The first attempts to extend the limited resources of the instru­ment in its new employment arose out of Hampel’s idea of lowering the harmonic sounds by introducing the hand into the bell. But, instead of fixing the shanks between the mouthpiece and the upper extremity, they were adapted to the body of the instrument itself by a double slide, upon the two branches of which tubes were in­serted bent in the form of a circle and gradually lengthened as required. This modified instrument became known as the “in­vention horn.” This system was applied to the trumpet by Michel Woegel (born at Rastatt in 1748), whose “invention trumpet” had a great success, notwithstanding the unavoidable imperfection of a too great disparity in quality of tone between the open and the closed sounds. The idea of applying the trombone slide to the trumpet is obvious. The slide trumpet is mentioned by T. E. Altenburg,@@1 who compares it, and with reason, to the alto trombone ; and there are grounds for identifying it with the “ tromba da tirarsi ” employed by J. S. Bach in some of his com­positions. The slide trumpet is still used in England in a some­what modified form. About 1760, Kolbel, a Russian musician, applied a key to the horn, and soon afterwards the trιmpet re­ceived a similar addition. By opening this key, which is placed near the bell, the instrument was raised a diatonic semitone, and by correcting errors of intonation by the pressure of the lips in the mouthpiece the following diatonic succession was obtained.

This invention was improved in 1801 by Weidinger, trum­peter to the imperial court at Vienna, who increased the number of keys and thus made the trumpet chromatic thoughout its scale. The instrument shown in the accompanying figure is in G ; the keys are five in number, and as they open one after another or in combination it is possible to connect the second proper tone with the third by chromatic steps, and thus produce the following succession. The number of keys was ap­plied to fill up the gaps between the extreme sounds of the interval of a fifth ; and a like result was arrived at more easily for the intervals of the fourth, the major third, &c., furnished by the proper tones of 3, 4, 5, &c. But, though the keyed trumpet was a notable improvement on the invention trumpet, the sounds obtained by means of the lateral open­ings of the tube did not possess the qualities which distinguish sounds caused by the reson­ance of the air-column vibrating in its entirety. But in 1815 Stölzel made a genuine chromatic trumpet by the invention of the ventile or piston ; for this ingenious mechanism, see Trombone. The simple trumpet is now no longer employed except in cavalry regiments.

It is usually in E♭. The bass trumpet in E♭, which is an octave lower, is sometimes, but rarely, used. Trumpets with pistons are generally constructed in F, with crooks in E and E♭. In Ger­many trumpets in the high B♭ with a crook in A are very often used in the orchestra. They are easier for cornet à piston players than the trumpet in F. The present writer has recently constructed for the concerts of the Conservatoire at Brussels trumpets in the high D, an octave above the old trumpet in the same key. They permit the execution of the high trumpet parts of Handel and J. S. Bach. The bass trumpet with pistons used for Wagner’s tetralogy is in E♭, in unison with the ordinary trumpet with crooks of D and C ; but, when constructed so as to allow of the production of the second proper tone as written by this master, this instrument belongs rather to the trombones than to the trumpets. (V. Μ.)

TRUMPET, Speaking and Hearing. The speaking trumpet, though some instrument of the kind appears to have been in earlier use in more than one part of the world, is connected in its modern form with the name of Athanasius Kircher and that of Sir Samuel Morland, who in 1670 proposed to the Royal Society of London the ques­tion of the best form for a speaking trumpet. Lambert, in the *Berlin Memoirs* for 1763, seems to have been the first to give a theory of the action of this instrument, based on an altogether imaginary analogy with the behaviour of light. In this theory, which is still commonly put forward, it is assumed that sound, like light, can be propagated in rays. This, however, is possible only when the aperture through

which the wave-disturbance passes into free air is large compared with the wave-length. If the fusiform mouth of the speaking trumpet were half a mile or so in radius, Lambert’s theory might give an approximation to the truth. But with trumpets whose aperture is only a foot in diameter at most the problem is one of diffraction ; and it has not yet been seriously studied from this point of view.

In the case of the hearing trumpet, the disturbance is propagated along the converging tube much in the same way as the tide-wave is propagated up the estuary of a tidal river.

Until the theory has been rigorously worked out the only safe course to adopt in manufacturing either class of instruments is to be guided by the results of varied trials.

The theoretical foundations of the subject will be found in Lord Rayleigh’s *Sound* and in Sir G. Airy’s *Tides and Waves*, respectively. In speaking and hearing trumpets alike all reverberation of the instrument should be avoided by making it thick and of the least elastic materials, and by covering it externally with cloth.

TRUMPETER, or Trumpet-Bird, the literal rendering in 1747, by the anonymous English translator of De la Condamine’s travels in South America (p. 87), of that writer’s “Oiseau trompette” (*Mem. de l'Acad. des Sciences,* 1745, p. 473), which he says was called “ Trompetero ” by the Spaniards of Maynas on the upper Amazons, from the peculiar sound it utters. He added that it was the “Agami ” of the inhabitants of Para and Cayenne,@@2 wherein he was not wholly accurate, since those birds are specifically distinct, though, as they are generically united, the state­ment may pass. But he was also wrong, as had been Barrere (*France Equinoxiale,* p. 132) in 1741, in identify­ing the “ Agami ” with the “ Macucagua ” of Marcgrave, for that is a Tinamou (*q.v.)* ; and both still more wrongly accounted for the origin of the peculiar sound just men­tioned, whereby Barrere was soon after led (*Ornith. Spec. Novum,* pp. 62, 63) to apply to the bird the generic and vulgar names of *Psophia* and “ Petteuse,” the former of which, being unfortunately adopted by Linnæus, has ever since been used, though in 1766 and 1767 Pallas (*Miscel­lanea,* p. 67, and *Spicilegia,* iv. p. 6), and in 1768 Vosmær

*(Descr. du Trompette Américain,* p. 5), showed that the

*@@@1 Versuch einer Anleitung zur heroisch-musikalischen Trompeter­und Pauker-Kunst,* Halle, 1795.

@@@2 Not to be confounded with the “ Heron Agami ” of Buffon *(Oiseaux,* vii. p. 382), which is the *Ardea agami* of other writers.