for wrapping electro-magnets, but his coils were laid flat; whether wrapping them edgewise presents any farther advantages, remains to be seen. It is a pity that M. Schefzik has not published his measurements of effect.

ED.

*On some Phenomena in Connexion with Molten Substances.**

By J. NASMYTH.

Proceedings of the 27th Meeting of the British Asso. for the Adv. of Science.

The author stated, on introducing the above subject to the notice of the Section, that his object in so doing was to direct the attention of scientific men to a class of phenomena which although in their main features might be familiar to practical men, yet appeared to have escaped the attention of those who were more engaged in scientific research. The great fact which he desired to call attention to is comprised in the following general proposition,—namely, that all substances in a molten condition are specifically heavier than the same substance in an unmolten state. Hitherto water has been supposed to be a singular and special exception to the ordinary law,—namely, that as substances were elevated in temperature they became specifically lighter, that is to say, water at temperature 32° on being heated does on its progress towards temperature 40° become more dense and specifically heavier until it reaches 40° , after which, if we continue to elevate the temperature, its density progressively decreases. From the facts which Mr. Nasmyth brought forward, it appears that water is not a special and singular exception in this respect, but that, on the contrary, the phenomenon in relation to change of density (when near the point of solidification) is shared with every substance with which we are at all familiar in a molten state, so entirely so, that Mr. Nasmyth felt himself warranted in propounding, as a general law, the one before stated,—namely, that in every instance in which he has tested its existence he finds that a molten substance is more dense, or specifically heavier, than the same substance in its unmolten state. It is on account of this that if we throw a piece of solid lead into a pot of melted lead, the solid, or unmolten metal, will float in the fluid, or molten metal. Mr. Nasmyth stated, that he found that this fact of the floating of the unmolten substance in the molten, holds true with every substance on which he has tested the existence of the phenomenon in question. As, for instance, in the case of lead, silver, copper, iron, zinc, tin, antimony, bismuth, glass, pitch, rosin, wax, tallow, &c.; and that the same is the case with respect to alloys of metals and mixtures of any of the above named substances. Also, that the normal condition as to density is resumed in most substances a little on the molten side of solidification, and in a few cases the resumption of the normal condition occurs during the act of solidification. He also stated that, from experiments which he had made, he had reason to believe that by heating molten metals up to a temperature far beyond their melting point, the point of maximum density was, as in the case of water, at 40° about to be passed; and that at such very elevated temperatures the normal

*From the London Athenæum, Sept., 1857.

state, as regards reduction of density by increase of temperature, was also resumed, but that as yet he has not been able to test this point with such certainty as to warrant him to allude further to its existence. Mr. Nasmyth concluded his observations by stating, that he considered this to be a subject well worthy of the attention of geologists, who might find in it a key to the explanation of many eruptive or upheaving phenomena which the earth's crust, and especially that of the moon, present,—namely, that on the approach to the point of solidification molten mineral substances then beneath the solid crust of the earth must, in accordance with the above stated law, expand, and tend to elevate or burst up the solid crust,—and also express upwards, through the so cracked surface, streams more or less fluid of those mineral substances which we know must have been originally in a molten condition. Mr. Nasmyth stated, that the aspect of the lunar surface, as revealed to us by powerful telescopes, appeared to him to yield most striking confirmation of the above remark. He concluded by expressing a hope, that the facts which he had brought forward might receive the careful attention of scientific men, which their important bearing on the phenomena in question appeared to him to entitle them to.

A gentleman in the Section asked Mr. Nasmyth whether the facts well known to chemists, that cast iron, and one or two other metals, in the act of solidifying enlarged so as to fill out sharply the minute parts of the mould—which was indeed the property on which their great use chiefly depended—were not at variance with his general principle.—Mr. NASMYTH replied, that, so far from that, they were the most striking examples of its application.

Refraction of Sound.

M. C. Hajech, has reported in the *Nuovo Cimento*, a series of interesting experiments on the refraction of sound. His apparatus consisted in a tube passing through a partition between two chambers, and closed at both ends by membrane, one of which (that turned towards the focus,) could be inclined at any angle to the axis. The tube was filled with the gas or liquid to be experimented on; the sounding body placed in the first chamber in the prolongation of the axis of the tube, and the point (or focus) where the sound was loudest, carefully determined in the second chamber. The following are his results:

1. The sound rays are refracted in passing from one medium to another.
2. The refracted ray lies in the same plane with the incident.
3. The ratio of the sines of incidence and refraction is constant for the same media.
4. The ratio is approximately the same as that of the numbers which express the velocities of sound in the media.
5. The different sounds are all refracted equally.
6. The direction of the refracted ray is independent of the nature of the diaphragms which separate the media; it is also independent (per-