Technology

My technology has developed as need arose; this need has an aesthetic origin, that is an origin in feeling, though I could not easily describe how it is conceived. The technological sources are: the experience of others, whether observed, told, or read about; my own observation of what happens—in nature or in my own attempts; and that combination of theory, experiment, intuition, and luck, called "invention".

The technology is partly in the devices I make and partly in my methods for constructing them. Some of the devices have been known for centuries, perhaps in different form and put to more practical use, such as the pendulum Some methods, such as welding and soldering, were known in Roman times, though we now have them vastly improved.

The general purpose of these machines is to establish a kind of order through movement and through variations, contrasts, and harmonies of movement. There is a limited repertoire of possible movements, but an infinite range of relationships of time and directions, roughly analogous to the infinite possibilities of hue and shade relationships amoung the rather few ingredients on the painter's palette. I employ a few quite common technical devices. There is no movement without the application of force, whether it be the "big bang" which may have started our universe, or the breath which moves the vocal cords in forming a whispered word. My movement, with very few exceptions, is powered by gently moving air, pressing against surfaces which are often quite slender. Friction is the enemy of movement, so all moving surfaces in contact are kept as small as possible and are polished. Since matter at rest has inertia which requires energy to overcome, weight also must be kept low. Most of my situations require that the components be rigid, so I use stainless steel as my structural material. Aluminum is cheaper and easier to work, but is softer and more flexible, it is more difficult to weld, and is less responsive to light. Ordinary steel rusts and must be painted. With any technology there are difficulties, recalcitrant material, unknown effects, unexpected weaknesses, but there are also unexpected opportunities. The stainless steel I use almost exclusively is not hard, but tough. It takes the edge from sharp tools very quickly. It also "work-hardens" very quickly. Because it transmits heat poorly, it warps badly when welded. One is constantly sharpening drills and throwing away used files and hacksaw blades.

Stainless steel is only stainless if it is clean, so one thinks also of pollution, corrosion, rain, snow, ice, durability, and maintenance. These affect all outdoor sculptures; then I have a group of special problems of my own:

Installation far from my studio; There are sometimes dozens, sometimes scores, of parts in one sculpture. If I forget one part of one vital tool, disaster!
Distortion in transit, faulty packing, careless handling on the ground.
Proper clearance between moving parts.
Unwanted flexibility of the whole system, after construction.
Turbulent winds between buildings or in exposed landscapes. Hurricanes.
Arriving to install at some sites and finding no ladders (or that they are too short), no water to wash off fingerprints, or that the crane cannot park at the site, that the agreed day is a holiday.
Vandalism.

The assumption by officials that sculpture needs no care after installation.

Technology is not art, but every art has its technology. Sometimes it is very simple, with few tools and materials, though possibly with very much skill, as in Central American ceramic sculpture and gold ornaments, or in French crocheted lace. I do not develop technology for its own sake or to cause wonder, only in response to my felt need. I use whatever modern tools or materials will save time or allow precision where I need it. Sometimes a new technique requires its own family of tools; for example, with ball bearings come snaprings, and for snaprings one must have special pliers. With ball bearings I can attempt devices which would have moved clumsily on simpler bearings. But my most sensitive bearing is still the polished knife edge, which has been known for centuries.