

Visual and Decorative Elements in Pipemaking:

Design and Proportion

presented by

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Discovering what looks good

- Train your eye
 - we say “eye”, perhaps because we mean “inner eye”
- Give it what it likes
- Looking is the best way to learn how to see
 - critical looking, not in fault-finding sense but in sense of discovering what looks good
- Why theory, then?
 - a framework for uncovering principles
 - a language for discussion

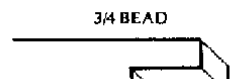
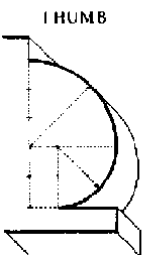
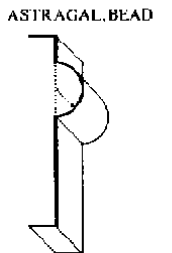
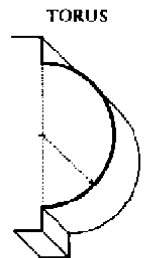
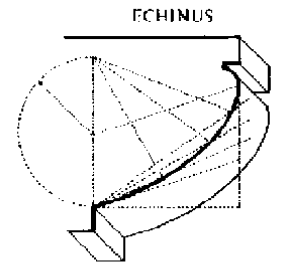
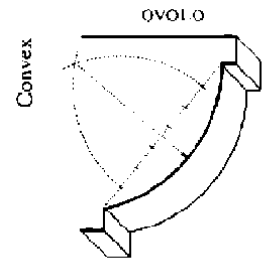
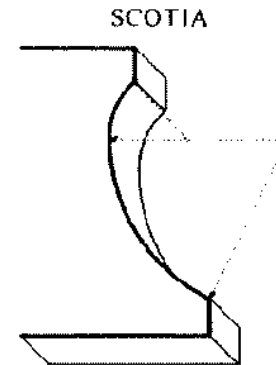
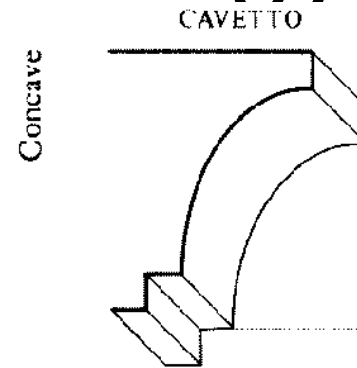
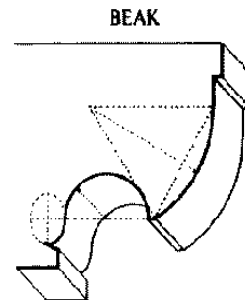
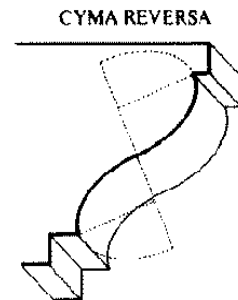
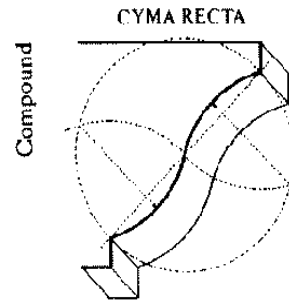
Decorative elements

- Rotational symmetry
 - thus woodturning terminology for elements
 - beads
 - coves
 - fillets
 - compound curves: convex+concave



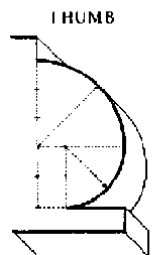
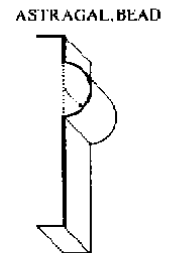
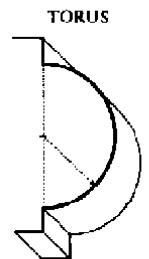
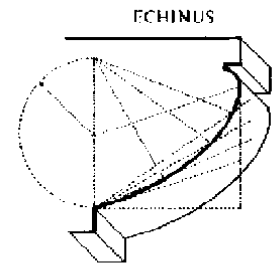
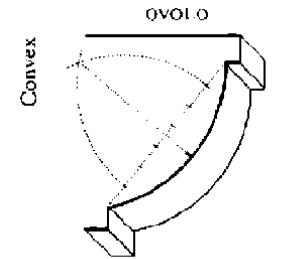
Moulding/turning terminology

- Convex
 - beads
- Concave
 - coves
- Compound
 - *some coves probably started out as functional elements for attaching end pins, were retained as beads*



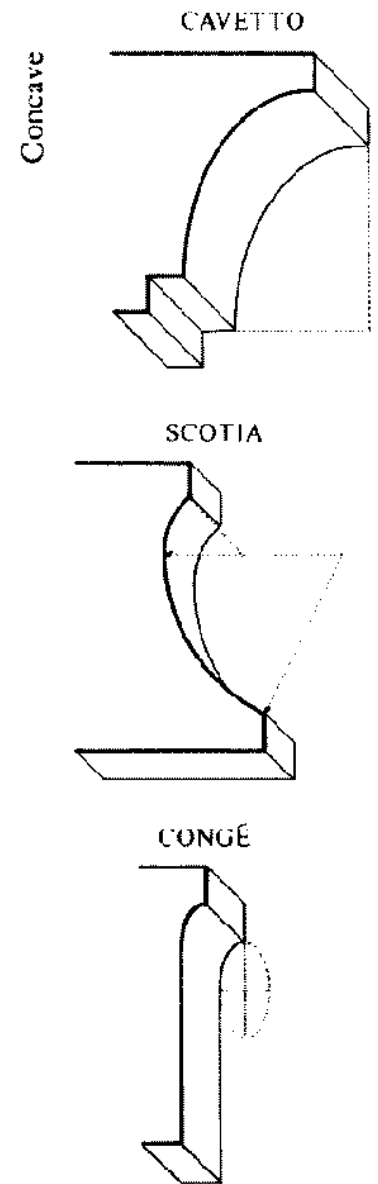
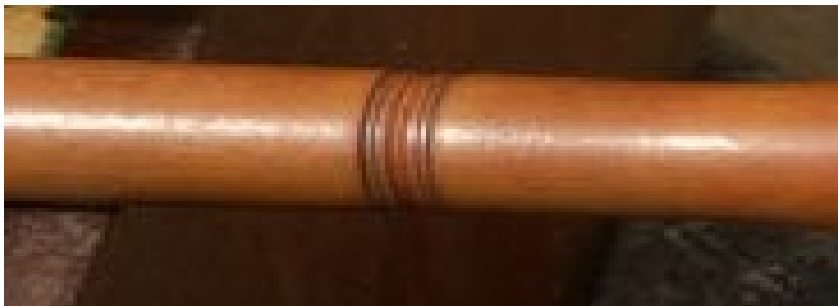
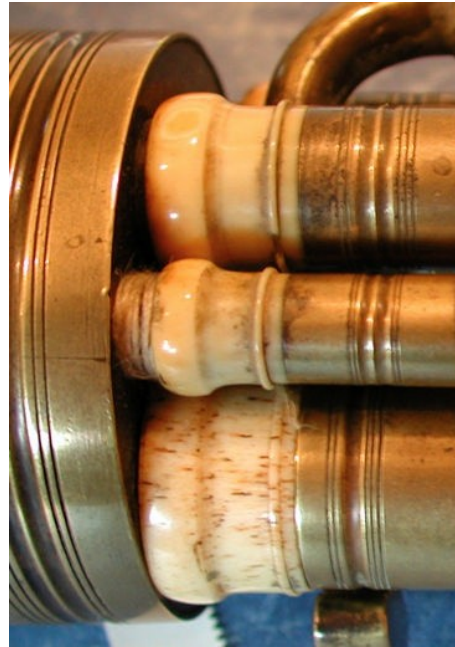
Convex forms

- Beads
- Astragals



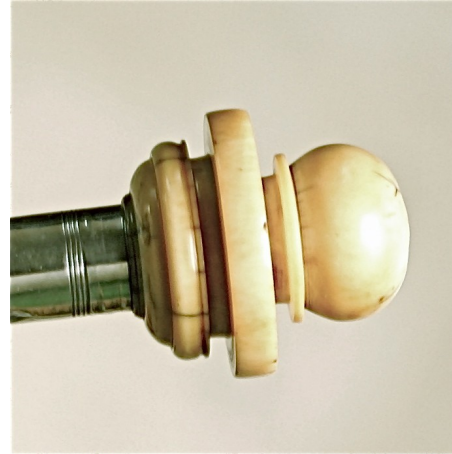
Concave forms

- Coves
- Scotias, etc.
 - commonly joining large to small diameters



Compound forms

- Curvature reverses, with smooth transition
 - aka 'S' curves
 - curvature may vary smoothly,
 - or may reverse suddenly, as long as curves touch at their 'tangent' points
 - objects composed of multiple elements may also be considered “compound” forms



Form Follows Function?

- metal ferrules reinforce and strengthen wood
- beads/rings may act as “stops” to limit movement
- caps, keys have obvious role
- all objects have shapes, therefore they have a non-neutral visual identity
 - decoration can help or hinder



Vitruvius' Architecture

- Marcus Vitruvius Pollio, 1st C. BC (served under Julius Caesar)
- Only surviving classical architecture text from antiquity
- Huge influence on Alberti, Da Vinci, Michelangelo... (and just about everyone in Renaissance and after)
- Available from 15th C, in English from 1771
- Principles underly all of Western early modern design
- Despite its importance to all of art and design, formal study of Vitruvius' principles mostly remains within architecture

Vitruvius' Architecture: principles

- In the Greek ideal Vitruvius addresses they are similarity, difference, motion, rest, number, sequence and consequence.
- We could paraphrase and regroup as:
 - proportion (vs. dimension)
 - repetition
 - rhythm
 - symmetry
 - harmony

Proportion

- proportion means ratio, as opposed to dimension
 - proportion implies scaling, in the context of similarity
 - some proportions will be dictated by physical constraints
 - acoustics (e.g. relative lengths of drones)
 - other shape constraints of instrument (e.g. reg caps)
 - human hand
- *equal ratio tends to please more than equal division*



Repetition, symmetry, rhythm

- balance between repetition and variety
- repetition can be direct or scaled via proportion
- symmetries also imply number; primary symmetry is rotational, but reflective also useful
- repetition at different scales implies a “rhythm”



Harmony?

- elements have a careful relationship to one another
- internal consistency
 - 'repetition' in smaller or larger scale, via proportion
 - not unison – similarity, not sameness
- elements inverted, dissected, reassembled to form complementary shapes



Proportion in “division”

- when 'dividing' a tapered surface such as a ferrule, consider “equal area” division; a line slightly nearer the wide end may look better than a line at the halfway point



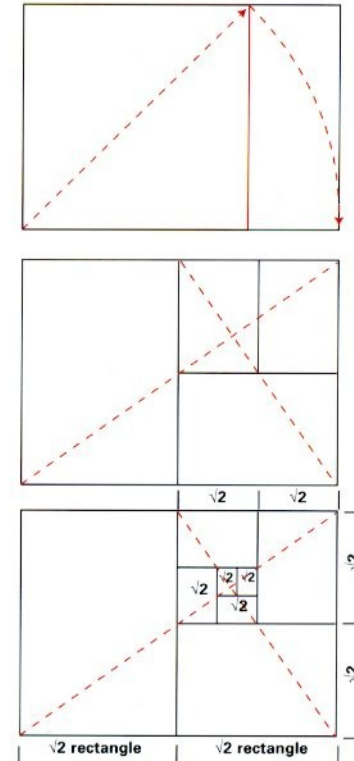
Proportion in “division” (cont.)

- when dividing any part lengthwise, for instance when adding a bead or a ferrule that doesn't go full-length, a proportion is created between the sections.
- it may look best if this proportion is held consistent across similar parts – or even within the subparts
 - i.e. proportions formed by bead may be same as proportions formed by ferrule, etc.



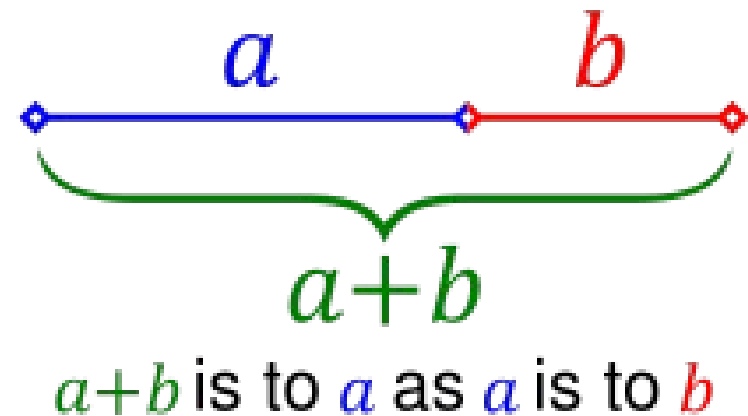
'Static' vs 'dynamic' proportion

- static proportion based on integer ratios
- dynamic proportions are based on other mathematical properties, and exhibit self-similarity
 - thus they support infinite subdivision
- “Root 2” is a useful dynamic proportion
 - used, for instance, in the DIN paper standard



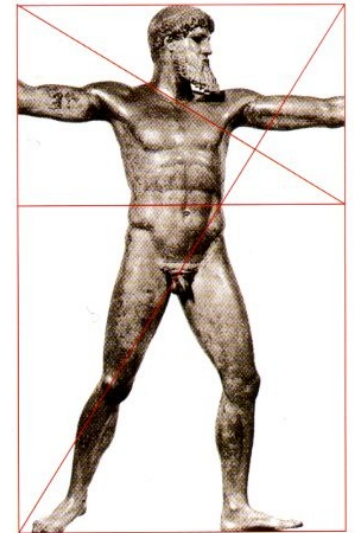
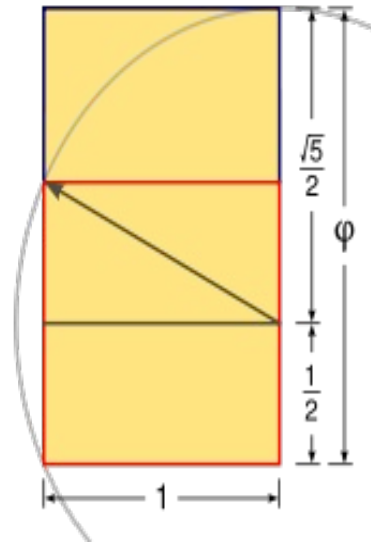
The Golden Ratio: an extraordinary proportion

- aka 'golden mean', 'divine proportion', 'golden section', or φ ("phi"), a proportion with special properties
- $x+1 = 1/x$
- that is:
 - if you divide a length into two such parts, the ratio of the larger part to the whole will be the same as the ratio of the smaller to the larger.

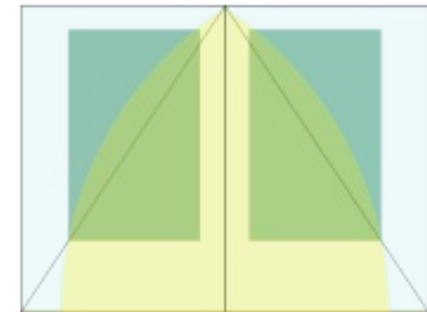


The Golden Ratio: an extraordinary proportion

- known from antiquity
 - this ratio is $(1+\sqrt{5})/2$
- approximately .62, i.e. 62%
 - note that $1.62/1 = 1/0.62$
- using this ratio allows repeated subdivisions in equal proportion to one another

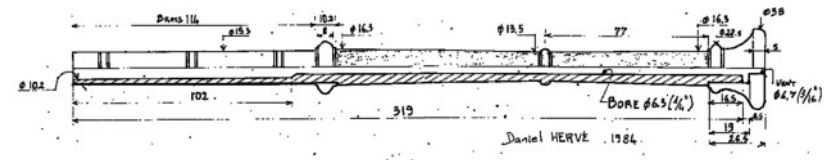
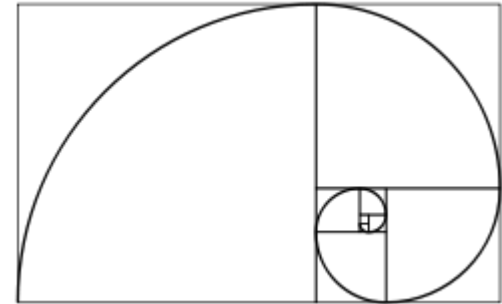


- *"There was a time when deviations from the truly beautiful page proportions 2:3, 1: $\sqrt{3}$, and the Golden Section were rare. Many books produced between 1550 and 1770 show these proportions exactly, to within half a millimetre." - Jan Tschichold*



The Golden Ratio: an extraordinary proportion

- this ratio occurs repeatedly in nature
 - thus, it is postulated, it is familiar and recognised as 'natural' and beautiful by eye and brain
- the ratio also seems to occur, at least approximately, in the work of classic makers
 - we don't know if this was conscious or not, but it doesn't seem to be coincidence



Viewers prefer the golden ratio

- experimental work carried out in 19th c and early 20th c shows preference for near-golden proportions
 - unfortunately the ratios tested were all 'static'! 5:8 is nearly, but not quite, the golden ratio

Table of Rectangle Proportion Preference

Ratio: Width/Length	Most Preferred Rectangle		Least Preferred Rectangle		
	% Fechner	% Lalo	% Fechner	% Lalo	
1:1	3.0	11.7	27.8	22.5	square
5:6	0.2	1.0	19.7	16.6	
4:5	2.0	1.3	9.4	9.1	
3:4	2.5	9.5	2.5	9.1	
7:10	7.7	5.6	1.2	2.5	
2:3	20.6	11.0	0.4	0.6	
5:8	35.0	30.3	0.0	0.0	Golden Section Proportion
13:23	20.0	6.3	0.8	0.6	
1:2	7.5	8.0	2.5	12.5	double square
2:5	1.5	15.3	35.7	26.6	
Totals:	100.0	100.0	100.0	100.1	



1:1
square



5:6



4:5

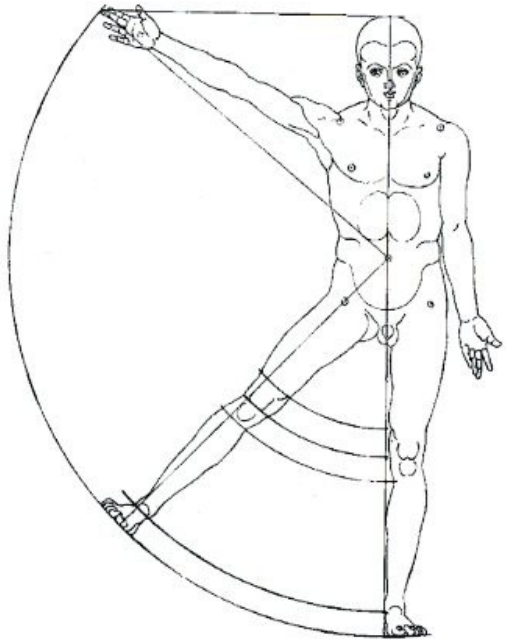


3:4

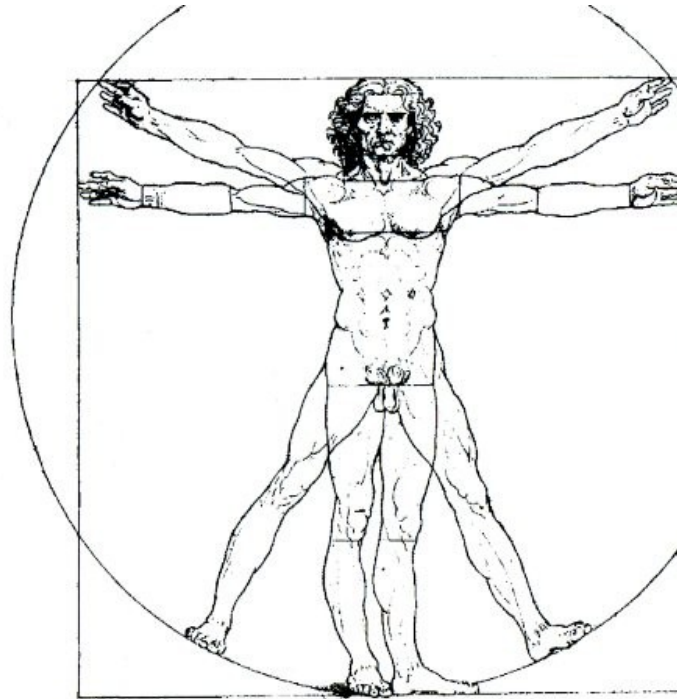


7:10

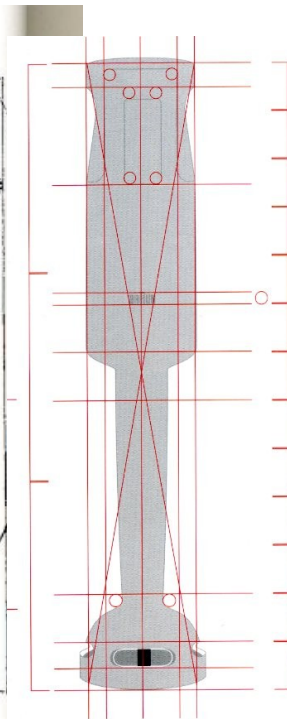
the golden ratio in use

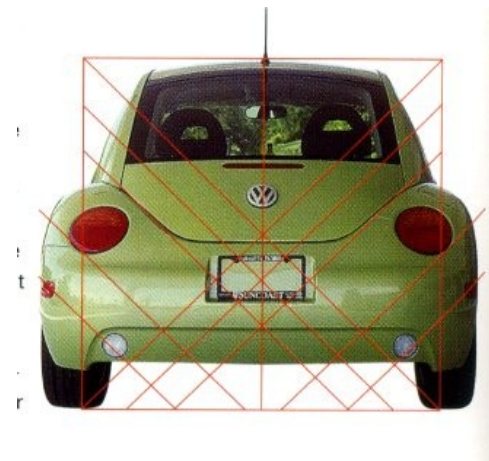
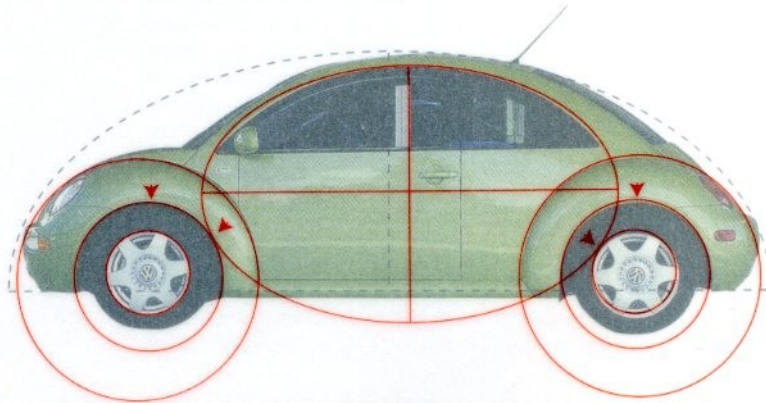
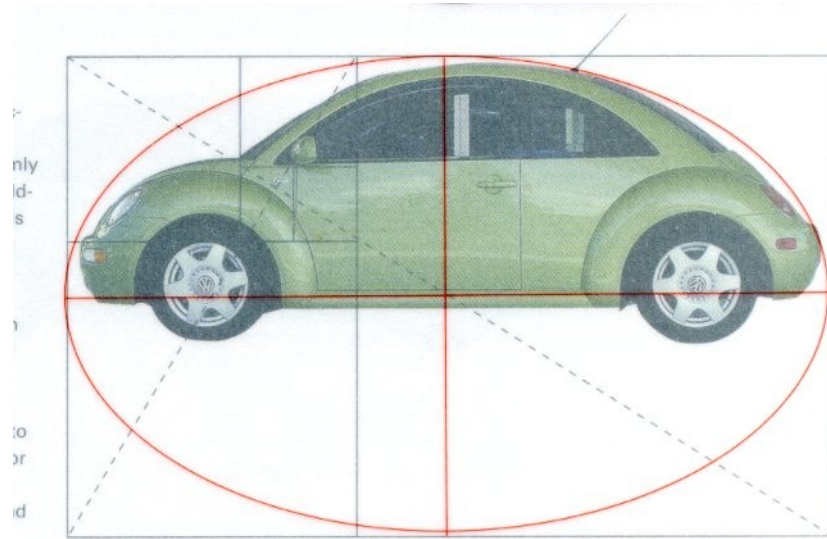


Man Inscribed in a Circle, Albrecht Dürer, After 1521



Human Figure in a Circle, Illustrating Proportions, Leonardo da Vinci, 1485–1490





Achieving a 'look'

- coves can be both mirrored and 'echoed' by beads
- a compound curve in a particular place may be balanced by another compound curve elsewhere
- 'number' may turn up in several places – for instance a three-lobed ring may be echoed in other tripartite elements

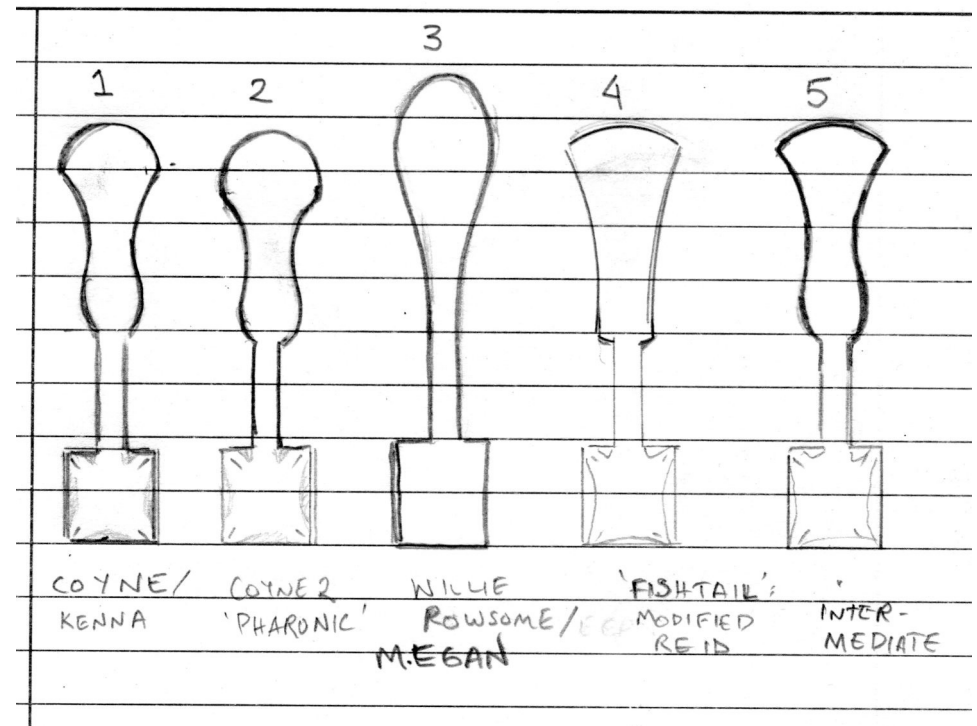
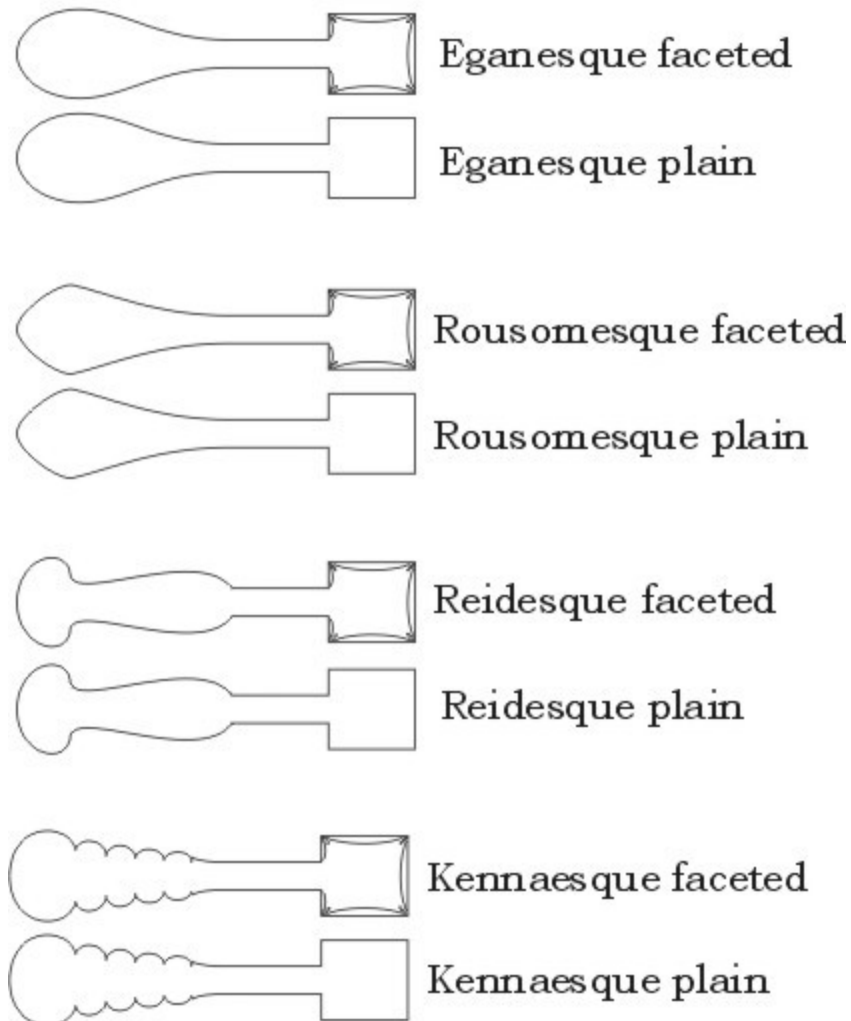


Keys

- keys are three-dimensional objects – consider them as such
- pay attention to the forms implied by the rounding of edges
- do round edges where this gives a more “finished” look
 - retaining some reasonably clean right angles adds a decisive look, this is a judgement call

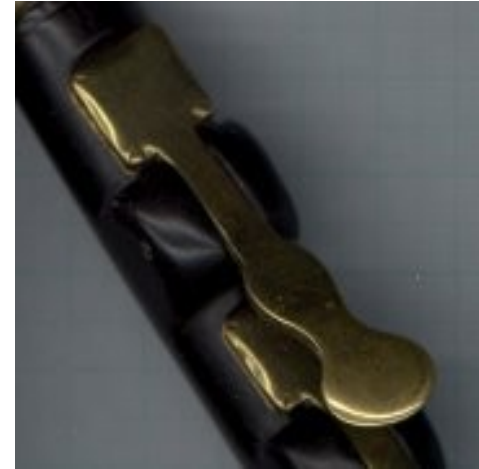


Keys (cont.)



Keys (cont.)

- there may be a trade-off between design subtlety and ease of manufacture
 - i.e. identical regulator keys vs. subtly adjusted lengths
- sometimes a decorative element makes things easier, masks irregularity, or is a consequence of manufacture
 - Coyne/Kenna classic pad shape
 - chamfers at top of folded key



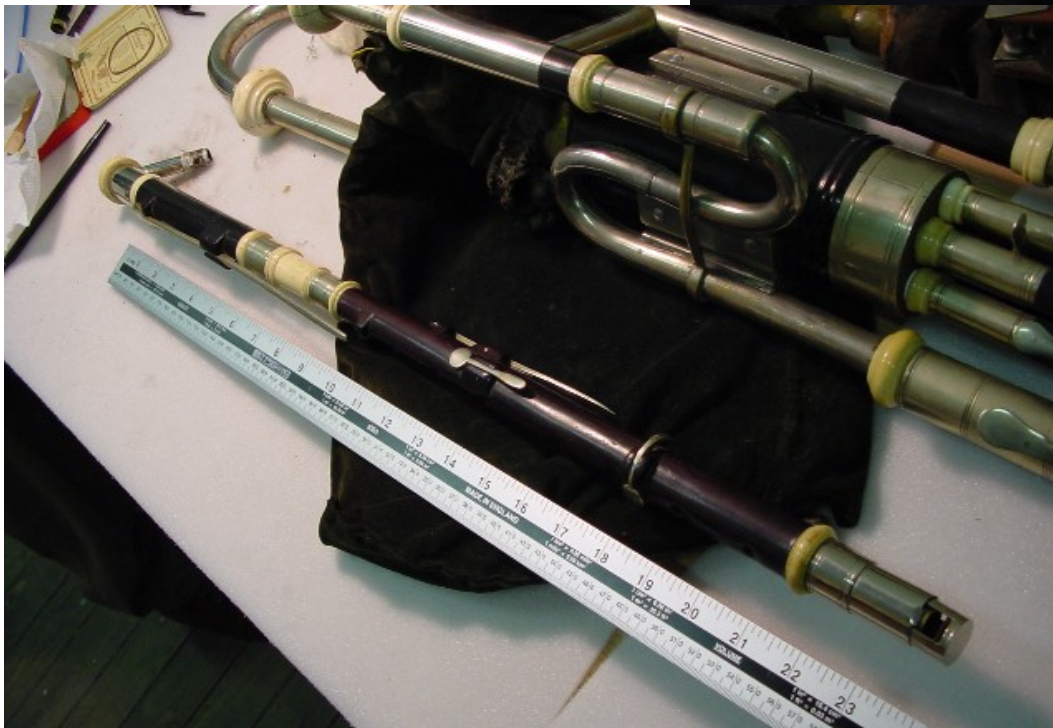
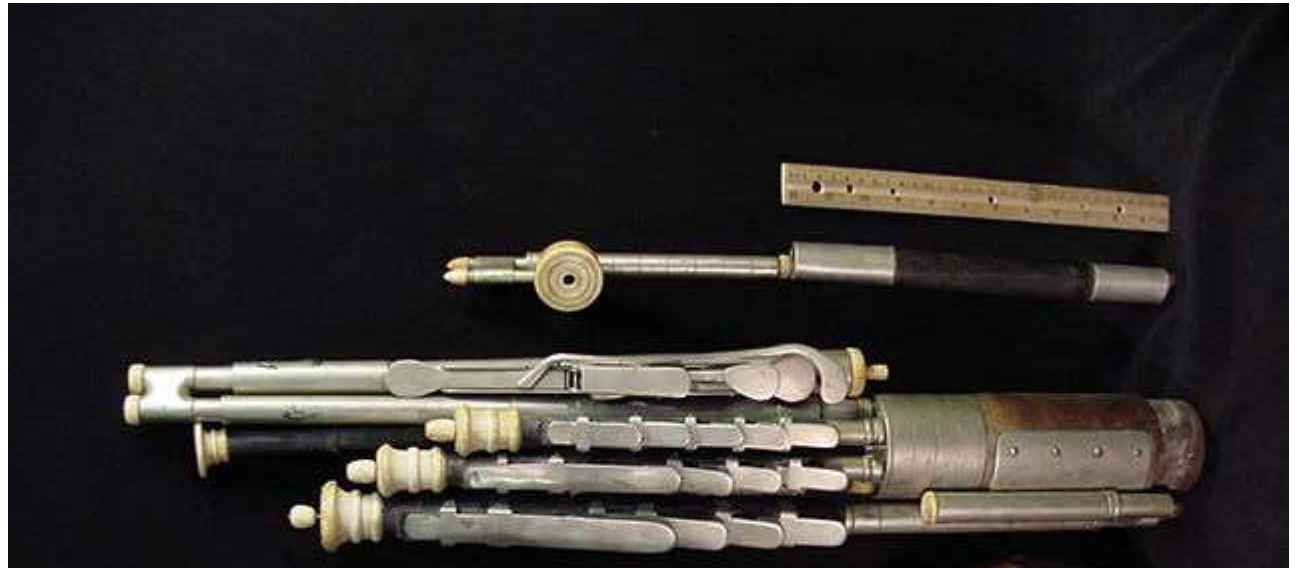
Suggestions

- very gentle curves are still noticeable and effective
- curves shouldn't change slope suddenly, unless a division is intended –
 - gradual change in curvature is usually preferred
- combine subtly blended curves with distinct, clear lines
-

Suggestions (cont.)

- avoid atypical or “extraneous” decorative additions
- use a “limited palette”
 - in materials and shapes
- consider where the eye is “drawn”
- check your dimensions “as assembled” for clearance before deciding on size and placement of ornament

overkill?



Suggestions (cont.)

- consider how the set will look when it's no longer shiny and new
 - will this affect your choice of materials? Of decoration?
- think of the way the set looks from two key viewpoints: the player's, and the onlookers'
 - is there a big 'hole' between bass reg and drones? Are the U-bends awkwardly large?



Suggestions (cont.)

- when using older sets as models, beware of copying dodgy repairs/replacements
 - is there anything that looks out of place? Why?



GENERAL PRINCIPLES IN THE ARRANGEMENT OF FORM AND COLOUR, IN ARCHITECTURE AND THE DECORATIVE ARTS, WHICH ARE ADVOCATED THROUGHOUT THIS WORK.

PROPOSITION 1.

The Decorative Arts arise from, and should properly be attendant upon, Architecture.

PROPOSITION 2.

Architecture is the material expression of the wants, the faculties, and the sentiments, of the age in which it is created.

Style in Architecture is the peculiar form that expression takes under the influence of climate and materials at command.

PROPOSITION 3.

As Architecture, so all works of the Decorative Arts, should possess fitness, proportion, harmony, the result of all which is repose.

PROPOSITION 4.

True beauty results from that repose which the mind feels when the eye, the intellect, and the affections, are satisfied from the absence of any want.

PROPOSITION 5.

Construction should be decorated. Decoration should never be purposely constructed.

That which is beautiful is true; that which is true must be beautiful.

PROPOSITION 6.

Beauty of form is produced by lines growing out one from the other in gradual undulations: there are no excrescences; nothing could be removed and leave the design equally good or better.

PROPOSITION 7.

The general forms being first cared for, these should be subdivided and ornamented by general lines; the interstices may then be filled in with ornament, which may again be subdivided and enriched for closer inspection.

PROPOSITION 8.

All ornament should be based upon a geometrical construction.

PROPOSITION 9.

As in every perfect work of Architecture a true proportion will be found to reign between all the members which compose it, so throughout the Decorative Arts every assemblage of forms should be arranged on certain definite proportions; the whole and each particular member should be a multiple of some simple unit.

Those proportions will be the most beautiful which it will be most difficult for the eye to detect.

Thus the proportion of a double square, or 4 to 8, will be less beautiful than the more subtle ratio of 5 to 8; 3 to 6, than 3 to 7; 3 to 9, than 3 to 8; 3 to 4, than 3 to 5.

PROPOSITION 10.

On harmony and contrast.

Harmony of form consists in the proper balancing, and contrast of, the straight, the inclined, and the curved.

PROPOSITION 11.

Distribution. Radiation. Continuity.

In surface decoration all lines should flow out of a parent stem. Every ornament, however distant, should be traced to its branch and root. *Oriental practice.*

PROPOSITION 12.

All junctions of curved lines with curved or of curved lines with straight should be tangential to each other. *Natural law. Oriental practice in accordance with it.*

PROPOSITION 13.

On the conventionality of natural forms.

Flowers or other natural objects should not be used as ornaments, but conventional representations founded upon them sufficiently suggestive to convey the intended image to the mind, without destroying the unity of the object they are employed to decorate. *Universally obeyed in the best periods of Art, equally violated when Art declines.*

PROPOSITION 14.

On colour generally.

Colour is used to assist in the development of form, and to distinguish objects or parts of objects one from another.

PROPOSITIONS.

PROPOSITION 15.

Colour is used to assist light and shade, helping the undulations of form by the proper distribution of the several colours.

PROPOSITION 16.

These objects are best attained by the use of the primary colours on small surfaces and in small quantities, balanced and supported by the secondary and tertiary colours on the larger masses.

PROPOSITION 17.

The primary colours should be used on the upper portions of objects, the secondary and tertiary on the lower.

PROPOSITION 18.

(*Feld's Chromatic equivalents.*)

The primaries of equal intensities will harmonise or neutralise each other, in the proportions of 3 yellow, 5 red, and 8 blue,—integrally as 16.

The secondaries in the proportions of 8 orange, 13 purple, 11 green,—integrally as 32.

The tertiaries, citrine (compound of orange and green), 19; russet (orange and purple), 21; olive (green and purple), 24;—integrally as 64.

It follows that,—

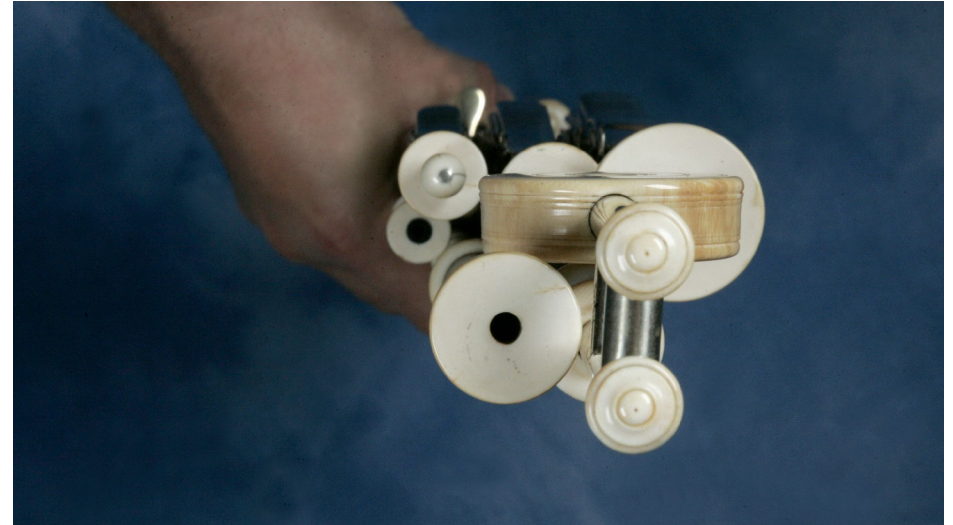
Each secondary being a compound of two primaries is neutralised by the remaining primary in the same proportions: thus, 8 of orange by 8 of blue, 11 of green by five of red, 13 of purple by 3 of yellow.

Each tertiary being a binary compound of two secondaries, is neutralised by the remaining secondary: as, 24 of olive by 8 of orange, 21 of russet by 11 of green, 19 of citrine by 13 of purple.

On the proportions by which harmony in colouring is produced.

Special considerations for the pipes

- the compactness and overall shape of drones and regulators in the body
- balance of extended vs. central elements
 - folded bass reg might look odd with straight bass drone
- shape of key blocks
- bag, cover, bellows, etc.
- surface finish



- maybe not the best choice of fabric...



Now let's look at some sets of pipes!