Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although merely approximate, they are sufficiently accurate to enable the ordinary observer to find the planets. M. M.

POSITIONS OF PLANETS FOR JULY, 1880.

Mercury.

On July 1 Mercury sets a few minutes after 9 in the evening.

Mercury can be readily found, early in July, a few degrees south of the point of sunset; the planet moves rapidly southward, but can be followed, and may be seen as late as the 20th. On July 18 Mercury has nearly the declination of Regulus.

Venus.

Venus keeps nearly the path of the sun, setting after the sun late in July, but so nearly with it that the planet is not likely to be seen.

Mars.

Mars has moved from its position nearly in line with Castor and Pollux toward Leo. It sets on July 1 at 9h. 44m. P.M. On the 31st Mars sets at 8h. 32m.

On the 31st, at meridian passage, Mars and Uranus are nearly together. Uranus is east of Mars and half a degree south.

Jupiter.

Jupiter is coming into the evening hours.

On July 1 Jupiter rises a few minutes after midnight. On July 31 Jupiter rises a few minutes after 10 P.M. It will be known at once by its brilliancy.

Besides the ordinary belts of Jupiter the planet still shows at this time (June 10) the large ruddy spot spoken of by many persons some weeks since. This spot is elliptical in shape; its longest diameter is about one-fifth that of Jupiter. A small glass will show it, and the ordinary observer can, by watching its appearance and disappearance and reappearance, determine the time of rotation of Jupiter on its axis, or the length of the planet's day.

The best evenings for looking at Jupiter are those of July 23, when the satellite nearest to Jupiter goes across its face, preceded by its shadow; July 28, when the first and second satellites will make similar transits; and July 29, when Jupiter will rise without the presence of its third satellite, which will be in eclipse, and will come out of the shadow after midnight.

Saturn.

Saturn follows close upon Jupiter, but keeps further north in declination by about 2½°.

On July 1 Saturn rises 36m. after midnight. On the 31st Saturn rises at 10h. 38m. P.M.

The waning moon will pass north of Jupiter and Saturn on the 27th to 28th.

Any one who has a glass sufficient to show the ring of Saturn and the largest satellite, Titan, will find this planet intensely interesting, and the movements of the satellite will show the time of its revolution in its orbit around Saturn.

Uranus.

Uranus rises after the sun, and sets too nearly with the sun to be seen.

Neptune.

Neptune may be seen, with a good telescope, in the early morning hour. Neptune is 2¼° west of Alpha Ceti, and 11° north. It approaches Alpha Ceti during the month, and if it can be found, may be known to be a planet by that movement.

Fires in New York.

The report of the Board of Fire Commissioners, just printed, shows that during the year 1879 there were in this city 1,551 fires, of which 1,029 were discovered by persons not connected with the Fire or Police Department. In 1,456 cases the fires were confined to the buildings in which they originated. Twenty-five buildings were totally destroyed, and 69 were greatly damaged. Of all the fires, 1,061 were extinguished by buckets of water and fire extinguishers. The total estimated loss by fire during the year was $900,280 on buildings and $4,771,300 on stock, making a total of $5,671,580. The estimated insurances on the buildings were $7,276,446, and on stock, $14,525,264, making a total of $21,801,710. The estimated uninsured loss was $180,060. In three cases the loss was between $100,000 and $115,000; in one case $168,908; in one case $352,185; in one case $333,900; and in one case $1,978,991. In 1,066 cases the loss was less than $100.

Nearly a quarter of all the fires were caused by carelessness, and 100 are attributed to children playing with matches and fire. Forty fires were caused by the spontaneous combustion of oily rags and other materials, and 93 by exploding kerosene lamps. Four members of the department and 12 citizens died of injuries received at fires during the year, and 139 firemen and 54 citizens were more or less injured.

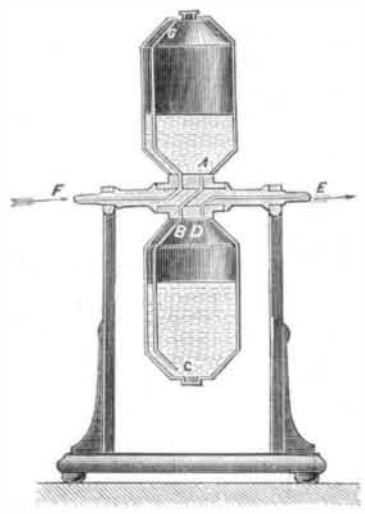
There are 729 uniformed members of the department The pay roll of the whole department for 1879 was $1,030,822.14, and the appropriation for all expenses was $1,254,970. The appropriation for the present year is $1,307,670. The department now possesses 233 horses, 1 marine steam fire engine, 58 steam fire engines, of which 5 are self propelling, 10 chemical engines, 24 hook and ladder trucks, 108 chemical fire extinguishers, and 4 aerial ladders, together with other fire apparatus.

The annual inspection of the department showed that the quickest average time in hitching a team was 3·17 seconds, and in hitching a single horse, 5·66 seconds. The general average in hitching all apparatus was, in 1879, 9·54 seconds; in 1878, 10·26 seconds; and in 1877, 13·03 seconds.

During the year, $30,300 was collected for licenses for the sale of kerosene oil, each license costing $10. The Fire Department Relief Fund now amounts to $422,539.07, and the insurance fund to $12,780.

ASPIRATOR AND COMPRESSOR.

Professor Marangoni, of Pavia, has invented an aspirator for measuring gases which is much simpler than many now in use in laboratories, which latter have the defect that the air or gas ascends through the descending liquid and makes thus the measuring of the former uncertain. The improved apparatus is shown in our illustration. It consists of two vessels attached to a fixed horizontal shaft, F E, which is placed upon two upright supports. This shaft has several ways or passages made in it which performs the functions of the taps. The water of the upper receptacle passes into the lower one by the passage, A, and thence through the tube, B C, issuing at its lowest extremity at C. The air contained in the lower vessel is thus emitted by the channel



D E, cut into the shaft, while the air or gas is aspirated in the same ratio by the passage and tube, F G. The apparatus acts thus at the same time as aspirator and compressor. It is simple, and will be a useful addition to the laboratory.

New Photoglyptic Process.*

WALTER B. WOODBURY.

It is now thirteen years since I had the honor of introducing in France my new photoglyptic process, which, up to the present time, has remained in the hands of very few, owing to the great expense hitherto necessary to start the working of it. For some time I have been engaged in making experiments with a view to discover a system which should be at the same time simple and inexpensive; and the process which I have this evening the honor to bring before your notice is the result of my researches.

The summary of the new system is as follows:

To obtain from negatives reliefs on glass similar to transparencies by the carbon process, but modified in the quantity of materials used.

To attach, and keep in absolute contact with the relief so obtained, a sheet of tin foil.

To solidify this sheet of tin foil by coating it with copper; then backing it up with another sheet of plate glass covered with a composition; and then to detach the whole from the first relief—the result being a mould ready to place in the press and print one thousand or more proofs.

I commence by showing you the relief made from the negative, and explaining how this is obtained.

I take a sheet of plate glass of a convenient size, and place it in hot water, together with a sheet of paper a little smaller; then, having driven out the excess of water by means of a squeegee, I place it on a leveling stand. Having prepared a solution composed of gelatine 200 parts, water 1,000 parts, glycerine 20 parts, white sugar 30 parts, with a little Indian ink, and filtered the same, I pour a sufficient quantity on the paper and spread it up to the corners with the finger. These plates are then dried in a dry place and can be kept until wanted.

To sensitize the plates I employ a bath of bichromate of potash of six per cent, and again dry them. Without doubt this method is rather long; but one should consider that each proof made is capable of giving five or ten thousand prints if necessary, as the same relief will make many printing moulds. I tried, with the aid of the Autotype Company, of London, to get a suitable tissue; but as this requires a uniform thickness of half a millimeter the ordinary system did not succeed. When the sensitized plate is dry the edges are cut with a knife, the glasses serving over and over again. I show you a piece of this prepared paper.

As in the carbon process, it is necessary to place a border of black paper at the back of the negative, and to cut the sensitized tissue a little larger than the opening.

After the exposure the gelatine is fixed on a collodionized glass by placing them both in water and squeegeeing the surface; but in dry weather it is as well to use albumen in place of collodion, as used by M. Ferrier for his transparencies in carbon. The glass holding the gelatine is now placed in a hot water bath heated to 42° Centigrade, and left till the paper comes away from the gelatine, when it is placed in this apparatus by the frame holding the grooves.

By means of this small gas regulator the temperature is kept always the same, namely, 50° Centigrade. The water should be now and then agitated by lifting up and down the frame holding the glasses.

After a space of three or four hours the reliefs will be sufficiently washed, and can be taken out and placed in alcohol to dry quickly and sharp at the same time. In this stage of the process all spots or scratches that may have been on the negative can be removed (being in relief on the gelatine) by means of a piece of glass. The relief is now ready to be covered with the tin. You will observe that up to the present the operations have been almost the same as those necessary to produce a transparency in carbon.

As it is of the first necessity that the tin should be kept in absolute contact with the gelatine relief, I prepare the latter by rubbing it over with a piece of flannel charged with a greasy matter (pomatum answers as well as anything). I then make a border of India-rubber in benzine round the glass. The effect of this is to prevent any air from returning between the tin and the relief when once it has been driven out.

Taking care that the back of the glass is perfectly clean, it is now placed on the steel or glass bed of a rolling-press. A sheet of tin foil (without holes) that has been smoothed on a sheet of glass by a soft brush is now laid on it, and then three or four thicknesses of blotting paper. The whole is then passed under the cylinder several times, each time increasing the pressure. The surface of the tin is now ready to place in the electrotyping cell, but must first be cleaned with a solution of caustic potash to remove any grease, and bordered with shellac varnish to prevent the copper from depositing where not required.

Electric contact is made by means of the small apparatus, on removing a small proportion of the lac varnish. After two or three hours sufficient copper will have been deposited, and after drying can be then attached to another glass, on which it will remain.

This glass is covered while hot with a composition of shellac, resin, and Venice turpentine, and can be prepared in advance, using an iron plate heated direct by the gas flame. The same iron plate is employed to again soften the composition and attach it to the copper; but this time heated only by boiling water, this temperature being sufficient to soften it until it enters into all the hollows of the copper. On placing a weight on the two glasses the excess of the composition is forced out at the edges. When cold the glass plate on which the copper and tin are now attached can be separated from the relief, which can then be used over and over again to produce fresh matrices.

The matrix or intaglio is now ready to place in the printing press, and the remaining operations of printing are exactly the same as those used in the old process of photoglyptic printing.

In placing the mould in the press it is advisable to place one or two thicknesses of stout blotting paper, previously wetted, under the mould to give to it a slight amount of elasticity and, at the same time, to keep it in place.

As in all other mechanical processes a reversed or pellicle negative is required; but it is very simple to print upon a specially prepared transfer paper, and, instead of mounting the print with the face uppermost, to attach it under water to the mount, and when dry to detach the paper on which the print has been made. By this means there remains only one thickness of paper instead of two, thus doing away with an objection which has often been found in mounted photographs for book illustration.

* A communication to the Photographic Society of France.

NEW INVENTIONS.

An improved combined cutting and clinching tool has been patented by Mr. Peter D. Graham, of Black Hawk, Col. The object of this invention is to provide a new, useful, and convenient tool for cutting and clinching horseshoe nails.

Mr. John J. Berger, of Brooklyn, N. Y., has patented an improved hand perforating or check stamp of the class which are used to cut or perforate the paper with figures and letters as a safeguard against alterations of the check; and the object of this improvement is to perforate the check with needle points, and at the same time ink the perforations, whereby the numbers may be clearly marked without cutting large openings in the paper.

An improved apparatus for the manufacture of nitric acid has been patented by Mr. Paul Marcelin, of Black Rock, Conn. The object of this invention is to furnish apparatus for manufacturing nitric acid so constructed that the stronger acid may be separated from the weaker acid as the acid passes from the retort to the receiving bottles, to obtain a strong acid suitable for use in manufacturing nitro-glycerine.

Mr. Max Rubin, of New York city, has patented an improved shawl strap, so constructed that either strap may be wound up alone, or both may be wound up together, or one may be wound up tighter than the other, by adjusting the handle.

Mr. Ambrose Madden, of Asbury Park, N. J., has patented an attachment for use with halters for preventing horses from cribbing and to cure them of that pernicious habit; and the invention consists in a combination of rigid arms and straps hung upon the halter and carrying a spiked plate, which is retained beneath the animal's under lip in such manner that the motions of the horse in the act of cribbing cause the spikes to prick.