than the boiler contains. The bottom or water connection should be taken from the front head at a point where about two thirds of the water in the boiler will be above it and one third below; this will lessen the chances of the pipe stopping up with mud, etc., and it should also be provided with a half inch pipe at the lowest point for a blow-out. When gauge glasses are set this way the condensation in the cylinder is downward, and the flow of water being toward the boiler through the bottom pipe, the tendency is to cleanse the glass and cylinder and keep them so.

Steam Gauges should never be set much above or below the boilers to which they are attached, as each two feet of fall or elevation from the direct connection is nearly equal to a difference of one pound on the steam gauge; always when the gauge is below, for the condensation in the gauge pipe fills it with water, which leaves a pressure on the steam gauge equal to the hydrostatic head, which is a little over two feet perpendicularly to the pound per steam gauge, giving the gauge the appearance of being weak. When the gauge is above it is not always so, though generally, the pipes being long and of small diameter or trapped, which prevents a circulation of steam in them, they fill with water, which acts against the pressure from the boiler and gives a gauge the appearance of being strong. A good way is to connect the gauge pipe to a boiler below the water line, say 12 or 18 inches, and have the gauge on the boiler about 12 inches above the water line, using no water trap or siphon, that the water may run back from the gauge when there is no pressure in the boiler, thereby preventing the possibility of freezing or of getting steam to the spring of the gauge.

Sometimes a steam fitter has to run a gauge pipe a long distance to an office or engine room. When such a gauge is far above the boiler he should run a large pipe direct from the steam dome and give it sufficient pitch to clear itself of water; it should be covered with some non-conducting material, and be of such size that the flow of steam through the pipe to supply the loss by condensation will be so slow as not to interfere with the flow of water along the bottom of the pipe in a contrary direction, and it should have a siphon immediately under the gauge.

When it is necessary to have a gauge very much lower than a boiler, fill the pipe with water, but before doing so remove the glass and lift the hand or index over the stop-pin and mark where it remains stationary; now fill the pipe to its highest point with water, then with two knives draw the index from its spindle and set it back to the mark where it remained stationary before the pipe was filled, and press it on; then bring it to its normal position on the stop pin and adjust the glass.

The Main Steam Pipe for Heating Apparatus should be high up on a boiler, and any pipe larger than 2 inch should not be tapped in, but connected with a flange bolted or riveted to the boiler. Two and a half inch pipe and larger sizes have eight threads to the inch, and will not make a good job otherwise.

Automatic water feeders, combination water gauges, or steam gauges, should not be tapped into the steam heating or engine pipe, as the draught of the steam through the pipe interferes with their proper working.

Engine or pump pipes should not be taken from the steam heating pipe, as the draught they cause relieves the pressure in the heating apparatus and spoils the circulation, especially if it is a direct return gravity circulation.

With an automatic return steam trap applied to an old job, if the steam heating pipe is large enough, it will not be necessary to move the engine pipe, but should the circulation be still defective, remove the engine pipe to shell of boiler remote from heating pipe. W. J. B.

PROCEEDINGS OF THE AMERICAN ASSOCIATION.

Subsequent to our last week's report, at one of the general meetings the chief incident was the reception of Professor Otto Struve, Director of the Imperial Observatory at Pultowa, Russia. Professor Struve explained his mission to America in the interest of the observatory under his care, and announced that Messrs. Alvan Clark & Sons, of Boston, Mass., had undertaken to construct for it the finest telescope the world could produce.

Among the more valuable papers read were: Professor Peirce's on the meteoric constitution of the sidereal universe, in which he developed at great length the theory set before the readers of the SCIENTIFIC AMERICAN last winter. Professor Leeds, of Stevens Institute, reviewed the long standing problem as to the solubility of ozone in water, and gave the reasons for believing that it is so dissolved, and that it retains in the solution its characteristic oxidizing power. Professor H. W. Wiley, of Purdue University, Lafayette, Ind., described an improved method of collecting and measuring gases soluble in water, and Professor F. W. Clarke, of Cincinnati, gave a preliminary notice of results obtained in an elaborate revision of the calculations determining the atomic weights of the chemical elements.

The paper of Professor Goode, of Middleton, Conn., on the menhaden, presented that cousin of the shad as not only the most valuable of the food supplies of edible fishes, but as the most important source of fish oil. Its annual yield of oil exceeds that of the whale (from American fisheries) by 200,000 gallons; and in the commercial value of all its products it is surpassed by but three fish: the cod fishery, estimated in 1876 as yielding $4,826,000; the whale fishery, $2,850,000; the mackerel, $2,275,000. The value of the menhaden taken this year amounted to $1,658,000.

Major Powell delivered, in Section B, the suggestive and valuable address on Mythologic Philosophy, printed in the SUPPLEMENT last week; and Professor Stephen P. Langly, whose instructive series of articles on the Sun has just been completed in this paper, discussed the same subject in his address as vice-president of Section A.

Commander E. P. Lull, U.S.N., read an important and timely paper on the Interoceanic Canal Problem, illustrating by maps and diagrams the several routes surveyed. The character and advantages of the Nicaragua route were specially dwelt upon; and the belief was very positively expressed that no commercially practical route without locks had been found.

Professor Draper's paper on the Identity of the Lines of Oxygen with Bright Solar Lines, as shown in photographs taken with increased dispersion, was read, in his absence, by Professor Barker.

A very popular and enjoyable paper was Mr. Wm. T. Hornaday's on the Orang-Outangs of Borneo. Touching the possible human relationships of the orangs, Mr. Hornaday said:

"Let such a one (if, indeed, such a one exists to-day), who is prejudiced against Darwinian views, go to the forests of Borneo. Let him there watch from day to day this strangely human form in all its various phases of existence. Let him see it climb, walk, build its nest, eat and drink, and fight like human 'roughs.' Let him see the female suckle her young and carry it astride her hip precisely as do the Cooly women of Hindostan. Let him witness their human-like emotions of affection, satisfaction, pain, and childish rage—let him see all this, and then he may feel how much more patent has been this lesson than all he has read in pages of abstract ratiocination."

Another interesting paper was on the Serpent Myths of the Red Men, by Judge J. G. Henderson, whose paper on superstitions connected with the rabbit, among our Indians and other primitive people, had been listened to the day before.

Mr. Edison's electro-chemical telephone was exhibited and explained by Professor Barker, and Mr. Edison, the inventor, acting also as draughtsman for the blackboard illustrations.

President Barnard, of Columbia College, read a paper on the Past State of the World's Metrology as Bearing on the Progress of Science, in which the progress of modern science was shown to hinge on the possession of exacter means of measurement than the world had previously known.

The chief paper of the closing day was Mr. Edison's on the Phenomena of Heating Metal in Vacuo by Means of an Electric Current, a report of which will be found on another page. Both this paper and that by Mr. Edison's mathematical assistant, Mr. Upton, on Tests of Faradic Machines, furnish ample confirmation, if it were needed, of the position we took last week in respect to the scientific investigations of modern inventors.

In this brief notice it is obviously impossible to do anything like justice to the multitude of valuable papers presented to the association. It has been an active, earnest, business-like session, as notable for its good work as for its full attendance. The place of meeting had been happily chosen, the weather was favorable, and all the external conditions conspired to make the meeting as pleasant as it was profitable.

It was resolved to hold the next meeting in Boston, beginning the last Wednesday in August, 1880. The following officers were elected for the coming year:

President—The Hon. L. H. Morgan, of Rochester.

Vice-President, Section A—Professor Asaph Hall, of Washington.

Vice-President, Section B—Professor Alexander Agassiz, of Cambridge.

Permanent Secretary—Professor F. W. Putnam, of Cambridge.

General Secretary—Professor John K. Rees, of St. Louis.

Secretary of Section A—Henry B. Nason, of Troy.

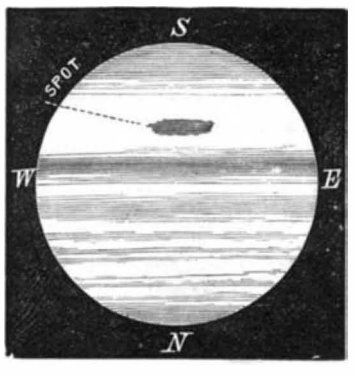
Secretary of Section B—Professor C. V. Riley, of St. Louis.

Treasurer—William S. Vaux, of Philadelphia.

The Remarkable Spot on the Disk of Jupiter.

To the Editor of the Scientific American:

Having from time to time seen in the SCIENTIFIC AMERICAN notices from your correspondents respecting the appearance of black spots upon the disk of the planet Jupiter, I



have of late watched with all possible care for such phenomena, but have seen no spots save such as any experienced observer would readily recognize as being produced by the transit of a satellite or its shadow. However, on the 25th inst., at 9:30 P. M. time at this place, I observed advancing upon the eastern wing of the planet, midway between the southern equatorial belt and the southern gray zone, a dusky patch of irregular outline, which in one hour and fifty-five minutes reached the position and assumed the appearance, shown in the accompanying rough yet faithful diagram.

The length of this patch when seen in the position shown was little more than one-fifth of the planet's diameter, and about one-fourth as broad as long. Color, decided pink; indeed the color at times appeared so vivid as to make the equatorial belts, usually of a dusky red color, appear by contrast of a somber gray.

From the first appearance of this patch until it commenced to pass off on the opposite limb, the time elapsed was three hours and fifty minutes. The same phenomen on was again observed on the evening of the 28th inst., without any apparent change.

These observations were made with an achromatic of four inches aperture.

Phenomena of this kind, though not unknown, are of rare occurrence. South mentions having seen a large spot, somewhat of this kind, on the 3d of June, 1839, but of so evanescent a nature that it partly disappeared before a sketch of it could be made. I have recently noticed other disturbances of the Jovial atmosphere well worthy of vigorous scrutiny with the highest optical aid.

As some of your readers are students of astronomy, I should be pleased to know the results of their observations on this subject. F. S. DAVENPORT.

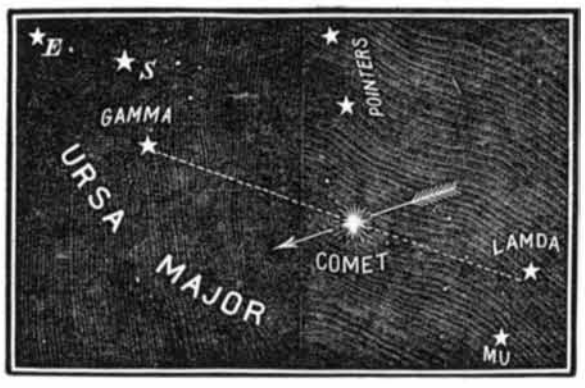
Jerseyville, Ill., Aug. 30, 1879.

ASTRONOMICAL NOTES.

PALISA'S NEW COMET.

It was my pleasure to obtain, at half past three o'clock this morning, very good observations of the new comet discovered by Palisa at Vienna on the 21st inst. It is not well situated for observation in this part of the world, owing to its slight altitude in the morning before daybreak, and in the evening the moon at present interferes. Notwithstanding this, it is quite a conspicuous object in the telescope, about twice as bright as Swift's last comet. It must really be a magnificent object in localities where it can be seen at a good elevation, as was the case when discovered. It is now nearly pointed at (south) by the "pointers" in Ursa Major, being in that constellation, and nearly on a line drawn from *Lambda* to *Gamma* Ursæ Majoris.

The comet is directly opposite the Pole Star from the



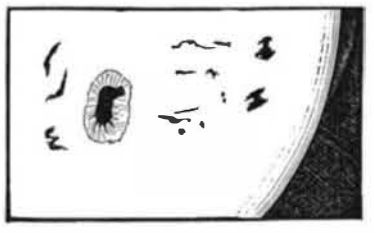
"pointers," and moving slowly toward the southeast, as indicated by the arrow in the diagram.

GRANDEUR OF THE MORNING SKIES.

A grander spectacle seldom greets the eye of man than that presented by our early morning skies at the present time. Three gorgeous planets form a royal girdle across the heavens. Jupiter in the west, Saturn high in the south, Mars well up in the east, and beyond, almost in a direct line with these planets, ruddy-faced Aldebaran. Overhead Cassiopeia and the Pleiades. Well down in the east noble Orion on his ride, while later, in the morning glow, shines silver-faced Sirius, in splendor rivaling Venus in the evening twilight. He who misses these grand scenes, misses royal soul feasts that the gods might envy.

SUN SPOTS.

A very pretty group of sun spots was observed on the 24th, just below the center of the disk, now much changed and nearing the western limb, but surrounded with intensely bright faculæ. Yesterday morning an interesting group appeared on the eastern limb with the faculæ very marked, and giving in its structure manifest evidences of rapid change. This morning confirmed the impression, for a large spot, unseen before, had broken out, and numerous small ones. Its appearance this morning (28th) is indicated in Fig.



2. This group of spots will be watched with interest as it traverses the solar disk, and may be seen with quite a small telescope. WILLIAM R. BROOKS.

Red House Observatory,
Phelps, N. Y., Aug. 28, 1879.