T. ERIC HOEPRICH

A Three-Key Clarinet by J. C. Denner

It has generally been accepted that Johann Christoph Denner was responsible for making improvements on the chalumeau and for inventing an instrument which either was known or subsequently became known, as the clarinet. As there is an advanced form of the chalumeau in the collection of the Bavarian National Museum, Munich, which bears the stamp of J. C. Denner—the same instrument J. G. Doppelmayr in his *Historische Nachricht von den Nürnbergischen Mathematicis und Künstlern* (1730) suggests that Denner made—it is clear that Denner did in fact improve the chalumeau. Although there are many similarities between the Denner chalumeau of the Bavarian National Museum and the various clarinets made by Denner's son (Jacob Denner) and other instrument makers of the early 18th century, this does not constitute proof that J. C. Denner made clarinets.

By chance, I recently had the privilege to examine and to play an instrument in the collection of the University of California, Berkeley, which bears the stamp of J. C. Denner.[1] It is a far more advanced instrument than the chalumeau in the Bavarian National Museum. Further, it is proof that J. C. Denner not only improved the chalumeau, but also made a clarinet with unique features which were neither superseded nor equalled by other makers for more than a half-century following his death. The Berkeley clarinet (Pl. I, Figs. 1–3) now consists of two pieces: a middle-section, and a bell, made in boxwood. Unfortunately, the mouthpiece-barrel combination found on clarinets of this period is missing. On the basis of bore size, tone-hole placement, and the length of the two pieces compared with other instruments of the same period and type, it is quite clear that the instrument is in D. Moreover, the clarinet plays nicely in the key of D at A = 415 when fitted with a mouthpiece constructed through reference to clarinets made by Jacob Denner (see dimensions at end of article). Such characteristics of the clarinet which are determinable only by playing are based on observations made while using this mouthpiece.

The most striking feature of the instrument is that it does not have two keys like the vast majority of early 18th-century clarinets, but

N.B. The key is shown too wide in this drawing by approx. 2 mm.

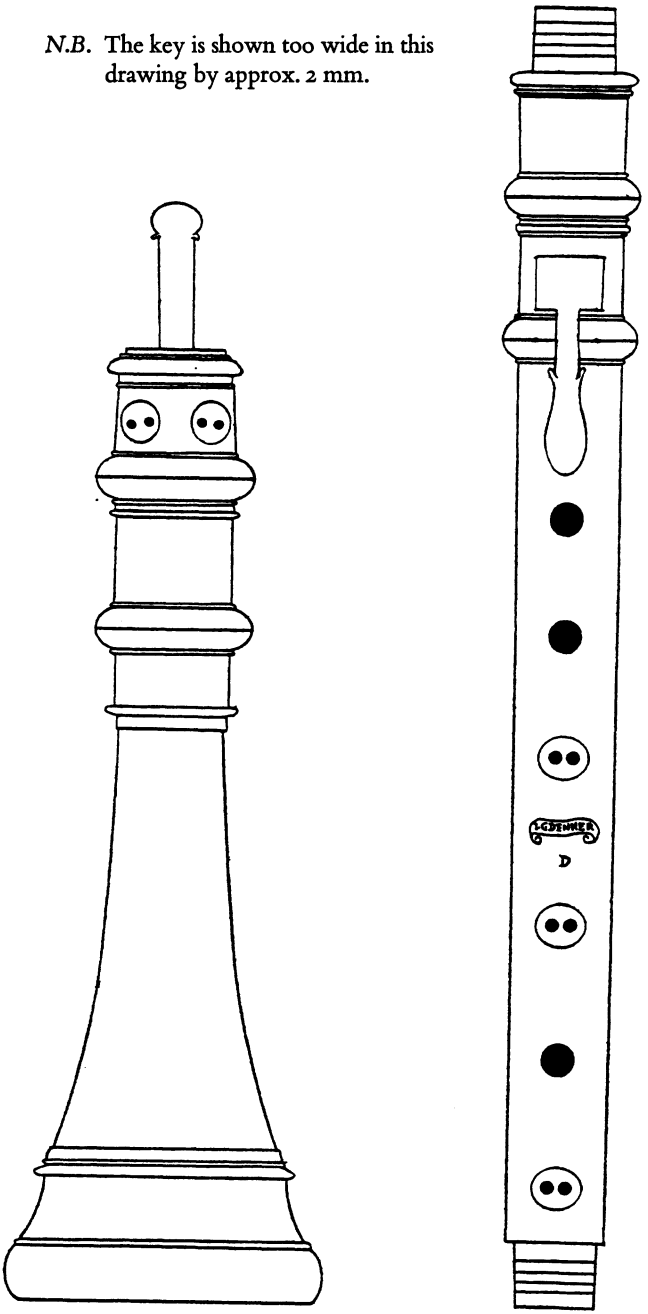


FIG. 1: *J. C. Denner clarinet, front view*

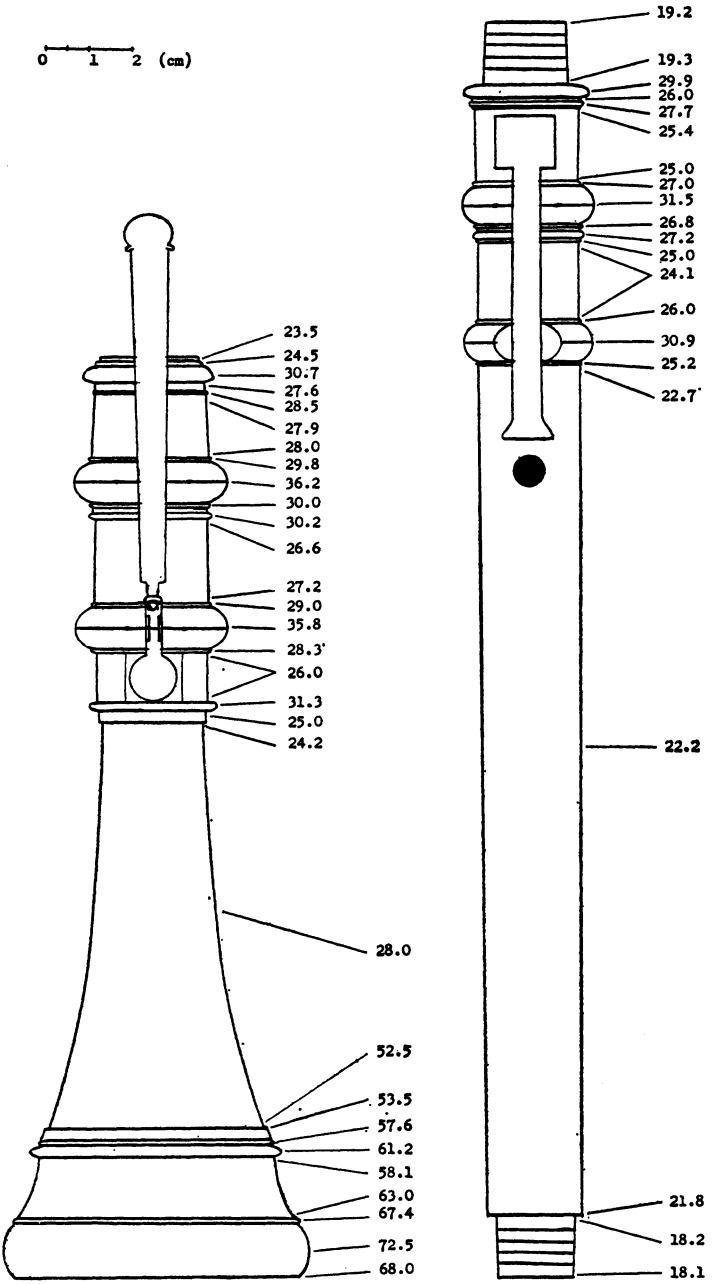


FIG. 2: *J. C. Denner clarinet, rear view*

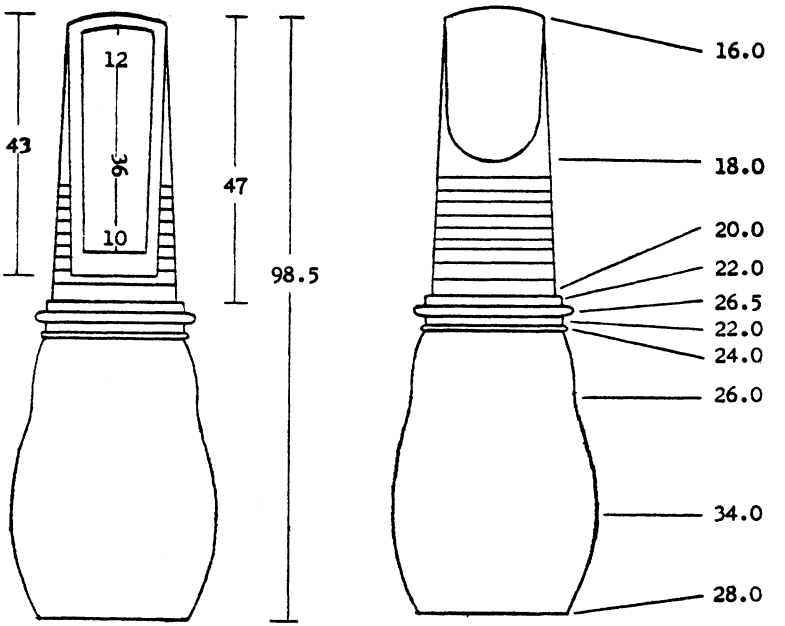


FIG. 3: *Mouthpiece based on extant originals, front and rear views*

three. In addition to the usual 'speaker' key on the back of the instrument and the shorter 'A' key on the front, there is a third, two-piece key on the back of the bell section. When operated by the thumb of the lower hand, this key closes a hole midway down the bell. All three keys are of brass and are mounted in wooden rings. There can be no doubt that this third key was the invention of Denner himself and not added later, since the rings in which the key is mounted are not merely ornamental and are clearly an original part of the bell.

Another feature, no less striking, is the abundance of double-holes: four sets in all, with the bottom set duplicated to allow for left or right-handed players. This duplication seems to make it all the more likely that this is an original instrument of J. C. Denner, because such duplication of the lowest fingerhole(s) of an instrument is common almost exclusively to instruments made prior to 1700, i.e. 17th-century recorders. This also implies that the thumb key is original. Had this key not been there when the duplicated tone-holes were drilled, such duplication would not have been necessary, i.e. the bell could simply have been rotated as with baroque treble recorders, to accommodate a left-handed player. There remains the possibility that

the extra set of holes was added along with the third key, but this remains unlikely with regard to the turning.

The instrument is in good condition, with only one small crack in the second ring of the middle-section. A repair(?) has been made on the upper end of the bell-section in the form of a horn mount about 13 mm in length. It is possible, however, that this ring was designed to protect the socket. The middle-section is warped, but not badly, as can be seen in the photographs. The workmanship is excellent and quite detailed in both the turning and keywork. The design of the short key on the front of the instrument is practically identical to that on the J. C. Denner chalumeau in the Bavarian National Museum. The stamp is rather badly worn away with only the profile of the banner and a few of the letters in the name showing clearly. The characteristic 'D' below the banner, however, is distinct. Apparently the instrument has been refurbished, as the keys cover and seal well, with new pads of leather, and the tenons are wrapped with cork. all the tone-holes are well undercut (particularly the thumb-hole). The bore of the instrument is smooth throughout and although warping has caused some ovality, this at no point exceeds 0.2 mm.

Several objections can be thought of at this point as to whether this instrument was actually made by J. C. Denner. An objection of the more superficial sort might be to suggest that since there are no other J. C. Denner clarinets and since this instrument is of such advanced design, perhaps J. C. Denner's son made it at a later date and stamped it with his father's stamp. Considering the fact that Jacob Denner was 25 years old when his father died and had probably been making instruments for some time, it is more than likely he would not have used the stamp of his deceased father. Furthermore, Jacob Denner's stamp is quite unlike that of his father, as if he wished to emphasize his identity.

Despite the obvious authenticity of the middle-section, one might wonder whether two of its features are too advanced for an instrument made in the time of J. C. Denner. One feature would be the double-holes, and the other the fact that the holes covered by keys are not drilled diametrically to each other, which is unlike what is found on the J. C. Denner chalumeau. Obviously if J. C. Denner did make the middle-section, as seems certain from the stamp, its features would have been his invention, insofar as one can call them inventions. And although they are indeed advanced for a clarinet of this period, when considered in light of the remarkably extensive range of instruments J. C. Denner made, they seem less unique. Double holes, for instance,

are commonly seen on oboes of the period including those of J. C. Denner. The J. C. Denner chalumeau in Munich also has them. The fact that he used double-holes on the chalumeau is perhaps an indication that he was already thinking in this direction for clarinets. As for the placement of the hole for the 'speaker' key higher than the hole for the 'A' key, anyone familiar with the acoustics of wind instruments, as J. C. Denner with his wide experience with a great number of different instruments no doubt was, would realize that this was done simply to raise the pitch of the note produced by opening that key alone and in conjunction with the 'A' key, and for producing the notes of the upper register with greater ease.

Doubts about the authenticity of the bell must be taken more seriously. The most obvious problem here is that the bell is unstamped. Although woodwind makers of the 17th and 18th centuries frequently left the bells of their instruments unstamped, this nonetheless fails to convince us that this bell was actually made by J. C. Denner. As mentioned above, there can be no doubt that the bell was made to be fitted with a key, since rings like those that hold the keys on the middle-section appear on the bell to hold the two parts of the bell key. Also, the clarinet would completely fail to produce certain notes if the hole in the bell were not there. Consequently, we seem to have a bell perhaps too sophisticated to have been made by J. C. Denner. There is, however, evidence to the contrary.

One of the clearest pieces of evidence in support of the bell being an original part of the instrument is that the colour and turning of bell and middle-section are identical. The colour is the usual hue one finds in instruments of this age made in boxwood. The quality of the wood in both sections is also identical. As for the turning, the middle-section and bell are clearly related. Not only are the rings that serve as key mounts identical, but the detail that surrounds them is so also. Having seen a number of J. C. Denner's instruments and studied the appearance of these instruments in detail and, more important, having spent numbers of hours working on a lathe, it seems clear that the same person turned both bell and middle-section.

In reference to all the extant clarinets of the younger Denner and seven of his oboes, it seems very unlikely that he might have made this bell. The trend in the profiles of early baroque instruments is toward a certain unevenness, as can be seen in the bell of this clarinet, especially in its lowest portion. The bells of Jacob Denner and his contemporaries show a trend toward more continuous lines, eventually leading to the simple profile of classical and modern instruments. A similar trend can be seen in the foot-joints of treble recorders by J. C. Denner

compared to those of his son. The diameter of the lowest ring can differ as much as 10 mm between the two, with J. C. Denner's instruments being always the larger.[2]

The last aspect of the bell to be discussed is the key. As mentioned above, the key on the front of the instrument is essentially identical to those on the J. C. Denner chalumeau. The bell key on the Berkeley clarinet is exactly the same as the keys on a number of extant bass recorders by J. C. Denner in various collections. No other contemporary of J. C. Denner whose instruments have survived employ this shape for their keys. Jacob Denner used the shape of the tip of the bell key for the 'speaker' keys of his clarinets, but there are no extant instruments of his that have the same two-piece type in the same shape.

The search for a clarinet with all joints bearing J. C. Denner's stamp is an elusive one. The German National Museum in Nuremberg was supposed to have had three clarinets by J. C. Denner before World War II. One of these, it turns out, is an instrument which is in the museum at present but bears the stamp of Jacob Denner. It is possible that the stamps of the other two instruments were also misread though it seems equally possible that they were indeed by J. C. Denner.[3] In his book *Die Klarinette* (1965), Oskar Kroll mentions in a footnote (p. 14) that there used to be a three-keyed clarinet (No. 414) by J. C. Denner in the collection of the Brussels Conservatoire, but it has disappeared.

Ekkehart Nickel, in his *Der Holzblasinstrumentenbau in der Freien Reichstadt Nürnberg* (1971, pp. 209–210), constructs an argument based on documents written by Jacob Denner preserved in the Klosters Eberbach/Rheingau, concluding that J. C. Denner must have had a hand in making two clarinets sold by Jacob Denner along with several other instruments in 1710. The argument is rather vague, but may well be correct.

Still there is no complete extant clarinet by J. C. Denner which bears his stamp on all sections. But on the basis of these phantom J. C. Denner clarinets, it becomes perhaps easier to believe that the bell as well as the middle-section of the Berkeley instrument was made by him. At any rate, the middle-section could not possibly comprise a part of any instrument other than a clarinet. No one can say for certain that the bell of this clarinet was made by J. C. Denner though it seems very possible.

Due to the large size and shape of mouthpieces on clarinets of this period, the tuning is quite flexible. Consequently, the fingerings

charted below may or may not work for another person playing on the same instrument. The tightness and relative strength of the player's embouchure will produce differing results. This is not to say, however, that any baroque clarinet can be played in tune and that no particular clarinet is better than another. Quite the opposite is true. In the case of the Berkely Denner clarinet, the tuning is in fact quite good and the instrument is fairly easy to play in tune. All the double holes work well and produce accurate semitones in both registers. The most serious difficulty occurs with the note *c''* which is too high. The most likely explanation for the defect is the size of the tone-hole under the third key which vents the *c''*. Originally the tone-hole was approximately 9.0 mm in diameter and was reduced to approx. 5.5 mm in diameter by means of a boxwood bushing. The bushing was offset slightly to lower the position of the tone-hole. In view of the sharpness of the *c''* at present, the same fingering must have produced this note almost a semitone too high before the bushing was fitted. A replica of the instrument with the same tone-hole drilled at a diameter of 5.0 mm and placed 1 mm. lower corrects this problem without any undesirable side-effects. In light of the possibility that this was the first three-key clarinet Denner ever made, it is likely that he was not certain as to where the lowest tone-hole should be placed, and this may account for the problem arising in the first place. Denner's possible uncertainty in the matter might also account for the presence of the boxwood bushing, which appears to be as old as the instrument, and thus may have been fitted by Denner himself.

For some time it has been held that the note *b♮'* is missing on most early 18th-century clarinets. It has been assumed, clearly only on the basis of the fingering charts of Eisel and Majer, both of which contain numerous errors, that a two-key clarinet played with all the holes and both keys open results in *b♭'*. Thus the only way to produce the B natural is to tighten the embouchure and attempt to drive the B flat up a semitone, or to finger C and relax the embouchure. After playing on about fifteen original instruments representing four different countries, not one was found that produced B flat when all the tone-holes and both keys were open. In fact all of these instruments instead produced unmistakably a B natural. The following extract from the notes of Canon Galpin is the only correct account in print:[4]

'The Clarinet invented at Nuremberg about 1600 by Christopher Denner (Leipsic 1655 – Nuremberg 1707)—at first only two keys. A & B♭ (= B-natural together) . . ."

These fingerings work on the majority of two-key clarinets and on the

Berkeley Denner clarinet as well. Why then the third key, since all that is gained is a low E and a duplicate B natural? The answer to this question can only be guessed. Perhaps the most logical reason is that J. C. Denner had in mind fingerings like those on classical clarinets (instruments made from approximately 1770 onward), where opening the short key on the front of the instrument produces A, opening the 'speaker' key on the back of the instrument produces G sharp, and opening both keys produces B flat, leaving B natural as the lowest note in the upper register. Unfortunately not enough time remained for J. C. Denner to complete his experiments before the 20th of April, 1707, when he died.

Length Measurements (mm.): Middle-section length, 302; sounding length, 298.9; Bell length, 222.

Tone-hole Measurements (mm.):

Tone-hole	*Horizontal/Vertical Diameters*	*Position (measured from the base of the upper tenon of the middle-section)*
S	3.3 / 3.3	15.3
B♭	6.4 / 6.9	49.3
T	7.5 / 7.7	92.3
1	6.2 / 6.2	104.3
2	6.2 / 6.6	131.5
3(L)	3.9 / 4.2	157.5
3(R)	4.0 / 4.2	„
4(L)	4.5 / 5.0	198.0
4(R)	4.6 / 5.0	„
5	6.8 / 7.0	229.5
6(L)	4.7 / 5.0	259.0
6(R)	4.6 / 4.9	„
7(L)	3.5 / 3.8	316.5
7(R)	3.4 / 3.7	„
TK	5.5 / 5.9	377.6

Bore: Middle-section diameter near upper end: 14.45 maximum, 14.3 minimum; Middle-section diameter near lower end: 14.2 maximum, 14.05 minimum.

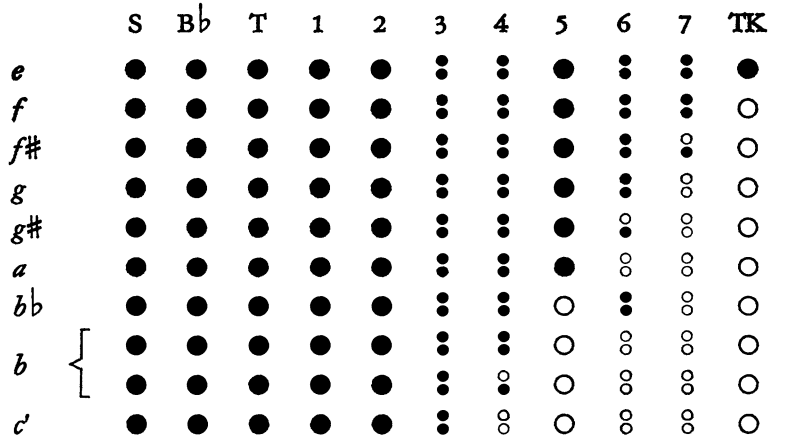
Bell diameter	*Corresponding length from bottom*	*Bell diameter*	*Corresponding length from bottom*
65.0	0	40.0	47
60.0	16	35.0	51
55.0	23	30.0	55
50.0	35	29.4	56
45.0	41	28.2	59

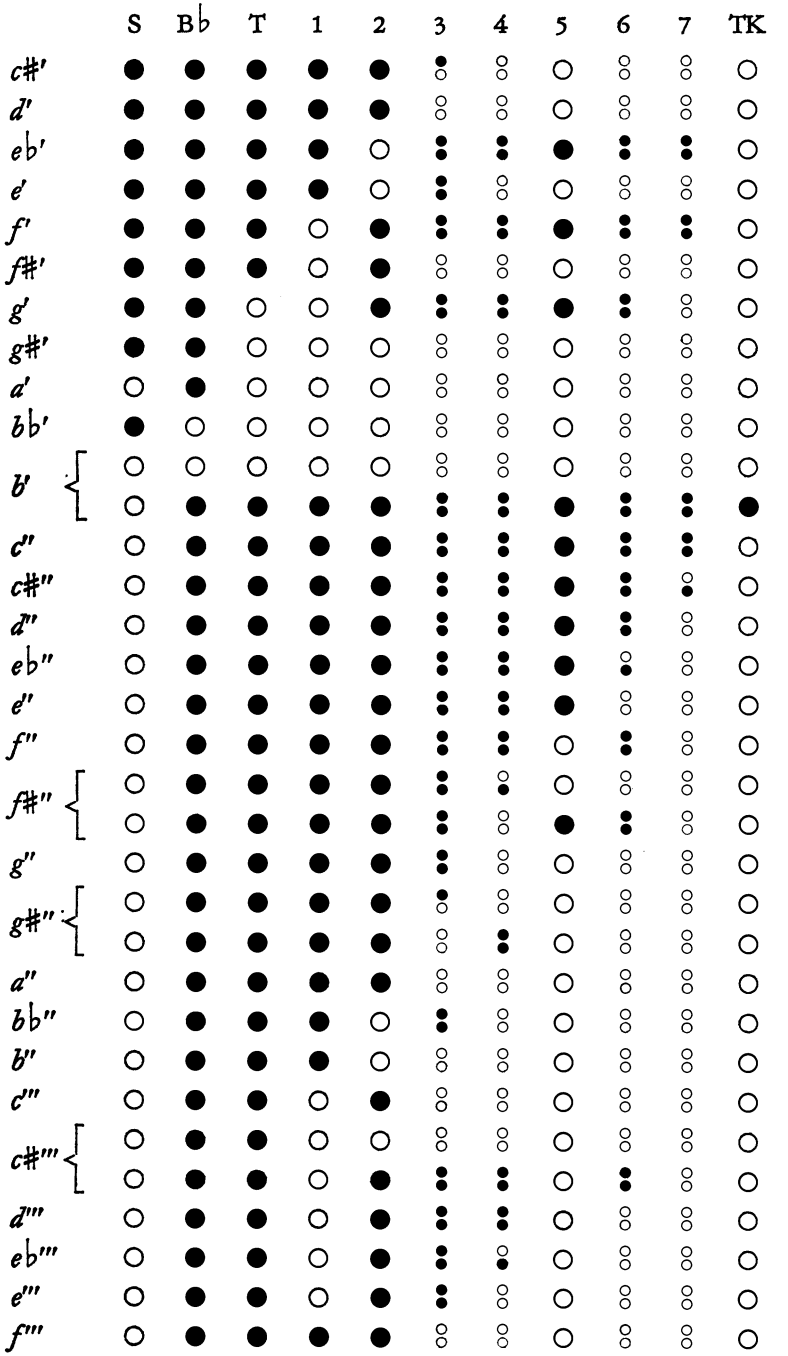
Bell diameter	*Corresponding length from bottom*	*Bell diameter*	*Corresponding length from bottom*
27.4	61	17.8	115
26.6	64	17.6	119
25.8	67	17.4	121
24.6	70	17.2	127
24.2	72	17.0	129.5
23.4	74	16.8	130
22.4	78	16.6	135
22.2	79	16.4	139
21.8	82	16.2	145
21.4	84	16.0	151
20.6	87	15.8	160
20.2	89	15.6	167
19.8	92	15.4	179
19.4	94	15.2	185
19.0	98	15.0	196
18.6	105	14.8	201
18.2	109		

Socket depth: 15.2. Diameter at top: 19.6 Diameter at base: 19.2

FINGER CHART

The instrument is pierced with a total of eleven holes. Eight of these are finger-holes, and the remaining three are covered or opened by keys. Listed in order from the top of the instrument, they are: the speaker-hole (S), the hole opened by the short key on the front of the instrument (B♭), the thumb-hole (T), finger-holes 1, 2, 3, 4, 5, 6, 7; and the hole closed by the thumb-key (TK). All fingerings refer to the clarinet being played with the right hand lowermost.




S
B♭
T
1
2
3
4
5
6
7
TK
c♯′
d′
e♭′
e′
f′
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g′
g♯′
a′
b♭′
b′
c″
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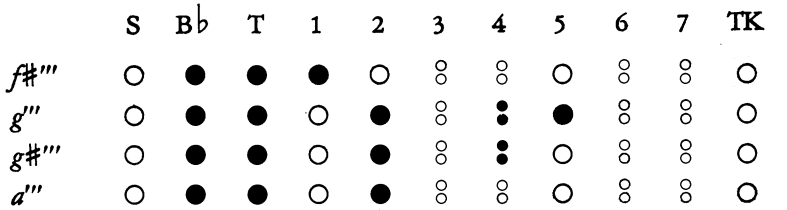

NOTES

1 I wish to express my appreciation to Bruce Haynes who told me about the Denner instrument in the first place, and to Professor Vincent Duckles of the University of California, Berkeley, who was most cooperative in allowing me to examine, measure and play it.

2 The J. C. Denner treble recorder here is in the Historical Museum, Basel and the Jacob Denner treble recorder is in the Music History Museum, Copenhagen.

3 From conversation with members of the staff of the German National Museum, Nuremberg.

4 Brian Galpin, 'Canon Galpin's Checklists', *GSJ* XXV, 1972, pp. 12–13.

Note added in proof.

Another clarinet bearing the stamp of J. C. Denner has just been located. Time does not permit description here but will be forthcoming.

PLATE I

The Berkeley J. C. Denner clarinet, (a) front view; (b) rear view; (c) side view