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A HISTORY OF VALVED BRASS INSTRUMENTS  
IN THE NINETEENTH CENTURY

THESIS

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## CHAPTER I

### THE INTRODUCTION OF VALVED BRASS INSTRUMENTS

The significance of the application of valves to brass instruments will be better understood by a brief discussion of conditions immediately preceding this innovation.

#### The Art of Clarion Playing

In the Baroque era composers made the trumpet and French horn very popular by scoring high melodic parts for them in the orchestra. The upper brass partials were very close; therefore, composers could write melodies freely for the natural trumpet and horn. The high register required a very shallow mouthpiece and concentrated practice from the players, but the effect was brilliant.<sup>1</sup> This style of composing in the clarion register reached a peak in the works of Bach and Handel.<sup>2</sup>

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<sup>1</sup>Robert Donington, The Instruments of Music (London, 1951), p. 103.

<sup>2</sup>H. W. Schwartz, The Story of Musical Instruments (New York, 1938), p. 170.

### Less Prominence for the Brass

The composers of the Classical period abandoned this style, and nothing was substituted in its place. The trumpet and horn were used as percussion instruments, mainly limited to playing dominant and tonic chords.<sup>3</sup> Mozart was especially critical of high clarion parts. He scored for trumpets only occasionally, and then sparsely.<sup>4</sup>

Without the use of the upper partials, the trumpet and horn were robbed of their melodic capabilities, leaving an empty gap in the orchestra. It soon became evident that brass instruments which were chromatic throughout their entire registers would be necessary to fill this gap.

In the late eighteenth and early nineteenth centuries many attempts were made to create satisfactory chromatic trumpets and horns. Keys were applied to these instruments in several instances,<sup>5</sup> as were removable crooks.<sup>6</sup> An improved model of the old slide trumpet was brought out,<sup>7</sup> and

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<sup>3</sup>Ibid., p. 170.

<sup>4</sup>Ibid., p. 170.

<sup>5</sup>Francis Galpin, A Textbook of European Musical Instruments (London, 1937), p. 227.

<sup>6</sup>Elizabeth Montgomery, The Story Behind Musical Instruments (New York, 1958), p. 107.

<sup>7</sup>Willi Apel, "Trumpet," Harvard Dictionary of Music (Cambridge, 1958), p. 772.

even stopping the horn with the hand was tried.<sup>8</sup> Although a certain degree of success was achieved, these modifications all fell short of the goal. Keys robbed the brass instruments of their brilliance, and slides and crooks were awkward.

#### Clagget's Valve Apparatus

In 1788 a device was introduced which helped to solve the problem. This was the valve apparatus for brass instruments designed by Charles Clagget of Ireland.<sup>9</sup> Clagget united two trumpets of different lengths, D and E-flat, and fitted a common mouthpiece into a cylinder attached at the small end.<sup>10</sup> The cylinder, or valve, was placed so that wind could be directed into either instrument.<sup>11</sup> The valve

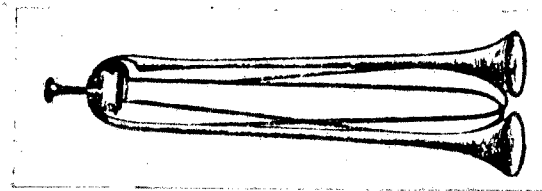


Fig. 1--Clagget's chromatic trumpet\*

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<sup>8</sup>Montgomery, op. cit., p. 104.

<sup>9</sup>Ulric Daubeny, Orchestral Wind Instruments (London, 1920), p. 16.

<sup>10</sup>Galpin, op. cit., p. 230.

<sup>11</sup>Daubeny, op. cit., p.16.

\*Galpin, op. cit., plate VI.

lowered the pitch of either trumpet a whole tone and flattened any note of the scale. The action of the valve was controlled by turning a small pin attached to it.<sup>12</sup> One instrument's harmonics were a semitone above the other's;<sup>13</sup> thus a chromatic range of two octaves and a minor third could be played by combining the two trumpets.<sup>14</sup>

Clagget's apparatus was used in a few demonstration performances in England,<sup>15</sup> but it failed to gain acceptance and disappeared soon. It was a step in the right direction, however, and probably inspired the making of the first successful valve mechanism several years later.<sup>16</sup>

#### The First Practical Valves

There was practically no further progress towards the development of a suitable valve mechanism until 1818, when Frederick Blühmel and Heinrich Stölzel jointly took out a ten-year patent on a two-piston valve action for French

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<sup>12</sup>Galpin, op. cit., p. 230.

<sup>13</sup>Daubeny, op. cit., p. 16.

<sup>14</sup>Galpin, op. cit., p. 230.

<sup>15</sup>Ibid., p. 230.

<sup>16</sup>Ralph Morley-Pegge, The French Horn (New York, 1960), p. 27.



horn.<sup>17</sup> Blümel, a Silesian, claimed to have invented the piston valve earlier, and to have sold the invention to Stölzel. Stölzel, a horn player of Berlin, denied this claim, stating that he had used a piston valved horn of his own making for quite some time prior to the joint patent.<sup>18</sup> No one knows for certain which of the two men actually invented the piston valve. There are bits of evidence supporting both men's claims, but there is no convincing proof of either claim.<sup>19</sup>

Little is known about the first piston valve which both Blümel and Stölzel claimed to have invented. It is known that Stölzel added a second valve to the original,<sup>20</sup> and that the two valves jointly patented were square.

Galpin states:

These early valves were made in the shape of square boxes, and the pistons themselves were constructed of square blocks of solid brass. The windways were bored in them in the same plane, and they were actuated by long slender rods with finger touches.<sup>21</sup>

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<sup>17</sup>Galpin, op. cit., p. 231.

<sup>18</sup>Morley-Pegge, op. cit., p. 31.

<sup>19</sup>Ibid., p. 31.

<sup>20</sup>Schwartz, op. cit., pp. 174, 175.

<sup>21</sup>Galpin, op. cit., p. 231.

The two valves had a pump action.<sup>22</sup> In resting position a piston allowed the air column to pass through the main tube without entering a supplementary tube.<sup>23</sup> With the second of the two pistons depressed, the air column was diverted into a length of tubing sufficient to lower an open note a half step. With the first of the pistons depressed, the open note was lowered a full step by the same principle. The two pistons depressed together lowered an open note a step and a half,<sup>24</sup> thereby enabling a player to have most of the notes of the chromatic scale in his command.

Before the Blümel-Stölzel valves could be used satisfactorily, several serious mechanical problems had to be overcome. The sharp bends and constricted air passages had to be remedied, and the valve casings had to be made airtight.<sup>25</sup> Blümel and Stölzel continued experiments in the 1820's. Blümel worked for Schuster, a brass maker, in Karlsruhe, while Stölzel worked for the Schlott firm in

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<sup>22</sup>Schwartz, op. cit., p. 174.

<sup>23</sup>Karl Geiringer, Musical Instruments (New York, 1945), p. 227.

<sup>24</sup>Schwartz, op. cit., p. 175.

<sup>25</sup>Morley-Pegge, op. cit., p. 25.

Berlin.<sup>26</sup> Within a few years other brass makers in Europe became interested in improving the new piston valve mechanism. Joseph Reidl of Vienna<sup>27</sup> and several makers in Paris joined Blühmel and Stölzel in the concentrated work.

#### Shaw's Transverse Spring Slides

In 1824 John Shaw, an Englishman, made an effort to replace the single piston valve when he patented his "transverse spring slides". These were double tubes in U-shape. By depressing a touchpiece, the movable tubing was added to the main instrument. The valves had both an ascending and descending action.<sup>28</sup> Shaw's spring slides were used for a short time in England, but they could not compete with the single piston valve.

#### Stölzel's Tubular Valve

After several years of testing, Stölzel brought out an improved piston valve in 1825. It was tubular, in contrast to the previous square model, and it had a more rapid movement.<sup>29</sup> The air column entered by the bottom of the

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<sup>26</sup>Ibid., p. 32.

<sup>27</sup>Hermann Pietzsch, The Trumpet (Leipzig, 1900), p. 22.

<sup>28</sup>Galpin, op. cit., p. 231.

<sup>29</sup>Daubeny, op. cit., p.17.

first valve and left by the bottom of the second valve.<sup>30</sup> Although there were still many angles necessary for the tubing, the new slender valve was an important advance.

#### Blühmel's Rotary Valve

Blühmel invented a new type of valve mechanism in 1827. After working in vain on square piston valves, he introduced a rotary valve, (Dreh-Ventil), which could compete with the piston valve. The rotor, or drum, had slots milled in the side, so that when it was turned on an axle the air column was diverted into the valve slides. In this manner, various lengths of tubing were added to the main length, and notes were lowered accordingly.<sup>31</sup> The action of Blühmel's rotary valve was very smooth, but its elaborate construction was not as simple as that of the piston valve.<sup>32</sup> The rotary valve was soon put to use in German and Austrian military bands.

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<sup>30</sup>Galpin, op. cit., p. 231.

<sup>31</sup>Schwartz, op. cit., pp. 194, 195.

<sup>32</sup>Galpin, op. cit., p. 231.

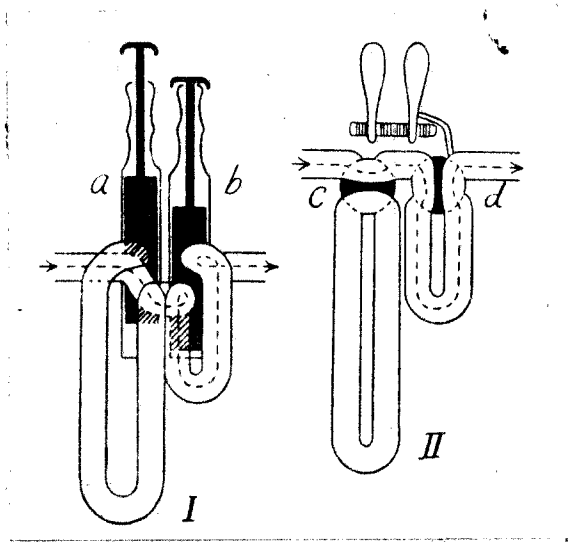


Fig. 2--Mechanism of valved brass instruments\*

I. Piston system    II. Rotary system

#### The Vienna Valve

Still another new valve device appeared in Vienna in the late 1820's. It was a twin-piston valve mechanism similar to Shaw's spring slides. There were some major differences, however. Whereas Shaw's slides were at right angles to a double windway, the Vienna type valves were set one behind the other on a single windway, and whereas Shaw's valves were both ascending and descending, the Vienna type were descending only.<sup>33</sup> The exact origin of the "Vienna valve" as it

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<sup>33</sup>Morley-Pegge, op. cit., p. 40.

\*Karl Geiringer, Musical Instruments (London, 1945), p. 227.

was later called, is not known. It is known that they were in use in Vienna before 1830, because instruments with Vienna valves dated before then are still in existence.<sup>34</sup> In 1830 Leopold Uhlmann, a Viennese brassmaker, brought out an improved version of this mechanism. On earlier models the pistons protruded through their casings

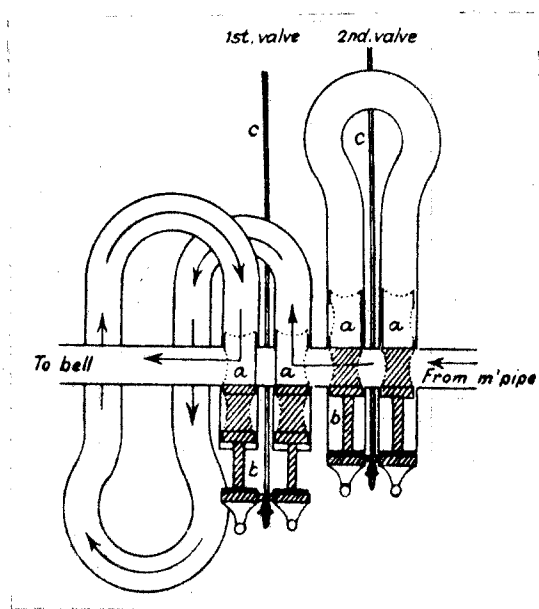


Fig. 3--Uhlmann's Vienna valve\*

when the finger levers were depressed. Uhlmann's model kept the pistons completely enclosed by use of external acting rods.<sup>35</sup>

<sup>34</sup> Ibid., p. 40.

<sup>35</sup> Ibid., p. 40.

\*Ralph Morley-Pegge, The French Horn (New York, 1960), p. 41.

The three new valve mechanisms, the piston, the rotary, and the Vienna valve provided great opportunities for European instrument makers. Within a few years a new family of valved brass instruments had come into being in Europe, thanks to these mechanisms. The type of valved device used on these new instruments varied from country to country. In general, the piston valve was favored in France and England, and the Vienna and rotary type were favored in Germany and Austria.<sup>36</sup>

#### The Cornet de Poste

When the piston valve reached Paris, it was greeted enthusiastically. Soon after its arrival, a new valved instrument appeared there. It was the cornet de poste, created sometime between 1826 and 1828.<sup>37</sup> By adding two tubular piston valves to the old post horn, this instrument, also called the cornet à pistons, was originated.<sup>38</sup> The earliest models had a circular form until a more convenient way of folding the tube was discovered to be that of a shortened, deeper trumpet.<sup>39</sup> The early French models were constructed in C, and they had transposing crooks for all keys.<sup>40</sup>

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<sup>36</sup>Adam Carse, The Orchestra from Beethoven to Berlioz (New York, 1949), p. 415.

<sup>37</sup>Adam Carse, Musical Wind Instruments (London, 1939), p. 244.

<sup>38</sup>Ibid., p. 244. <sup>39</sup>Ibid., p. 245. <sup>40</sup>Ibid., p. 245.

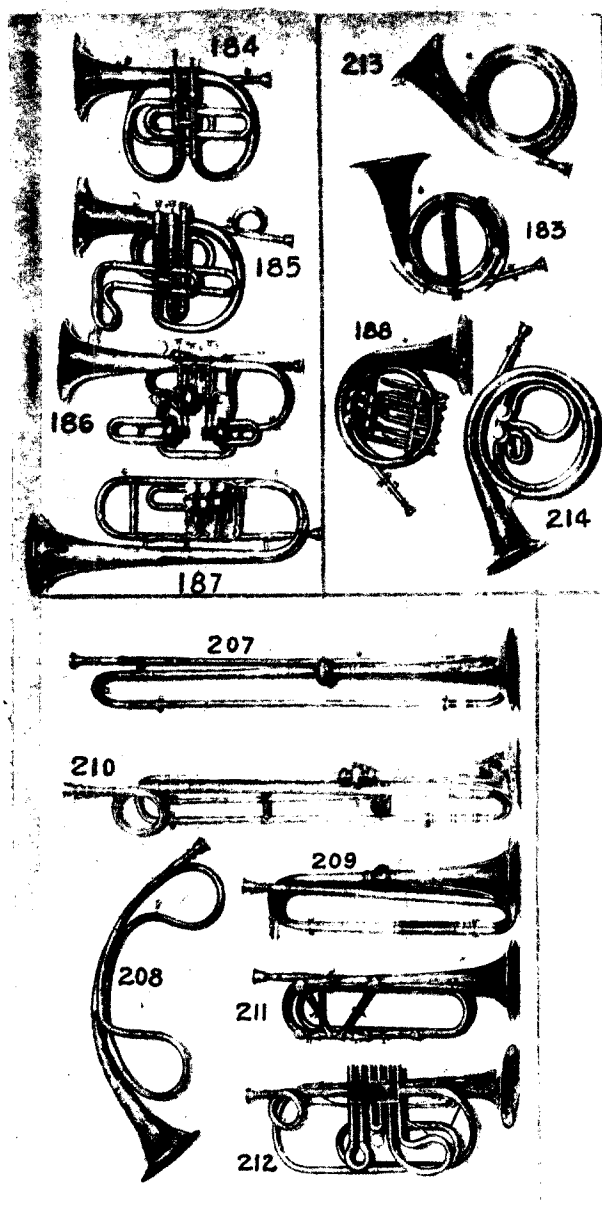


Fig. 4--(183) Keyed post horn, (184-186) valved cornets, (187) rotary valved trumpet (188) circular cornet, (207-210) trumpets, (211) keyed trumpet, (212) valved trumpet, (213, 214) post horns.\*

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\*Nicholas Bessaraboff, Ancient European Musical Instruments (Cambridge, 1941), plate VI.



The tone of the instrument was midway between that of the trumpet and the horn.<sup>41</sup>

### The Flügelhorn

About the same time that the cornet de poste appeared in France, an instrument called the Flügelhorn came into being in Vienna.<sup>42</sup> This successor to the keyed bugle was made by putting valves on the hunting bugle.<sup>43</sup> Bluhmel's new rotary valves were used on the early German and Austrian models.<sup>44</sup> The bore at the narrow end of the Flügelhorn was

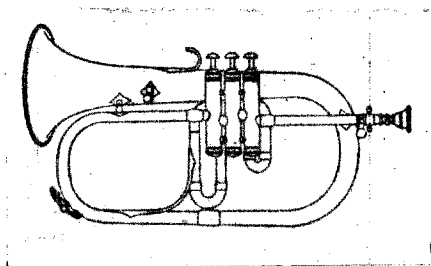


Fig. 5--Flügelhorn\*

about the same as that of the trumpet and cornet de poste, but the gradual expansion of the bore was much more marked.<sup>45</sup>

<sup>41</sup>Geiringer, op. cit., p. 233.

<sup>42</sup>Carse, Musical Wind Instruments, p. 294.

<sup>43</sup>Ibid., p. 293.

<sup>44</sup>Ibid., p. 294.

<sup>45</sup>Ibid., p. 293.

\*Albert Lavignac, editor, Encyclopedie de la Musique et Dictionnaire du Conservatoire (Paris, 1913), p. 1452.

The mouthpiece was wider and deeper than that of the trumpet or cornet de poste,<sup>46</sup> and the tone was midway between that of the cornet de poste and the French horn. Flügelhorns in B-flat, A, and C became quite popular in Germany and Austria in the early 1830's.<sup>47</sup>

#### The Alto and Tenor Horns

Shortly after the introduction of the cornet de poste and the Flügelhorn, a complete family of valved instruments was built in which some features of both were combined.<sup>48</sup> These were the alto and tenor horns which were being produced in Europe in various sizes and shapes by 1830.<sup>49</sup> There were three main types of alto and tenor horns. The highest of the group was built in E-flat and F. It was called the alto horn in England, the Altokornett in Germany, the bugle alto in France, and the flicorno alto in Italy. It was made in both coiled and upright form.<sup>50</sup> The second type was built in C and B-flat, a fifth lower than the highest member. It was called the baritone in England, the

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<sup>46</sup>Geiringer, op. cit., p. 233.

<sup>47</sup>Carse, Musical Wind Instruments, p. 295.

<sup>48</sup>Curt Sachs, The History of Musical Instruments (New York, 1940), p. 429.

<sup>49</sup>Geiringer, op. cit., p. 234.

<sup>50</sup>Sachs, op. cit., p. 428.

Tenor Horn in Germany, the bugle tenor in France, and the flicorno tenoré in Italy. It was made in either upright form, or oval form, with the bell facing backwards.<sup>51</sup> The third type, very similar to the second type, had the same range, but a larger bore which gave it a broader tone. It was called the euphonium in England, the Baryton in Germany, the basse à pistons in France, and the eufonio in Italy.<sup>52</sup>

#### Miscellaneous Valved Instruments

The experimentation during the early years of valved instruments also produced some unusual instruments. Two of these, the valved trombone and the so-called bass trumpet, proved fairly satisfactory.

The valved trombone, created shortly after the invention of the piston valve,<sup>53</sup> was a controversial instrument from its inception. Faulty intonation kept it from being generally accepted.<sup>54</sup> Only in Italy was it used to much extent.<sup>55</sup>

The bass trumpet, introduced in the late 1820's, was employed in German and Austrian cavalry bands.<sup>56</sup> It was

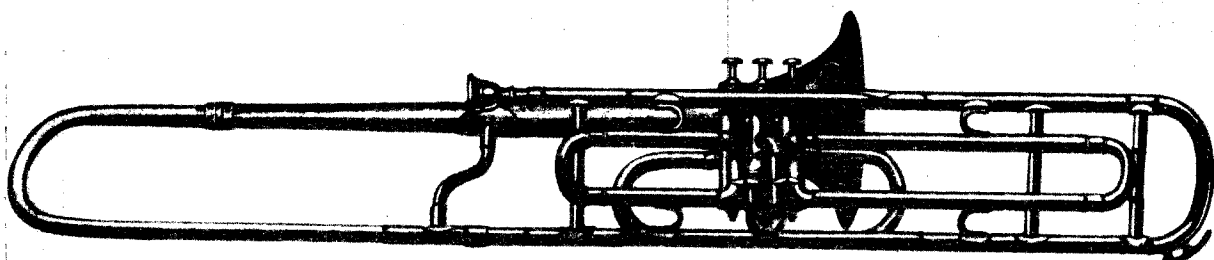
<sup>51</sup>Ibid., p. 428.      <sup>52</sup>Sachs, op. cit., p. 428.

<sup>53</sup>Schwartz, op. cit., p. 220.

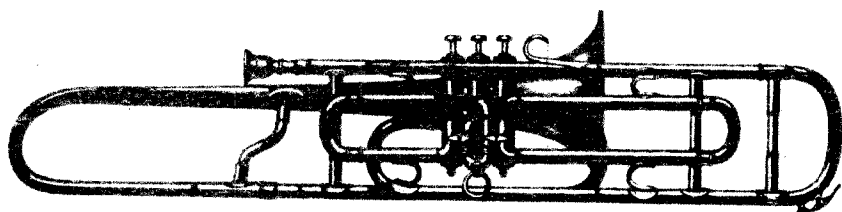
<sup>54</sup>Ibid., pp. 220, 221.      <sup>55</sup>Ibid., p. 221.

<sup>56</sup>Sachs, op. cit., p. 432.

actually a baritone trumpet built in C<sup>57</sup> and occasionally B-flat and E-flat.<sup>58</sup> Its tone was more like a tenor trombone than a trumpet, and it sounded an octave below its written parts.<sup>59</sup>



BASS VALVE TROMBONE.



TENOR VALVE TROMBONE.

Fig. 6--Bass and tenor valved trombones\*

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<sup>57</sup>Ibid., p. 432.

<sup>58</sup>H. E. Adkins, Treatise on the Military Band (London, 1945), p. 144.

<sup>59</sup>Ibid., p. 144.

\*H. E. Adkins, Treatise on the Military Band (London, 1945), p. 148.

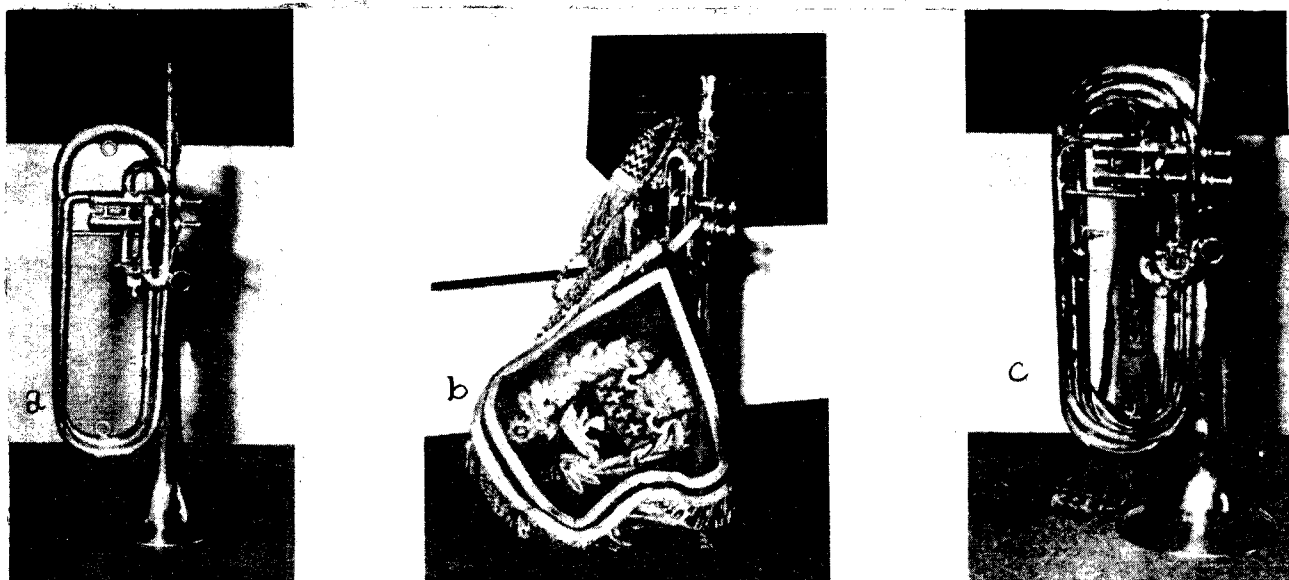


Fig. 7--Cavalry trumpets (a&b), bass trumpet (c)\*

#### Completely Chromatic Brass Instruments

In 1830 Müller, a brass maker of Mayence, successfully added a third valve to brass instruments.<sup>60</sup> The two-valved instruments used previous to Müller's contribution had notes between partials which could not be played. The two valves together lowered the pitch of an open note a step and a

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<sup>60</sup>Montgomery, op. cit., p. 112.

\*Gerald Gorgerat, Encyclopedia de la Musique pour instruments à vent, 2nd edition (Lausanne, 1955), p. 102.

half, leaving an interval of from one to three semitones to the next partial. With a third valve these gaps were filled, thus making brass instruments completely chromatic.<sup>61</sup> Now they could be more readily used in ensembles and as solo instruments. They could now pass from the experimental stage to the practical stage.

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<sup>61</sup>Ibid., p. 112.

## CHAPTER II

### THE SPREAD OF VALVED BRASS INSTRUMENTS

#### IN EUROPE AND AMERICA

1830-1865

Although there were various valved brass instruments being used in European bands and orchestras by 1830, they were still mainly in the experimental stage, and by no means in widespread use.<sup>1</sup> It was during the period 1830 to 1865 that the valve really came into common usage in the musical ensembles of Europe and America. This progress was due to several technical improvements on brass instruments, and to the contributions of Wilhelm Wieprecht and Adolphe Sax.

#### Wilhelm Wieprecht

The first significant progress of valved instruments in military bands was in Prussia under the leadership of Wilhelm Wieprecht. Only a few scattered bands had valved

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<sup>1</sup>Carse, The Orchestra from Beethoven to Berlioz, p. 415.

instruments when Wieprecht began the reorganization of Prussian cavalry bands.<sup>2</sup> As early as 1828 he began to use valved instruments in his bands, including the E-flat soprano cornet, E-flat trumpet, B-flat tenor horn, and B-flat euphonium.<sup>3</sup> Shortly afterwards, he added rotary valved French horns, which together with the piston valved instruments and the slide trombones comprised a brass section with great possibilities.<sup>4</sup>

Wieprecht believed that a brass section should be melodious as well as balanced. His transcriptions of Beethoven symphonies for band created a new concept of band sound.<sup>5</sup> In the transcriptions, the brass blended with the woodwinds, producing a smoothly balanced band sound.

#### The Bass Tuba

During the transcription of the Beethoven symphonies Wieprecht realized the need for another valved instrument, one which could play the bass notes in the symphonies which were too low for the trombones in the band. So Wieprecht began to design a valved instrument capable of playing these

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<sup>2</sup>Henry G. Farmer, The Rise and Development of Military Music (London, 1912), p. 103.

<sup>3</sup>Ibid., p. 103.

<sup>4</sup>Montgomery, op. cit., p. 118.

<sup>5</sup>Ibid., p. 120.



vital notes.<sup>6</sup> The ophicleide, a keyed brass instrument common in France at that time, could not be used because it did not blend with Wieprecht's family of valved instruments.<sup>7</sup> In 1835 Wieprecht, in association with G. W. Moritz, brought out an instrument called the Bass Tuba.<sup>8</sup> It was in the form of the ophicleide, that is, upright. It was completely chromatic, and was capable of reaching low E. It had five valves, two of which were operated by the left hand, and three by the right hand.<sup>9</sup>

#### The Berlin Valve

The valves used on the bass tuba were called Berliner Pumpen,<sup>10</sup> and were unique in their own right. They were piston valves, but they were shorter and stouter than the

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<sup>6</sup>Ibid., p. 120.

<sup>7</sup>Ibid., p. 115.

<sup>8</sup>Geiringer, op. cit., p. 234.

<sup>9</sup>Montgomery, op. cit., p. 120.

<sup>10</sup>Morley-Pegge, op. cit., p. 44.

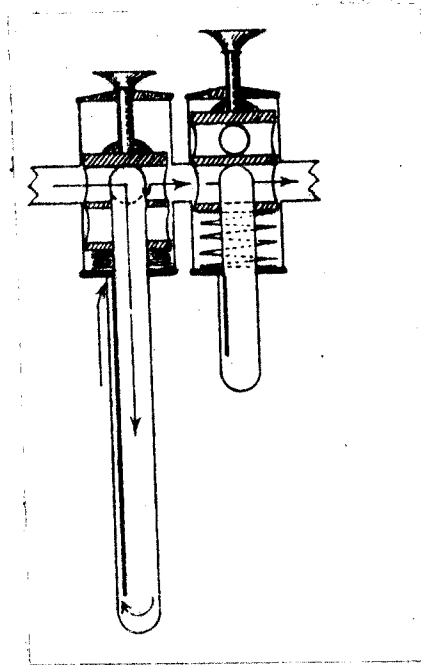


Fig. 8--Berlin Valve\*

Stölzel pistons.<sup>11</sup> Unlike the Stölzel model of 1825, the bottoms of the valves no longer served as windways.<sup>12</sup>

Wieprecht, therefore, made two major contributions in 1835. He created a valved instrument which was a suitable bass for the brass section, and he introduced an improved piston valve. Both the bass tuba and the Berlin valve became very popular almost immediately in Austria and Germany. Wieprecht's concept of band sound and use

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<sup>11</sup>Ibid., p. 45.

<sup>12</sup>Ibid., p. 45.

\*Morley-Pegge, op. cit., p. 44.

of valved instruments also spread throughout Austria and Germany, and formed the basis for later bands there. England and France, where Adolphe Sax gained great prestige in military bands, were not so greatly influenced by his methods, however.<sup>13</sup>

#### Progress in France

Despite the efforts of the French instrument makers, the valve was not so readily accepted into French musical ensembles. French brass players were reticent to exchange their natural instruments for the new valved instruments.<sup>14</sup> It was not until the 1840's that valved instruments gained a firm position in French military bands.

The man largely responsible for the reorganization of French military bands was Adolphe Sax.<sup>15</sup> Sax, a Belgian, came from a famous family of instrument makers. He was not satisfied with the various keyed brass instruments still

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<sup>13</sup>Farmer, The Rise and Development of Military Music, p. 103.

<sup>14</sup>Carse, The Orchestra from Beethoven to Berlioz, p. 416.

<sup>15</sup>Farmer, The Rise and Development of Military Music, p. 112.

being used in French bands in the early 1840's. Their tone color was inferior to that of the more brilliant valved brasses.<sup>16</sup>

### The Saxhorns

Sax made a family of valved instruments in the mid-1840's that at last unified the brass family.<sup>17</sup> There were seven members in the group, including E-flat sopranino, B-flat soprano, E-flat alto, B-flat tenor,<sup>18</sup> B-flat bass, E-flat bass, and B-flat doublebass.<sup>19</sup> Actually, the B-flat



Fig. 9--Upper four saxhorns\*

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<sup>16</sup>Schwartz, op. cit., p. 240.

<sup>17</sup>Geiringer, op. cit., p. 236.

<sup>18</sup>Percy A. Scholes, "Saxhorn and Flugelhorn Families," The Oxford Companion to Music (New York, 1938), p. 832.

<sup>19</sup>Scholes, "Tuba Group," op. cit., p. 964.

\*Carse, The Orchestra from Beethoven to Berlioz, p. 421.

baritone and the B-flat bass had the same range, but the latter had a larger bore and a fuller tone.<sup>20</sup> The upper four members were in the form of the trumpet, with their bells held forward. The lower three members were upright, with their bells held upward.<sup>21</sup> Sax equipped the instruments with Berlin piston valves,<sup>22</sup> and called them "Saxhorns," which they have been known as ever since.

Sax took some of his instruments to England, and in October of 1844 they were played in a concert there. Sax himself participated in the concert, but little impression was made upon the audience.<sup>23</sup> A few weeks later, however, the Distin family brass quintet played a concert on the saxhorns in London to a much more enthusiastic audience. For several years afterwards the Distin family toured France, England, and America with their saxhorns. Sax and his instruments were made famous.<sup>24</sup>

#### The Saxtrombas

After his success with the saxhorns, Sax brought another family of valved instruments called the saxtrombas. They

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<sup>20</sup>Ibid., p. 832.

<sup>21</sup>Ibid., p. 831.

<sup>22</sup>Anthony Baines, editor, Musical Instruments Through the Ages (Baltimore, 1961), p. 313.

<sup>23</sup>Carse, The Orchestra from Beethoven to Berlioz, p. 420.

<sup>24</sup>Ibid., p. 420.

were similar to the saxhorns, except that they had less taper and shallower mouthpieces, which produced a brighter, more solid tone than the saxhorns.<sup>25</sup> There were eight members in the saxtromba group.<sup>26</sup> They did not gain the acclaim which the saxhorns did, however.

### Sax's Reforms

Sax began reorganizing French military bands in the late 1840's by putting in his valved instruments. A great rivalry developed between him and Wilhelm Wieprecht due to their different methods.<sup>27</sup> Sax's campaign was interrupted by the revolution of 1848, but within a few years the saxhorns were firmly settled in French bands.<sup>28</sup> By this time, the alto and tenor saxhorns were made in upright form for marching convenience, leaving only the two highest saxhorns in the form of the trumpet.

### Progress in England

The valve came to England from Russia, not France, as might be expected.<sup>29</sup> The Earl of Cathcart, while visiting

<sup>25</sup>Schwartz, op. cit., p. 247.      <sup>26</sup>Ibid., p. 247.

<sup>27</sup>Henry G. Farmer, Military Music (New York, 1950), p. 46.

<sup>28</sup>Ibid., p. 46.

<sup>29</sup>Farmer, The Rise and Development of Military Music, p. 103.

Saint Petersburg in 1830, noticed that the Russian Guard band was using valved trumpets. The Earl was so impressed that the Emperor of Russia presented a set of these instruments to the Earl's regiment in England.<sup>30</sup> Shortly afterwards, an instrument was produced by Kohler and Pace of London with two "Russian valves."<sup>31</sup> This instrument, called the cornopean, was quite similar to the cornet de poste. It was adopted into English military bands almost immediately.<sup>32</sup> The various alto and tenor valved instruments became common in England soon afterwards.

The saxhorns, introduced into England by the Distin family concerts, were readily welcomed into English military bands around mid-century. Henry Distin, after touring with his family brass quintet, set up business in London as a band instrument maker and publisher.<sup>33</sup> Distin's company imported saxhorns for a short time, then began to make them in London for expedience.<sup>34</sup>

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<sup>30</sup>Ibid., p. 103.

<sup>31</sup>Ibid., p. 104.

<sup>32</sup>Ibid., p. 104.

<sup>33</sup>Farmer, Military Music, p. 49.

<sup>34</sup>Baines, op. cit., p. 313.

### Progress in Other European Countries

Little is known about the early development of valved brass instruments in Europe outside of Austria, Germany, France, and England. It is known, for instance, that valves were used in Russia by 1830,<sup>35</sup> and that valves reached Italy soon after 1830,<sup>36</sup> but detailed information of early progress in these and other smaller European countries is almost non-existent.

### Valved Instruments Come to America

The utilization of valved brass instruments was not confined to Europe for long. By the late 1830's several bands made up entirely of brass instruments had formed in America. The City Brass band of New York, founded in 1836,<sup>37</sup> and the Salem Brass band, founded in 1837,<sup>38</sup> were among the first notable brass bands in America. The instrumentation of the Salem band was as follows: 1 E-flat bugle, 1 B-flat

<sup>35</sup>Farmer, The Rise and Development of Military Music, p. 103.

<sup>36</sup>Carse, The Orchestra from Beethoven to Berlioz, p. 417.

<sup>37</sup>W. C. White, A History of Military Music in America (New York, 1945), p. 50.

<sup>38</sup>N. A. Lee, Jr., "The Development of the Brass Band from the Baroque Period to the Present," unpublished master's thesis, School of Music, North Texas State College, Denton, Texas, 1951, pp. 39, 40.



bugle, 1 trumpet, 1 E-flat alto horn, 1 post horn, 4 trombones, 2 basses, and a snare and bass drum.<sup>39</sup> These instruments were brought to America from Europe, there being no important makers in America at that time.<sup>40</sup> Brass bands became very much in demand within a few years, and countless new brass bands formed in New England as a result.<sup>41</sup>

### Progress in European Orchestras

Valved brass instruments were not accepted into European orchestras as quickly as they were into European and American bands. Military and brass bands needed melodic brass instruments, but orchestras had strings to fulfill the function of melodists. Therefore, in the orchestra the call for melodic brass instruments was not very urgent.<sup>42</sup>

The valved trumpet in F was used alongside the natural trumpet when it entered the orchestra. At that time it had transposing crooks for practically all keys.<sup>43</sup> A few composers,

<sup>39</sup>White, op. cit., p. 41.

<sup>40</sup>Schwartz, op. cit., p.249.

<sup>41</sup>Lee, op. cit., p. 40.

<sup>42</sup>Carse, The Orchestra from Beethoven to Berlioz, p. 418.

<sup>43</sup>Carse, Musical Wind Instruments, p. 240.

such as Rossini, Meyerbeer, and Halevy, began to score for valved trumpets in the 1830's,<sup>44</sup> but this practice was not widespread. After striving for years to hold a position in European orchestras, the valved trumpet finally came into prominence in the works of Richard Wagner.<sup>45</sup> Wagner took full advantage of the valve mechanism in scoring brilliant and effective passages for the trumpet.<sup>46</sup>

The valved French horn in D and F also was slow to be accepted into the orchestra. Like the valved trumpet, it was used concurrently with its natural counterpart in the orchestra for several years, and had transposing crooks.<sup>47</sup> In 1848, when Richard Wagner scored for valved horns only, the position of the natural horn in the orchestra was greatly shaken.<sup>48</sup>

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<sup>44</sup>Carse, The Orchestra from Beethoven to Berlioz, p. 44.

<sup>45</sup>Schwartz, op. cit., p. 179.

<sup>46</sup>Ibid., p. 179.

<sup>47</sup>Carse, Musical Wind Instruments, p. 240.

<sup>48</sup>Schwartz, op. cit., p. 199.



Fig. 10--(1) Rotary valved horn, c. 1835,  
(2) Early piston valved horn, (3) Vienna  
valved horn, c. 1850.\*

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\*Morley-Pegge, op. cit., plate VII.

By 1865 the valved trumpet and French horn, both in F, were used almost exclusively in European orchestras. Crooks were rapidly disappearing, and players were transposing at sight when necessary to play all parts on one tube length.<sup>49</sup>

The valved bass tuba had a little easier time obtaining a position in the orchestra. Well before 1850 valved bass tubas were standard instruments in all large German orchestras.<sup>50</sup> The most common bass tuba was in F with three valves.<sup>51</sup> At first, all tubas had piston valves. Later, rotary valved tubas were favored in Germany and Austria, but France, England, and America kept the piston models.<sup>52</sup> In 1845 V. F. Cerveny made the first contrabass tuba. It had four valves, the additional one throwing the instrument into contrabass C.<sup>53</sup> Thereafter, contrabass tubas began to appear in some orchestras, but the F tuba remained the standard orchestral instrument.<sup>54</sup>

<sup>49</sup>Carse, Musical Wind Instruments, p. 240.

<sup>50</sup>Carse, The Orchestra from Beethoven to Berlioz, p. 43.

<sup>51</sup>Daubeny, op. cit., p. 112.

<sup>52</sup>Byford Gayle Sealy, "A History of the Bass Tuba and Its Use in the Symphony Orchestra," unpublished master's thesis, School of Music, North Texas State College, Denton, Texas, 1950, p. 31.

<sup>53</sup>Sachs, op. cit., p. 430.

<sup>54</sup>Sealy, op. cit., p. 32.

The cornet, although frequently used by Rossini before and after 1830,<sup>55</sup> did not become a permanent member of the orchestra. Its mellow tone was more suited for the band.

The Flugelhorn, alto, and tenor horns were also too mellow to be used in the orchestra, and they remained strictly band instruments.

#### Further Improvement of the Valve

In 1835, the year that the Berlin valve was introduced, John Shaw of England patented his disc valve action.<sup>56</sup> According to Galpin, "The discs were made in pairs, one being attached to the additional tube lengths with suitable windways, and the other revolving under it on the action of a lever provided with a touchpiece."<sup>57</sup> When the disc moved, the additional tubing was brought into circuit, thus altering the pitch of the instrument as desired. The French maker Halary later produced disc valves based on those of Shaw.<sup>58</sup> However, because of a mechanical problem, neither

<sup>55</sup>Galpin, op. cit., p. 233.

<sup>56</sup>Ibid., p. 232.

<sup>57</sup>Ibid., p. 232.

<sup>58</sup>Ibid., p. 232.

his nor Shaw's discs were generally accepted. It was impossible to keep the faces of the discs airtight.<sup>59</sup>

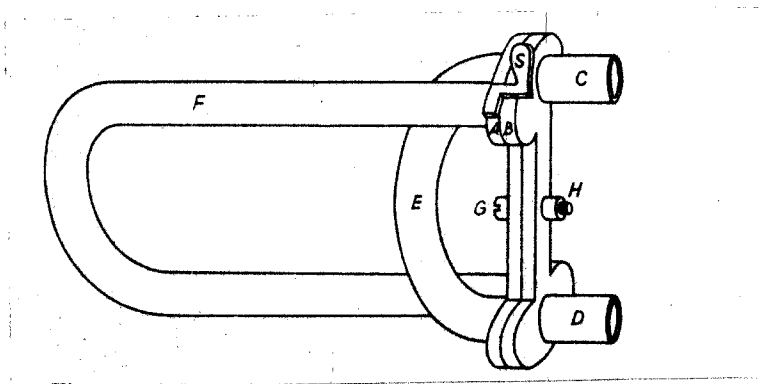


Fig. 11--Disc valve mechanism\*

A much more practical valve device than the disc valve was produced by Francois Perinet of Paris in 1839.<sup>60</sup> The "Perinet valve," as it was later called, was midway in diameter between the slender Stölzel piston and the squat Berlin piston.<sup>61</sup> The air passages were less constricted than on any previous valve, allowing great ease of blowing. It is this type of valve, improved and modified, that is employed currently.<sup>62</sup> England and France welcomed the Perinet valve, but Germany and Austria were still reticent to part with their Berlin, Vienna, and rotary valves.

<sup>59</sup>Ibid., p. 232.

<sup>60</sup>Morley-Pegge, op. cit., p. 49.

<sup>61</sup>Ibid., p. 49.

<sup>62</sup>Ibid., p. 49.

\*Morley-Pegge, op. cit., p. 46.

While the Perinet valve was being produced for use in England and France in the 1840's, experimentation was being carried on to further improve the piston valve. In 1851 J. P. Oates of London introduced piston valves which were excellently designed.<sup>63</sup> His pistons, exhibited at the International Exhibition in London, were called "equi-trilateral." This term referred to the uniformly spaced windways.<sup>64</sup> The result was an even greater ease of blowing than the Perinet valve allowed. Oates's valves were designed on such sound principles that they became models for brass makers in later years.<sup>65</sup>

Gustave Besson of France made the next big improvement on the piston valve. In 1859 Besson designed piston valves which kept the same diameter of bore throughout in every combination. This exactness let the air column pass through directly and evenly. With Besson's valves passages involving the use of valves could be played more cleanly, without so much fear of cracking the notes.<sup>66</sup>

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<sup>63</sup>D. J. Blaikley, "Valve," Groves Dictionary of Music and Musicians, Vol. V, edited by H. C. Colles, (New York, 1937), p. 436.

<sup>64</sup>Ibid., p. 437.

<sup>65</sup>Ibid., p. 436.

<sup>66</sup>Galpin, op. cit., p. 232.

In 1864 Henry Distin made a valve tube with windways soldered into it.<sup>67</sup> The result was a light action, which together with the ease of blowing achieved by the pistons of Oates and Besson, brought piston valves to a state of near perfection.<sup>68</sup>

The rotary valve, with no awkward angles or constricted windways, needed very little improvement to be satisfactory. Joseph Reidl's model of 1832 remained essentially unchanged throughout the nineteenth century.<sup>69</sup>

The Vienna valve also reached its finished state early in the last century. Only minor changes were needed after Leopold Uhlmann patented his improved version of this valve in 1830.

#### Miscellaneous Instruments

Of the unique instruments produced in this period only the helicon had lasting value. The others proved impractical.

A peculiar valved instrument for marching purposes appeared in Europe at mid-century. It was called the helicon, and was made in bass and contrabass sizes, but

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<sup>67</sup>Ibid., p. 232.

<sup>68</sup>Ibid., p. 232.

<sup>69</sup>Baines, op. cit., p. 308.



was coiled rather than upright.<sup>70</sup> The name helicon was derived from the Greek word helicos, meaning coiled.<sup>71</sup> It was ideal for marching, as it could be easily carried over

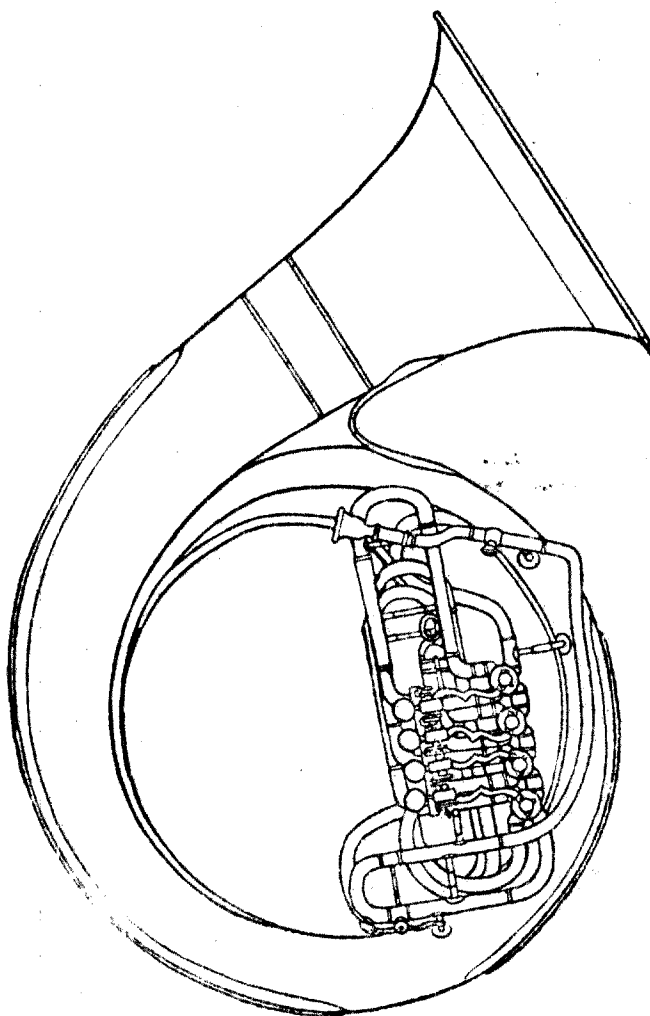


Fig. 12--Helicon\*

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<sup>70</sup>Willi Apel, "Brass Instruments," Harvard Dictionary of Music (Cambridge, 1958), p. 99.

<sup>71</sup>Sachs, op. cit., p. 429.

\*Sachs, op. cit., p. 431.

the shoulder.<sup>72</sup> Ignax Stowasser built the first helicons in Vienna in 1849,<sup>73</sup> and they began to appear in European and American bands after mid-century.

An odd family of tubas, also for marching purposes, was often used in America during the Civil War.<sup>74</sup> They were designed to "backfire" over the left shoulder to throw the sound backward while the player marched.<sup>75</sup> They were

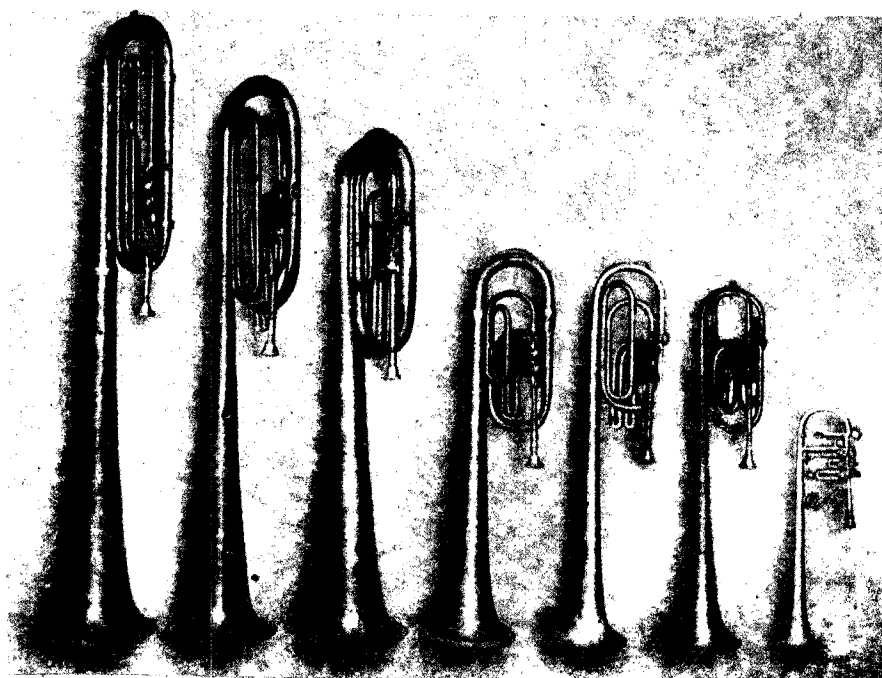


Fig. 13--Backfiring tubas

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<sup>72</sup>Apel, op. cit., p. 99.      <sup>73</sup>Sachs, op. cit., p. 429.

<sup>74</sup>Schwartz, op. cit., p. 248.      <sup>75</sup>Ibid., p. 248.

made in sizes ranging from soprano to bass, and were all equipped with rotary valves.<sup>76</sup> When the Civil War ended, marching bands in America declined, and the backfiring tubas began to disappear.<sup>77</sup>

One of the first extra large tubas made was the saxhorn bourdon in E-flat, pitched an octave below the E-flat bass

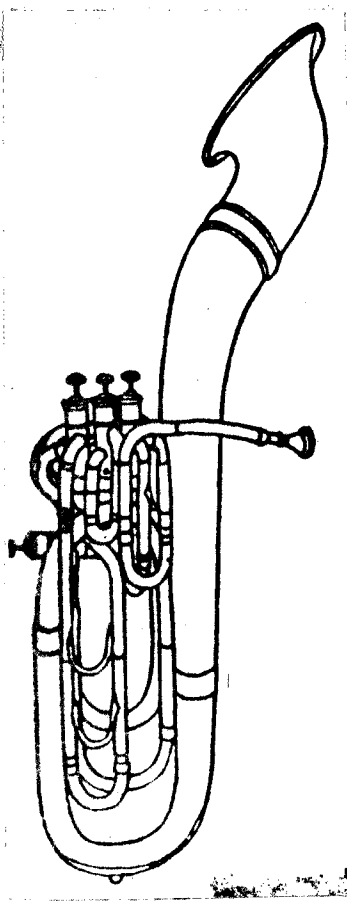


Fig. 14--Saxhorn bourdon

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<sup>76</sup>Ibid., p. 248.

<sup>77</sup>Ibid., p. 248.

tuba.<sup>78</sup> It was larger than a man, and could play pitches too low for the human ear to distinguish. Due to its impractical features it never became a regular member of the saxhorns.<sup>79</sup>

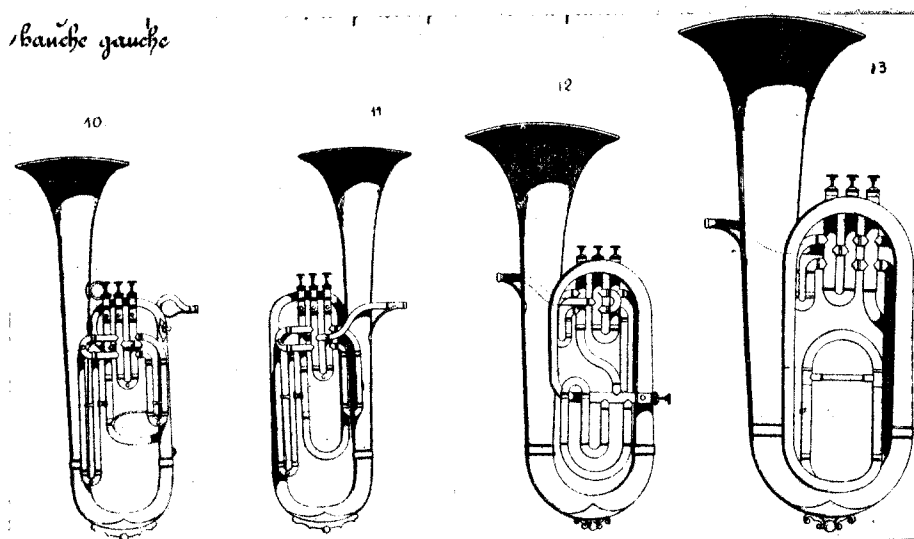


Fig. 15--(10) E-flat alto horn, (11) C alto horn, (12) B-flat tenor horn, (13) E-flat bass tuba.\*

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<sup>78</sup>Sealy, op. cit., p. 34.

<sup>79</sup>Ibid., p. 34.

\*Lavignac, op. cit., p. 1456.

CHAPTER III  
FURTHER IMPROVEMENTS AND MODIFICATIONS  
OF VALVED BRASS INSTRUMENTS  
1865-1900

The changes made upon valved brass instruments during the years 1865 to 1900 advanced them to a new high standard of excellence. The newly formed brass instrument companies in America joined the European companies in this endeavor. In Europe, bands and orchestras were found in almost every country.<sup>1</sup> In America, the band movement was growing rapidly, and orchestras were forming in several cities.<sup>2</sup> This tremendous growth in the last part of the nineteenth century brought about demands for greater quality and quantity of valved instruments. European brass makers, for the most part, improved the existing instruments. American brass instruments, although based on European models, were slightly different from them.

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<sup>1</sup>Farmer, Military Music, p. 58.

<sup>2</sup>Galpin, op. cit., p. 238.

### American Brass Instruments

After importing brass instruments for several years, American began to make them after the Civil War. The first band instrument company in America was started by Captain C. G. Conn in 1873.<sup>3</sup> In 1875 Conn and his partner, Dupont, started making cornets.<sup>4</sup> Among their several early improvements were valve slides which ascended from the valves, thus preventing water from entering the slides.<sup>5</sup> Soon, Conn's "American Band Instruments" were competing favorably with foreign instruments.<sup>6</sup> The Conn Company's most famous instrument was the sousaphone, named for the famous bandman, John Philip Sousa, who suggested its design.<sup>7</sup> The first model, made in 1898, was actually a large helicon with a huge, upright bell. The bell-front models were not produced until 1908.<sup>8</sup>

By the end of the century other new band instrument companies were thriving in America. The brass instruments they made differed from European instruments in tone color because they were copied from the saxtromba family, not the

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<sup>3</sup>Schwartz, op. cit., p. 249.

<sup>4</sup>Ibid., p. 250.

<sup>5</sup>Ibid., p. 250.

<sup>6</sup>Ibid., p. 250.

<sup>7</sup>Ibid., p. 250.

<sup>8</sup>Ibid., p. 250.

saxhorns. By enlarging the bore of the saxtrombas, and still keeping the taper to a minimum, the American makers produced instruments with a full, yet brilliant sound.<sup>9</sup>

#### Changes in the Brasses

The extra range and technique demanded of valved instruments during this period produced numerous changes in

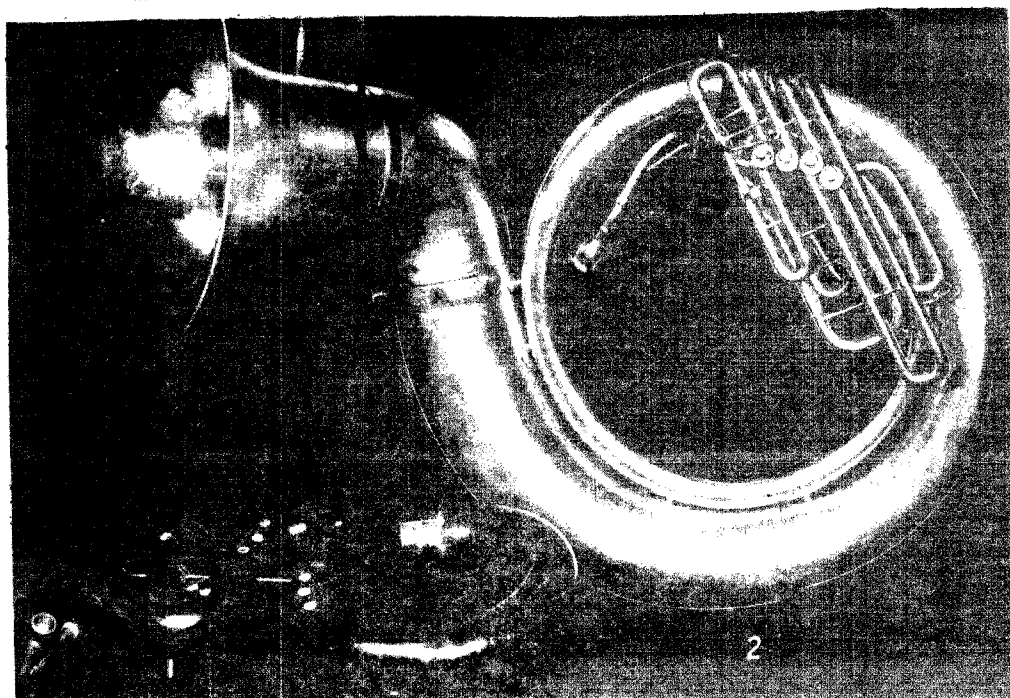


Fig. 16--1. Serpent 2. Sousaphone\*

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<sup>9</sup>Ibid., p. 250.

\*Schwartz, op. cit., p. 204.

design. Many of the instruments appeared for the first time in their present forms in these years.

The valved trumpet in F began to be replaced by the B-flat soprano trumpet towards the end of the century. High B-flat trumpets had been made as early as 1822 by Courtois, and had been used in bands. However, they were not used in the orchestra until the last quarter of the century.<sup>10</sup> The F trumpet, with a large bore, had a good low register, but a poor high register. As composers tended to score progressively higher for the trumpets, the B-flat instrument was revived.<sup>11</sup> A deeper, more conical mouthpiece was also needed to play the difficult slurred and legato passages being written.<sup>12</sup>

The French horn also underwent a few changes during these years. In 1866 the Schreiber Cornet Manufacturing Company of New York took out a patent for "string action" for horn.<sup>13</sup> The strings were tied to the rotary valves in such a way as to lessen the noise of the moving valve parts. This device was taken up by many horn players, and became

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<sup>10</sup>Carse, Musical Wind Instruments, p. 240.

<sup>11</sup>Schwartz, op. cit., p. 181.

<sup>12</sup>Carse, Musical Wind Instruments, p. 240.

<sup>13</sup>Baines, op. cit., p. 309.



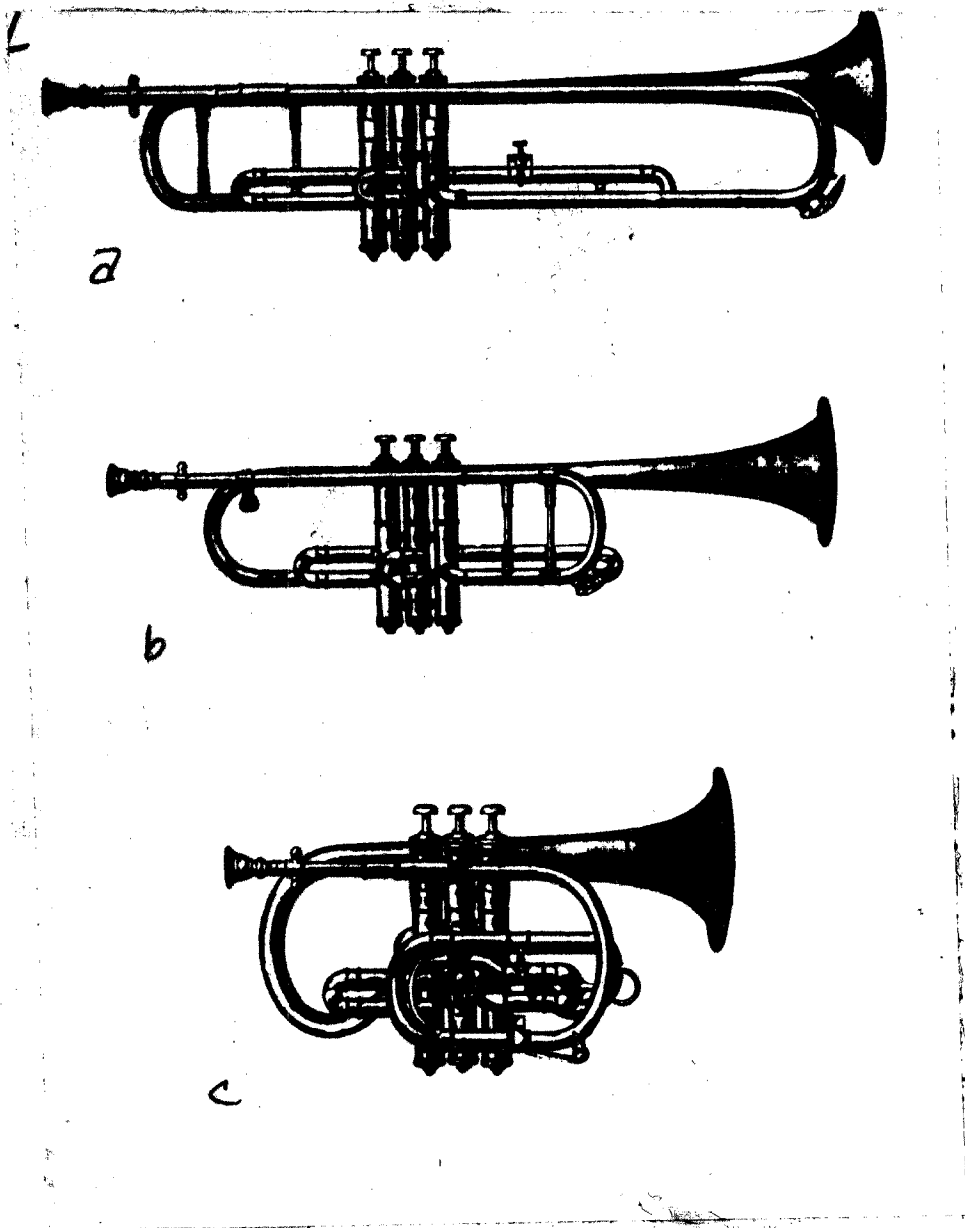


Fig. 17--(a) F trumpet, (b) B-flat trumpet,  
(c) B-flat cornet.\*

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\*Cecil Forsyth, Orchestration (New York, 1942),  
plate IV.



Fig. 18--1&2. B-flat rotary valved horns,  
3. Double horn (F&B-flat).\*

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\*Morley-Pegge, op. cit., plate VIII.

quite popular through the years, especially in America.<sup>14</sup> During the 1870's and 1880's the rotary valved horn gained much more prominence. Even England and France began to change from piston valved French horns. By 1890 rotary valved horns were standard in practically all parts of Europe and America.<sup>15</sup> Probably the most important improvement to the horn in this period was the invention of the double horn. This horn had dual windways for F and B-flat. By means of a special valve, the air stream was diverted from the F tubing to the B-flat tubing, or vice-versa.<sup>16</sup> The double horn made the high register easier to attain, consequently, it became increasingly common after the turn of the century.

The cornet underwent relatively minor changes, having reached essentially its modern form by 1839.<sup>17</sup> The only significant change was the placement of the valves to the right of the bellpipe instead of the left side.<sup>18</sup>

The Flugelhorns remained popular in Germany and Austria. A family of Flugelhorns similar to the saxhorns was created

<sup>14</sup>Ibid., p. 309.

<sup>15</sup>Carse, Musical Wind Instruments, p. 222.

<sup>16</sup>Ibid., p. 224.

<sup>17</sup>Adkins, op. cit., p. 134.

<sup>18</sup>Carse, Musical Wind Instruments, p. 245.

there, but only the B-flat soprano and the E-flat alto instruments were used to any extent.<sup>19</sup> In France, England, and America B-flat Flugelhorns with piston valves were used, but in a minor role in bands.<sup>20</sup>

The many types of alto and tenor horns used in the early part of the century were merged into a more or less common upright type.<sup>21</sup> A fourth piston was added to the tenor horns to bridge the gap between low F-sharp and C.<sup>22</sup> This, in turn, brought about the addition of a fifth piston for intonation purposes.<sup>23</sup>

Extra piston valves were applied to the large tubas also. As many as six pistons were used on the bass and contrabass tubas to allow the low notes above their fundamentals to be played in tune.<sup>24</sup> The BB-flat and CC contrabass tubas gained in importance, the former used in bands, and the latter in orchestras.<sup>25</sup>

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<sup>19</sup>Cecil Forsyth, Orchestration (New York, 1942), p. 165.

<sup>20</sup>Carse, Musical Wind Instruments, p. 294.

<sup>21</sup>Ibid., p. 298.

<sup>22</sup>Schwartz, op. cit., p. 244.

<sup>23</sup>Ibid., p. 244.

<sup>24</sup>Sealy, op. cit., p. 32.

<sup>25</sup>Ibid., p. 34.

### The Problem of Intonation

By 1865 the position of valved brass instruments in Europe and America was secure. However, the problem of intonation was still great, and there was much work to be done along this line. There was a slight discrepancy when two valves were used, but it became more pronounced when the third valve came into use in combination with the other two. The instrument involved became quite sharp in pitch. On the smaller instruments the problem was serious, and on the larger instruments it was much worse.<sup>26</sup>

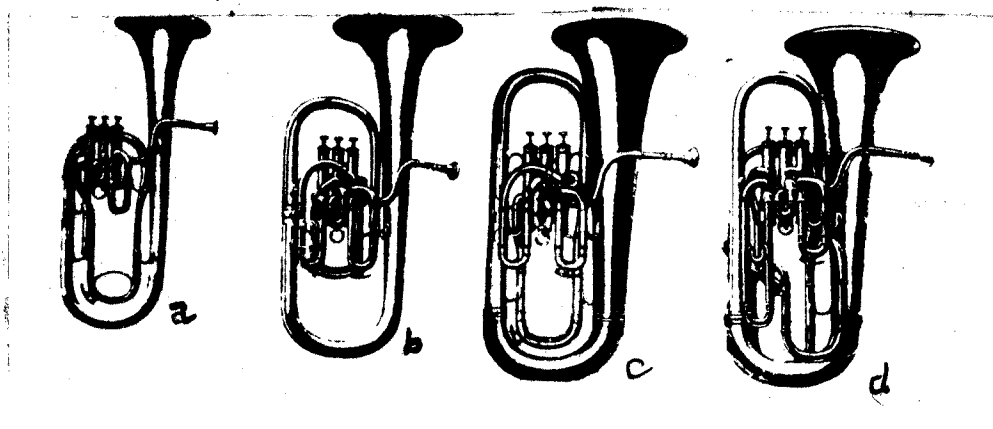


Fig. 19--(a) E-flat alto horn, (b) B-flat baritone horn, (c) B-flat euphonium, (d) B-flat euphonium with extra valve.\*

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<sup>26</sup>Carse, Musical Wind Instruments, p. 34.

\*Adkins, op. cit., p. 171B.

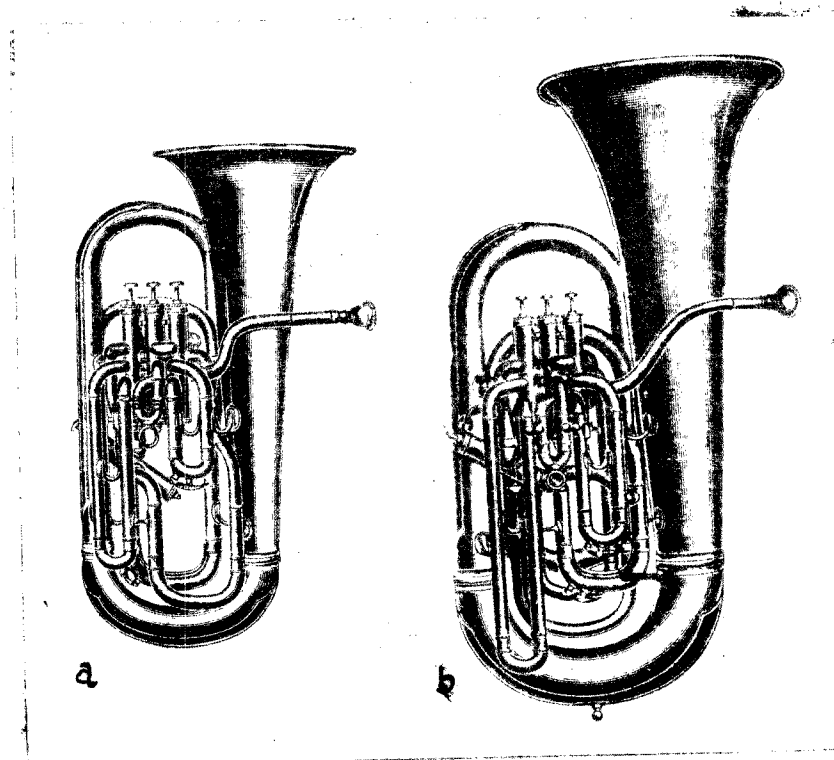


Fig. 20--(a) E-flat bass tuba with extra valve,  
 (b) BB-flat contrabass tuba.\*

#### The Compensation System

No one made much progress in solving this problem until D. J. Blaikley of the Boosey Company in London came out with his automatic compensating pistons in 1874.<sup>27</sup> The system

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<sup>27</sup>D. J. Blaikley, "Valve," Grove's Dictionary of Music and Musicians, Vol. V, edited by H. C. Colles (New York, 1937), p. 437.

\*Forsyth, op. cit., p. plate V.

consisted of short, extra bows of tubing which were brought into effect as part of the air passages when two or more valves were used in combination.<sup>28</sup>

By an ingenious arrangement of double porting of the valves and making the third valve a master control valve, when any other valve is used in combination with this third valve he arranged for an increment of extra length of tubing to be brought into effect by the double porting, the length depending on the particular valve used in combination with the master valve.<sup>29</sup>

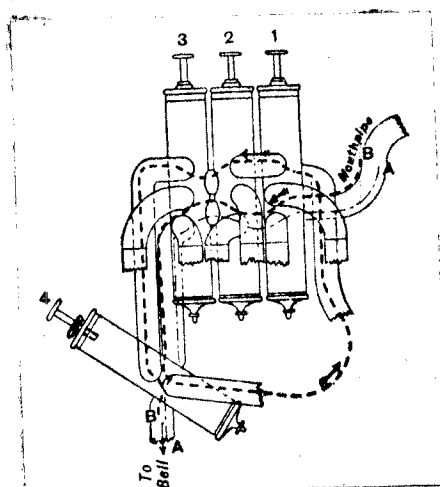


Fig. 21--Valves with compensation system.

Subsequently, the Besson Company developed their "enharmonic" system of compensation.<sup>30</sup> It was similar to

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<sup>28</sup>Daubeny, op. cit., pp. 19,20.    <sup>29</sup>Ibid., p. 20.

<sup>30</sup>Frank Wright, editor, Brass Today (London, 1957) p. 97.

the Blaikley system, except that instead of bringing in extra tubing as required for each valve, the instrument had double slides. When a valve was depressed, the correct slide length was brought into circuit. When this valve was used in combination with the third valve, a longer slide length was brought into play. The extra length of slide was equal to the added compensated loop in the Blaikley system.<sup>31</sup> This new principle was also applied to the four-valved instruments, and was further spread when Victor Mahillon of Brussels introduced his "regulating pistons" based on Blaikley's idea.<sup>32</sup>

With the use of the compensation system the larger brass instruments had much better intonation, even on their lowest notes.<sup>33</sup> The system was not applied to the cornet and trumpet until the twentieth century, however.<sup>34</sup>

#### Miscellaneous Instruments

The unusual valved instruments produced in the late nineteenth century included the Wagner "tubas", the cornophones, the double-belled euphoniums, and various high, straight valved trumpets.

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<sup>31</sup>Ibid., p. 97.

<sup>32</sup>Galpin, op. cit., p. 234.

<sup>33</sup>Ibid., p. 234.

<sup>34</sup>Wright, op. cit., p. 97.



In 1876 Richard Wagner designed a new family of five "tubas" for his Ring des Nibelungen.<sup>35</sup> They were actually modified French horns, being more narrow in bore than the corresponding tenor, bass, and contrabass standard tubas.<sup>36</sup> The upper pair were built in B-flat, and the lower pair were in F. The bass of the group was in BB-flat.<sup>37</sup> Although these instruments had a mellow tone and great agility,<sup>38</sup> they never gained a permanent place in the orchestra. Anton Bruckner scored for them in his seventh symphony in 1884,<sup>39</sup> but few other composers found a use for them.

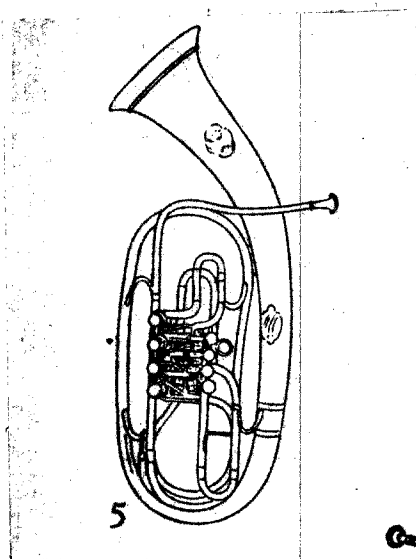


Fig. 22--Wagner tuba.

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<sup>35</sup>Sachs, op. cit., p. 432.

<sup>36</sup>Geiringer, op. cit., p. 235.

<sup>37</sup>Carse, The Orchestra from Beethoven to Berlioz, p. 415.

<sup>38</sup>Apel, "Tuba," op. cit., p. 772. <sup>39</sup>Sachs, op. cit., p. 432.

The cornophones were a family of tubas brought out by the Besson Company in 1890. They resembled the saxhorns, except that their bells curved backward over the valves. They were used in the orchestra when Wagner tubas were not available.<sup>40</sup>

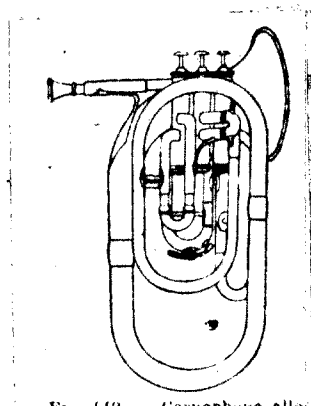


Fig. 23--Cornophone.

Of the many double-belled instruments made, the double-belled euphonium by Conn<sup>41</sup> and the doublephone by Besson<sup>42</sup> were the most practical instruments. Both could produce either a euphonium or a trombone sound, the change being effected by use of a fourth valve. One mouthpiece served the two purposes, and the bells were of different size and shape.

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<sup>40</sup>Baines, op. cit., p. 316.

<sup>41</sup>Ibid., p. 316.

<sup>42</sup>Galpin, op. cit., p. 244.

A straight trumpet in A with piston valves was made by Julius Kosleck of Berlin in the 1880's. Kosleck used the instrument to play the high trumpet parts written in the Baroque Period.<sup>43</sup> Although the instrument was not practical enough for common use, it revived interest in playing in the clarino register. Soon, valved trumpets in high D, F, and G were being produced in an effort to make the high parts easier to play.<sup>44</sup> Interest in this matter has carried over into the twentieth century, and currently high trumpets are still being made.

#### Further Results of Experimentation

The improvement of valved brass instruments in the latter nineteenth century which made possible the excellent artistry in brass solo and ensemble music in that period gave great impetus and inspiration to brass makers in the twentieth century. Aided by the efforts of their predecessors, contemporary makers have been able to produce the high quality instruments currently in use.

All of the valved instruments have been further improved during the past few decades, with both precision and

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<sup>43</sup>Galpin, op. cit., p. 243.

<sup>44</sup>Carse, Musical Wind Instruments, p. 242.

practicality in mind. The compensation system, still being used in many parts of Europe, has been carried a step further in America.<sup>45</sup> The American "trigger" system allows for a greater degree of accuracy in intonation because, unlike the compensation system, it is manually controlled. The triggers, attached to the valve slides, can move the slides to the length desired by means of the fingers. The triggers are of slightly better use on the smaller valved instruments, being harder to operate on large valve slides.

#### Summary

In the early nineteenth century the need for chromatic brass instruments caused widespread experimentation in Europe. From this research came the various valve mechanisms for brass instruments which made them chromatic. The early rotary and Vienna types of valves needed little improvement, but the early piston valves were quite imperfect. In 1839 Francois Perinet designed an improved piston valve. Its design has become standard through the years. As a result of the valve mechanisms reaching a high level of excellence by the end of the century, musical ensembles flourished as never before. This momentum has continued to build after the turn of the century until currently, brass instruments have very few shortcomings indeed.

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<sup>45</sup>Wright, op. cit., p. 98.

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