

FEW present-day engineers are aware that Watt produced a steam tilt hammer some years before Nasmyth designed the type of hammer that bears his name. The works at Soho held at one time a great reputation for coppersmith work, and this class of work was done with a Watt tilt hammer, which continued to be in use until quite recently. A photograph of the hammer, together with many others showing machines used by Boulton and Watt, appears in an article in the *Engineer* for September 10. In examining the illustration of one of the Soho boring machines, we are reminded of Watt's early troubles in boring his cylinders—on one occasion we find him rejoicing over a finished cylinder which was nowhere more than $\frac{3}{8}$ -inch from true circularity. We agree with our contemporary that it is greatly to be deplored that the history of machine tools has not been preserved. The ingenuity which has produced the development of machine tools has contributed in no small degree to the rise and progress of mechanical engineering.

A CONSIDERABLE extension of our knowledge of the electrical strength of air has been made by Mr. E. A. Watson, of the University of Liverpool, who has measured the potential difference necessary to cause a spark to pass between two small metal spheres at various distances apart in air at pressures between one and fifteen atmospheres. His paper, and the discussion which arose on it, will be found in the August number of the *Journal of the Institution of Electrical Engineers*. From it we gather that air compressed to fifteen atmospheres will stand an electrical stress of 40,000 volts per millimetre, and it is to be hoped that this fact will soon find its application in apparatus in which high insulation is required.

Erratum.—In NATURE of September 16, p. 339, second column, line twenty-two from bottom, the word satisfactory should be unsatisfactory. The sentence should read:—"With a sextant and artificial horizon, a low altitude, such as 10° or 11° or below, is very unsatisfactory."

OUR ASTRONOMICAL COLUMN.

HALLEY'S COMET.—From a Central News telegram published in Monday's *Daily Telegraph*, we learn that Prof. Burnham has obtained two photographs of Halley's comet, with instruments at Yerkes Observatory.

OBSERVATIONS OF PERRINE'S COMET, 1909b.—A further observation of Perrine's comet, made by Dr. Max Wolf on September 5, is recorded in No. 4355 of the *Astronomische Nachrichten* (p. 179, September 12). With the reflector, and a power of 140, the comet appeared as a round, nebulous mass, of about $10'$ diameter, increasing in intensity towards the centre. The brightness of the whole comet is about equal to the fourteenth magnitude, while the nucleus is about equal to a star of that magnitude.

Dr. Ebell gives an ephemeris for this comet in the same journal showing that it should become about 1.5 magnitudes brighter than it is at present by October 17. The observation of September 5 shows that this ephemeris then required corrections of $-1m. 39s.$ and $-23'$.

OBSERVATIONS OF MARS.—In No. 4354 of the *Astronomische Nachrichten* (p. 159) M. Jonckheere gives a drawing illustrating his observation of August 11–12. The peculiar interest of the observation was the aspect of the Novissima Thyle, which, although still covered with ice, was detached from the polar cap. This feature of the Martian landscape appeared oval, with its broad extremity in long. 330° and its narrow end in long. 310° , its apparent length being $1.42''$.

Measures of the polar cap show that its apparent diameter decreased from $4.33''$ on July 16 to $3.00''$ on August 21.

Further changes are recorded by M. Jarry Desloges in No. 4355 of the same journal. Observations made with a 37-cm. refractor on the Revard plateau on September 3 showed that the white polar spot was divided completely by a crevasse and a greyish region in long. 80° . The region of the Lacus Solis and d'Aurora Sinus, so pale during the previous rotations, showed considerable changes, the details now appearing very different in form, colouring, and position to what they did in 1907. Juventa Fons is dark and easily visible, and the canal Coprates appears to have changed its position since 1907. Nectar is dark and broad, and Araxes is double and very complicated in its structure. Lacus Phoenicis is blackish and is doubled, the southern portion being the smaller. Lacus Tithonius has very indefinite edges, and two dark spots are seen within its area. The Solis Lacus presents a number of detailed features, and is much elongated in the direction east-west. A number of canals, single and double, were observed, and all the regions observed presented such a complicated structure that it was found impossible to make complete drawings.

WATER VAPOUR IN THE MARTIAN ATMOSPHERE.—According to a despatch published in the *Times* of September 17, spectrograms of Mars and the moon, secured by a party of Lick observers on the summit of Mount Whitney, indicate that there is no appreciable quantity of water vapour in the Martian atmosphere. Prof. Campbell suggests that the positive results obtained by Prof. Lowell and other observers may be attributable to water vapour in the earth's atmosphere, but further details should be awaited ere the recent negative results are accepted as final. The photographs are stated to have been taken when Mars and the moon were at the same altitude, and under similar conditions of the earth's atmosphere, yet the vapour bands in the Martian are no stronger than in the lunar spectra; hence it follows that, at the time the spectra were obtained, the quantity of water vapour on Mars was apparently no greater than that on the moon.

THE MAXIMUM OF MIRA IN OCTOBER, 1908.—Dr. Nijland's observations of the magnitude of Mira, made at the Utrecht Observatory during the period July, 1908, to February, 1909, showed that the maximum (mag. = 3.5) occurred on October 6, 1908 (J.D. 2418221), five days before the time given by Guthnick's ephemeris (*Astronomische Nachrichten*, No. 4355, p. 165).

THE SPECTROHELIOGRAPH OF THE CATANIA OBSERVATORY.—In an extract from vol. xvii. of the *Rendiconti della R. Accademia dei Lincei*, Prof. Riccò describes the spectroheliograph now in use at the Catania Observatory, the first to be erected in Italy.

The instrument is made to attach to a telescope, and may be used with a prismatic, or a grating, dispersion. The regulation of the transit of the primary slit across the solar image is effected by a clepsidra containing water with 20 per cent. of glycerine added. The diameter of the solar image operated upon is 52 mm., but the primary slit is but 37 mm. long, therefore the whole disc takes two exposures. Some of the results obtained at Catania, in 1908, are reproduced with the paper, which is also printed in No. 8, vol. xxxviii., of the *Memorie della Società degli Spettroscopisti Italiani*.

H α IMAGES ON SPECTROHELIOGRAMS.—In concluding a letter to the *Observatory*, M. Deslandres states that, on spectroheliograms taken in H α light at Meudon, he has, this year, noted numerous instances where the spectroregister of velocities has revealed some very large radial displacements, similar to those observed by Young in 1872 and Hale in 1892. These were thought to be exceptional phenomena, but Mr. Buss, who calls them "horns," claims that he has seen them with relative frequency. The Meudon observations now confirm Mr. Buss's ocular observations.

DOUBLE-STAR MEASURES.—In Nos. 4353–4 of the *Astronomische Nachrichten*, Prof. Burnham continues the record of the observations of double stars made since the publication of his General Catalogue. The majority of measures refer to doubles otherwise neglected, and comparatively few of the Σ or $O\Sigma$ are considered to require present attention. About 150 systems are included in the list of measures now published.