have here a tight tin box, and in this pan some lumps of quick-lime. Now if I pour some water on the lime, the water will enter into chemical combination with the lime, and will be solidified—giving out its 142° of latent heat. I will put this ground coffee into this cold water, and set the dish into the box. I will also place some eggs and oysters in this pan and place the pan in the box. Now if I pour some water upon the lime and close the lid of the box, I think we shall find that the water in solidifying will give out sufficient heat to cook the eggs and oysters, and to draw the coffee. Though the lime absorbs the water it exhibits no appearance of moisture. The water becomes as solid and as dry as the lime. [A great cloud of steam arose from the box, and at the close of the lecture the food was found to be cooked.] Water in changing from the liquid form to the gaseous, absorbs and renders latent not less than 1,000° of heat. The law applies to all substances; in changing from the solid to the liquid form, or from the liquid to the gaseous, they absorb and conceal a quantity of heat; the quantities varying with the several substances."

CARBONIC ACID.

"I have in this glass-beaker some marble dust. It is the carbonate of lime—composed of lime and carbonic acid. If I pour some sulphuric acid upon it, the stronger acid will seize upon the lime and the carbonic acid will be set free in the form of an invisible gas. After the beaker is filled, as the gas continues to be generated, it will be forced over through this curved tube into this large glass vase. As the carbonic acid is as invisible as air, we will test its presence by lowering into the vase a lighted candle, which will be extinguished as soon as it enters the gas. You see the vase is about half full. As soon as the vase is filled I will demonstrate that carbonic acid gas is heavier than air by pouring it down this trough." [A light wooden trough some ten feet in length, with a hopper at the upper end, was inclined from the stage down towards the audience, and the assistants lighted a series of short candles and fixed them along the bottom of the trough. The lecturer then placed the brim of the large vase over the hopper, and inclined the vessel in a way to pour its contents into the hopper. As the invisible gas flowed downward along the trough, all of the candles were in succession extinguished. This striking experiment elicited universal applause.]

THE CONDENSATION OF CARBONIC ACID.

"At ordinary pressures carbonic acid retains the gaseous form; but under a pressure of about 900 lbs. to the square inch, it is condensed to a liquid. In this strong wrought-iron vessel, I placed a quantity of carbonate of soda, and filled a copper tube within the vessel with sulphuric acid. Then after the vessel was very securely closed, it was inclined on its trunnions, so as to pour the sulphuric acid from the tube into the carbonate of soda. The carbonic acid from the soda was set free in such quantities as to raise the pressure to the point of condensation. The liquid was then discharged into another similar vessel, which I have here surrounded with ice. By repeating the process several times, I have collected about a gallon of liquid carbonic acid. I have a little in this small strong glass tube. You see that it is as pellucid as water, and more fluid. If the tube should be cracked, or even scratched, an explosion would follow, and the liquid would suddenly expand into a gas. If we allow a portion of the liquid in this iron vessel to escape into the air, part of it will expand into gas, and in the act of expanding it will absorb so much latent heat as to freeze the rest of the liquid that escapes, and we shall have solid carbonic acid." [The assistants then opened the stop-cock a little, a sound like escaping steam was heard, and presently they brought forward a stout cotton bag which contained a pound or two of a white, snowy-looking substance which was solid carbonic acid.]

FREEZING MERCURY.

"If we place this carbonic acid on some mercury, and dissolve it with ether, as it assumes the liquid state, it will absorb so much heat from the mercury as to freeze that liquid metal. [A couple of pounds of mercury were poured into a wooden mold, and covered with the solid carbonic acid, upon which was then poured some ether from a bottle. In two or three minutes the lecturer turned the mercury from out the mold in the form of a solid bar, which he threw down upon the floor without breaking it.] This solid mercury cannot be less than 40° below zero and it is probably 60° or 70°. If touched to the wrist it will freeze the skin instantly, raising a blister as quickly as if the skin were touched with a red-hot iron. Any one who chooses may try the experiment."

FREEZING MERCURY IN A RED-HOT CUP.

"The extremes of heat and cold may be exhibited in a very striking manner, by means of solid carbonic acid. This platina cup [holding about a gill] you see is red-hot. I will fill it with some fragments of this solid carbonic acid, which I will wet with ether. If I now introduce this thimble-full of mercury into the middle of the mass, it will soon be frozen. A portion of the carbonic acid takes the spheroidal state, which prevents its contact with the heated platina, and thus the cup continues red-hot, while the mercury in its middle is freezing." [In about two minutes the thimble was withdrawn, and the solid lump of mercury was knocked out of it upon the table!]

GODWIN'S PATENT LUBRICATOR.

The object of this invention is the admission of oil or melted tallow to the cylinder and other parts of the

steam engine under steam pressure, in such a manner that it cannot escape during the admission of the lubricating substance.

The inventor says:—"It is evident that every arrangement to effect this object must consist of two chambers or reservoirs, with two valves so connected and operated that one valve shall always be closed to prevent the escape of steam while the other is open for the passage of the lubricating substance, and that these offices should be alternately performed by each valve. This lubricator will accomplish the object in a manner at once simple, convenient and effective."

In the engraving A represents a combined feeding cup and stuffing-box screwed to the top of the reservoir, B. In the lower part of the reservoir a tube, D, rises, through which a channel communicates with the machinery to be lubricated; the top of the tube forming the seat of the lower valve, C. A boss (not shown in the engraving) also projects downward from the top of the reservoir, B, and is provided internally with a screw thread, which receives the hollow vertical shaft, E. This shaft is tubular from the top to a point near its bottom. The bore within it communicates with the cavity of the reservoir, B, by the holes, *b b*, and with the open feeding cup, A, by means of the apertures, *a a*. F is a screw plug and handle moving up and down in the shaft, E, and opening or closing the apertures *a*. The threads by which this screw plug moves in the shaft, run in an opposite direction to the threads by which the shaft is moved up and down in the boss on the upper end of the reservoir. The lower end of the shaft is seated upon the upper end of the tube, D, forming a closely-fitting valve.

The operation of this lubricator is as follows:—By turning the handle, F, in one direction the screw plug attached to it descends upon its seat, inside and just below the holes, *a*, closing the apertures, *a*, the motion of this handle is thereupon communicated to the whole shaft, E, which, held by screw threads running in an opposite direction to those of the plug, begins to move upward and opens the lower valve, C. Upon reversing the motion of the handle, the shaft, E, screws back again, closing the lower valve, C. The moment this is done the motion of the shaft stops, and if the movement of the handle, F, be continued, the upper valve plug rises again, opening the apertures, *a*, as before. By grasping the milled collar, H, the lower valve may be screwed down upon its seat independent of the use of the handle for that purpose.

The object of the tube, G, is to prevent the condensed water from being fed through to the machinery; besides this, the oil rises above the condensed water and flows into the tube, F, thereby making a most complete and accurate self-feeding cup, regulated by the quantity of steam admitted into the reservoir; for as the steam condenses and the water accumulates, the oil must pass out through D. The water may be drawn off by the tube, G, or by a small cock at the bottom of the reservoir.

This lubricator is an improvement on one which was patented on Nov. 3, 1863, by T. W. Godwin, of Norfolk, Va. For further information address Hayden, Gere & Co., 84 Beekman street, New York, who have the article for sale.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

This Association held its regular weekly meeting in its room at the Cooper Institute on Thursday evening, Feb. 11th; the President, S. D. Tillman, in the chair.

The chairman presented the following summary:—

OCCULT POISONS.

Prof. Letherby, of London, has ascertained that nitro-benzole and aniline in their free states are powerful narcotic poisons. As these substances are produced in the process of making coal-tar dyes, persons engaged in that manufacture should be on their guard. Nitro-benzole may remain a long time in the system before producing any effect, and then, after exerting its fatal power, it is so changed as to leave scarcely any traces of its presence.

THE WEATHER AND WEATHER PROPHETS.

Sir John F. W. Herschel has an interesting article under this head in *Good Words*. He says that it is ascertained that the winds in their changes have a tendency to "follow the sun," that is to so change as to turn the vane through the south, west, north and east in the northern hemisphere, and the opposite way in the southern hemisphere. Mr. Dove has connected this with that great fact which underlies so many other phenomena—the rotation of the earth upon its axis.

TYPHOID FEVER.

Prof. Sigri, in a memoir to the French Academy, states that the infusoria, *Bacteriums*, were found in the blood of a man who died of this disease at the hospital of Sienna. It has long been suspected that malaria is an animal or vegetable organism.

A PARASITIC PESTILENCE.

Van Rundoff Leuchart states that one-sixth of the annual deaths in Iceland are owing to a little parasitic animal living in the dog. The larva if kept in an undeveloped condition grows to a large size. These larvae infest both men and cattle.

TIDE WAVES AND WIND WAVES.

This being the regular subject of the evening, it was next taken up.

The Chairman:—"The self-registering tide-gauge used in the U. S. Coast Survey was invented by Joseph Saxton. One of the most interesting cases o