

**SYNTHETIC TALKING MACHINE.**

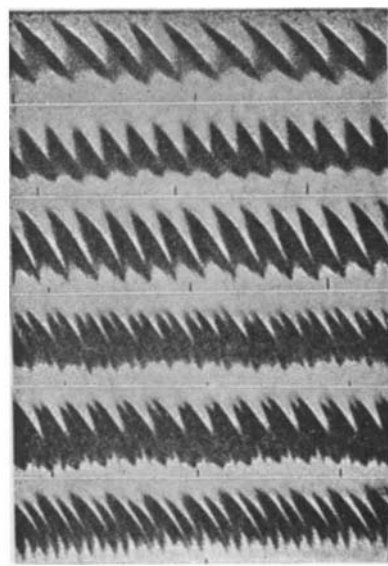
Inventors who were working upon talking machines received a severe blow when the phonograph was invented, as it reproduced rather than imitated the human voice. Lately, however, there have been experiments made upon the production of a talking machine.

Dr. Marage has constructed an apparatus which is a step in the direction of producing a practical talking machine, although it is limited to the production of vowels. It reverses the whole series of experiments made for the analysis of sound and is constructed on strictly mathematical principles. It will be remembered that with the manometric flame of Koenig, a stretched membrane is placed at the end of a mouthpiece. On one of the faces of this membrane the air is caused to vibrate by means of sounds, and to the other some system of registration is applied. In general, this consists of a very long needle connected to the membrane and vibrating with it, tracing a curve on a moving sheet of paper or on a smoked disk. Dr. Marage reverses this method of procedure and produces the sounds synthetically. He does away with all parts of the apparatus not absolutely indispensable, so that it follows that the vibration takes place in direct contact with the membrane. Instead of using ordinary gas or a registering needle, he uses acetylene gas at a constant pressure. The gas is delivered on the reverse side of the membrane. When the membrane is vibrated the flame changes in intensity, when viewed in a revolving mirror or when received on a moving band of sensitized paper. By using the latter he obtained a graphic record showing the formation of different sounds. He found that certain vowels—*I, U, OU* (in French)—are formed by a series of vibrations of different intensity and separation, but regularly spaced. In other words, there exists for these sounds a series of continued and similar vibrations, as shown in the first, second and third lines of our engraving

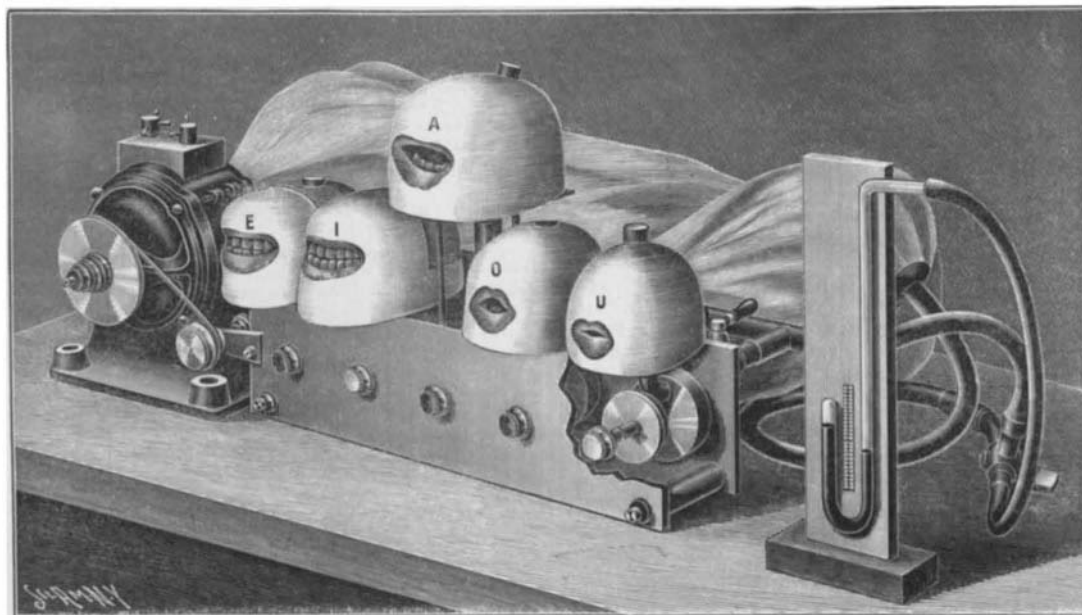
of the flames, demonstrating vowel formation. For *E* and *O* these vibrations are also regular, but each is formed of two oscillations, as shown in the fourth and fifth lines of our engraving. We thus have groups of double vibrations. Finally, in the case of *A* (see sixth line in flame diagram), these groups have three component vibrations. While these observations are not especially new, they confirm former results and render the graphic records clearer so that they become easier to follow.

Dr. Marage was not satisfied with the siren for the production of vowels. Not only the larynx but also the cheeks play an important part in the production of sound, adding the harmonics which give the voice its character. Other elements also contribute to this special characteristic of the voice, whereby that of each person present can be recognized. Dr. Marage constructed an apparatus to reproduce the interior of a person's mouth while pronouncing the different vowels, using the plastic substance employed by dentists. These false mouths, as it were, are made of plaster of Paris, and are fitted to sirens giving the appropriate combinations of sounds. He then sets his machine in operation, and the vowels are produced synthetically. Dr. Marage purposes to modify the steam sirens used on shipboard so they will imitate the vowel sounds. Thus different phonetic syllables may be obtained which may be used to form an international alphabet. Another important application of this synthetic process can be made in the construction of ear trumpets that will not fatigue the deaf, because they will not modify the grouping of oscillation adapted to the ear. Dr. Marage has also constructed the "acuometer," giving a typical sound of the vowel *A*, for example, which may be used as a standard to which certain other sounds may be referred.—We are indebted to La Nature for our engravings.

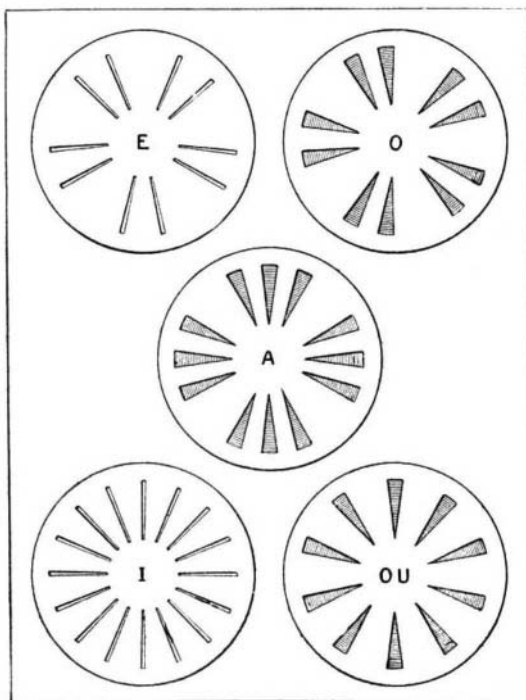
A new time-saving appliance for the embarkation and discharge of mails and baggage at Dover, England, and Calais, France, the terminal points of one of the cross-channel mailboat services, has been installed. It is an electrical gangway, and is constructed upon the system of an endless platform. It conveys packages of any weight ashore at the rate of one in fifteen seconds, when working at normal speed. Even the heaviest sacks of mail and baggage are brought ashore with remarkable celerity and facility. The saving in transshipment is more than half the ordinary time.



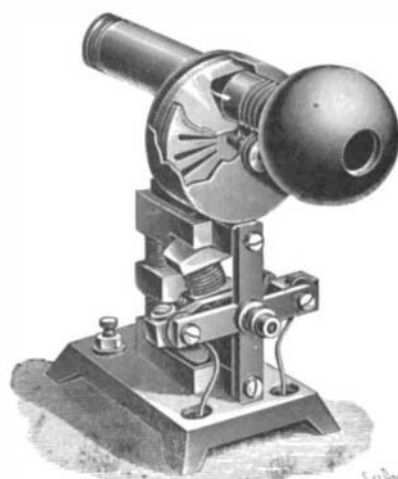
MANOMETRIC FLAMES OF VOWEL-FORMATION, I, U, OU, E, D, A (FRENCH).



SYNTHETIC APPARATUS FOR FORMING VOWEL SOUNDS.



MOVABLE PLATES FOR GIVING DIFFERENT VOWELS IN THE "SIREN."



"ACUOMETER," GIVING STANDARD SOUND.

**A New Self-Propelled Car.**

The Northern Railroad Company is making a series of tests between Paris and Pontoise of a new type of self-propelled car which has lately been built to run upon the rails. These cars are intended to replace certain of the trains which have heretofore been running especially for the postal service, as, for instance, the Paris-Pontoise postal train. They will also be tried on some other lines. The new vehicle is complete in itself, with the motive apparatus, passenger and baggage compartments and brake-cabin. As it is arranged to run in either direction, the engineer's cab is placed in the middle of the vehicle and in an elevated position so as to give a good lookout on the track. The steam apparatus includes a Turgan 125 horse power boiler and a compound engine which has some modifications and special devices to adapt it to the present use. These vehicles will transport in all 80 persons, in three classes. The total length is about 85 feet, and the average speed 36 miles an hour.

**Electrolysis of Sodium.**

The Fischer process for obtaining sodium by the electrolytic method has been one of the most successful. The characteristic of the process is the use of a melted bath formed of a mixture of equal molecular weights of chloride of sodium and chloride of potassium. The addition of the latter chloride permits the bath to be kept at a lower temperature than when chloride of sodium is used alone, and this presents a decided advantage, as the loss of the sodium by volatilization is greatly diminished. As to the sodium which results from the electrolysis of this bath, it contains less than one per cent of potassium, provided the difference of potential between the electrodes is properly regulated. The inventor has made many trials of electric furnaces of different forms, and has been led to adopt the following type: A crucible, wide and not too deep, is divided into two compartments by a middle partition which does not reach the bottom. The walls of the compartment which contains the cathode are cooled by a system of water-circulation. The electrodes, which are placed horizontally, pass through the opposite walls of the crucible, each being thus in its own compartment and separated by the middle partition. The anode is formed of a solid carbon, and the cathode of a metallic tube whose axis is on a level with the surface of the bath. This tube is used at the same time to draw off the melted sodium produced by the electrolysis.

There recently died in England Mr. Oliver Morris, the well-known engineer and contractor, rendered most famous by his boring of the preliminary heading of the Severn tunnel, beneath the Riven Severn, seven miles in length. He encountered innumerable difficulties in the work, which he ingeniously surmounted, but his works were finally interrupted by the irruption of a great spring of fresh water which completely drowned them out. A curious fact in connection with this engineer was that he could neither read nor write, owing to lack of education.

**The Current Supplement.**

The current SUPPLEMENT, No. 1344, has a number of most interesting articles. The first page is devoted to the Buffalo Water Works. "Some Motions, Relative and Absolute," is by Oberlin Smith. "The Presidential Address of Prof. Swan" is continued. "Longevity of Insects" is by Carus Sterne. "The Intelligence of Our Wasps" is by A. S. Packard. "A Camping or Mess Wagon" describes a most curious vehicle. "Methods of Curing Tobacco" is by Milton Whitney. The usual Selected Formulae, Trade Suggestions, and United States Consul and Trade Notes and Receipts are published.

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