

CHRYSALIS

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Construction

Chrysalis, my first of three instruments to date, was inspired by a large, round, stone-hewn Aztec calender. Its overwhelming shape and masterfully intricate workmanship immediately suggested to me the possibility of a musical wheel that has strings instead of spokes, would spin on an axle, and could, in my imagination, sound like the wind. Chrysalis has eighty-two strings of varying lengths on both sides of the wheel and it may be freely spun in either direction. The performer sits to the left, where the wheel extends beyond the base of the stand, allowing the wheel to rotate between the legs.

Below, Figure 1, shows the inside, ^{CONSTRUCTION} ~~top view~~ of the Chrysalis wheel with both soundboards removed. Figure 2, shows ^{VERTICLE} ~~a cross-section view~~ of the wheel: two soundboards and two bridges, set off by slanted and horizontal lines, are here visible from the performer's perspective. A steel axle (a) is mounted through the center of an octagonal oak hub (b). Eight birch spokes (c) radiate from the hub to the centers of maple dowel separators (d) onto which two birch plywood rings (e) are attached. This ring construction leaves the entire inner area of the wheel unobstructed for maximum soundboard resonance. Both soundboards (f) are glued directly over the rings in much the same fashion as a drum head covers a drum shell. The two soundboards are built after traditional piano soundboards. Spruce strips 6" x 1/4" are joined together, and ribs, running against the grain, are glued at close intervals across the back side to give the soundboard structural support. Two ring-shaped bridges (g) are bolted off-center to the tops of the soundboards. Figure 2 shows that these bridges are placed opposite each other so as to balance the wheel while it is in motion, and musically, to provide the performer with both long and short strings from his/her playing position. Eighty-two tuning gears (h) are mounted along the circumference of both soundboards and steel strings (i) are stretched from here to pins along the rims of the bridges. The entire wheel is rigidly connected to its axle which turns in two eccentric collar, sealed ball bearings (j). To keep the wheel balanced so that it would not always swing back and forth to the same resting position, I copied the wheel balancing technique of garage mechanics and installed lead weights into the separators. This worked like magic.

Figure 1

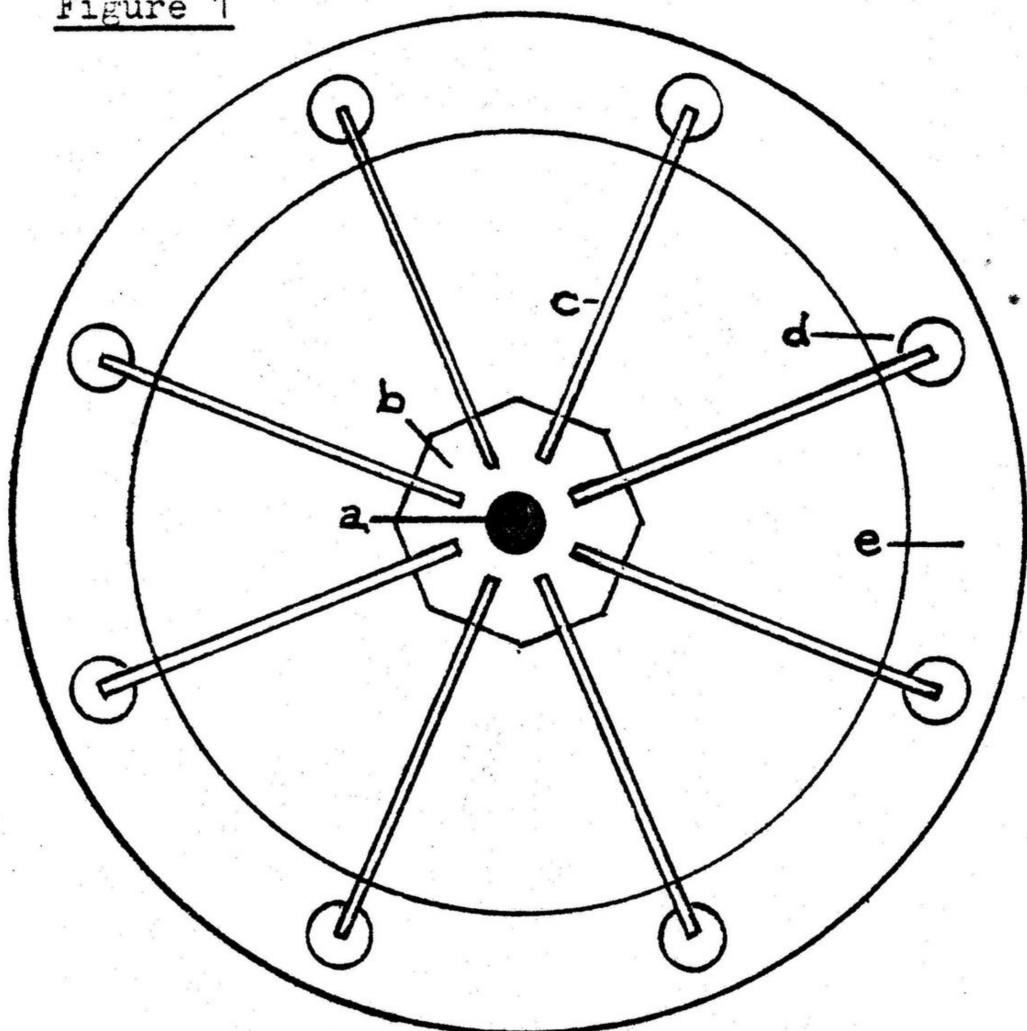
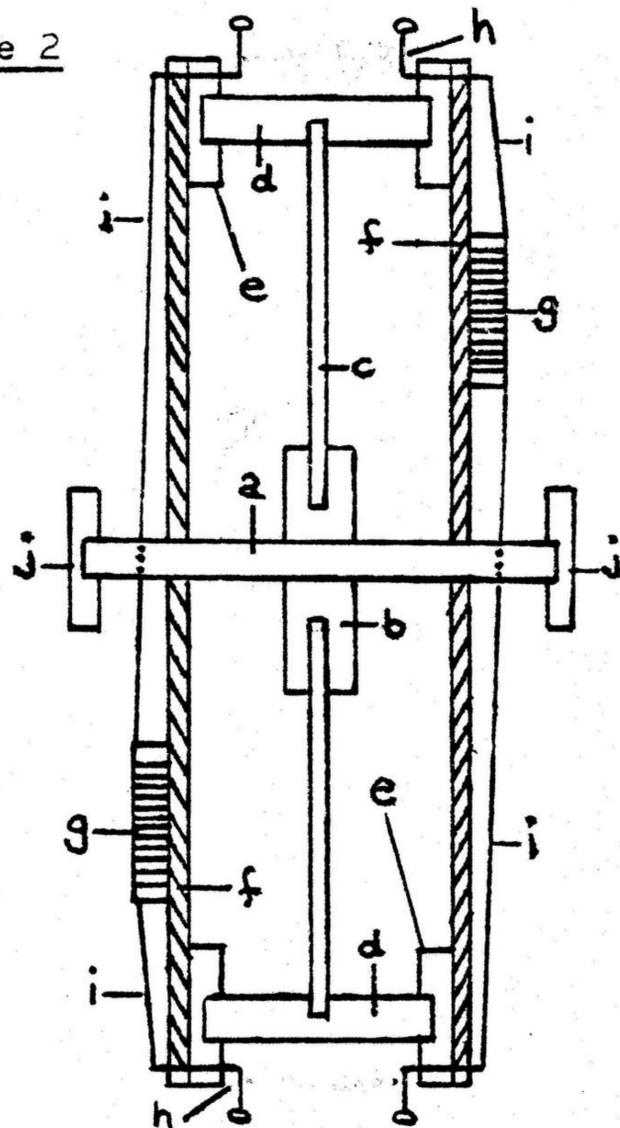


Figure 2

- a - Axle
- b - Hub
- c - Spokes
- d - Separators
- e - Rings
- f - Soundboards
- g - Bridges
- h - Gears
- i - Strings
- j - Bearings



CHRYSALIS (cont.)

Tuning

As composer, performer, instrument builder, I am deeply indebted to the work of Harry Partch. I find his life work to be inseparable from the concept of ratio tuning.

My first composition, Song of Myself: Intoned poems of Walt Whitman, for Chrysalis and Harmonic/Melodic Canon IV, is a theoretical and practical exploration of ratios. The string numbers in the tuning charts below proceed from the longest string 1 (it actually passes through a hole in the axle) counterclockwise around the circumference of the wheel. All strings, except 1-3 right side which are tuned ~~down~~^{below}, are tuned above the 1/1 frequency of C-528 c.p.s.; strings 32-57 right side, and 22-67 left side above the 2/1 frequency of C-1056 c.p.s.. I used steel wire gauge #9, .022", right side, and gauge #6, .016", on the left side. This stringing gives a range of about two "octaves", which could easily be expanded by starting with a thicker gauge for string 1 and changing to thinner gauges as the shortest string 42 is approached.

Right Side:

1-3:	24/13	37-41:	3/2
4-6:	9/7	42-45:	11/8
7-8:	21/16	46-49:	21/16
9-10:	27/20	50-53:	8/7
11-13:	11/8	54-57:	13/12
14-16:	7/5	58-62:	15/8
17-18:	13/9	63-65:	16/11
19-20:	32/21	66-68:	10/7
21-22:	8/5	74-76:	27/20
23-24:	18/11	72-73:	13/10
25-26:	7/4	69-71:	5/4
27-28:	24/13	77-79:	8/7
29-31:	64/33	80-82:	11/10
32-36:	10/7		

Left Side:

1-3:	10/7	44-48:	12/7
4-6:	8/5	49-51:	14/9
7-9:	27/16	52-54:	21/16
10-13:	12/7	55-58:	13/11
14-17:	16/9	59-61:	8/7
18-21:	64/33	62-64:	13/12
22-25:	16/15	65-67:	16/15
26-29:	11/9	68-70:	12/7
30-33:	10/7	71-74:	18/11
34-36:	3/2	75-78:	20/13
37-39:	22/13	79-82:	40/27
40-43:	16/9		

CHRYSALIS (cont.)

Dimensions

Wheel diameter.....	36 inches
Width of wheel, from soundboard to soundboard.....	5 inches
Shortest string.....	8 inches
Longest string.....	20 inches
From the floor to the top of the wheel.....	56½ inches
Forward extension of wheel beyond stand at playing position....	9 inches
Height of stand to the top of the wave-like curve.....	41½ inches
Length of stand.....	61 inches
Width of stand.....	10½ inches

Photograph