f, fig. 2, is a movable door, by which to clean the chamber of the ashes and cinders which fall from the grate.

g, fig. 3, is the tuyere, or blast pipe, through which the supply of air to the fuel is introduced.

i, figs. 2 and 3, is a cast iron plate placed horizontally on the bottom of the furnace; a hole is cut through it for the passage of air from the chamber *b* to the fuel upon the grate.

h, figs. 1 and 3, are two cast iron plates, half an inch in thickness, one of them being placed at each end of the furnace in the inclined positions shown in fig 3.

c, figs. 1, 2, and 3, is an opening two and a half inches high, and two inches wide, through which the gun barrel to be welded is introduced into the furnace; and *d*, figs. 1 and 2, is a recess of the same dimensions in height and width, and one foot ten inches long; its object is to receive the gun barrel, so as to permit the part to be heated to be brought directly over the fire. Into the recess *d*, there is a lateral opening *m*, fig. 1, five inches in width.

The furnace is built of fire bricks, the basis being a common blacksmith's forge. The two ends, as shown in fig. 3, are left open; upon one of them the fireman keeps a pile of coal, which forms a simple and efficient door; the coal is pushed with a poker into the fire, as it requires replenishing, and the pile is renewed.

Note on Astronomical Observations, particularly with reference to a Monthly Statement of Celestial Phenomena, to be Calculated for Philadelphia and its vicinity. By SEARS C. WALKER.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—It has frequently been remarked that while the natural sciences have been cultivated in this city with a zeal and success unexampled in this country, the science of practical astronomy has fallen into general neglect.

An excellent treatise on practical astronomy, by John Gummere, and several valuable papers in the Transactions of the American Philosophical Society, are nearly all that the press of Philadelphia has furnished in the last fifteen years. During this period many volumes and papers have been published on every subject of natural, medical, and chemical sciences, and practical mechanics.

Theoretical astronomy is taught in all our academies of note, and courses are given every year in all our public lecture rooms. These lectures are as well attended as those on any of the natural sciences. At this time, the course on this subject delivered at the room of the Franklin Institute by a gentleman distinguished for his attainments in astronomy, is listened to by a crowded audience.

We should not be astonished that a study so classical in its nature has numerous votaries; but we may be surprised that its practical applications should be neglected.

Yet within a few years the occultations of Venus, Jupiter, Saturn,

of Aldebaran, the transit of Mercury, and the solar eclipse of 1882, have passed away almost unnoticed, or which is nearly the same, the observations which have been made have been kept from the world.

I must here remark that the annular eclipse of 1831, was observed with a zeal whose rarity enhances its value.

It could not have been expected that a study which for fifty years took the lead of all others, should become so nearly obsolete; when in a neighbouring city it is still cultivated with untiring zeal. From the press of that city we are furnished with the means of interpolating between Boston, Mass., and Charleston, S. C., the times of interesting celestial phenomena visible in this place.

It has been supposed by some that the deficiency of apparatus has caused this neglect. I believe that this opinion is erroneous; for the means of making observations have been constantly increasing.

There are in the city, or in its immediate neighbourhood, four telescopes, as good as those used in the Royal Observatory of England for making observations of solar eclipses, lunar occultations, and eclipses of Jupiter's satellites. There are besides four achromatics of three and a half feet focal length, three Gregorians of equivalent magnifying power, and several thirty inch achromatics.

It is worthy of remark, that observations with the last class of thirty inch instruments, are eagerly collected and published in the *Transactions of the Royal Astronomical Society of London*. Chronometers and astronomical clocks are possessed in abundance by individuals; and there is in this city a manufactory of clocks and chronometers, of high reputation at home and abroad.

For rating these chronometers, a sextant would suffice in the hands of a careful observer; but there are four transit instruments either in perfect repair and adjusted to the meridian, or susceptible of repairs and adjustment by mechanical means, in the possession of individuals in this city.

It would seem that it is not the want of instruments which has retarded the progress of this study, for there are several individuals, in this city, better furnished with instruments than was Olbers when he made two discoveries of new planets, either of which will form an era in the history of his native country.

No one, I believe, will maintain that enough has already been done in practical astronomy here; or that additional observations would be useless. The longitude of this place is not completely determined, and were it so, the greater would be the need of accurate observations for correspondence with others made in every section of the country.

A century of observations at the London and Paris observatories, had not determined their difference of longitude with accuracy sufficient for the demands of science in England and France.

It will be a long time before accurate observations will be accumulated in this country to such a degree as to become superfluous. I may rather say, that such a period will never arrive.

It has been found by experience, that the circulation of predicted lunar occultations, and similar phenomena, in the European journals, has done much to promote the cultivation of this useful study.

With a hope that the possessors of astronomical instruments will be disposed to make observations, and publish them in the Journal of the Franklin Institute, or in some other journal, or transactions, I send you a list of the lunar occultations of the fixed stars to the seventh magnitude, inclusive, visible in Philadelphia, in the month of March; together with the eclipses of Jupiter's satellites, and other interesting celestial phenomena. These will be continued in future numbers,* if they meet your approbation, and accomplish the purpose for which they were intended.

I am, gentlemen,

Yours truly and very respectfully,

S. C. WALKER.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Analysis and observations on divers Mineral Substances.

By THOMAS G. CLEMONS.

[Read before the Geological Society of Pennsylvania.]

There exists, near Philadelphia, on the land of Dr. Parrish, considerable quantities of a substance which has the following properties. It is found in amorphous masses, of a dark brown colour, having an earthy fracture, may be cut with a knife, which gives a waxy or resinous lustre to the parts separated, a lustre which may be obtained more perfect by burnishing. It is susceptible of being reduced to an impalpable powder. The vestiges of vegetable fibre have not yet entirely disappeared from it, proving its vegetable origin. When exposed to heat, the ordinary products obtained from organic distillation, are given off.

Ten grammes of a portion previously dried to 100° centigrade, (212° Fah.,) were calcined in a close crucible, the loss in water and bituminous matter, was 3.4 grammes. The remaining 6.6 grammes, were then heated, and at the same time exposed to the air. The earthy residuum weighed 5.57 grammes. From this, the composition in parts of unity is as follows:—

Volatile matter,	. . .	0.340
Carbon	. . .	0.103
Cinders	. . .	0.557
		1.000

The cinders, or earthy matter, left after roasting were coloured of a reddish orange hue, owing to the presence of a little oxide of iron; it might thus be employed as a pigment. When in its natural state, and pulverized, it gives a fine brown colour, with all the intermediate shades between a dark and light brown, and may be used with glue

* The table for March, will be found by our readers at the close of this number.