butter in a short time. Sometimes the skins are kneaded with the feet as observed by Dr. Chandler while traveling in Greece.

In Bengal they churn every morning that they may have fresh butter for breakfast. They simply stir the milk rapidly with a stick. In some parts of the East they make butter of the milk of the buffalo; but this is in every way inferior to that made from cow's milk. W. R. S.

Action of Hydrogen on Red Hot Oxide of Iron.

To the Editor of the Scientific American:

In a late number of the SCIENTIFIC AMERICAN, there appeared an article on "Boiler Explosions" over the signature of John Lynch, M.D., Professorin South Carolina University, which makes an erroneous statement of chemical facts.

The writer, iu discussing boiler explosions, comes to the conclusion that they are caused by the chemical combination of hydrogen and oxygen gases. His error consists in confounding the action of free hydrogen when in contact with free oxygen, with the action of free hydrogen when in contact with combined oxygen.

I quote a few words for the purpose of explanation: "While the machinery is not in motion, or the steam not escaping freely, the hydrogen fills the upper portion of the boiler, and does not come in contact with the red hot iron or its oxide; but any cause which may produce an expansion or disturbance of the gas, so as to bring it into contact with the oxide of iron, heated to the same temperature as will decompose steam, the gases will immediately become chemically combined, producing a most intense heat ('the most intense heat that can be produced is caused by the combustion of hydrogen gas') and *causing an explosion;* at the same time the "oxide of iron will be reduced to its metallic state." I have italicized the words to which attention is directed. No explosion will take place from the combination of the free hydrogen with the combined oxygen of the oxide of iron, supposing for a moment that such an unheard of state of things, as the contact of free hydrogen with red hot oxide of iron in an ordinary boiler, should exist.

An explosion from the combination of hydrogen and oxygen results only when these mixed free gases are ignited by intense heat. When free dry hydrogen is passed over red hot oxide of iron or copper, there is no free gaseous oxygen to combine with the hydrogen, but oxygen in a solid combined state. This oxygen, the hydrogen abstracts from the iron quietly and without explosion, forming vapor of water, while metallic iron remains behind.

In an ordinary steam boiler no free oxygen can, under any circumstances, be produced from the decomposition of the water or steam, and there is good authority for stating that no free hydrogen can be so produced. Consequently, no explosion can take place from the ignition of the mixed gases.

I agree with the writer that "the engineer should study thoroughly not only machinery but also chemistry, at least so far as it relates to those bodies which he is obliged to use."

But this study should not embrace any erroneous chemical theories unsupported by chemical facts; but should include especially the tensile strength of iron under the varying conditions of thickness and temperature, and the immense power capable of being developed by the generation of steam in a confined space.

The intelligent engineer should not be long in learning the fact (though Heaven save him from the personal experience so necessary in other matters) that, when a boiler explodes, it is because the shell of iron without is not strong enough to withstand the pressure of steam within.

West Farms, N. Y. JOHN F. GESNER.

Testing Boilers by Hydrostatic Pressure.

To the Editor of the Scientific American:

In your paper of September 2d, you published a letter from me in which I questioned the possibility of testing a steam boiler properly in the manner stated in the testimony of Inspector John K. Mathews. In your issue of September 30th, I find an answer, to my communication, signed by that gentleman, in which he explains how, by having a man at the safety valve, men stationed at the blow cocks, and men at the main valves of the engine, with the men, as sworn to, at the hydrant valve, and, I suppose, properly agreed signals, such a feat is possible. For so much of the communication I am thankful; the rest proves nothing except that Mr. Mathews is unable to discuss a simple question without showing his contempt for the witnesses of coroners' inquests (among which are some of the ablest and truest men in the country); no doubt he dislikes the whole institution, and particularly its characteristic prying into people's actions.

"That knaves and fools will exist with the human race" (to use his own words) is evident; and as long as men, innocent of overalls and too large to get through a manhole, take the oath and fee of inspectors, and certify to a thorough inspection of steam boilers, there is no danger of either the one or the other running out.

But, Mr. Editor, the question under consideration is a serious one, for on its decision depend the lives of the people. It is certainly very convenient to fill a boiler by a hydrant; and it would be more so to call this a thorough test. Yet the man must be very selfish and devoid of all regard to the sacred obligation of an oath who would not spend ten minutes to attach a pump and really and truly test the boiler under hydrostatic pressure. I am not willing to admit that men, at all the possible outlets of a boiler, could save the same from strain and injury; for water has no practical elasticity, and even lightning would not be quick enough to save the boiler from overstrain. But there is, fortunately, one security. Boilers, when subjected to hydrostatic pressure, gradually change their form, and assume the one which holds the largest amount of water. A barrel nearly approaching a cylinder will become a perfect one under *maximum* test; all stays are gradually brought to their true tension, and, if one should be too short, it will (being unable to stand the whole pressure of several hundred inches) be torn off; plates not properly cut and caulked will be strained and leak, and the whole boiler will assume the shape, appearance, and duty as though it was under the same pressure of steam, with this exception, that the solid pressure of water on a cold boiler is more severe.

The object of the law is manifest, and is intended to show what the condition of the boiler is under this test. For this purpose it is to be examined carefully outside while under pressure, and inside when the pressure is relieved. That this can be done thoroughly in the manner sworn to as having been done on the *Westfield,* I deny.

Unless Mr. Mathews will add to our information, and condescend to treat correspondents of the SCIENTIFIC AMERICAN as gentlemen, and not as fools and knaves, I cannot further recognize him. JOSEPH A. MILLER.

Boston, Mass.

Treatment of Colorado Ores.

To the Editor of the Scientific American:

I am much pleased to have, by means of my article upon this subject, drawn forth Mr. Church's letter in your issue of October 7th. I do not consider myself competent to judge of the correctness of the position taken by this gentleman; but I am glad to find that, by having the accounts at the mine, in which I am interested, kept in a systematic manner, and by contributing these details to Professor Hague, I have done something toward enabling Mr. Church to prove, as he believes, the correctness of his theory.

For one, however, I hope Mr. Church will not include me among the number of mineowners who have "systematically resisted all efforts to ascertain the truth." For some years I have sought, by having weekly returns of all costs and results, by having assays constantly made of the ores, and by all other means in my power, to ascertain "the truth;" and all facts I have gleaned have, in one way and another, been placed before those interested, with the desire that others might throw still more light upon the subject than I was able to.

Long since I came to the conclusion that concentration was the remedy, but how shall we effectively concentrate? I think the gold ores of Colorado will average not far from thirty dollars per tun. The smelter will pay us a much better proportionate price for an ore worth $150 than one worth $100 per tun. How can we concentrate to a value of $150 per tun? THOS. J. LEE.

Boston, Mass.

Ignition by Superheated Steam.

To the Editor of the Scientific American:

An accident occurred here recently to a Low steam automatic heating arrangement, whereby a valuable building and some lives were placed in great peril. The heating arrangement has attached to it a regulator which admits water to supply the loss by evaporation, connected to the boiler by two pipes, one at the top and one at the bottom. The bottom pipe became closed by rust, preventing the water from entering the boiler, while, at the same time, the glass gage indicated water at the usual hight. The consequence was the boiler became empty, and nearly white hot, creating superheated steam, which set fire to the felting or covering around the pipes. This was discovered just in time to prevent serious damage.

I would suggest that parties having these heaters should have the pipes that lead to the boiler taken off and examined, as that is the only way the evil can be detected; and then place a draw off cock on the same.

Canton, Ohio. G. W. D.

Liquid Measuring Can.

In this invention, an ordinary sheet metal can has a large vertical tube, and a smaller one, placed beside the large one, extending from the bottom or below the bottom to the top. A float in the larger one is intended to rest on the liquid and is partly suspended, by a cord passing up over pulleys, down the side of the can, around a pulley, and back over pulleys and down into a smaller tube to a weight suspended by it. One of the pulleys carries a notched disk, which will be turned the distance between two notches by the falling of the float when a given quantity of fluid is drawn, say a pint, the parts being accurately adjusted therefor. A pawl, resting on the edge of the disk and dropping into the notches as each one comes under it, shows when the given quantity has been drawn. The disk is held always in the right position, when the drawing begins, to be turned forward just one measure between the notches before the pawl drops. A three way cock for drawing from the large measuring tube has a branch leading from the bottom of the can, for allowlowing the liquid to flow into the tube through said cock when the flow from the tube is stopped; but when opened to draw therefrom, the cock is turned against the passage so as to shut off the flow therefrom. The disk may be notched to indicate any measures preferred, and it may be arranged on any approved part of the can. The weight need not necessarily be arranged in a tube, but is so preferred. Mr. Christopher Martin Bridges, of Leon, Iowa, is the inventor of this improvement.

THERE is perhaps no time at which we are disposed to think so highly of a friend as when we find him standing higher than we expected in the esteem of others.

[Special Correspondence of the Scientific American.]

THE CERULEAN PLEASONTON'S SUNSHINE PATENT.

Washington, D. C.

The cerulean Pleasonton (Gen. A. J., of Philadelphia, not the Hon. Boutwell Grant, Ex-Commissioner, nor even a brother) has just been successful in receiving a patent for his blue light vegetable and animal stimulator, fructifier, and panacea. Not an unpleasant entertainment, on the evening of our national extended-eagle anniversary, are those blue lights that shoot upward so zealously, and then suddenly vanish without even a tail to tell their story. The discussion, of the scientific and unscientific features of the blue light process. belongs to some other column of your paper, but you may be pleased to note the breadth of the inventor's views and the modesty of his expectations, as appear in the "breadth" of his original claim, which reads, we are informed, very nearly as follows: "I claim the use of the combined natural light of the sun in combination with the transmitted blue or electric light of the sky, to the growth of the animal kingdom of nature, to the growth of fruits, vines, flowers, plants, vegetables, etc , and to the cure of diseases in men and animals."

The term "combined natural" is good, being both scientific and complimentary to his solar majesty; and the discovery of the new dynamics of the sky in transmitting light deserves of itself a patent, with a seven years' extension thrown in. The examiner, in his treatment of the case, well observes that the applicant cannot properly claim the use of the unchanging forces of nature, and such a monopoly could not be granted. He can only claim new and useful devices for applying and controlling the powers of nature. The patent granted contains two clauses of claims, one for the method of utilizing the solar rays, another for the construction of buildings for the above purpose. The method consists solely, as far as we can discern, in combining the sunlight with the blue light by transmitting the solar rays through alternate portions of clear glass, and blue, purple, or violet colored glass, and the construction of the conservatory consists in making the roof and sides of such alternate portions of glass. What will the scientific men, who for many years have experimented in the most elaborate and thorough manner to ascertain the chemical effects of the constituent colored solar rays on vegetable life, say to this patent? In a published paper read before the Philadelphia Agricultural Society, Mr. Pleasonton says:

"If" (a brief but sensible preface, that word if), "by the combination of sunlight and blue light from the sky, you can mature quadrupeds in twelve months with no greater supply of food than would be used for an immature animal in the same period, you can scarcely conceive of the immeasurable value of this discovery to an agricultural people. You would no longer have to wait five years for the maturity of a colt; and all your animals could be produced in the greatest abundance and variety. In regard to the human family, its influence would be wide spread—you could not only in the temperate regions produce the early maturity of the tropics, but you could invigorate the constitutions of invalids, and develop in the young, a generation, physically and intellectually, which might become a marvel to mankind. Architects would be required to so arrange the introduction of these mixed rays of light into our houses, that the occupants might derive the greatest benefit from their influence. Mankind will then not only be able to live fast, but they can live well and also live long."

Mr. Pleasonton's faith in blue light is such that the address referred to is printed on blue paper, "to relieve," as he says, "the eyes of the reader from the great glare from white paper;" and he expresses the hope of seeing "this colored paper introduced for all books and periodicals.' The effect of blue light on the human brain should be his next theme.

‡

The Approaching Solar Eclipse.

An eclipse of the sun will occur, on the eleventh of next December, which will be visible as a total one in India, Ceylon and Australia. Preparations are being made to observe the astronomical event in a manner worthy of its great scientific importance. The British men of science are already commencing energetic action to make the most of the occasion. The Astronomer Royal is superintending the adaptation of instruments already in his possession for use in his chosen locality in India. The President of the Royal Society has arranged to have instruments of the newest and most approved kind sent to Australia. The President of the Scientific Association at the recent meeting stirred up the members to vigorous action in order to gain all possible knowledge from the solar phenomenon. The Royal Society of New South Wales is organizing an expedition to Cape Sidmouth to observe the event, and it is expected that a staff of observers from England, will take possession of a fitting position in Ceylon. Government is to be petitioned for the means, which it will not fail to grant, and much enthusiasm and interest prevail among the British men of science, who are determined to utilize the solar ecclipse to add largely to the knowledge of solar physics. We are sure that our American astronomers, who earned great distinction by their observations during the last two solar eclipses, will not be behind the European co-workers in doing all that can be done to aid the cause.

MILK STATISTICS.—Sixteen quarts of pure milk are required to make one pound of butter, and 10 quarts to make one pound of cheese. When butter is 40 cents per pound, and cheese 11 cents: one pound of butter equals in value 16 quarts of milk and returns 2½ cents per quart to the dairyman. But one pound of cheese from 10 quarts of milk only gives him $1\frac{1}{11}$ cents per quart for the milk.

Improved Railroad Rail Joint, with Nut Locking Chair.

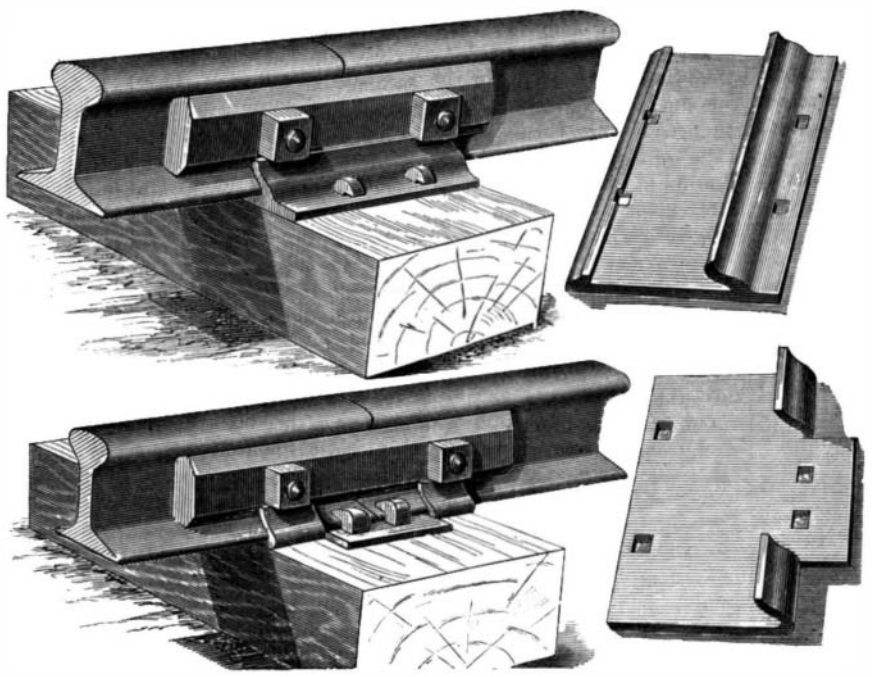
The object of the invention illustrated in the accompanying engraving, is the locking of the nuts of railroad fished joint bolts, by the prolongation inwards and upwards of the lip or lips of the chair, near to or against one or more of the horizontal, inclined, or vertical sides of the nuts, and to furnish also a better combination for a railroad rail joint fastening than has hitherto been used.

The views show the outer or nut side of the joint, and the method of locking the nuts of the bolts, by means of the lip or lips of the chair, and also the form of the chairs. One view is of a joint with a plate chair, with a lip under each nut; the middle portion being turned down upon the crosstie and punched to receive the spikes. The other view is of the joint with a form for a rolled iron chair, with a continuous lip, and a flange, resting upon the tie, punched for the spikes. The two forms of chair, one of plate and the other of rolled iron, are shown separately.

Many other forms of chairs may be made, if desired, of plate, rolled or cast iron to fit and lock any form of nuts, whether square, hexagonal, octagonal, oval, etc,, in any position in which they may be placed when screwed up.

By prolonging the lip or lips of the chair upwards between the nuts, or under and between them—the chair being spiked down firmly to the crosstie—the chair will hold the rail from "creeping," without slotting the rail, which is desirable for steel rails.

The fish plate on the nut side of the joint is made without a groove, to avoid the use of washers under the nuts. Upon the opposite side the fish plate is channeled to receive the heads of the bolts, and prevent them from turning when the nuts are screwed up.



BAYLEY'S RAILROAD RAIL JOINT, WITH NUT LOCKING CHAIR.

It is generally conceded that the fished or bolted rail joint is the best joint known, but, unless the bolt nuts are locked securely and permanently, they will work loose, and as the value and safety of the joint depends upon the plates being held firmly against the sides of the rail, the working loose of the nuts destroys, or very much impairs, the bolted joint. With the nuts locked perfectly and permanently, the bolted joint is the best joint known; without it, it is no better than, if at good as, some others.

As the fished joint is weaker than the rail itself, it should have a bearing upon the crosstie or sleeper; for any settling of the joint bends the plates, strains the bolts, and tends to force off or loosen the bolt nuts. The joint should rest in a chair of plate or rolled iron, to prevent the rail ends from being pounded into the sleeper by the wheels passing over them, and to prevent the hammering of the ends of the rails, in consequence of one end settling, under the load, below the level of the other. By locking the nuts by means of the lip of the chair, it is claimed, the joint is rendered perfect with the least number of parts possible, easy of manufacture, strong, durable, and cheap.

With the joint on the tie or sleeper, and in the nut locking chair described, the outer pair of bolts, commonly used for bolted joints, are unnecessary. The saving of the cost of these two bolts, and of the extra length of plates required for them, will more than equal the cost of the nut locking chair. It is claimed, therefore, that this joint can be furnished considerably cheaper, while it is much better and more reliable, and will last much longer than the four bolted fish joint now generally used.

It is claimed that this nut locking chair can be used for four bolted fish joints already laid down, to great advantage, for if the nuts of the two inner bolts are securely locked by means of it, the joint is safe, and there will be but little, if any, strain upon the outer bolt nuts to force them off; in point of fact the rail joint will be equally strong without them.

The use of a two bolt joint and the nut locking chair permits an increase of the section of the fish plates and the size of the bolts, if desired, and thus strengthens the joint, at a cost still considerablcy less than the ordinary four bolt joint.

Several of the best railroads in this country have used the chair with the bolted joint, and one of the very best—the Cleveland and Erie—has used the two bolt joint with a chair; but not with a nut locking chair. This alone, it is claimed, was needed to make the joint perfect, and the advantages to be gained, by so locking the nuts of the fish plate bolts, are manifest. We are informed that some important railways will soon introduce this joint, which has met with the approval of experienced railroad engineers.

The improvement is the subject of two patents, granted to G. W. R. Bayley, of Algiers, La,, dated December 29, 1868, and March 2, 1869.

For further information address G. W. R. Bayley, Chief Engineer, New Orleans, Mobile, and Texas Railroad, New Orleans, La.

Awful Fate of a Balloonist.

At Paoli, Orange county, Ind., recently, Professor Wilbur made arrangements for a balloon ascension, accompanied by George H. Knapp, editor of the *Orange County Union*. As they were about getting into the balloon, the cord gave way, and they made a spring for the car, but only succeeded in grasping the ropes. As the balloon rose, Mr. Knapp let go, and fell from a hight of about thirty feet without serious injury. Professor Wilbur held on, and attempted to climb into the basket; but was unable to do so and the balloon shot up rapidly with the aeronaut.

At a hight of about one mile, the doomed man let go his hold and came whirling to the earth. At the hight he had attained, he looked like a small sack about a foot long. As he approached the earth he was coming down feet foremost, then spread out horizontally, then doubled up, turned over, and then straightened out with his head downward. As he struck the earth, he fell upon his head and back. His head was crushed into an indistinguishable mass, and his body was bruised and crushed horribly. The body made a hole in the ground eight inches deep, and it rebounded four feet from where it struck.

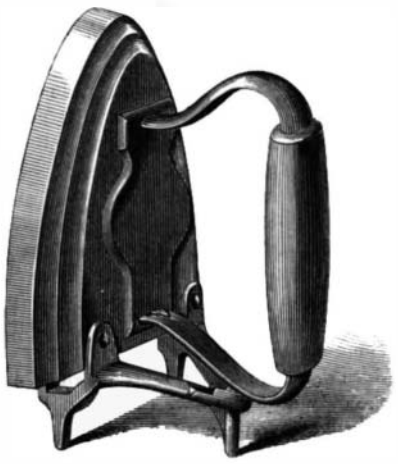
To add to the painful character of the accident, the Professor's young wife and little daughter were on the ground and witnessed the terrible affair.

COMBINED SADIRON AND STAND, AND COMBINED REVERSIBLE SADIRON AND POLISHING IRON.

The first named of these new inventions is shown in Fig. 1, and the second in Fig. 2.

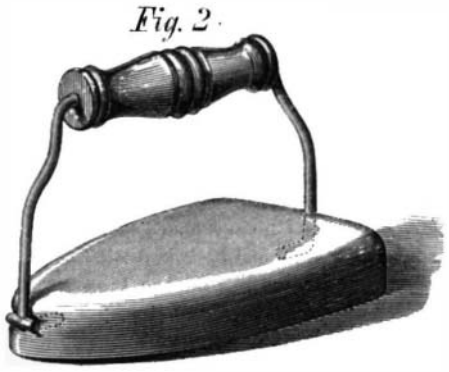
In the combined sadiron and stand, the stand is made separately, and riveted to the heel of the sadiron, so that the

Fig. 1



iron stands upright when resting on the stand. The stand consists of three legs—two for the heel and one for the handle—connected by two bows of an approximately triangular shaped frame, having brackets extending under the end of the iron, each having a small stud on which the sadiron is seated. The frame is also provided with projections, extending up along the top side of the iron and riveted thereto.

Fig. 2



The stand is made of malleable iron or any other suitable material, and its attachment adds but a trifling amount to the cost of the iron.

By this manner of attaching the stand to the iron, the former is always with the latter, ready for use. It prevents the smooth face of the iron from being scratched or otherwise injured. The sadiron can be placed on any part of the table, while adjusting the clothes, and will retain its heat longer than when placed on a separate stand, which latter subtracts heat from the iron every time the two are brought into contact.

It is claimed that the attachment of the stand in no way interferes with the ironing, and that it will not, unless greatly overheated, burn the table when placed upon the latter in the manner described, as the supports are so slender in proportion to their length that they radiate off the heat before it is conducted through them to the table.

The combined reversible sad and polishing iron shown in Fig. 2, is very simple and easy to operate. The iron is provided with a spring handle which allows it to be reversed.

The flat face is used as an ordinary sadiron, and the rounded face, which is highly polished, as a polishing iron. This form prevents the polished side from becoming injured in heating the iron, as the flat face only is placed upon the stove or heater for this purpose.

Several reversible irons have been invented, but it is claimed that the one herein described is the most simple and the cheapest yet devised, dispensing with all complications, catches, etc.

Patents for the above inventions have been secured in the United States and Europe. Any parties wishing to manufacture the same on royalty can obtain full particulars by addressing Myers Mauufacturing Company, 104 John street, New York.

Breeding Silkworms.

The doctrine of survival of the fittest is being enforced by the silk growers of Lombardy, who have adopted the cellular system of MM. Pasteur and Cantoin. Moths and eggs are both subjected to microscopical examination, and only the healthy are used for the purpose of perpetuating the race. This mode of inspection not only confines reproduction to the most vigorous specimens, but it insures the detection of the disease that has recently so virulently attracted the silkworms of northern Italy. Signor Cattaneo, of Milan, states that this disease is caused by the degeneration of the mulberry tree, and it seems that this opinion is well founded, as some trees grown from seed imported by that gentleman, from the north of China—the native land of the mulberry tree—are far more vigorous in growth than the white mulberry tree common in Italy; and their leaves contain much more of the resinous substances which are the nutriment of the worm, and from which the silk is produced. If Signor Cattaneo's view be a correct one it will be necessary to import seed into Europe to re-invigorate the plantations, which are the chief subsistence of the silk worms. Our silk growers of the West will find it interesting as well as profitable to bestow attention on this subject.

Plants in Bedrooms.

Dr. J. H. Hanaford, in *The Household*, says that the idea that plants throw off nitrogen in the night to an extent to prove injurious, in any material degree, may have had its origin in the vagaries and speculations of some medical theorists, utterly forgetful of an over-ruling Providence who makes no blunders of this kind. These plants have their labor to perform, so to speak, and we need not trouble ourselves about that, but simply regard all as right.

While the breathing of every living creature, the combustion of fuel, etc., are constantly destroying the oxygen of the air, leaving an excess of nitrogen, the other element of air, (the two gases, oxygen and nitrogen, making pure air,) some means of restoring these relations would seem necessary This is done by the vegetable creation, the leaves of plants, like lungs, absorbing this gas, and throwing off the oxygen or restoring the purity of the air.

The animal creation and combustion thus furnish carbon in the form of carbonic acid gas to the vegetable, while the vegetable creation kindly returns to us the oxygen in a gaseous form, and the carbon in a solid, in the form of food; an arrangement with which we need not quarrel. This work is constantly going on, illustrative of the wisdom and the goodness of the Great Father. It is a matter of little importance whether this is in vast creation, on a grand scale, or in our sleeping rooms. It may be remarked that it would be possible to fill our rooms with various articles to an extent to leave too little room for air, and thus deprive ourselves of this necessity of life We can scarcely have too much of it, as it is our life to a greater extent than many suppose. But even if there might be some of the evils referred to, it does not follow that these rooms should be so closed at night as to exclude all of the outward air or prevent the escape of a large amount of carbonic gas, or supposed excess of nitrogen from the plants. The breathing will leave such an excess, even with no plants in the room, which should be allowed to escape.

Such sleepers have more occasion to fear this deadly gas, constantly produced by breathing, than the "night air," so foolishly dreaded.

In short, while our sleeping rooms are so often too small, it may be advisable to have our plants in some other room, with open doors, that they may aid in purifying the air. We may rest assured that they will do us far more good than harm; that this law of compensation is in active operation all around us, and is merely another term for the goodness of the Creator.

TO VIOLIN PLAYERS.—A correspondent, Mr. J. R. Little, of Monmouth, Ill,, suggests the use of chalk on the fingers of the left hand to prevent their slipping on the strings. Chalk will undoubtedly answer this purpose, and may be found useful to performers whose hands are subject to perspiration.