Law of Motion.—Accelerations occur only in opposite pairs, the ratios of which are constant for given particles.

Definition of Mass.—The masses of particles are positive constants, inversely as their mutual accelerations.

Definition of Force.—Force is the product, mass into acceleration, and has the direction of the acceleration.

Choice of Axes.—Since motion is relative, force and mechanics are relative also. Hence, the foregoing and any problems based upon them should be referred to axes which, in each case, yield a mechanics most appropriate to the phenomena under discussion.

Nottingham, May 12. E. H. BARTON.

I AM much obliged to the Editor of NATURE for giving me an opportunity of commenting upon Prof. Barton's letter. In the second edition of my book on "Theoretical Mechanics" I have expressed my ideas on the subject at such length that it is unnecessary to go into details here. It may suffice to say that the first two of Prof. Barton's proposed enunciations seem to me to be too abbreviated to be of much value. To anyone who understands the theory of mechanics, as explained by the writers whom he cites, such statements could be of little use, while to any-one who does not they might be misleading. The third enunciation does not distinguish between force and the quantity which Routh called "effective force" and I call "kinetic reaction." The distinction appears to me to be important. The fourth enunciation would seem to permit an undesirable degree of freedom in respect to the choice of a reference system. I do not wish to suggest that Prof. Barton means by his brief enunciations something different from what I mean in my book, but rather to point out that such brevity as he aims at may be inconsistent with clearness in the statement of principles. One way of bringing the results of modern critical discussions concerning the laws of motion within the reach of the "ordinary student" would be to publish a short tract, on the same scale, say, as Maxwell's "Matter and Motion." In such a tract summary enunciations could be accompanied by adequate explanations. Would not this be better than providing teachers with a set of enunciations?

May 18. A. E. H. LOVE.

Further Experiments with the Gramophone.

I HAVE just seen Prof. McKendrick's letter in your issue of April 20, describing the experiments he has made with a view to improving the quality of the notes reproduced by a gramophone.

Some five or six years ago, when I was working at the auxetophone, I tried a number of similar devices, and, to a very large extent, succeeded in getting rid of the objectionable hissing and scratching sounds.

One of the horns I tried consisted of a wooden tube of rectangular section and gradually increasing area, which was doubled backwards and forwards on itself in the shape of a flat zigzag, and was practically identical with the metal horn illustrated in your paper.

In the end I found it was best to use a coiled metal trumpet of large size and gradually increasing area and about 48 feet long, in which I introduced several right-angled and "U" shaped bends; further, I fitted a "T" shaped tube close to the reproducer, which made a considerable improvement in the quality of the tone. The longer sound waves passed through this "T" shaped bend with little loss, but the very short waves, which caused most of the scratching, were absorbed at the bend, especially if the blank end of the "T" was filled with cotton wool or some other similar substance, or if an inner sliding tube, with the end closed, was introduced into the blank end of the "T," and pushed in, so as to throttle the sounds at the bend.

I also fitted a flexible joint between the needle and the actual reproducer, which further eliminated these high-period vibrations. This flexibility was obtained by giving the joint very large clearance, and filling the space in between with a highly viscous substance.

I found considerable improvement, as well, in the tone when a paper diaphragm, or when moderate quantities of paper, linen, &c., were put in the trumpet.

In conclusion, I might say that my own experiments quite bear our Prof. McKendrick's opinion on the importance of using suitably shaped trumpets in order to obtain pleasant natural reproductions of musical tones and of the human voice. CHARLES A. PARSONS.

Heaton Works, Newcastle-on-Tyne, May 17.

German East African Dinosaurs.

WITH reference to your note on the German East African Dinosaurs (NATURE, May 18, p. 390), *Die Woche* of May 6 reproduces an interesting series of photographs of the remains, taken on the site of the excavations.

Matlock, May 20. F. GILLMAN.

BREATH FIGURES.

THE manner in which aqueous vapour condenses upon ordinarily clean surfaces of glass or metal is familiar to all. Examination with a magnifier shows that the condensed water is in the form of small lenses, often in pretty close juxtaposition. The number and thickness of these lenses depends upon the cleanness of the glass and the amount of water deposited. In the days of wet collodion every photographer judged of the success of the cleaning process by the uniformity of the dew deposited from the breath.

Information as to the character of the deposit is obtained by looking through it at a candle or small gas flame. The diameter of the halo measures the angle at which the drops meet the glass, an angle which diminishes as the dew evaporates. That the flame is seen at all in good definition is a proof that some of the glass is uncovered. Even when both sides of a plate are dewed the flame is still seen distinctly though with much diminished intensity.

The process of formation may be followed to some extent under the microscope, the breath being led through a tube. The first deposit occurs very suddenly. As the condensation progresses, the drops grow, and many of the smaller ones coalesce. During evaporation there are two sorts of behaviour. Sometimes the boundaries of the drops contract, leaving the glass bare. In other cases the boundary of a drop remains fixed, while the thickness of the lens diminishes until all that remains is a thin lamina. Several successive formations of dew will often take place in what seems to be precisely the same pattern, showing that the local conditions which determine the situation of the drops have a certain degree of permanence.

An interesting and easy experiment has been described by Aitken (Proc. Ed. Soc., p. 94, 1893). Clean a glass plate in the usual way until the breath deposits equally.

"If we now pass over this clean surface the point of a blow-pipe flame, using a very small jet, and passing it over the glass with sufficient quickness to prevent the sudden heating breaking it; and if we now breathe on the glass after it is cold, we shall find the track of the flame clearly marked. While most of the surface looks white by the light reflected from the deposited moisture, the track of the flame is quite black; not a ray of light is scattered by it. It looks as if there were no moisture condensed on that part of the plate, as it seems unchanged; but if it be closely examined by a lens, it will be seen to be quite wet. But the water is so evenly distributed, that it forms a thin film, in which, with proper lighting and the aid of a lens, a display of interference colours may be seen as the film dries and thins away."

"Another way of studying the change produced on the surface of the glass by the action of the flame is to take the [plate], as above described, after a line has been drawn over it with the blow-pipe jet, and when cold let a drop