

cities. Had it not been for the steam engine there would have been no fire; and it seems to me that it would be much more reasonable to condemn their use than to pitch into Mansard roofs so vigorously.

The amount of property and life annually destroyed in this country, by the use of steam engines, in the compactly built and settled portions of our cities is frightful. Now all this may be prevented by the substitution of either water or air engines for the steam engines. We have both, that are as perfect as steam engines and of are course perfectly safe. True, there is not provision for their use as yet, but that can soon be remedied. Let it once be settled, by law, that no steam engine shall be permitted in any thickly settled portion of a city, and provision will soon be made for the others, both water and air. As to water engines, they can be and are now used to a considerable extent, by simply connecting them to the city water pipes. Of course, the supply of water is not sufficient at present for their general adoption, simply because no such idea was contemplated when the water works were established, and no provision has been made for them. It is, however, a very simple matter to do this; and if there was a demand for it, created by prohibiting the use of steam engines, the supply would soon be furnished. Take, for instance, New York, Boston, Chicago, or any other large city; how easy it would be to lay water pipes for this special purpose, and force water through them by pumps! Sea water would do for this purpose, and the engine for pumping it could be located at any convenient point along the wharf. The water, after being used for the purpose of operating the engines, could then be used to sprinkle the streets, clean the gutters, slush the sewers, and for many other purposes, and thus improve the sanitary condition, while at the same time lessening the demand on the regular water supply for such purposes, which in most cities is fast becoming deficient. There is no doubt that it would pay for any city to increase its water supply for the express purpose of furnishing power, charging a reasonable price for it. It is cheaper than steam power as at present used, and is infinitely safer. In those towns and cities where the Holly system has been adopted, all that is required is to increase the pumping capacity, as the present pipes will answer. If it were intended at the outset to do this, it would be better to increase the size of the pipes, or perhaps have a separate set for that special purpose.

Compressed air may be used in the same manner, but not so well, because it is far more difficult to confine, as it will escape where steam will not; and it is far more difficult to keep the air pumps in working order. One advantage of the air would be better ventilation of shops and buildings, as the escape air might be utilized for this purpose; but I doubt whether it would be of as much use, in a sanitary point of view, as the water.

It seems to me that if "an ounce of preventive is worth more than a pound of cure," this is a remedy well worth our notice. I have no doubt the time will come, when we shall have power conveyed, all through our principal cities, for manufacturing and shop purposes in this way, more especially for all the lighter kinds of work, elevators included; but to effect it, the use of steam must be prohibited.

Washington, D. C. W. C. DODGE.

The Vienna Exhibition.

To the Editor of the Scientific American:

In the presumption that you desire to be correct in your statement of facts in connection with the American department of the Exhibition, will you permit me to point out certain errors in your editorial of November 30?

You say that "In a widely distributed circular issued from General Van Buren's office, we find the following remarkable statement: The Austrian government is exceedingly desirous that the United States shall be well represented, and makes extraordinary concessions to American manufacturers. The Austrian patent law is practically abrogated for the six months following, and inventors are protected by a special ordinance against piracy of their inventions." Now, sir, the circular from which you have taken this extract I find, upon enquiry, was published by Professor Thurston, of the Stevens Institute, at Hoboken, and bears his name and address in full. It was never issued from this office, nor does it purport to be.

The expressions commented on are perhaps a little stronger than may be warranted, and yet it remains true that concessions have been made and that patents are granted without cost to exhibitors, to be in force during the Exhibition and for two months afterwards. In all my statements upon the subject, I have endeavored to give a careful and true account of what had been done for the protection of our inventors and of what I was striving to accomplish. I have never hesitated to say that the policy of the patent laws of most European countries was piracy and not protection, but I have claimed that the disposition of the Austrian authorities in connection with the proposed Exhibition was to modify existing statutes, so as to protect inventions sent to Vienna from this country.

In referring to the treaty upon trade marks, I have never claimed any connection with it, but have spoken of it as being a step in advance and as evidencing a more liberal spirit. So, too, with the law which permits an exhibitor to take out without cost a certificate which operates for the time as a full patent. I admit, and have always done so, that these are not sufficient, that the obnoxious feature of the Austrian patent law, which compels the manufacture of the article in Austria within one year from date of patent, remains. And I have striven to obtain a treaty removing or modifying that provision, not "by simply sending a draft to Washington," as you allege, but by months of correspond-

ence with the proper authorities of both countries and by visiting Washington to urge speedy action. And I have faith to believe that favorable results may be looked for; but I must be pardoned for judging that the violent opposition of some portions of our press and threats of ruining the prospects of our American department at the Exhibition—if they have any effect—will serve to postpone or prevent the success of my endeavors.

You say again that I have appointed sixty-five assistant commissioners. By what authority, may I ask, is this statement made? Not one fifth of that number have yet been appointed; and they are scattered about in some of the larger cities of the Union, and are engaged in distributing programmes of instruction, giving explanations and receiving and forwarding applications for space, etc.

In regard to an appropriation, I propose to ask that the expenses of a certain number of commissioners be paid, not to exceed a limited sum; and that these commissioners shall give their time and labor to the duties of their positions. A proportion of this commission will be composed of some of our most distinguished scientific men, who will thoroughly examine and report upon all parts of the Exhibition.

I propose also that the Government shall bear the expense of receiving, storing, shipping, freightage, and placing all goods sent to the Exhibition and returning them, of fitting up the American department, of the rental of space, of the construction of a model school building, of the necessary office work and rental in this city, and all the absolutely necessary attendant expenses. If this is refused, of course the Exhibition, so far as we are concerned, will fail, in which failure I shall be but little more concerned than any other citizen; but as a citizen, I should deeply regret such a disgrace produced by such causes.

THOS. B. VAN BUREN,

United States Commissioner for the Vienna Exposition of 1873.

[For the Scientific American.]

ASTRONOMICAL NOTES.

OBSERVATORY OF VASSAR COLLEGE.

[For the items of meteorological and astronomical observation and for some of the computations in the accompanying notes, I am indebted to students.]

The times of rising and setting of the planets are for the latitude of Vassar College, and are approximate only, no account having been taken of refraction or dip of the horizon, the aim being to furnish to everyday readers the means of recognizing the planets, and of following them in their apparent daily motion from east to west.—M. M.]

The following notes are from the records of the Observatory of Vassar College, from November 1 to 15, 1872:

THERMOMETER AND BAROMETER.

Highest thermometer at the time of recording was
at 2 P. M., November 1.....59°
Lowest thermometer 7 A. M., November 5.....25°
Highest barometer 7 A. M., " 5.....30.46 in.
Lowest " 2 P. M., " 7.....29.57 in.

The highest wind was from the northwest, November 12, at 9 P. M.

QUANTITY OF RAIN.

	Inches.
November 3.....	0.07
" 5 and 6.....	1.25
" 12.....	1.675
" 14.....	0.365

Amount November 1 to 15.....3.36

SUN SPOTS.

The spots on the sun have been very numerous, and some of them very large. On November 5, five groups were seen by the aid of a glass of low power. One of these groups was very much extended across the disk. On the 7th, this had stretched along for more than half a diameter, and, on the 10th, was easily seen with the eye (protected, as it always should be, by smoked glass). On the 11th it seemed to reach its maximum; on the 16th, it was still to be seen, although the sun's motion on its axis had carried it nearly out of sight. Even with a low magnifying power, more than thirty individual spots could be counted in this remarkable group. They must have been formed rapidly, as the record of November 4 makes no mention of unusual agitation. At this date (November 16), spots of good size are coming on, and will probably be seen for some twelve days.

OCCULTATION.

November 10, at 7h. 55m. 38.9s. the moon occulted, or seemed to pass over, the star 30 *Piscium*, a star of the 5th magnitude. As the moon was not full, its dark limb seemed to approach the star, which disappeared instantaneously as they met.

POSITIONS OF PLANETS FOR DECEMBER, 1872.

MERCURY.

Mercury passes the meridian, or souths, at 1h. 20m. December 1, and at 10h. 27m. on December 31. On the 1st of the month it sets after the sun, about a quarter before six, and on the last of the month it rises before the sun, a little before 6 A. M.

VENUS.

Venus (at this time, November 16, so brilliant in the southwest), sets on December 1 at 6h. 44m., and on December 31, at 5 minutes before 7.

MARS.

Mars is very small, but can easily be known by its ruddy light. It rises December 1, about half past one in the morning, and keeps nearly the path of the celestial equator, setting about half past one in the afternoon. On December 31, Mars is much further south, being 4° north of the bright star *Spica*.

JUPITER.

Jupiter, the most interesting of all the planets, rises at this time (November 16) about midnight; it is becoming more and more favorably situated for observation, and on December 1 will rise a quarter before eleven, and on the 31st, before nine in the evening.

The best time for observing any planet is when it souths; Jupiter souths, or comes to meridian, in the early morning hours all through December, but it is in northern declination, and in this latitude has a good elevation some hours before meridian passage. By the last of December, it can be well seen in the evening. It is in the constellation *Leo*, between *rho* and *gamma Leonis*, nearer to *rho*.

JUPITER'S SATELLITES.

The four moons of Jupiter can be seen with a glass of low power, and their transits, occultations and eclipses, which occur very frequently, render the observations of this planet intensely interesting. The shadow of the largest of these moons will be thrown upon the face of the planet after midnight on the 21st, appearing generally as a round, black spot. The 4th satellite, which is next to the 3rd in size, will be eclipsed on the 24th and will emerge from the shadow of Jupiter at 11h. 47 m. 48s., Washington time.

Seen in large telescopes, the belts of Jupiter are continually changing, and are, some reddish and mottled by dark and white spots, some dusky and broken into irregular stripes.

SATURN.

Saturn is no longer well situated for observation. It is among the stars of *Sagittarius*, and sets at 7h. 11m. on December 1, and at 5h. 29m. on the 31st. Its ring can be seen with a glass of low power.

URANUS.

Uranus is in the constellation *Cancer*. It rises on the 1st about 8:30, P. M., and is well situated for observation. An ordinarily good telescope will show its disk. It comes to meridian at 3h. 50m. on December 1st, and 1h. 49m. on December 31.

NEPTUNE.

Neptune is in good position, but a very good glass is needed to show it to be a planet. It rises on December 1 at 2h. 19m., comes to meridian, or souths, before 9 P. M. (8h. 46m.) and sets a little after 3 A. M.

The Great Pumping Engine in Chicago.

An immense pumping engine has lately been completed and successfully operated in Chicago. It is of 1,200 horse power, and consists of two machines connected by a single shaft. The two steam cylinders are each 70 inches in internal diameter and allow a 20 feet stroke of piston. The steam chests are provided with double puppet-balanced valves, and the unhooking gear is arranged so that both engines may be controlled at the front of either. The flywheel is 25 feet in diameter and weighs 33 tons. With the exception of the great machine at Haarlem, Holland of which the diameter of the cylinder is 12 feet and stroke 10 feet, there is probably no larger pump in existence.

During the past year Chicago has laid nearly 20 miles of water pipe; which is more than has ever been placed in the city during a similar period.

Chinese Arithmetic.

The Chinese have a most ingenious method of reckoning by the aid of the fingers, performing all the operations of addition, subtraction, multiplication, and division, with numbers from 1 up to 100,000. Every finger of the left hand represents nine figures, as follows:—The little finger represents units, the ring finger tens, the middle finger hundreds, the forefinger thousands, the thumb tens of thousands. When the three joints of each finger are touched from the palm towards the tip they count one, two, and three of each of the denominations as above named. Four, five, and six are counted on the back of the finger joints in the same way; seven, eight, and nine are counted on the right side of the joints from the palm to the tip. The forefinger of the right hand is used as a pointer. Thus, 1, 2, 3, 4 would be indicated by first touching the joint of the forefinger; next the the hand on the inside; next the middle joint of the middle finger on the inside; next the end joint of the ring finger on the inside; and finally the joint of the little finger next the hand on the outside. The reader will be able to make further examples for himself.

Action of the Brain.

M. Fournié communicates to *Les Mondes* the following interesting experiment on the cerebro-spinal nervous system of animals. He says: "I wished to determine a process which would permit me to injure any portion of the brain without destroying life. With this view I made a small hole in the skull of a living animal by means of the instrument used in surgery for osseous sutures; then across this hole I introduced the needle of a hypodermic syringe (*séringue Pravaz*), and, at the point of the brain I wished to destroy, I injected a caustic solution, chloride of zinc colored blue. The part touched by the fluid was injured; consequently it ceased to fulfil its functions. After the subject had reposed, I noted the symptoms presented for some twenty-four hours and then killed the animal. I discovered readily the injured part by the induration of the tissues and the blue coloration. The experiments show plainly that simple perception resides in the optic couches (*couches optiques*), that distinct perception and memory require the integrity of the cortical periphery, and that the lesion of the circumvolutions is not accompanied by paralysis of the members but only by weakening." The author proposes to extend these experiments with a view of arriving at further important results.