in the image.

The special features of this bronze mirror are attributable to the casting and grinding techniques used to manufacture it. The reflective body consists of a very thin central section embossed on the rear and possessing a thick edge (see Figure 1a). When the cast mirror cools, its relatively thick edge loses heat energy more slowly than its thinner center, thus exerting a moment on the center (see Figure 1b). As a result, the mirror is subjected to internal stress, which increases during the grinding and polishing processes. The thinnest parts of the mirror are only about 1 mm in thickness.

The thick edge presses the thinner, reflective material together, thus lending the mirror its convex shape. Grinding and polishing have a more pronounced effect on the mirror's thinner parts than its thicker ones (see Figure 1c).

These minimal differences in curvature influence the quantity of light reflected by all the various parts of the mirror on to a white surface. As shown in Figure 2, light from the more convex parts of the mirror are scattered more widely compared with the less convex (thinner) parts, therefore creating darker patches in the reflected image. This is how the patterns on the rear of the mirror become visible.

Diameter:	70 mm approx.
Thickness:	10 mm approx.

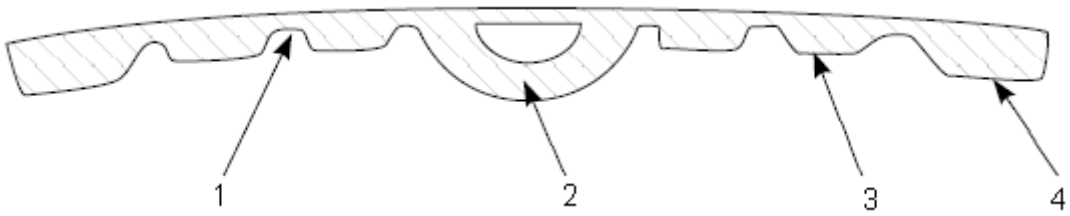

Fig. 1a
1 Thin central section
2 Eyelet
3 Embossed pattern
4 Thick edge

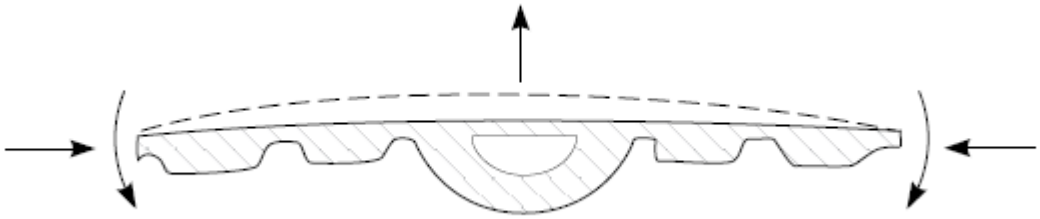

Fig. 1b Moment exerted by the thick edge on the thin central section during cooling.

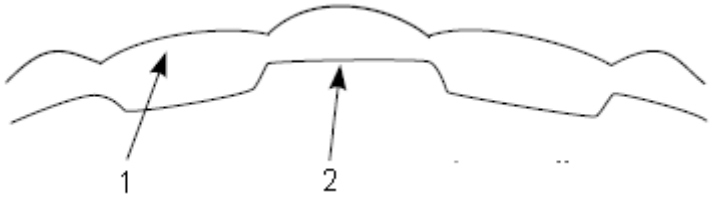

Fig. 1c
1 Thick, decorated spot
2 Thin, plain spot

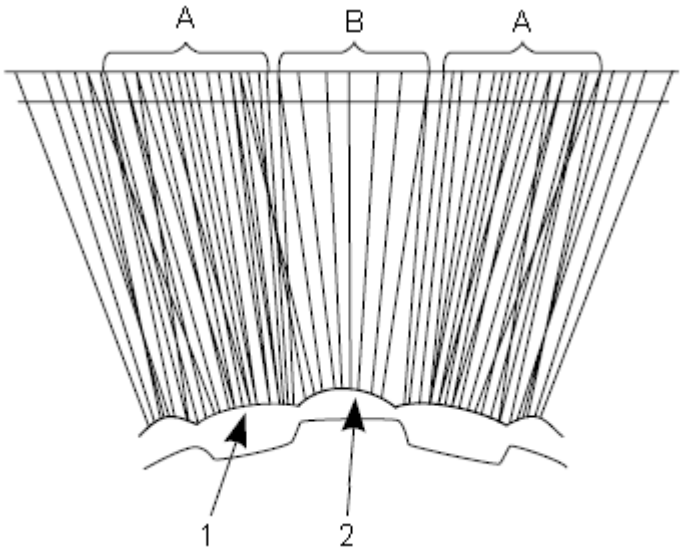

Fig. 2
A Lighter, 1 Less convex
B Darker, 2 More convex