PLAYING A 'CELLO BY COMPRESSED AIR.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

At a recent concert in London one of the programme features was a violoncello solo, rendered in conjunction with the "auxetophone," the invention of the Hon. C. A. Parsons of turbine fame. Through the courtesy of the inventor we are enabled to describe and illustrate this novel attachment to musical instruments, whereby the tone of the latter, to which it is attached, is appreciably increased by means of a current of compressed air.

The auxetophone may be best described as a comb or multiple-reed valve of aluminium, which comb is hinged in such a manner that each tooth of the comb can vibrate at a variable distance from a corresponding slot in a little box to which compressed air is supplied at about five pounds pressure. The farther away the teeth are from the slots, the greater is the flow of air, and *vice versa*. The flow of air is controlled by a valve, and when caused to vibrate, the air transmits corresponding sound waves into the trumpet.

When the auxetophone is applied to the 'cello or any other stringed instrument, the valve is connected by a rod of aluminium with the bridge of the instrument. Thus the valve is caused to vibrate in accord with the characteristic tone of the instrument. The sound issuing from the trumpet, though in many respects identical with that of the instrument itself, is at the same time richer in character and greater in volume.

In the accompanying illustrations the disposition and details of the apparatus are clearly shown. A special bar is carried across the sounding box of the instrument to support the multiple-reed valve and its box. The current of compressed air enters the box at its lower end. The aluminium connecting rod between the valve and the bridge of the instrument is clearly shown.

The air is compressed in a small portable cylinder. The current first passes through a pressure gage at the player's foot, the dial of which can be instantly and easily read and followed. From the pressure gage it passes to a small air filter, which removes all suspended impurities. Then it passes to the lower end of the valve box mounted on the instrument. Between the pressure gage and the filter is a small pedal, by means of which the player can modulate the flow of the compressed air by means of his foot.

The horn is mounted on a stand beside the instrument, and a flexible pipe coupling connects the valve box of the instrument with the horn. The valve mechanism support is so made that it can be attached to or detached from the instrument in a few moments.

At the concert previously mentioned, the possibilities of the invention were very strikingly evidenced. The tone of the instrument was appreciably fuller, richer, and stronger when the auxetophone was attached, the harmonics were clearer, and the high-pitched notes were more clearly defined than is possible without the attachment. In the fortissimo passages the tones had a solid, well-rounded ring of great volume, while in pianissimo the expression of the artist was well produced with a softness accompanied by distinct clearness of the tones.

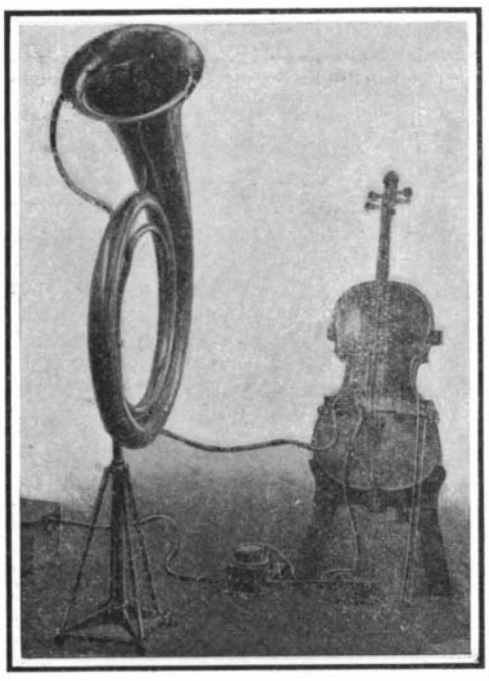

Fig. 1.—'Cello with the auxetophone attached which delivers the sound waves to the trumpet. On the floor is a pedal for modulating the air pressure, a pressure gage, and air filter.

Fig. 2.—View of the instrument, showing mounting of the valve mechanism and aluminium connection between the bridge of the instrument and the valve.

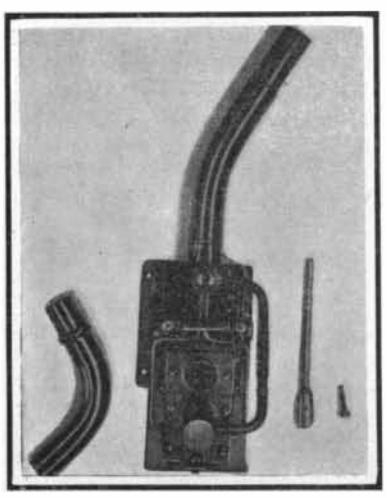

Fig. 3.—View of the instrument looking on the delivery side of valve.

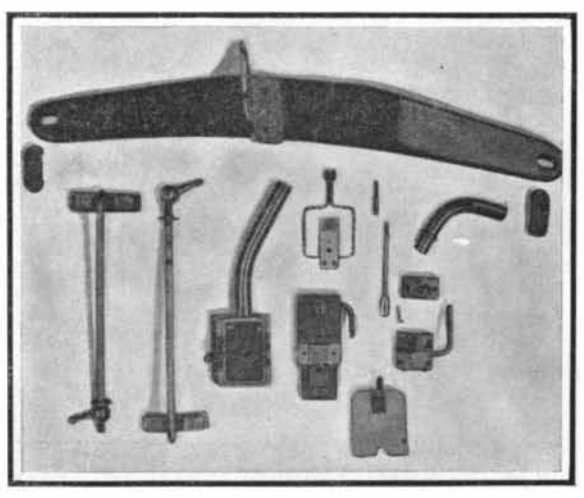

Fig. 4.—The several component parts of the auxetophone.

Timber is scarce at Tucson, Ariz., and fence posts are expensive. Recently, states the Industrial World, the manager of the Tucson Rapid Transit Company found it necessary to string some wire fencing, and in lieu of fence posts he cut up a lot of old boiler tubes into suitable lengths and made holes in them to attach the wire fencing. He made some convenient gates by sliding 4-inch tubes inside of 4½-inch tubes, the collapsible tubes serving the purpose of cross bars. Recently, in sinking a well for power-station circulating water, he utilized the shells of two water-tube boilers, sinking them one above the other to a depth of 36 feet.

The Budde Hydrogen Peroxide Process for Sterilizing Milk.

The problems confronting a public pure milk supply are only too well known. The greatest difficulties arise from the fact that trade milk is drawn from so many quarters and such a varied assortment of sources, and then promiscuously mixed, that even if the supply from one set of cows should be pure, it is immediately contaminated by its admixture with the product from other doubtful cattle. Sterile milk in the generally accepted sense of the word is practically impossible to obtain. Numerous methods have been evolved for treating milk so as to render it perfectly innocuous. Scalding or boiling are the most commonly favored means for destroying germs, but heat destroys the character of the article, and in artificially-fed children it is invariably productive of rickets and other serious infantile maladies. In pasteurizing milk no two dairymen adopt the same degree of temperature.

Within recent years the tendency has been toward the use of a powerful antiseptic, such as hydrogen peroxide. Although highly successful in its results, the use of antiseptics requires care, since otherwise the requisite effect is not achieved or the taste of the milk is quite changed. A Danish chemical engineer, C. Budde, D.Sc., of Copenhagen, has for some time been prosecuting his investigation along these lines, and after prolonged experiment has succeeded in evolving a process which has received the indorsement of such eminent bacteriologists as Prof. Von Behring, Dr. Rideal, Prof. Tanner Hewlett, and other well-known luminaries at the leading institutions of Europe. So effective is it in its application, that buddeized milk, as it is generically termed, is becoming extensively consumed not only in Denmark, but other European countries and Great Britain.

Although it appears somewhat elaborate in comparison with the popular dairy methods, the process is so inexpensive as to enable the purified milk to be sold at the customary price. The milk upon collection from the various farms is brought to a central depot, where it is raised to a temperature of 122 deg. In this heated condition it passes through a centrifugal cleaning machine similar in design to a separator, but having only one outlet, the cream not being separated from the milk. This operation not only removes all particles of dirt suspended in the milk more effectively than ordinary filtering, but also serves to arrest any bacteria that may be adhering to the foreign articles and to the minute motes of the tissues of the cow which are always present in milk. It may be mentioned in passing that such cleaning the inventor maintains to be necessary in any milk treatment, since experiments have proved that the bacilli adhering to these different particles are the most resistant. Striking illustration of the extent to which dirt is present in milk is afforded by the amount of residue that is found in the bowl of the centrifugal cleaner after the raw milk has passed through.

From the cleanser the milk passes into a water-jacketed glazed earthenware vat, in which it receives the predetermined quantity of hydrogen peroxide (H_2O_2). The temperature of the water jacket can be raised to the requisite degree and maintained thereat merely by the admission of steam. The vat is fitted with a mechanical stirrer, which is actuated from time to time to create and maintain a homogeneous mixture. The peroxide is perfectly harmless when taken in small quantities. The amount used by Dr. Budde is very minute. The chemical is added to the fluid when heated to the temperature of 122 deg. F.

The effect produced upon the milk by the hydrogen peroxide is that the enzyme catalase, first isolated by Loewe at Washington in 1901, attacks the hydrogen peroxide, and immediately decomposes it into water and oxygen. The result is that the one volume of oxygen thus released—hydrogen peroxide consists of two equal parts of hydrogen and oxygen—immediately seizes upon another atom of oxygen. Consequently, for a very short moment the oxygen is in the form of unic atoms, and exercises a far greater inclination than ordinary oxygen to combine with the oxidizable substances present, which fact explains the well-known powerful oxidizing qualities of the hydrogen peroxide. It is imperative that the H_2O_2 be chemically pure.

The product has been subjected to prolonged searching tests by eminent Swedish, Danish, Austrian, and German scientists and bacteriologists, who have pronounced an eminently favorable verdict thereon. Possibly the most striking of these investigations were those carried out by Dr. Th. Begtrup Hansen at the Silkeborg Tuberculosis Sanatorium in Denmark in comparison with raw and pasteurized milk. The results of these observations were completely satisfactory. It was found that the patients partook of the buddeized milk readily and found it agree well with them; it was well absorbed and possessed good nutritive value; and in certain cases of gastric and intestinal disease agreed better with the patients than pasteurized milk, while no ill effects arose from the method of sterilization. Its greatest advantage, however, was its sterility, while the fact that it insured the destruction of tubercle bacilli in mixed milk from several cows, such as ordinarily exists in trade milk, i. e., that generally provided for the public, was especially commented upon.

The wireless telegraph stations along the British coast established by the Marconi Company and the Lloyds have been taken over by the British Post Office, and hereafter will be operated by the government. The long-distance stations, however, at Poldhu, Cornwall, and Clifton are not included in the transaction and still belong to the Marconi Company. This act of the British government will no doubt mark an important step in the commercial use of wireless telegraphy, because the Marconi Company has heretofore refused to communicate with vessels not equipped with the Marconi system of wireless telegraphy. The British government will of course make no such distinction.