

applying the gas from coal to economic purposes. Although the gas had been discovered and obtained both naturally and artificially more than half century before, nobody had thought of this application. He perfected the mechanism for such a gas light and described it in the *Philosophical transactions* of the Royal Society in 1808. This earned him the Rumford gold medal of the Society.

PNEUMATIC INVENTIONS

Murdock had made many mechanical improvements in the equipment of the Soho Foundry. Prominent among them is the construction of the first pneumatic lift for the purpose of raising and lowering the castings from the boring mill to the level of the foundry.

He was also the first to make use of compressed air to ring the bell in his house and in the office. He was the inventor of Cast-Iron Cement which is now so much used in the construction of engines and machinery. He invented a crown-screw by which marble and stone could be bored for use as water pipes.

HIS END

Murdock was also the first to invent central heating. While engaged on the erection of this apparatus at Leamington, he met with a severe accident by the fall of a ponderous cast-iron plate upon his leg above his ankle. He never recovered completely from the effects of this injury.

Murdock died November 15, 1839.

ASTRONOMICAL NOTES

Planets during December 1939.—Venus continues to be an evening star and will be visible low down in the western sky for about an hour and a half after sunset; Mercury will be at its greatest elongation from the Sun ($21^{\circ} 25'W.$) on December 17 and can be seen for a short while before sunrise. Mars is rapidly moving eastwards in the constellation Aquarius and although decreasing in brightness, will still be a conspicuous object in the western sky in the early part of the night.

Jupiter will be on the meridian at about sunset and continues to be well placed for observation. Saturn moves slowly in a retrograde direction near the western border of Aries and becomes stationary on December 29. The rings can be seen fairly widened, the angular dimensions of the major and minor axes being $43''$ and $10''$ respectively about the middle of the month. Not far eastwards of this interesting

planet, will be Uranus which can be easily located about 2° south of the star δ Arietis (magnitude 4.5). Neptune is in quadrature with the Sun on December 18, and is stationary on December 29. It is situated about a degree to the north of β Virginis and can be observed with some optical aid. A lunar occultation of some interest that will be visible in India is that of β Capricorni (magnitude 3.2) on the evening of December 14.

Jupiter X.—Two extremely faint satellites (X and XI) of Jupiter were discovered last year by Dr. Nicholson at the Mt. Wilson Observatory. From the revised orbit of J. X published by R. H. Wilson (*P.A.S.P.*, August 1939), it is found that the mean distance is .077 astronomical units and the period 252.8 days. The orbit of this satellite appears to be very close to those of J. VI and J. VII. T. P. B.

MAGNETIC NOTES FOR OCTOBER 1939

MAGNETIC ACTIVITY.—The terrestrial magnetic activity during October 1939 was larger than that in the previous month. There were 6 days of moderate disturbance, and 16 of slight disturbance. The number of days of great disturbance was only one while 8 quiet days occurred during the month.

It is interesting to note that the most disturbed day in the month that of 13th October occurred immediately after the 12th October which is the quietest day during the month. The distribution of the magnetic characters* of individual days is shown in the table below.

Magnetic Storms.—A storm of great intensity with "sudden commencements" in H, D and Z, was recorded on the 13th and 3 moderate storms each with a gradual beginning occurred on 2nd, 9th and 14th respectively. The number of dis-

Dates of the month	Quiet days	Disturbed days		
		Slight	Moderate	Great
1939 Oct.	8, 12, 20, 24, 25, 27, 29 and 31	1, 2, 5 to 7, 10, 11, 16 to 19, 21, 22, 26, 28 and 30	4, 9, 14, 15 and 23	13

turbances during October 1938 were three (one great on 7th, and 2 moderate on 23rd and 25th).

Monthly Characters.—The mean character figure for October 1939 is 0.97 as against 0.94 for the corresponding month of 1938.

M. R. RANGASWAMI.

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* For method of characterisation please see "Magnetic Notes for July, 1939," in *Curr. Sci.*, 1939, 8, No. 9, 434.